University of Kentucky
Facilites Management
Office of the Vice President

October 2, 2024

Ms. Stacie Daniels
Kentucky Division for Air Quality
Permit Review Branch, Combustion Section
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

Submitted via eForms

RE: Title V Renewal Application: V-18-052 R1
University of Kentucky
Agency Interest: 1104

Dear Ms. Daniels:

The University of Kentucky (UK) is an educational institution in Lexington, KY, which owns an adjacent source, UK Good Samaritan Hospital (Samaritan Hospital), regulated as a single major source under the Title V permit program (herein referred to collectively as UK) and operates in accordance with Title V permit V-18-052 R1, originally issued on April 2, 2020 by the Kentucky Division for Air Quality (KDAQ) and revised on October 3, 2021. The permit expires on April 2, 2025, thus, pursuant to permit condition G.2.a, a complete renewal application is being submitted herein at least six months prior to the expiration date.

APPLICATION SUMMARY

Pursuant to 401 KAR 52:020, permit applications shall include the information required by Section 5 of the regulation in the manner described in Section 4. Section 4(2)(c) further specifies that applications for permit renewals shall provide only the information that is new or different from the most recent source-wide permit application and certification by a responsible official. The information required for permit applications is provided in Attachment B DEP7007AI form, including the responsible official certification. Any information that is new or different from the last source-wide application is provided in the Attachment B Forms and Attachment C Emissions Calculations for all previously submitted Off-Permit or Section 502(b)(10) Change notifications.

401 KAR 52:020, Section 6(2) specifies that permit renewals must include descriptions for all insignificant activities, list all applicable requirements for each insignificant activity, but not be required to provide detailed emissions estimates for insignificant activities. UK is meeting this requirement through submission of DEP7007DD form, included in Attachment B. Emission calculations for new or modified emission units are included in Attachment C.

The remainder of this application letter includes a brief description of the operations at UK, summary of recent permit actions, a summary of any new or revised applicable requirements, and requested permit changes.

An aerial image that shows the layout of the UK and Samaritan hospital facilities is provided in Attachment A. The DEP 7007CC form was provided to KDAQ in January of 2023 – as part of the annual compliance certification – and is not duplicated in this application.

FACILITY DESCRIPTION

The University of Kentucky is classified under Standard Industrial Code (SIC) 8221 for Colleges, Universities, and Professional Schools, and the Main Campus also includes UK HealthCare, which includes the hospitals and clinics of the University of Kentucky and adjacent Samaritan Hospital.

The majority of emission sources at UK are boilers and emergency generators, combusting natural gas, diesel, and coal. A summary of the emission units present, inclusive of any recent permit actions to be incorporated during permit renewal are shown below:

- Significant Emission Units
  - 10 dual-fuel natural gas and diesel-fired boilers
  - 4 coal-fired boilers
    - The coal-fired boilers are controlled by cyclones with efficiencies of 92% for Emission Units 7 and 8 and 94.5% for Emission Unit 13.
  - 25 natural gas-fired boilers
  - 85 diesel-fired emergency use generators
  - 14 natural gas-fired emergency use generators
  - 2 gasoline dispensing facilities from underground storage tanks
  - 2 maintenance shop paint spray booths with a permitted operating rate of 2.0 gallons per hour

- Insignificant Activities
  - UK operates various insignificant activities including a Cabinet Shop cyclone separator, storage tanks, laboratory hoods, small boilers and heaters, paint spray booths, TSD consolidation, brewery, and fermentation activities.

PERMIT ACTIONS SUMMARY

Since the most recent permit revision on October 3, 2021, several Off-Permit and Section 502(b)(10) Change notifications have been submitted. UK is requesting that the changes associated with these permit actions be incorporated into the renewal permit. The changes are summarized in Table 1.

APPLICABLE REGULATIONS SUMMARY AND UPDATES

The following subsections discuss the applicability of regulatory requirements to the affected source, including any changes to applicability or requirements since the V-18-052 R1 was issued.

Source Status

With respect to the federal NSR permitting program, incorporated into the Kentucky State Implementation Plan (SIP) under 401 KAR 51:017 to implement the federal requirements of 40 CFR 51.166 or 52.21, UK is a major stationary source due to it having potential emissions greater than a major source threshold (100 tpy for sources on the "list of 28 source categories") for the following regulated air pollutants: nitrogen oxides (NOx), sulfur dioxide (SO_2) and carbon monoxide (CO). Similarly, the above pollutant emission rates also qualify the source a major source for Title V permitting.

Unrestricted hazardous air pollutant (HAP) emissions would qualify the site as a major HAP source; however, UK has taken voluntary restrictions of total combined HAP <22.5 tpy and each individual HAP <9 tpy. As a result, the site is synthetic minor for HAP and subject to area source NESHAP standards.

Table 1. Permit Actions Since V-18-052 R1

Activity Type	Submittal Dates	EUs Added	EUs Removed
Title V-off Permit Change	6/14/2022	**EU88** - 69 hp Diesel Emergency Generator (Distillery)	N/A
502(b)(10) Change	10/12/2022	**EU89** - 1114 hp Diesel Emergency Generator (Samaritan Hospital) **EU90** - 729 hp NG Emergency Generator (Reynolds bldg #1)	N/A
502(b)(10) Change	6/12/2023 Replaced by 10/10/2023	**EU91** - 903 HP Diesel Emergency Generator (Sanders-Brown bldg 0230)	**EU54-07** - Cummins 587 HP Emergency Generator (Removed from Sanders-Brown) **EU56-03** - Caterpillar 434 HP Emergency Generator (Removed from Sanders-Brown to trailer for portable use - not stationary)
502(b)(10) Change	7/27/2023 Replaced by 10/10/2023	**EU92** - 237 HP Diesel Emergency Generator (Pence Hall bldg 0041)	N/A
Title V-off Permit Change	10/10/2023	**EU93** - 757 HP Diesel Emergency Generator; (Memorial Coliseum bldg 0019) **EU94** - 762 HP Diesel Emergency Generator (Parking Structure #8) **IA11 -** Additional <1 MMBtu/hr heater (Bosworth Hall bldg 0652)	**EU59-13** - 94 HP Emergency Generator (Removed from Memorial Coliseum) **EU57-11** - 1.3 MMBtu/hr Boiler (Removed from Bosworth Hall)

Compliance Assurance Monitoring

40 CFR 64 establishes Compliance assurance monitoring (CAM) requirements. This regulation is applicable to pollutant specific emission units (PSEUs) that are subject to an emission limitation, use control devices to achieve compliance, and have pre-control emissions that exceed a major source threshold. It has previously been determined that the emission units at the source are exempt from CAM since the only emission units using a control device operate a cyclone inherent to the units. No new PSEUs using control devices to meet a standard have been installed since the last renewal.

Federal Internal Combustion Engine (ICE) Regulations

40 CFR 63 Subpart ZZZZ – Reciprocating Internal Combustion Engines

NESHAP Subpart ZZZZ applies to new and existing reciprocating internal combustion engines. The requirements of this regulation are already incorporated into V-18-052 R1; however, additional applicability is discussed for newly installed emergency generator engines, as shown in the DEP7007V forms in Attachment B, from recent permit actions to be incorporated into the permit at renewal. Emission Units 60, 61, 62, 67, 68, 69, 70, 71, 72, 75, 76, 77, 79, 80, 81, 85, 86, and proposed 88, 89, 90, 91, 92, 93, 94 are subject to NSPS Subpart ZZZZ. Emission Units 53, 54, 55, 56, 59, 63, 64, 65, 66 and 78 are not subject as they are classified as existing institutional emergency stationary RICE located at an area source of HAP emissions. In general, new emergency generator engines comply with NESHAP Subpart ZZZZ via compliance with New Source Performance Standard (NSPS) Subpart IIII or Subpart JJJJ, as applicable.

40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII applies to owners, and operators of stationary compression ignition internal combustion engines for which construction commences after July 11, 2005, where the stationary compression ignition internal combustion engines are either manufactured after April 1, 2006, and are not fire pump engines, or are manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006. Additionally, stationary compression ignition internal combustion engines are subject if the owners and operators modify or reconstruct the engines after July 11, 2005. The requirements of this regulation are already incorporated into V-18-052 R1; however, additional applicability is discussed for newly installed emergency generator engines, as shown in the DEP7007V forms in Attachment B, from recent permit actions to be incorporated into the permit at renewal. Emission Units 60, 61, 62, 67, 68, 69, 70, 71, 75, 76, 77, 79, 81, 85, and proposed 88, 89, 91, 92, 93, and 94 are subject to NSPS Subpart IIII. Emission Units 53, 54, 55, 56, 59, 63, 64, 65, and 66 are not subject as construction commenced prior to July 11, 2005.

40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

NSPS Subpart JJJJ applies to owners and operators of stationary spark ignition internal combustion engines which construction commences after June 12, 2006, where the stationary spark ignition internal combustion engines are either manufactured on or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 hp (except lean burn engines with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp), on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 hp and less than 1,350 hp, on or after July 1, 2008, for engines with a maximum engine power less than 500 hp, or on or after January 1, 2009, for emergency engines with a maximum engine power greater than 25 hp. Emission Units 72, 80, and proposed 90 are subject to NSPS Subpart JJJJ. Emission unit 78 is not subject as the engines are all emergency engines manufactured prior to January 1, 2009.

2022 ICE Regulation Updates

On August 10, 2022, EPA published amendments to NSPS Subpart IIII, NSPS subpart JJJJ, and NESHAP Subpart ZZZZ to reflect the 2015 court decision in Delaware Department of Natural Resources and Environmental Control v. EPA,[1] vacating 40 CFR 60.4211(f)(2)(ii) and (iii), 60.4243(d)(2)(ii) and (iii), and

[1] 785 F.3d 1 (D.C. Cir. 2015)

63.6640(f)(2)(ii) and (iii). UK's permit V-18-052 R1 includes a note referencing this court vacatur under each relevant "Applicable Regulations" heading in the permit. UK is requesting that this note be removed from the renewal permit in favor of updating the regulatory text in each permit section to match the updated regulation and eliminate the allowance for emergency engines to operate for demand response.

2024 ICE Regulation Updates

On August 16, 2024, the EPA finalized amendments to NSPS Subpart IIII, NSPS subpart JJJJ, and NESHAP Subpart ZZZZ to add electronic reporting requirements and to clarify and correct inadvertent and other minor errors in the Code of Federal Regulations. UK is requesting that KDAQ add the relevant electronic reporting requirements of 40 CFR 60.4214(f)-(i) and 40 CFR 60.4245(f)-(i) in the permit sections with NSPS Subpart IIII and JJJJ, respectively.

Other NESHAP Area Source Standards

40 CFR 63 Subpart JJJJJJ - Industrial, Commercial and Institutional Boilers at Area Sources of HAP Emissions

NESHAP Subpart JJJJJJ applies to each new, reconstructed, or existing affected source, located at an area source of HAP. The affected source includes the collection of existing and each new or reconstructed industrial, commercial or institutional boilers within a subcategory listed in 40 CFR 63.11200. Emission Units 1, 2, 7, 8, 9, 10, 13, 15, 16, 51, 83, and 84 are subject to NESHAP Subpart JJJJJJ. Applicability and requirements are already included in permit V-18-052 R1; however, UK is seeking to remove or revise the following permit conditions that include non-applicable regulatory requirements.

EU01, 02, 15, 16, 09, 10, 51, 82, 83, 84, Permit Section B.5.h.5, B.5.d.5, or B.5.f.5
The recordkeeping requirement of 40 CFR 63.11225(c)(6) does not apply to these boilers and the permit conditions should be removed from the permit. These boilers are not equipped with monitoring equipment requiring inspection under 40 CFR 63.11221 nor are they subject to an emission standard or operating limit in Tables 1 & 3 which would trigger monitoring requirements under 40 CFR 63.11222.

EU15, 16, 09, 10, 51, 82, 83, 84 Permit Section B.5.h.2, B.5.d.2, or B.5.f.d
The requirement to track fuel type for new oil-fired boilers does not apply to these boilers, which are classified as existing boilers. However, the referenced citation 40 CFR 63.11225(c)(2)(iii) does apply. Thus, these permit conditions should be revised to state "The permittee must keep a copy of the energy assessment report."

EU02, 02, Permit Section B.5.h.2
The regulatory citation for the requirement to track ultra-low sulfur fuel for new oil-fired boilers should be revised from 40 CFR 63.11225(c)(2)(iii) to 40 CFR 63.11225(c)(2)(iv).

EU07, 08, Permit Section B.1.g
40 CFR 63.11201 does not apply because the boilers do not operate any controls which would require monitoring per Table 3, Item 5. The integral cyclones are not control equipment.

40 CFR 63 Subpart CCCCCC - Gasoline Dispensing Facilities

NESHAP Subpart CCCCCC (GACT 6C) regulates the loading of gasoline storage tanks at gasoline dispensing facilities (GDFs). Affected sources under GACT 6C include GDFs that are located at an area source of HAP. A GDF is defined as "any stationary facility which dispenses gasoline into the fuel tank of a motor vehicle, motor vehicle engine, nonroad vehicle, or nonroad engine." UK has determined that the two underground gasoline storage tanks, currently permitted as insignificant activities, IA2, are subject to GACT 6C. UK has reviewed historical gasoline throughput records for each of the two underground storage tanks / GDFs. The Cooling #2 GDF located in building 204 (proposed EU95) was confirmed that the monthly throughput, on 365-day average basis is less than 10,000 gallons per month of gasoline. At this throughput level, only the requirements for 40 CFR 63.11116 are applicable, as follows:

- UK must not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Measures to be taken include, but are not limited to, the following:
  (1) Minimize gasoline spills;
  (2) Clean up spills as expeditiously as practicable;
  (3) Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use;
  (4) Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators.

- UK is not required to submit notifications or reports as specified in 40 CFR 63.11125, 40 CFR 63.11126, or subpart A of Part 63; however, records must be available within 24 hours of a request by KDAQ to document gasoline throughput.

The Agricultural Motor Pool GDF located in building 88 (proposed EU96) has a monthly throughput greater than 10,000 gallons per month but less than 100,000 gallons per month, on a 365-day average. At this throughput level, the requirements listed above for 40 CFR 63.11116 are applicable, as well as the following requirements from 40 CFR 63.11117 as follows:

- Only load gasoline by utilizing a submerged fill pipe, as specified in 40 CFR 63.11117(b)(1)-(3)
- Have records available within 24 hours of a request by KDAQ to document gasoline throughput.
- You must submit the initial notification and NOCS as required under § 63.11124(a).

UK would like to add the requirements of this regulation to the renewal permit. A DEP7007V form is included in Attachment B.

Other New Source Performance Standards

40 CFR 60 Subpart Db – Industrial – Commercial – Institutional Steam Generating Units

NSPS Subpart Db standards of performance apply to Industrial-Commercial-Institutional Steam Generating Units, greater than 100 MMBtu/hr, and installed after June 19, 1984. Emission Units 1, 2, 15, and 16 are subject to NSPS Subpart Db. Applicability and requirements are already included in permit V-18-052 R1. UK is seeking to remove the following permit condition that includes non-applicable regulatory requirements.

EU09, 10, 82, Permit Section B.6.d
NSPS Subpart Db is not applicable to EUs 09, 10, and 82, thus the permit condition for annual capacity factor monitoring pursuant to 40 CFR 60.49b(d)(1) is not applicable.

40 CFR 60 Subpart Dc – Small Industrial – Commercial – Institutional Steam Generating Units

NSPS Subpart Dc applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989, and that has a maximum design heat input capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Emission Units 51, 83 and 84 are subject to NSPS subpart Dc. The applicable requirements of NSPS Dc are already fully detailed within permit V-18-052 R1 and no revisions are needed during renewal.

Kentucky Administrative Regulations

401 KAR 59:015 – New Indirect Heat Exchangers

401 KAR 59:015 applies to indirect heat exchangers with a capacity greater than 1 MMBtu/hr and less than 250 MMBtu/hour and which commenced after April 9, 1972, and to indirect heat exchangers with a capacity greater than 250 MMBtu/hr and which commenced after August 17, 1971. The applicable requirements of 401 KAR 59:015 are already fully detailed within permit V-18-052 R1 and no revisions are needed during renewal.

401 KAR 61:015 – Existing Indirect Heat Exchangers

401 KAR 61:015 applies to indirect heat exchangers with a capacity greater than 1 MMBtu/hr and less than 250 MMBtu/hour and which commenced on or before April 9, 1972, and to indirect heat exchangers with a capacity greater than 250 MMBtu/hr and which commenced on or before August 17, 1971. The applicable requirements of 401 KAR 61:015 are already fully detailed within permit V-18-052 R1 and no revisions are needed during renewal.

401 KAR 59:010 – New Process Operations

401 KAR 59:010 applies to new process operations and establishes particulate and visible emissions standards. The applicable requirements of 401 KAR 59:010 are already fully detailed within permit V-18-052 R1 and no revisions are needed during renewal.

REQUESTED PERMIT REVISIONS

Emissions Units to Add

- Add the following EUs to Section B "Emission Units 60–62, 67, 68, 69, 70, 71, 75, 76, 77, 79, 81-1, 81-2, 85 and 86: Nineteen Diesel-Fired Emergency Generators"
  - EU88 - 69 hp Diesel Emergency Generator (Distillery)
  - EU89 - 1114 hp Diesel Emergency Generator (Samaritan Hospital)
  - EU91 - 903 HP Diesel Emergency Generator (Sanders-Brown bldg 0230)
  - EU92 - 237 HP Diesel Emergency Generator (Pence Hall bldg 0041)
  - EU93 - 757 HP Diesel Emergency Generator (Memorial Coliseum bldg 0019)
  - EU94 - 762 HP Diesel Emergency Generator (Parking Structure #8)

- Add the following EUs to Section B "Emission Units 72 and 80: Four Natural Gas-Fired Emergency Generators"
  - EU90 - 729 hp NG Emergency Generator (Reynolds bldg #1)

Emissions Units to Remove

- Remove the following three generators from Section B " Emission Units 53, 54, 55, 56, 59, 63, 64, 65 and 66: Sixty-Three Diesel-Fired Emergency Generators"
  - EU54-07 - Cummins 587 HP Emergency Generator (Removed from Sanders-Brown)
  - EU56-03 - Caterpillar 434 HP Emergency Generator (Removed from Sanders-Brown bldg. 230)
  - EU59-13 - 94 HP Emergency Generator (Removed from Memorial Coliseum bldg. 19)

- Remove the following one boiler from "Section B Emission Units 20-21 and 57: Natural Gas-Fired Indirect Heat Exchangers"
  - EU57-11 - 1.3 MMBtu/hr Boiler (Removed from Bosworth Hall)

Other Requested Changes to Title V Permit

Changes are requested to the existing Title V permit to reflect the additions and deletions of emissions units noted above, the regulatory changes addressed for ICE, and the following additional changes:

- Remove the applicability of 401 KAR 63:010 to insignificant activity IA-14 fermenters. Pursuant to an email from Stacie Daniels (KDAQ) to Andrea Smith (UK) on December 15, 2023, the Division no longer considers fermenter emissions to be fugitive.

- Update the table of emissions limits on page 82 of 102 of permit V-18-052 R1 in accordance with the email exchange between Stacie Daniels (KDAQ) and Andrea Smith (UK) on March 15 and 16, 2023. EU72 and EU80-3 are each greater than 130 HP, while EU80-1 and EU80-2 are each less than 130 HP, so they applicable standards pursuant to Table 1 of NSPS Subpart JJJJ should be swapped for CO and VOC, as shown below in redline-strikeout of permit page 83 excerpt.

EU #	NO_x+HC g/HP-hr	NO_x g/HP-hr (ppm @ 15% O_2)	CO g/HP-hr (ppm @ 15% O_2)	VOC g/HP-hr (ppm @ 15% O_2)
72	N/A	2.0 (160)	~~387~~ **4.0 (540)**	**1.0 (86)** ~~N/A~~
80 (80-1)	10	N/A	**387** ~~4.0 (540)~~	~~1.0 (86)~~ **N/A**
80 (80-2)	10	N/A	**387** ~~4.0 (540)~~	~~1.0 (86)~~ **N/A**
80 (80-3)	N/A	2.0 (160)	~~387~~ **4.0 (540)**	**1.0 (86)** ~~N/A~~

- Revise the permitting of the underground gasoline storage tanks (IA2) to reflect that these tanks are gasoline dispensing facilities (GDF) subject to 40 CFR 63 Subpart CCCCCC, and thus may no longer qualify as insignificant activities. UK is suggesting to add these tanks as EU95 and EU96 in Section B of the renewal permit.

- Add four additional natural gas-fired indirect heat exchangers (less than 1 MMBtu/hr each) to insignificant activity IA11, for a total of 17 heaters. One heater was included in the off-permit change submitted in October 2023. Three additional heaters will be installed in the upcoming months.

- Remove Permit Section B.7 for EU07, 08 since there is no control equipment associated with the boilers. The cyclones are integral process equipment.

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Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

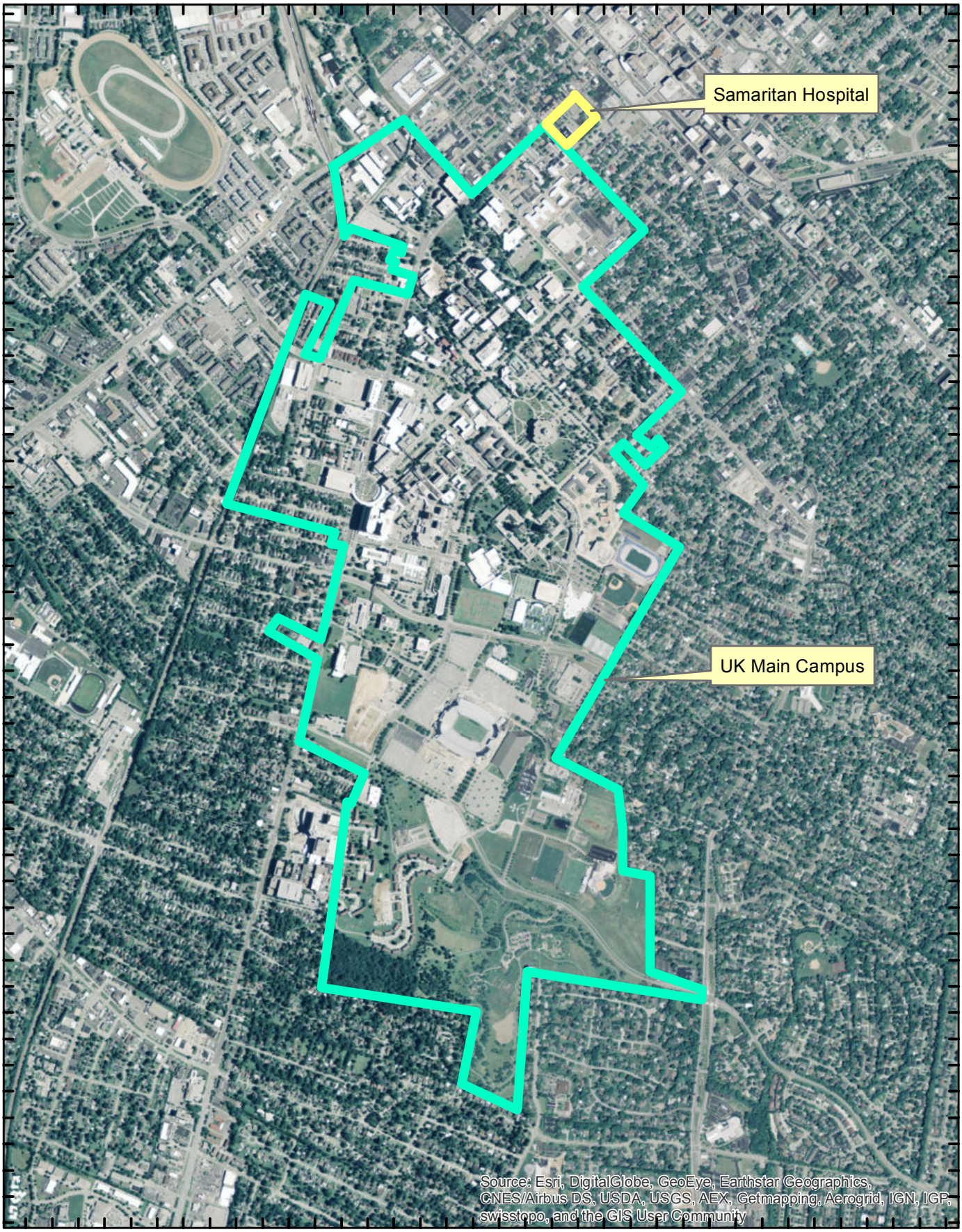
Mary S. Vosevich

Mary S. Vosevich
Vice President, Facilities Management
Chief Facilities Officer

Attachments

ATTACHMENT A – Facility Layout

UK - University of Kentucky
Locations of Main Campus and Samaritan Hospital



UTM Northing (m)

4,213,800
4,213,500
4,213,200
4,212,900
4,212,600
4,212,300
4,212,000
4,211,700
4,211,400
4,211,100
4,210,800
4,210,500
4,210,200
4,209,900
4,209,600

717,300 717,500 717,700 717,900 718,100 718,300 718,500 718,700 718,900 719,100 719,300 719,500 719,700 719,900 720,100 720,300 720,500 720,700

UTM Easting (m)

Coordinates reflect NAD83, Zone 16.

Trinity Consultants

ATTACHMENT B – DEP7007 Forms

B.1
DEP7007AI – Administrative Information
DEP7007DD – Insignificant Activities
DEP7007J - Gasoline Dispensing Facilities
DEP7007N - Emissions for Gasoline Dispensing Facilities
DEP7007V - Applicable Requirements for Gasoline Dispensing Facilities

B.2
Previously Submitted Forms for OPC and 502(b)10 Changes

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

None

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: Oct-24

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D. Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D. Peterson Service Bldg.				
	City:	Lexington	**State:**	KY	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: -84.50496 (decimal degrees) **Latitude:** 38.03895 (decimal degrees)

Primary (NAICS) Category: University **Primary NAICS #:** 611310

#

Classification (SIC) Category: University **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: The University of Kentucky is classified under Standard Industrial Code (SIC) 8221 for Colleges, Universities, and Professional Schools, and the Main Campus also includes UK HealthCare, which includes the hospitals and clinics of the University of Kentucky, and Samaritan Hospital. The majority of emission sources at are boilers and emergency generators, combusting natural gas, diesel, and coal.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: ~17,000

Approximate distance to nearest residence or commercial property: 40 ft **Property Area:** 600 acres **Is this source portable?** ☐ Yes ☐ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☐ Currently Hold	☐ Need	☑ N/A
RCRA:	☐ Currently Hold	☐ Need	☑ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☐ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☑ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual) N/A

Mailing Address:
Street or P.O. Box: 225 Frank D. Peterson Service Bldg.
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual) andrea.smith@uky.edu

Phone: (859) 218-6265

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: Same as Applicant
City: **State:** **Zip Code:**

Email:

Phone: (502) 218-6265

Air Permit Contact for Source

Name: Same as technical contact.

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**

City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position
State Owned University	

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☑ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	9 tpy (retain current limit)
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	22.5 tpy (retain current limit)
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☑ **No** **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- ☐ DEP7007A Indirect Heat Exchangers and Turbines
- ☐ DEP7007B Manufacturing or Processing Operations
- ☐ DEP7007C Incinerators and Waste Burners
- ☐ DEP7007F Episode Standby Plan
- ☑ DEP7007J Volatile Liquid Storage
- ☐ DEP7007K Surface Coating or Printing Operations
- ☐ DEP7007L Mineral Processes
- ☐ DEP7007M Metal Cleaning Degreasers
- ☑ DEP7007N Source Emissions Profile
- ☑ DEP7007P Perchloroethylene Dry Cleaning Systems
- ☐ DEP7007R Emission Offset Credit
- ☐ DEP7007S Service Stations
- ☐ DEP7007T Metal Plating and Surface Treatment Operations
- ☐ DEP7007V Applicable Requirements and Compliance Activities
- ☐ DEP7007Y Good Engineering Practice and Stack Height Determination
- ☐ DEP7007AA Compliance Schedule for Non-complying Emission Units
- ☐ DEP7007BB Certified Progress Report
- ☐ DEP7007CC Compliance Certification On file w KDAQ - Submited January 2024
- ☑ DEP7007DD Insignificant Activities
- ☐ DEP7007EE Internal Combustion Engines
- ☐ DEP7007FF Secondary Aluminum Processing
- ☐ DEP7007GG Control Equipment
- ☐ DEP7007HH Haul Roads
- ☐ Confidentiality Claim
- ☐ Ownership Change Form
- ☐ Secretary of State Certificate
- ☐ Flowcharts or diagrams depicting process On file w KDAQ
- ☐ Digital Line Graphs (DLG) files of buildings, roads, etc.
- ☐ Site Map On file w KDAQ
- ☑ Map or drawing depicting location of facility
- ☐ Safety Data Sheet (SDS)
- ☐ Emergency Response Plan
- ☐ Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Mary Vosevich
Authorized Signature

10/02/24
Date

Mary Vosevich
Type or Printed Name of Signatory

VP, Facilities Mgmt. & Chief Facilities Officer
Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

Division for Air Quality
300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: University of Kentucky

KY EIS (AFS) 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: Oct-24

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3… etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
IA01	Fuel Oil Storage Tanks	N/A	N/A	Negligible, <0.01 tpy VOC
~~IA2~~	~~Underground Gasoline Storage Tanks~~	~~N/A~~	~~N/A~~	Move to Section B
IA03	Laboratory Fume Hoods	N/A	N/A	Negligible
IA04	TSD Consolidation	N/A	N/A	<0.26 tpy VOC/HAP based on RCRA permit limit of 300hr/yr, 3 drums/hr, and worst-case emitting volatile as Chloroform
IA05	Transportation Research Center Spray Booth (Usage less than 5 gal/yr)	N/A	401 KAR 59:010	VOC/PM < 0.03 tpy, assuming 100% VOC or PM (max 10 lb/gal), usage <5 gal/yr

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
IA06	Arts and Visual Bldg. Paint Spray Booth (Usage less than 50 gal/yr)	N/A	401 KAR 59:010	VOC/PM < 0.25 tpy, assuming 100% VOC or PM (max 10 lb/gal)
IA07	TK-76 Fuel oil storage tank (300 gal)	TK-76	N/A	Negligible, <0.01 tpy VOC
IA08	Fifty-Seven hot water heaters 8.4 MMBtu/hr combined	Varies (57 units)	N/A	Highest single pollutant (NOx) = 3.61 tpy combined
IA09	Four gas-fired space heaters 0.54 MMBtu/hr combined	N/A	N/A	Highest single pollutant (NOx) = 0.23 tpy combined
IA10	One gas-fired furnace 0.08 MMBtu/hr	N/A	N/A	Highest single pollutant (NOx) = 0.03 tpy combined
IA11	**Seventeen** natural gas heat exchangers under 1 MMBtu/hr each	N/A	N/A	Highest single pollutant (NOx) < 0.43 tpy each
IA12	#2 Diesel Fuel Cylinder tank and vehicle fueling, underground (2 tanks)	Bldg 490 #2 Cooling Diesel Fueling Tank; Bldg 88 Ag Motor Diesel Fueling Tank	N/A	Negligible, <0.01 tpy VOC per AP-42 Section 5.2 and weekly tank turnovers
IA14	Grain Handling Operations (2.1 tons/hr)	N/A	401 KAR 59:010 401 KAR 63:010	PM = 0.112 tpy
IA15	Six 500-Gallon Fermenters	N/A	401 KAR 63:010	VOC = .00113 tpy
IA16	Aging Facility (952 bbl/yr)	N/A	401 KAR 63:010	VOC = 3.28 tpy

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

Mary A. Vosevich — **Authorized Signature**

10/02/24 — **Date**

By:

Mary Vosevich — **Type/Print Name of Signatory**

VP, Facilities Mgmt. & Chief Facilities Officer — **Title of Signatory**

Section DD.3: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007J

Volatile Liquid Storage

___ Section J.1: General Information

___ Section J.2: Tank Description

___ Section J.3: Gasoline Plants and Terminals

___ Section J.4: Loading Rack(s)

___ Section J.5: Equipment Leaks

___ Section J.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ SDS attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: Oct-24

Section J.1: General Information

Emission Unit #	Emission Unit Name	Emission Unit Description	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date of modification/ reconstruction	Control Device ID	Stack ID
EU95	Storage Tank (EU85)	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal			N/A	
EU96	Storage Tank (EU86)	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal			N/A	

Section J.2: Tank Description

Emission Point #: EU 95 and EU 96

Emission Point Name: Cooling #2 Gasoline Dispensing Facility (GDF) and AG Motor Pool Gasoline Dispensing Facility (GDF)

Tank ID#: NA

Date Installed:

List Applicable Regulations: 40 CFR 63 Subpart CCCCCC

J.2A: Stored Liquid Data:

Single or Multi-Component Liquid Name(s)	Maximum Annual Throughput *(gal/yr)*	Liquid Density *(lb/gal)*	Molecular Weight of Single or Multi-Component Liquid	Percent Composition of Multi-Component Liquid(s)	Temperature *(°F)*		Vapor Pressure *(psia)*	
					Minimum	Maximum	Minimum	Maximum
Gasoline (EU 95)	<120,000	5.60	92.00		50	60	RVP 13 typical	
Gasoline (EU 96)	<1,200,000	5.60	92.00		50	60	RVP 13 typical	

J.2B: Tank Data:

Tank Capacity: *(gallons)* 10,000 **Shell Height/ Length:** *(ft)* 18 **Shell Diameter:** *(ft)* 10 **Tank Turnovers per Year:** 12

Tank Orientation: ☑ Horizontal ☐ Vertical If Vertical, provide Maximum Liquid Height: *(ft)* _____ Average Liquid Height: *(ft)* _____

Shell Color/Shade: ☐ Red ☐White ☐ght Gray ☐Medium Gray ☐luminum Specular ☐luminum Diffuse ☑her: ____ Underground

Roof Color: ☐ Slack ☐White ☐ight Gray ☐Medium Gray ☐luminum Specular ☐luminum Diffuse ☑ther: ____ Underground

Tank Type: ☐ Fixed Roof ☐nternal Floating Roof ☐xternal Floating Roof ☐ressure Tank

J.2C: For Fixed Roof Tanks:

Roof Type: ☐ome ☐Flat ☐one **Dome/Cone Height:** _____ ft **Average Vapor Space Height:** _____ ft

Is Tank Underground? ☑ Yes ☐ No **Roof Condition:** ☐Good ☐Poor **Vacuum Setting:** _____ psig

Is Tank Heated?: ☐ Yes ☑ No **Shell Condition:** ☐Good ☐Poor **Pressure Setting:** _____ psig

J.2D: For All Internal Floating Roof Tanks:

Rim Seal Description: ☐ Vapor Mounted Primary ☐ Vapor Mounted Primary plus Secondary Seal ☐ Shoe Mounted
☐ Liquid Mounted Primary ☐ Liquid Mounted Primary plus Secondary Seal ☐ Shoe Mounted plus Secondary Seal

Secondary Seal: ☐ Rim Mounted ☐ Shoe Mounted ☐ None

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lin **External Shell Condition:** ☐ ood ☐ or

Roof Paint Condition: ☐ Good ☐ Poor **Self Supporting Roof?** ☐ Yes ☐ No

Number of Support Columns: _____ **Effective Column Diameter:** _____ ft

J.2E: Deck Data for Internal Floating Roofs:

Length of Deck Seam: _____ ft

Deck Type: ☐ Bolted ☐ Welded

Type of Deck Fitting: ☐ Access Hatch ☐ Ladder Well ☐ Sample Pipe ☐ Sample Well ☐ Vacuum Breaker
☐ Column Well ☐ Roof Leg ☐ Hanger Well ☐ Stub Drain ☐ Automatic Gauge Float Well

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover or fabric seal, adjustable or fixed roof leg/hanger well and number)

J.2F: For All External Floating Roof Tanks:

Rim Seal Description: ☐ Vapor Mounted Primary ☐ Vapor Mounted Primary Rim Secondary Seal ☐ Vapor Mounted Prmary with Weather Shield
☐ Liquid Mounted Primary ☐ Liquid Mounted Primary Rim Secondary Seal ☐ Liquid Mounted Primary with Weather Shield
☐ Shoe Mounted Primary ☐ Shoe Mounted Primary Rim Secondary Seal ☐ Shoe Mounted Primary Shoe Secondary

Internal Shell Condition: ☐ Light Rust ☐ Dense Rust ☐ Gunite-lined

Tank Type: ☐ Riveted ☐ Welded

Roof Type: ☐ Pontoon Roof ☐ Double Deck Roof

J.2G: Deck Data for External Floating Roof Tanks:

Type of Deck Fitting: ☐ Access Hatch ☐ Gauge Hatch ☐ Sample Well ☐ Roof Leg ☐ Vacuum Breaker
☐ Guide Pole ☐ Gauge Float ☐ Roof Drain ☐ Rim Vent ☐ Other

Design of each deck fitting:
(diameter sizes, bolted or gasket covers, sliding cover, unslotted or slotted guide pole well, adjusted or fixed roof leg and number of each design)

J.2H: Emissions Data:

Attach SDS/Composition Analysis for Each Component Listed

Process ID	Component Name	Process Name (e.g. Breathing, Working, Cleaning, Flashing Loss(es))	Lost Emissions *(lb/1000 gal)*	Frequency of Occurrence	Determination Methodology for Each Type of Loss*

Section J.3: Gasoline Plants and Terminals

Indicate the percentage of one or more of the following modes of transportation for incoming liquid and outgoing liquid:

	Tank Truck	Trailer	Railcar	Pipeline	Marine Tank	Barge	Other (Specify)
Incoming Liquid Material:	100%						
Outgoing Liquid Material:							No Outgoing Material

For Gasoline Dispensing Facilities (GDF) only:

Is the loading of gasoline storage tanks at a GDF located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☑ Yes ☐ No

Is there the dispensing of gasoline from a fixed storage tank at a GDF into a portable tank for the on-site delivery and subsequent dispensing into gasoline-fueled equipment? ☐ Yes ☑ No

Maximum monthly throughput in gallons: EU 95 - <10,000; EU 96 - <100,000

For Bulk Gasoline Plants Only:

Is the maximum calculated design throughput less than 20,000 gallons (75,700 liters) per day? ☐ Yes ☐ No

Is gasoline loaded into cargo tanks for transport to gasoline dispensing facilities? ☐ Yes ☐ No

For Bulk Gasoline Terminals Only:

Is the maximum calculated design throughput equal to or greater than 20,000 gallons (75,700 liters) per day? ☐ Yes ☐ No

Is the terminal located at an area source of hazardous air pollutants as defined in 40 CFR 63.2? ☐ Yes ☐ No

Does the facility load from marine tank vessel loading operations at all loading berths less than 1.6 billion liters (10 M barrels) of gasoline annually and of less than 32 billion liters (200 M barrels) of crude oil annually? ☐ Yes ☐ No

Does the terminal handle any reformatted or oxygenated gasoline containing methyl tertbutyl ether (MTBE), CF? ☐ Yes ☐ No

Indicate the type of vapor control device utilized: ☐ Incinerator ☐ Adsorber ☐ Other

Division for Air Quality

300 Sower Boulevard

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: Oct-24

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	1	GDF gasoline throughput	N/A	N/A	N/A	1.37E-02	VOC	24.20	AP-42 Section 5.2, Table 5.2-7	N/A	N/A	0.33	0.33	1.45	1.45
EU 95		1	GDF gasoline throughput	N/A	N/A	N/A	1.37E-02	Total HAP	5.59	AP-42 Section 5.2, Table 5.2-7, TankESP Speciation	N/A	N/A	0.077	0.077	0.336	0.336
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	1	GDF gasoline throughput	N/A	N/A	N/A	1.37E-01	VOC	20.00	AP-42 Section 5.2, Table 5.2-7	N/A	N/A	2.74	2.74	12.00	12.00
EU 96		1	GDF gasoline throughput	N/A	N/A	N/A	1.37E-01	Total HAP	4.62	AP-42 Section 5.2, Table 5.2-7, TankESP Speciation	N/A	N/A	0.633	0.633	2.774	2.774

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
95-1	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	1						
96-1	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	1						

Section N.4: Notes, Comments, and Explanations

Individual HAP composition and emission factors provided in Attachment C.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limita

___ Section V.2: Monitoring Req

___ Section V.3: Recordkeeping

___ Section V.4: Reporting Requ

___ Section V.5: Testing Require

___ Section V.6: Notes, Comments, and Explana

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: 45567

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	40 CFR 63.11115(a)	na	na	na	Operate and maintain any affected source in a manner consistent with safety and good air pollution control practices for minimizing emissions.	Follow standard operating procedures for tank loading and dispensing operations, including the applicable practices required by 40 CFR 63.11116.
EU 95		40 CFR 63.11116(a)	na	na	na	Minimize gasoline spills.	Follow standard operating procedures for tank loading and dispensing operations.
EU 95		40 CFR 63.11116(a)	na	na	na	Clean up spills as expeditiously as practicable.	Follow standard operating procedures for cleaning spills.
EU 95		40 CFR 63.11116(a)	na	na	na	Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use.	Follow standard operating procedures for tank loading and dispensing operations.
EU 95		40 CFR 63.11116(a)	na	na	na	Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices.	Follow standard operating procedures for tank loading and dispensing operations.

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	40 CFR 63.11115(a)	na	na	na	Operate and maintain any affected source in a manner consistent with safety and good air pollution control practices for minimizing emissions.	Follow standard operating procedures for tank loading and dispensing operations, including the applicable practices required by 40 CFR 63.11116.
EU 96		40 CFR 63.11116(a)	na	na	na	Minimize gasoline spills.	Follow standard operating procedures for tank loading and dispensing operations.
EU 96		40 CFR 63.11116(a)	na	na	na	Clean up spills as expeditiously as practicable.	Follow standard operating procedures for cleaning spills.
EU 96		40 CFR 63.11116(a)	na	na	na	Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use.	Follow standard operating procedures for tank loading and dispensing operations.
EU 96		40 CFR 63.11116(a)	na	na	na	Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices.	Follow standard operating procedures for tank loading and dispensing operations.
EU 96		40 63.11117(a)	na	na	na	Only load gasoline into storage tanks at your facility by utilizing submerged filling, as specified in paragraphs (b)(1), (b)(2), or (b)(3) of this section. The applicable distances in paragraphs (b)(1) and (2) shall be measured from the point in the opening of the submerged fill pipe that is the greatest distance from the bottom of the storage tank.	Tank design.

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	None	na	na	na
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	None	na	na	na

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	HAP	40 CFR 63.11116(b)	Gasoline Throughput	The permittee must have records available within 24 hours of a request by the Administrator to document gasoline throughput.
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	HAP	40 CFR 63.11117(d)	Gasoline Throughput	The permittee must have records available within 24 hours of a request by the Administrator to document gasoline throughput.
EU 96		HAP	40 CFR 63.11125(d)	Malfuctions	Records of the occurrence and duration of each malfunction of operation or the air pollution control and monitoring equipment.
EU 96		HAP	40 CFR 63.11125(d)	Malfunction Actions	Records of actions taken during periods of malfunction to minimize emissions in accordance with 40 CFR 63.11115(a), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	HAP	40 CFR 63.11111(e)	Gasoline Throughput	The permittee shall, upon request by the Administrator, demonstrate that their monthly throughput is less than the 10,000-gallon threshold level.
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	HAP	40 CFR 63.11111(e)	Gasoline Throughput	The permittee shall, upon request by the Administrator, demonstrate that their monthly throughput is less than the 10,000-gallon threshold level.
EU 96		HAP	40 CFR 63.11124(a)	Applicability and Compliance	Submit Initial Notification and Notification of Compliane Status.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU 95	Bldg 490 Cooling #2 Gasoline Dispensing Facility (GDF) Storage Tank (EU95) Capacity: 10,000 gal	None	na	na	na
EU 96	Bldg 88 AG Motor Pool Gasoline Dispensing Facility (GDF) Storage Tank (EU96) Capacity: 14,000 gal	None	na	na	na

Section V.6: Notes, Comments, and Explanations

ATTACHMENT B.2.1 – DEP7007 Forms

Forms Submitted With 06/14/2022 Off-Permit Change Notification

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: 14-Jun-22

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
88	69 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Catepillar	C25 D6	11/2022, est	20300101	1000 gal	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
88				100	0.49	25 69	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	8760		0.015

Section A.3: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 6/14/2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
88	69 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.00242	CO	34.13	mfg cert	0.00%	0.00%	0.0826	0.0826	0.3618	0.3618
								NO2	100.12	mfg cert	0.00%	0.00%	0.2423	0.2423	1.0612	1.0612
								PM10	6.6	mfg cert	0.00%	0.00%	0.0160	0.0160	0.0700	0.0700
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.0014	0.0014	0.0063	0.0063
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.1160	0.1160	0.5083	0.5083
								Benzene	0.1278	AP-42, 3.3-2	0.00%	0.00%	0.00031	0.00031	0.0014	0.0014
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00014	0.00014	0.0006	0.0006
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00009	0.00009	0.0004	0.0004
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00039	0.00039	0.0017	0.0017
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00025	0.00025	0.0011	0.0011

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00003	0.00003	0.0001	0.0001
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00006	0.00006	0.0002	0.0002
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	54.37	54.37	238.2	238.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
88	88 01	0.5	39.6				290 (cfm)	825	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V
Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: **University of Kentucky**
KY EIS (AFS) #: **21- 067-00003**
Permit #: **V-18-052 R1**
Agency Interest (AI) ID: **1104**
Date: **6/14/2022**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
88	Diesel Generator -69 HP (25 kW)	40CFR60, Subpart IIII (60.4205(b) & 4202(a)(2)) 40CFR1039, Appendix I	CO	3.5 g/KW-hr			Compliance demonstrated through recordkeeping of manufacturer testing.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
88	Diesel Generator -69 HP (25 kW)	CO	40CFR60, Subpart IIII (60.4209; 60.4211 (a)(1), (a)(2), (c), (f)); and 60.4214(b)	Monitor the hours of operation and reason for operation.	In accordance with 60.4209(a), the unit does not need to install a non-resettable hours meter. The engine will be operated and maintained by the manufacturer's instructions; change only those emission-related setting that are permitted by the manufacturer; and the engine has been certified to the emission standards. The engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4214 (b) monitor the hours of operation and reason for operation.
		NOx + HC	same	Monitor the hours of operation and reason for operation.	same
		PM	same	Monitor the hours of operation and reason for operation.	same
		SO2	same	Diesel sulfur content	Maintain bill of lading.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
88	Diesel Generator -69 HP (25 kW)	CO	40CFR60, Subpart IIII (60.4214(b))	The hours of operation and reason for operation.	Initial notification is not required and the emergency engine and meets the non-emergency engine standards so a non-settable hour meter is not required. Record the time of operation of the engine and the reason the engine was in operation during that time, 40 CFR 60.4214(b). Bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.
		NOx + HC	same	The hours of operation and reason for operation.	same
		PM	same	The hours of operation and reason for operation.	same
		SO2	same	Diesel sulfur content	Maintain bill of lading.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
88	Diesel Generator -69 HP (25kW)	CO	401 KAR 52:020, Section 22	Report fuel usage based on hours of operations for calendar year.	Submit necessary information to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same
					NOTE: Engine does not meet the requirements of 60.4211(f)(3)(i-iii) so the annual report in 60.4214(d), is not required.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
88	Diesel Generator -69 HP (25 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations

ATTACHMENT B.2.2 – DEP7007 Forms

Forms Submitted With 10/12/2023 502(b)(10) Change

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: **21-067-00003**

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: October 12, 2022

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
89	1114 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Catepillar	C27	3/2023, est	20300101	1000 gal	None	1
90	729 Hp Natural Gas Generator	1	Natural Gas	Emergency Generator		Generac	SG500	3/2023, est	20300201	MM ft^3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
89				100	7.04	750 1114	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.015
90				100	5.75	500 729	kW hp		Primary	Natural Gas	1020	Btu/ft^3	500		

Section A.3: Notes, Comments, and Explanations

A complete list of pollutant emissions and calculations is contained in the Air Emissions Calculation attachment.

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 12, 2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
89	1114 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.0536	CO	10.78	mfg cert	0.00%	0.00%	0.5778	0.5778	0.1445	0.1445
								NO2	226.32	mfg cert	0.00%	0.00%	12.1308	12.1308	3.0327	3.0327
								PM10	0.862	mfg cert	0.00%	0.00%	0.0462	0.0462	0.0116	0.0116
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.0319	0.0319	0.0080	0.0080
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	2.5701	2.5701	0.6425	0.6425
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00686	0.00686	0.0017	0.0017
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00300	0.00300	0.0008	0.0008
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00209	0.00209	0.0005	0.0005
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00867	0.00867	0.0022	0.0022
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00563	0.00563	0.0014	0.0014

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00068	0.00068	0.0002	0.0002
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00123	0.00123	0.0003	0.0003
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	1204.28	1204.28	301.1	301.1

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 12, 2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
90	729 Hp Nat. Gas Generator	1	Nat. Gas Usage	NA	NA	1	0.005862	CO	192.57	mfg cert	0.00%	0.00%	1.1288	1.1288	0.2822	0.2822
								NO2	9.63	mfg cert	0.00%	0.00%	0.0565	0.0565	0.0141	0.0141
								PM10	10.110	AP-42, 3.2-2	0.00%	0.00%	0.0593	0.0593	0.0148	0.0148
								SO2	0.6	AP-42, 3.2-2	0.00%	0.00%	0.0035	0.0035	0.0009	8.79E-04
								VOC	51.35	mfg cert (as worst case THC value)	0.00%	0.00%	0.3010	0.3010	0.0753	0.0753
								Benzene	0.45	AP-42, 3.2-2	0.00%	0.00%	0.00264	0.00264	0.0007	0.0007
								Toluene	0.42	AP-42, 3.2-2	0.00%	0.00%	0.00246	0.00246	0.0006	0.0006
								Xylene	0.19	AP-42, 3.2-2	0.00%	0.00%	0.00111	0.00111	0.0003	0.0003
								Formaldehyde	53.86	AP-42, 3.2-2	0.00%	0.00%	0.31573	0.31573	0.0789	0.0789
								Acetaldehyde	8.53	AP-42, 3.2-2	0.00%	0.00%	0.05000	0.05000	0.0125	0.0125

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	5.24	AP-42, 3.2-2	0.00%	0.00%	0.03072	0.03072	0.0077	0.0077
								CO2	112200	AP-42, 3.2-2	0.00%	0.00%	657.71640	657.71640	164.4291	164.4291

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
89	89 01	1.0, est	30, est				5612	949	
90	90 01	1.0, est	30, est				3188	1380	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
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DEP7007V
Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 10/12/2022

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
89	Diesel Generator 1114 HP (750 kW)	40CFR60, Subpart IIII (60.4205(b) & 4202(a)(2)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm
90	Nat. Gas Generator 729 HP (500 kW)	40CFR60, Subpart JJJJ (60.4243(d)(1-3) & 60.4233(d) Table 1 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	4.0 g/hp-hr			Per 60.4243(b)(1), engine emission are certified to the non-emergency emission standards of 60.4233(d). Record the hours of operation and fuel usage monthly.
		same	NOx + HC	2.0 g/hp-hr			Same
		same	VOC	1.0 g/hp-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
89	Diesel Generator 1114 HP (750 kW)	CO	40CFR60, Subpart IIII 60.4211(a)(1-2), (c), (f)) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the hours of operation and fuel usage monthly.	Since the engine emission are certified to the non-emergency emission standards (60.4214(c)), the unit does not need to install a non-resettable hours meter per 60.4209(a). Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. The engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Monitor the hours of operation and fuel usage monthly.	same
		PM	same	Monitor the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4243(d)(1-3); 60.4245(a)(2) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the hours of operation and fuel usage monthly.	Per 60.4245(a)(2), maintain maintenance records. Since the engine emission are certified to the non-emergency emission standards, the unit does not need to install a non-resettable hours meter per 60.4237(a) and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required (60.4245(b)). The engine will be operated and maintained by the manufacturer's instructions; change only those emission-related setting that are permitted by the manufacturer; and the engine has been certified to the emission standards. The engine qualifies as emergency in accordance with 60.4243(d)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note d(2)(ii-iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in d(3). Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Monitor the hours of operation and fuel usage monthly.	same
		VOC	same	Monitor the hours of operation and fuel usage monthly.	same

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
89	Diesel Generator 1114 HP (750 kW)	CO	401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the hours of operation and fuel usage monthly.	Per 60.4214(b), initial notification and a installation of a non-settable hour meters is not required since the engine emissions are certified to non-emergency standard. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Record the hours of operation and fuel usage monthly.	same
		PM	same	Record the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4245(a)(1-3) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the hours of operation and fuel usage monthly.	Per 60.4245(a)(1-3), maintain records of all notifications; maintenance records; and emissions certification. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis and the manufacturer's certified emissions certificate. Since the engine emissions are certified to non-emergency standards, 60.4245(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Record the hours of operation and fuel usage monthly.	same
		VOC	same	Record the hours of operation and fuel usage monthly.	same

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
89	Diesel Generator 1114 HP (750 kW)	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ (60.4245) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4245(c), not required. If performance tests listed V.5 are performed, submit the results per 60.4245(d). If engine becomes contractually obligated obligated to be available for more than 15 hours per year, report information of 60.4245(e). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		VOC	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
89	Diesel Generator 1114 HP (750 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4243(e)	NA	Generator emission standards not certified to propane so if propane is used for more than 100 hours per year, a performance test required to demonstrate compliance with the emission standards. No other testing required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	same	same	same
		VOC	same	same	same

Section V.6: Notes, Comments, and Explanations
None

ATTACHMENT B.2.3 – DEP7007 Forms

Forms Submitted With 06/12/2023 502(b)(10) Change

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: June 12, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Kohler	600REOZVB	06/2023, ordered	20300101	1000 gal	None	1

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: June 12, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Kohler	600REOZVB	06/2023, ordered	20300101	1000 gal	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
91				100	6.32	674 903	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.015

Section A.3: Notes, Comments, and Explanations
A complete list of pollutant emissions and calculations is contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 12, 2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
91	903 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.0427	CO	13.20	mfg cert	0.00%	0.00%	0.5636	0.5636	0.1409	0.1409
								NO2	181.10	mfg cert	0.00%	0.00%	7.7330	7.7330	1.9332	1.9332
								PM10	2.400	mfg cert	0.00%	0.00%	0.1025	0.1025	0.0256	0.0256
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.0254	0.0254	0.0064	0.0064
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	2.0475	2.0475	0.5119	0.5119
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00547	0.00547	0.0014	0.0014
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00239	0.00239	0.0006	0.0006
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00167	0.00167	0.0004	0.0004
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00690	0.00690	0.0017	0.0017
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00449	0.00449	0.0011	0.0011

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00054	0.00054	0.0001	0.0001
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00098	0.00098	0.0002	0.0002
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	959.38	959.38	239.8	239.8

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
91	91 01	1.0, est	30, est				4044	923	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 6/12/2023

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
91	Diesel Generator 903 HP (674 kW)	40CFR60, Subpart IIII (60.4205(b) & 4202(a)(2)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Emission Unit #	**Emission Unit Description**	**Applicable Regulation or Requirement**	**Pollutant**	**Emission Limit** (if applicable)	**Voluntary Emission Limit or Exemption** (if applicable)	**Operating Requirement or Limitation** (if applicable)	**Method of Determining Compliance with the Emission and Operating Requirement(s)**
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
91	Diesel Generator 903 HP (674 kW)	CO	40CFR60, Subpart IIII 60.4211(a)(1-2), (c), (f)) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the hours of operation and fuel usage monthly.	Since the engine emissions are certified to the non-emergency emission standards (60.4214(c)), the unit does not need to install a non-resettable hours meter per 60.4209(a). Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. The engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Monitor the hours of operation and fuel usage monthly.	same
		PM	same	Monitor the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
91	Diesel Generator 903 HP (674 kW)	CO	401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the hours of operation and fuel usage monthly.	Per 60.4214(b), initial notification and a installation of a non-settable hour meters is not required since the engine emissions are certified to non-emergency standard. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Record the hours of operation and fuel usage monthly.	same
		PM	same	Record the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
91	Diesel Generator 903 HP (674 kW)	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
91	Diesel Generator 903 HP (674 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations
None

ATTACHMENT B.2.4 – DEP7007 Forms

Forms Submitted With 07/27/2023 502(b)(10) Change

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: July 27, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
92	237 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Kohler	150REOZJF	08/2023, ordered 07/2024 install	20300101	1000 gal	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
92				100	1.66	177 237	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	100		0.015

Section A.3: Notes, Comments, and Explanations
A complete list of pollutant emissions and calculations is contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: July 27, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	237 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.0117	CO	38.60	mfg cert	0.00%	0.00%	0.45	0.45	0.02	0.02
								NO2	122.00	mfg cert	0.00%	0.00%	1.43	1.43	0.07	0.07
								PM10	3.860	mfg cert	0.00%	0.00%	0.045	0.045	0.002	0.002
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.007	0.007	0.0003	0.0003
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.561	0.561	0.028	0.028
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00150	0.00150	0.00007	0.00007
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00066	0.00066	0.00003	0.00003
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00046	0.00046	0.00002	0.00002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00189	0.00189	0.00009	0.00009
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00123	0.00123	0.00006	0.00006

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00015	0.00015	0.00001	0.00001
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00027	0.00027	0.00001	0.00001
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	263	263	13	13

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
92	92 01	0.33, est	30, est				1197	950	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 7/27/2023

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	Diesel Generator 237 HP (177 kW)	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (f), (g)(2)) 60.4214(b) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performacne test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
92	Diesel Generator 237 HP (177 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations
None

ATTACHMENT B.2.5 – DEP7007 Forms

Forms Submitted With 10/10/2023 Off-Permit Change Notification

N.1 Form is Revised Pursuant to the Emission Factor Calculation Provided in Attachment C.2

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information
___ Section A.2: Operating and Fuel Information
___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky
KY EIS (AFS) #: 21-067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903Hp Diesel Generator-Sanders Brown	1	Diesel Fuel Usage	Emergency Generator		Kohler	600REOZVB	06/2023, ordered 06/2024, install est.	20300101	1000 gal	None	1
92	237 Hp Diesel Generator-Pence Hall	1	Diesel Fuel Usage	Emergency Generator		Kohler	150REOZJF	08/2023, ordered 07/2024, install est.	20300101	1000 gal	None	1
93	757 Hp Diesel Generator-Memorial Coliseum	1	Diesel Fuel Usage	Emergency Generator		Kohler	500REOZVC	02/2024, install est.	20300101	1000 gal	None	1
94	762 Hp Diesel Generator-Parking Structure #8	1	Diesel Fuel Usage	Emergency Generator		Kohler	150REOZJF	07/2023, ordered 02/2025, install est.	20300101	1000 gal	None	1
IA	0.85 MMBtu Natural Gas Boiler-Bosworth	1	Natural Gas Usage	Indirect Heat Exchanger		Valiant Series II	VA0850	11/2023, install est	10100602	MMft3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
91				100	6.32	674 903	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
92				100	1.66	177 237	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
93				100	5.30	565 757	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
94				100	5.33	568 762	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
IA		100, hot water			0.85	4980	gal/hr		Primary	Natural Gas	1020	Btu/scf	8760		NA

Section A.3: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.06997	0.06997	0.30648	0.30648
	Bldg 0652							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.08330	0.08330	0.36485	0.36485
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.00633	0.00633	0.02773	0.02773
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00050	0.00050	0.00219	0.00219
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00458	0.00458	0.02007	0.02007
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-09	2.00E-09	8.76E-09	8.76E-09
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.33E-08	1.33E-08	5.84E-08	5.84E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-06	1.00E-06	4.38E-06	4.38E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-09	2.50E-09	1.09E-08	1.09E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.33E-09	2.33E-09	1.02E-08	1.02E-08
								3- Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	6.25E-05	6.25E-05	2.74E-04	2.74E-04
								Methylchloranthrene	1.80 E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
	Bldg 0652							n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-03	1.50E-03	6.57E-03	6.57E-03
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.08E-07	5.08E-07	2.23E-06	2.23E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.42E-08	1.42E-08	6.20E-08	6.20E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.17E-09	4.17E-09	1.82E-08	1.82E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.83E-06	2.83E-06	1.24E-05	1.24E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.67E-07	1.67E-07	7.30E-07	7.30E-07
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.00E-08	1.00E-08	4.38E-08	4.38E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	9.16E-07	9.16E-07	4.01E-06	4.01E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.17E-06	1.17E-06	5.11E-06	5.11E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.00E-08	7.00E-08	3.06E-07	3.06E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.17E-06	3.17E-06	1.39E-05	1.39E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.17E-07	2.17E-07	9.49E-07	9.49E-07
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.58E-03	1.58E-03	6.90E-03	6.90E-03
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	100.0	100.0	437.8	437.8

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
57-11 replaced with IA-11	Removed 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.10668	-0.10668	-0.46726	-0.46726
57-11 =	COMB0015							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.12700	-0.12700	-0.55626	-0.55626
	Bldg 0652							PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	-0.00965	-0.00965	-0.04228	-0.04228
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	-0.00076	-0.00076	-0.00334	-0.00334
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	-0.00699	-0.00699	-0.03059	-0.03059
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-09	-3.05E-09	-1.34E-08	-1.34E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.03E-08	-2.03E-08	-8.90E-08	-8.90E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-06	-1.52E-06	-6.68E-06	-6.68E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.81E-09	-3.81E-09	-1.67E-08	-1.67E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.56E-09	-3.56E-09	-1.56E-08	-1.56E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
57-11 replaced with IA-11	**Removed** 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	-9.53E-05	-9.53E-05	-4.17E-04	-4.17E-04
57-11 =	COMB0015							3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
	Bldg 0652							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-03	-2.29E-03	-1.00E-02	-1.00E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	-7.75E-07	-7.75E-07	-3.39E-06	-3.39E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.16E-08	-2.16E-08	-9.46E-08	-9.46E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-6.35E-09	-6.35E-09	-2.78E-08	-2.78E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	-4.32E-06	-4.32E-06	-1.89E-05	-1.89E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	-2.54E-07	-2.54E-07	-1.11E-06	-1.11E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.52E-08	-1.52E-08	-6.68E-08	-6.68E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.40E-06	-1.40E-06	-6.12E-06	-6.12E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.78E-06	-1.78E-06	-7.79E-06	-7.79E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.07E-07	-1.07E-07	-4.67E-07	-4.67E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	-4.83E-06	-4.83E-06	-2.11E-05	-2.11E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	-3.30E-07	-3.30E-07	-1.45E-06	-1.45E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	-2.40E-03	-2.40E-03	-1.05E-02	-1.05E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	-152.4	-152.4	-667.5	-667.5

Division for Air Quality

300 Sower Boulevard
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
91	903 Hp Diesel Generator-Sanders Brown	1	Diesel Usage	NA	NA	1	0.0427	CO	13.2	mfg cert	0.00%	0.00%	0.5636	0.5636	0.1409	0.1409
	Bldg 0230							NO2	181.1	mfg cert	0.00%	0.00%	7.7338	7.7338	1.9335	1.9335
								PM10	2.45	mfg cert	0.00%	0.00%	0.1046	0.1046	0.0262	0.0262
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0090	0.0090	0.0022	0.0022
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	2.0475	2.0475	0.5119	0.5119
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	1.49E-04	1.49E-04	3.74E-05	3.74E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	4.70E-05	4.70E-05	1.17E-05	1.17E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	4.53E-03	4.53E-03	1.13E-03	1.13E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	4.61E-04	4.61E-04	1.15E-04	1.15E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	1.64E-03	1.64E-03	4.11E-04	4.11E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	1.13E-03	1.13E-03	2.82E-04	2.82E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	1.24E-03	1.24E-03	3.10E-04	3.10E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	968.52	968.52	242.1	242.1

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
54-07 replaced with EU91	**REMOVED** 587 Hp Diesel Generator-Sanders Brown	2	Diesel Usage	NA	NA	1	-0.0300	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-3.9060	-3.9060	-0.9765	-0.9765
54-07 =	COMB0012	2	0.03 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-18.1290	-18.1290	-4.5323	-4.5323
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-1.2744	-1.2744	-0.3186	-0.3186
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0018	-0.0018	-0.0004	-0.0004
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.4385	-1.4385	-0.3596	-0.3596
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-3.15E-03	-3.15E-03	-7.88E-04	-7.88E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-3.81E-04	-3.81E-04	-9.53E-05	-9.53E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-3.84E-03	-3.84E-03	-9.60E-04	-9.60E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-4.85E-03	-4.85E-03	-1.21E-03	-1.21E-03
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.68E-03	-1.68E-03	-4.20E-04	-4.20E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-1.17E-03	-1.17E-03	-2.93E-04	-2.93E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-6.90E-04	-6.90E-04	-1.73E-04	-1.73E-04
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-674.04	-674.04	-168.5	-168.5

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
56-03 Replaced with EU91	**REMOVED** 434 Hp Diesel Generator-Sanders Brown		Diesel Usage	NA	NA	1	-0.0220	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-2.8644	-2.8644	-0.2864	-0.2864
56-03 =	COMB0014	1	0.022 (Mgal)	200 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-13.2946	-13.2946	-1.3295	-1.3295
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.9346	-0.9346	-0.0935	-0.0935
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0013	-0.0013	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.0549	-1.0549	-0.1055	-0.1055
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-2.31E-03	-2.31E-03	-2.31E-04	-2.31E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-2.79E-04	-2.79E-04	-2.79E-05	-2.79E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-2.82E-03	-2.82E-03	-2.82E-04	-2.82E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-3.56E-03	-3.56E-03	-3.56E-04	-3.56E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.23E-03	-1.23E-03	-1.23E-04	-1.23E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-8.58E-04	-8.58E-04	-8.58E-05	-8.58E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-5.06E-04	-5.06E-04	-5.06E-05	-5.06E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-494.30	-494.30	-49.4	-49.4

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	237 Hp Diesel Generator-Pence	1	Diesel Usage	NA	NA	1	0.0117	CO	38.60	mfg cert	0.00%	0.00%	0.45	0.45	0.11	0.11
	Bldg 0041							NO2	122.00	mfg cert	0.00%	0.00%	1.43	1.43	0.36	0.36
								PM10	3.860	mfg cert	0.00%	0.00%	0.045	4.52E-02	1.13E-02	1.13E-02
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	0.001	6.97E-04	1.74E-04	1.74E-04
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.561	0.561	1.40E-01	0.140
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00123	1.23E-03	3.07E-04	3.07E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00015	1.49E-04	3.71E-05	3.71E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00150	1.50E-03	3.74E-04	3.74E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00189	1.89E-03	4.73E-04	4.73E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00066	6.55E-04	1.64E-04	1.64E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00046	4.56E-04	1.14E-04	1.14E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00027	2.69E-04	6.73E-05	6.73E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	263	263	65.72	66

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Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: 10-Oct-23

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU93	757 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	0.03680	CO	11.80	mfg cert	0.00%	0.00%	0.43	0.43	0.11	0.11
								NO2	188.03	mfg cert	0.00%	0.00%	6.92	6.92	1.73	1.73
								PM10	1.35	mfg cert	0.00%	0.00%	0.05	0.05	0.01	0.01
								SO2	0.22	AP-42, 3.4-1	0.00%	0.00%	0.01	0.01	2.01E-03	2.01E-03
								VOC	11.79	AP-42, 3.4-1	0.00%	0.00%	0.43	0.43	0.11	0.11
								Acetaldehyde	3.63E-03	AP-42, 3.4-3	0.00%	0.00%	1.34E-04	1.34E-04	3.34E-05	3.34E-05
								Acrolein	1.13E-03	AP-42, 3.4-3	0.00%	0.00%	4.18E-05	4.18E-05	1.04E-05	1.04E-05
								Benzene	0.112	AP-42, 3.4-3	0.00%	0.00%	4.11E-03	4.11E-03	1.03E-03	1.03E-03
								Formaldehyde	0.011	AP-42, 3.4-3	0.00%	0.00%	4.18E-04	4.18E-04	1.05E-04	1.05E-04
								Toluene	0.040	AP-42, 3.4-3	0.00%	0.00%	1.49E-03	1.49E-03	3.72E-04	3.72E-04
								Xylene	0.028	AP-42, 3.4-3	0.00%	0.00%	1.02E-03	1.02E-03	2.56E-04	2.56E-04
								CO2	23759	AP-42, 3.4-1	0.00%	0.00%	874.34	874.335	218.58	218.58375

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
59-13 Replaced with EU93	REMOVED 94 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	-0.00480	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-0.6250	-0.6250	-0.1562	-0.1562
59-13 =	COMB0017	1	0.0048 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-2.9006	-2.9006	-0.7252	-0.7252
	Bldg 0019							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.2039	-0.2039	-0.0510	-0.0510
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0003	-0.0003	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-0.2302	-0.2302	-0.0575	-0.0575
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-0.00050	-0.00050	-1.26E-04	-1.26E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-0.00006	-0.00006	-1.52E-05	-1.52E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-0.00061	-0.00061	-1.54E-04	-0.0002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-0.00078	-0.00078	-1.94E-04	-1.94E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-0.00027	-0.00027	-6.72E-05	-6.72E-05
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-0.00019	-0.00019	-4.68E-05	-4.68E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-0.00011	-0.00011	-2.76E-05	-2.76E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-108	-108	-27	-27

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Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation
___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: 10-Oct-23

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU94	762 HP Diesel Generator-Parking #8	1	Diesel Usage	NA	NA	1	0.03570	CO	28.23	mfg cert	0.00%	0.00%	1.01	1.01	0.25	0.25
								NO2	216.46	mfg cert	0.00%	0.00%	7.73	7.73	1.93	1.93
								PM10	1.41	mfg cert	0.00%	0.00%	0.05	0.05	0.013	0.013
								SO2	0.23	AP-42, 3.4-1	0.00%	0.00%	0.01	0.01	2.02E-03	2.02E-03
								VOC	12.24	AP-42, 3.4-1	0.00%	0.00%	0.44	0.44	0.11	0.11
								Acetaldehyde	3.77E-03	AP-42, 3.4-3	0.00%	0.00%	1.34E-04	1.34E-04	3.36E-05	3.36E-05
								Acrolein	1.18E-03	AP-42, 3.4-3	0.00%	0.00%	4.20E-05	4.20E-05	1.05E-05	1.05E-05
								Benzene	0.116	AP-42, 3.4-3	0.00%	0.00%	4.14E-03	4.14E-03	1.03E-03	1.03E-03
								Formaldehyde	0.012	AP-42, 3.4-3	0.00%	0.00%	4.21E-04	4.21E-04	1.05E-04	1.05E-04
								Toluene	0.042	AP-42, 3.4-3	0.00%	0.00%	1.50E-03	1.50E-03	3.75E-04	3.75E-04
								Xylene	0.029	AP-42, 3.4-3	0.00%	0.00%	1.03E-03	1.03E-03	2.57E-04	2.57E-04
								CO2	24653	AP-42, 3.4-1	0.00%	0.00%	880	880	220	220

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 10/10/2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								CO					-5.080	-5.080	-0.992	-0.992
								NO2					-11.544	-11.544	-1.072	-1.072
								PM10					-2.172	-2.172	-0.417	-0.417
								SO2					0.021	0.021	4.42E-03	4.42E-03
								VOC					3.359	3.359	0.988	0.988
								Acenaphthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acenaphthylene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acetaldehyde					-4.34E-03	-4.34E-03	-7.37E-04	-7.37E-04
								Acrolein					-4.46E-04	-4.46E-04	-6.96E-05	-6.96E-05
								Anthracene					-1.05E-09	-1.05E-09	-4.59E-09	-4.59E-09
								Benz(a)anthracene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzene					6.46E-03	6.46E-03	2.03E-03	2.03E-03
								Benzo(b)fluoranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzo(a)pyrene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(g,h,i)perylene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(k)flouranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Chrysene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								7,12-Dimethylbenz(a)anthracene					-6.99E-09	-6.99E-09	-3.06E-08	-3.06E-08
								Dibenzo(a,h)anthracene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Dichlorobenzene					-5.24E-07	-5.24E-07	-2.30E-06	-2.30E-06
								Fluoranthene					-1.31E-09	-1.31E-09	-5.74E-09	-5.74E-09
								Fluorene					-1.22E-09	-1.22E-09	-5.36E-09	-5.36E-09
								Formaldehyde					-7.50E-03	-7.50E-03	-1.60E-03	-1.60E-03
								3-Methylchloranthrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								2-Methylnaphthalene					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								n-Hexane					-7.87E-04	-7.87E-04	-3.45E-03	-3.45E-03
								Indeno(1,2,3-cd)pyrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Naphthalene					-2.67E-07	-2.67E-07	-1.17E-06	-1.17E-06
								Phenanthrene					-7.43E-09	-7.43E-09	-3.25E-08	-3.25E-08
								Pyrene					-2.19E-09	-2.19E-09	-9.57E-09	-9.57E-09
								Toluene					1.91E-03	1.91E-03	6.56E-04	6.56E-04
								Xylene					1.28E-03	1.28E-03	4.49E-04	4.49E-04
								Arsenic					-8.74E-08	-8.74E-08	-3.83E-07	-3.83E-07
								Beryllium					-5.24E-09	-5.24E-09	-2.30E-08	-2.30E-08
								Cadmium					-4.81E-07	-4.81E-07	-2.11E-06	-2.11E-06
								Chromium					-6.12E-07	-6.12E-07	-2.68E-06	-2.68E-06
								Cobalt					-3.67E-08	-3.67E-08	-1.61E-07	-1.61E-07
								Manganese					-1.66E-06	-1.66E-06	-7.27E-06	-7.27E-06
								Mercury					-1.14E-07	-1.14E-07	-4.98E-07	-4.98E-07
								Nickel					-9.18E-07	-9.18E-07	-4.02E-06	-4.02E-06
								Selenium					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08
								PAH					2.30E-03	2.30E-03	6.52E-04	6.52E-04
								Total HAP					-1.12E-03	-1.12E-03	-2.08E-03	-2.08E-03
								CO2					1542	1542	243	243

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
91	91 01	1.0, est	30, est				4044	923	
92	92 01	0.33, est	30, est				1197	950	
93	93 01	0.6	30, est				3249	851	
94	94 01	0.6, est	30, est				3606	988	
IA	IA	0.33	20, est					230	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
Bosworth natural gas boiler replacement. Removed 1.3 MMBtu/hr boiler (57-11) and replaced with 0.85 MMBtu/hr boiler (IA11), bldg 0652.
Sanders-Brown emergency generator replacement. Removed 587 Hp and 434 Hp generators (EU54-07 and EU56-03) and replaced with one 903 Hp generator (EU91, bldg 0230).
Memorial Coliseum emergency generator replacement. Removed 94 Hp generator (EU59-13) and replaced with 757 Hp generator (EU93, bldg 0019).
Pence Hall 237 Hp emergency generator addition (bldg 0041, EU92).
Parking Structure #8 762 Hp emergency generator addition (EU94, bldg 0601).

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirement
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 29, 2023

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	237 Hp Diesel Generator-Pence Hall	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
91 93 94	903 Hp Diesel Generator-Sanders Brown 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (c), (f), (g)(2-3)) 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(c), the engine must be EPA certified by the manufacturer to theemission standards for the same model year and engine power in 60.4205(b). Engine must be installed and configured to manufacture's emission-related specifications. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g)(2-3), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN:** **EU92 -** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performance test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. **EU91, 93, 94** - demonstrate compliance with 60.4211(g)(2) and additionally with (g)(3) which requires subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2-3) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations
None

ATTACHMENT C - Emissions Calculations

C.1
Emissions Calculations for GDF
C.2
Emissions Calculations from Previously Submitted OPC and 502(b)(10) Changes

C-1. Gasoline Dispensing Facility (EU95, EU96)

> Working and breathing losses from University of Kentucky's gasoline dispensing facility (GDF) tank and dispensing losses associated with the GDF are calculated using AP-42 Section 5.2. Gasoline compositions are based on the output of TankESP.

Table C.1. GDF Tank Parameters

Tank Parameters	Gasoline Tank (EU95)	Gasoline Tank (EU96)	
Diameter (ft)	10	11	*estimated*
Length (ft)	18	20	*estimated*
Volume (gallons)	10,000	14,000	
Roof Type	Horizontal	Horizontal	
Underground?	Yes	Yes	
Stock	Gasoline	Gasoline	
Maximum Throughput (gal/mo)	<10,000	<100,000	
Maximum Throughput (gal/yr)	<120,000	<1,200,000	

Table C.2. Gasoline Stock Information (from TankESP)

> Vapor speciation calculated using TankESP stock data for RVP gasoline.

Stock Parameters	TankESP Input
Stock Name	Gasoline RVP_X
Stock Abbreviation	GAS_X
MWL	92
MWV	66
Liquid Density (lb/gal)	5.6
Distillation Slope	3
RVP[1]	13
Composition	
Benzene	1.80%
Benzo(g,h,i)perylene	0.00%
Cumene (isopropylbenzene)	0.50%
Cyclohexane	0.24%
Ethylbenzene	1.40%
Hexane (n-)	1.00%
Iso-octane (2,2,4 trimethylpentan	4.00%
Naphthalene	0.42%
PACs (Chrysene)	0.00%
Toluene	7.00%
Trimethylbenzene (1,2,4)	2.50%
Xylene	7.00%

Table C.3. Potential Organic Compound Emissions from GDF Loading Losses

	Potential Gasoline Throughput[2]		Emission Factors[1]					Organic Compound Emissions	
EU	(1,000 gal/hr)	(1,000 gal/yr)	Vehicle Refueling (no control) (lbs OC/1000 gal)	Vehicle Refueling Spillage (lbs OC/1000 gal)	Filling Underground Storage Tank[3] (lbs OC/1000 gal)	Underground Tank Breathing and Emptying (lbs OC/1000 gal)	Overall Emission Factor (lbs OC/1000 gal)	(lb/hr)	(tpy)
EU 95	1.37E-02	120	11.0	0.7	11.5	1.0	24.2	0.33	1.45
EU 96	1.37E-01	1,200	11.0	0.7	7.3	1.0	20.0	2.74	12.00

1. Emission factors from AP-42 Section 5.2, Table 5.2-7, Evaporative emissions from gasoline service station operations.

2. Maximum annual throughput corresponds to maximum monthly throughput that can be processed before exceeding the more burdensome requirements under NESHAP CCCCCC.

3. Splash filling factor is used for EU95. Submerged filling factor is used for EU96, which is subject to the submerged fill requirements under NESHAP CCCCCC.

Table C.4. Potential Speciated VOC and HAP Emissions from GDF Loading Losses

	Emission Factors (lbs HAP/1000 gal)		Potential HAP Emissions (tpy)	
Pollutant	**EU 95**	**EU 96**	**EU 95**	**EU 96**
VOC	**24.2**	**20.0**	**1.452**	**12.000**
Benzene	0.436	0.360	0.026	0.216
Benzo(g,h,i)perylene	0.000	0.000	0.000	0.000
Cumene (isopropylbenzene)	0.121	0.100	0.007	0.060
Ethylbenzene	0.339	0.280	0.020	0.168
Hexane (n-)	0.242	0.200	0.015	0.120
Iso-octane (2,2,4 trimethylpentane	0.968	0.800	0.058	0.480
Naphthalene	0.100	0.083	0.006	0.050
PACs (Chrysene)	0.001	0.001	0.000	0.000
Toluene	1.694	1.400	0.102	0.840
Xylene	1.694	1.400	0.102	0.840
Total HAP	5.595	4.624	0.336	2.774

4. HAP emission factors are calculated by multiplying the total organic compound emission factor x vapor weight percent of each component.

ATTACHMENT C.2.1

Calculations Submitted With 06/14/2022 Off-Permit Change Notification

Emissions Associated with EU**88 Distillery** Generator (Diesel)

88.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	69	hp
Total Engine Rating (kW):	25	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	0.486	MMBtu/hr
Maximum Annual Operating Hours:	8760	hrs
Calculated Fuel Consumption in Mgal/hr:	0.00242	Mgal/hr

88.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01
SCC Units:	1000 Gallons Distillate Oil (Diesel)

88.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacture certification. emission factors in AP-42 Table 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition). PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are is based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

88.3.1 NOx

Emission factor for NOx:	0.242 lb/MMBtu	Mfg. Certification
NO_X emission factor in terms of SCC units:	100.12 lb/ Mgal	= (0.242 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.2 CO

Emission factor for CO:	0.083 lb/MMBtu	Mfg. Certification
CO emission factor in terms of SCC units:	34.13 lb/Mgal	= (0.083 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.3 VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.4 PM

Emission factor for PM:	0.016 lb/MMBtu	Mfg. Certification
PM emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.5 PM10

Emission factor for PM10:	0.016 lb/MMBtu	Mfg. Certification
PM10 emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.6 PM2.5

Emission factor for PM2.5:	0.016 lb/MMBtu	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.7 SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

Emissions Associated with EU**88 Distillery** Generator (Diesel)

88.3.8 HAP Emission Estimates

> Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	HAP?	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	Y	7.67E-04	0.105
Acrolein	107-02-8	Y	9.25E-05	0.013
Benzene	71-43-2	Y	9.33E-04	0.128
Formaldehyde	50-00-0	Y	1.18E-03	0.162
Toluene	108-88-3	Y	4.09E-04	0.056
Xylene	1330-20-7	Y	2.85E-04	0.039
Total HAPs				5.02E-01

88.3.9 GHG Emission Factors

> CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

88.4 Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**100.1**	Mfg. Certification	0.242	1.06
CO	**34.13**	Mfg. Certification	0.083	0.36
VOC	**47.95**	Mfg. Certification	0.116	0.10
PM	**6.60**	AP-42 Table 3.3-2	0.016	0.07
PM10	**6.60**	AP-42 Table 3.3-2	0.016	0.07
PM2.5	**6.60**	AP-42 Table 3.3-2	0.016	0.07
SO2	**0.60**	AP-42 Table 3.3-2	0.014	0.006
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.002	0.009
Fomaldehyde	**0.162**	AP-42 Table 3.3-2	0.0004	0.002
CO2	22,468	AP-42 Table 3.3-1, 10/96	180	45
CH4	0.91	40 CFR 98, Subpart C, Table C-2	0.007	0.002
N2O	0.18	40 CFR 98, Subpart C, Table C-2	0.001	0.000
GHGs as CO2e	22,545	40 CFR 98, Subpart A	181	45

ATTACHMENT C.2.2

Calculations Submitted With 10/12/2023 502(b)(10) Change

Emissions Associated with EU89 Samaritan Generator #3 (Diesel)

89.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	1114	hp
Total Engine Rating (kW):	750	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	7.800	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Calculated Fuel Consumption in Mgal/hr:	0.0536	Mgal/hr

89.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

89.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacturer certification. PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

NOx

Emission factor for NOx:	5.25 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	226.3 lb/Mgal	= (5.25 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

CO

Emission factor for CO:	0.25 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	10.8 lb/Mgal	= (0.25 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

PM

Emission factor for PM:	0.02 lb/MMBtu	Mfg. Certification
PM emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM10

Emission factor for PM10:	0.02 lb/MMBtu	Mfg. Certification
PM10 emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM2.5

Emission factor for PM2.5:	0.02 lb/MMBtu	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

Emissions Associated with EU89 Samaritan Generator #3 (Diesel)

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	7.67E-04	0.105
Acrolein	107-02-8	9.25E-05	0.013
Benzene	71-43-2	9.33E-04	0.128
Formaldehyde	50-00-0	1.18E-03	0.162
Toluene	108-88-3	4.09E-04	0.056
Xylene	1330-20-7	2.85E-04	0.039
Total HAPs			5.02E-01

GHG Emission Factors

CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**226.3**	Mfg. Certification	12.1	3.03
CO	**10.8**	Mfg. Certification	0.58	0.15
VOC	**47.95**	AP-42 Table 3.3-1	2.57	0.64
PM	**0.86**	Mfg. Certification	0.046	0.01
PM10	**0.86**	Mfg. Certification	0.046	0.01
PM2.5	**0.86**	Mfg. Certification	0.046	0.01
SO2	**0.29**	AP-42 Table 3.3-1	0.032	0.008
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.027	0.007
Fomaldehyde	**0.162**	AP-42 Table 3.3-2	0.009	0.002
CO2	**22,468**	AP-42 Table 3.3-1, 10/96	1204	301
CH4	**0.91**	40 CFR 98, Subpart C, Table C-2	0.049	0.01
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.010	0.002
GHGs as CO2e	**22,545**	40 CFR 98, Subpart A	1208	302

Emissions Associated with EU90 Reynolds Bldg #1 Natural Gas Emergency Generator

90.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	729 hp
Total Engine Rating (kW):	500 kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000 Btu/hp-hr
Natural Gas Heating Value in Btu/gal:	1,020 Btu/gal
Calculated Fuel Input in MMBtu/hr:	5.750 MMBtu/hr
Maximum Annual Operating Hours:	500 hrs
Calculated Fuel Consumption in MMft3/hr:	0.005862 MMft3l/hr

90.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300201
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Natural Gas (2-03-002), Reciprocating (2-03-002-01)
SCC Units:	Million Cubic Feet Natural Gas Burned

90.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and VOC (as worst case THC = VOC) are based on manufacturer certification. SO2 and PM emission factors are based on AP-42 Table 3.2-2 for Natural gas-fired Reciprocating Engines (07/00 edition). PM and PM2.5 are assumed to equal PM10.

NOx

Emission factor for NOx:	0.03 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	9.63 lb/MMft3	= (0.03 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

CO

Emission factor for CO:	0.60 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	192.6 lb/MMft3	= (0.60 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

VOC

Emission factor for VOC:	0.16 g/hp-hr	Mfg. Certification (as worse case THC = VOC)
VOC emission factor in terms of SCC units:	51.35 lb/MMft3	= (0.16 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

PM / PM10 / PM2.5

Emission factor for PM:	0.00991 lb/MMBtu	AP-42, Table 3.2-2, 07/00
PM emission factor in terms of SCC units:	10.11 lb/MMft3	= (0.00991 lb/MMBtu * 1020 Btu/ft3)(10^{-6} MMBtu/Btu / $ft^3/10^{-6}$ MMft3)

SO2

Emission factor for SO2:	0.000588 lb/MMBtu	AP-42, Table 3.2-2, 07/00
SO2 emission factor in terms of SCC units:	0.6 lb/MM/ft3	= (0.000588 lb/MMBtu * 1020 Btu/ft3)(10^{-6} MMBtu/Btu / $ft^3/10^{-6}$ MMft3)

Emissions Associated with EU90 Reynolds Bldg #1 Natural Gas Emergency Generator

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.2-2 (07/00 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMft^3)
Acetaldehyde	75-07-0	8.36E-03	8.53
Acrolein	107-02-8	5.14E-03	5.24
Benzene	71-43-2	4.40E-04	0.45
Formaldehyde	50-00-0	5.28E-02	53.9
n-Hexane	100-54-3	1.11E-03	1.13
Methanol	67-56-1	2.50E-03	2.55
Toluene	108-88-3	4.08E-04	0.42
Xylene	1330-20-7	1.84E-04	0.19
Total HAPs			73.6

GHG Emission Factors

CO2, CH4 and N2O emissions for natural gas combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.2-2 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

N2O Emission Factor 1.0E-04 kg N2O/MMBtu 40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/MMft^3)	Emission Factor Basis
CO2		110.00	112,200	AP-42 Table 3.2-1, 07/00
CH4		1.25	1,275	AP-42 Table 3.2-1, 07/00
N2O	1.00E-04		0.22	40 CFR 98, Subpart C, Table C-2
CO2e			144,142	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/MMft3)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**9.63**	Mfg. Certification	0.056	0.014
CO	**192.57**	Mfg. Certification	1.13	0.28
VOC	**51.35**	Mfg. Certification(as worse case THC = VOC)	0.30	0.075
PM	**10.11**	AP-42 Table 3.2-2	0.059	0.015
PM10	**10.11**	AP-42 Table 3.2-2	0.059	0.015
PM2.5	**10.11**	AP-42 Table 3.2-2	0.059	0.015
SO2	**0.60**	AP-42 Table 3.2-2	0.004	0.0009
Total HAPs	**73.61**	AP-42 Table 3.2-2	0.43	0.108
Fomaldehyde	**53.86**	AP-42 Table 3.2-2	0.316	0.079
CO2	**112200**	AP-42 Table 3.2-1	658	164
CH4	**1275**	40 CFR 98, Subpart C, Table C-2	7.47	1.87
N2O	**0.22**	40 CFR 98, Subpart C, Table C-2	0.0013	0.00033
GHGs as CO2e	**144,142**	40 CFR 98, Subpart A	845	211

ATTACHMENT C.2.3

Calculations Submitted With 06/12/2023 502(b)(10) Change

Emissions Associated with EU91 Sanders Brown Generator (Diesel)

89.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	903	hp
Total Engine Rating (kW):	674	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	6.321	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Calculated Fuel Consumption in Mgal/hr:	0.0427	Mgal/hr

89.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

89.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacturer certification. PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

NOx

Emission factor for NOx:	4.20 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	181.1 lb/Mgal	= (4.20 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

CO

Emission factor for CO:	0.31 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	13.2 lb/Mgal	= (0.31 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

PM

Emission factor for PM:	0.057 g/hp-hr	Mfg. Certification
PM emission factor in terms of SCC units:	2.445 lb/Mgal	= (0.057 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM10

Emission factor for PM10:	0.057 g/hp-hr	Mfg. Certification
PM10 emission factor in terms of SCC units:	2.445 lb/Mgal	= (0.057 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM2.5

Emission factor for PM2.5:	0.057 g/hp-hr	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	2.445 lb/Mgal	= (0.057 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

Emissions Associated with EU91 Sanders Brown Generator (Diesel)

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	7.67E-04	0.105
Acrolein	107-02-8	9.25E-05	0.013
Benzene	71-43-2	9.33E-04	0.128
Formaldehyde	50-00-0	1.18E-03	0.162
Toluene	108-88-3	4.09E-04	0.056
Xylene	1330-20-7	2.85E-04	0.039
Total HAPs			5.02E-01

GHG Emission Factors

CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**181.1**	Mfg. Certification	7.73	1.93
CO	**13.2**	Mfg. Certification	0.56	0.14
VOC	**47.95**	AP-42 Table 3.3-1	2.05	0.51
PM	**2.45**	Mfg. Certification	0.104	0.03
PM10	**2.45**	Mfg. Certification	0.104	0.03
PM2.5	**2.45**	Mfg. Certification	0.104	0.03
SO2	**0.29**	AP-42 Table 3.3-1	0.025	0.006
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.024	0.005
Fomaldehyde	**0.162**	AP-42 Table 3.3-2	0.007	0.002
CO2	**22,468**	AP-42 Table 3.3-1, 10/96	959	240
CH4	**0.91**	40 CFR 98, Subpart C, Table C-2	0.039	0.01
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.008	0.002
GHGs as CO2e	**22,545**	40 CFR 98, Subpart A	963	241

ATTACHMENT C.2.4

Calculations Submitted With 07/27/2023 502(b)(10) Change

Emissions Associated with EU92 Sanders Brown Generator (Diesel)

92.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	237	hp
Total Engine Rating (kW):	177	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	1.659	MMBtu/hr
Maximum Annual Operating Hours:	100	hrs
Calculated Fuel Consumption in Mgal/hr:	0.0117	Mgal/hr

Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacturer certification. PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

NOx

Emission factor for NOx:	2.83 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	121.9 lb/Mgal	= (2.83 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

CO

Emission factor for CO:	0.90 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	38.6 lb/Mgal	= (0.90 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

PM

Emission factor for PM:	0.090 g/hp-hr	Mfg. Certification
PM emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM10

Emission factor for PM10:	0.090 g/hp-hr	Mfg. Certification
PM10 emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM2.5

Emission factor for PM2.5:	0.090 g/hp-hr	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

Emissions Associated with EU92 Sanders Brown Generator (Diesel)

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	7.67E-04	0.105
Acrolein	107-02-8	9.25E-05	0.013
Benzene	71-43-2	9.33E-04	0.128
Formaldehyde	50-00-0	1.18E-03	0.162
Toluene	108-88-3	4.09E-04	0.056
Xylene	1330-20-7	2.85E-04	0.039
Total HAPs			5.02E-01

GHG Emission Factors

CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**121.9**	Mfg. Certification	1.43	0.07
CO	**38.6**	Mfg. Certification	0.45	0.02
VOC	**47.95**	AP-42 Table 3.3-1	0.56	0.03
PM	**3.86**	Mfg. Certification	0.045	0.002
PM10	**3.86**	Mfg. Certification	0.045	0.002
PM2.5	**3.86**	Mfg. Certification	0.045	0.002
SO2	**39.7**	AP-42 Table 3.3-1	0.007	0.0003
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.006	0.0003
Formaldehyde	**0.162**	AP-42 Table 3.3-2	0.002	0.00009
CO2	**22,468**	AP-42 Table 3.3-1, 10/96	263	13
CH4	**0.91**	40 CFR 98, Subpart C, Table C-2	0.011	0.001
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.002	0.0001
GHGs as CO2e	**22,545**	40 CFR 98, Subpart A	264	13

ATTACHMENT C.2.5

Calculations Supporting 10/10/2023 Off-Permit Change Notification

Revised 10/1/2024

2. Emissions Associated with EU93 Diesel-Fired Emergency Generator

2.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	757	hp
Total Engine Rating (kW):	565	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	5.30	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Fuel Consumption in Mgal/hr:	0.03680	Mgal/hr

2.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

2.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOX, CO, VOC, PM, PM10, PM2.5, and SO2 are based on emission factors in AP-42 Table 3.4-1 for Large Stationary Diesel And All Stationary Dual-fuel Engines (10/96 edition) and manufacturer specifications.

2.3.1 NOx

Emission factor for NOx:	5.56	g/kw-hr	Manufacturer Specifications
Emission factor for NOx:	6.92	lb/hr	= (5.56 g/kw-hr / 453.6 g/lb *565 kW)
NO_X emission factor in terms of SCC units:	188.03	lb/Mgal	

2.3.2 CO

Emission factor for CO:	0.35	g/kw-hr	Manufacturer Specifications
Emission factor for CO:	0.4343	lb/hr	= (0.349 g/kw-hr / 453.6 g/lb *565 kW)
CO emission factor in terms of SCC units:	11.80	lb/Mgal	

2.3.3 VOC

Emission factor for VOC:	0.082	lb/MMBtu	AP-42 Table 3.4-1, 10/96
VOC emission factor in terms of SCC units:	11.79	lb/Mgal	= (0.0819 lb/MMBtu * 5 MMBtu/hr / 0.037 Mgal/hr)

2.3.4 PM

Emission factor for PM:	0.04	g/kw-hr	Manufacturer Specifications
Emission factor for PM:	0.62	lb/hr	= (0.04 g/kw-hr / 453.6 g/lb *565 kW)
PM emission factor in terms of SCC units:	1.35	lb/Mgal	

2.3.5 PM10

Emission factor for PM10:	0.04	g/kw-hr	Manufacturer Specifications
Emission factor for PM:	0.62	lb/hr	= (0.04 g/kw-hr / 453.6 g/lb *565 kW)
PM10 emission factor in terms of SCC units:	1.35	lb/Mgal	

2.3.6 PM2.5

Emission factor for PM2.5:	0.04	g/kw-hr	Manufacturer Specifications
Emission factor for PM:	0.62	lb/hr	= (0.04 g/kw-hr / 453.6 g/lb *565 kW)
PM2.5 emission factor in terms of SCC units:	1.35	lb/Mgal	

2.3.7 SO2

Emission factor for SO2:	1.52E-03	lb/MMBtu	AP-42 Table 3.4-1, 10/96	(0.0015% sulfur content)
SO2 emission factor in terms of SCC units:	0.22	lb/Mgal	= (0.00152 lb/MMBtu * 5 MMBtu/hr / 0.037 Mgal/hr)	

2. Emissions Associated with EU93 Diesel-Fired Emergency Generator

2.3.8 HAP Emission Estimates

> Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.4-3 (10/96 Edition).

	CAS #	HAP?	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)	Emission Factor Basis
Acetaldehyde	75-07-0	Y	2.52E-05	0.0036	AP-42 Table 3.4-3, 10/96
Acrolein	107-02-8	Y	7.88E-06	0.001	AP-42 Table 3.4-3, 10/96
Benzene	71-43-2	Y	7.76E-04	0.112	AP-42 Table 3.4-3, 10/96
Formaldehyde	50-00-0	Y	7.89E-05	0.011	AP-42 Table 3.4-3, 10/96
Toluene	108-88-3	Y	2.81E-04	0.040	AP-42 Table 3.4-3, 10/96
Xylene	1330-20-7	Y	1.93E-04	0.028	AP-42 Table 3.4-3, 10/96
Total HAPs				1.96E-01	

2.3.9 GHG Emission Factors

> CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.4-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	28
N2O	265

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		165.00	23,759	AP-42 Table 3.4-1, 10/96
CH4	3.00E-03		0.95	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.19	40 CFR 98, Subpart C, Table C-2
CO2e			23,836	40 CFR 98, Subpart A

2.4 Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**188.0**	Manufacturer Specifications	6.92	1.73
CO	**11.8**	Manufacturer Specifications	0.43	0.109
VOC	**11.79**	AP-42 Table 3.4-1, 10/96	0.43	0.11
PM	**1.35**	Manufacturer Specifications	0.05	0.0124
PM10	**1.35**	Manufacturer Specifications	0.05	0.01
PM2.5	**1.35**	Manufacturer Specifications	0.05	0.01
SO2	**0.22**	AP-42 Table 3.4-1, 10/96	0.008	0.002
Total HAPs	**0.20**	AP-42 Table 3.4-3, 10/96	0.007	0.002
Fomaldehyde	**0.01**	AP-42 Table 3.4-3, 10/96	0.0004	1.05E-04
CO2	**23,759**	AP-42 Table 3.4-1, 10/96	874	219
CH4	**0.95**	40 CFR 98, Subpart C, Table C-2	0.035	0.009
N2O	**0.19**	40 CFR 98, Subpart C, Table C-2	0.007	0.002
GHGs as CO2e	**23,836**	40 CFR 98, Subpart A	877	219

2. Emissions Associated with EU94 Diesel-Fired Emergency Generator

2.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	762	hp
Total Engine Rating (kW):	568	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	5.33	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Fuel Consumption in Mgal/hr:	0.03570	Mgal/hr

2.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

2.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOX, CO, VOC, PM, PM10, PM2.5, and SO2 are based on emission factors in AP-42 Table 3.4-1 for Large Stationary Diesel And All Stationary Dual-fuel Engines (10/96 edition) and manufacturer specifications.

2.3.1 NOx

Emission factor for NOx:	4.60	g/hp-hr	Manufacturer Specifications
Emission factor for NOx:	7.73	lb/hr	= (4.6 g/hp-hr / 453.6 g/lb *762 hp)
NO_X emission factor in terms of SCC units:	216.46	lb/Mgal	

2.3.2 CO

Emission factor for CO:	0.60	g/hp-hr	Manufacturer Specifications
Emission factor for CO:	1.01	lb/hr	= (0.6 g/hp-hr / 453.6 g/lb *762 hp)
CO emission factor in terms of SCC units:	28.23	lb/Mgal	

2.3.3 VOC

Emission factor for VOC:	0.082	lb/MMBtu	AP-42 Table 3.4-1, 10/96
VOC emission factor in terms of SCC units:	12.24	lb/Mgal	= (0.0819 lb/MMBtu * 5 MMBtu/hr / 0.036 Mgal/hr)

2.3.4 PM

Emission factor for PM:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.05	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *762 hp)
PM emission factor in terms of SCC units:	1.41	lb/Mgal	

2.3.5 PM10

Emission factor for PM10:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.05	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *762 hp)
PM10 emission factor in terms of SCC units:	1.41	lb/Mgal	

2.3.6 PM2.5

Emission factor for PM2.5:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.05	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *762 hp)
PM2.5 emission factor in terms of SCC units:	1.41	lb/Mgal	

2.3.7 SO2

Emission factor for SO2:	1.52E-03	lb/MMBtu	AP-42 Table 3.4-1, 10/96	(0.0015% sulfur content)
SO2 emission factor in terms of SCC units:	0.23	lb/Mgal	= (0.00152 lb/MMBtu * 5 MMBtu/hr / 0.036 Mgal/hr)	

2. Emissions Associated with EU94 Diesel-Fired Emergency Generator

2.3.8 HAP Emission Estimates

> Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.4-3 (10/96 Edition).

	CAS #	HAP?	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)	Emission Factor Basis
Acetaldehyde	75-07-0	Y	2.52E-05	0.0038	AP-42 Table 3.4-3, 10/96
Acrolein	107-02-8	Y	7.88E-06	0.001	AP-42 Table 3.4-3, 10/96
Benzene	71-43-2	Y	7.76E-04	0.116	AP-42 Table 3.4-3, 10/96
Formaldehyde	50-00-0	Y	7.89E-05	0.012	AP-42 Table 3.4-3, 10/96
Toluene	108-88-3	Y	2.81E-04	0.042	AP-42 Table 3.4-3, 10/96
Xylene	1330-20-7	Y	1.93E-04	0.029	AP-42 Table 3.4-3, 10/96
Total HAPs				2.03E-01	

2.3.9 GHG Emission Factors

> CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.4-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	28
N2O	265

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		165.00	24,653	AP-42 Table 3.4-1, 10/96
CH4	3.00E-03		0.99	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.20	40 CFR 98, Subpart C, Table C-2
CO2e			24,733	40 CFR 98, Subpart A

2.4 Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**216.5**	Manufacturer Specifications	7.73	1.93
CO	**28.2**	Manufacturer Specifications	1.01	0.25
VOC	**12.24**	AP-42 Table 3.4-1, 10/96	0.44	0.11
PM	**1.41**	Manufacturer Specifications	0.05	0.0126
PM10	**1.41**	Manufacturer Specifications	0.05	0.01
PM2.5	**1.41**	Manufacturer Specifications	0.05	0.01
SO2	**0.23**	AP-42 Table 3.4-1, 10/96	0.008	0.002
Total HAPs	**0.20**	AP-42 Table 3.4-3, 10/96	0.007	0.002
Fomaldehyde	**0.01**	AP-42 Table 3.4-3, 10/96	0.0004	1.05E-04
CO2	**24,653**	AP-42 Table 3.4-1, 10/96	880	220
CH4	**0.99**	40 CFR 98, Subpart C, Table C-2	0.035	0.009
N2O	**0.20**	40 CFR 98, Subpart C, Table C-2	0.007	0.002
GHGs as CO2e	**24,733**	40 CFR 98, Subpart A	883	221

University of Kentucky
Facilites Management
Office of the Vice President

October 10, 2024

Ms. Courtney Shattuck, Environmental Scientist V
KY Division for Air Quality, Florence Regional Office
8020 Veterans Memorial Dr., Ste 110
Florence, KY 41042

Subject: University of Kentucky – Main Campus, AI 1004, ID#21-067-00003
Initial Notification of Applicability and Notification of Compliance
40 CFR 63 Subpart CCCCCC

Dear Ms. Shattuck:

This letter serves to satisfy the Initial Notification of Applicability and Notification of Compliance of 40 CFR 63 Subpart 6C, Gasoline Dispensing Facilities (GACT 6C) which regulates the loading of gasoline storage tanks at gasoline dispensing facilities (GDFs). Affected sources under GACT 6C include GDFs that are located at an area source of HAP. A GDF is defined as "any stationary facility which dispenses gasoline into the fuel tank of a motor vehicle, motor vehicle engine, nonroad vehicle, or nonroad engine." As addressed in our Title V renewal application submitted October 2, 2024, UK determined that two underground gasoline storage tanks, currently permitted as insignificant activities, IA2, are subject to GACT 6C. UK has reviewed historical monthly gasoline throughput records from 2008 – 2023 for each of the two underground storage tanks / GDFs.

Initial Notification of Applicability

The Cooling #2 GDF located at building 204 (proposed EU95) has a monthly throughput less than 10,000 gallons per month of gasoline, on 365-day average basis. Therefore, UK is not required to submit Initial Notification of Applicability or Notification of Compliance status as specified in §63.11116.

The Agricultural Motor Pool GDF located at building 88 (proposed EU96) has a monthly throughput greater than 10,000 gallons per month of gasoline but less than 100,000 gallons per month, on a 365-day average. At this throughput level, the requirements as specified in §63.11117(b)(3) requires UK to submit an Initial Notification of Applicability and Notification of Compliance status as required under § 63.11124(a).

Notification of Compliance

The Cooling #2 GDF is subject to the requirements of 40 CFR 63.11116, as follows:

UK must not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Measures to be taken include, but are not limited to, the following:

1. Minimize gasoline spills;
2. Clean up spills as expeditiously as practicable;
3. Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use;
4. Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators.

UK is not required to submit notifications or reports as specified in 40 CFR 63.11125, 40 CFR 63.11126, or subpart A of Part 63; however, records must be available within 24 hours of a request by KDAQ to document gasoline throughput. The records are available for review within 24 hours.

The Agricultural Motor Pool GDF is subject to the requirements listed above for 40 CFR 63.11116, as well as the following requirements from 40 CFR 63.11117 as follows:

1. Only load gasoline by utilizing a submerged fill pipe, as specified in 40 CFR 63.11117(b)(1);
   The Agricultural Motor Pool GDF was installed in 1999 and utilizes submerged fill pipes 4 inches from the bottom of the tank.
2. Have records available within 24 hours of a request by the Administrator to document gasoline throughput;
   The records are available for review within 24 hours.
3. You must submit the Initial Notification of Applicability and Notification of Compliance status as required under § 63.11124(a).
   The Initial Notification of Applicability was required within 120 days of applicability (May 9, 2008). As of October 10, 2024, the University complies with the requirement.
   The Notice of Compliance was required within 60 days of applicable compliance date in §63.11113(b), March 10, 2011. As of October 10, 2024, the University complies with the requirement.

If you have any questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Mary S. Vosevich

Mary S. Vosevich
Vice President for Facilities Management
Chief Facilities Officer

Cc: Region IV EPA via CEDRI electronic submittal
Natasha Parker, KyDAQ

University of Kentucky
Facilities Management
® *Office of the Vice President*

May 23, 2025

Zachary Bittner
Environmental Control Manager
Kentucky Division for Air Quality
Permit Review Branch, Combustion Section
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

Submitted via eForms

RE: Significant Permit Revision Application for Central Heating Plant Coal Boiler Replacement – Campus Heating Upgrade Project
University of Kentucky – V-18-052 R1
Agency Interest: 1104

Mr. Bittner:

The University of Kentucky (UK) is an educational institution in Lexington, KY, which owns an adjacent source, UK Good Samaritan Hospital (Samaritan Hospital), regulated as a single major source under the Title V permit program (herein referred to collectively as UK) and operates in accordance with Title V permit V-18-052 R1, originally issued on April 2, 2020 by the Kentucky Division for Air Quality (KDAQ) and revised on October 3, 2021. The permit expires on April 2, 2025, and a timely renewal application was submitted on October 2, 2024.

As part of the Campus Heating Upgrade Project, UK is submitting this significant permit revision application to replace the existing coal-fired boilers at the Central Heating Plant (CHP) with a new and reliable natural gas-fired boiler, with ultra-low sulfur diesel (ULSD) as a backup fuel. Unrelated projects to install emergency generators to serve various campus buildings are being submitted separately in accordance with Section 502(b)(10) change notification procedures. Additionally, UK is in the planning stages of a second unrelated project. The second project will involve installing new boilers and generators to serve a planned Medical Center Upgrade and Expansion Project and ultimately replace the existing Medical Center Heating and Cooling Plant. The heating plant for the Medical Center Upgrade and Expansion Project is not designed or funded at this time.

APPLICATION SUMMARY

The changes associated with the Campus Heating Upgrade Project are submitted as a Significant Permit Revision (SPR) in accordance with 401 KAR 52:020, Section 16. A SPR is requested to implement federally-enforceable limits on back-up fuel use to avoid the Prevention of Significant Deterioration (PSD) permitting program.

The components required for a SPR, pursuant to 401 KAR 52:020, Section 5, are included in this application letter and its attachments. The required permit application forms (DEP7007AI, DD, A, EE, V, and N) are provided in **Attachment A**. A description of the Campus Heating Upgrade Project and regulatory review are provided within the letter, along with an analysis of potential emissions from the new boiler and associated equipment. Detailed supporting emission calculations are included in **Attachment B**).

PROJECT DESCRIPTION

The Campus Heating Upgrade Project will include the installation of one natural gas-fired boiler, proposed emission unit (EU) 97 (CHP Boiler #3), which is capable of producing 100,000 pounds per hour (lb/hr) of 150 psig steam. The boiler will primarily operate by combusting pipeline quality natural gas using ultra-low NO_X burner technology with maximum heat input rating of 120.9 MMBtu/hr. The boiler will alternately combust ULSD fuel in cases of natural gas supply interruptions. The maximum heat input capacity rating of the burner combusting ULSD is 115.6 MMBtu/hr.

To support the CHP Boiler #3, UK will require additional backup power and fuel storage. UK will install one new 500 kW diesel fueled emergency generator engine (proposed as EU98) to provide the backup power. To address fuel storage needs, UK will add one ULSD fixed-roof storage tank, which will be installed above-ground and proposed to be included in existing IA#1 "Fuel Oil Storage Tanks".

Prior to the installation of CHP Boiler #3, UK will decommission and demolish existing coal-fired boilers CHP Boiler #4 and #5. Additionally, the existing CHP emergency generator which is part of EU55 will be relocated on campus to Cooling Plant #2 (building 0204). Associated coal receiving equipment has already been removed, rendering the coal boilers inoperable.

Demolition of the coal boilers and associated equipment will proceed in earnest by the Summer of 2025 and is expected to be followed by the start of construction on the foundations for the new boilers around November 1, 2025, pending issue of the significant revision application.

APPLICABLE REGULATIONS SUMMARY

The following subsections discuss the applicability of regulatory requirements to the affected source, including any changes to applicability or requirements since the V-18-052 R1 was issued.

New Source Review (NSR) / PSD

Federal construction permitting programs regulate new and modified sources of attainment pollutants under the PSD program and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NA-NSR). UK is located in Fayette County, Kentucky, which is designated as in attainment/unclassifiable for all pollutants. Therefore, PSD permitting is potentially applicable to the facility. The PSD preconstruction permitting program in Kentucky has been approved by the US EPA and incorporated into the Kentucky State Implementation Plan (SIP) under 401 KAR 51:017 to implement the federal requirements of 40 CFR 51.166 or 52.21.

For the purposes of the PSD permitting program, a *major stationary source* can be summarized as:

- One of the 28 listed stationary sources that emits, or has the potential to emit, 100 tons per year (tpy) or more of any regulated NSR pollutant, where fugitive emissions from the listed source category must be included in the total; or
- Any source not belonging to one of the listed source categories that emits, or has the potential to emit, 250 tpy or more of any regulated NSR pollutant, where fugitive emissions are not included in the total.

One of the 28 listed stationary source categories (otherwise known as the List of 28) is "fossil fuel boilers (or combinations thereof) totaling more than 250 MMBtu/hr heat input", which applies to UK. The facility has a PTE greater than 100 tpy for particulate matter less than 10 microns and less than 2.5 microns

($PM_{10}/PM_{2.5}$), carbon monoxide (CO), nitrogen oxides (NO_X), and sulfur dioxide (SO_2) and is classified as an existing major stationary source.

As an existing major stationary source, PSD permitting is triggered for a regulated NSR pollutant only if the project is considered a major modification. To qualify as a major modification the project must result in both a significant emissions increase and a significant net emissions increase. As demonstrated by Table 1, maximum potential emissions from the new boilers and auxiliary combustion equipment (i.e., the project emissions increase, PEI) are less than the significant emission rate (SER) for each regulated NSR pollutant, when taking into account requested federally enforceable limits of fuel oil.[1] Therefore, PSD permitting is not required for the Campus Heating Upgrade Project.

Table 1. Project Emissions Increase

KyEIS ID, Permit ID	Description	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
New Emission Units								
COMB36, EU97	CHP Boiler #3, NG-Fired, FO Backup, 120 MMBtu/hr	2.36	2.36	2.36	6.78	19.48	2.84	0.18
EQPTTBD, EU98	EU98 Diesel-Fired Emergency Generator	0.01	0.01	0.01	1.70	0.22	0.01	0.00
IA-1	Diesel Storage Tanks (adding 1 tank)						<0.1	
Emissions Increase Summary								
Project Emission Increases		**2.4**	**2.4**	**2.4**	**8.5**	**19.7**	**2.9**	**0.2**
PSD/NSR Major Modification Threshold		25	15	10	40	100	40	40
Trigger PSD/NSR?		**No**	**No**	**No**	**No**	**No**	**No**	**No**

[1] A facility only triggers PSD requirements for GHG emissions if the requirements are also triggered for a traditional NSR pollutant. Since no NSR pollutants trigger PSD requirements, the proposed GHG emissions increase does not become subject to the PSD permitting program.

Federal Internal Combustion Engine Regulations

40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

NESHAP Subpart ZZZZ applies to new and existing reciprocating internal combustion engines. The requirements of this regulation are already incorporated into V-18-052 R1; and additional applicability for newly installed emergency generator engines as well as recent changes to the regulation were addressed in the Title V renewal application UK submitted in October 2024. The proposed new emergency generator for the CHP will be subject to NESHAP Subpart ZZZZ, as shown in the DEP7007V forms in Attachment B. Pursuant to 40 CFR §63.6590(c)(1), new emergency generator engines shall comply with NESHAP Subpart ZZZZ via compliance with New Source Performance Standard (NSPS) Subpart IIII.

40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

NSPS Subpart IIII applies to owners, and operators of stationary compression ignition internal combustion engines for which construction commences after July 11, 2005, where the stationary compression ignition internal combustion engines are either manufactured after April 1, 2006, and are not fire pump engines, or are manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006. The requirements of this regulation are already incorporated into V-18-052 R1; and additional applicability for newly installed emergency generator engines as well as recent changes to the regulation were addressed in the Title V renewal application UK submitted in October 2024. The proposed new emergency generator for the CHP will be subject to NSPS Subpart IIII, with specific requirements detailed in the DEP7007V forms in Attachment B.

National Emissions Standards for Hazardous Air Pollutants

A major source of HAP is one with potential emissions in excess of 25 tpy for total combined HAP and/or in excess of 10 tpy for any individual HAP. UK's Title V permit includes emissions limits for combined HAP below 22.5 tpy and below 9.0 tpy for any individual HAP; therefore, UK is classified as an area source of HAP. As such, UK is subject to certain area-source NESHAP standards.

40 CFR 63 Subpart JJJJJJ – Industrial, Commercial and Institutional Boilers at Area Sources of HAP Emissions

NESHAP Subpart JJJJJJ applies to each new, reconstructed, or existing affected source, located at an area source of HAP. The affected source includes the collection of existing and each new or reconstructed industrial, commercial or institutional boilers within a subcategory listed in 40 CFR 63.11200. The CHP Boiler #3 will be subject to NESHAP Subpart JJJJJJ.

Pursuant to 40 CFR 63.11201, the boiler must meet applicable emission limits in Table 1 to Subpart JJJJJJ, comply with the work practice standards of Table 2, and comply with the operating limits in Table 3 at all times except during periods of startup and shutdown. These requirements are as follows (and detailed in the DEP7007V form in Attachment A):

Emission Limits: None

- Pursuant to 40 CFR 63.1120(f), new or reconstructed boilers that combust only ultra-low-sulfur liquid fuel as defined in §63.11237, are not subject to the PM emission limit in Table 1 of this regulation

providing the facility monitors and records on a monthly basis the type of fuel combusted. A performance test is required if any fuel other than ULSD will be fired.

Work Practice Standards:

- Minimize the boiler's startup and shutdown periods and conduct startups and shutdowns according to the manufacturer's recommended procedures.
- Conduct a tune-up of the boiler biennially as specified in §63.11223, or every 5 years when using an oxygen trim system that maintains an optimum air-to-fuel ratio.

Operating Limits: None

Notifications, Recordkeeping, and Reporting:
UK has several boilers which are already in compliance with NESHAP Subpart JJJJJJ and will comply with the periodic reporting requirements already in the permit, as well as additional recordkeeping and notification requirements for the affected liquid-fired boilers under 40 CFR 63.11225.

- The initial notification required by 40 CFR 63.11225(a)(2) is satisfied by this permit application.
- A notification of compliance status report (NOCS) is not required, pursuant to 40 CFR 63.11225(a)(4) because the new boiler is subject only to a requirement to conduct a biennial or 5-year tune-up.

40 CFR 60 Subpart Db – Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

NSPS Subpart Db standards of performance apply to Industrial-Commercial-Institutional Steam Generating Units, greater than 100 MMBtu/hr, and installed after June 19, 1984. The CHP Boiler #3 will be subject to NSPS Subpart Db, including NO_X emissions and opacity standards and associated compliance demonstration requirements. The CHP Boiler #3 will be exempt from the SO_2 and PM (except opacity) standards, as described below. These requirements are already established for EU01 and EU02 (CHP Boiler #1 and #2) Section B of the current air permit.

Pursuant to 40 CFR 60.42b(k)(2), units firing only very low sulfur oil, gaseous fuel, a mixture of these fuels, or a mixture of these fuels with any other fuels with a potential SO_2 emission rate of 0.32 lb/MMBtu or less are exempt from the SO_2 emission limits in 40 CFR 60.42b(k)(1). CHP Boiler #3 will fire only natural gas or ULSD, both having an SO_2 emission rate less than 0.32 lb/MMBtu; therefore, the SO_2 emission limits in this section do not apply. Furthermore, pursuant to 40 CFR 60.34b(h)(5) the PM standards of §60.43b(h)(1) do not apply to boilers that commence construction after February 28, 2005, and that combust only natural gas and ULSD and not using a post-combustion technology to reduce SO_2 or PM emission.

Based on the design heat release rate for each of CHP Boiler #3, the boiler represents a high heat release rate unit and is subject to a NO_X limit of 0.20 lb/MMBtu under 40 CFR 60.44b(a). The vendor guarantees for these boilers (i.e., 9 ppmv @ 3% O2, which corresponds to 0.01 lb/MMBtu) ensures that the unit achieves compliance with the NSPS Db limit. UK will demonstrate compliance with this limit on a 30-day rolling average basis (including periods of startup, shutdown, or malfunction) using a Continuous Parametric Emissions Monitoring System (PEMS) for estimating NO_X.

Initial compliance will be demonstrated by conducting a NO_X performance test for 30 successive steam generating unit operating days, as required by 40 CFR 60.46b(e)(4). The 30-day average emission rate (i.e., the average of all hourly emissions data recorded by the monitoring system during the 30-day test period) is used to determine compliance with the NO_X limit. Following this initial demonstration, UK will

identify excess emissions with respect to the NO_x standard on a continuous basis as specified in a plan submitted pursuant to §60.49b(c).

While firing fuel oil, CHP Boiler #3 will be subject to 40 CFR 60.43b(f), which states that opacity shall not exceed 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity. This limit applies at all times the boiler is firing fuel oil, except during periods of startup, shutdown, or malfunction, as specified in 40 CFR 60.43b(g). UK will demonstrate compliance with this requirement through initial and subsequent performance testing using EPA Method 9, as required by 40 CFR 60.46b(d)(7) and 60.48b(a)(1).

The applicable requirements of NSPS Db are detailed in the DEP7007V forms in Attachment A.

40 CFR 60 Subpart Kc – Volatile Organic Liquid Storage Vessels

NSPS Subpart Kc standards of performance apply to each storage vessel with a capacity greater than or equal to 20,000 gallons that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after October 4, 2023. NSPS Subpart Kc will not apply to the proposed new ULSD storage tank, pursuant to 40 CFR 60.110c(b)(8), because it will only store VOL with a maximum true vapor pressure less than 0.25 psia.

Kentucky Administrative Regulations

401 KAR 59:015 – New Indirect Heat Exchangers

401 KAR 59:015 applies to indirect heat exchangers with a capacity greater than 1 MMBtu/hr and less than 250 MMBtu/hour and which commenced after April 9, 1972, and to indirect heat exchangers with a capacity greater than 250 MMBtu/hr and which commenced after August 17, 1971. The CHP Boiler #3 will be subject to the PM, opacity, and SO_2 emissions standards of this regulation.

PM shall not exceed 0.10 lb/MMBtu, pursuant to 401 KAR 59:015, Section 4(1)(c). Compliance is implicit based on the potential to emit emission factors while combusting natural gas.

Opacity shall not exceed 20 percent, except for one 6-minute period up to 27 percent in 60 consecutive minutes, pursuant to 401 KAR 59:015, Section 4(2). These limits do not apply while building a new fire, as long as the method used and duration of bringing the boiler up to operating conditions is consistent with manufacturer's recommendations. Compliance is assured with this standard while CHP Boiler #3 combusts natural gas. Compliance with NSPS Subpart Db assures compliance with this regulation while burning ULSD.

SO_2 emissions shall not exceed 0.8 lb/MMBtu, pursuant to 401 KAR 59:015, Section 5(1). Compliance with this limitation is assured through combustion of pipeline quality natural gas and ULSD, demonstrated by the fuel receipt records required by 40 CFR 60.49b(r)(1).

401 KAR 59:015 was revised, effective March 9, 2018. Changes were made to the startup, shutdown, and malfunction (SSM) provisions of the rule; whereby work practice standards must be met during periods of SSM and certain procedures must be followed for startup and shutdown periods (now defined in the rule). Because the new boiler is subject to 40 CFR 63, Subpart JJJJJJ, the units must meet the work practices standards established in Table 2 of that regulation pursuant to 401 KAR 59:015, Section 7 and 401 KAR 59:015, Section 7(2)(c).

401 KAR 63:020 – Potentially Hazardous Matter or Toxic Substances

Kentucky regulates the emissions of toxic air pollutant emissions through 401 KAR 63:020. KDAQ can require that dispersion modeling or other analyses be completed by facilities at permit renewal or when constructing equipment when there is an increase in toxic pollutant emissions, as defined under 401 KAR 63:020, Section 2(2), deemed to be "significant." This is done so that there is a documented basis for affirming that a facility does not cause an adverse impact. However, pursuant to 401 KAR 63:020, Section 1, the requirements of this rule are applicable only to the extent that such emissions are not elsewhere subject to the provisions of the KAR.

The CHP Boiler #3 emits toxic chemicals as a biproduct of fuel combustion; however, these emissions are elsewhere subject to the provisions of the KAR via their applicability to 40 CFR 63, Subpart JJJJJJ. Similarly, the emergency generator emits small amounts of toxic chemicals; however, these emissions are subject to 40 CFR 63 Subpart ZZZZ. Any emissions of toxic chemicals from the ULSD storage tank are expected to be negligible.

REQUESTED PERMIT LIMITS

UK is herein requesting federally enforceable limits to ensure the Campus Heating Upgrade Project is minor with respect to PSD for all pollutants. When using the manufacturer's guaranteed emission rates for NO_X based on the burner design, NO_X emissions remain well below the SER of 40 tpy when firing the worst-case fuel (ULSD) exclusively. In contrast, potential $PM_{2.5}$ emissions would exceed the SER of 10 tpy using AP-42 emission factors if ULSD was fired exclusively. Since ULSD is intended as a back-up fuel only, a more realistic PTE would be calculated by assuming no more than 500 hours of operation on fuel oil would be necessary in any 12month period. As such, UK is seeking a limit restricting the amount of backup ULSD allowed to be fired in the boiler on a 12-month rolling basis to the equivalent of 500 hours at maximum capacity, or 414 Mgal/12-months. The requested limits are as follows:

- 413,000 gallons ULSD per rolling 12 months

401 KAR 52:020, Section 16 provides procedures for existing Title V sources to obtain significant permit revisions for modifications that involve significant changes in the monitoring requirements or a relaxation in the reporting or recordkeeping requirements contained in the permit. Based on UK's request for a limit to preclude PSD permitting under 401 KAR 51:017, UK has prepared this submittal in accordance with the requirements for significant permit revisions, which follow the same procedures that are required for initial permits and permit renewals per 401 KAR 52:020, Section 16(2).

This permit action is not a modification under Title I of the Clean Air Act as this term is defined at 401 KAR 52:001 Section 1(52). Kentucky's Title V permitting rules define *modification* under Title I of the Act as "a change at a facility that would constitute a modification under 42 USC 7470 to 7492 or 42 USC 7501 to 7515." This includes PSD and NA-NSR modifications. The proposed changes do not trigger PSD permitting, provided that 12-month rolling ULSD usage from the Campus Heating Upgrade Project remains below the proposed limit. Therefore, this permit action is not considered a modification under Title I of the Act.

If you have any questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Barry K. Swanson
Chief Procurement Officer
Acting Chief Facilities Officer, Facilities Management

Attachments

ATTACHMENT A – DEP7007 Forms

DEP7007AI – Administrative Information
DEP7007A – Indirect Heat Exchangers
DEP7007EE – Internal Combustion Engines
DEP7007N - Emissions
DEP7007V - Applicable Requirements
DEP7007DD – Insignificant Activities

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information
___ Section AI.2: Applicant Information
___ Section AI.3: Owner Information
___ Section AI.4: Type of Application
___ Section AI.5: Other Required Information
___ Section AI.6: Signature Block
___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

None

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May-25

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D. Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D. Peterson Service Bldg.				
	City:	Lexington	**State:**	KY	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: -84.50496 (decimal degrees) **Latitude:** 38.03895 (decimal degrees)

Primary (NAICS) Category: University **Primary NAICS #:** 611310

Classification (SIC) Category: University **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: The University of Kentucky is classified under Standard Industrial Code (SIC) 8221 for Colleges, Universities, and Professional Schools, and the Main Campus also includes UK HealthCare, which includes the hospitals and clinics of the University of Kentucky, and Samaritan Hospital. The majority of emission sources at are boilers and emergency generators, combusting natural gas, diesel, and coal.

Description of Area Surrounding ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employee ~17,000

distance to nearest residence or commercial 40 ft

Property Area: 600 acres

Is this source portable? ☐ Yes ☐ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☐ Currently Hold	☐ Need	☑ N/A
RCRA:	☐ Currently Hold	☐ Need	☑ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity: ☐ Mixed Waste Generator ☐ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☑ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual) N/A

Mailing Address:
Street or P.O. Box: 225 Frank D. Peterson Service Bldg.
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual) andrea.smith@uky.edu

Phone: (859) 218-6265

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: Same as Applicant
City: **State:** **Zip Code:**

Email:

Phone: (502) 218-6265

Air Permit Contact for Source

Name: Same as technical contact.

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name:

Title:

Mailing Address: **Street or P.O. Box:**

City: **State:** **Zip Code:**

Email:

Phone:

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position
State Owned University	

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☑ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide Operating Permit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origir ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	9 tpy (retain current limit)
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	22.5 tpy (retain current limit)
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	413 Mgal/12-months (CHP Boiler 3)

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Q3 2025 **Proposed Operation Start-Up Date:** *(MM/YYYY)* Q1 2026

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* _____ **Proposed Operation Start-Up Date:** *(MM/YYYY)* _____

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☑ **No** **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certificatio On file w KDAQ - Submitted January 2025
- [x] DEP7007DD Insignificant Activities
- [x] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting proc On file w KDAQ
- [ ] Digital Line Graphs (DLG) files of buildings, roads, etc.
- [ ] Site Map On file w KDAQ
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.



Authorized Signature

5/28/2025

Date

Barry K. Swanson

Type or Printed Name of Signatory

Chief Facilities Officer, Facilities Management

Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information
___ Section A.2: Operating and Fuel Information
___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG
____ Manufacturer's specifications

Source Name: University of Kentucky
KY EIS (AFS) #: 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May-25

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
EU97	Central Heating Plant Boiler #3	1	Natural Gas Combustion w/ LNB	Indirect Heat Exchanger	Industrial Watertube Boiler	Babcock & Wilcox	FM103-97	Q3 2025	10300601	Million Cubic Feet	na	S-97
EU97	Central Heating Plant Boiler #3	2	No. 2 Fuel Oil Back-up	Indirect Heat Exchanger	Industrial Watertube Boiler	Babcock & Wilcox	FM103-97	Q3 2025	10300501	1000 Gallons	na	S-97

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
EU97					120.3	100	lb Steam / hr	N/A	Primary	Natural Gas	1,020	Btu/scf	8,760	N/A	N/A
EU97					115.6	100	lb Steam / hr	N/A	Secondary	No. 2 Fuel Oil	140	Btu/Mgal	500	N/A	0.0015%

Section A.3: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007EE

Internal Combustion Engines

___ Section EE.1: General Information
___ Section EE.2: Operating Information
___ Section EE.3: Design Information
___ Section EE.4: Fuel Information
___ Section EE.5: Emission Factor Information
___ Section EE.6: Notes, Comments, and Explanations

Additional Documentation

__ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG

__ Attach EPA certification of the engine

Source Name: University of Kentucky
KY EIS (AFS) #: 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May-25

Section EE.1: General Information

Emission Unit #	Emission Unit Name	Control Device ID	Stack ID	Manufacturer	Model Number	Model Year	Date of Manufacture	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date Reconstructed/ Modified	List Applicable Regulations
EU98	Diesel-Fired Emergency Generator	N/A	S-97	Caterpillar	Cat® C15 In-line 6, 4-cycle Diesel	TBD	TBD	Q12026	N/A	40 CFR 63 Subpart ZZZZ, 40 CFR 60 Subpart IIII

Section EE.2: Operating Information

Emission Unit #	Engine Purpose (Identify if Non-Emergency, Emergency,Fire/Water Pump, Black-start engine for combustion turbine, Engine Testing)	Hours Operated	Is this engine a rental? *(Yes/No)*	Rental Time Period *(hrs)*	Alternate Operating Scenarios (Describe any operating scenarios in which the engine may be used in a different configuration)
EU98	Emergency	500	No	N/A	N/A

Section EE.3: Design Information

Emission Unit #	Engine Type (Identify all that apply: Commercial, Institutional, Stationary, Non-Road)	Ignition Type (Identify if either Compression or Spark Ignition)	Engine Family (Identify all that apply: 2-stroke, 4-stroke, Rich Burn, Lean Burn)	Maximum Engine Power *(bhp)*	Maximum Engine Speed *(rpm)*	Total Displacement *(L)*	Number of Cylinders
EU98	Non-Road	Compression Ignition	4-Stroke	670	TBD	15.2	6

Section EE.4: Fuel Information

Emission Unit #	Identify if Primary, Secondary, or Tertiary Fuel	Fuel Type (Identify if Diesel, Gasoline, Natural Gas, Liquefied Petroleum Gas (LPG), Landfill/Digester Gas, or Other)	Fuel Grade	Percent Time Used *(%)*	Maximum Fuel Consumption	Heat Content	Sulfur Content *(%)*	SCC Code	SCC Units
EU98	Primary	Diesel	ULSD	100%	0.035 Mgal/hr	137,000 Btu/gal	0.0015%	20300101	1000 Gallons Distillate Oil (Diesel) Burned

Section EE.5: Emission Factor Information

Emission factors expressed here are based on the potential to emit.

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor
EU98	Diesel	PM/PM10/PM2.5	1.26	lb/Mgal	Manufacturer Specifications
EU98	Diesel	NOx	192.5	lb/Mgal	Manufacturer Specifications
EU98	Diesel	CO	25.11	lb/Mgal	Manufacturer Specifications
EU98	Diesel	VOC	1.26	lb/Mgal	Manufacturers Specifications (TOC)
EU98	Diesel	SO2	0.20	lb/Mgal	AP-42 Table 3.4-1, 10/96
EU98	Diesel	CO2	21922	lb/Mgal	AP-42 Table 3.4-1, 10/96
EU98	Diesel	N2O	0.18	lb/Mgal	40 CFR 98, Subpart C, Table C-2
EU98	Diesel	CH4	0.88	lb/Mgal	40 CFR 98, Subpart C, Table C-2
EU98	Diesel	Benzene	1.03E-01	lb/Mgal	AP-42 Table 3.4-3
EU98	Diesel	Toluene	3.73E-02	lb/Mgal	AP-42 Table 3.4-3
EU98	Diesel	Xylene	2.56E-02	lb/Mgal	AP-42 Table 3.4-3
EU98	Diesel	Formaldehyde	1.05E-02	lb/Mgal	AP-42 Table 3.4-3
EU98	Diesel	Total HAP	0.18	lb/Mgal	AP-42 Table 3.4-3

Section EE.6: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May-25

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU96	Central Heating Plant Boiler #3	1	Natural Gas Combustion w/ LNB	--	--	S-97	0.12	CO	37.68	Vendor guarantee	--	--	4.44	4.44	19.47	19.47
								NOx	11.14	Vendor guarantee	--	--	1.31	1.31	5.76	5.76
								PM	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	--	--	0.41	0.41	1.78	1.78
								PM10	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	--	--	0.41	0.41	1.78	1.78
								PM2.5	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	--	--	0.41	0.41	1.78	1.78
								SO2	0.29	Maximum based on 12/20/2024 analysis	--	--	0.03	0.03	0.15	0.15
								VOC	5.50	AP-42 Table 1.3-3	--	--	0.65	0.65	2.84	2.84
								H2SO4	2.19E-03	1.53% conversion of SO2 to H2S	--	--	2.58E-04	2.58E-04	1.13E-03	1.13E-03
								Lead	5.00E-04	AP-42, Section 1.4	--	--	5.90E-05	5.90E-05	2.58E-04	2.58E-04
								CO2	120,000	AP-42, Section 1.4	--	--	14,154	14,154	61,994	61,994
								CH4	2.30	AP-42, Section 1.4	--	--	0.27	0.27	1.19	1.19
								N2O	0.64	AP-42, Section 1.4	--	--	0.08	0.08	0.33	0.33
								CO2e	120,234	GWP from Subpart 98	--	--	14,181	14,181	62,114	62,114

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU96	Central Heating Plant Boiler #3	2	No. 2 Fuel Oil Back-up	--	--	S-97	0.83	CO	5.46	Vendor guarantee	--	--	4.51	4.51	1.13	1.13
								NOx	6.55	Vendor guarantee	--	--	5.41	5.41	1.35	1.35
								PM	3.30	Vendor guarantee + AP-42 condensable	--	--	2.73	2.73	0.68	0.68
								PM10	3.30	PM=PM10	--	--	2.73	2.73	0.68	0.68
								PM2.5	3.30	PM = PM2.5	--	--	2.73	2.73	0.68	0.68
								SO2	0.21	AP-42 Table 1.3-1	--	--	0.18	0.18	0.044	0.044
								VOC	0.34	AP-42 Table 1.3-3	--	--	0.28	0.28	0.070	0.070
								H2SO4	1.63E-03	AP-42 Table 1.3-1	--	--	1.35E-03	1.35E-03	3.37E-04	3.37E-04
								Lead	1.26E-03	AP-42 Table 1.3-1	--	--	1.04E-03	1.04E-03	2.60E-04	2.60E-04
								CO2	22,300	AP-42 Table 1.3-12	--	--	18,416	18,416	4,604	4,604
								CH4	0.22	AP-42 Table 1.3-3	--	--	0.18	0.18	0.045	0.045
								N2O	0.26	AP-42 Table 1.3-9	--	--	0.21	0.21	0.054	0.054
								CO2e	22,375	GWP from Subpart 98	--	--	18,478	18,478	4,619	4,619
EU98	Diesel-Fired Emergency Generator	1	No. 2 Fuel Oil	N/A	N/A	S-97	0.035	PM/PM10/PM2.5	1.26	Manufacturer Specifications	--	--	0.044	0.044	0.011	0.011
								NOx	192.5	Manufacturer Specifications	--	--	6.79	6.79	1.70	1.70
								CO	25.11	Manufacturer Specifications	--	--	0.89	0.89	0.22	0.22
								VOC	1.26	Manufacturers Specifications (TOC)	--	--	0.044	0.044	0.011	0.011
								SO2	0.20	AP-42 Table 3.4-1, 10/96	--	--	7.11E-03	7.11E-03	1.78E-03	1.78E-03
								CO2	21,922	AP-42 Table 3.4-1, 10/96	--	--	773.9	773.9	193.5	193.5
								N2O	0.18	40 CFR 98, Subpart C, Table C-2	--	--	6.20E-03	6.20E-03	1.55E-03	1.55E-03
								CH4	0.88	40 CFR 98, Subpart C, Table C-2	--	--	0.031	0.031	0.0078	0.0078
								Benzene	0.103	AP-42 Table 3.4-3	--	--	3.64E-03	3.64E-03	9.10E-04	9.10E-04
								Toluene	0.037	AP-42 Table 3.4-3	--	--	1.32E-03	1.32E-03	3.29E-04	3.29E-04
								Xylene	0.026	AP-42 Table 3.4-3	--	--	9.05E-04	9.05E-04	2.26E-04	2.26E-04
								Formaldehyde	0.010	AP-42 Table 3.4-3	--	--	3.70E-04	3.70E-04	9.25E-05	9.25E-05
								Total HAP	0.18	AP-42 Table 3.4-3	--	--	6.39E-03	6.39E-03	1.60E-03	1.60E-03

Section N.2: Stack Information

UTM Zone: 16

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
S-97	Central Heating Plant Boiler #3	4.0	60.0	942.7	718,870.4	4,213,304.4	22,500	307	29.9
S-97	Diesel-Fired Emergency Generator	0.5	41.0	942.8	718,868.6	4,213,302.9	5,997	847	511.7

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
Not Applicable for this Application								

Section N.4: Notes, Comments, and Explanations
1. Fuel oil emissions for EU97 are based on the requested limitation of 413,000 gallons per year (approx. 500 hours).

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitatio
___ Section V.2: Monitoring Requirem
___ Section V.3: Recordkeeping Requi
___ Section V.4: Reporting Requireme
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanatio

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) # 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May-25

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU97	Central Heating Plant Boiler #3	NESHAP JJJJJJ: 401 KAR 59:015, Section 7(2)(c)	N/A	N/A	N/A	Meet the work practice standards established in 40 CFR Part 63, Table 2 to Subpart JJJJJJ, as established in 401 KAR 63:002, Section 2(4)(jjjjj).	Refer to V.3 recordkeeping and V.4 reporting requirements.
EU97	Central Heating Plant Boiler #3	NESHAP JJJJJJ: 401 KAR 59:015, Section 7(2)(c) and 40 CFR 63.11201(b) referencing Table 2, Item 1.	N/A	N/A	N/A	Minimize the boilers' startup and shutdown periods and conduct startups and shutdowns according to the manufacturer's recommended procedures. If manufacturer's recommended procedures are not available, the permittee shall follow recommended procedures for a unit of similar design for which manufacturer's recommended procedures are available.	Refer to V.3 recordkeeping and V.4 reporting requirements.

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU97	Central Heating Plant Boiler #3	NSPS Db: 40 CFR 60.42b(k)(2); 40 CFR 60.43b(h)(5); and 40 CFR 60.48b(j)(7)	N/A	N/A	N/A	Only use natural gas and very low sulfur oil that contains no more than 0.30 weight percent sulfur.	Purchase only compliant diesel fuel and submit reports to the Administrator certifying that only very low sulfur oil is used.
EU97	Central Heating Plant Boiler #3	NESHAP JJJJJJ: 401 KAR 59:015, Section 7(2)(c); 40 CFR 63.11201(b) referencing Table 2, Item 5.; and 40 CFR 63.11223(b) and (c)	N/A	N/A	N/A	Conduct a tune-up of the boiler every 5 years when oxygen trim system is operated (in lieu of biennially) to demonstrate continuous compliance as specified in 40 CFR 63.11223(b)(1) through (7).	Perform a tune-up within 180 days of startup. Refer to V.3 recordkeeping and V.4 reporting requirements.
EU97	Central Heating Plant Boiler #3	NESHAP JJJJJJ: 40 CFR 63.11205(a)	N/A	N/A	N/A	Operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions.	Minimize startup and shutdown events.
EU97	Central Heating Plant Boiler #3	401 KAR 59:015, Section 4(1)(c)	PM	0.10 lb/MMBtu	N/A	Particulate matter (PM) emissions from each stack shall not exceed 0.10 lbs/MMBtu.	Units are assumed in compliance with the 401 KAR 59:015 PM emission standard while combusting natural gas or fuel oil based on AP-42 emission factors, manufacturer specifications or most recently approved stack test.
EU97	Central Heating Plant Boiler #3	NESHAP JJJJJJ: 40 CFR 63.11210(f)	N/A	N/A	N/A	The permittee is not subject to the PM emission limitation in 40 CFR 63, Subpart JJJJJJ, Table 1 while combusting only ultra-low-sulfur liquid fuel. If the permittee intends to burn a fuel other than ultra-low-sulfur liquid fuel or gaseous fuels as defined in 40 CFR 63.11237, the permittee shall conduct a performance test within 60 days of burning the new fuel.	Compliance is assumed while combusting ultra-low-sulfur liquid fuel.

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU97	Central Heating Plant Boiler #3	401 KAR 59:015, Section 4(2)(a)	Visible Emissions (VE)	20% Opacity	N/A	While combusting natural gas, opacity emissions from each stack shall not exceed 20 percent opacity except: a maximum of 27 percent opacity shall be allowed for one six minute period in any 60 consecutive minutes.	These units are assumed to be in compliance while combusting natural gas.
EU97	Central Heating Plant Boiler #3	401 KAR 59:015, Section 4(2)(c)	Visible Emissions (VE)	20% Opacity	N/A	While combusting natural gas, opacity emissions from each stack shall not exceed 20 percent opacity except: for emissions caused by building a new fire, emissions during the period required to bring the boiler up to operating conditions shall be allowed, if the method used is recommended by the manufacturer and the time does not exceed the manufacturer's recommendations.	These units are assumed to be in compliance while combusting natural gas.
EU97	Central Heating Plant Boiler #3	NSPS Db: 40 CFR 60.43b(f) & 40 CFR 60.43b(g)	Visible Emissions (VE)	20% Opacity	N/A	While combusting fuel oil, visible emissions from each stack shall not exceed 20 percent opacity (6-minute average) except for one 6-minute period per hour of not more than 27 percent opacity. This opacity standard applies at all times, except during periods of startup, shutdown, or malfunction.	Refer to V.2 monitoring, V5 testing, V.3 recordkeeping, and V.4 reporting requirements.
EU97	Central Heating Plant Boiler #3	401 KAR 59:015, Section 5(1)	SO2	0.8 lb/MMBtu	N/A	Sulfur dioxide (SO2) emissions from each stack shall not exceed 0.8 lb/MMBtu.	Units are assumed to be in compliance while combusting natural gas. While burning fuel oil, the facility shall obtain fuel receipts that certify that the oil meets the definition of distillate oil and certify reports to the Administrator certifying that only very low sulfur oil (per 40 CFR 60, Subpart Db) was combusted during the reporting period.

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU97	Central Heating Plant Boiler #3	NSPS Db: 40 CFR 60.44b(a) and (i) and 40 CFR 60.44b(h)	NOX	0.20 lb/MMBtu	N/A	Emissions of nitrogen oxides (expressed as NO2) from each stack shall not exceed 0.20 lb/MMBtu based on a 30-day rolling average. This NOX standard applies at all times including periods of startup, shutdown, or malfunction.	Refer to V.2 monitoring, V.5 testing, V.3 recordkeeping, and V.4 reporting requirements.
EU97	Central Heating Plant Boiler #3	To Preclude Applicability of 401 KAR 51:017	Fuel Oil (USLD) Usage	NA	413,000 gallons ULSD / 12-months	This unit shall combust more than 413,000 gallons fuel oil per year (12 month rolling total).	Refer to V.2 monitoring and V.3 recordkeeping.
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4211(f)	NA	NA	NA	In order for the engines to be considered emergency stationary ICE (Internal Combustion Engine) under 40 CFR 60, Subpart IIII, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1)-(3) is prohibited. If the permittee does not operate the engines according to these requirements, the engines will not be considered emergency engines and shall meet all requirements for non-emergency engines.	
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4211(a)	NA	NA	NA	The permittee shall operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions, change only those emission-related settings that are permitted by the manufacturer; and meet the requirements of 40 CFR parts 89, 94 and/or 1068, as they apply.	

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4207(b)	NA	NA	NA	The permittee shall use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to October 1, 2010, may be used until depleted	
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4206	NA	NA	NA	The permittee shall operate and maintain the stationary CI ICE such that the emission standards required in 40 CFR 60.4205 are achieved over the entire life of the engine.	
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4211(g)	NA	NA	NA	If the engine and control device are not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or emission-related settings are changed in a way that is not permitted by the manufacturer, the permittee shall demonstrate compliance according to 40 CFR 60.4211(g)(3)	
EU98	Diesel-Fired Emergency Generator	NSPS IIII: 40 CFR 60.4205(b) 40 CFR 60.4211(c)	All	NA	NA	The emergency engines shall comply with the emission standards for new nonroad CI engines in 40 CFR 60.4202 for all pollutants, for the same model year and maximum engine power	Purchase engine certified to the emission standards in 40 CFR 60.4204(b), for the same model year and maximum engine power. The engine shall be installed and configured according to the manufacturer's emission-related specifications

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(d)(1)	Fuel Usage	The permittee shall monitor the amount of natural gas combusted (in MMscf) and the amount of fuel oil combusted (in gallons) during each day.
EU97	Central Heating Plant Boiler #3	N/A	401 KAR 52:020, Section 10	Fuel Usage	Monitor the total amount of ULSD consumed (in gallons) on a monthly and on a consecutive twelve (12) month rolling total basis.
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.48b(g)	Emission Rate	Comply with the provisions of paragraphs (b), (c), (d), (e)(2), (e)(3), and (f) of 40 CFR 60.48b (NOX CEMS) or monitor steam generating unit operating conditions and predict NOX emission rates as specified in a plan submitted pursuant to 40 CFR 60.49b(c).
EU97	Central Heating Plant Boiler #3	NOX and O2/CO2	NSPS Db: 40 CFR 60.48b(b)(1)	Fuel Usage	If the option to operate NOX CEMS is selected, the permittee shall install, calibrate, maintain, and operate CEMS for measuring NOX and O2 (or CO2) emissions discharged to the atmosphere, and shall record the output
EU97	Central Heating Plant Boiler #3	Visible Emissions (VE)	NSPS Db: 40 CFR 60.48b(a)	Opacity	While combusting fuel oil, the permittee shall conduct a performance test using U.S. EPA Reference Method 9 to demonstrate compliance with the applicable limit in 40 CFR 60.43b, and shall comply with either 40 CFR 60.48b(a)(1), (2), or (3).
EU98	Diesel-Fired Emergency Generator	NA	NSPS IIII: 40 CFR 60.4209(a)	Hours	The permittee shall install non-resettable hour meters prior to startup of each engine.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(d)(1)	Fuel Usage	Maintain records of the amount of natural gas combusted (in MMscf) and the amount of fuel oil combusted (in gallons) each day.
EU97	Central Heating Plant Boiler #3	N/A	401 KAR 52:020, Section 10	Fuel Usage	Compile and maintain records of the total amount of ULSD consumed (in gallons) on a monthly and on a consecutive twelve (12) month rolling total basis.
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.49b(g)	Emissions Rates	The permittee shall maintain records obtained through the use of CEMS or PEMS consisting of the information specified in 40 CFR 60.49b(g).
EU97	Central Heating Plant Boiler #3	Visable Emissions	NSPS Db: 40 CFR 60.49b(f)(1)	Opacity	For each performance test conducted using Method 9 of appendix A-4 of this part, the owner or operator shall keep the records including the information specified in 40 CFR 60.49 (f)(1)(i) through (iii).
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(r)(1)	Fuel Sulfur Conent	The permittee shall obtain and maintain at the affected facility fuel receipts (such as a current, valid purchase contract, tariff sheet, or transportation contract) from the fuel supplier that certify that the oil meets the definition of distillate oil and gaseous fuel meets the definition of natural gas as defined in 40 CFR 60.41b and the applicable sulfur limit. For the purposes of 40 CFR 60, Subpart Db the distillate oil need not meet the fuel nitrogen content specification in the definition of distillate oil.
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b	N/A	The permittee shall maintain records of all performance tests.
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(o)	N/A	All records required under 40 CFR 60.49b shall be maintained for a period of 2 years following the date of such record.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU97	Central Heating Plant Boiler #3	CO	40 CFR 63.11223(b)(6)	Concentration	The permittee shall maintain on-site and submit, if requested by the Administrator, a report containing the concentrations of CO in the effluent stream in parts per million, by volume, and oxygen in volume percent, measured at high fire or typical operating load, before and after the tune-up of each boiler; a description of any corrective actions taken as a part of the tune-up of each boiler; and the type and amount of fuel used over the 12 months prior to the tune-up of each boiler. Units sharing a fuel meter may estimate the fuel use by each unit.
EU97	Central Heating Plant Boiler #3	N/A	NESHAP JJJJJJ: 40 CFR 63.11225(c)	N/A	The permittee shall maintain a copy of the following: - Each notification and report that was submitted to comply with 40 CFR 63, Subpart JJJJJJ and all documentation supporting any Initial Notification or Notification of Compliance Status that was submitted - Records to document conformance with the work practices, emission reduction measure, and management practices required by 40 CFR 63.11214 and 40 CFR 63.11223 - Records of the occurrence and duration of each malfunction of the boiler, or of the associated air pollution control and monitoring equipment - Records of actions taken during periods of malfunction to minimize emissions in accordance with the general duty to minimize emissions in 40 CFR 63.11205(a), including corrective actions to restore the malfunctioning boiler, air pollution control, or monitoring equipment to its normal or usual manner of operation - Records of all inspection and monitoring data required by 40 CFR 63.11221 and 63.11222.
EU97	Central Heating Plant Boiler #3	N/A	NESHAP JJJJJJ: 40 CFR 63.11225(d)	N/A	Records shall be in a form suitable and readily available for expeditious review. The permittee shall keep each record for 5 years following the date of each recorded action. The permittee shall keep each record on-site or be accessible from a central location by computer or other means that instantly provide access at the site for at least 2 years after the date of each recorded action. The permittee may keep the records off site for the remaining 3 years.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU98	Diesel-Fired Emergency Generator	N/A	NSPS IIII: 40 CFR 60.4214(b)	Hours	The permittee shall record the time of operation of the engine and the reason the engine was in operation during that time.
EU98	Diesel-Fired Emergency Generator	N/A	401 KAR 52:020, Section 10	Hours	The permittee shall maintain records of the manufacturer's certified emissions certificate, manufacturer's written operating instructions, and any procedures developed by the permittee that are approved by the engine manufacturer, over the entire life of the engine.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(d)(1)	Annual Capacity	The permittee shall calculate the annual capacity factor individually for natural gas and fuel oil for the reporting period. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of each calendar month.
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(a)	Initial Startup Notification	The permittee shall submit notification of the date of initial startup, as provided by 40 CFR 60.7.
EU97	Central Heating Plant Boiler #3	SO2/PM/NOX	NSPS Db: 40 CFR 60.49b(b)	Performance Test Data	The permittee of each affected facility subject to the SO2, PM, or NOX emission limits under 40 CFR 60.42b, 60.43b, and 60.44b shall submit to the Administrator the performance test data from the initial performance test and the performance evaluation of the CEMS using the applicable performance specifications in Appendix B of 40 CFR Part 60.
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.49b(c)	Emission Rates and Operating Conditions	The permittee of each affected facility subject to the NOX standard in 40 CFR 60.44b who seeks to demonstrate compliance with those standards through the monitoring of steam generating unit operating conditions in the provisions of 40 CFR 60.48b(g)(2) shall submit to the Administrator for approval a plan that identifies the operating conditions to be monitored in 40 CFR 60.48b(g)(2) and the records to be maintained in 40 CFR 60.49b(g). This plan shall be submitted to the Administrator for approval within 360 days of the initial startup of the affected facility. If the plan is approved, the permittee shall maintain records of predicted nitrogen oxide emission rates and the monitored operating conditions, including steam generating unit load, identified in the plan.
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.49b(h) and 40 CFR 60.49b(h)(4)	Excess Emissions	The permittee shall submit excess emission reports for any excess emissions that occurred during the reporting period. For purposes of 40 CFR 60.48b(g)(1), excess emissions are defined as any calculated 30-day rolling average NOX emission rate, as determined under 40 CFR 60.46b(e), that exceeds the applicable emission limits in 40 CFR 60.44b.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.49b(h) and 40 CFR 60.49b(h)(4)	Emission Rates	The permittee shall submit reports consisting of the information specified in 40 CFR 60.49b(i) using data obtained through CEMS.
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.49b(v)	Quarterly Reports	The permittee may submit electronic quarterly reports for NOX in lieu of submitting the written reports required under paragraphs 40 CFR 60.49b(h), (i), (j), (k) or (l). The format of each quarterly electronic report shall be coordinated with the permitting authority. The electronic report(s) shall be submitted no later than 30 days after the end of the calendar quarter and shall be accompanied by a certification statement from the permittee, indicating whether compliance with the applicable emission standards and minimum data requirements of 40 CFR 60 Subpart Db was achieved during the reporting period. Before submitting reports in the electronic format, the permittee shall coordinate with the permitting authority to obtain their agreement to submit reports in this alternative format.
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(w)	Semi-Annual Reports	The reporting period for the reports required under 40 CFR 60, Subpart Db is each 6 month period. All reports shall be submitted to the Administrator and shall be postmarked by the 30th day following the end of the reporting period.
EU97	Central Heating Plant Boiler #3	N/A	NSPS Db: 40 CFR 60.49b(r)(1)	Fuel Sulfur Content	Reports shall be submitted to the Administrator certifying that only very low sulfur oil meeting the definition in 40 CFR 60, Subpart Db, natural gas, wood, and/or other fuels that are known to contain insignificant amounts of sulfur were combusted in the affected facility during the reporting period.
EU97	Central Heating Plant Boiler #3	N/A	NESHAP JJJJJJ: 40 CFR 63.11225(a)(1) and (2)	Initial Startup Notification	The permittee shall submit to the Administrator all of the notifications in 40 CFR 63.7(b); 63.8(e) and (f); and 63.9(b) through (e), (g), and (h) that apply.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU97	Central Heating Plant Boiler #3	N/A	NESHAP JJJJJJ: 40 CFR 63.11225(b)(1) and (2)	Annual Compliance Certification	The permittee shall prepare, by March 1 of each year, and submit to the delegated authority upon request, an annual compliance certification report for the previous calendar year containing the company name and address and a statement by a responsible official, with the official's name, title, phone number, email address, and signature, certifying the truth, accuracy and completeness of the notification and a statement of whether the source has complied with all the relevant standards and other requirements of 40 CFR 63, Subpart JJJJJJ.
EU98	Diesel-Fired Emergency Generator	N/A	NSPS IIII: 40 CFR 60.4214(d)	N/A	If the engine operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(3) the permittee shall submit an annual report by March 31 of the following calendar year.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU97	Central Heating Plant Boiler #3	NOX	NSPS Db: 40 CFR 60.46b(e)(4)	NOX, 30-day rolling average	Following the date on which the initial performance test is completed, the permittee shall upon request determine compliance with the NOX standards in 40 CFR 60.44b through the use of a 30-day performance test. During periods when performance tests are not requested, NOX emissions data collected pursuant to 40 CFR 60.48b(g)(1) or 40 CFR 60.48b(g)(2) shall be used to calculate a 30-day rolling average emission rate on a daily basis and used to prepare excess emission reports, but will not be used to determine compliance with the NOX emission standards. A new 30-day rolling average emission rate shall be calculated for each steam generating unit operating day as the average of all of the hourly NOX emission data for the preceding 30 steam generating unit operating days.
EU97	Central Heating Plant Boiler #3	Visible Emissions (VE)	NSPS Db: 40 CFR 60.46b(d)(7)	Opacity/Method 9	To determine compliance with the opacity limits under 40 CFR 60.43b (fuel oil), the permittee shall conduct an initial performance test as required under 40 CFR 60.8, and shall conduct subsequent performance tests as requested by the Administrator, using U.S. EPA Reference Method 9 of Appendix A of 40 CFR Part 60.
EU97	Diesel-Fired Emergency Generator	N/A	401 KAR 50:045, Section 4	N/A	Testing shall be conducted at such times as may be required by the Cabinet.

Section V.6: Notes, Comments, and Explanations

Division for Air Quality
300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: University of Kentucky
KY EIS (AFS 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May-25

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3… etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
IA01	Fuel Oil Storage Tanks	N/A	N/A	Negligible, <0.1 tpy VOC
~~IA2~~	~~Underground Gasoline Storage Tanks~~	~~N/A~~	~~N/A~~	Move to Section B
IA03	Laboratory Fume Hoods	N/A	N/A	Negligible
IA04	TSD Consolidation	N/A	N/A	<0.26 tpy VOC/HAP based on RCRA permit limit of 300hr/yr, 3 drums/hr, and worst-case emitting volatile as Chloroform
IA05	Transportation Research Center Spray Booth (Usage less than 5 gal/yr)	N/A	401 KAR 59:010	VOC/PM < 0.03 tpy, assuming 100% VOC or PM (max 10 lb/gal), usage <5 gal/yr
IA06	Arts and Visual Bldg. Paint Spray Booth (Usage less than 50 gal/yr)	N/A	401 KAR 59:010	VOC/PM < 0.25 tpy, assuming 100% VOC or PM (max 10 lb/gal)
IA07	TK-76 Fuel oil storage tank (300 gal)	TK-76	N/A	Negligible, <0.01 tpy VOC

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
IA08	Fifty-Seven hot water heaters 8.4 MMBtu/hr combined	Varies (57 units)	N/A	Highest single pollutant (NOx) = 3.61 tpy combined
IA09	Four gas-fired space heaters 0.54 MMBtu/hr combined	N/A	N/A	Highest single pollutant (NOx) = 0.23 tpy combined
IA10	One gas-fired furnace 0.08 MMBtu/hr	N/A	N/A	Highest single pollutant (NOx) = 0.03 tpy combined
IA11	**Seventeen** natural gas heat exchangers under 1 MMBtu/hr each	N/A	N/A	Highest single pollutant (NOx) < 0.43 tpy each
IA12	#2 Diesel Fuel Cylinder tank and vehicle fueling, underground (2 tanks)	Bldg 490 #2 Cooling Diesel Fueling Tank; Bldg 88 Ag Motor Diesel Fueling Tank	N/A	Negligible, <0.01 tpy VOC per AP-42 Section 5.2 and weekly tank turnovers
IA14	Grain Handling Operations (2.1	N/A	401 KAR 59:010 401 KAR 63:010	PM = 0.112 tpy
IA15	Six 500-Gallon Fermenters	N/A	401 KAR 63:010	VOC = .00113 tpy
IA16	Aging Facility (952 bbl/yr)	N/A	401 KAR 63:010	VOC = 3.28 tpy

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

By:

Authorized Signature	Date
Barry K. Swanson	Acting Chief Facilities Officer, Facilities Management
Type/Print Name of Signatory	Title of Signatory

5/28/2025

Section DD.3: Notes, Comments, and Explanations
New fuel oil storage tank located in boiler building will be 30-60 Mgal capacity to store backup fuel for new CHP Boiler #3. Can be included with IA-01.

ATTACHMENT B - Emissions Calculations

1. CHP Boiler #3, NG-Fired, FO Backup, 120 MMBtu/hr Potential Emissions Profile

> A new steam boiler will be installed at the Central Heating Plant, to replace existing coal-fired capacity with natural gas capacity (fuel oil back-up). Potential emissions for the CHP boiler are documented in this section.

1.1 Boiler Nomenclature and Specifications

> Central Heating Plant Boiler #3

KyEIS Equipment, Source ID: **COMB36, EU97**
Emission Unit Description: Steam Boiler
KyEIS Process ID/Description: 1 - Natural Gas Combustion w/ LNB
KyEIS Process ID/Description: 2 - No. 2 Fuel Oil Back-up
Control Device: --
Stack ID: S-97

> Process ID 1 SCC Information:

SCC Code 10300601
SCC Description External Combustion Boilers, Commercial/Institutional (1-03), Natural Gas (1-03-006), > 100 Million Btu/hr (1-03-006-01)
SCC Units Million Cubic Feet Natural Gas Burned
SCC Units Ab: Million Cubic Feet

> Process ID 2 SCC Information:

SCC Code 10300501
SCC Description External Combustion Boilers, Commercial/Institutional (1-03), Distillate Oil (1-03-005), Grades 1 and 2 Oil (1-03-005-01)
SCC Units 1000 Gallons Distillate Oil (No. 1 & 2) Burned
SCC Units Ab: 1000 Gallons

1.1.1 Natural Gas Combustion

Max Annual Operating Hours	8,760	hr/yr	
Combustion Efficiency =	83.54%		B&W Bid package
Blowdown Rate =	3%		Estimate
Saturated Steam Enthalpy =	1,195.7	Btu/lbm	At 150 psig steam pressure, the enthalpy of saturated steam as gas
Steam Mass Flow Required =	100.0	klb/hr	Specification
	119.6	MMBtu/hr	= 1195.74 Btu/lbm x 100 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
Feedwater Mass Flow Rate =	103.09	klb/hr	= 100 klb/hr / (1 - 0.03)
Specific Enthalpy of Feedwater =	195.1	Btu/lbm	Enthalpy of saturated liquid at feedwater temperature of 227°F
	20.12	MMBtu/hr	= 195.121 Btu/lbm x 103.09 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
Blowdown Mass Flow Rate =	3.09	klb/hr	= Feedwater mass flow of 103.093 klb/hr * 0.03
Specific Enthalpy of Blowdown Water =	338.26	Btu/lbm	Enthalpy of saturated liquid for 150 psig steam (assumed)
	1.05	MMBtu/hr	= 338.26 Btu/lbm x 3.093 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
	100.50	MMBtu/hr	Boiler Energy = Steam Energy Flow + Blowdown Energy Flow - Feedwater Energy Flow
Capacity =	**120.3**	**MMBtu/hr**	Capacity = Boiler Energy / efficiency losses (page 14 of 34 of CP bid packag
Maximum =	**120.3**	**MMBtu/hr**	Maximum Continuous Range
NG Heating Value	1,020	Btu/scf	AP-42 Section 1.4
Max Gas Firing Rate at AP-42 HHV	0.1179	MMscf/hr	120.3 MMBtu/hr / 1,020.0 MMBtu/MMscf = 0.1179 MMscf/hr
Max Gas Usage at Zero Fuel Oil and AP-42 HHV =	1,033	MMscf/yr	At hourly usage at rating and actual heating value, minus fuel oil hours
Adjusted Annual Gas Usage at Max Fuel Oil =	974	MMscf/yr	At hourly usage at rating and actual heating value, minus fuel oil hours

1.1.2 No. 2 Fuel Oil Combustion

Combustion Efficiency =	86.93%		B&W Bid package
Blowdown Rate =	3%		Estimate
Saturated Steam Enthalpy =	1,195.7	Btu/lbm	At 150 psig steam pressure, the enthalpy of saturated steam as gas
Steam Mass Flow Required =	100.0	klb/hr	Specification
	119.57	MMBtu/hr	= 1195.74 Btu/lbm x 100 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
Feedwater Mass Flow Rate =	103.09	klb/hr	= 100 klb/hr / (1 - 0.03)
Specific Enthalpy of Feedwater =	195.1	Btu/lbm	Enthalpy of saturated liquid at feedwater temperature of 227°F
	20.12	MMBtu/hr	= 195.121 Btu/lbm x 103.09 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
Blowdown Mass Flow Rate =	3.09	klb/hr	= Feedwater mass flow of 103.093 klb/hr * 0.03
Specific Enthalpy of Blowdown Water =	338.26	Btu/lbm	Enthalpy of saturated liquid for 300 psig steam (assumed)
	1.05	MMBtu/hr	= 338.26 Btu/lbm x 3.093 klb/hr x 1,000 lb/klb / 1,000,000 Btu/MMBtu
	100.50	MMBtu/hr	Boiler Energy = Steam Energy + Blowdown Energy - Feedwater Energy
Capacity =	**115.6**	**MMBtu/hr**	Capacity = Boiler Energy / efficiency losses
Maximum =	**115.6**	**MMBtu/hr**	Maximum Continuous Range
Heating Value of No. 2 FO =	140,000	Btu/gal - FO	For estimating emissions with normalized conversion factor from gal to btu
Maximum =	0.826	Mgal/hr	For estimating emissions with normalized conversion factor from gal to btu
Assumed Maximum Hours of Operation on FO =	500	Hours on FO	Maximum allowed while remaining gas-fired boiler under Boiler NESHAP
Maximum for emissions =	413	Mgal/yr	For estimating emissions with normalized conversion factor from gal to btu

1.2 Derivation and Documentation of Emission Factors

1.2.1 Constants and Conversion Factors

Molar Volume (at STP)	385.5	scf/lbmol	= 528 °R / 1 atm x 0.7302 cf-atm/(lbmol-°R)
Atomic Weight of Sulfur	32.07	lb/lbmol	
Molecular Weight of NO2	46.01	lb NO_2/lbmol	
Molecular Weight of CO	28.01	lb CO/lbmol	
Molecular Weight of SO2	64.07	lb SO_2/lbmol	
Molecular Weight of H2SO4	98.079	lb H_2SO_4/lbmol	
F-Factor for natural gas combustion from 40 CFR	8,710	dscf/MMBtu	
F-Factor for oil combustion from 40 CFR 60,	9,190	dscf/MMBtu	
Concentration of Sulfur in Natural Gas	0.1	gr/Ccf	Conservative maximum based on 12/20/2024 analysis result = 0.012 gr/CCf
	0.5	gr/Ccf	AP-42 emission factor basis
Concentration of Sulfur in Fuel Oil	15.0	ppm	Only ULSD will be fired.
Estimated SO_2 to H_2SO_4 Conversion Rate	1.53	%	
F2 Factor for APH	0.50	%	

1.2.2 Prospective Vendor Data

Pollutant	CAS #	Concentration (ppmv @ 3% O_2)	Concentration (ppmv @ 0% O_2)	Emission Factor Basis
Natural Gas				
NOx	na	9	11	Mfg. guarantee with Ultra Low NOx Burners (ULNB); exhaust expressed at 3% oxygen concentration, corrected to 0% oxygen concentration by multiplying by 20.9% / (20.9% - 3%)
CO	00630-08-0	50	58	UK requirement at 3% oxygen concentration, corrected to 0% oxygen concentration by multiplying by 20.9% / (20.9% - 3%)
Standard No. 2 Fuel Oil				
NOx	na	60	70	Mfg. guarantee at 3% oxygen concentration, corrected to 0% oxygen concentration by multiplying by 20.9% / (20.9% - 3%)
CO	00630-08-0	50	58	Mfg. guarantee at 3% oxygen concentration, corrected to 0% oxygen concentration by multiplying by 20.9% / (20.9% - 3%)

1.2.3 Regulated NSR Pollutant Emission Factors for NG Combustion

Pollutant	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMscf)	Emission Factor Basis
NOx	10102-44-0	0.011	11.14	Vendor guarantee (9 ppmv @ 3% O2) *11 lbmol NO2/10^6 lbmol air x 46.01 lb NO2/lbmol / 385.5 scf/lbmol x 8,710 dscf/MMBtu x 1,020 MMBtu/MMscf =11.1 lb/MMscf*
CO	00630-08-0	0.037	37.68	Vendor guarantee (50 ppmv @ 3% O2) *58 lbmol NO2/10^6 lbmol air x 28.01 lb NO2/lbmol / 385.5 scf/lbmol x 8,710 dscf/MMBtu x 1,020 MMBtu/MMscf =37.7 lb/MMscf*
VOC	na	0.0054	5.5	AP-42 Section 1.4 Table 1.4-2 (7/98)
PM/PM10/PM2.5-Filt		0.0019	1.90	AP-42 Section 1.4 Table 1.4-2 (7/98)
PM-Condensable		0.0015	1.55	AP-42 Table 1.4-2 + EPA Speciate Database
PM/PM10/PM2.5 Total		0.0034	3.45	AP-42 Table 1.4-2 + EPA Speciate Database with filterable PM2.5 ratio to total PM2.5 = 0.55
SO2	07446-09-5	0.0003	0.29	0.10 gr/CCf / 7,000 gr/dscf x 64.07 lb SO2/lbmol / 32.07 lb S/lbmol x 10,000 CCf/MMscf
H2SO4	7664-93-9	2.14E-06	2.19E-03	1.53% conversion of SO2 to H2SO4 and 0.5 factor for air preheater *0.285 lb SO2/MMscf x 1.53% Conv to H2SO4 x 0.50 F2*
Lead		4.90E-07	5.00E-04	AP-42, Section 1.4, Table 1.4-2

1.2.4 GHG Emission Factors

Pollutant	GWP	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMscf)	Emission Factor Basis
CO2	1	117.65	120,000	AP-42, Section 1.4, Table 1.4-2
CH4	28	0.0023	2.3	AP-42, Section 1.4, Table 1.4-2
N2O	265	0.0006	0.6	AP-42, Section 1.4, Table 1.4-2 (low-NOx burner)
CO2e		117.88	120,234	GWP from Subpart 98, Table A-1 (1/2025). Sum of individual pollutants x GWP.

1.2.5 Regulated NSR Pollutant Emission Factors for No. 2 Fuel Oil

Pollutant	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)	Emission Factor Basis
PM		0.024	3.3	AP-42 Table 1.3-1
PM-CON = PM10-CON = PM25-CON		0.009	1.3	Calculated as a ratio of total particulate matter based off AP-42 Table 1.3-1 factors
PM-FIL		0.014	2.0	Calculated as a ratio of total particulate matter based off AP-42 Table 1.3-1 factors
PM10		0.024	3.3	PM=PM10
PM2.5		0.024	3.3	PM = PM2.5
VOC		0.002	0.34	AP-42 Table 1.3-3 (05/2010) (institutional boiler)
CO	00630-08-0	0.039	5.5	Vendor guarantee (50 ppmv @ 3% O2)
SO2	07446-09-5	0.002	0.213	AP-42 Table 1.3-1 (05/2010), sulfur content spec = 15 ppm
H2SO4	7664-93-9	1.16E-05	1.63E-03	AP-42 Table 1.3-1 (05/2010), sulfur content spec = 15 ppm
NO_X	10102-44-0	0.05	6.55	Vendor guarantee (60 ppmv @ 3% O2)
Lead		9.00E-06	1.26E-03	AP-42 Table 1.3-1 (05/2010)

1.2.6 GHG Emission Factors

Pollutant	GWP	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)	Emission Factor Basis
CO2	1	159.286	22,300	AP-42 Table 1.3-12
CH4	28	0.002	0.216	AP-42 Table 1.3-3 for institutional boilers
N2O	265	0.002	0.260	AP-42 Table 1.3-9
CO2e		159.82	22,375	GWP from Subpart 98, Table A-1 (1/2025). Sum of individual pollutants x GWP.

1.2.7 Hazardous Air Pollutant Emission Factors

> Natural gas emission factors for HAPs are obtained from AP-42, Chapter 1.4, Table 1.4-3 (organics) and 1.4-4 (metals). Emissions are only included for pollutants with emission factors greater than or equal to 1.0E-04 lb/MMscf.

> No. 2 Fuel Oil emission factors for HAPs are obtained from AP-42, Chapter 1.3, Table 1.3-9 (organics) and 1.3-10 (metals)

Pollutant	Emission Factor (lb/MMBtu)	Basis	Emission Factor (lb/Mgal)	Basis
Speciated Organic Compounds				
Benzene	0.0021	AP-42, Table 1.4-3	2.14E-04	AP-42, Table 1.3-9
Dichlorobenzene	0.0012	AP-42, Table 1.4-3	0.0000	AP-42, Table 1.3-9
Formaldehyde	0.0750	AP-42, Table 1.4-3	0.0610	AP-42, Table 1.3-9
Hexane	1.8000	AP-42, Table 1.4-3	0.0000	AP-42, Table 1.3-9
Naphthalene	0.0006	AP-42, Table 1.4-3	0.0011	AP-42, Table 1.3-9
Toluene	0.0034	AP-42, Table 1.4-3	0.0062	AP-42, Table 1.3-9
Metals				
Arsenic	0.0002	AP-42, Table 1.4-4	5.60E-04	AP-42, Table 1.3-10
Cadmium	0.0011	AP-42, Table 1.4-4	4.20E-04	AP-42, Table 1.3-10
Chromium	0.0014	AP-42, Table 1.4-4	4.20E-04	AP-42, Table 1.3-10
Manganese	0.0004	AP-42, Table 1.4-4	8.40E-04	AP-42, Table 1.3-10
Mercury	0.0003	AP-42, Table 1.4-4	4.20E-04	AP-42, Table 1.3-10
Nickel	0.0021	AP-42, Table 1.4-4	4.20E-04	AP-42, Table 1.3-10
Total HAP	1.888		0.079	

1.3 CHP Boiler #3 Potential Emissions Summary

1.3.1 Regulated NSR and Pollutant and GHG Potential Emissions

	NG Emission Factors		FO Emission Factors		Hourly Emissions		Annual Emissions	
					Natural Gas	FO	Unlimited	Max 500 hr FO
Pollutant	(lb/MMscf)	Basis	(lb/Mgal)	Basis	(lb/hr)	(lb/hr)	(tpy)	(tpy)
NO_X	11.14	Vendor guarantee	6.55	Vendor guarantee	1.314	5.41	23.69	6.78
CO	37.68	Vendor guarantee	5.46	Vendor guarantee	4.444	4.51	19.74	19.48
VOC	5.5	AP-42 Table 1.3-3	0.34	AP-42 Table 1.3-3	0.649	0.28	2.84	2.84
PM	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	3.30	Vendor guarantee + AP-42 condensable	0.407	2.73	11.94	2.36
PM10	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	3.30	PM=PM10	0.407	2.73	11.94	2.36
PM2.5	3.45	AP-42 Section 1.4 Table 1.4-2 (7/98)	3.30	PM = PM2.5	0.407	2.73	11.94	2.36
SO2	0.29	Maximum based on 12/20/2024 analysis	0.21	AP-42 Table 1.3-1	0.034	0.18	0.77	0.18
H2SO4	2.19E-03	1.53% conversion of SO2 to H2S	1.63E-03	AP-42 Table 1.3-1	0.000	0.00	0.01	0.00
Lead	5.00E-04	AP-42, Section 1.4	1.26E-03	AP-42 Table 1.3-1	5.90E-05	1.04E-03	4.56E-03	5.04E-04
CO2	120,000	AP-42, Section 1.4	22,300	AP-42 Table 1.3-12	14,154	18,416	80,662	63,059
CH4	2.30	AP-42, Section 1.4	0.22	AP-42 Table 1.3-3	0.271	0.18	1.188	1.19
N2O	0.64	AP-42, Section 1.4	0.26	AP-42 Table 1.3-9	0.075	0.21	0.940	0.37
CO2e	120,234	GWP from Subpart 98	22,375	GWP from Subpart 98	14,181	18,478	80,933	63,189

1.3.2 Hazardous Air Pollutant Potential Emissions

	NG Emission Factors		FO Emission Factors		Hourly Emissions		Annual Emissions	
					Natural Gas	FO	Unlimited	Max 500 hr FO
Pollutant	(lb/MMscf)	Basis	(lb/Mgal)	Basis	(lb/hr)	(lb/hr)	(tpy)	(tpy)
Benzene	2.1E-03	AP-42, Table 1.4-3	2.1E-04	AP-42, Table 1.3-9	2.48E-04	1.77E-04	1.08E-03	1.08E-03
Dichlorobenze	1.2E-03	AP-42, Table 1.4-3	0.0E+00	AP-42, Table 1.3-9	1.42E-04	0.00E+00	6.20E-04	6.20E-04
Formaldehyde	7.5E-02	AP-42, Table 1.4-3	6.1E-02	AP-42, Table 1.3-9	8.85E-03	5.04E-02	2.21E-01	4.91E-02
Hexane	1.8E+00	AP-42, Table 1.4-3	0.0E+00	AP-42, Table 1.3-9	2.12E-01	0.00E+00	9.30E-01	9.30E-01
Naphthalene	6.1E-04	AP-42, Table 1.4-3	1.1E-03	AP-42, Table 1.3-9	7.19E-05	9.33E-04	4.09E-03	5.30E-04
Toluene	3.4E-03	AP-42, Table 1.4-3	6.2E-03	AP-42, Table 1.3-9	4.01E-04	5.12E-03	2.24E-02	2.94E-03
Arsenic	2.0E-04	AP-42, Table 1.4-4	5.6E-04	AP-42, Table 1.3-10	2.36E-05	4.62E-04	2.03E-03	2.13E-04
Cadmium	1.1E-03	AP-42, Table 1.4-4	4.2E-04	AP-42, Table 1.3-10	1.30E-04	3.47E-04	1.52E-03	6.23E-04
Chromium	1.4E-03	AP-42, Table 1.4-4	4.2E-04	AP-42, Table 1.3-10	1.65E-04	3.47E-04	1.52E-03	7.69E-04
Manganese	3.8E-04	AP-42, Table 1.4-4	8.4E-04	AP-42, Table 1.3-10	4.48E-05	6.94E-04	3.04E-03	3.59E-04
Mercury	2.6E-04	AP-42, Table 1.4-4	4.2E-04	AP-42, Table 1.3-10	3.07E-05	3.47E-04	1.52E-03	2.13E-04
Nickel	2.1E-03	AP-42, Table 1.4-4	4.2E-04	AP-42, Table 1.3-10	2.48E-04	3.47E-04	1.52E-03	1.11E-03
Sum	1.888		0.079		0.223	0.94	0.223	0.975

2. EU98 Diesel-Fired Emergency Generator

2.1 Generator Power and Fuel Consumption Data

KyEIS Equipment, Source ID:	**EQPTTBD, EU98**	
Total Engine Rating (hp):	670	hp
Total Engine Rating (kW):	500	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	4.69	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Fuel Consumption in Mgal/hr:	0.03530	Mgal/hr

2.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units	1000 Gallons Distillate Oil (Diesel) Burned
SCC Units Ab:	1000 Gallons

2.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOX, CO, VOC, PM, PM10, PM2.5, and SO2 are based on emission factors in AP-42 Table 3.4-1 for Large Stationary Diesel And All Stationary Dual-fuel Engines (10/96 edition) and manufacturer specifications.

2.3.1 NOx

Emission factor for NOx:	4.60	g/hp-hr	Manufacturer Specifications
Emission factor for NOx:	6.79	lb/hr	= (4.6 g/hp-hr / 453.6 g/lb *670 hp)
NO_X emission factor in terms of SCC units:	192.48	lb/Mgal	

2.3.2 CO

Emission factor for CO:	0.60	g/hp-hr	Manufacturer Specifications
Emission factor for CO:	0.89	lb/hr	= (0.6 g/hp-hr / 453.6 g/lb *670 hp)
CO emission factor in terms of SCC units:	25.11	lb/Mgal	

2.3.3 VOC

Emission factor for VOC:	0.03	g/hp-hr	Manufacturers Specifications (TOC)
Emission factor for VOC:	0.04	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *670 hp)
VOC emission factor in terms of SCC units:	1.26	lb/Mgal	

2.3.4 PM

Emission factor for PM:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.04	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *670 hp)
PM emission factor in terms of SCC units:	1.26	lb/Mgal	

2.3.5 PM10

Emission factor for PM10:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.04	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *670 hp)
PM10 emission factor in terms of SCC units:	1.26	lb/Mgal	

2.3.6 PM2.5

Emission factor for PM2.5:	0.03	g/hp-hr	Manufacturer Specifications
Emission factor for PM:	0.04	lb/hr	= (0.03 g/hp-hr / 453.6 g/lb *670 hp)
PM2.5 emission factor in terms of SCC units:	1.26	lb/Mgal	

2.3.7 SO2

Emission factor for SO2:	1.52E-03	lb/MMBtu	AP-42 Table 3.4-1, 10/96 (0.0015% sulfur content)
SO2 emission factor in terms of SCC units:	0.20	lb/Mgal	= (0.00152 lb/MMBtu * 5 MMBtu/hr / 0.035 Mgal/hr)

2. EU98 Diesel-Fired Emergency Generator

2.3.8 HAP Emission Estimates

> Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.4-3 (10/96 Edition).

	CAS #	HAP?	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)	Emission Factor Basis
Acetaldehyde	75-07-0	Y	2.52E-05	0.0033	AP-42 Table 3.4-3
Acrolein	107-02-8	Y	7.88E-06	0.001	AP-42 Table 3.4-3
Benzene	71-43-2	Y	7.76E-04	0.103	AP-42 Table 3.4-3
Formaldehyde	50-00-0	Y	7.89E-05	0.010	AP-42 Table 3.4-3
Toluene	108-88-3	Y	2.81E-04	0.037	AP-42 Table 3.4-3
Xylene	1330-20-7	Y	1.93E-04	0.026	AP-42 Table 3.4-3
Total HAPs				1.81E-01	

2.3.9 GHG Emission Factors

> CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.4-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	28
N2O	265

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		165.00	21,922	AP-42 Table 3.4-1, 10/96
CH4	3.00E-03		0.88	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			21,993	40 CFR 98, Subpart A

2.4 Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NO2	**192.5**	Manufacturer Specifications	6.79	1.70
CO	**25.1**	Manufacturer Specifications	0.89	0.22
VOC	**1.26**	Manufacturers Specifications (TOC)	0.04	0.01
PM	**1.26**	Manufacturer Specifications	0.04	0.0111
PM10	**1.26**	Manufacturer Specifications	0.04	0.01
PM2.5	**1.26**	Manufacturer Specifications	0.04	0.01
SO2	**0.20**	AP-42 Table 3.4-1, 10/96	0.007	0.002
Total HAPs	**0.18**	AP-42 Table 3.4-3	0.006	0.002
Formaldehyde	**0.01**	AP-42 Table 3.4-3	0.0004	9.25E-05
CO2	**21,922**	AP-42 Table 3.4-1, 10/96	774	193
CH4	**0.88**	40 CFR 98, Subpart C, Table C-2	0.031	0.008
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.006	0.002
GHGs as CO2e	**21,993**	40 CFR 98, Subpart A	776	194

3. IA 01 CHP Boiler Fuel Oil Tank

3.1 Storage Tank Capacities and Throughput Rates

> The maximum hourly and annual throughput rates for the diesel storage tanks are provided below.

Emission Unit	Permit EU ID	Permit Emission Unit Description	Tank Contents	Storage Capacity	Maximum Hourly Throughput	Maximum Annual Throughput
--	--	--	--	Mgal-Cap	Mgal/hr	Mgal/yr
CHP Boiler Fuel Oil Tank (60,000 gallons)	IA #1	Fuel Oil Storage Tanks	ULSD	60.00	2.500	21,900.0

* Throughput is based on a highly conservative estimate of 1 turnover per day. In reality this tank supplies the CHP Boiler 3 (EU96) which has a limit on 500 gal of Fuel Oil per year.

3.2 VOC and HAP Potential Emissions Calculations for Condensate Storage Tanks

> The following tables document the potential VOC emissions resulting from the 60,000-gal tank at UK. The VOC emission factors for the storage tank documented in the following tables are based on EPA Tanks 5.1 runs using the worst case annual throughput based on unliimited tank turnovers of 1 per day. The liquid composition within the tank is assumed to be No. 2 Fuel Oil (diesel fuel) and as such, AP-42 Petroleum Liquid properties in AP-42 Table 7.1-2 were used.

3.2.1 Working Loss VOC and HAP Emissions Calculations

> Working loss emissions for the gasoline storage tank is calculated below.

Emission Unit	Permit Emission Unit Description	Hourly Operating Rate	Pollutant	Emission Factor	Hourly Potential Emissions	Annual Potential Emissions
--	--	Mgal/hr	--	lb/Mgal	lb/hr	tpy
CHP Boiler Fuel Oil Tank (60,000 gallons)	Fuel Oil Storage Tanks	2.50	VOC	7.31E-03	1.83E-02	8.01E-02

3.2.2 Breathing Loss VOC Emissions Calculations

> Since this tank will be operated in a temperature controlled environment, there will be no emissions resulting from the displacement of vapors as a result of temperature and pressure changes

Emission Unit	Permit Emission Unit Description	Hourly Operating Rate	Pollutant	Emission Factor	Hourly Potential Emissions	Annual Potential Emissions
--	--	Mgal-cap/hr	--	lb/Mgal-cap	lb/hr	tpy
CHP Boiler Fuel Oil Tank (60,000 gallons)	Fuel Oil Storage Tanks	6.85E-03	VOC	0.00E+00	0.00E+00	0.00E+00

3.2.3 Total VOC Emissions for ULSD Storage Tank

> Total emissions for the ULSD storage tank is calculated below.

Emission Unit	Permit Emission Unit Description	Pollutant	Hourly Potential Emissions	Annual Potential Emissions
--	--	--	lb/hr	tpy
CHP Boiler Fuel Oil Tank (60,000 gallons)	Fuel Oil Storage Tanks	VOC	1.83E-02	8.01E-02

University of Kentucky
Facilities Management
Office of the Vice President

May 27, 2025

Mr. Zack Bittner
Ky Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: Application to amend emergency generators and boilers to permit V-18-052 R1
University of Kentucky, 21-067-00003, AI 1104

Dear Mr. Bittner:

The University of Kentucky is proposing to install new diesel-fired emergency generators for auxiliary power and a natural gas boiler as part of a modernization project. Additionally, six indirect heat exchangers were identified during a full compliance evaluation on March 20, 2025, that were not previously submitted to the Kentucky Division for Air Quality as well as three insignificant indirect heat exchangers identified through University internal inspections. The application consist of:

- EU99 - Agriculture Research Bldg 1 (bldg 0364) – Install a 3685 hp diesel-fired emergency generator
- EU100 - Rankin MD Health Ed (bldg 0724) – Install a 2010 hp diesel-fired emergency generator
- EU101 - Barnhart (bldg 0276) – Replace 157 Hp diesel-fired emergency generator (EU59) with a 757 hp diesel-fired emergency generator
- EU102 - Barnhart (bldg 0276) – Install a 1.5 MMBtu/hr natural gas-fired boiler
- EU103 - Craft Football Training (bldg 0280) – 6, 1.6 MMBtu/hr natural gas-fired boilers
- IA11 - Bosworth Hall (bldg 0652) – 0.85 MMBtu/hr natural gas-fired boiler
- IA11 - Anthropology (bldg 9854) – 2, 1.0 MMBtu/hr natural gas-fired boilers

Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generators. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines. Regulations 401 KAR 59:015, *New Indirect Heat Exchangers*, applies to indirect heat exchangers with a capacity greater than 1 MMBtu/hr and boilers equal to or less than 1 MMBtu/hr meet the definition of an insignificant activity as defined in Section 6 of regulation 401 KAR 52:020, *Title V Permits*. Construction of the generators and boilers do not add any additional regulations to the current V-18-052 R1 permit, and all existing conditions of the permit will be met after the addition. Therefore, we request the Division for Air Quality process the construction as a 502(b)(10) change in accordance with 401 KAR 52:020, Section 17.

We appreciate your timely review and consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Barry K. Swanson
Chief Procurement Officer
Acting Chief Facilities Officer, Facilities Management

Attachments

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May 27, 2025

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: 500 ft **Property Area:** 1500 **Is this source portable?** ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity: ☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☑ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Refer to DEP7007A & EE

Proposed Operation Start-Up Date: *(MM/YYYY)* Refer to DEP7007A & EE

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ Yes ☐ No

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.



Authorized Signature

5/28/2025

Date

Barry K. Swanson

Type or Printed Name of Signatory

Chief Procurement Officer
Acting Chief Facilities Officer,
Facilities Management

Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
EU99 - Agriculture Research Bldg 1 (bldg 0364) – Install a 3685 hp diesel-fired emergency generator
EU100 - Rankin MD Health Ed (bldg 0724) – Install a 2010 hp diesel-fired emergency generator
EU101 - Barnhart (bldg 0276) – Replace 157 Hp diesel-fired emergency generator (EU59) with a 757 hp diesel-fired emergency generator
EU102 - Barnhart (bldg 0276) – Install a 1.5 MMBtu/hr natural gas-fired boiler
EU103 - Craft Football Training (bldg 0280) – Install 6, 1.6 MMBtu/hr, each natural gas-fired boilers
IA11 - Bosworth Hall (bldg 0652) – Install a 0.85 MMBtu/hr natural gas-fired boiler **Addition of second 0.85 MMBtu/hr boiler for a total of 2, 0.85 MMBtu/hr boilers to replace 1.3 MMBtu/hr boiler**
IA11 - Anthropology (bldg 9854) – Install 2, 1.0 MMBtu/hr natural gas-fired boilers

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May 27, 2025

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
EU102	1.5 MMBtu Natural Gas Boiler-Barnhart	1	Natural Gas Usage	Indirect Heat Exchanger	Shell and Tube	Bell & Gossett	SU66-2		10100602	MMft3	None	1
EU103	6, 1.6 MMBtu Natural Gas Boiler-Craft Football	1	Natural Gas Usage	Indirect Heat Exchanger	Shell and Tube	PVI Industries	Firepower		10100602	MMft3	None	1

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

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DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May 27, 2025

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
EU102	1.5 MMBtu Natural Gas Boiler-Barnhart	1	Natural Gas Usage	Indirect Heat Exchanger	Shell and Tube	Bell & Gossett	SU66-2		10100602	MMft3	None	1
EU103	6, 1.6 MMBtu Natural Gas Boiler-Craft Football	1	Natural Gas Usage	Indirect Heat Exchanger	Shell and Tube	PVI Industries	Firepower		10100602	MMft3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
EU102	100				1.5	1,545	lb steam /hr		Primary	Natural Gas	1020	Btu/scf	8760		
EU103	100				1.6, each	1,600	lb steam /hr		Primary	Natural Gas	1020	Btu/scf	8760		

Section A.3: Notes, Comments, and Explanations
None

Division for Air Quality

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DEP7007EE

Internal Combustion Engines

___ Section EE.1: General Information
___ Section EE.2: Operating Information
___ Section EE.3: Design Information
___ Section EE.4: Fuel Information
___ Section EE.5: Emission Factor Information
___ Section EE.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG

___ Attach EPA certification of the engine

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

Section EE.1: General Information

Emission Unit #	Emission Unit Name	Control Device ID	Stack ID	Manufacturer	Model Number	Model Year	Date of Manufacture	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Date Reconstructed/ Modified	List Applicable Regulations
EU99	Diesel Engine Ag Research	NA	1	Caterpillar	3516E	TBD	TBD	01/2025	NA	40CFR60, Subpart IIII
EU100	Diesel Engine Rankin MD Health Ed	NA	1	Caterpillar	3512C	TBD	TBD	TBD	NA	40CFR60, Subpart IIII
EU101	Diesel Engine Barnhart	NA	1	Kohler	500REOZVC	2024	2024	02/2025	NA	40CFR60, Subpart IIII

Section EE.2: Operating Information

Emission Unit #	Engine Purpose (Identify if Non-Emergency, Emergency,Fire/Water Pump, Black-start engine for combustion turbine, Engine Testing)	Hours Operated	Is this engine a rental? *(Yes/No)*	Rental Time Period *(hrs)*	Alternate Operating Scenarios (Describe any operating scenarios in which the engine may be used in a different configuration)
EU99	Emergency	New	No	NA	NA
EU100	Emergency	New	No	NA	NA
EU101	Emergency	New	No	NA	NA

Section EE.3: Design Information

Emission Unit #	Engine Type (Identify all that apply: Commercial, Institutional, Stationary, Non-Road)	Ignition Type (Identify if either Compression or Spark Ignition)	Engine Family (Identify all that apply: 2-stroke, 4-stroke, Rich Burn, Lean Burn)	Maximum Engine Power *(bhp)*	Maximum Engine Speed *(rpm)*	Total Displacement *(L)*	Number of Cylinders
EU99	Stationary	Compression	4-cycle	3685	1800	78.1	16
EU100	Stationary	Compression	4-cycle	2010	1800	51.8	12
EU101	Stationary	Compression	4-cycle	757	565	16.12	6

Section EE.4: Fuel Information

Emission Unit #	Identify if Primary, Secondary, or Tertiary Fuel	Fuel Type (Identify if Diesel, Gasoline, Natural Gas, Liquefied Petroleum Gas (LPG), Landfill/Digester Gas, or Other)	Fuel Grade	Percent Time Used *(%)*	Maximum Fuel Consumption	Heat Content	Sulfur Content *(%)*	SCC Code	SCC Units
EU99	Primary	Diesel	#2	100	0.189 Mgal/hr	137000 Btu/gal	0.0015%	20300101	1000 gal
EU100	Primary	Diesel	#2	100	0.101 Mgal/hr	137000 Btu/gal	0.0015%	20300101	1000 gal
EU101	Primary	Diesel	#2	100	0.054Mgal/hr	137000 Btu/gal	0.0015%	20300101	1000 gal

Section EE.5: Emission Factor Information

Emission factors expressed here are based on the potential to emit.

Emission Unit #	Fuel	Pollutant	Emission Factor	Emission Factor Units	Source of Emission Factor
EU99	Diesel	NOx	8.04	g/KW-hr	Manufacturer
		CO	1.55	g/KW-hr	Manufacturer
		HC	0.13	g/KW-hr	Manufacturer
		PM	0.09	g/KW-hr	Manufacturer
		SO2	0.21	#/1000gal	AP-42
EU100	Diesel	NOx	8.55	g/KW-hr	Manufacturer
		CO	1.13	g/KW-hr	Manufacturer
		HC	0.21	g/KW-hr	Manufacturer
		PM	0.05	g/KW-hr	Manufacturer
		SO2	0.21	#/1000gal	AP-42
EU101	Diesel	NOx	5.56	g/KW-hr	Manufacturer
		CO	0.349	g/KW-hr	Manufacturer
		HC	0.139	g/KW-hr	Manufacturer
		PM	0.04	g/KW-hr	Manufacturer
		SO2	0.21	#/1000gal	AP-42

Section EE.6: Notes, Comments, and Explanations

None

Division for Air Quality
300 Sower Boulevard
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(502) 564-3999

DEP7007DD

Insignificant Activities

___ Section DD.1: Table of Insignificant Activities
___ Section DD.2: Signature Block
___ Section DD.3: Notes, Comments, and Explanations

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May 27, 2025

Section DD.1: Table of Insignificant Activities

*Identify each activity with a unique Insignificant Activity number (IA #); for example: 1, 2, 3… etc.

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions
Bosworth	0.85MMBtu/hr gas water heater	Valiant-FT Serier II Model VANH-0850-MSI Serial 082333853	NA	<5 tons/yr
Anthropolgy	2, 1.0MMBtu/hr gas boilers	Fulton Model EDR-1000	NA	<5 tons/yr

Insignificant Activity #	Description of Activity including Rated Capacity	Serial Number or Other Unique Identifier	Applicable Regulation(s)	Calculated Emissions

Section DD.2: Signature Block

I, THE UNDERSIGNED, HEREBY CERTIFY UNDER PENALTY OF LAW, THAT I AM A RESPONSIBLE OFFICIAL, AND THAT I HAVE PERSONALLY EXAMINED, AND AM FAMILIAR WITH, THE INFORMATION SUBMITTED IN THIS DOCUMENT AND ALL ITS ATTACHMENTS. BASED ON MY INQUIRY OF THOSE INDIVIDUALS WITH PRIMARY RESPONSIBILITY FOR OBTAINING THE INFORMATION, I CERTIFY THAT THE INFORMATION IS ON KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE OR INCOMPLETE INFORMATION, INCLUDING THE POSSIBILITY OF FINE OR IMPRISONMENT.

By:

Authorized Signature	Date
Barry K. Swanson	Acting Chief Facilities Officer, Facilities Management
Type/Print Name of Siguatory	Title of Siguatory

5/28/2025

Section DD.3: Notes, Comments, and Explanations

This is the second 0.85 MMBtu/hr boiler installed at Bosworth. Units are identical.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU99	3685 Hp Diesel Generator-Ag Research	1	Diesel Usage	NA	NA	1	0.1892	CO	50.0	mfg cert	0.00%	0.00%	9.4611	9.4611	2.3653	2.3653
	Bldg 0364							NO2	258.7	mfg cert	0.00%	0.00%	48.9460	48.9460	12.2365	12.2365
								PM10	3.02	mfg cert	0.00%	0.00%	0.5714	0.5714	0.1428	0.1428
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0397	0.0397	0.0099	0.0099
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	9.0721	9.0721	2.2680	2.2680
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	6.62E-04	6.62E-04	0.0002	1.66E-04
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	2.08E-04	2.08E-04	0.0001	5.20E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	2.01E-02	2.01E-02	0.0050	5.01E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	2.04E-03	2.04E-03	0.0005	5.11E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	7.28E-03	7.28E-03	0.0018	1.82E-03
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	4.99E-03	4.99E-03	0.0012	1.25E-03
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	5.49E-03	5.49E-03	0.0014	1.37E-03
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	4291.43	4291.43	1072.8586	1072.9

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU100	2010 Hp Diesel Generator-Rankin Health ED	1	Diesel Usage	NA	NA	1	0.1030	CO	36.2	mfg cert	0.00%	0.00%	3.7286	3.7286	0.9322	0.9322
	Bldg 0724							NO2	275.0	mfg cert	0.00%	0.00%	28.3250	28.3250	7.0813	7.0813
								PM10	1.72	mfg cert	0.00%	0.00%	0.1772	0.1772	0.0443	0.0443
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0216	0.0216	0.0054	0.0054
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	4.9389	4.9389	1.2347	1.2347
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	3.61E-04	3.61E-04	9.01E-05	9.01E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	1.13E-04	1.13E-04	2.83E-05	2.83E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	1.09E-02	1.09E-02	2.73E-03	2.73E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	1.11E-03	1.11E-03	2.78E-04	2.78E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	3.97E-03	3.97E-03	9.91E-04	9.91E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	2.72E-03	2.72E-03	6.80E-04	6.80E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	2.99E-03	2.99E-03	7.47E-04	7.47E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	2336.25	2336.25	584.1	584.1

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU101	757 Hp Diesel Generator-Barnhart	1	Diesel Usage	NA	NA	1	0.0368	CO	11.2	mfg cert	0.00%	0.00%	0.4122	0.4122	0.1030	0.1030
	Bldg 0276							NO2	178.9	mfg cert	0.00%	0.00%	6.5835	6.5835	1.6459	1.6459
								PM10	1.29	mfg cert	0.00%	0.00%	0.0475	0.0475	0.0119	0.0119
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0077	0.0077	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7646	1.7646	0.4411	0.4411
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	1.29E-04	1.29E-04	3.22E-05	3.22E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	4.05E-05	4.05E-05	1.01E-05	1.01E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	3.90E-03	3.90E-03	9.75E-04	9.75E-04
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	3.97E-04	3.97E-04	9.94E-05	9.94E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	1.42E-03	1.42E-03	3.54E-04	3.54E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	9.72E-04	9.72E-04	2.43E-04	2.43E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	1.07E-03	1.07E-03	2.67E-04	2.67E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	834.70	834.70	208.7	208.7

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
59-18 replaced with EU97	REMOVED 157 Hp Diesel Generator-Barnhart	1	Diesel Usage	NA	NA	1	-0.0100	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-1.3020	-1.3020	-0.3255	-0.3255
	Bldg 0276							NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-6.0430	-6.0430	-1.5108	-1.5108
								PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.4248	-0.4248	-0.1062	-0.1062
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0006	-0.0006	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-0.4795	-0.4795	-0.1199	-0.1199
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-1.05E-03	-1.05E-03	-2.63E-04	-2.63E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-1.27E-04	-1.27E-04	-3.18E-05	-3.18E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-1.28E-03	-1.28E-03	-3.20E-04	-3.20E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-1.62E-03	-1.62E-03	-4.04E-04	-4.04E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-5.60E-04	-5.60E-04	-1.40E-04	-1.40E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-3.90E-04	-3.90E-04	-9.75E-05	-9.75E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-2.30E-04	-2.30E-04	-5.75E-05	-5.75E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-224.68	-224.68	-56.2	-56.2

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU102	1.5 MMBtu/hr Boiler-Barnhart	1	Natural Gas Usage	NA	NA	1	0.001470	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.12348	0.12348	0.54084	0.54084
	Bldg 0276							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.14700	0.14700	0.64386	0.64386
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.01117	0.01117	0.04893	0.04893
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00088	0.00088	0.00386	0.00386
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00809	0.00809	0.03541	0.03541
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	3.09E-06	3.09E-06	1.35E-05	1.35E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.76E-09	1.76E-09	7.73E-09	7.73E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.76E-09	1.76E-09	7.73E-09	7.73E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.35E-08	2.35E-08	1.03E-07	1.03E-07
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.76E-09	1.76E-09	7.73E-09	7.73E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.76E-06	1.76E-06	7.73E-06	7.73E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.41E-09	4.41E-09	1.93E-08	1.93E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.12E-09	4.12E-09	1.80E-08	1.80E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	1.10E-04	1.10E-04	4.83E-04	4.83E-04

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU102	0.85 MMBtu/hr Boiler-Barnhart	1	Natural Gas Usage	NA	NA	1	0.000833	3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
	Bldg 0276							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-08	3.53E-08	1.55E-07	1.55E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-03	2.65E-03	1.16E-02	1.16E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.65E-09	2.65E-09	1.16E-08	1.16E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	8.97E-07	8.97E-07	3.93E-06	3.93E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-08	2.50E-08	1.09E-07	1.09E-07
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	7.35E-09	7.35E-09	3.22E-08	3.22E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	5.00E-06	5.00E-06	2.19E-05	2.19E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.94E-07	2.94E-07	1.29E-06	1.29E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.76E-08	1.76E-08	7.73E-08	7.73E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.62E-06	1.62E-06	7.08E-06	7.08E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	2.06E-06	2.06E-06	9.01E-06	9.01E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.23E-07	1.23E-07	5.41E-07	5.41E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	5.59E-06	5.59E-06	2.45E-05	2.45E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	3.82E-07	3.82E-07	1.67E-06	1.67E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.09E-06	3.09E-06	1.35E-05	1.35E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	3.53E-08	3.53E-08	1.55E-07	1.55E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	2.78E-03	2.78E-03	1.22E-02	1.22E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	176.4	176.4	772.6	772.6

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
EU103	6, 1.6 MMBtu/hr Boilers-Craft Football Training	1	Natural Gas Usage	NA	NA	1	0.009410	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.79044	0.79044	3.46213	3.46213
	Bldg 0280							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.94100	0.94100	4.12158	4.12158
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.07152	0.07152	0.31324	0.31324
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00565	0.00565	0.02473	0.02473
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.05176	0.05176	0.22669	0.22669
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.26E-08	2.26E-08	9.89E-08	9.89E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.98E-05	1.98E-05	8.66E-05	8.66E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.13E-08	1.13E-08	4.95E-08	4.95E-08
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.13E-08	1.13E-08	4.95E-08	4.95E-08
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.51E-07	1.51E-07	6.59E-07	6.59E-07
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.13E-08	1.13E-08	4.95E-08	4.95E-08
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.13E-05	1.13E-05	4.95E-05	4.95E-05
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.82E-08	2.82E-08	1.24E-07	1.24E-07
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.63E-08	2.63E-08	1.15E-07	1.15E-07
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	7.06E-04	7.06E-04	3.09E-03	3.09E-03

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
EU103	6, 1.6 MMBtu/hr Boilers-Craft Football Training	1	Natural Gas Usage	NA	NA	1	0.009410	3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
	Bldg 0280							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.26E-07	2.26E-07	9.89E-07	9.89E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-02	1.69E-02	7.42E-02	7.42E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.69E-08	1.69E-08	7.42E-08	7.42E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.74E-06	5.74E-06	2.51E-05	2.51E-05
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.60E-07	1.60E-07	7.01E-07	7.01E-07
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.71E-08	4.71E-08	2.06E-07	2.06E-07
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	3.20E-05	3.20E-05	1.40E-04	1.40E-04
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.88E-06	1.88E-06	8.24E-06	8.24E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.13E-07	1.13E-07	4.95E-07	4.95E-07
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.04E-05	1.04E-05	4.53E-05	4.53E-05
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.32E-05	1.32E-05	5.77E-05	5.77E-05
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.90E-07	7.90E-07	3.46E-06	3.46E-06
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.58E-05	3.58E-05	1.57E-04	1.57E-04
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.45E-06	2.45E-06	1.07E-05	1.07E-05
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.98E-05	1.98E-05	8.66E-05	8.66E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.26E-07	2.26E-07	9.89E-07	9.89E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.78E-02	1.78E-02	7.80E-02	7.80E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	1129.2	1129.2	4945.9	4945.9

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.06997	0.06997	0.30648	0.30648
	Bldg 0652							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.08330	0.08330	0.36485	0.36485
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.00633	0.00633	0.02773	0.02773
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00050	0.00050	0.00219	0.00219
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00458	0.00458	0.02007	0.02007
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-09	2.00E-09	8.76E-09	8.76E-09
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.33E-08	1.33E-08	5.84E-08	5.84E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-06	1.00E-06	4.38E-06	4.38E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-09	2.50E-09	1.09E-08	1.09E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.33E-09	2.33E-09	1.02E-08	1.02E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	6.25E-05	6.25E-05	2.74E-04	2.74E-04

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
	Bldg 0652							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-03	1.50E-03	6.57E-03	6.57E-03
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.08E-07	5.08E-07	2.23E-06	2.23E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.42E-08	1.42E-08	6.20E-08	6.20E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.17E-09	4.17E-09	1.82E-08	1.82E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.83E-06	2.83E-06	1.24E-05	1.24E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.67E-07	1.67E-07	7.30E-07	7.30E-07
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.00E-08	1.00E-08	4.38E-08	4.38E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	9.16E-07	9.16E-07	4.01E-06	4.01E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.17E-06	1.17E-06	5.11E-06	5.11E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.00E-08	7.00E-08	3.06E-07	3.06E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.17E-06	3.17E-06	1.39E-05	1.39E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.17E-07	2.17E-07	9.49E-07	9.49E-07
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.58E-03	1.58E-03	6.90E-03	6.90E-03
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	100.0	100.0	437.8	437.8

Division for Air Quality

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(502) 564-3999

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Source Emissions Profile

__ Section N.1: Emission Summary
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Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	2, 1.0 MMBtu/hr Boiler-Anthropology	1	Natural Gas Usage	NA	NA	1	0.001960	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.16464	0.16464	0.72112	0.72112
	Bldg 9854							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.19600	0.19600	0.85848	0.85848
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.01490	0.01490	0.06524	0.06524
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00118	0.00118	0.00515	0.00515
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.01078	0.01078	0.04722	0.04722
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.70E-09	4.70E-09	2.06E-08	2.06E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	4.12E-06	4.12E-06	1.80E-05	1.80E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.35E-09	2.35E-09	1.03E-08	1.03E-08
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.35E-09	2.35E-09	1.03E-08	1.03E-08
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	3.14E-08	3.14E-08	1.37E-07	1.37E-07
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.35E-09	2.35E-09	1.03E-08	1.03E-08
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.35E-06	2.35E-06	1.03E-05	1.03E-05
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	5.88E-09	5.88E-09	2.58E-08	2.58E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	5.49E-09	5.49E-09	2.40E-08	2.40E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	1.47E-04	1.47E-04	6.44E-04	6.44E-04

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	2, 1.0 MMBtu/hr Boiler-Anthropology	1	Natural Gas Usage	NA	NA	1	0.000833	3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
	Bldg 9854							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	4.70E-08	4.70E-08	2.06E-07	2.06E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-03	3.53E-03	1.55E-02	1.55E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	3.53E-09	3.53E-09	1.55E-08	1.55E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	1.20E-06	1.20E-06	5.24E-06	5.24E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	3.33E-08	3.33E-08	1.46E-07	1.46E-07
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	9.80E-09	9.80E-09	4.29E-08	4.29E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	6.66E-06	6.66E-06	2.92E-05	2.92E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	3.92E-07	3.92E-07	1.72E-06	1.72E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.35E-08	2.35E-08	1.03E-07	1.03E-07
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	2.16E-06	2.16E-06	9.44E-06	9.44E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	2.74E-06	2.74E-06	1.20E-05	1.20E-05
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.65E-07	1.65E-07	7.21E-07	7.21E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	7.45E-06	7.45E-06	3.26E-05	3.26E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	5.10E-07	5.10E-07	2.23E-06	2.23E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	4.12E-06	4.12E-06	1.80E-05	1.80E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	4.70E-08	4.70E-08	2.06E-07	2.06E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	3.71E-03	3.71E-03	1.62E-02	1.62E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	235.2	235.2	1030.2	1030.2

Division for Air Quality

300 Sower Boulevard
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 5/27/2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions.								CO					13.448	13.448	8.106	8.106
								NO2					79.179	79.179	25.442	25.442
								PM10					0.475	0.475	0.548	0.548
								SO2					0.077	0.077	0.053	5.31E-02
								VOC					15.371	15.371	4.153	4.153
								Acenaphthene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Acenaphthylene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Acetaldehyde					1.15E-03	1.15E-03	2.88E-04	2.88E-04
								Acrolein					3.62E-04	3.62E-04	9.05E-05	9.05E-05
								Anthracene					3.28E-08	3.28E-08	1.44E-07	1.44E-07
								Benz(a)anthracene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Benzene					3.36E-02	3.36E-02	8.52E-03	8.52E-03
								Benzo(b)fluoranthene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Benzo(a)pyrene					1.64E-08	1.64E-08	7.19E-08	7.19E-08
								Benzo(g,h,i)perylene					1.64E-08	1.64E-08	7.19E-08	7.19E-08
								Benzo(k)flouranthene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Chrysene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								7,12-Dimethylbenz(a)anthracene					2.19E-07	2.19E-07	9.58E-07	9.58E-07
								Dibenzo(a,h)anthracene					1.64E-08	1.64E-08	7.19E-08	7.19E-08
								Dichlorobenzene					1.64E-05	1.64E-05	7.19E-05	7.19E-05
								Fluoranthene					4.10E-08	4.10E-08	1.80E-07	1.80E-07
								Fluorene					3.83E-08	3.83E-08	1.68E-07	1.68E-07
								Formaldehyde					2.96E-03	2.96E-03	4.98E-03	4.98E-03
								3-Methylchloranthrene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								2-Methylnaphthalene					3.28E-07	3.28E-07	1.44E-06	1.44E-06

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions.								n-Hexane					2.46E-02	2.46E-02	1.08E-01	1.08E-01
								Indeno(1,2,3-cd)pyrene					2.46E-08	2.46E-08	1.08E-07	1.08E-07
								Naphthalene					8.34E-06	8.34E-06	3.65E-05	3.65E-05
								Phenanthrene					2.32E-07	2.32E-07	1.02E-06	1.02E-06
								Pyrene					6.84E-08	6.84E-08	2.99E-07	2.99E-07
								Toluene					1.22E-02	1.22E-02	3.23E-03	3.23E-03
								Xylene					8.30E-03	8.30E-03	2.07E-03	2.07E-03
								Arsenic					2.73E-06	2.73E-06	1.20E-05	1.20E-05
								Beryllium					1.64E-07	1.64E-07	7.19E-07	7.19E-07
								Cadmium					1.50E-05	1.50E-05	6.59E-05	6.59E-05
								Chromium					1.91E-05	1.91E-05	8.38E-05	8.38E-05
								Cobalt					1.15E-06	1.15E-06	5.03E-06	5.03E-06
								Manganese					5.20E-05	5.20E-05	2.28E-04	2.28E-04
								Mercury					3.55E-06	3.55E-06	1.56E-05	1.56E-05
								Nickel					2.87E-05	2.87E-05	1.26E-04	1.26E-04
								Selenium					3.28E-07	3.28E-07	1.44E-06	1.44E-06
								PAH					9.31E-03	9.31E-03	2.33E-03	2.33E-03
								Total HAP					9.26E-02	9.26E-02	1.30E-01	1.30E-01
								CO2					8.88E+03	8878	3.02E+03	3020

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
1	EU99	1.0, est	30, est				22052	896	
1	EU100	0.6, est	30, est				11406	757	
1	EU101	0.6, est	30, est				3249	851	
1	EU102	0.33, est	30, est				368	250	
1	EU103	0.33, est	30, est				400	330	

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
EU99 - Agriculture Research Bldg 1 (bldg 0364) – Install a 3685 hp diesel-fired emergency generator
EU100 - Rankin MD Health Ed (bldg 0724) – Install a 2010 hp diesel-fired emergency generator
EU101 - Barnhart (bldg 0276) – Replace 157 Hp diesel-fired emergency generator (EU59) with a 757 hp diesel-fired emergency generator
EU102 - Barnhart (bldg 0276) – Install a 1.5 MMBtu/hr natural gas-fired boiler
EU103 - Craft Football Training (bldg 0280) – Install 6, 1.6 MMBtu/hr, each natural gas-fired boilers
IA11 - Bosworth Hall (bldg 0652) – Install a 0.85 MMBtu/hr natural gas-fired boiler **Addition of second 0.85 MMBtu/hr boiler for a total of 2, 0.85 MMBtu/hr boilers to replace 1.3 MMBtu/hr boiler**
IA11 - Anthropology (bldg 9854) – Install 2, 1.0 MMBtu/hr natural gas-fired boilers

Division for Air Quality

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DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: May 27, 2025

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68 °F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range (in. H_2O)	Pollutants Collected/ Controlled	Pollutant Removal (%)
NA																

Division for Air Quality

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DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirem
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanation

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: May 27, 2025

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4211(f)	NA	NA	NA	In order for the engines to be considered emergency stationary ICE (Internal Combustion Engine) under 40 CFR 60, Subpart IIII, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in 40 CFR 60.4211(f)(1)-(3) is prohibited. If the permittee does not operate the engines according to these requirements, the engines will not be considered emergency engines and shall meet all requirements for non-emergency engines.	
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4211(a)	NA	NA	NA	The permittee shall operate and maintain the stationary CI internal combustion engine and control device according to the manufacturer's emission-related written instructions, change only those emission-related settings that are permitted by the manufacturer; and meet the requirements of 40 CFR parts 89, 94 and/or 1068, as they apply.	

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4207(b)	NA	NA	NA	The permittee shall use diesel fuel that meets the requirements of 40 CFR 80.510(b) for nonroad diesel fuel, except that any existing diesel fuel purchased (or otherwise obtained) prior to October 1, 2010, may be used until depleted.	
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4206	NA	NA	NA	The permittee shall operate and maintain the stationary CI ICE such that the emission standards required in 40 CFR 60.4205 are achieved over the entire life of the engine.	
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4211(g)	NA	NA	NA	If the engine and control device are not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or emission-related settings are changed in a way that is not permitted by the manufacturer, the permittee shall demonstrate compliance according to 40 CFR 60.4211(g)(3).	
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NSPS IIII: 40 CFR 60.4205(b) 40 CFR 60.4211©	NA	NA	NA	The emergency engines shall comply with the emission standards for new nonroad CI engines in 40 CFR 60.4202 for all pollutants, for the same model year and maximum engine power.	Purchase engine certified to the emission standards in 40 CFR 60.4204(b), for the same model year and maximum engine power. The engine shall be installed and configured according to the manufacturer's emission-related specifications.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	401 KAR 59:015, Section 7(1)(b-e2)	NA	NA	NA	Minimize the boilers' startup and shutdown periods and conduct startups and shutdowns according to the manufacturer's recommended procedures. If manufacturer's recommended procedures are not available, the permittee shall follow recommended procedures for a unit of similar design for which manufacturer's recommended procedures are available.	Refer to V.3 recordkeeping and V.4 reporting requirements.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	401 KAR 59:015, Section 4(1)(b)	PM	0.10 lb/MMBtu	NA	Particulate matter (PM) emissions from each stack shall not exceed 0.10 lbs/MMBtu.	Compliance is assumed while combusting natural gas.

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	401 KAR 59:015, Section 4(2)(a)	Visible Emissions (VE)	20% Opacity	NA	While combusting natural gas, opacity emissions from each stack shall not exceed 20 percent opacity except: a maximum of 27 percent opacity shall be allowed for one six minute period in any 60 consecutive minutes.	Compliance is assumed while combusting natural gas.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	401 KAR 59:015, Section 4(2)(c)	Visible Emissions (VE)	20% Opacity	NA	While combusting natural gas, opacity emissions from each stack shall not exceed 20 percent opacity except: for emissions caused by building a new fire, emissions during the period required to bring the boiler up to operating conditions shall be allowed, if the method used is recommended by the manufacturer and the time does not exceed the manufacturer's recommendations.	Compliance is assumed while combusting natural gas.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	401 KAR 59:015, Section 5(1)(b)1	SO2	0.8 lb/MMBtu	NA	Sulfur dioxide (SO2) emissions from each stack shall not exceed 0.8 lb/MMBtu.	Compliance is assumed while combusting natural gas.

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	NSPS IIII: 40 CFR 60.4209(a)	Hours	The permittee shall install non-resettable hour meters prior to startup of each engine.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	NA	401 KAR 52:020, Section 10	Fuel Usage	Monitor the amount of natural gas (in MMscf) on a monthly basis.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	NSPS IIII: 40 CFR 60.4214(b)	Hours	The permittee shall record the time of operation of the engine and the reason the engine was in operation during that time.
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	401 KAR 52:020, Section 10	Hours	The permittee shall maintain records of the manufacturer's certified emissions certificate, manufacturer's written operating instructions, and any procedures developed by the permittee that are approved by the engine manufacturer, over the entire life of the engine.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	NA	401 KAR 52:020, Section 10	Fuel Usage	The permittee shall record the amount of natural gas (in MMscf) on a monthly basis.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	NA	401 KAR 52:020, Section 10	NA	The permittee shall keep records of the manufacturer's recommended procedures for startup and shutdown, any instance in which the recommended procedures were not followed, and any corrective actions taken.

Section V.4: Reporting Requirements

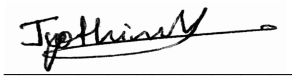
Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	NSPS IIII: 40 CFR 60.4214(d)	NA	If the engine operates or is contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4211(f)(3) the permittee shall submit an annual report by March 31 of the following calendar year.
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	401 KAR 52:020, Section 22	Fuel Usage	Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	NA	401 KAR 52:020, Section 22	Fuel Usage	Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
EU99-EU101	3685 Hp Diesel Generator-Ag. Research 2010 Hp Diesel Generator-Rankin MD Health Ed 757 Hp Diesel Generator-Barnhart	NA	401 KAR 50:045, Section 1	NA	Testing shall be conducted at such times as may be required by the Cabinet.
EU102, EU103	1.5 MMBtu Natural Gas Boiler-Barnhart 6, 1.6 MMBtu Natural Gas Boilers-Craft Football Training	NA	401 KAR 50:045, Section 1	NA	Testing shall be conducted at such times as may be required by the Cabinet.

Section V.6: Notes, Comments, and Explanations
None

Turner

Project Name: UK Agriculture Research Facility **Signature:**  **Date:** 09/05/2024

Nirdesh, Intern

This review does not relieve the Trade Contractor of the responsibility for making the work conform to the requirements of the Contract. The Trade Contractor is responsible for all dimensions, correct fabrication and accurate fit with the work of other trades.

Date of Submittal Reception: 08/26/2024 **Type:** Product Data
Submittal #: 01 R0 **Submittal Description:** Emergency Generator
Spec Section #: 26 3213-01
Trade Contractor: Boyd CAT

TURNER COMMENTS IN **BLUE**

Additional Comments:

Turner Reviewed ☑

CAT 3516 PGJL
2750kW, 480V
Generator Set

SUBMITTAL

CUSTOMER:

University of Kentucky

PROJECT:

UK AG Research

Steve Works

steveworks@BoydCat.com
(803) 600-8983

BILL OF MATERIALS

BILL OF MATERIALS

Quote: 31113659

Re: UK Agriculture Research Facility 1 TC-010 Electrical Equipment

Boyd Cat is pleased to present you with the following quotation for the UK Agriculture Research Facility 1 TC-010 Electrical Equipment project:

Model: 3516 PGJL
Quantity: 1
Rating: 2750 kW
Certification: U.S. EPA Stationary Emergency Use Only
Fuel: DIESEL
Excitation: PM
Frequency: 60 Hz
Voltage: 480 V
Duty: STANDBY

The following features will be included:

Feature Description
EPA STATIONARY EMERGENCY
60HZ 480 VOLT (WYE), 2750 EKW W/FAN
3516E 60HZ LV/MV PKG 2750 KW
105C TEMP RISE OVER 40C AMB
cULus CERTIFIED GEN SET
1868/2B-2/3P-FW-PM 862
ECS100 CONTROL PANEL
NO SEISMIC CERTIFICATION
FORM WOUND
PERMANANENT MAGNET (PM)
ALTERNATOR RTDS
POWER FACTOR 0.8
REAR CTRL PANEL MOUNTING
ECS100 CTRL PACKAGE MOUNT
CTRL PANEL DOOR W/HMI DISPLAY
ENGINE INTERFACE HARNESS EUI
MAIN GENERATOR TERMINAL BOX
RR CP/AUX MTG WITH RR EXT BOX
QTY REMOTE ANNUNC (1)
ETHERNET TELEMATICS
NEUTRAL GROUND CONNECTION
LOW VOLTAGE WIRING
1800 FRAME REAR & BOTTOM COVER
CONTROL BOX MOUNTING
CT 6000:5 RATIO
GENSET ETHERNET IO-BASE CONF

ETHERNET DC CONVERTER
CIRCUIT BREAKER RATING REAR
E FRAME BREAKER
3 POLE BREAKER UL/CSA
LSIG-P TRIP UNIT
NON-PARALLELING BREAKER
EMAX 4000A LSIG-P 3P UL EO
NO POWER CONN REAR
BOTTOM CABLE ENTRY
REAR EXTENSION BOX
BOTTOM CABLE SHROUD REAR
REAR EXT BOX CLOSE OUT
EMAX2 FRAME CONN 6P BCE REAR
CENTER 5000A LV MULTI BUS
E FRAME CB REAR MOUNT
QTY CB TERMINALS FOR WM (1-2)
MP FRAME 1ST CB WIRING
TORSIONAL COUPLING 80 SHORE
DRAIN GP - OIL PAN 15
LINEAR SPRING ISOLATORS
RAD AF81AVS HIGH AMB
COOLANT 110 Gal – FUW AF81 RAD
3516 RAIL 1822-1868 2B FRAME
AF81 COOLANT LEVEL SITE GAUGE
INTEGRATED VOLTAGE REG
HD AIR CLEAN-SINGLE ELEMENT
SPACE HEATER 1600 FRAME
LUBE OIL 481L SAE 15W-40
PRIMARY FUEL FILTER/FW SEP
PLUG GP-NO CYL TEMP SENSORS
STANDARD CRANKCASE COVERS
DUAL ELECTRIC START LH 50MT
COVERS-DUAL START & NO BAR
SPACE HEATER CONTROL
NON-FILTER CRKCASE VENT SYS
BATT SET 4x 12V WET 1500CCA
RACK & CABLE-4x 1400CCA BAT
BATTERY CHARGER 10A NFPA
JACKET WATER HTR-208V 580
WIRING GP-JW HEATER 42
208/220/240V JWH CONTROL
PGS TEST REPORT @ 0.8 PF
PLAT 5Y 2500HR GEN STNDBY WARRANTY

Dealer provided components and services:

Quantity: 1

Description
NFPA Load Bank Test
NFPA Start-up by Boyd Cat Tech

BACnet
ONSITE PRESSURE TEST OF DIESEL BELLY TANK PER NFPA 30 BEFORE FILL

Quantity: 1

Dealer provided components and services:

Description
1. **Custom Generator Enclosure and Fuel Tank**: • Noise emissions reduced to 75dB(A) when measured at a distance of 23 feet, from a height of 5 feet above grade • 115 MPH wind loads • 50 lbs/ft² roof loads • 4 inch per hour rainfall
2. UL 142 labeled atmospheric diesel fuel tank including the following items: a) 4,670 usable gallon (24-hour capacity @ 100% of full load) b) 3-5 PSI tested c) Full steel construction with diamond plate top d) The fuel tank comes with a top mounted siphon drain and the containment basin comes with an NPT fitting and plug
3. Secondary containment basin for the above fuel tank including the following items: a) 3-5 PSI tested air tight seal b) Capacity is approximately 110% of the fuel tank actual capacity c) Grounding provisions installed at diagonally opposite corners of the sub base d) NEC-250 sized and rated ground strap installed between the generator set sub-rail to the enclosure base e) One (1) Conduit stub up opening for cable access to the generator output terminals f) Empty conduit run from the generator stub up to the panelboard for the incoming AC power g) Six-point lift provisions h) Concrete pad anchor holes i) Approximate sub base dimensions: 132"W x 27"H x 661"L
4. Fuel tank accessory group including the following items: a) Mechanical type fuel level gauge complete with a 0-5mA sensor output to communicate with the generator control panel b) Vandal-resistant fuel fill complete with a padlock type cap installed in the following five- gallon fuel fill spill containment c) Interior five-gallon fuel fill spill containment basin complete with a lockable lid d) Standard tank fittings group e) Flexible braided fuel lines with crimp-on type fittings f) Primary fuel tank and secondary containment basin vents through the roof of the enclosure and terminated at a point which measures at least 12 feet above grade level. Includes pop-up cap(s) on the emergency vents g) Mounting pads and shipping blocks to install the Boyd supplied spring type vibration isolators between the engine rails and the sub base floor
5. Fuel level control switch group including the following items: a) Low fuel level alarm switch set @ 40% usable fuel remaining installed in the fuel tank and wired to the generator set control panel b) High fuel level alarm switch set at 90% of actual capacity installed in the fuel tank and wired to the generator set control panel c) Leak detection alarm switch installed in the rupture basin and wired to the generator set control panel complete with dry contacts for use by others at the jobsite

6. Ship loose engine accessories including the following items:
   a) Labor to install the dealer supplied shipped loose radiator. The radiator is to be received with all fluid connections, couplings, belts, guards, drive group and the wishbone attachment frame
   b) Labor to install the Caterpillar supplied air charge pipe from the engine to the radiator
   c) Labor to install and plumb the Caterpillar supplied fuel filter and water separator

7. Enclosure group including the following items:
   a) 12-gauge galvannealed steel, formed and bolted constructed, reach-in enclosure
   b) The roof is crowned to prevent the ponding of water and the seams have continuous welds preventing the entrance of water
   c) Roof mounted tie-off provisions for personnel safety
   d) Engine lube oil and coolant drain are extended to the exterior of the enclosure complete with NPT fittings on the lube oil and coolant drains
   e) The enclosure is designed for 115 mph wind gusts complete with roof loading equal to 50 lbs/ft² per IBC (International Building Code) 2018 based on the Site Category
   f) Steel skirt installed under the enclosure complete with lifting provisions and mounting holes to attach directly to the base. Note: The lifting provisions are design to lift the enclosure only
8. Approximate enclosure dimensions: 130"W x 140"H x 660"L

9. Enclosure door accessory group including the following items:
   - Four (4) 36"W x 84"H access doors
   - Stainless steel, surface mount, strap-type hinges
   - Stainless steel padlock door handles
   - Zinc plated, three-point door latches with interior override handles
   - Restraint chains to prevent the door from opening more than 100 degrees
   - Full perimeter gaskets
   - 1.5" deep drip gutters
   - Anti-skid tape applied to the thresholds

10. Sound attenuation and air control accessory group including the following items:
   a) Sound attenuating insulation complete with a perforated galvanized, mill finished liner are applied to the interior walls and ceiling of the enclosure
   b) Side mounted, bottom entry, vertical updraft, sound attenuating plenum for the air intake. The side hoods will be removed for shipment and require attachment at the job site. The approximate width of the enclosure, with the side hoods installed, is 298"
   c) Integral type, sound attenuating, vertical updraft radiator discharge plenum with top discharge
   d) Removable access panel in the discharge plenum to allow for periodic maintenance
   e) Galvanized construction motorized louvers for the air intake opening(s). The 120VAC louver motors are wired to motor close and spring open.
   f) Aluminum construction gravity type radiator discharge louver installed
   g) Radiator air discharge shroud assembly to prevent recirculation
   h) Discharge air diverter with drains extended to the enclosure exterior
   i) Bird screens installed for the air intake and discharge openings
   j) Discharge sound module for installation on the sound attenuating discharge plenum. The module will ship loose for job site installation
   k) Sound baffles to achieve a 75dB(A) sound rating when measured at a distance of 23 feet free field

11. Enclosure electrical accessory group including the following items:
   a) Labor and material to install the CMCO supplied 208/120-volt, three phase, NEMA 1 surface mounted Square D, 30-pole, breaker type panelboard and complete with a 100A bolt-in style main circuit breaker and bolt-in style branch circuit breakers for the engine and enclosure accessories

b) Labor and material to install the six (6) CMCO supplied, 120VAC, LED, forty-eight-inch, vapor-tight light fixtures complete with two (2) three-way wall switches
c) One (1) 120VAC emergency light fixture complete with dual lamps, integral battery and battery charger.
d) 20A GFI receptacle and a 20A GFI protected duplex receptacle
e) Wire the jacket water heater to the panelboard
f) Wire the generator strip heater to the panelboard
g) Install a Boyd supplied battery charger and wire the charger alarm relays to the control panel
h) Install the Caterpillar supplied battery racks and supplied battery cables for use with the Caterpillar supplied lead acid batteries
i) All wiring is installed in surface mounted EMT (Electrical Metallic Tubing) with compression fittings, liquid tight flexible conduit, and galvanized steel boxes. All wire will be THHN unless otherwise noted and all liquid tight flexible conduit runs will be less than six feet long. PLEASE NOTE: All supplied conduit and wiring installed to current NEC Code requirements (NFPA 70)

12. Enclosure exhaust accessory group including the following items:
a) Exhaust roof dress cap installed
b) Low profile, pancake style muffler for installation inside the enclosure. The muffler is to be ordered with 2.00-inch-thick internal insulation
c) Mounting brackets to install the low profile, pancake style muffler inside the enclosure complete with flexible connections to the engine including all gaskets and hardware
d) Silencer outlet exhaust extension complete with gaskets, hardware, and a stainless-steel rain cap
e) Install insulation blankets for the flex assemblies

Quantity: 1

Dealer provided components and services:

Description	
Russelectric Automatic Transfer Switches	
(QTY) 2	**ATS-ELS, ATS-ELS_2--RTS03-ATC4004AMW1-RPTCS01** RTS-03 Cycle, Automatic, Transfer Switch, Closed Transition - Dual, RPTCS, 400 A, 4 Poles, 277/480 V, 3Ø 4W, 42,000 A WCR. Estimated Lead Time : 150 Working Days 1 - SECTION-ATS 1 - Closed Transition 1 - Enclosed Switch 1 - NEMA 1 Enclosure 1 - Enclosure Paint (Exterior) - ANSI 61 Gray 1 - Source 1 Arrangement - Front Top 1 - Source 1 Per Phase Lug Type Standard Mechanical (1)#4-600MCM / (2)#1/0-250MCM 1 - Source 1 Neutral Lug Type - Match Phases 1 - Source 1 Ground Lug Type - Standard Mechanical (1) #14-1/0 1 - Load Arrangement - Front Top 1 - Load Per Phase Lug Type Load Lug Type Standard Mechanical (1)# 4-600MCM / (2)#1/0-250MCM 1 - Load Neutral Lug Type - Match Phases 1 - Load Ground Lug Type - Standard Mechanical (1) #14-1/0 1 - Source 2 Arrangement - Front Bottom 1 - Source 2 Per Phase Lug Type Source 2 Lug Type Standard Mechanical (1)#4-600MCM / (2)#1/0-250MCM 1 - Source 2 Neutral Lug Type - Match Phases

- 1 - Source 2 Ground Lug Type - Standard Mechanical (1) #14-1/0

1 - SELECTORS
- 1 - XL10 - Test / Auto / Off / Hand Lever Switch w/ Test Mode Contact
- 1 - XK18- Closed / Open Transition Mode Key Switch

1 - LIGHTS
- 1 - LT1 - Source 1 Position Light (Internal)
- 1 - LT2 - Source 2 Position Light (Internal)
- 1 - LT3 - Source 1 Available Light (Internal)
- 1 - LT4 - Source 2 Available Light (Internal)
- 1 - LT20 - Transfer Inhibit Light (Internal)
- 1 - LT21 - System in Alarm Light (Internal)

1 - TIMERS AND RELAY
- 1 - TDES - Time Delay Override Momentary Power Outage - Delay Engine Start (0:0-259:59 min:sec)
- 1 - TDEC - Time Delay Engine Cooldown (Internal 0-3600s)
- 1 - TDPS - Time Delay Retransfer to Preferred Source
- 1 - TDNP - Time Delay Neutral to Preferred Source
- 1 - TDNNP - Time Delay Neutral to Nonpreferred Source

1 - METER
- 1 - No Metering Selected
- 1 - Serial Connection

1 - CONTACTS
- 2 - CS1A - Source 1 Available Form C Auxiliary Contact
- 2 - CS1P - Source 1 Position NC Auxiliary Contact
- 2 - CS2A - Source 2 Available Form C Auxiliary Contact
- 2 - CS2P - Source 2 Position NC Auxiliary Contact
- 1 - CES - Form C Contact to Initiate Engine Start

1 - MISCELLANEOUS
- 1 - FTT - Fail to Transfer Timer (0.1 - 1s) w/ Contacts
- 1 - SCF - Synchronizing Check Function

(QTY) 1 **ATS-ELEV--RTS03-ATC6004AMF1-RPTCS01**

RTS-03 Cycle, Automatic, Transfer Switch, Closed Transition - Dual, RPTCS, 600 A, 4 Poles, 277/480 V, 3Ø 4W, 65,000 A WCR.
Estimated Lead Time : 150 Working Days

1 - SECTION-ATS
- 1 - Closed Transition
- 1 - Enclosed Switch
- 1 - NEMA 1 Enclosure
- 1 - Enclosure Paint (Exterior) - ANSI 61 Gray
- 1 - Source 1 Arrangement - Front Top
- 1 - Source 1 Per Phase Lug Type Standard Mechanical (2)#4-500MCM
- 1 - Source 1 Neutral Lug Type - Match Phases
- 1 - Source 1 Ground Lug Type - Standard Mechanical (2) #6-250MCM
- 1 - Load Arrangement - Front Top
- 1 - Load Per Phase Lug Type Load Lug Type Standard Mechanical (2)# 4-500MCM
- 1 - Load Neutral Lug Type - Match Phases
- 1 - Load Ground Lug Type - Standard Mechanical (2) #6-250MCM
- 1 - Source 2 Arrangement - Front Bottom
- 1 - Source 2 Per Phase Lug Type Source 2 Lug Type Standard Mechanical (2)#4-500MCM
- 1 - Source 2 Neutral Lug Type - Match Phases
- 1 - Source 2 Ground Lug Type - Standard Mechanical (2) #6-250MCM

1 - SELECTORS

- 1 - XL10 - Test / Auto / Off / Hand Lever Switch w/ Test Mode Contact
- 1 - XK18- Closed / Open Transition Mode Key Switch

1 - LIGHTS
- 1 - LT1 - Source 1 Position Light (Internal)
- 1 - LT2 - Source 2 Position Light (Internal)
- 1 - LT3 - Source 1 Available Light (Internal)
- 1 - LT4 - Source 2 Available Light (Internal)
- 1 - LT20 - Transfer Inhibit Light (Internal)
- 1 - LT21 - System in Alarm Light (Internal)

1 - TIMERS AND RELAY
- 1 - TDES - Time Delay Override Momentary Power Outage - Delay Engine Start (0:0-259:59 min:sec)
- 1 - TDEC - Time Delay Engine Cooldown (Internal 0-3600s)
- 1 - TDPS - Time Delay Retransfer to Preferred Source
- 1 - TDNP - Time Delay Neutral to Preferred Source
- 1 - TDNNP - Time Delay Neutral to Nonpreferred Source

1 - METER
- 1 - No Metering Selected
- 1 - Serial Connection

1 - CONTACTS
- 2 - CS1A - Source 1 Available Form C Auxiliary Contact
- 2 - CS1P - Source 1 Position NC Auxiliary Contact
- 2 - CS2A - Source 2 Available Form C Auxiliary Contact
- 2 - CS2P - Source 2 Position NC Auxiliary Contact
- 1 - CES - Form C Contact to Initiate Engine Start

1 - MISCELLANEOUS
- 1 - FTT - Fail to Transfer Timer (0.1 - 1s) w/ Contacts
- 1 - SCF - Synchronizing Check Function

(QTY) 1 **ATS-ESB1--RTS03-ATC10004AMF1-RPTCS01**

RTS-03 Cycle, Automatic, Transfer Switch, Closed Transition - Dual, RPTCS, 1,000 A, 4 Poles, 277/480 V, 3Ø 4W, 85,000 A WCR.
Estimated Lead Time : 150 Working Days

1 - SECTION-ATS
- 1 - Closed Transition
- 1 - Enclosed Switch
- 1 - NEMA 1 Enclosure
- 1 - Enclosure Paint (Exterior) - ANSI 61 Gray
- 1 - Source 1 Arrangement - Front Top
- 1 - Source 1 Per Phase Lug Type Standard Mechanical (4)#2-600MCM
- 1 - Source 1 Neutral Lug Type - Match Phases
- 1 - Source 1 Ground Lug Type - Standard Mechanical (4) #6-250MCM
- 1 - Load Arrangement - Front Top
- 1 - Load Per Phase Lug Type Load Lug Type Standard Mechanical (4)# 2-600MCM
- 1 - Load Neutral Lug Type - Match Phases
- 1 - Load Ground Lug Type - Standard Mechanical (4) #6-250MCM
- 1 - Source 2 Arrangement - Front Bottom
- 1 - Source 2 Per Phase Lug Type Source 2 Lug Type Standard Mechanical (4)#2-600MCM
- 1 - Source 2 Neutral Lug Type - Match Phases
- 1 - Source 2 Ground Lug Type - Standard Mechanical (4) #6-250MCM

1 - SELECTORS
- 1 - XL10 - Test / Auto / Off / Hand Lever Switch w/ Test Mode Contact

- 1 - XK18- Closed / Open Transition Mode Key Switch

1 - LIGHTS
- 1 - LT1 - Source 1 Position Light (Internal)
- 1 - LT2 - Source 2 Position Light (Internal)
- 1 - LT3 - Source 1 Available Light (Internal)
- 1 - LT4 - Source 2 Available Light (Internal)
- 1 - LT20 - Transfer Inhibit Light (Internal)
- 1 - LT21 - System in Alarm Light (Internal)

1 - TIMERS AND RELAY
- 1 - TDES - Time Delay Override Momentary Power Outage - Delay Engine Start (0:0-259:59 min:sec)
- 1 - TDEC - Time Delay Engine Cooldown (Internal 0-3600s)
- 1 - TDPS - Time Delay Retransfer to Preferred Source
- 1 - TDNP - Time Delay Neutral to Preferred Source
- 1 - TDNNP - Time Delay Neutral to Nonpreferred Source

1 - METER
- 1 - No Metering Selected
- 1 - Serial Connection

1 - CONTACTS
- 2 - CS1A - Source 1 Available Form C Auxiliary Contact
- 2 - CS1P - Source 1 Position NC Auxiliary Contact
- 2 - CS2A - Source 2 Available Form C Auxiliary Contact
- 2 - CS2P - Source 2 Position NC Auxiliary Contact
- 1 - CES - Form C Contact to Initiate Engine Start

1 - MISCELLANEOUS
- 1 - FTT - Fail to Transfer Timer (0.1 - 1s) w/ Contacts
- 1 - SCF - Synchronizing Check Function

(QTY) 1 **ATS-ESB4--RTS03-ABLC25004AMF1-RPTCS02**

RTS-03 Cycle, Automatic, Bypass/Isolation Fail-safe, Closed Transition - Dual, RPTCS, 2,500 A, 4 Poles, 277/480 V, 3Ø 4W, 100,000 A WCR.
Estimated Lead Time : 200 Working Days

1 - SECTION-ATS
- 1 - Closed Transition
- 1 - Additional I/O Card
- 1 - NEMA 1 Enclosure
- 1 - Enclosure Paint (Exterior) - ANSI 61 Gray
- 1 - Source 1 Arrangement - Rear Top
- 1 - Source 1 Per Phase Lug Type Standard Mechanical (6)#4-600MCM / (12)#1/0-250MCM
- 1 - Source 1 Neutral Lug Type - Match Phases
- 1 - Source 1 Ground Lug Type - Standard Mechanical (6) #6-250MCM
- 1 - Load Arrangement - Rear Top
- 1 - Load Per Phase Lug Type Load Lug Type Standard Mechanical (6)# 4-600MCM / (12)#1/0-250MCM
- 1 - Load Neutral Lug Type - Match Phases
- 1 - Load Ground Lug Type - Standard Mechanical (6) #6-250MCM
- 1 - Source 2 Arrangement - Rear Top
- 1 - Source 2 Per Phase Lug Type Source 2 Lug Type Standard Mechanical (6)#4-600MCM / (12)#1/0-250MCM
- 1 - Source 2 Neutral Lug Type - Match Phases
- 1 - Source 2 Ground Lug Type - Standard Mechanical (6) #6-250MCM

1 - SELECTORS
- 1 - XL10 - Test / Auto / Off / Hand Lever Switch w/ Test Mode Contact

- 1 - XK18- Closed / Open Transition Mode Key Switch

1 - LIGHTS
- 1 - LT1 - Source 1 Position Light (Internal)
- 1 - LT2 - Source 2 Position Light (Internal)
- 1 - LT3 - Source 1 Available Light (Internal)
- 1 - LT4 - Source 2 Available Light (Internal)
- 1 - LT16 - Load Bypassed to Source 1 Light
- 1 - LT17 - Load Bypassed to Source 2 Light
- 1 - LT18 - Switch is Isolated Light
- 1 - LT20 - Transfer Inhibit Light (Internal)
- 1 - LT21 - System in Alarm Light (Internal)

1 - TIMERS AND RELAY
- 1 - TDES - Time Delay Override Momentary Power Outage - Delay Engine Start (0:0-259:59 min:sec)
- 1 - TDEC - Time Delay Engine Cooldown (Internal 0-3600s)
- 1 - TDPS - Time Delay Retransfer to Preferred Source
- 1 - TDNP - Time Delay Neutral to Preferred Source
- 1 - TDNNP - Time Delay Neutral to Nonpreferred Source

1 - METER
- 1 - No Metering Selected
- 1 - Serial Connection

1 - CONTACTS
- 2 - CS1A - Source 1 Available Form C Auxiliary Contact
- 2 - CS1P - Source 1 Position NC Auxiliary Contact
- 2 - CS2A - Source 2 Available Form C Auxiliary Contact
- 2 - CS2P - Source 2 Position NC Auxiliary Contact
- 1 - CB1 - Switch Bypass to Source 1 Auxiliary Contact
- 1 - CB2 - Switch Bypass to Source 2 Auxiliary Contact
- 2 - CES - Form C Contact to Initiate Engine Start
- 2 - CMES - Maintain Engine Start Signal, Parallel Circuit

1 - MISCELLANEOUS
- 1 - FTT - Fail to Transfer Timer (0.1 - 1s) w/ Contacts
- 1 - SCF - Synchronizing Check Function

Quantity: 1

Dealer provided components and services:

Description
Generator Connection Cabinet Quick Connect 4000A 480/277V Dual Purpose Quick Connect Male Cam Input Brown, Orange, Yellow, White, and Green | Fem LB Cams (Brown, Orange, Yellow, and Green) w/Covers, Tamper Resistant & Pad Lockable, Phase Rotation Monitor- Fused, Dual Purp Pkg: 2WA, SDS, FTL, 20A GFCI & 30A L5-30 w/CB's, (2) 4000A ISO CB's w/TKI, (1) 4000A Load Dump CB w/Shunt, Perm Gen LED Remote Annunciator to Meet 700.3

GENERATOR SET

Cat® 3516E
Diesel Generator Sets

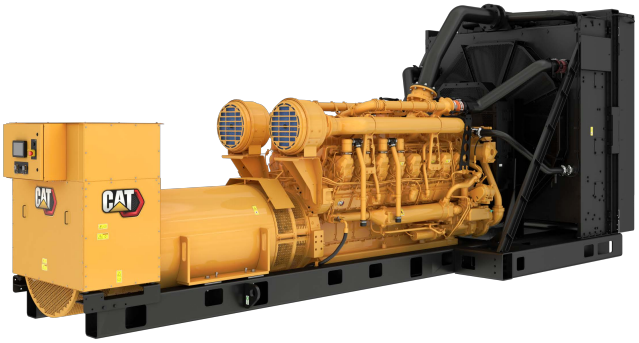


Image shown may not reflect actual configuration

Bore – mm (in)	170 (6.69)
Stroke – mm (in)	215 (8.46)
Displacement – L (in^3)	78.1 (4766)
Compression Ratio	14.7:1
Aspiration	TA
Fuel System	EUI
Governor Type	ADEM™ A5

Standby 60 Hz ekW (kVA)	Mission Critical 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Emissions Performance
2750 (3438)	2750 (3438)	2500 (3125)	U.S. EPA Certified for Emergency Stationary Applications (Tier 2)

Features

Cat® Diesel Engine
- Meets U.S. EPA Stationary Emergency Use Only (Tier 2) emission standards
- Reliable performance proven in thousands of applications worldwide
- Certified alternative fuels including Hydrotreated Vegetable Oil (HVO), Renewable Diesel (RD) and Hydrotreated Renewable Diesel (HRD) which meet EN 15940 or ASTM D975 can be used or blended with EN 590 diesel

Generator Set Package
- Accepts 100% block load in one step
- Meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators
- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System
- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

Cat Energy Control System (ECS)
- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements
- Graphical touchscreen display
- Easily upgradeable

Warranty
- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Financing
- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Standard and Optional Equipment

Engine

Air Cleaner
- ❑ Single element

Muffler
- ❑ Industrial grade (15 dB)
- ❑ Critical grade (25 dB)
- ❑ Hospital grade (35 dB)

Starting
- ❑ Standard batteries
- ❑ Oversized batteries
- ❑ Heavy duty electric starter(s)
- ❑ Air starter(s)
- ❑ Jacket water heater

Alternator

Output voltage
- ❑ 416V
- ❑ 480V
- ❑ 600V
- ❑ 4160V
- ❑ 12470V
- ❑ 13200V
- ❑ 13800V

Temperature Rise (over 40°C ambient)
- ❑ 150°C
- ❑ 125°C/130°C
- ❑ 105°C
- ❑ 80°C

Winding type
- ❑ Form wound

Excitation
- ❑ Permanent magnet (PM)

Attachments
- ❑ Anti-condensation heater
- ❑ Stator and bearing temperature monitoring and protection

Power Termination

Type
- ❑ Bus bar
- ❑ Circuit breaker
- ❑ 1600A
- ❑ 2000A
- ❑ 2500A
- ❑ 3000A
- ❑ 3200A
- ❑ 4000A
- ❑ 5000A
- ❑ IEC
- ❑ UL
- ❑ 3-pole
- ❑ 4-pole
- ❑ Manually operated
- ❑ Electrically operated

Trip Unit
- ❑ LSI
- ❑ LSI-G
- ❑ LSI-P
- ❑ LSIG-P

Control System

Controller
- ❑ Cat ECS 100
- ❑ Cat ECS 200
- ❑ EMCP 4.4

Attachments
- ❑ Local annunciator module
- ❑ Remote annunciator module
- ❑ Expansion I/O module
- ❑ Remote monitoring software

Charging

- ❑ Battery charger – 10A
- ❑ Battery charger – 20A
- ❑ Battery charger – 35A

Vibration Isolators

- ❑ Rubber
- ❑ Spring
- ❑ Seismic rated

Cat Connect

Connectivity
- ❑ Ethernet
- ❑ Cellular

Extended Service Options

Terms
- ❑ 2 year (prime)
- ❑ 3 year
- ❑ 5 year
- ❑ 10 year

Coverage
- ❑ Silver
- ❑ Gold
- ❑ Platinum
- ❑ Platinum Plus

Ancillary Equipment

- ❑ Automatic transfer switch (ATS)
- ❑ Paralleling switchgear
- ❑ Paralleling controls

Certifications

- ❑ ULC 2200 Listed
- ❑ IBC seismic certification
- ❑ OSHPD pre-approval

Note: *Some options may not be available on all models. Certifications may not be available with all model configurations. Consult factory for availability.*

Package Performance

Performance	Standby		Mission Critical		Prime	
Frequency	60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	2750 ekW		2750 ekW		2500 ekW	
Gen set power rating with fan @ 0.8 power factor	3438 kVA		3438 kVA		3125 kVA	
Emissions	EPA ESE (TIER 2)		EPA ESE (TIER 2)		EPA ESE (TIER 2)	
Performance number	EM5400-00		EM5402-00		EM5404-00	
Fuel Consumption						
100% load with fan – L/hr (gal/hr)	716.3	(189.2)	716.3	(189.2)	645.8	(170.6)
75% load with fan – L/hr (gal/hr)	547.0	(144.5)	547.0	(144.5)	505.8	(133.6)
50% load with fan – L/hr (gal/hr)	399.0	(105.4)	399.0	(105.4)	370.6	(97.9)
25% load with fan – L/hr (gal/hr)	233.5	(61.7)	233.5	(61.7)	218.7	(57.8)
Cooling System						
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m^3/min (cfm)	3026	(106862)	3026	(106862)	3026	(106862)
Engine coolant capacity – L (gal)	233.0	(61.6)	233.0	(61.6)	233.0	(61.6)
Radiator coolant capacity – L (gal)	202.0	(53.3)	202.0	(53.3)	202.0	(53.3)
Total coolant capacity – L (gal)	435.0	(114.9)	435.0	(114.9)	435.0	(114.9)
Inlet Air						
Combustion air inlet flow rate – m^3/min (cfm)	236.0	(8332.4)	236.0	(8332.4)	223.7	(7898.4)
Exhaust System						
Exhaust stack gas temperature – °C (°F)	480.0	(896.1)	480.0	(896.1)	459.3	(858.7)
Exhaust gas flow rate – m^3/min (cfm)	624.5	(22051.6)	624.5	(22051.6)	574.2	(20277.1)
Exhaust system backpressure (maximum allowable) – kPa (in. water)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)
Heat Rejection						
Heat rejection to jacket water – kW (Btu/min)	894	(50827)	894	(50827)	827	(47027)
Heat rejection to exhaust (total) – kW (Btu/min)	2849	(162025)	2849	(162025)	2514	(142941)
Heat rejection to aftercooler – kW (Btu/min)	941	(53492)	941	(53492)	844	(47998)
Heat rejection to atmosphere from engine – kW (Btu/min)	160	(9124)	160	(9124)	147	(8364)
Heat rejection from alternator – kW (Btu/min)	126	(7172)	126	(7172)	112	(6386)
Emissions* (Nominal)						
NOx mg/Nm^3 (g/hp-h)	2319.2	(5.00)	2319.2	(5.00)	2275.1	(4.82)
CO mg/Nm^3 (g/hp-h)	321.4	(0.69)	321.4	(0.69)	183.8	(0.39)
HC mg/Nm^3 (g/hp-h)	30.7	(0.08)	30.7	(0.08)	33.1	(0.08)
PM mg/Nm^3 (g/hp-h)	20.0	(0.05)	20.0	(0.05)	14.6	(0.04)
Emissions* (Potential Site Variation)						
NOx mg/Nm^3 (g/hp-h)	2783.0	(6.00)	2783.0	(6.00)	2730.1	(5.79)
CO mg/Nm^3 (g/hp-h)	536.7	(1.16)	536.7	(1.16)	307.0	(0.65)
HC mg/Nm^3 (g/hp-h)	40.8	(0.10)	40.8	(0.10)	44.1	(0.11)
PM mg/Nm^3 (g/hp-h)	28.1	(0.07)	28.1	(0.07)	20.4	(0.05)

**mg/Nm^3 levels are corrected to 5% O_2. Contact your local Cat dealer for further information.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2025 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: SCPXL78.1NZS-031

Effective Date: 08/05/2024

Expiration Date: 12/31/2025

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 08/05/2024

Revision Date: N/A

Model Year: 2025
Manufacturer Type: Original Engine Manufacturer
Engine Family: SCPXL78.1NZS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

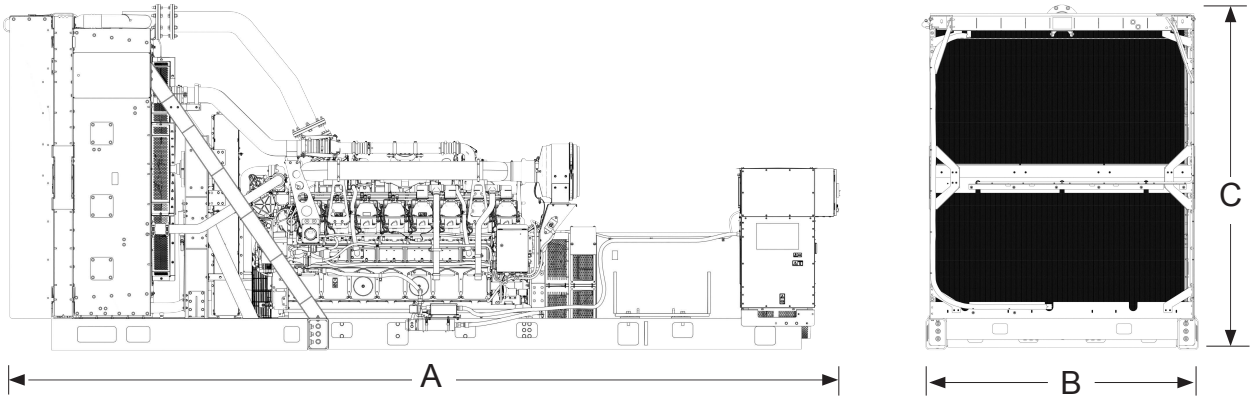
Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
7922 (311.9)	2640 (104.0)	3342 (131.6)	18 480 (40,750)

Note: *For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.*

Ratings Definitions

Standby
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby rated ekW. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Mission Critical
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 85% of the mission critical rated ekW. Typical peak demand up to 100% of rated ekW for up to 5% of the operating time. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime
Output available with varying load for an unlimited time. Average power output is 70% of the prime rated ekW. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Applicable Codes and Standards
AS 1359, ULC 2200 3rd edition, UL 489, UL 869A, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU and facilitates compliance to NFPA 37, NFPA 70, NFPA 99, NFPA 110.

Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications
- All ratings Tier III/Tier IV compliant per Uptime Institute requirements.
- All ratings ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates
Fuel consumption reported in accordance with ISO 3046-1, based on fuel oil of 35º API [16°C (60ºF)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 15ºC (59ºF) and weighing 850 g/liter (7.0936 lbs/U.S. gal.) All fuel consumption values refer to rated engine power.

www.cat.com/electricpower
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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

CAT, CATERPILLAR, LET'S DO THE WORK, their respective logos, "Caterpillar Corporate Yellow", the "Power Edge" and Cat "Modern Hex" trade dress as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

GENERATOR DATA

Selected Model

Engine: 3516	**Generator Frame:** 1868	**Genset Rating (kW):** 2750.0	**Line Voltage:** 480
Fuel: Diesel	**Generator Arrangement:** 3723068	**Genset Rating (kVA):** 3437.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Permanent Magnet	**Pwr. Factor:** 0.8	**Rated Current:** 4134.1
Duty: STANDBY	**Connection:** SERIES STAR	**Application:** EPG	**Status:** Current

Version: 20245 /20245 /20245 /666689

Spec Information

Generator Specification

Frame: 1868 **Type:** SR5	**No. of Bearings:** 2
Winding Type: FORM WOUND	**Flywheel:** 21.0
Connection: SERIES STAR	**Housing:** 00
Phases: 3	**No. of Leads:** 6
Poles: 4	**Wires per Lead:** 8
Sync Speed: 1800	**Generator Pitch:** 0.67

Generator Efficiency

Per Unit Load	kW	Efficiency %
0.25	687.5	93.1
0.5	1375.0	95.6
0.75	2062.5	96.3
1.0	2750.0	96.3

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X''_d	0.1044	0.0070
SUBTRANSIENT - QUADRATURE AXIS X''_q	0.1134	0.0076
TRANSIENT - SATURATED X'_d	0.1343	0.0090
SYNCHRONOUS - DIRECT AXIS X_d	2.7467	0.1841
SYNCHRONOUS - QUADRATURE AXIS X_q	1.1682	0.0783
NEGATIVE SEQUENCE X_2	0.1507	0.0101
ZERO SEQUENCE X_0	0.0418	0.0028

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'_{d0}	5.5950
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'_d	0.3618
OPEN CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_{d0}	0.0087
SHORT CIRCUIT SUBSTRANSIENT - DIRECT AXIS T''_d	0.0073
OPEN CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_{q0}	0.0080
SHORT CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T''_q	0.0068
EXCITER TIME CONSTANT T_e	0.2230
ARMATURE SHORT CIRCUIT T_a	0.0463

Short Circuit Ratio: 0.51	Stator Resistance = 8.0E-4 Ohms	Field Resistance = 1.106 Ohms

Voltage Regulation

Voltage level adjustment: +/-	5.0%
Voltage regulation, steady state: +/-	0.5%
Voltage regulation with 3% speed change: +/-	0.5%
Waveform deviation line - line, no load: less than	3.0%
Telephone influence factor: less than	50

Generator Excitation

	No Load	Full Load, (rated) pf	
		Series	Parallel
Excitation voltage:	13.4 Volts	52.3 Volts	Volts
Excitation current	1.23 Amps	3.96 Amps	Amps

Selected Model

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Version: 20245 /20245 /20245 /666689

Generator Mechanical Information

Center of Gravity

Dimension X	-1249.0 mm	-49.2 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.

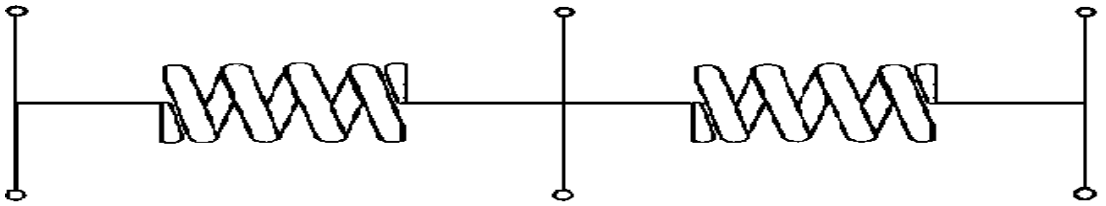
- "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details
- "Y" is measured vertically from rotor center line. Up is positive.
- "Z" is measured to left and right of rotor center line. To the right is positive.

Generator WT = 5630 kg * Rotor WT = 2099 kg * Stator WT = 2888 kg
12,412 LB 4,627 LB 6,367 LB

Rotor Balance = 0.0508 mm deflection PTP

Overspeed Capacity = 125% of synchronous speed

Generator Torsional Data



J1 = Coupling and Fan | **J2 = Rotor** | **J3 = Exciter End**

TOTAL J = J1 + J2 + J3

K1 = Shaft Stiffness between J1 + J2 (Diameter 1)

K2 = Shaft Stiffness between J2 + J3 (Diameter 2)

J1	K1	Min Shaft Dia 1	J2	K2	Min Shaft Dia 2	J3
30.1 LB IN. s^2	60.5 MLB IN./rad	6.1 IN.	648.8 LB IN. s^2	41.2 MLB IN./rad	6.2 IN.	3.8 LB IN. s^2
3.4 N m s^2	6.84 MN m/rad	154.9 mm	73.3 N m s^2	4.66 MN m/rad	157.2 mm	0.43 N m s^2

Total J

682.7 LB IN. s^2

77.13 N m s^2

Selected Model

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Generator Cooling Requirements - Temperature - Insulation Data

Cooling Requirements:		**Temperature Data: (Ambient 40 ^{0}C)**	
Heat Dissipated:	105.7 kW	**Stator Rise:**	105.0 ^{0}C
Air Flow:	271.8 m^3/min	**Rotor Rise:**	105.0 ^{0}C

Insulation Class: H

Insulation Reg. as shipped: 100.0 MΩ minimum at 40 ^{0}C

Thermal Limits of Generator

Frequency:	60 Hz
Line to Line Voltage:	480 Volts
B BR 80/40	3000.0 kVA
F BR -105/40	3438.0 kVA
H BR - 125/40	3750.0 kVA
F PR - 130/40	3750.0 kVA
H PR - 150/40	4063.0 kVA

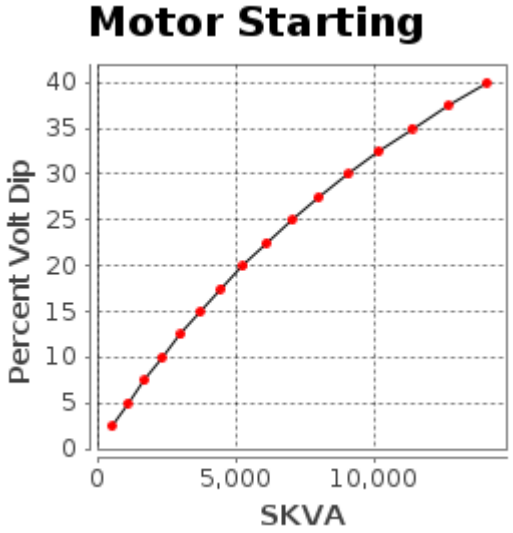
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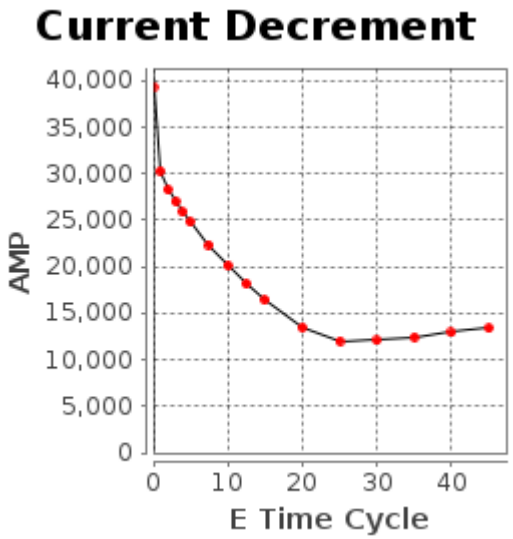
Starting Capability & Current Decrement
Motor Starting Capability (0.4 pf)

SKVA	Percent Volt Dip
541	2.5
1,111	5.0
1,711	7.5
2,345	10.0
3,015	12.5
3,725	15.0
4,477	17.5
5,277	20.0
6,128	22.5
7,036	25.0
8,006	27.5
9,046	30.0
10,163	32.5
11,366	35.0
12,665	37.5
14,072	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	39,350
1.0	30,307
2.0	28,266
3.0	27,011
4.0	25,882
5.0	24,812
7.5	22,343
10.0	20,144
12.5	18,183
15.0	16,436
20.0	13,492
25.0	12,018
30.0	12,065
35.0	12,455
40.0	12,923
45.0	13,391



Instantaneous 3 Phase Fault Current: 39350 Amps **Instantaneous Line - Line Fault Current:** 27929 Amps

Instantaneous Line - Neutral Fault Current: 41595 Amps

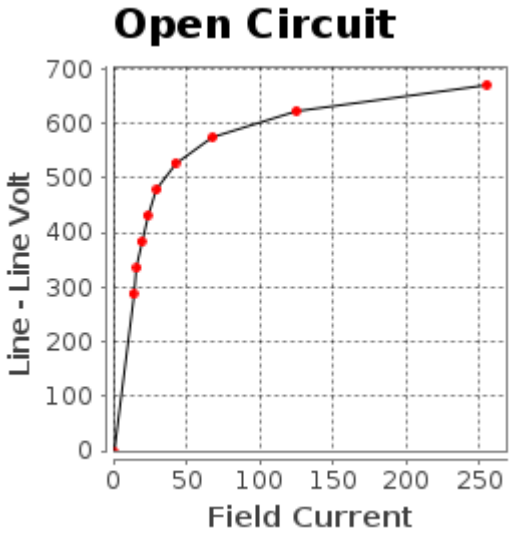
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Version: 20245 /20245 /20245 /666689

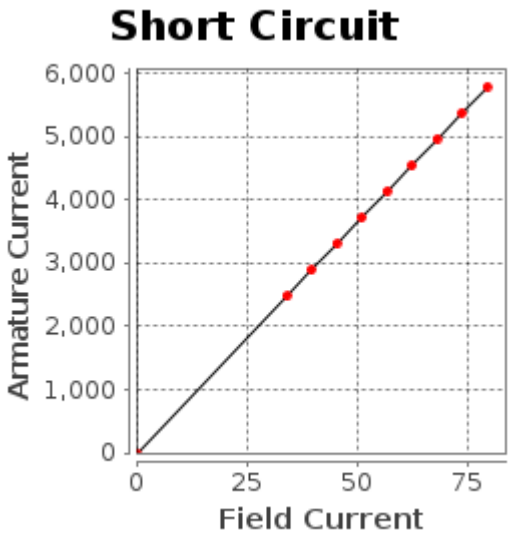
Generator Output Characteristic Curves
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
13.8	288
16.4	336
19.4	384
23.5	432
30.1	480
42.5	528
68.3	576
125.4	624
255.7	672



Short Circuit Curve

Field Current	Armature Current
0.0	0
34.1	2,481
39.7	2,894
45.4	3,308
51.1	3,721
56.8	4,135
62.4	4,548
68.1	4,962
73.8	5,375
79.5	5,789



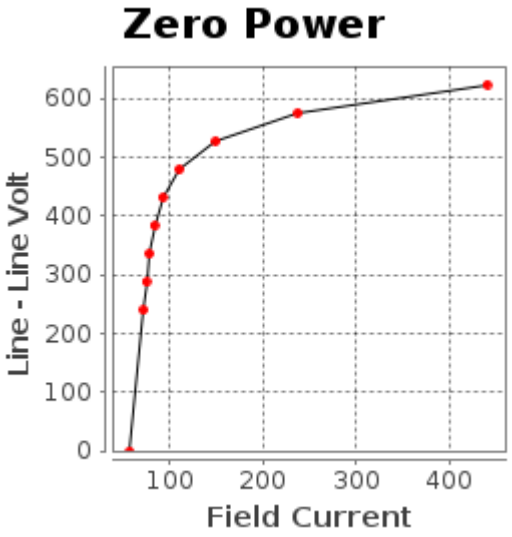
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Version: 20245 /20245 /20245 /666689

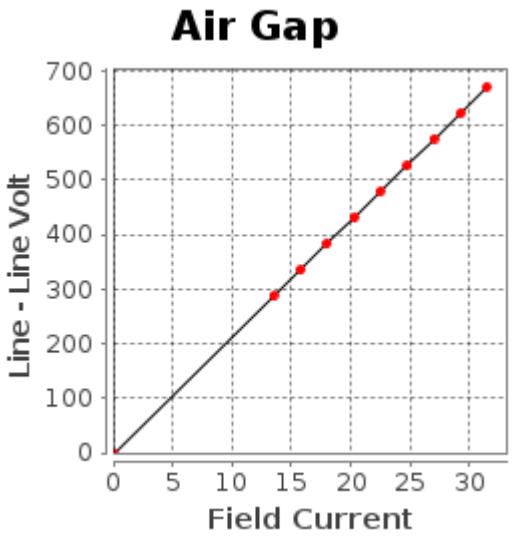
Generator Output Characteristic Curves
Zero Power Factor Curve

Field Current	Line - Line Volt
56.8	0
71.6	240
74.4	288
77.9	336
83.1	384
92.2	432
110.2	480
149.4	528
237.7	576
440.7	624



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
13.5	288
15.8	336
18.0	384
20.3	432
22.5	480
24.8	528
27.0	576
29.3	624
31.5	672

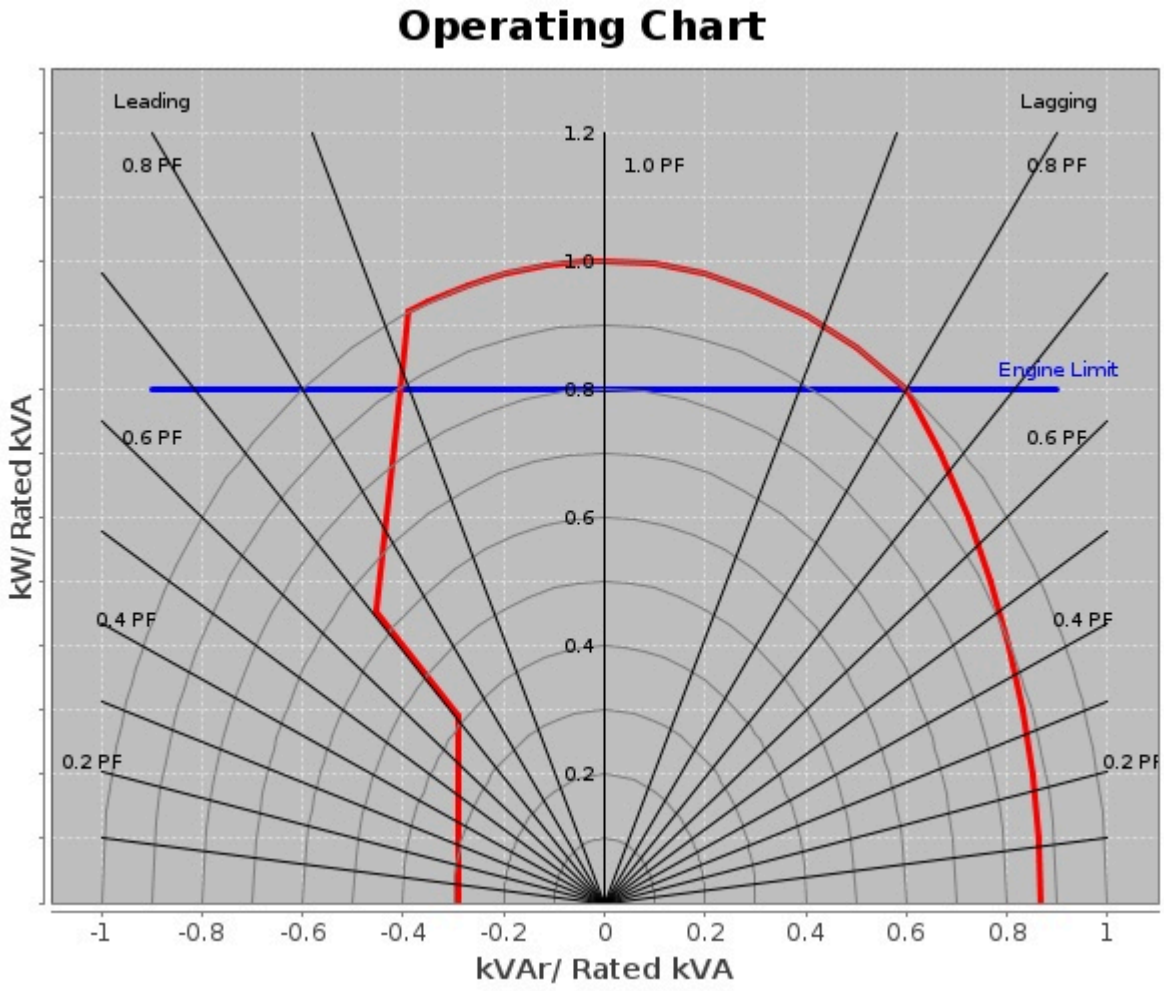


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Fuel: Diesel **Generator Arrangement:** 3723068 **Genset Rating (kVA):** 3437.0 **Phase Voltage:** 277
Frequency: 60 **Excitation Type:** Permanent Magnet **Pwr. Factor:** 0.8 **Rated Current:** 4134.1
Duty: STANDBY **Connection:** SERIES STAR **Application:** EPG **Status:** Current

Version: 20245 /20245 /20245 /666689

Reactive Capability Curve



Selected Model

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Fuel: Diesel	**Generator Arrangement:** 3723068	**Genset Rating (kVA):** 3437.0	**Phase Voltage:** 277
Frequency: 60	**Excitation Type:** Permanent Magnet	**Pwr. Factor:** 0.8	**Rated Current:** 4134.1
Duty: STANDBY	**Connection:** SERIES STAR	**Application:** EPG	**Status:** Current

Version: 20245 /20245 /20245 /666689

General Information

DM7825 Caterpillar SR5 Generators (50 Hz, 60 Hz)
Data for 1400, 1600, 1700, 1800 and 1900 frames Caterpillar SR5 generators built by Leroy Somer - USA and Leroy Somer □ France.

Refer to DM7821 for explanation of all generator data in Technical Marketing Information (TMI) except generator efficiency for which the explanation is given below.

GENERATOR EFFICIENCY
Generator efficiency is the percentage of engine flywheel (or other prime mover) power that is converted into electrical output. The generator efficiency shown is calculated by the summation of all losses method, and is determined in accordance with the IEC Standard 60034. The efficiency considers only the generator. There is no consideration of engine or parasitic losses here.

Refer to DM7829 for low and medium voltage protective setting values a nd limits.

ENGINE MONITORING SYSTEM



Image shown may not reflect actual configuration.

Cat® Energy Control System (ECS) 100

The Cat ECS 100 generator set controller uses system graphic icons and labels that allow for simple, comprehensive generator set operation. The easy-to-use 203 mm (8”) color LED touchscreen display features scroll navigation. Generator set and remote-mount options are available.

FEATURES

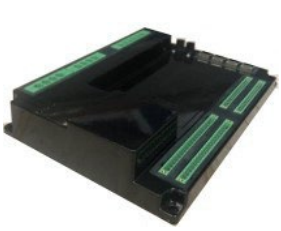
- Island mode – single unit operation
- High visibility graphical touchscreen display with alarm/event descriptions, set points, engine and generator monitoring
- Meets UL 2200, 3rd Edition requirements including UL 6200
- Local annunciation to meet NFPA 110 (subject to local authority having jurisdiction approval)
- Ethernet Modbus TCP for external communications
- Intuitive navigation for display of power metering, protection, engine and generator parameters and tuning
- Lockout security provision to assure platform integrity with three programable security levels
- Support of up to four (4) remote HMI’s (sold separately)
- Multi-language support.
- Compatible with Cat Connect Product Link™ devices
- IVR or CDVR voltage regulation compatibility
- Emergency Override

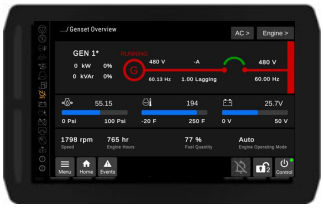
Advanced Functionality

- Automatic mains failure with utility voltage sensing capability (open transition) and remote breaker or contactor control/monitoring
- Engine remote start integrity monitoring
- Single genset transient load relief (TLR)
- Basic programmable logic control (PLC) function
- Embedded webserver
- EPA Tier 4 integration
- Real (kW) load histograms
- Status event log
- Supports Dynamic Gas Blending™ (DGB™)

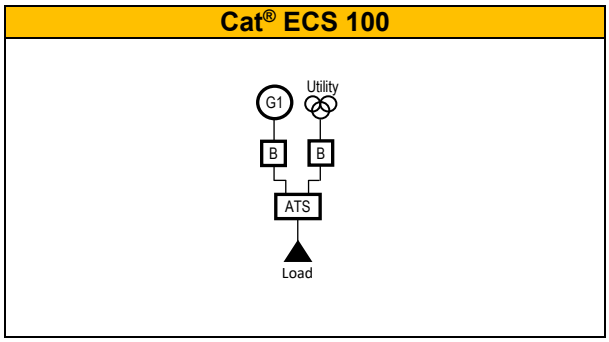
Control Module and Display

The Cat A6L3 is the base module controller utilizing the high-resolution display for the human machine interface (HMI).





Typical(1) Single Line Diagram (SLD)



(1) - More single line diagrams (SLD’s) are available to meet application requirements. Contact your local Cat dealer for more information.

Caterpillar: Non-Confidential

Standard Features

Controls	• Auto / Start / Stop • Emergency stop • Engine cooldown timer • Engine cycle crank • Programmable cycle timer • Speed and voltage adjust
Generator Set Monitoring	• Generator AC voltage monitoring (+/- 0.25% controller lifetime accuracy) • Utility/Bus AC voltage monitoring (+/- 0.25% controller lifetime accuracy) • 3 phase/4 wire (L-L&L-N) sensing • Current sensing (3 phase/6 wire) (+/- 0.1% up to 100% of rated current controller accuracy) • Generator AC current (per phase & avg) • Generator frequency • Power metering (kW, kVA, kVAr, pf) • kW-hr (export), kVAr-hr (import and export), total and trip • Generator stator and bearing temp (with optional RTD module) • kW load histogram
Generator Protection	• Generator phase sequence (47G) • Over/Under voltage (27/59) • Over/Under frequency (81 O/U) • Overcurrent timed & inverse (50/51) • Overcurrent (Thermal Damage Curve) (51) • Reverse power real (kW) (32) • Reverse power reactive (kVAr) (32RV) • Current balance (46) • Overload (49)
Engine Monitoring	• Engine oil pressure (kPa or psi) • Engine oil temperature (°C or °F) • Engine coolant temperature (°C or °F) • Engine speed (RPM) • Battery voltage • Crank attempt and successful start counter • Run hour meter • Real time clock
Engine Protection	• Control switch not in auto (alarm) • Low oil pressure • High coolant temperature (alarm and shutdown) • Low coolant temp (alarm) • Low coolant level (alarm and shutdown) • High engine oil temp (alarm and shutdown) • Low/High/Weak battery voltage • Fail to start • Overspeed • Overcrank • Low gas pressure (alarm and shutdown)

Caterpillar: Non-Confidential

Standard Features *(continued)*

Digital Inputs	• Emergency Stop • Remote Start • 16 programmable inputs (4 used for functional safety)[2]
Digital Outputs	• 12 programmable outputs (4 used for functional safety)[2]
Analog Outputs	• 2 analog outputs
PWM Outputs	• 3 Total (1 used for IVR - standard)
Analog Inputs	• 3 programmable inputs (0-5V, 0.5-4.5V, 1-5V, or resistive)[2]
Communication	• Primary & accessory CAN data link • Remote annunciator data link up to 1219 m (4000 ft) • Cat® Data Link (CDL) - with optional PLE702 • Ethernet (Modbus TCP/IP) - 100 baseT • USB- touchscreen display • Four 4-wire ports for internal and customer use • Two 2-wire ports for internal device network
Environmental	• HMI (front touchscreen) IP66 • A6L3 Controller Operating Temp. -40°C to + 70°C • Control module box: - Ingress protection IP23 - Health Care Access and Information (HCAI) ground and roof seismic certification
Languages	• Chinese | Danish | English | French | German | Italian | Japanese | • Portuguese | Russian | Spanish | additional languages on request |

[2] - Generator set configuration may affect available features.

Caterpillar: Non-Confidential

Enhanced Control Features

Advanced overcurrent protection
The Cat ECS 100 provides advanced overcurrent protection of the generator set system via programmable Definite Time and Inverse Time curves.
For the Inverse time curve the following four selections are available:
- Normally Inverse
- Very Inverse
- Extremely Inverse
- Thermal Damage Curve - the Thermal Damage curve may be more closely aligned to specific generators.

Arc Flash Maintenance mode
The Cat ECS 100 Programmable Arc Flash Energy Reducing Maintenance Mode feature provides a method to reduce clearing time via two functions that work together to meet the 2023 edition of NFPA 70, Section 240.87 (Arc Energy Reduction).
- A means to accept an energy-reducing maintenance switch and provide means to connect a local status indicator.
- An instantaneous overcurrent setting that can be set below the available arcing current.

Integrated programmable logic controller (PLC)
This feature set of the Cat ECS 100 allows the user to create custom logic functions in similar fashion to that of the capability of a PLC controller. These logic functions allow for increased capability of the Cat ECS 100 through interaction and control of internal signals within the control software as well as the programmable inputs/outputs of the device.

Programmable kW relay
The Cat ECS 100 includes three programmable kW relay outputs configured based on the % kW of the generator set. The configurable set points of the kW relay include: trigger condition, percentage threshold, hysteresis percentage and trip activation & deactivation delay time. These output functions may also be used to trigger events, recordable within the event log and included in the remote monitoring of the generator set.

Real-time clock
The real-time clock allows for date and time stamping of diagnostics and events in the control's logs as well as service maintenance reminders based on engine operating hours or calendar days.

Diagnostic System and Status Event Logs
Up to 40 unique diagnostic events (e.g., warnings, shutdowns, etc.) are stored in the non-volatile memory. It also allows for the creation of a status event log. This log holds the last 500 control events such as Engine Control Switch Position, Remote Initiate, Load Shed, etc. Events are stored in a "first in, first out" strategy.

Programmable cycle timer
The programmable cycle timer (PCT) feature allows for programming of seven independent times, when tasks (called PCT outputs), will be activated or deactivated automatically during the week. This is useful for exercising generator sets, or cases where two or more generators are required to automatically share the duty of supplying a load throughout the week. Using the PCT, each generator set can be programmed to start and stop at pre-set times. The PCT can handle a seven-day sequence with seven independent starts happening one or more times each week. Each of the seven timers has the following set points: activation day of the week,
activation start time, active time and includes three (3) independent activation outputs.

Real (kW) load histogram
The Cat ECS 100 is equipped with a real (kW) load histogram. This feature keeps track of the amount of time the generator percent kW is within certain predefined ranges. The ranges monitored are in 10% steps (0 to <10%, 10% to <20%, …, 90% to 100%).

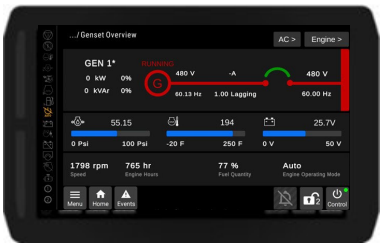
HMI Webserver
The Cat ECS 100 HMIs include an embedded web server. The embedded web server allows the operator to operate a virtual HMI with the same control and permissions as the host HMI (local or remote, if applicable) over an Ethernet connection to a local and/or remote station. Custom screen creation is also available. Each HMI webserver is independent.

Caterpillar: Non-Confidential

Optional Modules

Off Package HMI

The Cat ECS 100 supports up to four (4) optional full function off package HMI displays with the addition of an unmanaged Ethernet switch. The interactive 203 mm (8”) color touchscreen graphical interface serves to display generator set system alarm conditions, status indications and annunciation (with RCA output) to meet NFPA110 (subject to local authority having jurisdiction approval).



RS-485 Remote Annunciator

The remote RS-485 annunciator serves to display genset system alarm conditions and status indications for 16 points with a standard NFPA 99 & 110 label. The annunciator has been designed for use on the long-distance annunciator datalink and may be used off package up to 1220m (4000 feet) applications. A maximum of four (4) annunciators may be used with a Cat ECS 100.

See LEHE21395.

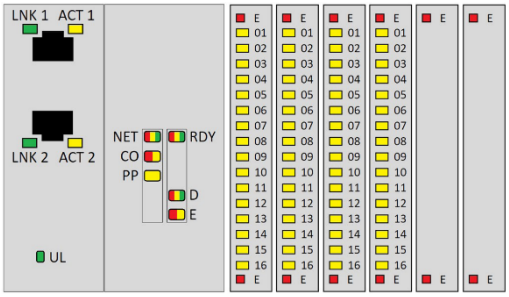


Expansion Input/Output Ethernet Modules

- Supports expanded Inputs/Outputs (IO) capability of the Cat ECS 100 control:
  - Analog & digital I/O
  - Temperature sensing (RTD)
- Configure I/O for any event (read & write function)
- Package mounted and/or ship loose options

See LEHE22466

Modbus Coupler Digital & Analog I/O



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Dimensions

Package-Mounted or Ship Loose (with harness)

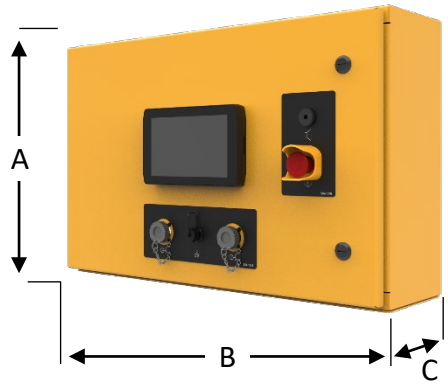


Image shown may not reflect actual configuration.

Dimensions				
Control Box Dimensions	A	B	C[3]	Weight
Units	mm (in)	mm (in)	mm (in)	kg (lbs)
Cat ECS 100	515 (20.28)	794 (31.27)	273 (10.73)	43 (95)

[3] - Dimension including E-Stop button is 263 mm (10.35 in).

Worldwide Product Support
Cat dealers have over 1,800 dealer branch stores operating in 200 countries and offer extensive post-sale support including maintenance and repair agreements

Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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www.cat.com/electricpower

WIRING DIAGRAM

CIRCUIT BREAKER

CIRCUIT BREAKERS



Picture shown may not reflect actual configuration

Molded Case and Insulated Case Circuit Breakers:

C27-C175 North America built packages (50/60Hz)

L-Frame
400A (UL)

P-Frame
800-1200A (UL)

R-Frame
1600-3000A (UL)

NS-Frame
1600-3200A (IEC)

NW-Frame
1200-5000A (UL), 1600-5000A (IEC)

Features

- Moisture and fungus protection
- Clear indication of breaker status
- Reinforced insulation
- Shunt trip
- Auxiliary contacts
- Load side extension bars
- Maintenance-free operation
- Exceptional characteristics under short-circuit conditions
- Adjustable trip settings

NS-Frame

- Federal Specification W-C-375B/GEN
- NEMA AB1
- UTE, VDE, BS, CEI, UNE

Conformity with International Standards

Circuit Breakers have been designed to comply with the international standard IEC 60947-2 as well as these other major standards:

L-Frame
UL 489
CSA 22.2 No 5
Federal Specification W-C-375B/GEN
NEMA AB1
NMX J-266
CCC
CE Marking

P-Frame & R-Frame
UL 489
IEC Standard 60947-2
CSA 22.2 No 5-02
Federal Specification W-C-375B/GEN
NEMA AB1
NMX J-266
UTE, VDE, BS, CEI, UNE

NW-Frame
UL 489
NEMA AB1
CSA 22.2 No. 5096
NMX J-266-ANCE
ANSI C37.13, C37.16, C37.17, C37.50
UL 1066 (cULus Listed)
NEMA SG3

Standard Features

Standards

- UL-CSA
  - L-Frame
  - P-Frame
  - R-Frame
  - NW-Frame
- IEC
  - NS-Frame

Shunt trip

- The shunt trip provides a means of tripping the circuit breaker electronically
- Shunt trip ratings
- Voltage: 24VDC
- Coil Burden (Holding/Inrush): 4.5/200 VA
- Power Consumption: 4.5 VA

Auxiliary contacts

The auxiliary contacts provide a means of remote circuit breaker position indication and consists of (1) Form C Contact (1 Normally open and 1 Normally closed contact) with the following current ratings:
6A @ 240-480 VAC, 50/60Hz

Trip units

All circuit breakers come equipped with True RMS Current Sensing.
The trip units for each of the circuit breaker ratings sample the current waveform to provide true RMS protection through the 15th harmonic. This true RMS sensing gives accurate values for the magnitude of a nonsinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.
The trip system comes equipped with a set of current transformers (CT's) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker.
Additionally, each trip unit comes equipped with Active Thermal Imaging which is active 20 minutes before and after tripping.

Customer cable connections

Connections include bus for installation flexibility.

Optional Features

Electrically-operated Circuit Breakers

Circuit breakers that are electrically-operated come with a two-step stored energy mechanism and come standard with a motor assembly. Motor assemblies provide on and off control from remote locations.
These assemblies contain a spring-charging motor, a shunt trip, and shunt close.
Motor Assembly Voltage Rating: 24-30VDC

Undervoltage trip

Undervoltage trip option trips the circuit breaker when the voltage drops to a value between 35% and 70% of the control voltage.
An attempt to close the circuit breaker when the UV is not energized produces no movement in the main contacts.
Closing is allowed when the supply voltage of the UV trip reaches 85% of the rated voltage.

- Voltage Rating: 24-30VAC/VDC
- Operating Threshold:
  - Opening: 0.35 to 0.7Vn
  - Closing: 0.85 Vn
- Power Consumption: 4.5VA
- Circuit Breaker Response Time at Vn: 50ms +/- 10

Circuit Breakers Table (Continued)

Cat® Part Number	Frame and Rating (Amps)	IEC/UL	No. Poles	Operation	Trip Unit	Circuit Breaker Characteristics	Options	Instantaneous Override (kA RMS) +/- 10%
2449911	4000A NW-Frame ICCB	UL	6P	EO	6.0A LSIG	Table 8	4 Aux Contact, Shunt Trip	170
2449913	4000A NW-Frame ICCB	UL	6P	EO	6.0P LSIG-P	Table 8	4 Aux Contact, Shunt Trip, Modbus	170
2527378	4000A NW-Frame ICCB	UL	6P	EO	5.0P LSI-P	Table 8	4 Aux Contact, Shunt Trip, Modbus	170
3946024	4000A NW-Frame ICCB	IEC	3P	EO	5.0A LSI	Table 5	4 Aux Contacts, Shunt Trip, UV	170
3946025	4000A NW-Frame ICCB	IEC	3P	EO	6.0A LSIG	Table 5	4 Aux Contacts, Shunt Trip, UV	170
3946026	4000A NW-Frame ICCB	IEC	3P	EO	6.0P LSIG-P	Table 5	4 Aux Contact, Shunt Trip, Modbus	170
3946027	4000A NW-Frame ICCB	UL	6P	EO	5.0A LSI	Table 8	4 Aux Contacts, Shunt Trip, UV	170
3946028	4000A NW-Frame ICCB	UL	6P	EO	6.0A LSIG	Table 8	4 Aux Contacts, Shunt Trip, UV	170
3946029	4000A NW-Frame ICCB	UL	6P	EO	6.0P LSIG-P	Table 8	4 Aux Contact, Shunt Trip, Modbus	170
4448355	4000A NW-Frame ICCB	IEC	3P	EO	5.0 LSI	Table 5	4 Aux Contacts, Shunt Trip, UV	170
4448356	4000A NW-Frame ICCB	IEC	3P	EO	6.0A LSIG	Table 5	4 Aux Contacts, Shunt Trip, UV	170
4448357	4000ANW-Frame ICCB	IEC	3P	EO	6.0P LSIG-P	Table 5	4 Aux Contacts, Shunt Trip, UV	170

Circuit Breakers Characteristics (Continued)

Model			R-Frame
Number of Poles			3
Rated Current (Amps)			1600-3000A (UL)
Voltage Rating (VAC)			600UL/ 690 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	65
		480V	35
		600V	18
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	50
		380/415V	35
	Ics	240V	25
		380/415V	20

Table 6

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		1200-2000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	65
	480V	65
	600V	50

Table 7

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		2500-5000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	100
	480V	100
	600V	85

Table 8

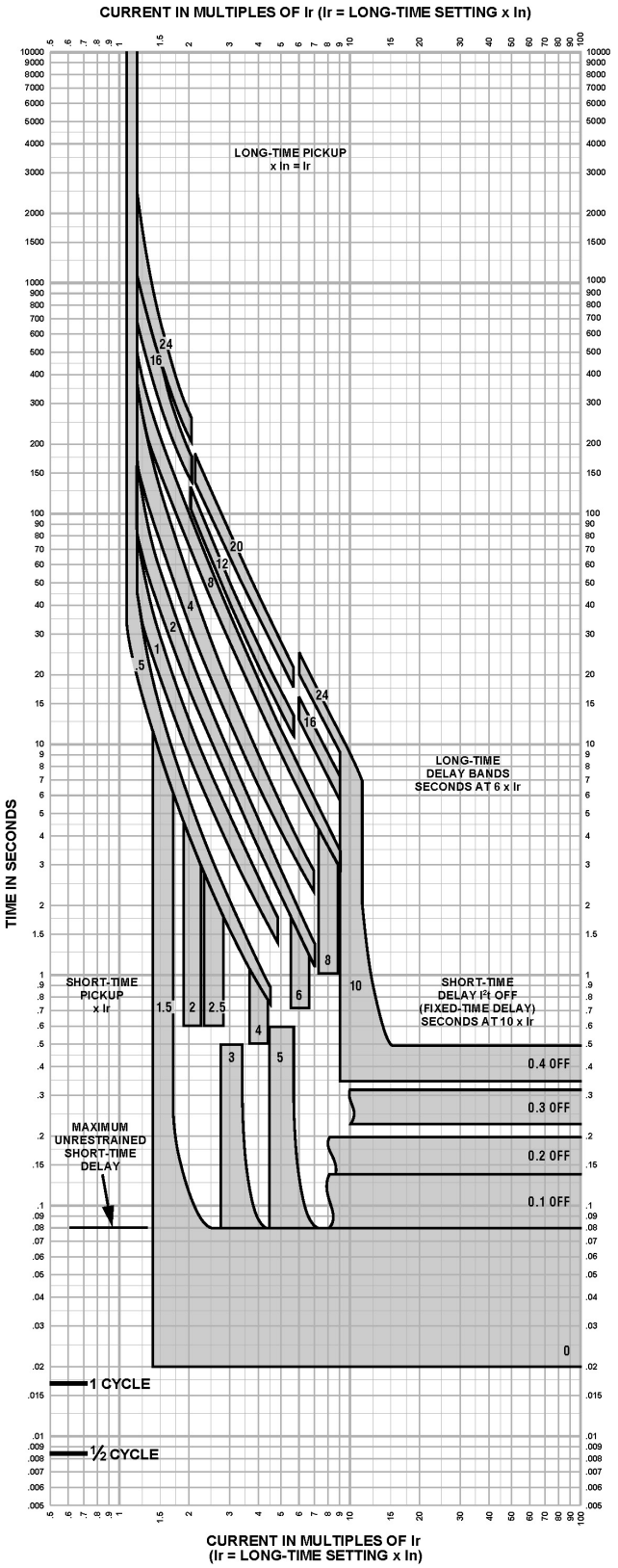
Model			R-Frame
Number of Poles			3
Rated Current (Amps)			1600-3000A (UL)
Voltage Rating (VAC)			600UL/ 690 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	100
		480V	65
		600V	25
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	50
	Ics	240V	35
		380/415V	25

Table 9

Model			L-Frame
Number of Poles			3
Rated Current (Amps)			400A (UL)
Voltage Rating (VAC)			600UL/ 525 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	65
		480V	35
		600V	18
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	35
	Ics	220V	65
		380/415V	35

Table 10

P, R, NS-Frame Long-Short Trip Curve and NW-Frame Long-Short Trip Curve



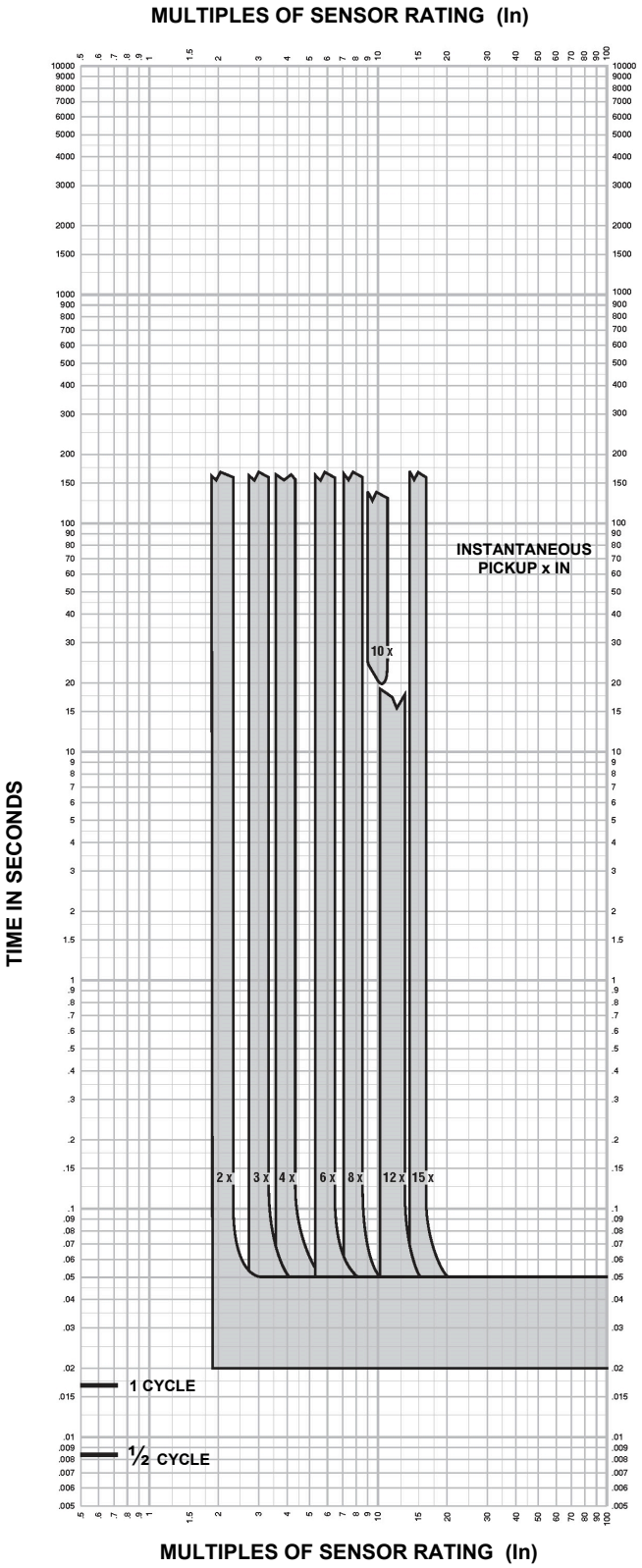
Long-time Pickup and Delay Short-time Pickup and I²t OFF Delay

The time-current curve information is to be used for application and coordination purposes only. Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermalimaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See Page 22 for instantaneous trip curve. See tables on pages 03-18 for instantaneous override values..
6. Overload indicator illuminates at 100%.

P, R, NS-Frame Instant Curve and NW-Frame Instant Trip Curve



Instantaneous Pickup 2x–15x and OFF

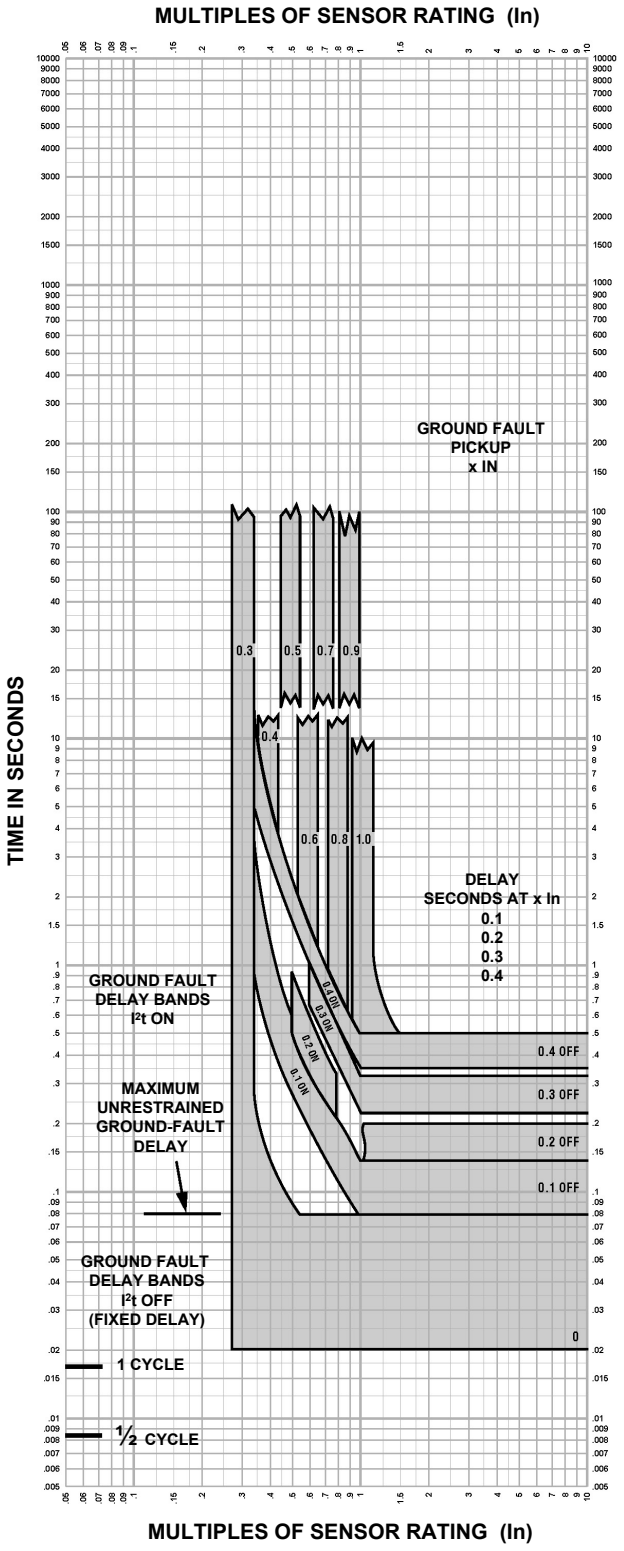
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See tables on pages 03-18 for instantaneous override values.
5. See page 22 for long-time pickup, long-time delay, short-time pickup, and short time delay trip curves.

P, R, NS-Frame Gound Curve and NW-Frame Ground Fault Trip Curve



Ground-fault I^2t OFF and ON In ≤ 400 A

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

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MAINTENANCE
DO NOT OPEN
LEAD
RETURN
RECYCLE
DO NOT TIP
3T-5859
425 CCA at 0°F (-18°C)
Distr. by: Caterpillar Inc.
Peoria, Illinois 61629 USA
Made in USA
CAT
CATERPILLAR®
Date Battery Purchased
1 2 3 4 5 J F M A M J
6 7 8 9 0 J A S O N D
Warranty Void if This Tag is Removed or Altered
3-3966

Cat Battery Specifications

General Information

Premium High Output - Maximum Vibration Resistance

– Vibration Resistance-five times the Industry Standard

– Exclusive “flat top” BCI group 4D & 8D batteries are Maintenance Free and have the industry’s highest cold cranking amps (CCA)

– Popular BCI group 31 Maintenance Free batteries with industry leading cold cranking amps...up to 1000 (CCA), for electric power, machine or on-highway truck and bus applications. Deep cycle models are available for truck, marine and recreational usage

Specifications for Cat Premium High Output Batteries-Available Worldwide

BCI Group Size	Part No.	CCA ≈	RC Mins †	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction Notes	Accessiblity - Fluid Level Check Hours	BCI Overall Dimensions			Nominal Weight		Nominal Acid to Fill Qt (liter)
								Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)	Dry Lb(kg)	
8D	153-5720	1500	465	12	210	C/MFA	A - 1000	20.5 (520)	10.8 (275)	9.8 (248)	132 (59.9)	-	-
8D	101-4000	1400	400	12	190	LAC+	A - 1000	20.8 (527)	11.0 (278)	9.8 (248)	132 (59.9)	86 (39.0)	18.0 (17.0)
4D	153-5710	1400	425	12	200	C/MFA	A - 1000	20.5 (520)	8.6 (218)	9.8 (248)	119 (54.0)	-	-
4D	9X-9730	1300	400	12	190	LAC+	A - 1000	20.8 (527)	8.6 (218)	9.8 (248)	120 (54.0)	81 (36.8)	14.8 (14.0)
4D	153-5700	1125	305	12	145	C/MFA	A - 1000	20.5 (520)	8.6 (218)	9.8 (248)	101 (45.8)	-	-
4D	9X-9720	1000	275	12	140	LAC+	A - 1000	20.8 (527)	8.6 (218)	9.8 (248)	102 (45.8)	59 (26.8)	15.9 (15.0)
31	175-4390	1000	180	12	90	C/MFA/S	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	60 (27.2)	-	-
31	175-4370	825	190	12	100	C/MFA/S**	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	61 (27.2)	-	-
31	175-4360	710	185	12	100	C/MFA/S***	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	62 (28.1)	-	-
31/30H	115-2422	1000	170	12	90	C/MFA	A - 1000	12.9 (329)	6.8 (172)	9.5 (241)	63 (28.6)	-	-
31/30H	115-2421	950	170	12	90	C/MFA+	A - 1000	12.9 (329)	6.8 (172)	9.5 (241)	64 (29.1)	44 (20.0)	6.6 (6.2)
31/30H	9X-3404[1]	950	165	12	95/100	C/MF	NA	13.0 (331)	6.8 (172)	9.5 (241)	58 (26.3)	-	-
31/30H	3T-5760	750	165	12	95/100	C/MF	AV - 1000	13.0 (331)	6.8 (172)	9.5 (241)	56 (25.4)	-	-
65	230-6368	880	140	12	70	C/MF	NA	11.9 (304)	7.5 (191)	7.5 (191)	46 (20.9)	-	-
24	153-5656	650	110	12	52	C/MF	NA	11.0 (279)	6.9 (174)	9.0 (229)	39 (17.7)	-	-

Construction Notes:

Batteries use SAE taper post design and are shipped wet except as:

LAC = Low Maintenance - Hybrid Construction
C = Calcium Lead Alloy Grid Design
MF = Maintenance Free Non-Accessible
MFA = Maintenance Free Accessible
A = Accessible
NA = Non-Accessible
AV = Accessibily Varies - Accessiblity varies depending on supplier used. If it has caps, it is accessible and fluid levels should be checked.

S = Stud Terminals
+ = Shipped Dry Only
* = Side Terminals Only
** = Starting and Deep Cycle Battery
*** = Deep Cycle and Starting Battery
≈ = Cold Cranking Amps for 30 seconds at 0° F (-18° C)
† = Reserve Capacity Minutes minimum of 25 amp output at 80° F (27° C)
SDT = Dual, Top mounted Terminals - Stud and SAE Post. Marine Deep Cycle/ Starting Battery

Rugged Design-Built Tough-Reliable Starting

– Positive and negative plates are anchored to container bottom and locked at the top of celnelement for maximum vibration resistance.

– Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage.

– Hefty full-frame grids, no sharp edges, optimum acid/paste combination provides better charge acceptance after deep discharge.

– Manifold vented cover with built-in Flame Arrestor...a safety feature that directs corrosive gases away from the battery and holddowns.

– Thick, robust container resists rugged treatment typical of heavy-duty commercial use. Embossed part number & descriptors for easy serviceability.

1 not available in US

Battery Charger

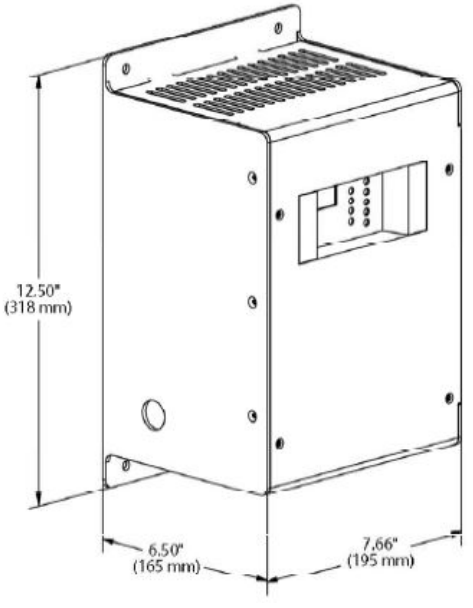


Image Shown may not Reflect Actual Package.

UL 10 Amp

Battery Charger

This battery charger offers accurate, automatic charging of lead-acid and nickel cadmium batteries. The output voltage automatically adjusts to changing input, load, battery and ambient conditions. This prevents battery over-charging and consequent loss of battery electrolyte.

Standard features include AC line compensation, precision voltage regulation, current limiting, automatic 2-rate charging, voltmeter and ammeter, temperature compensation and UL Listing.

The user interface is easy to understand with digital metering, NFPA 110 alarms and a battery fault alarm.

Features

- Electronically current limited at 105% of rated output
- Alarm system
- Digital display
- Lightning and voltage transient protection
- Protection of connected equipment against load dump protection
- Constant voltage, current limited, 4-rate automatic equalization
- IP 20 housing
- Temperature compensation
- On board temperature sensor with remote port
- Auto AC line compensation
- Output regulated by sensed battery voltage

Standards

- C-UL listed to UL 1236
- NFPA 70, NFPA 110
- CSA 22.2 No 107 certified
- CE DOC to EN 60335
- IBC Seismic Certification

Specifications

Input supply	110 – 120 V 208 – 240 V
AC and DC fuses	2 input and 2 output)
Output voltage	24V
Output amps	10
Frequency	50 / 60 Hz
Operating temperature	-20°C (-4°F) to +60°C (140°F)
Housing constructed of rustproof anodized Aluminum	

Dimensions			
Width	Depth	Height	Weight
195 mm (7.66 in)	165 mm (6.5 in)	318 mm (12.5 in)	10.4 kg (23 lb)

NFPA 110 alarm package as follows:

- AC on Green led (indication)
- AC fail Red led and form C contact (2A)
- Float mode LED
- Fast charge LED
- Temp comp active LED
- Low battery volts Red led and Form C conta
- High Battery Volts Red led and Form C conta
- Charger fail Red led and Form C conta
- Battery fault Red led and Form C conta
- Battery disconnected
- Battery polarity reversed
- Mismatched charger battery voltage
- Open or high resistance charger to battery connection
- Open battery cell or excessive internal resistance

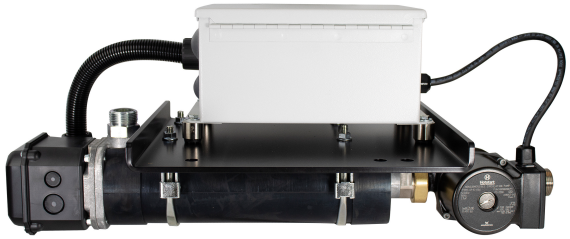
Feature Codes:

BTC1024 BTC1028 BTC1035 BTC1025 BTC1032

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Picture shown may not reflect actual configuration

JACKET WATER HEATER With Pump

Diesel Gensets: 3512, 3516 and C175-16
Gas Gensets: G3412, G3512 and G3516

Caterpillar offers a factory-installed jacket water heater for improved cold-starting capability.

The Jacket Water Heater is a complete coolant preheater with thermostat, pump and all required controls. Forced circulation of the coolant delivers uniform heating throughout the entire engine, reduces wear from cold spots and offers a significant reduction in electrical consumption.

The Jacket Water Heater operates automatically when provided contacts are supplied with a 24 Volt DC signal from the engine.

FEATURES

- Factory Installed
- Complete with hoses, thermostat and pump
- Base frame mounting minimizes engine induced vibration
- Automatically disconnected when engine is running via the generator jacket water heater relay
- Supplied with UL recognized components
- Standard thermostat is factory preset to 54°C (130°F)
  - o Optional High Temperature thermostat is available with factory preset to 71°C (160°F)

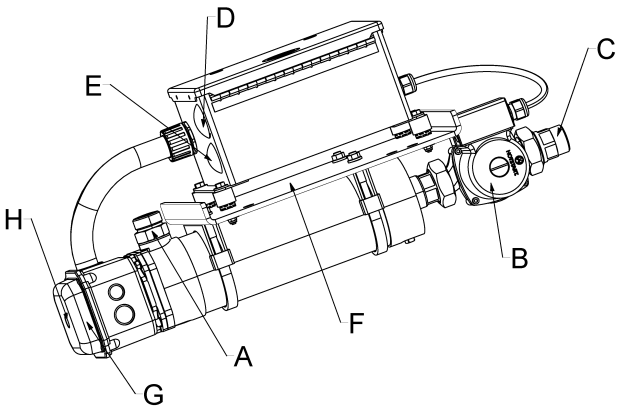
HEATER DESIGN DESCRIPTION

The jacket water heater package is designed to efficiently pre-heat the engine by heating and circulating the engine's coolant.
This design results in the following benefits

- Increase life of heater hoses, engine seals, and heating elements.
- Improve heat transfer efficiency from elements to engine coolant.
- More uniform engine temperature distribution.
- Application of a thermostat with a reduced thermal differential.
- Lower customer utility costs and increased heater reliability.
- Heater thermostat's setpoint is preset from the factory.

HEATER OPERATION/WIRING

A 38 L/pm (10 gpm) pump is located at the heater inlet to push the coolant through the heater.
A fixed thermostat is located inside Element enclosure box, near the outlet of the heater and responds to the temperature of the coolant inside the tank. The figure below shows the general heater design.



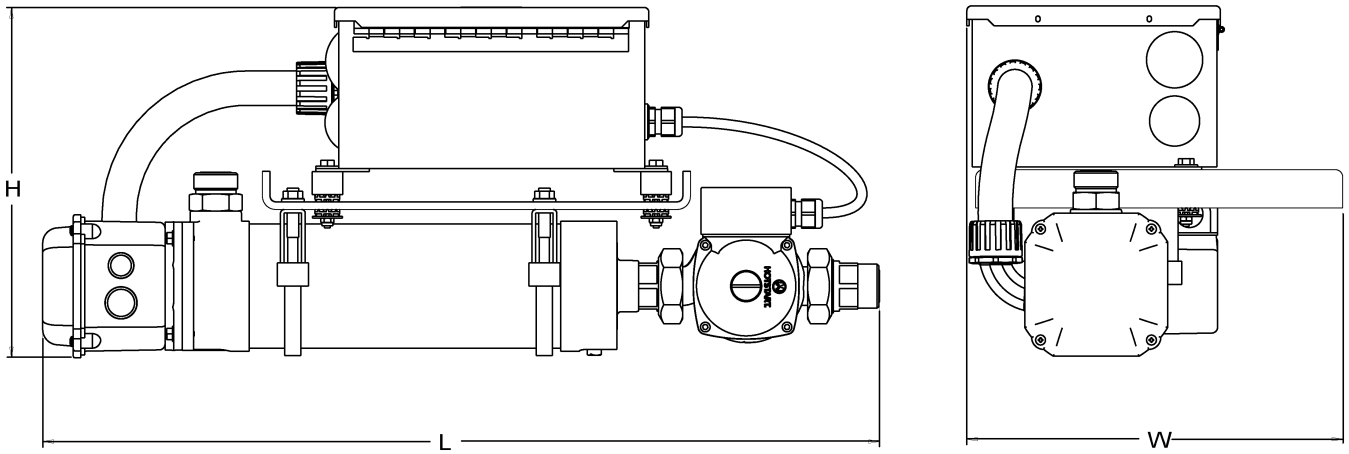
A. Discharge port
B. Pump/motor
C. Suction Port
D. Power Wiring Entrance
E. Control Wiring Entrance
F. Mounting base
G. Element assembly
H. Thermostat

SPECIFICATIONS

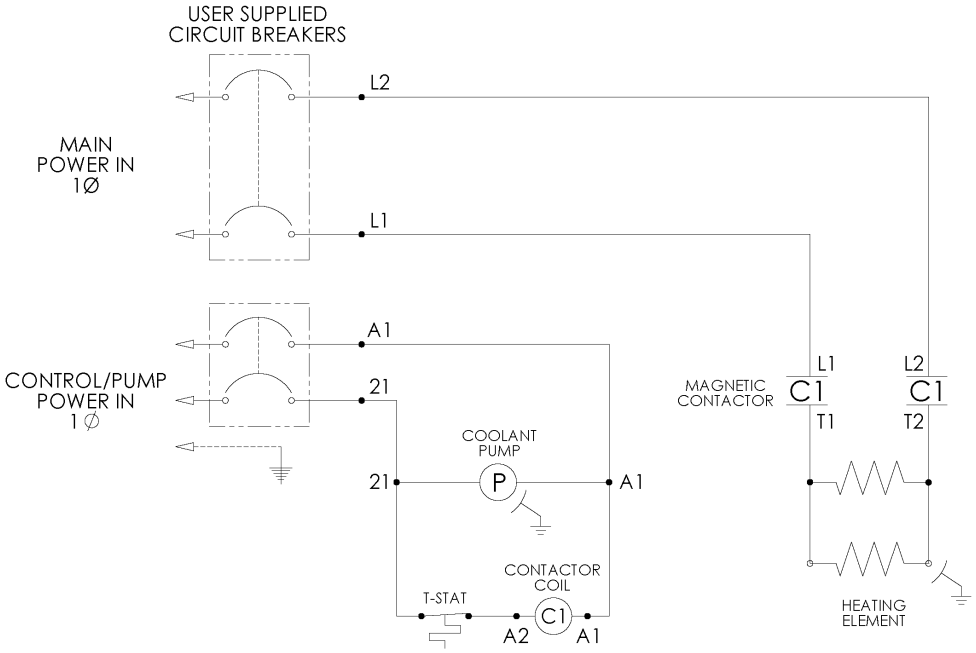
Voltage (VAC)	480	400*	240	220	208
Fixed Thermostat (Standard)	38°C - 54°C (100°F - 130°F)				
Power (with Standard Thermostat)	9 kW / 12 kW	9 kW / 12 kW	9 kW / 12 kW	9 kW	9 kW / 10.5 kW
Amperage (with Standard Thermostat)	10.8 A / 14.4 A	13.0 A / 17.4 A	37.5 A / 50.0 A	40.9 A	43.3 A / 50.5 A
Fixed Thermostat (High Temperature)	60°C - 71°C (140°F - 160°F)				
Power (with High Temperature Thermostat)	9 kW / 12 kW	9 kW	9 kW / 12 kW	9 kW / 12 kW	9 kW / 10.5 kW
Amperage (with High Temperature Thermostat)	10.8 A / 14.4 A	13.0 A	37.5 A / 50.0 A	40.9 A / 54.5 A	43.3 A / 50.5 A
Frequency	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Phase	Three Phase		Single Phase		
Flow Rate	38 LPM (10 GPM)				
Pump Power	97 W	95 W	97 W	95 W	97 W
Length (L)	695 mm (27.4")				
Width (W)	312 mm (12.3")				
Height (H)	291 mm (11.4")				
Weight	24.0 kg (52.8 lbs)	24.2 kg (53.4 lbs)	21.5 kg (47.5 lbs)	21.4 kg (47.2 lbs)	24.2 kg (53.4 lbs)

*Only available with diesel gensets

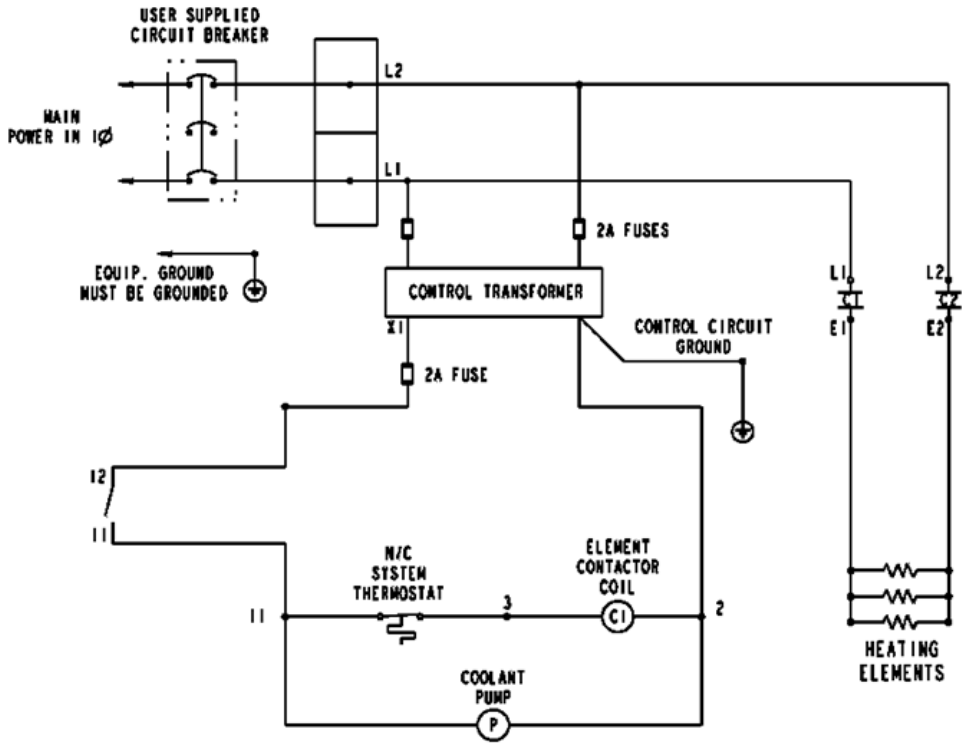
GENERAL DRAWING



Wiring Diagram - 208, 220 and 240 V Single Phase JWH (9 kW Heating Systems) and 240 V Single Phase JWH (12 kW Heating Systems)



Wiring Diagram - 208 V Single Phase JWH (9 kW Heating Systems)



Materials and specifications are subject to change without notice.
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AUTOMATIC TRANSFER SWITCH

LOAD TEST

Generator Startup Checklist

POWER SYSTEMS DIVISION

Installation job site_____ Date: _____

Caterpillar—Olympian Model_____ Rating_____KW Standby----Prime

Engine S/N_____ Generator S/N_____ GenSet Pkg. S/N_____

ATS Model_____ ATS S/N_____

ATS Model_____ ATS S/N_____

✓	Check Points	Notes
	Lube system connections	
	Oil Level	
	Check fuel system connections	
	Check fuel system linkages	
	Check air filter	
	Check vent piping and connections	
	Check and adjust fan belts	
	Check anti-freeze—top as needed	
	Check remote components (if applicable)	
	Check radiator core and tanks	
	Check jacket water heater connections and operation	
	Check battery electrolyte level	
	Check cables, lugs, and terminals	
	Check battery charger and operation Make necessary connections	
	Check power connections	
	Check circuit breaker connections and operation	
	Check panel light operation	
	Check annunciator lights and alarms	
	Check remote annunciator connections (if equipped)	
	Connect control wiring as necessary	
	Check transfer switch operation	
	Check phase rotation	
	Adjust time delays as required	
	Check shutdowns and alarms	
	Check exhaust system	

ENGINE RUNNING

Oil pressure_____ PSI Engine RPM_____ Freq _____ AC Voltage_____
Battery Charging Volts (if applicable)_____ Volts Water Temp_____

Note additional comments:_____

_____

_____

I hereby confirm that the above generator set has been correctly installed at the above location.

Field Technician_____Signature_____

RECOMMENDED INSTALLATION GUIDELINES

The following outline contains general requirements for successful installation of a generator set . The list is not meant to be a substitute for other and more specific installation guides by equipment manufacturers, but rather as a general guideline to the installing personnel.

Important! Prior to beginning installation, please reference the enclosed map and contact your Boyd representative. This is your contact person for installation related questions. This no-charge service will save time and money!

Storage of Equipment

All-equipment, especially generators, control panels, transfer switches, etc., should be stored in a clean, dry, and non-corrosive atmosphere between the time of arrival on the jobsite and final installation. Medium-voltage equipment has specific and stricter storage requirements.

Care should be taken in abnormal environments. IE equipment should be properly protected from the effects of chlorine atmosphere as is often encountered in water treatment plants, etc.

Concrete Pad

The concrete pad on which the generator set is mounted should be reinforced with steel mesh or bars. The pad depth should be calculated to support the generator set, the housing and all associated equipment. If the unit includes a base fuel tank, the weight of the fuel must be included.

It is recommended that the pad extend at least 12" beyond all sides of the enclosure.

Ventilation

Enclosure sides and rear must be located a minimum of 48" from any obstruction or wall to insure proper ventilation and permit all doors to be opened fully. Please consult a Boyd representative if more than one side of the enclosure will be in close proximity to an obstruction.

Radiator end should be located to allow proper clearance from any obstruction or wall so no recirculation of hot air or exhaust gases will occur. Units with horizontal radiator discharge generally require clearance equal to the length of the generator set.

When possible, position unit so that the prevailing winds blow from rear to front over the Generator, (generally from south-west to north-east) to help dissipate the hot gases.

OPEN UNITS – verify proper ventilation to provide proper combustion and cooling air flow for unit operation while maintaining ½" H_2O maximum restriction. ** *A general rule of thumb – intake surface area should be 1.5X the discharge area of the radiator. This is a rule of thumb only and does not guarantee sufficient flow in all cases.*

Exhaust Piping

Engine exhaust should be directed up and away from the generator air intake Rain caps or weather guards are recommended on the exhaust outlet elbow. Again, the prevailing winds must be considered when locating the exhaust outlet.

Extreme care should be taken to ensure that engine exhaust is not drawn into the buildings intake air system.

OPEN UNITS – must be installed with a stainless flex pipe at the turbo. Care should be taken to prevent any weight bearing on the turbocharger.

Starting and Battery Groups

Jacket water heaters are required for all engine generator sets to ensure NFPA 99/110 starting requirements and to prolong equipment life.

Batteries should be sized to provide at least 60 seconds of cranking time at the minimum ambient temperature. Battery heating pads can be harmful to batteries and are not recommended. Modern battery chargers are temperature compensated and must be located in the same ambient temperature as the batteries. Heating pads may cause temperature compensated chargers to over-charge their batteries.

The battery manufacturer's recommendations should be followed for any battery installation in an outdoor enclosure. Nickel Cadmium batteries are not intended for and should not be used in outdoor enclosure installations.

Electrical Wiring for Package Generator Set and ATS

- *Transfer switch(es) may be energized prior to the arrival of Boyd personnel. Refer to the O&M manual (located inside of the switch) for instructions prior to energizing.*
- *Boyd Technicians will land/terminate control wiring for the generator set and ATS.*
- *A separate interconnect diagram is provided for wiring specifics.*

Power wiring must be connected to the generator by means of a flexible element. In case of an engine mounted generator control panel, it is important that no extra weight be imposed by the flexible conduit on control panel mounts.

Boyd will furnish standard lugs as shipped by the manufacturer, an adder will be charged for providing lugs other than those shipped by the factory.

DC Control Wiring and AC feeds can NOT be in the same conduit.

Shielded cables must be continuous without splices. All control wiring must be clearly marked on both ends prior to technician arrival.

Remote auxiliary/support equipment (IE; fuel tanks, day tanks, pumps, battery chargers, etc.) will require additional wiring. Consult the individual component sections of this submittal or contact your Boyd representative.

Care must be taken not to connect AC voltage to the DC control voltage. AC Circuits should be in separate conduit from all DC control circuits.

Installation & Pre-Start-Up and Start-Up Guidelines

Before factory authorized start-up can be initiated, the following must be completed:

By Installing Contractor

- Generator installed and AC (primary) connections pulled, landed, and properly torqued
    - In certain cases where a load bank test is required the Boyd representative may request that primary cables not be terminated prior to technician arrival
- AC auxiliary service wiring pulled. A Boyd technician will land the aux wiring during start-up. Wiring should be clearly identified/labeled and contractor should be prepared to energize aux service during start-up
- Fuel tanks (main and day) plumbed and filled
- Transfer switch installed with AC (primary) connections pulled, landed, and properly torqued. Utility source must be available during commissioning.
- Enclosure is cleaned and free of debris.
- All other auxiliary equipment needed to operate the generator set shall be installed. Consult with Boyd representative if in doubt.

Prior to a technician being dispatched your Boyd service representative will pre-inspect the project. Please contact your service representative, contact information is on the cover of this submittal.

By Boyd Cat Power Systems Sales Department Representative

- Pre-inspect all applicable systems / Meet with installing contractor if any corrections or additions are necessary.
- Prepare pre-inspection report and authorize dispatch of technician
- Check all fuel levels – verify diesel tanks are filled
- Verify all AC and DC wiring is pulled
- Inspect diesel fuel system – complete and proper installation
- Inspect air intake and exhaust systems.
    - Inspect air cleaner(s) to ensure proper storage (clean/dry)
    - Verify sufficient air-flow/ventilation for installation
- Discuss testing requirements with contractor / coordinate testing.
    - ATS testing requires outages to fed loads, we cannot complete and certify a start-up without transferring the ATS.
- Review project information with assigned technician

By Boyd Cat Technician

- Review submittal and testing requirements prior to job
- Land Gen/ATS/Annunciator control wiring
- Connect pre-charged batteries to engine or fill dry-batteries
- Land and energize shore-power (heater, charger, etc.)
- Start engine and check speed
- Check generator phase rotation against utility at the ATS
- Verify matched phase-phase and phase-neutral voltages

- Make sure automatic transfer switch operates correctly and is adjusted as job specifications requires
- Check all alarms, audible and visual
- Adjust the battery charger charge rate for the type of battery being used
- Check engine, cooling system and fuel system for leaks
- Check coolant protection level after running
- Set engine governors for proper operation if electronic or load share type.
- Perform load bank test or building load test as specified and maintain log if required
- Submit a copy of the factory start-up report for insertion into the branch service department history folder and have customer sign start-up report.

End-user instruction is normally provided by a Boyd Product Support Representative after completion of the start-up.

NOTE: If there are any questions regarding proper installation before, during, or after commissioning, please contact your Boyd Cat representative.

BOYD CAT


Parkersburg
Ohio
Jackson
West Virginia
Nitro
Belle
Diamond
Dry Ridge
Ashland
Jeffersonville
Indiana
Middletown
Mt. Sterling
Logan
Beckley
Evansville
Louisville
Lexington
Pikeville
Elizabethtown
Kentucky
Hazard
Columbia
Corbin
Bowling Green
Hopkinsville
Paducah
Mayfield

Effective with sales to the first user on or after December 1, 2010

CATERPILLAR LIMITED WARRANTY

Industrial, Petroleum, Locomotive, and Agriculture Engine Products and Electric Power Generation Products

Worldwide

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new and remanufactured engines and electric power generation products sold by it (including any products of other manufacturers packaged and sold by Caterpillar), to be free from defects in material and workmanship.

This warranty does not apply to Caterpillar Motoren (CM) product; engines sold for use in on-highway vehicle or marine applications; engines in machines manufactured by or for Caterpillar; 3500 and 3600 Family engines used in locomotive applications; 3000 Family engines, C0.5 through C4.4 and ACERT (C6.6, C7, C7.1, C9, C9.3, C11, C13, C15, C18, C27, and C32) engines used in industrial applications; or Cat batteries. These products are covered by other Caterpillar warranties.

This warranty is subject to the following:

Warranty Period

- For new industrial engines, engines in a petroleum applications or Petroleum Power Systems, or engines in a Locomotive application, or Uninterruptible Power Supply (UPS) systems, the warranty period is 12 months after date of delivery to the first user.
- For Mobile Agricultural applications the warranty period is 24 months after date of delivery to the first user.
- For controls only (EPIC), configurable, and custom switchgear products, as well as automatic transfer switch products, the warranty period is 24 months after date of delivery to the first user.
- For electric power generation products in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For all Remanufactured Generator (GenEnds) products in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For all Remanufactured engines, the warranty period is 6 months (12 months for mobile agricultural and standby electric power generation applications) after date of delivery to the first user.

Caterpillar Responsibilities

If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Cat dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, Remanufactured, or Caterpillar approved repaired parts or assembled components needed to correct the defect.

Note: New, remanufactured, or Caterpillar approved repaired parts or assembled components provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product in which installed as if such parts were original components of that product. Items replaced under this warranty become the property of Caterpillar.

- Replace lubricating oil, filters, coolant, and other service items made unusable by the defect.
- Provide reasonable and customary labor needed to correct the defect, including labor to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems, if required.

For new 3114, 3116, and 3126 engines and electric power generation products (including any new products of other manufacturers packaged and sold by Caterpillar):

- Provide travel labor, up to four hours round trip, if in the opinion of Caterpillar, the product cannot reasonably be transported to a place of business of a Cat dealer or other source approved by Caterpillar (travel labor in excess of four hours round trip, and any meals, mileage, lodging, etc. is the user's responsibility).

For all other products:

- Provide reasonable travel expenses for authorized mechanics, including meals, mileage, and lodging, when Caterpillar chooses to make the repair on-site.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the first user.
- Labor costs, except as stated under "Caterpillar Responsibilities," including costs beyond those required to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems.
- Travel or transporting costs, except as stated under "Caterpillar Responsibilities."
- Premium or overtime labor costs.
- Parts shipping charges in excess of those that are usual and customary.
- Local taxes, if applicable.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.

(continue on the reverse side……..)

- Performance of the required maintenance (including use of proper fuel, oil, lubricants, and coolant) and items replaced due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for:

- Failures resulting from any use or installation that Caterpillar judges improper.
- Failures resulting from attachments, accessory items, and parts not sold or approved by Caterpillar.
- Failures resulting from abuse, neglect, and/or improper repair.
- Failures resulting from user's delay in making the product available after being notified of a potential product problem.
- Failures resulting from unauthorized repairs or adjustments, and unauthorized fuel setting changes.
- Damage to parts, fixtures, housings, attachments, and accessory items that are not part of the engine or electric power generation product (including any products of other manufacturers packaged and sold by Caterpillar).
- Repair of components sold by Caterpillar that is warranted directly to the user by their respective manufacturer. Depending on type of application, certain exclusions may apply. Consult your Cat dealer for more information.

For products operating outside of Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXCEPT CATERPILLAR EMISSION-RELATED COMPONENTS WARRANTIES FOR NEW ENGINES, WHERE APPLICABLE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN.

CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

For personal or family use engines or electric power generation products, operating in the USA, its territories and possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary by jurisdiction. To find the location of the nearest Cat dealer or other authorized repair facility, call (800) 447-4986. If you have questions concerning this warranty or its applications, call or write:

In USA and Canada: Caterpillar Inc., Engine Division, P. O. Box 610, Mossville, IL 61552-0610, Attention: Customer Service Manager, Telephone (800) 447-4986. Outside the USA and Canada: Contact your Cat dealer.

For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

THIS WARRANTY IS IN ADDITION TO WARRANTIES AND CONDITIONS IMPLIED BY STATUTE AND OTHER STATUTORY RIGHTS AND OBLIGATIONS THAT BY ANY APPLICABLE LAW CANNOT BE EXCLUDED, RESTRICTED OR MODIFIED ("MANDATORY RIGHTS"). ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED (BY STATUTE OR OTHERWISE), ARE EXCLUDED.

NEITHER THIS WARRANTY NOR ANY OTHER CONDITION OR WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED (SUBJECT ONLY TO THE MANDATORY RIGHTS), IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

TO THE EXTENT PERMITTED UNDER THE MANDATORY RIGHTS, IF CATERPILLAR IS THE SUPPLIER TO THE USER, CATERPILLAR'S LIABILITY SHALL BE LIMITED AT ITS OPTION TO (a) IN THE CASE OF SERVICES, THE SUPPLY OF THE SERVICES AGAIN OR THE PAYMENT OF THE COST OF HAVING THE SERVICES SUPPLIED AGAIN, AND (b) IN THE CASE OF GOODS, THE REPAIR OR REPLACEMENT OF THE GOODS, THE SUPPLY OF EQUIVALENT GOODS, THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT GOODS.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

CATERPILLAR IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNLESS IMPOSED UNDER MANDATORY RIGHTS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

This warranty covers every major component of the products. Claims under this warranty should be submitted to a place of business of a Cat dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.

PRODUCT SPECIFICATIONS FOR 3516E (60 HZ)

GENERATOR SET SPECIFICATIONS

Standby Rating	2750 ekW
Prime Power Rating	2500 ekW
Emissions/Fuel Strategy	Tier 2, Low NOx
Voltage	416 to 13,800 Volts
Frequency	60 Hz
Speed	1800 rpm
Duty Cycle	Standby, Mission Critical, Prime
Maximum Rating	2750 ekW
Minimum Rating	2500 ekW

ENGINE SPECIFICATIONS

Engine Model	3516E, V-16, 4-Stroke, Water-Cooled Diesel
Bore	6.69 in
Stroke	8.47 in
Displacement	4765 in³
Compression Ratio	14.7:1
Aspiration	ATAAC
Fuel System	EUI
Governor Type	Adem™ A5

GENERATOR SET DIMENSIONS

Length - Maximum	311.9 in
Width - Maximum	104 in
Height - Maximum	131.6 in
Dry Weight - Genset (maximum)	40750 lb

3516E (60 HZ) STANDARD EQUIPMENT

AIR INLET SYSTEM

- Single element canister type with service indicator
- Air cleaner

COOLING

- Package mounted radiator

EXHAUST

- Exhaust flange outlet

FUEL

- Primary fuel filter with integral water separator
- Fuel priming pump

GENERATOR

- IP23 Protection
- Matched to the performance and output characteristics of Cat engines

POWER TERMINATION

- Busbar

STARTING/CHARGING

- Heavy duty starting system
- Charging alternator

CONTROL PANEL

- Communications:
- 6 Programmable digital inputs
- Programmable protective relaying functions:
- Low oil pressure
- Environmental sealed front face
- Volts (L-L & L-N)
- Emergency stop pushbutton
- Serial annunciator module data link
- Reverse power (kW) (32)
- Engine cycle crank
- Lamp test

- Over/under frequency (81 o/u)
- kW-hr (total)
- Speed adjust
- True RMS AC metering, 3-phase, +/-2% accuracy
- Engine cool-down timer
- Overcurrent (50/51)
- Reverse reactive power (kVAr) (32RV)
- kW (per phase, average & percent)
- kVAr-hr (total)
- Generator phase sequence
- Oil pressure (psi, kPa or bar)
- Low coolant temperature
- Amps (per phase & average)
- Generator mounted - rear facing
- Over/under voltage (27/59)
- Low coolant level
- Accessory module data link
- kVAr (per phase, average & percent)
- Cat ECS controller includes:
- Failure to start (overcrank)
- 2 Programmable relay outputs (Form C)
- Cat ECS 100
- Overspeed
- 2 Programmable digital outputs
- DC volts
- Frequency (Hz)
- High coolant temperature
- Warning/shutdown with common LED indication of shutdowns for:
- Operating hours

- 4 Programmable relay outputs (Form A)
- Coolant temperature
- Power factor (per phase & average)
- Digital indication for:
- Panel lights
- Text alarm/event descriptions
- Controls:
- 24 Volt DC operation
- Alarm acknowledge
- Customer data link (Modbus RTU)
- kVA (per phase, average & percent)

COOLING SYSTEM

- Caterpillar extended life coolant
- Coolant drain line with valve
- Coolant level sensors
- JWAC
- Radiator fan and fan drive
- Fan and belt guards

EXHAUST SYSTEM

- Dry exhaust manifold
- Flanged faced outlet(s)

FUEL SYSTEM

- Secondary fuel filters
- Flexible fuel lines - shipped loose
- Fuel cooler; not included with packages without radiator
- Fuel priming pump

GENERATORS AND ATTACHMENTS

- Form wound

- 3 Phase brushless, Salient pole
- Class H insulation, Class F temperature rise at 40C ambient (105C prime/130C standby)
- Winding temperature detectors
- Permanent magnet excitation (PMG)
- Anti-condensation space heater
- Right side extension terminal box, busbar connections, top mounted, bottom cable entry
- 6 Lead
- NEMA standard hole pattern

GOVERNING SYSTEM

- ADEM III

LITERATURE

- Parts book
- Operation & Maintenance Manual

LUBE SYSTEM

- Integral lube Oil cooler
- Fumes disposal
- Oil drain lines and valve
- Oil filter, filler and dipstick
- Lubricating oil
- Gear type lube oil pump

MOUNTING SYSTEM

- Rubber anti-vibration mounts - shipped loose
- Rails - engine/generator/radiator mounting

STARTING / CHARGING SYSTEM

- Battery disconnect switch
- 45 Amp Charging alternator
- Battery and battery rack w/cables

- 24 Volt electric starting motor

GENERAL

- Flywheel and flywheel housing-SAE No. 00
- SAE standard rotation
- Paint - Caterpillar yellow with high gloss black rails & radiator
- Right hand servicing

3516E (60 HZ) OPTIONAL EQUIPMENT

AIR INLET SYSTEM

- Air inlet protection
- Remote air inlet adapters
- Dual element air cleaners
- Heavy duty air cleaners

CIRCUIT BREAKERS

- Busbar connections
- P Frame breaker connections
- R Frame breaker connections
- Optional busbar power connections
- Circuit breaker harnesses
- Masterpact breaker connections
- Cable entry options
- 2000, 2500, 3200, 4000 Amp, 4 Pole, IEC rated Circuit breakers
- 2000, 2500, 3200, 4000, 5000 Amp, 3 Pole, IEC rated Circuit breakers
- 1600, 2000, 2500, 3000, 4000, 5000 Amp, 3 Pole, UL-100% rated Circuit breakers

POWER TERMINATION

- Circuit breakers, IEC compliant

CONTROL PANEL

- Customer interface options

- Mounting group - External box clips
- EMCP 4.4
- PC monitoring (Remote and local)
- Ground
- Load share module options
- Annunciator modules
- Auxiliary box
- Language options
- Remote speed adjust
- Vandal proof panel door
- Voltage raise/lower switch
- Generator temperature monitoring

COOLING SYSTEM

- Expansion tanks
- Optional Serpentine radiators
- Water level switch gauges
- Optional ATAAC radiators

EXHAUST SYSTEM

- Flexible fittings
- Elbows
- Flanges and exhaust fittings
- Flanges
- Y Adapters
- Mufflers

FUEL SYSTEM

- Duplex fuel filters
- Primary fuel filters

GENERATORS AND ATTACHMENTS

- Differential current transformers - 8.7 and 15 kV class
- Alternator air cleaners

INSTRUMENTATION

- Pyrometer and thermocouples

LUBE SYSTEM

- Manual prelube pump
- Lube oil in standard sump
- Oil level regulator
- Electric prelube pumps

MOUNTING SYSTEM

- Spring type vibration isolators
- IBC Seismic vibration isolators NORAD
- Puck style low efficiency Isolators

POWER CONNECTIONS

- Neutral ground connections
- 2700 & 3000 Frame
- Grounding groups

SPECIAL TESTS / REPORTS

- IBC Certifications
- Generator set test report
- Torsional vibration analysis
- PGS Test report @ 1.0 power factor
- PGS Test report @ 0.8 power factor
- Standard engine test charge
- Fuel consumption test
- Generator set consumption test

STARTING / CHARGING SYSTEM

- Starter cover
- Electric starting motors
- Air pressure regulator
- 24 Volt battery set - Dry
- Jacket water heaters
- Engine barring group
- 10, 20, 35 and 50 Amp Battery chargers
- Air starting motors

GENERAL

- Special paint colors
- US aid emblem

CMTA
A LEGENCE Company

-Submittal Review Summary

Project: 2564.0 Construct. Health Education Building

Submittal: #304-263231-01-Generator

CMTA Project Code: XKSM21 Reviewed by: ARK

Date Received: 2025-02-03 Date Returned: 2025-02-11

Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

☐ **Reviewed** ☒ **Furnish as Corrected**

☐ **Rejected** ☐ **Revise and Resubmit**

COMMENTS:

1. Provide with 350A and 2000A output breakers. Preferred position is rear or left side as viewed from alternator end.
2. Provide with enclosed battery box(es).
3. Provide controller with Bacnet IP communications.
4. Submit complete emissions data for incorporation into the University's air permit documentation.
5. Confirm warranty period is in compliance with the contract documents.

220 Lexington Green Circle, Suite 600, Lexington KY 40504 859.253.0892 www.cmta.com

MEP Engineering | Performance Contracting | Zero Energy Engineering | Technology | Commissioning

Turner

Project Name: UK Health Education Building **Signature:** _____ **Date:** 2/3/2025

Ben Morey, TCCO Engineer

This review does not relieve the Trade Contractor of the responsibility for making the work conform to the requirements of the Contract. The Trade Contractor is responsible for all dimensions, correct fabrication and accurate fit with the work of other trades.

Date of Submittal Reception: 1/28/2025 **Type:** Product Data
Submittal #: 304 **Submittal Description:** BP-04 Generator
Spec Section #: 263213-04
Trade Contractor: TC-017A Boyd CAT

TURNER COMMENTS IN **BLUE**

Additional Comments: _____

Turner Reviewed ☑

CAT 3512 PGJL
1500kW, 480V
Generator Set

SUBMITTAL

CUSTOMER:

University of Kenctucky

PROJECT:

UK HEB Stock Order

Steve Works

steveworks@BoydCat.com
(803) 600-8983

BILL OF MATERIALS

BILL OF MATERIALS

Quote: 31348700

Re: UK HEB Generator only

Boyd Cat is pleased to present you with the following quotation for the UK HEB Generator only project:

Model: 3512 PGJL
Quantity: 0
Rating: 1500 kW
Certification: U.S. EPA Stationary Emergency Use Only
Fuel: DIESEL
Excitation: IE
Frequency: 60 Hz
Voltage: 480 V
Duty: STANDBY

The following features will be included:

Feature Description
STANDBY POWER
EPA STATIONARY EMERGENCY
60HZ 480 VOLT (WYE)
60 Hz, 1500 EKW W/FAN
3512C 60HZ LV PKG 1500ekW STBY
125C TEMP RISE OVER 40C AMB
cULus CERTIFIED GEN SET
1447/1B-2/3P-RW-IE 348
ECS100 CONTROL PANEL
ENGLISH INSTRUCTION LANGUAGE
GENERAL EPG
PUBLIC OR CIVIL SERVICES
STANDBY POWER
RANDOM WOUND
INTERNALLY EXCITED (IE)
ALTERNATOR RTDS
NON-OCEANIC TRANSPORT
RIGHT HAND CTRL PANEL MOUNTING
ECS100 CTRL PACKAGE MOUNT
CTRL PANEL DOOR W/HMI DISPLAY
ENGINE INTERFACE HARNESS EUI 1
MAIN GENERATOR TERMINAL BOX
QTY REMOTE ANNUNC (1-5)
ETHERNET TELEMATICS.
GEN TEMP MONITORING PACKAGE N
NEUTRAL GROUND CONNECTION LV
GROUND GROUP 11
LOW VOLTAGE WIRING 04

1400 FRAME REAR & BOTTOM COVER
LOWER COVER LEFT
LOWER COVER REAR
UPPER COVER LEFT
CT 3000:5 RATIO
RH CP/AUX MTG WITH RH EXT BOX
UPPER COVER REAR
DECLINE / NOTAPPLICABLE
GENSET ETHERNET IO-BASE CONF 1
ETHERNET DC CONVERTER
CAN2 WIRING HMI ON DOOR
CIRCUIT BREAKER RATING REAR
CIRCUIT BREAKER RATING RIGHT
R FRAME BREAKER
3 POLE BREAKER UL/CSA
LSIG TRIP UNIT
NON-PARALLELING BREAKER
R 2500A LSIG 3P UL MO
BOTTOM CABLE ENTRY 3
RIGHT SIDE EXTENSION BOX
BOTTOM CABLE SHROUD RIGHT
CIRCUIT BREAKER RATING LEFT
SUPPORT CABLE GROUP 3
R/NS FRAME CONN 3P BCE RIGHT
CENTER 5000A LV MULTI BUS
R OR NS-R FRAME CB RIGHT MOUNT
P-R-NS FRAME 1ST CB WIRING
DRAIN GP - OIL PAN 14
LINEAR SPRING ISOLATOR 26
RAD A48ATS STANDARD AMB 304
34 GAL EXTENDED LIFE COOLANT
3512 RAIL 1445-1488 1B FRM 69
FAN PULLEY 0.499 RATIO
INTEGRATED VOLTAGE REG
HD AIR CLEAN-SINGLE ELEMENT 13
SPACE HEATER 1600 FRAME
LUBE OIL 333L SAE 15W-40
PRIMARY FUEL FILTER/FW SEP 03
PLUG GP-NO CYL TEMP SENSORS 24
STANDARD CRANKCASE COVERS 72
DUAL ELECTRIC START LH 50MT 23
COVERS-DUAL START & NO BAR 79
SPACE HEATER CONTROL 01
OPEN CRANKCASE VENT SYS 06
EXCITATION CONVERT IE TO PM 06
BATT SET 4x 12V WET 1500CCA 19
RACK&CABLE-4x SIDE-SIDE BAT 03
BATTERY CHARGER 10A NFPA
JACKET WATER HTR-208V 575
WIRING GP-JW HEATER 31
208/220/240V JWH CONTROL
STD ENGINE TEST CHARGE
SHRINK WRAP+TARP-GENSET PKG 5
PGS TEST REPORT @ 0.8 PF
PLAT 5Y 2500HR GEN STNDBY

GENERATOR SET

Cat® 3512C
Diesel Generator Sets



Image shown may not reflect actual configuration

Bore – mm (in)	170 (6.69)
Stroke – mm (in)	190 (7.48)
Displacement – L (in^3)	51.8 (3161)
Compression Ratio	14.7:1
Aspiration	TA
Fuel System	EUI
Governor Type	ADEM™ A3

Standby 60 Hz ekW (kVA)	Mission Critical 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Continuous 60 Hz ekW (kVA)	Emissions Performance
1500 (1875)	1500 (1875)	1360 (1700)	1230 (1537)	U.S. EPA Stationary Emergency Use Only (Tier 2)

Features

Cat® Diesel Engine
- Meets U.S. EPA Stationary Emergency Use Only (Tier 2) emission standards
- Reliable performance proven in thousands of applications worldwide
- Certified alternative fuels including Hydrotreated Vegetable Oil (HVO), Renewable Diesel (RD) and Hydrotreated Renewable Diesel (HRD) which meet EN 15940 or ASTM D975 can be used or blended with EN 590 diesel

Generator Set Package
- Accepts 100% block load in one step
- Meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators
- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System
- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

Cat Energy Control System (ECS)
- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements
- Graphical touchscreen display
- Easily upgradeable

Warranty
- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

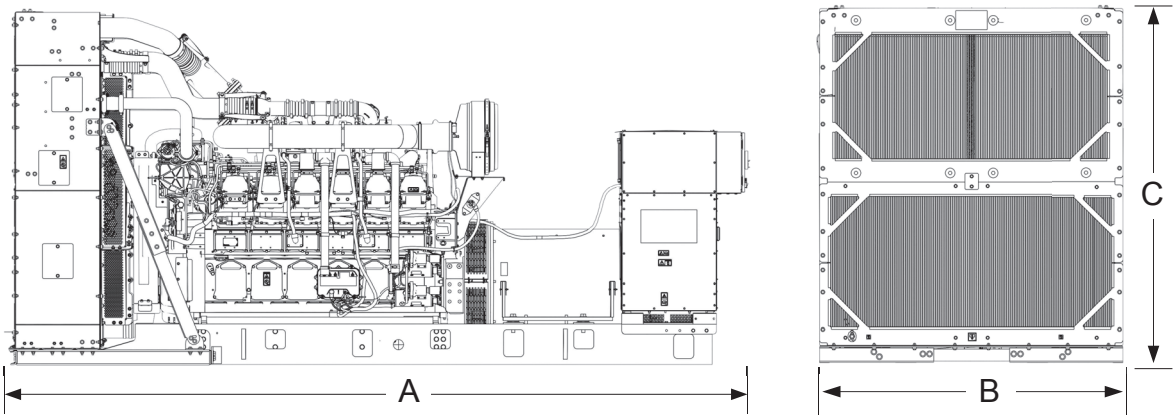
Financing
- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Package Performance

Performance	Standby		Mission Critical		Prime		Continuous	
Frequency	60 Hz		60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	1500 ekW		1500 ekW		1360 ekW		1230 ekW	
Gen set power rating with fan @ 0.8 power factor	1875 kVA		1875 kVA		1700 kVA		1537 kVA	
Emissions	EPA ESE (Tier 2)		EPA ESE (Tier 2)		EPA ESE (Tier 2)		EPA ESE (Tier 2)	
Performance number	EM1898-01		EM1899-01		DM8261-05		DM8262-05	
Fuel Consumption								
100% load with fan – L/hr (gal/hr)	383.3	(101.3)	383.3	(101.3)	352.5	(93.1)	326.2	(86.2)
75% load with fan – L/hr (gal/hr)	300.6	(79.4)	300.6	(79.4)	276.7	(73.1)	253.8	(67.1)
50% load with fan – L/hr (gal/hr)	212.7	(56.2)	212.7	(56.2)	195.3	(51.6)	179.1	(47.3)
25% load with fan – L/hr (gal/hr)	124.3	(32.8)	124.3	(32.8)	115.9	(30.6)	108.1	(28.6)
Cooling System								
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m^3/min (cfm)	1745	(61624)	1745	(61624)	1745	(61624)	1745	(61624)
Engine coolant capacity – L (gal)	156.8	(41.4)	156.8	(41.4)	156.8	(41.4)	156.8	(41.4)
Radiator coolant capacity – L (gal)	128.0	(33.8)	128.0	(33.8)	128.0	(33.8)	128.0	(33.8)
Total coolant capacity – L (gal)	284.8	(75.2)	284.8	(75.2)	284.8	(75.2)	284.8	(75.2)
Inlet Air								
Combustion air inlet flow rate – m^3/min (cfm)	135.8	(4794.6)	135.8	(4794.6)	130.9	(4621.6)	125.8	(4441.3)
Exhaust System								
Exhaust stack gas temperature – °C (°F)	402.6	(756.6)	402.6	(756.6)	387.3	(729.2)	380.6	(717.1)
Exhaust gas flow rate – m^3/min (cfm)	323.0	(11406.4)	323.0	(11406.4)	303.5	(10715.6)	288.2	(10176.5)
Exhaust system backpressure (maximum allowable – kPa (in. water)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)
Heat Rejection								
Heat rejection to jacket water – kW (Btu/min)	499	(28363)	499	(28363)	471	(26784)	447	(25402)
Heat rejection to exhaust (total) – kW (Btu/min)	1431	(81392)	1431	(81392)	1316	(74821)	1231	(69985)
Heat rejection to aftercooler – kW (Btu/min)	504	(28646)	504	(28646)	463	(26343)	425	(24173)
Heat rejection to atmosphere from engine – kW (Btu/min)	125	(7084)	125	(7084)	118	(6701)	113	(6439)
Heat rejection from alternator – kW (Btu/min)	74	(4208)	74	(4208)	64	(3645)	69	(3913)
Emissions* (Nominal)								
NOx mg/Nm^3 (g/hp-h)	2303.5	(5.32)	2303.5	(5.32)	1961.1	(4.62)	1641.9	(3.93)
CO mg/Nm^3 (g/hp-h)	230.3	(0.47)	230.3	(0.47)	207.3	(0.42)	189.9	(0.40)
HC mg/Nm^3 (g/hp-h)	50.3	(0.12)	50.3	(0.12)	59.8	(0.14)	63.0	(0.15)
PM mg/Nm^3 (g/hp-h)	12.6	(0.03)	12.6	(0.03)	13.5	(0.03)	14.9	(0.04)
Emissions* (Potential Site Variation)								
NOx mg/Nm^3 (g/hp-h)	2764.3	(6.38)	2764.3	(6.38)	2353.3	(5.54)	1970.3	(4.71)
CO mg/Nm^3 (g/hp-h)	414.5	(0.84)	414.5	(0.84)	373.1	(0.76)	341.7	(0.71)
HC mg/Nm^3 (g/hp-h)	66.9	(0.16)	66.9	(0.16)	79.6	(0.19)	83.8	(0.20)
PM mg/Nm^3 (g/hp-h)	17.7	(0.04)	17.7	(0.04)	18.9	(0.05)	20.8	(0.05)

**mg/Nm^3 levels are corrected to 5% O_2. Contact your local Cat dealer for further information.*

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
5618 (221.2)	2279 (89.7)	2652 (104.4)	13 141 (28,971)

Note: *For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.*

Ratings Definitions

Standby
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby rated ekW. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Mission Critical
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 85% of the mission critical rated ekW. Typical peak demand up to 100% of rated ekW for up to 5% of the operating time. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime
Output available with varying load for an unlimited time. Average power output is 70% of the prime rated ekW. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Continuous
Output available with non-varying load for an unlimited time. Average power output is 70-100% of the continuous rated ekW. Typical peak demand is 100% of continuous rated ekW for 100% of the operating hours.

Applicable Codes and Standards
AS 1359, ULC 2200 3rd edition, UL 489, UL 869A, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU and facilitates compliance to NFPA 37, NFPA 70, NFPA 99, NFPA 110.

Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications
- All ratings Tier III/Tier IV compliant per Uptime Institute requirements.
- All ratings ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates
Fuel consumption reported in accordance with ISO 3046-1, based on fuel oil of 35º API [16°C (60ºF)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 15ºC (59ºF) and weighing 850 g/liter (7.0936 lbs/U.S. gal.) All fuel consumption values refer to rated engine power.

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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3512 PGJL
LEHE1248-07 (08/23)

GENERATOR DATA

GENERATOR DATA

Selected Model

Engine	3512	**Generator Frame:**	1447	**Genset Rating(kW):**	1500.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Internal Excitation	**Pwr.Factor:**	0.8	**Rated Current:**	2255.3
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Spec Information

Generator Specification

Frame:	1447	**Type**	SR5	**No.of Bearings:**	1
Winding Type:	RANDOM WOUND			**Flywheel:**	21.0
Connection:	SERIES STAR			**Housing:**	00
Phases	3			**No.of Leads:**	6
Poles:	4			**Wires per Lead:**	4
Sync Speed:	1800			**Generator Pitch:**	0.6667

Generator Efficiency

Per Unit Load	kW	Efficiency %
0.25	375.0	93.5
0.5	750.0	95.4
0.75	1125.0	95.6
1.0	1500.0	95.2

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X" d	0.1416	0.0174
SUBTRANSIENT - QUADRATURE AXIS X"q	0.1603	0.0197
TRANSIENT - SATURATED X'd	0.1766	0.0217
SYNCHRONOUS - DIRECT AXIS X'd	3.9355	0.4836
SYNCHRONOUS - QUADRATURE AXIS X'q	2.3633	0.2904
NEGATIVE SEQUENCE X'2	0.1514	0.0186
ZERO SEQUENCE X'0	0.0342	0.0042

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T'd0	3.9100
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T'd	0.1800
OPEN CIRCUIT SUBSTRANSIENT - DIRECT AXIS T"d0	0.0320
SHORT CIRCUIT SUBSTRANSIENT - DIRECT AXIS T"d	0.0180
OPEN CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T"q0	0.2650
SHORT CIRCUIT SUBSTRANSIENT - QUADRATURE AXIS T"q	0.0180
EXCITER TIME CONSTANT Te	0.0600
ARMATURE SHORT CIRCUIT Ta	0.0270

Short Circuit Ratio:0.34	Stator Resistance=0.0025Ohms	Field Resistance=0.506Ohms

Voltage Regulation

Voltage level adjustment:+/-	**5.0%**
Voltage regulation,steady state:+/-	**0.5%**
Voltage regulation with 3% speed change: +/-	**0.5%**
Waveform deviation line - line, no load: less than	**2.0%**
Telephone influence factor: less than	**100%**

Generator Excitation

	No Load	Full Load, Series	(rated)pf Parallel
Excitation Voltage:	10.34Volts	57.26Volts	Volts
Excitation Current:	0.81Amps	3.7Amps	Amps

GENERATOR DATA

Selected Model

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Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
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Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Generator Mechanical Information

Center Of Gravity

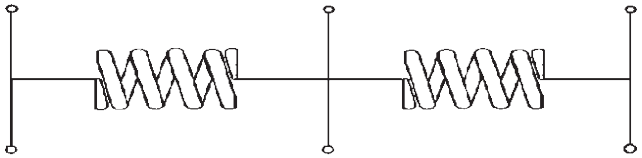
Dimension X	-686.5mm	-27.0IN.
Dimension Y	0.0mm	0.0IN.
Dimension Z	0.0mm	0.0IN.

* 'X' is measured from driven end of generator and parallel to rotor.Towards engine fan is positive.See General Information for details
* 'Y' is measured vertically from rotor center line.Up is positive
* 'Z' is measured to left and right of rotor center line.To the right is positive.

Generator WT =	2900Kg 6,393LB	* Rotor WT =	1104Kg 2,434LB	* Stator WT=	1796Kg 3,959LB

Rotor Balance =	0.0508mm deflection PTP
Overspeed Capacity =	125%of synchronous speed

Generator Torsional Data



J1= Coupling and Fan | **J2= Rotor TOTAL J = J1+J2+J3** | **J3= Exciter End**

K1=Shaft Stiffness between J1+J2(Diameter1) | **K2=Shaft Stiffness between J2+J3(Diameter2)**

J1	**K1**	**Min Shaft Dia 1**	**J2**	**K2**	**Min Shaft Dia 2**	**J3**
30.2LB IN.s²	155.8MLB IN./rad	6.7IN.	184.1LB IN.s²	119.5MLB IN./rad	5.5IN.	7.1IN.s²
3.41N m s²	17.6MN m/rad	170.0mm	20.8N m s²	13.5m/rad	140.0mm	0.8N m s²
			Total J			
			221.4LB IN.s²			
			25.01N m s²			

GENERATOR DATA

Selected Model

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						Version:	20205 /20191 /20205 /675307

Generator Cooling Requirements - Temperature -Insulation Data

Cooling Requirements:		**Temperature Data:**	(Ambient 40.0°C)
Heat Dissipated:	76.0kW	**Stator Rise:**	125.0°C
Air Flow:	132.0m³/min	**Rotor Rise:**	125.0°C

Insulation Class:H

Insulation Reg. as shipped:100.0 M Ω minimum at 40 °C

Thermal Limits of Generator

Frequency:	60.0Hz
Line to Line Voltage:	480.0Volts
B BR 80/40	1500.0kVA
F BR -105/40	1706.0kVA
H BR - 125/40	1875.0kVA
F PR - 130/40	1875.0kVA
H PR - 150/40	1992.0kVA
H PR27 - 163/27	2072.0kVA

GENERATOR DATA

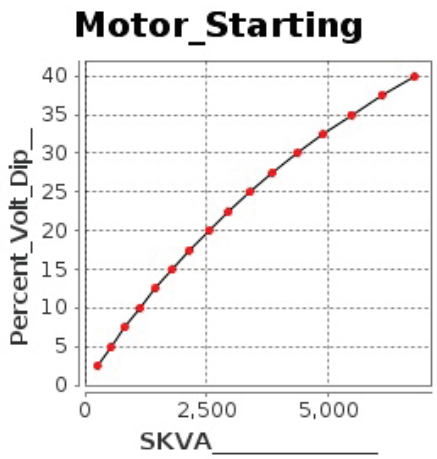
Selected Model

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Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Starting Capability and Current Decrement

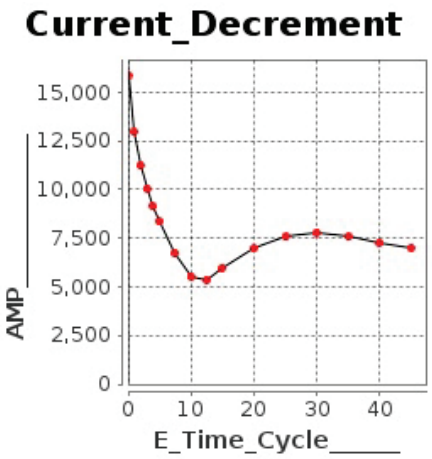
Motor Starting Capability (0.4 pf)

SKVA	Percent Volt Dip
260	2.5
534	5.0
823	7.5
1,128	10.0
1,450	12.5
1,791	15.0
2,153	17.5
2,538	20.0
2,947	22.5
3,384	25.0
3,850	27.5
4,350	30.0
4,888	32.5
5,466	35.0
6,091	37.5
6,767	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	15,887
1.0	12,954
2.0	11,229
3.0	10,048
4.0	9,125
5.0	8,346
7.5	6,758
10.0	5,518
12.5	5,375
15.0	5,994
20.0	6,997
25.0	7,566
30.0	7,800
35.0	7,579
40.0	7,272
45.0	7,023



GENERATOR DATA

Instantaneous 3 Phase Fault Current: 15887.0Amps
Instantaneous Line- Line Fault Current: 13300.0Amps
Instantaneous Line- Neutral Fault Current: 20629.0Amps

GENERATOR DATA

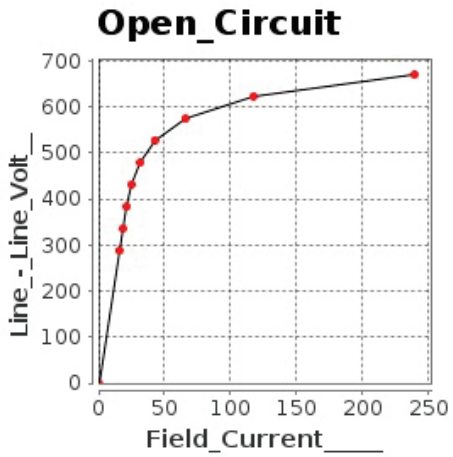
Selected Model

Engine	3512	**Generator Frame:**	1447	**Genset Rating(kW):**	1500.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Internal Excitation	**Pwr.Factor:**	0.8	**Rated Current:**	2255.3
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Generator Output Characteristic Curves

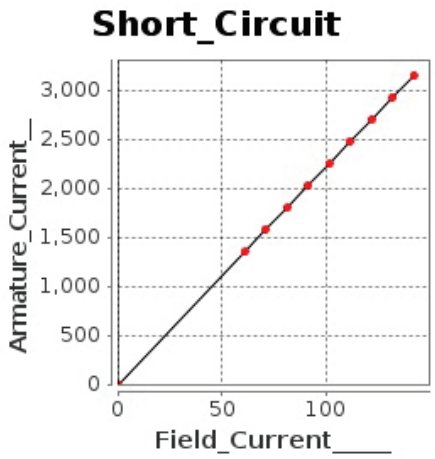
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
15.6	288
18.4	336
21.6	384
25.6	432
31.7	480
42.8	528
65.8	576
117.8	624
239.7	672



Short Circuit Curve

Field Current	Armature Current
0.0	0
61.0	1,353
71.1	1,579
81.3	1,804
91.4	2,030
101.6	2,255
111.7	2,481
121.9	2,706
132.1	2,932
142.2	3,157



GENERATOR DATA

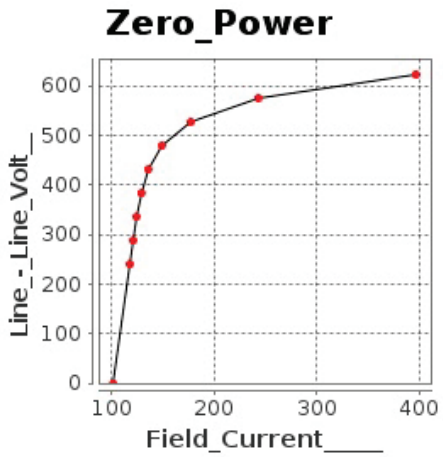
Selected Model

Engine	3512	**Generator Frame:**	1447	**Genset Rating(kW):**	1500.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Internal Excitation	**Pwr.Factor:**	0.8	**Rated Current:**	2255.3
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Generator Output Characteristic Curves

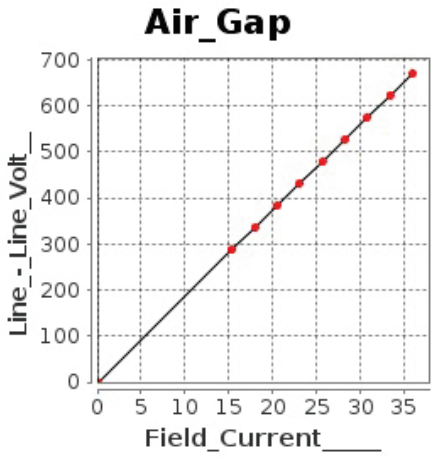
Zero Power Factor Curve

Field Current	Line - Line Volt
101.6	0
117.6	240
120.6	288
123.9	336
128.4	384
135.4	432
148.7	480
177.3	528
242.5	576
396.3	624



Air Gap Curve

Field Current	Line - Line Volt
0.0	0
15.4	288
18.0	336
20.5	384
23.1	432
25.7	480
28.3	528
30.8	576
33.4	624
36.0	672

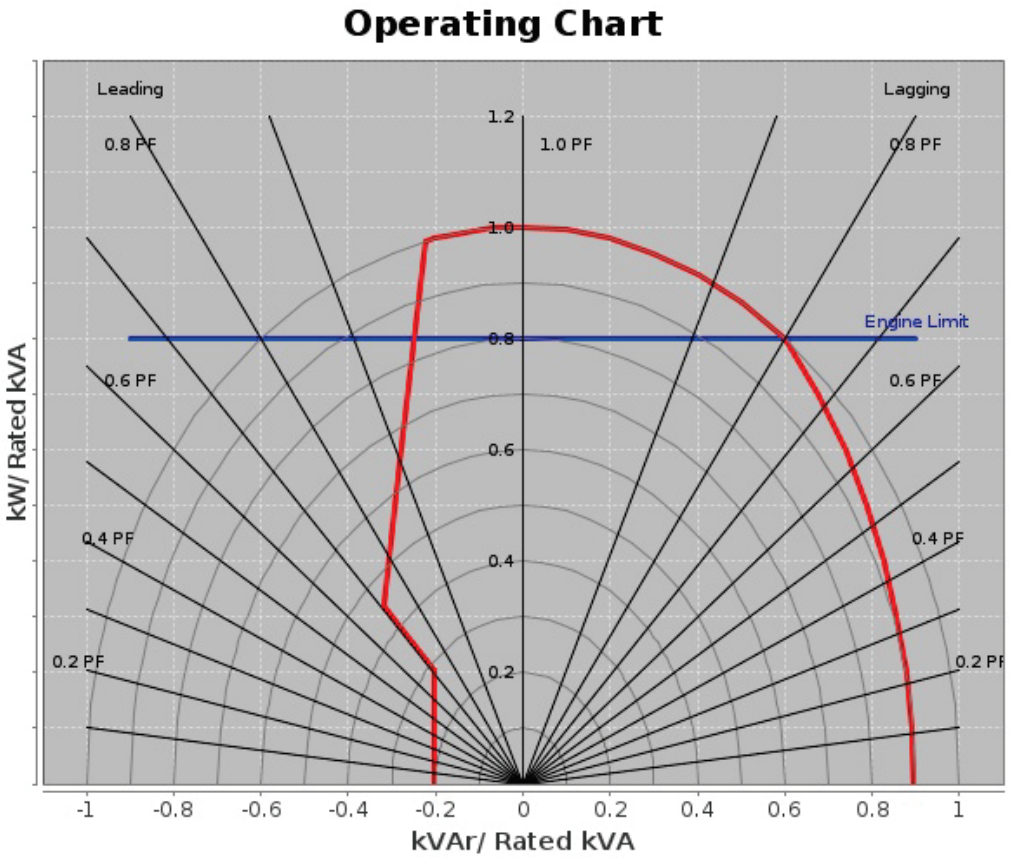


GENERATOR DATA

Selected Model

Engine	3512	**Generator Frame:**	1447	**Genset Rating(kW):**	1500.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Internal Excitation	**Pwr.Factor:**	0.8	**Rated Current:**	2255.3
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

Reactive Capability Curve



GENERATOR DATA

Selected Model

Engine	3512	**Generator Frame:**	1447	**Genset Rating(kW):**	1500.0	**Line Voltage:**	480
Fuel	Diesel	**Generator Arrangement:**	5873762	**Genset Rating(kVA):**	1875.0	**Phase Voltage:**	277.0
Frequency	60	**Excitation Type:**	Internal Excitation	**Pwr.Factor:**	0.8	**Rated Current:**	2255.3
Duty	STANDBY	**Connection:**	SERIES STAR	**Application:**	EPG	**Status:**	Current
						Version:	20205 /20191 /20205 /675307

General Information

DM7825 Caterpillar SR5 Generators (50 Hz, 60 Hz)
Data for 1400, 1600, 1700, 1800 and 1900 frames Caterpillar SR5 generators built by Leroy Somer - USA and Leroy Somer □ France.

Refer to DM7821 for explanation of all generator data in Technical Marketing Information (TMI) except generator efficiency for which the explanation is given below.

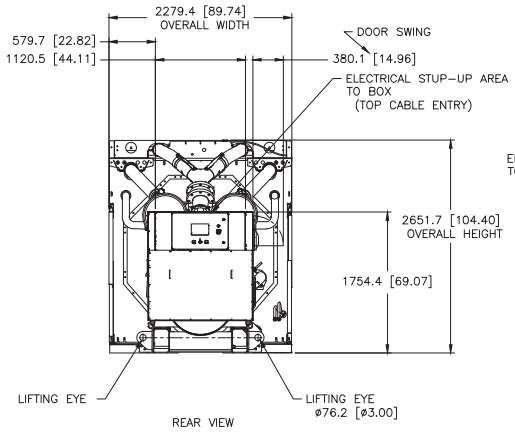
GENERATOR EFFICIENCY
Generator efficiency is the percentage of engine flywheel (or other prime mover) power that is converted into electrical output. The generator efficiency shown is calculated by the summation of all losses method, and is determined in accordance with the IEC Standard 60034. The efficiency considers only the generator. There is no consideration of engine or parasitic losses here.

Refer to DM7829 for low and medium voltage protective setting values a nd limits.

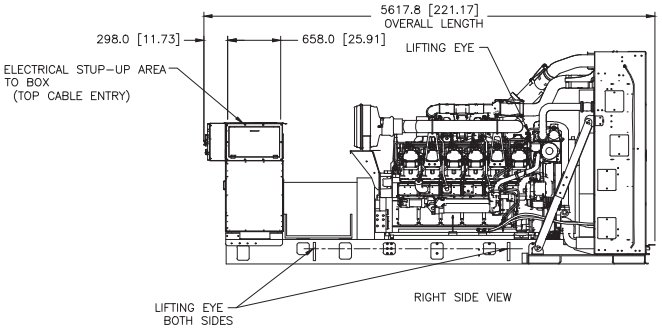
Caterpillar Confidential:Green
Content Owner:Alan Scott
Web Master(s):PSG Web Based Systems Support
Current Date:Tue, 28 Jan 2025 15:40:40 PM
Caterpillar Inc. 2008 All Rights Reserved

METRIC 639-6616

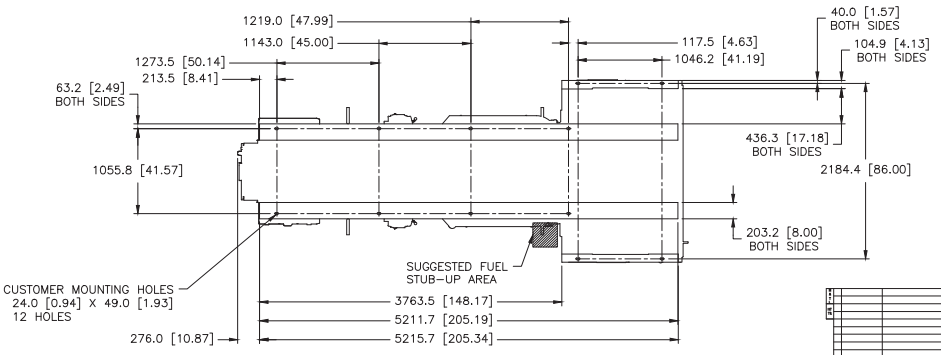
QTY	CONNECTION	SIZE	SHEETS
1	FUEL INLET	3/4-14 NPSM	2,5
1	EXCESS FUEL RETURN	1 3/16-12 THD	2,5
1	EXHAUST	DETAIL	4,6,7
2	FUMES DISPOSAL HOSE	ø57.2 [ø2.25] OD	4,5
1	OIL DRAIN	1 3/16-12 THD	2,5
1	RADIATOR DRAIN	1/2-14 NPT	2,3,4



REAR VIEW



RIGHT SIDE VIEW



FOOTPRINT
(DIMENSIONED OUTLINE VIEW FROM ABOVE)

MODEL	TYPE	PRICING AR	MANDATORY ATT
3512PGJL	–	LF-2923 CHG 10 LF-2924 CHG 05	LF-6185 CHG 00
			621-9888 CHG 01
			LF-6206 CHG 02
			LF-2838 CHG 01
			LF-2975 CHG 00
			LF-5487 CHG 00
			LF-2830 CHG 00
			LF-2848 CHG 02
			516-7990 CHG 01
			491-5899 CHG 02
			491-5896 CHG 03
			491-5856 CHG 03
			375-2296 CHG 01
			447-1538 CHG 01
			LF-1344 CHG 00
			LF-5495 CHG 00
			LF-2694 CHG 02
			LF-1318 CHG 02
			325-6244 CHG 00
			LF-1865 CHG 00
			LF-1870 CHG 02
			283-2549 CHG 00
			473-4535 CHG 00
			367-5169 CHG 01
			LF-1319 CHG 01
			LF-1349 CHG 00

PACKAGE LIFTED IN 3 PLACES WITH RADIATOR INSTALLED

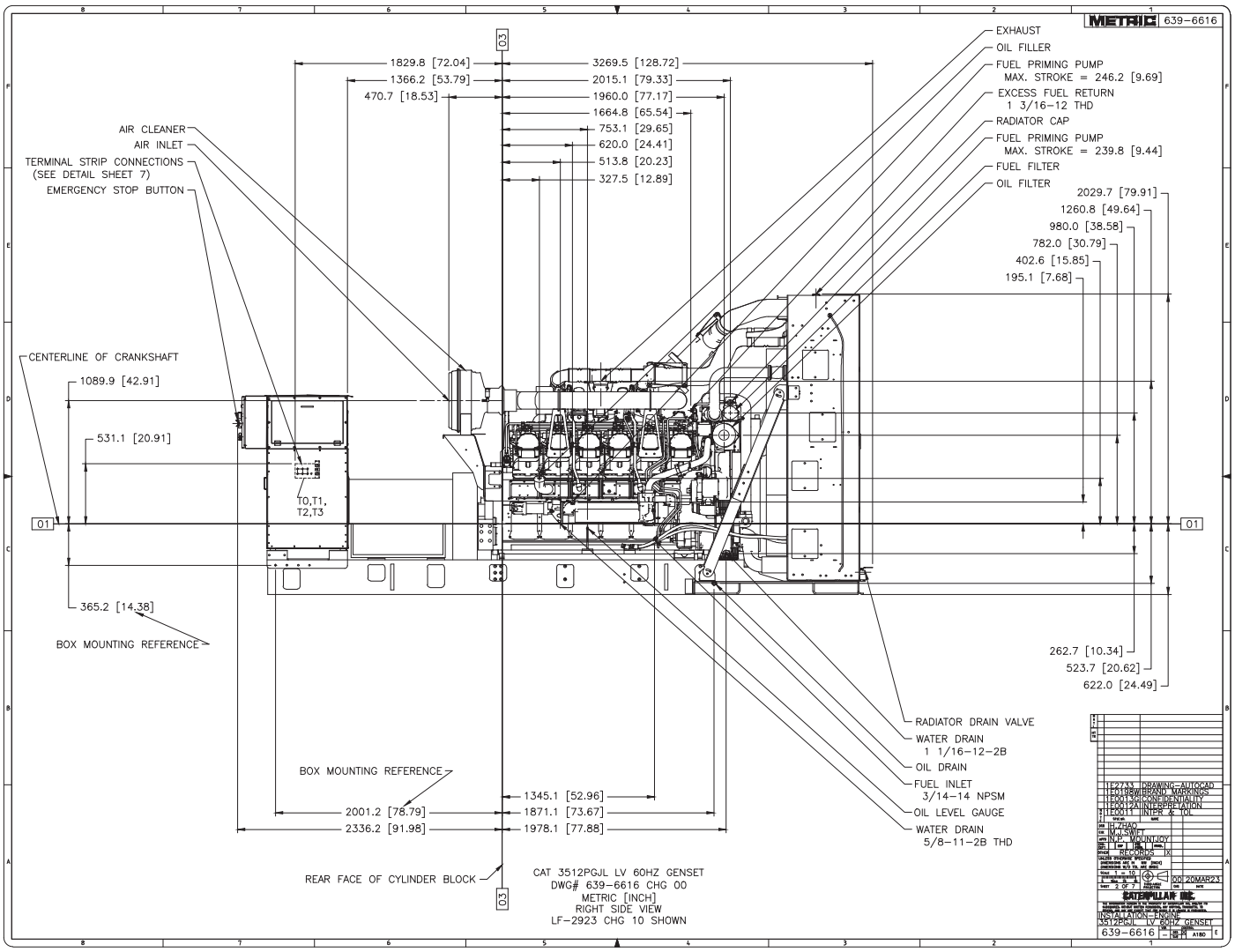
PACKAGE SHOWN WITH MORE DETAIL ON FOLLOWING SHEETS

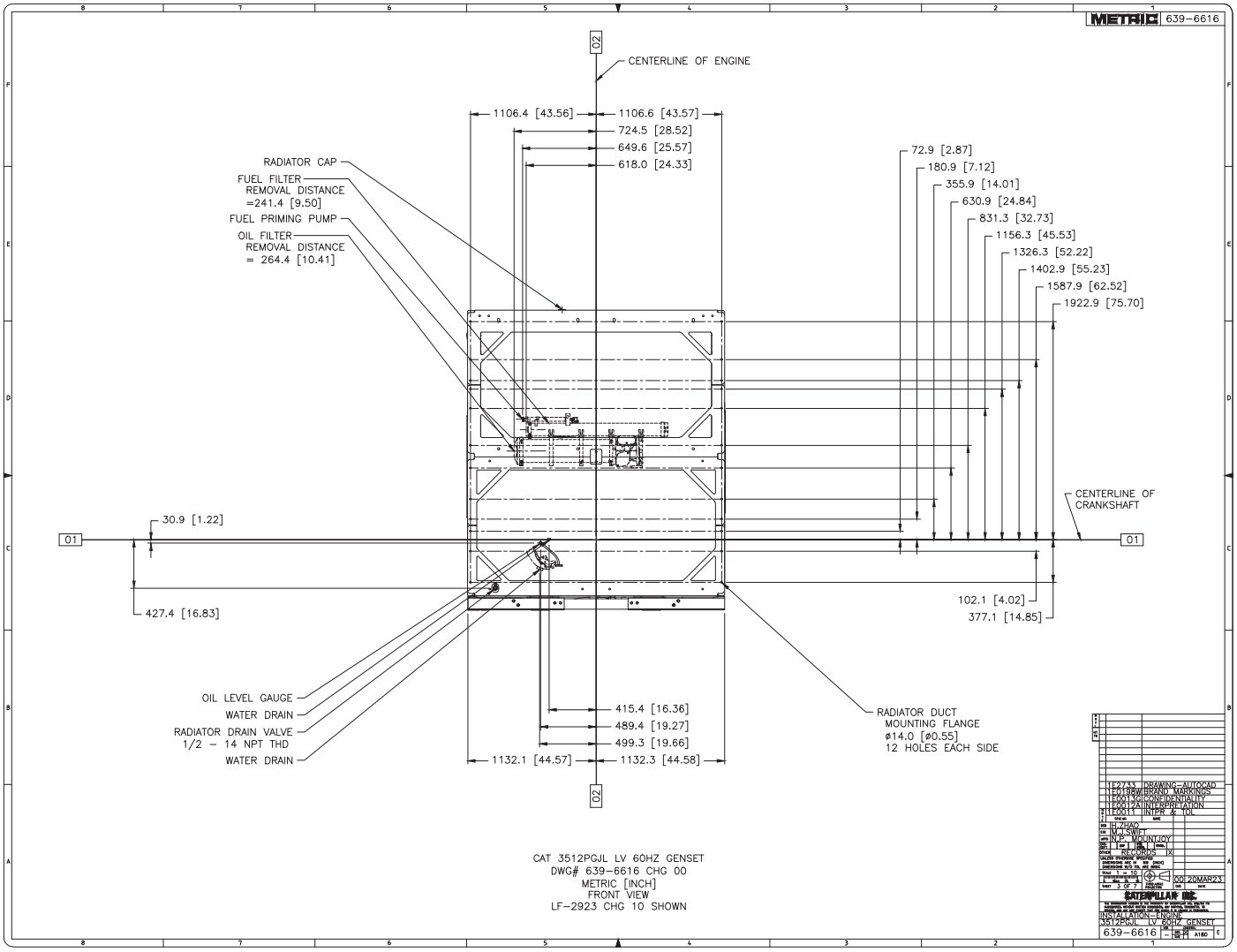
E2733	DRAWING-AUTOCAD
E0195W	BRAND MARKINGS
E0013K	CONFIDENTIALITY
E0012A	INTERPRETATION
E0011	INTER & TOL

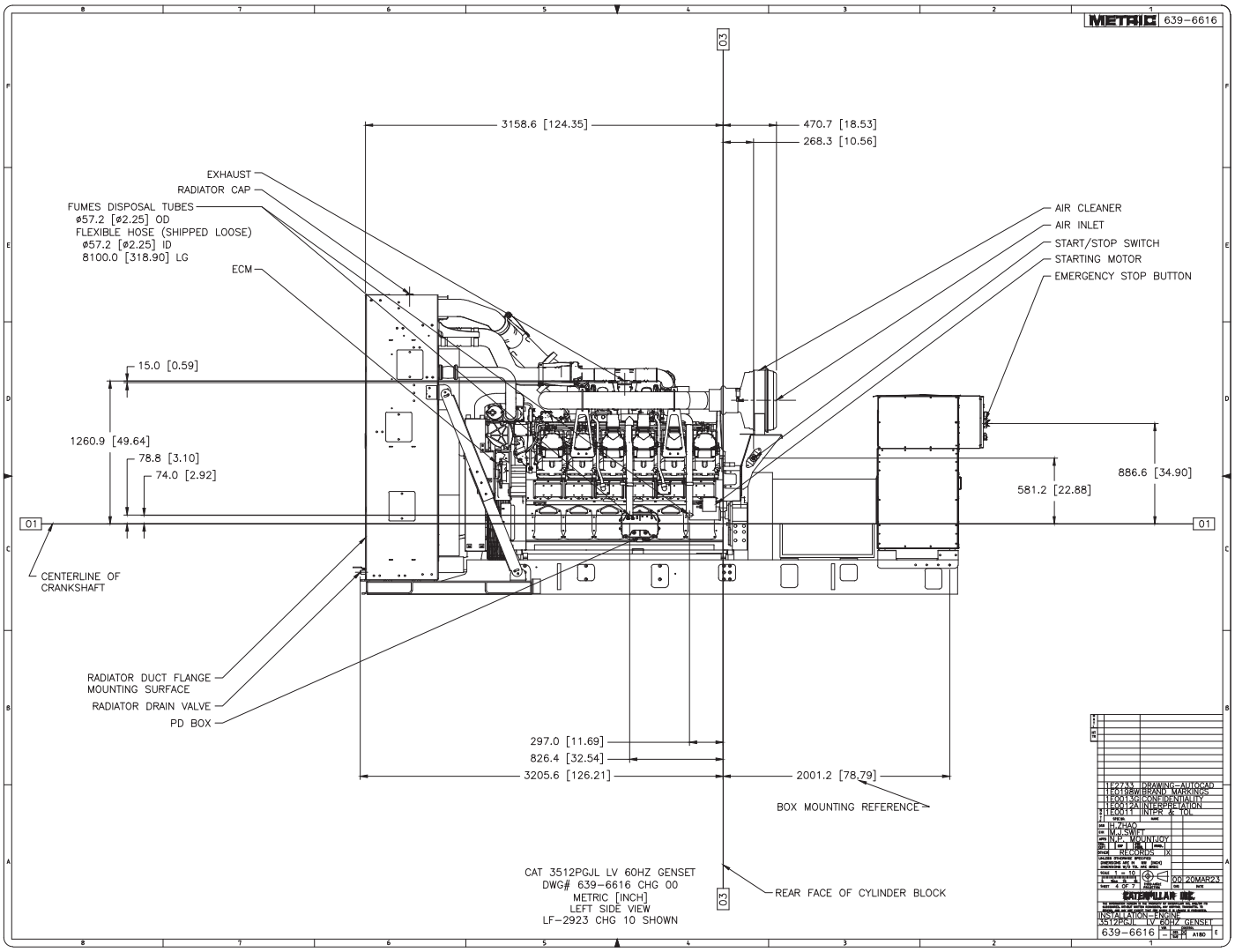
DR H. ZHAO
CH M.J.SWIFT
APP N.P. MOUNTJOY
DEC DRAWING
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN mm [INCH]
DIMENSIONS W/O TOL ARE BASIC
SCALE 1 = 16
SHEET 1 OF 7
DO: 20MAR23

CATERPILLAR INC.

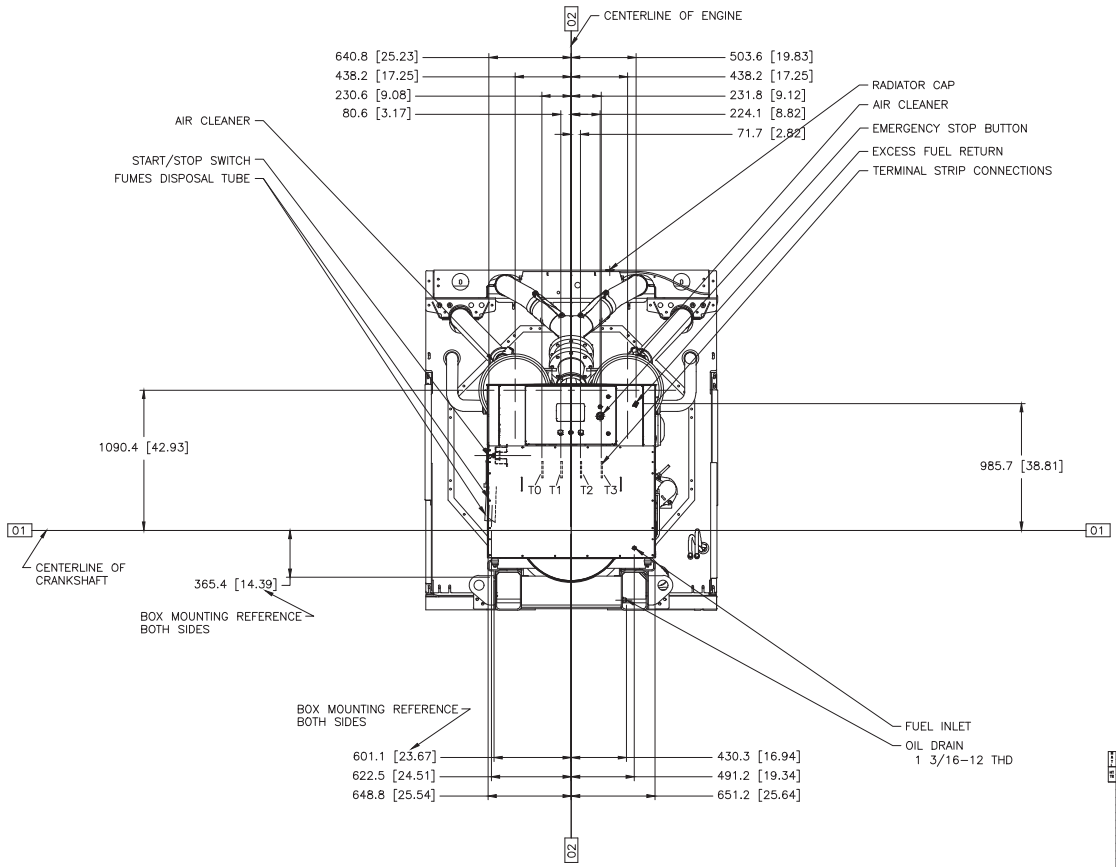
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616 – A1SO E


METRIC 639-6616
1829.8 [72.04]
1366.2 [53.79]
470.7 [18.53]
3269.5 [128.72]
2015.1 [79.33]
1960.0 [77.17]
1664.8 [65.54]
753.1 [29.65]
620.0 [24.41]
513.8 [20.23]
327.5 [12.89]
EXHAUST
OIL FILLER
FUEL PRIMING PUMP
MAX. STROKE = 246.2 [9.69]
EXCESS FUEL RETURN
1 3/16-12 THD
RADIATOR CAP
FUEL PRIMING PUMP
MAX. STROKE = 239.8 [9.44]
FUEL FILTER
OIL FILTER
AIR CLEANER
AIR INLET
TERMINAL STRIP CONNECTIONS
(SEE DETAIL SHEET 7)
EMERGENCY STOP BUTTON
2029.7 [79.91]
1260.8 [49.64]
980.0 [38.58]
782.0 [30.79]
402.6 [15.85]
195.1 [7.68]
CENTERLINE OF CRANKSHAFT
1089.9 [42.91]
531.1 [20.91]
T0,T1,
T2,T3
01
365.2 [14.38]
BOX MOUNTING REFERENCE
262.7 [10.34]
523.7 [20.62]
622.0 [24.49]
RADIATOR DRAIN VALVE
WATER DRAIN
1 1/16-12-2B
OIL DRAIN
FUEL INLET
3/14-14 NPSM
OIL LEVEL GAUGE
WATER DRAIN
5/8-11-2B THD
BOX MOUNTING REFERENCE
1345.1 [52.96]
1871.1 [73.67]
1978.1 [77.88]
2001.2 [78.79]
2336.2 [91.98]
REAR FACE OF CYLINDER BLOCK
03
CAT 3512PGJL LV 60HZ GENSET
DWG# 639-6616 CHG 00
METRIC [INCH]
RIGHT SIDE VIEW
LF-2923 CHG 10 SHOWN
00 20MAR23
CATERPILLAR INC.
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616
A1BD


METRIC 639-6616
02
CENTERLINE OF ENGINE
1106.4 [43.56]
1106.6 [43.57]
724.5 [28.52]
649.6 [25.57]
618.0 [24.33]
RADIATOR CAP
FUEL FILTER REMOVAL DISTANCE =241.4 [9.50]
FUEL PRIMING PUMP
OIL FILTER REMOVAL DISTANCE = 264.4 [10.41]
72.9 [2.87]
180.9 [7.12]
355.9 [14.01]
630.9 [24.84]
831.3 [32.73]
1156.3 [45.53]
1326.3 [52.22]
1402.9 [55.23]
1587.9 [62.52]
1922.9 [75.70]
CENTERLINE OF CRANKSHAFT
01
30.9 [1.22]
427.4 [16.83]
102.1 [4.02]
377.1 [14.85]
OIL LEVEL GAUGE
WATER DRAIN
RADIATOR DRAIN VALVE 1/2 - 14 NPT THD
WATER DRAIN
415.4 [16.36]
489.4 [19.27]
499.3 [19.66]
1132.1 [44.57]
1132.3 [44.58]
RADIATOR DUCT MOUNTING FLANGE ø14.0 [ø0.55] 12 HOLES EACH SIDE
CAT 3512PGJL LV 60HZ GENSET
DWG# 639-6616 CHG 00
METRIC [INCH]
FRONT VIEW
LF-2923 CHG 10 SHOWN
CATERPILLAR INC.
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616
00 20MAR23


METRIC 639-6616
03
3158.6 [124.35]
470.7 [18.53]
268.3 [10.56]
EXHAUST
RADIATOR CAP
FUMES DISPOSAL TUBES
ø57.2 [ø2.25] OD
FLEXIBLE HOSE (SHIPPED LOOSE)
ø57.2 [ø2.25] ID
8100.0 [318.90] LG
ECM
AIR CLEANER
AIR INLET
START/STOP SWITCH
STARTING MOTOR
EMERGENCY STOP BUTTON
15.0 [0.59]
1260.9 [49.64]
78.8 [3.10]
74.0 [2.92]
886.6 [34.90]
581.2 [22.88]
01
01
CENTERLINE OF CRANKSHAFT
RADIATOR DUCT FLANGE MOUNTING SURFACE
RADIATOR DRAIN VALVE
PD BOX
297.0 [11.69]
826.4 [32.54]
3205.6 [126.21]
2001.2 [78.79]
BOX MOUNTING REFERENCE
REAR FACE OF CYLINDER BLOCK
03
CAT 3512PGJL LV 60HZ GENSET
DWG# 639-6616 CHG 00
METRIC [INCH]
LEFT SIDE VIEW
LF-2923 CHG 10 SHOWN
00 20MAR23
CATERPILLAR INC.
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616
A1BD

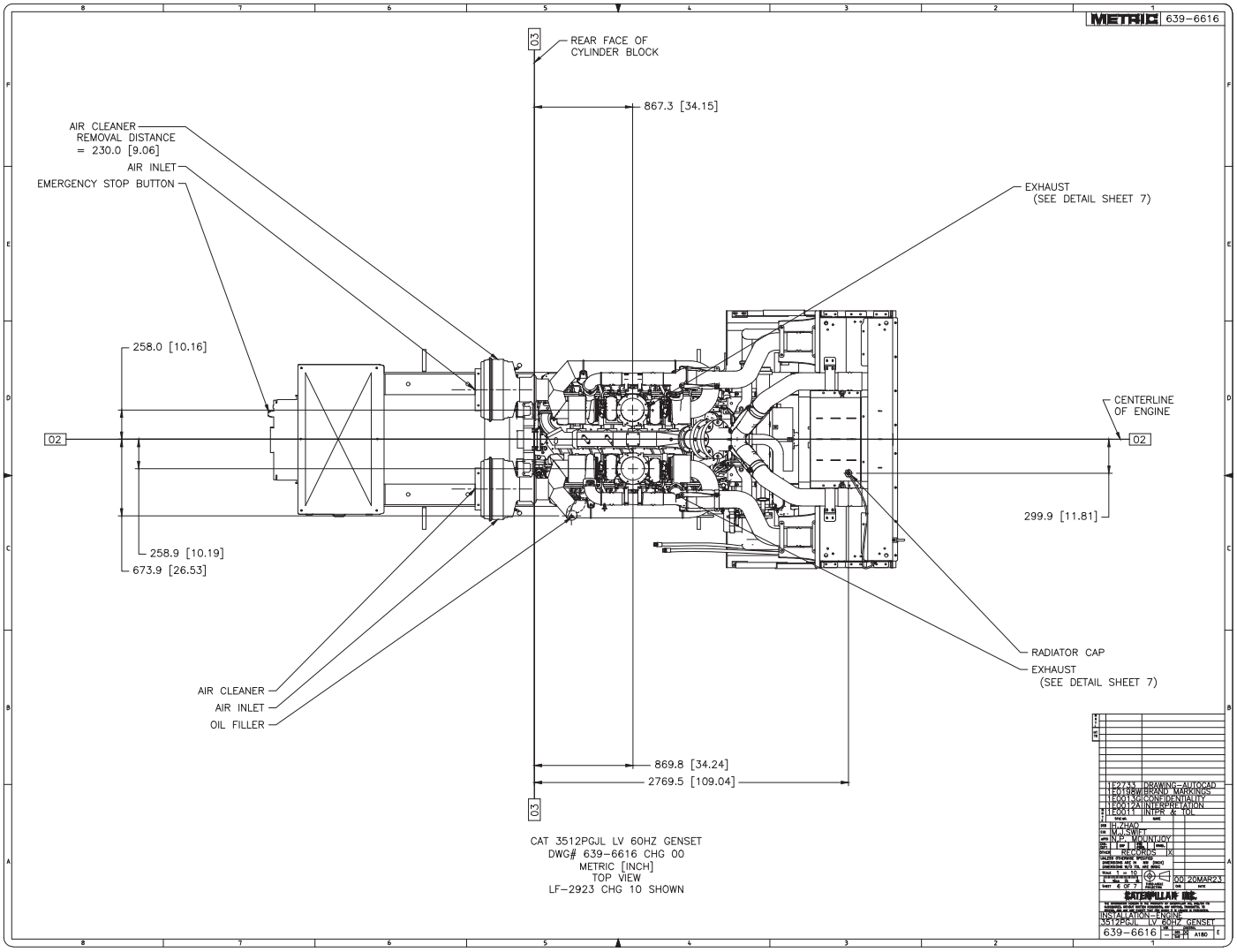
METRIC 639-6616

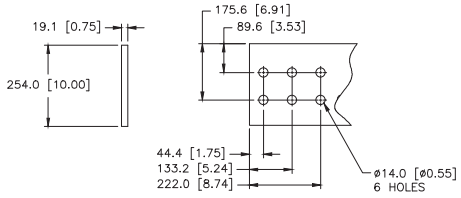


CAT 3512PGJL LV 60HZ GENSET
DWG# 639-6616 CHG 00
METRIC [INCH]
REAR VIEW
LF-2923 CHG 10 SHOWN

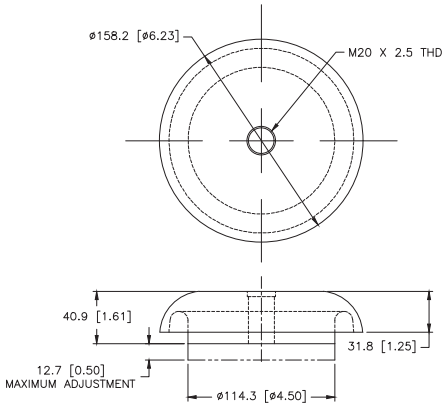
1	E2733 DRAWING-AUTOCAD
1	E0195W BRAND MARKINGS
1	E0013R CONFIDENTIALITY
1	E0012A INTERPRETATION
1	E0011 TINTER & TOL

DR H.ZHAO
CH M.J.SWIFT
APP N.P. MOUNTJOY
DEPT SPC-PRMG
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN mm [INCH] DIMENSIONS W/O TOL PER ANSI
SCALE 1 = 10 SHEET 5 OF 7
00 20MAR23
CAT CATERPILLAR INC.
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616 00 A1BD

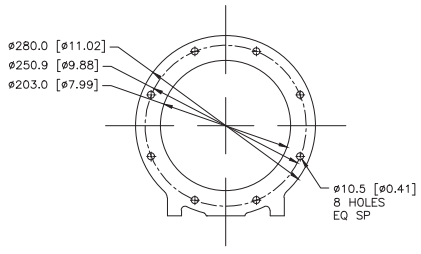

METRIC 639-6616
03
REAR FACE OF CYLINDER BLOCK
867.3 [34.15]
AIR CLEANER REMOVAL DISTANCE = 230.0 [9.06]
AIR INLET
EMERGENCY STOP BUTTON
EXHAUST (SEE DETAIL SHEET 7)
258.0 [10.16]
02
CENTERLINE OF ENGINE
299.9 [11.81]
258.9 [10.19]
673.9 [26.53]
RADIATOR CAP
EXHAUST (SEE DETAIL SHEET 7)
AIR CLEANER
AIR INLET
OIL FILLER
869.8 [34.24]
2769.5 [109.04]
CAT 3512PGJL LV 60HZ GENSET
DWG# 639-6616 CHG 00
METRIC [INCH]
TOP VIEW
LF-2923 CHG 10 SHOWN
EQ2733 DRAWING-AUTOCAD
EQ1956 BRAND MARKINGS
EQ0013 DRAWING IDENTIFIABILITY
EQ012A INTERPRETATION
EQ011 TINTER & TOL
H-ZHAO
M.J.SWIFT
N.P. YOUNTJOY
00 20MAR23
CATERPILLAR INC.
INSTALLATION-ENGINE
3512PGJL LV 60HZ GENSET
639-6616
A1BD



DETAIL OF TERMINAL STRIP CONNECTIONS
(T0, T1, T2, T3)
SCALE 1=2



DETAIL OF MOUNTING GP ISOLATOR
(SHIPPED LOOSE)
SCALE 1=1



DETAIL OF EXHAUST
SCALE 1=2

1	E2733 DRAWING-AUTOCAD
1	E0195W BRAND MARKINGS
1	E0013K KNOWLEDGE/ENTITY
1	E0012A INTERPRETATION
1	E0011 ENTER K-TOL

DRN H. ZHAO
CHK M.W. SWIFT
APVD N.P. MOUNTJOY
DATE 20MAR23
SIZE A1 SCALE 1:10
SHEET 7 OF 7
CAGE CODE 00124
CATERPILLAR INC.
INSTALLATION-ENGINE
3512B,3L LV 60HZ GENSET
639-6616 - REV A1 E

ENGINE MONITORING SYSTEM

Cat® Energy Control System 100



Image shown may not reflect actual configuration.

Cat® Energy Control System (ECS) 100

The Cat ECS 100 generator set controller uses system graphic icons and labels that allow for simple, comprehensive generator set operation. The easy-to-use 203 mm (8”) color LED touchscreen display features scroll navigation. Generator set and remote-mount options are available.

FEATURES

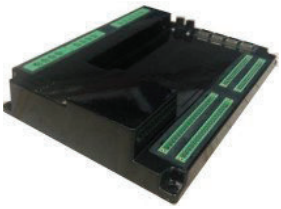
- Island mode – single unit operation
- High visibility graphical touchscreen display with alarm/event descriptions, set points, engine and generator monitoring
- Meets UL 2200, 3rd Edition requirements including UL 6200
- Local annunciation to meet NFPA 110 (subject to local authority having jurisdiction approval)
- Ethernet Modbus TCP for external communications
- Intuitive navigation for display of power metering, protection, engine and generator parameters and tuning
- Lockout security provision to assure platform integrity with three programable security levels
- Support of up to four (4) remote HMI’s (sold separately)
- Multi-language support.
- Compatible with Cat Connect Product Link™ devices
- IVR or CDVR voltage regulation compatibility
- Emergency Override

Advanced Functionality

- Automatic mains failure with utility voltage sensing capability (open transition) and remote breaker or contactor control/monitoring
- Engine remote start integrity monitoring
- Single genset transient load relief (TLR)
- Basic programmable logic control (PLC) function
- Embedded webserver
- EPA Tier 4 integration
- Real (kW) load histograms
- Status event log
- Supports Dynamic Gas Blending™ (DGB™)

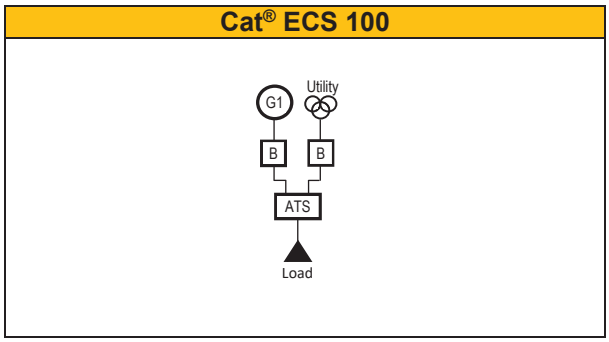
Control Module and Display

The Cat A6L3 is the base module controller utilizing the high-resolution display for the human machine interface (HMI).





Typical(1) Single Line Diagram (SLD)



(1) - More single line diagrams (SLD’s) are available to meet application requirements. Contact your local Cat dealer for more information.

Caterpillar: Non-Confidential

Cat® Energy Control System 100

Standard Features

Controls	• Auto / Start / Stop • Emergency stop • Engine cooldown timer • Engine cycle crank • Programmable cycle timer • Speed and voltage adjust
Generator Set Monitoring	• Generator AC voltage monitoring (+/- 0.25% controller lifetime accuracy) • Utility/Bus AC voltage monitoring (+/- 0.25% controller lifetime accuracy) • 3 phase/4 wire (L-L&L-N) sensing • Current sensing (3 phase/6 wire) (+/- 0.1% up to 100% of rated current controller accuracy) • Generator AC current (per phase & avg) • Generator frequency • Power metering (kW, kVA, kVAr, pf) • kW-hr (export), kVAr-hr (import and export), total and trip • Generator stator and bearing temp (with optional RTD module) • kW load histogram
Generator Protection	• Generator phase sequence (47G) • Over/Under voltage (27/59) • Over/Under frequency (81 O/U) • Overcurrent timed & inverse (50/51) • Overcurrent (Thermal Damage Curve) (51) • Reverse power real (kW) (32) • Reverse power reactive (kVAr) (32RV) • Current balance (46) • Overload (49)
Engine Monitoring	• Engine oil pressure (kPa or psi) • Engine oil temperature (°C or °F) • Engine coolant temperature (°C or °F) • Engine speed (RPM) • Battery voltage • Crank attempt and successful start counter • Run hour meter • Real time clock
Engine Protection	• Control switch not in auto (alarm) • Low oil pressure • High coolant temperature (alarm and shutdown) • Low coolant temp (alarm) • Low coolant level (alarm and shutdown) • High engine oil temp (alarm and shutdown) • Low/High/Weak battery voltage • Fail to start • Overspeed • Overcrank • Low gas pressure (alarm and shutdown)

Caterpillar: Non-Confidential

Standard Features *(continued)*

Digital Inputs	• Emergency Stop • Remote Start • 16 programmable inputs (4 used for functional safety)[2]
Digital Outputs	• 12 programmable outputs (4 used for functional safety)[2]
Analog Outputs	• 2 analog outputs
PWM Outputs	• 3 Total (1 used for IVR - standard)
Analog Inputs	• 3 programmable inputs (0-5V, 0.5-4.5V, 1-5V, or resistive)[2]
Communication	• Primary & accessory CAN data link • Remote annunciator data link up to 1219 m (4000 ft) • Cat® Data Link (CDL) - with optional PLE702 • Ethernet (Modbus TCP/IP) - 100 baseT • USB- touchscreen display • Four 4-wire ports for internal and customer use • Two 2-wire ports for internal device network
Environmental	• HMI (front touchscreen) IP66 • A6L3 Controller Operating Temp. -40°C to + 70°C • Control module box: - Ingress protection IP23 - Health Care Access and Information (HCAI) ground and roof seismic certification
Languages	• Chinese | Danish | English | French | German | Italian | Japanese | • Portuguese | Russian | Spanish | additional languages on request |

[2] - Generator set configuration may affect available features.

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Cat® Energy Control System 100

Enhanced Control Features

Advanced overcurrent protection
The Cat ECS 100 provides advanced overcurrent protection of the generator set system via programmable Definite Time and Inverse Time curves.
For the Inverse time curve the following four selections are available:
- Normally Inverse
- Very Inverse
- Extremely Inverse
- Thermal Damage Curve - the Thermal Damage curve may be more closely aligned to specific generators.

Arc Flash Maintenance mode
The Cat ECS 100 Programmable Arc Flash Energy Reducing Maintenance Mode feature provides a method to reduce clearing time via two functions that work together to meet the 2023 edition of NFPA 70, Section 240.87 (Arc Energy Reduction).
- A means to accept an energy-reducing maintenance switch and provide means to connect a local status indicator.
- An instantaneous overcurrent setting that can be set below the available arcing current.

Integrated programmable logic controller (PLC)
This feature set of the Cat ECS 100 allows the user to create custom logic functions in similar fashion to that of the capability of a PLC controller. These logic functions allow for increased capability of the Cat ECS 100 through interaction and control of internal signals within the control software as well as the programmable inputs/outputs of the device.

Programmable kW relay
The Cat ECS 100 includes three programmable kW relay outputs configured based on the % kW of the generator set. The configurable set points of the kW relay include: trigger condition, percentage threshold, hysteresis percentage and trip activation & deactivation delay time. These output functions may also be used to trigger events, recordable within the event log and included in the remote monitoring of the generator set.

Real-time clock
The real-time clock allows for date and time stamping of diagnostics and events in the control's logs as well as service maintenance reminders based on engine operating hours or calendar days.

Diagnostic System and Status Event Logs
Up to 40 unique diagnostic events (e.g., warnings, shutdowns, etc.) are stored in the non-volatile memory. It also allows for the creation of a status event log. This log holds the last 500 control events such as Engine Control Switch Position, Remote Initiate, Load Shed, etc. Events are stored in a "first in, first out" strategy.

Programmable cycle timer
The programmable cycle timer (PCT) feature allows for programming of seven independent times, when tasks (called PCT outputs), will be activated or deactivated automatically during the week. This is useful for exercising generator sets, or cases where two or more generators are required to automatically share the duty of supplying a load throughout the week. Using the PCT, each generator set can be programmed to start and stop at pre-set times. The PCT can handle a seven-day sequence with seven independent starts happening one or more times each week. Each of the seven timers has the following set points: activation day of the week,
activation start time, active time and includes three (3) independent activation outputs.

Real (kW) load histogram
The Cat ECS 100 is equipped with a real (kW) load histogram. This feature keeps track of the amount of time the generator percent kW is within certain predefined ranges. The ranges monitored are in 10% steps (0 to <10%, 10% to <20%, …, 90% to 100%).

HMI Webserver
The Cat ECS 100 HMIs include an embedded web server. The embedded web server allows the operator to operate a virtual HMI with the same control and permissions as the host HMI (local or remote, if applicable) over an Ethernet connection to a local and/or remote station. Custom screen creation is also available. Each HMI webserver is independent.

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Cat® Energy Control System 100

Optional Modules

Off Package HMI

The Cat ECS 100 supports up to four (4) optional full function off package HMI displays with the addition of an unmanaged Ethernet switch. The interactive 203 mm (8”) color touchscreen graphical interface serves to display generator set system alarm conditions, status indications and annunciation (with RCA output) to meet NFPA110 (subject to local authority having jurisdiction approval).



RS-485 Remote Annunciator

The remote RS-485 annunciator serves to display genset system alarm conditions and status indications for 16 points with a standard NFPA 99 & 110 label. The annunciator has been designed for use on the long-distance annunciator datalink and may be used off package up to 1220m (4000 feet) applications. A maximum of four (4) annunciators may be used with a Cat ECS 100.

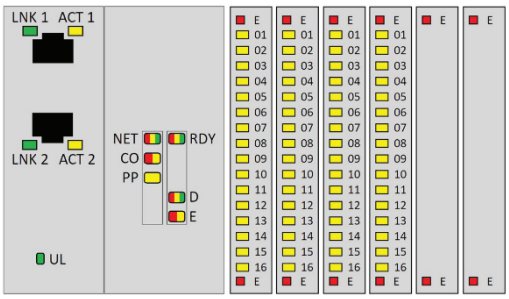
See LEHE21395.



Expansion Input/Output Ethernet Modules

- Supports expanded Inputs/Outputs (IO) capability of the Cat ECS 100 control:
  - Analog & digital I/O
  - Temperature sensing (RTD)
- Configure I/O for any event (read & write function)
- Package mounted and/or ship loose options

See LEHE22466



Optional Modules*(continued)*

Digital Input/Output Module

The Digital Input/Output (DI/O) module serves to provide expandable Input and Output for any event and is capable of reading 12 discrete inputs to trigger system events and setting 8 relay outputs based on system events. The DI/O module has been designed for use on the accessory communication network and may be used in either local (package mounted) or off package up to 244 m (800 feet) applications. A maximum of four DI/O modules may be used with a Cat ECS 100.

See LEHE21394



RTD Module

The RTD module serves to provide expandable generator temperature monitoring capability of the Cat ECS 100 control system and is capable of reading up to eight 2-wire, 3-wire and 4-wire RTD inputs. The RTD Module has been designed for use on the accessory communication network and may be used in either local (package mounted) or off package up to 244 m (800 feet)applications. A maximum of one RTD Module may be used with a Cat ECS 100.

See LEHE21396



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Cat® Energy Control System 100

Dimensions

Package-Mounted or Ship Loose (with harness)

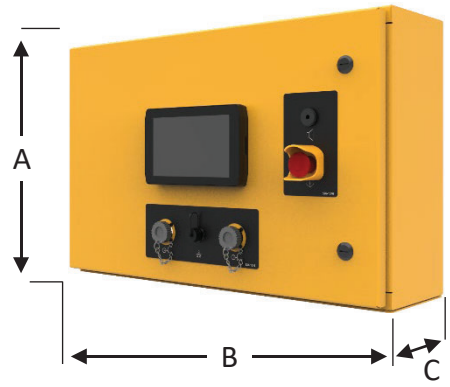


Image shown may not reflect actual configuration.

Dimensions				
Control Box Dimensions	A	B	C[3]	Weight
Units	mm (in)	mm (in)	mm (in)	kg (lbs)
Cat ECS 100	515 (20.28)	794 (31.27)	273 (10.73)	43 (95)

[3] - Dimension including E-Stop button is 263 mm (10.35 in).

Worldwide Product Support
Cat dealers have over 1,800 dealer branch stores operating in 200 countries and offer extensive post-sale support including maintenance and repair agreements

Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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www.cat.com/electricpower

LEHE20708-05 (05/24)

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WIRING DIAGRAM

CIRCUIT BREAKERS



Picture shown may not reflect actual configuration

Molded Case and Insulated Case Circuit Breakers:

C27-C175 North America built packages (50/60Hz)

L-Frame
400A (UL)

P-Frame
800-1200A (UL)

R-Frame
1600-3000A (UL)

NS-Frame
1600-3200A (IEC)

NW-Frame
1200-5000A (UL), 1600-5000A (IEC)

Features

- Moisture and fungus protection
- Clear indication of breaker status
- Reinforced insulation
- Shunt trip
- Auxiliary contacts
- Load side extension bars
- Maintenance-free operation
- Exceptional characteristics under short-circuit conditions
- Adjustable trip settings

NS-Frame

- Federal Specification W-C-375B/GEN
- NEMA AB1
- UTE, VDE, BS, CEI, UNE

Conformity with International Standards

Circuit Breakers have been designed to comply with the international standard IEC 60947-2 as well as these other major standards:

L-Frame
UL 489
CSA 22.2 No 5
Federal Specification W-C-375B/GEN
NEMA AB1
NMX J-266
CCC
CE Marking

P-Frame & R-Frame
UL 489
IEC Standard 60947-2
CSA 22.2 No 5-02
Federal Specification W-C-375B/GEN
NEMA AB1
NMX J-266
UTE, VDE, BS, CEI, UNE

NW-Frame
UL 489
NEMA AB1
CSA 22.2 No. 5096
NMX J-266-ANCE
ANSI C37.13, C37.16, C37.17, C37.50
UL 1066 (cULus Listed)
NEMA SG3

Standard Features

Standards

- UL-CSA
  - L-Frame
  - P-Frame
  - R-Frame
  - NW-Frame
- IEC
  - NS-Frame

Shunt trip

- The shunt trip provides a means of tripping the circuit breaker electronically
- Shunt trip ratings
- Voltage: 24VDC
- Coil Burden (Holding/Inrush): 4.5/200 VA
- Power Consumption: 4.5 VA

Auxiliary contacts

The auxiliary contacts provide a means of remote circuit breaker position indication and consists of (1) Form C Contact (1 Normally open and 1 Normally closed contact) with the following current ratings:
6A @ 240-480 VAC, 50/60Hz

Trip units

All circuit breakers come equipped with True RMS Current Sensing.
The trip units for each of the circuit breaker ratings sample the current waveform to provide true RMS protection through the 15th harmonic. This true RMS sensing gives accurate values for the magnitude of a nonsinusoidal waveform. Therefore, the heating effects of harmonically distorted waveforms are accurately evaluated.
The trip system comes equipped with a set of current transformers (CT's) to sense current, a trip unit to evaluate the current, and a tripping solenoid to trip the circuit breaker.
Additionally, each trip unit comes equipped with Active Thermal Imaging which is active 20 minutes before and after tripping.

Customer cable connections

Connections include bus for installation flexibility.

Optional Features

Electrically-operated Circuit Breakers

Circuit breakers that are electrically-operated come with a two-step stored energy mechanism and come standard with a motor assembly. Motor assemblies provide on and off control from remote locations.
These assemblies contain a spring-charging motor, a shunt trip, and shunt close.
Motor Assembly Voltage Rating: 24-30VDC

Undervoltage trip

Undervoltage trip option trips the circuit breaker when the voltage drops to a value between 35% and 70% of the control voltage.
An attempt to close the circuit breaker when the UV is not energized produces no movement in the main contacts.
Closing is allowed when the supply voltage of the UV trip reaches 85% of the rated voltage.

- Voltage Rating: 24-30VAC/VDC
- Operating Threshold:
  - Opening: 0.35 to 0.7Vn
  - Closing: 0.85 Vn
- Power Consumption: 4.5VA
- Circuit Breaker Response Time at Vn: 50ms +/- 10

Circuit Breakers Table (Continued)

Cat® Part Number	Frame and Rating (Amps)	IEC/UL	No. Poles	Operation	Trip Unit	Circuit Breaker Characteristics	Options	Instantaneous Override (kA RMS) +/- 10%
2449889	2500A NW-Frame ICCB	IEC	4P	EO	6.0P LSIG-P	Table 5	4 Aux Contact, Shunt Trip, Modbus	–
2449890	2500A NW-Frame ICCB	UL	3P	EO	5.0A LSI	Table 8	4 Aux Contact, Shunt Trip	65
2449891	2500A NW-Frame ICCB	UL	3P	EO	6.0A LSIG	Table 8	4 Aux Contact, Shunt Trip	65
2449893	2500ANW-Frame ICCB	UL	3P	EO	6.0P LSIG-P	Table 8	4 Aux Contact, Shunt Trip, Modbus	65
2449919	2500A R-Frame MCCB	UL	3P	MO	5.0A LSI	Table 6	1 Aux Contact, Shunt Trip	57
2449920	2500A R-Frame MCCB	UL	3P	MO	6.0A LSIG	Table 6	1 Aux Contact, Shunt Trip	57
2449921	2500A R-Frame MCCB	UL	3P	MO	6.0H LSIG-H	Table 6	1 Aux Contact, Shunt Trip, Modbus	57
2449922	2500A R-Frame MCCB	UL	3P	MO	6.0P LSIG-P	Table 6	1 Aux Contact, Shunt Trip, Modbus	57
2449995	2500A R-Frame MCCB	UL	3P	MO	5.0P LSI-P	Table 6	1 Aux Contact, Shunt Trip, Modbus	57
2449998	2500A NW-Frame ICCB	UL	3P	EO	5.0P LSI-P	Table 8	4 Aux Contact, Shunt Trip, Modbus	65
3853418	2500A R-Frame MCCB	UL	3P	MO	5.0A LSI	Table 9	1 Aux Contact, Shunt Trip	48
3853425	2500A R-Frame MCCB	UL	3P	MO	6.0A LSIG	Table 9	1 Aux Contact, Shunt Trip	48

Circuit Breakers Characteristics (Continued)

Model			R-Frame
Number of Poles			3
Rated Current (Amps)			1600-3000A (UL)
Voltage Rating (VAC)			600UL/ 690 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	65
		480V	35
		600V	18
IEC 60947-2 Rating (50/60Hz) - kA RMS	Icu	240V	50
		380/415V	35
	Ics	240V	25
		380/415V	20

Table 6

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		1200-2000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	65
	480V	65
	600V	50

Table 7

Model		NW-Frame
Number of Poles		3 & 4
Rated Current (Amps)		2500-5000A (UL)
Voltage Rating (VAC)		600UL
Interrupt Rating (UL/CSA) (60Hz) - kA RMS	240V	100
	480V	100
	600V	85

Table 8

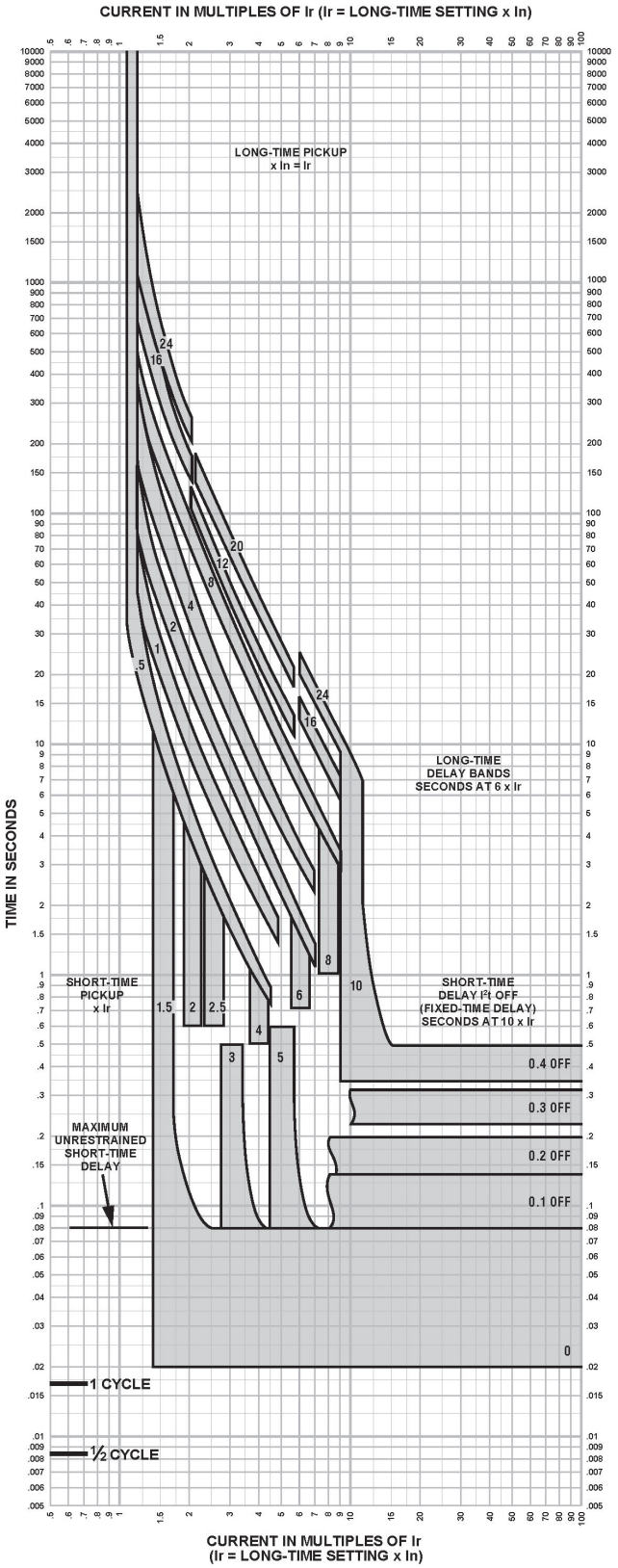
Model			R-Frame
Number of Poles			3
Rated Current (Amps)			1600-3000A (UL)
Voltage Rating (VAC)			600UL/ 690 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	100
		480V	65
		600V	25
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	50
	Ics	240V	35
		380/415V	25

Table 9

Model			L-Frame
Number of Poles			3
Rated Current (Amps)			400A (UL)
Voltage Rating (VAC)			600UL/ 525 IEC
Interrupt Rating (UL/CSA) (60Hz) - kA RMS		240V	65
		480V	35
		600V	18
IEC 647-2 Rating (50/60Hz) - kA RMS	Icu	240V	65
		380/415V	35
	Ics	220V	65
		380/415V	35

Table 10

P, R, NS-Frame Long-Short Trip Curve and NW-Frame Long-Short Trip Curve



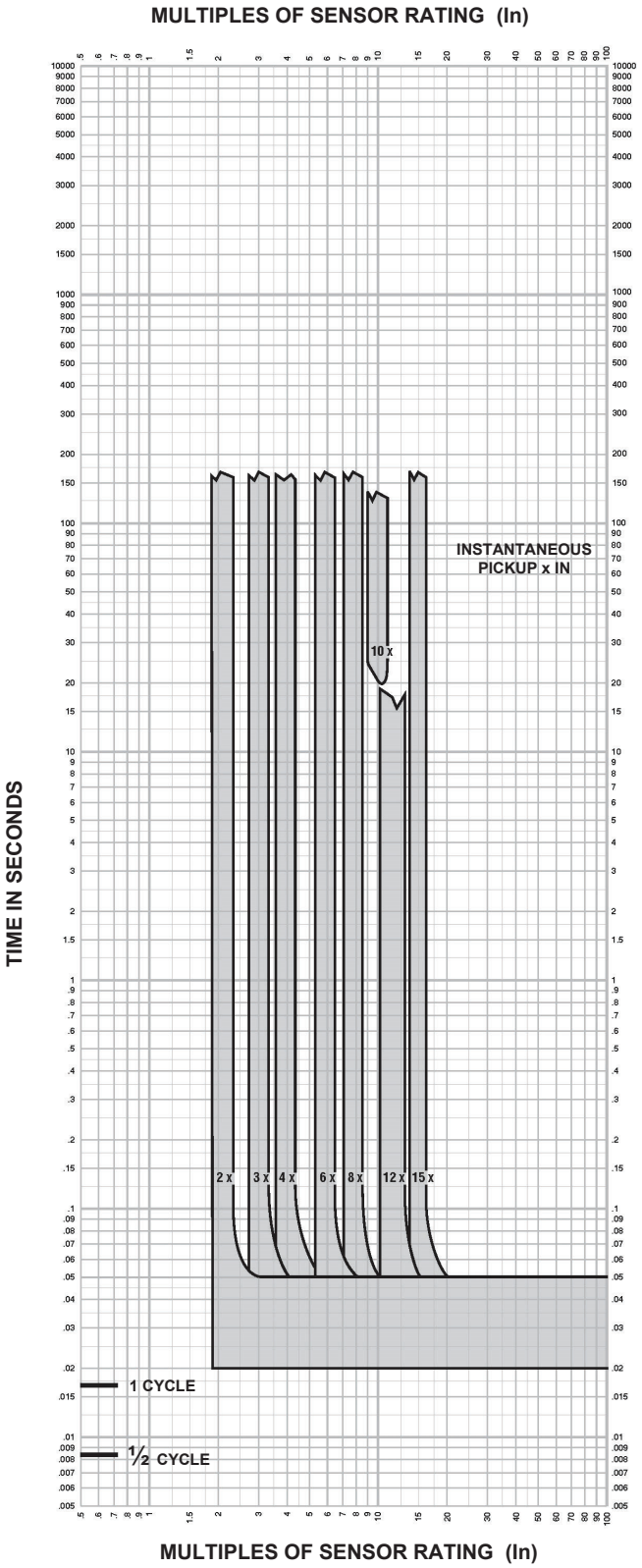
Long-time Pickup and Delay Short-time Pickup and I²t OFF Delay

The time-current curve information is to be used for application and coordination purposes only. Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermalimaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See Page 22 for instantaneous trip curve. See tables on pages 03-18 for instantaneous override values..
6. Overload indicator illuminates at 100%.

P, R, NS-Frame Instant Curve and NW-Frame Instant Trip Curve



Instantaneous Pickup 2x–15x and OFF

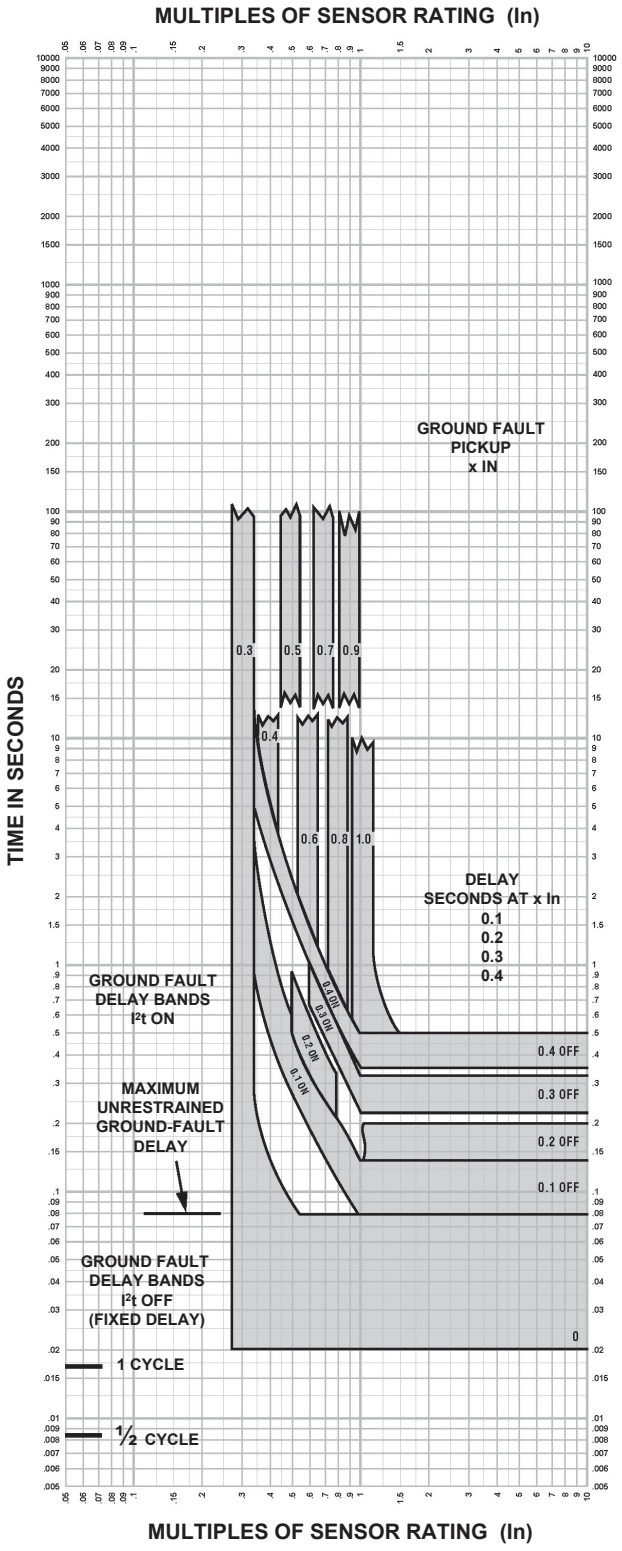
The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

Notes:

1. The end of the curve is determined by the interrupting rating of the circuit breaker.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
4. For a withstand circuit breaker, instantaneous can be turned OFF. See tables on pages 03-18 for instantaneous override values.
5. See page 22 for long-time pickup, long-time delay, short-time pickup, and short time delay trip curves.

P, R, NS-Frame Gound Curve and NW-Frame Ground Fault Trip Curve



Ground-fault I^2t OFF and ON In ≤ 400 A

The time-current curve information is to be used for application and coordination purposes only.

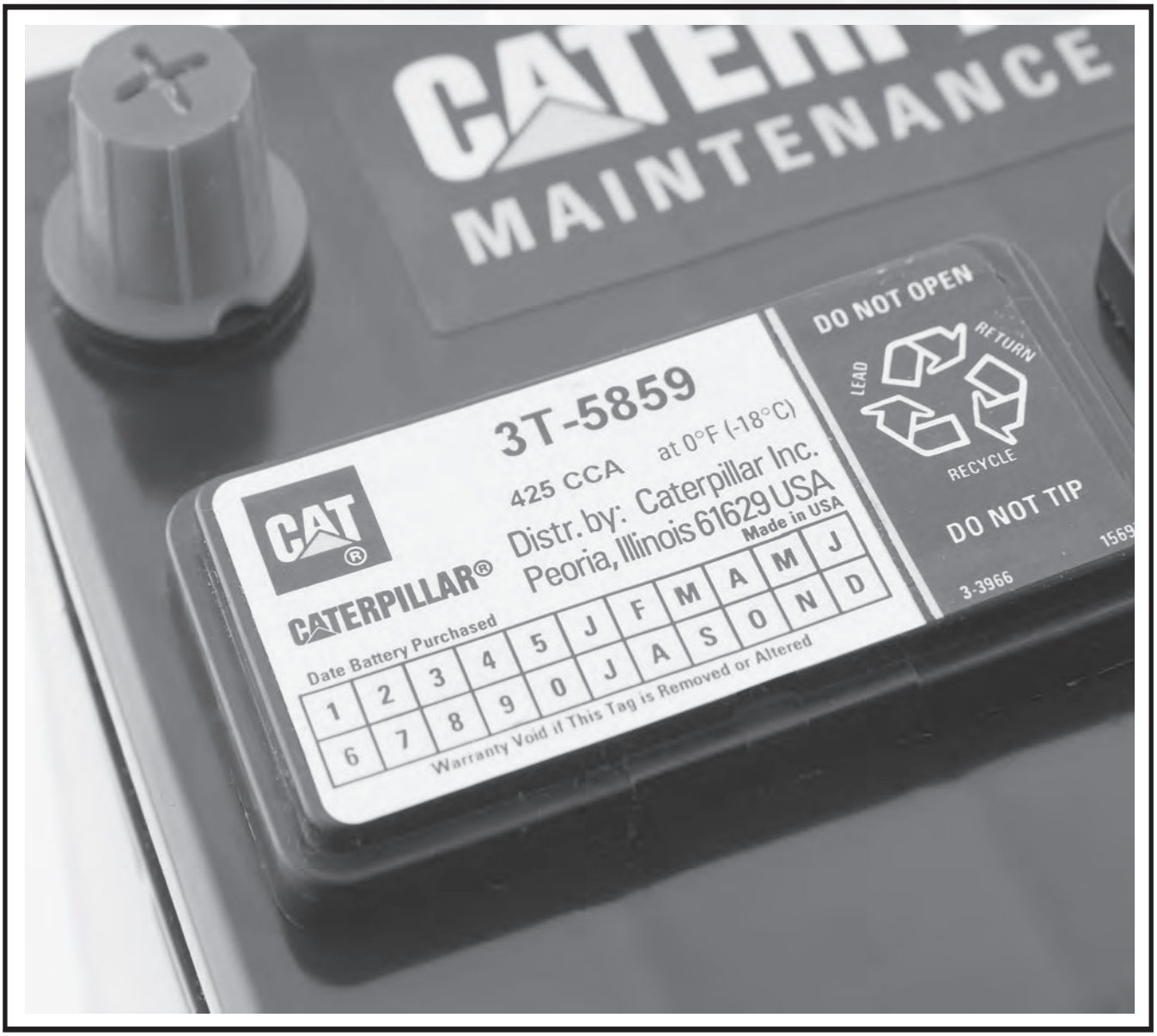
Curves apply from -30°C to +60°C ambient temperature.

Materials and specifications are subject to change without notice.
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ANCILLARY EQUIPMENT


CAT


MAINTENANCE
DO NOT OPEN
LEAD
RETURN
RECYCLE
DO NOT TIP
3T-5859
425 CCA at 0°F (-18°C)
Distr. by: Caterpillar Inc.
Peoria, Illinois 61629 USA
Made in USA
CAT
CATERPILLAR®
Date Battery Purchased
1 2 3 4 5 J F M A M J
6 7 8 9 0 J A S O N D
Warranty Void if This Tag is Removed or Altered
3-3966

Cat Battery Specifications

General Information

Premium High Output - Maximum Vibration Resistance

– Vibration Resistance-five times the Industry Standard

– Exclusive “flat top” BCI group 4D & 8D batteries are Maintenance Free and have the industry’s highest cold cranking amps (CCA)

– Popular BCI group 31 Maintenance Free batteries with industry leading cold cranking amps...up to 1000 (CCA), for electric power, machine or on-highway truck and bus applications. Deep cycle models are available for truck, marine and recreational usage

Specifications for Cat Premium High Output Batteries-Available Worldwide

BCI Group Size	Part No.	CCA ≈	RC Mins †	Volts	Amp Hr. Capacity @ 20 Hrs.	Construction Notes	Accessiblity - Fluid Level Check Hours	BCI Overall Dimensions			Nominal Weight		Nominal Acid to Fill Qt (liter)
								Length In (mm)	Width In (mm)	Height In (mm)	Wet Lb (kg)	Dry Lb(kg)	
8D	153-5720	1500	465	12	210	C/MFA	A - 1000	20.5 (520)	10.8 (275)	9.8 (248)	132 (59.9)	-	-
8D	101-4000	1400	400	12	190	LAC+	A - 1000	20.8 (527)	11.0 (278)	9.8 (248)	132 (59.9)	86 (39.0)	18.0 (17.0)
4D	153-5710	1400	425	12	200	C/MFA	A - 1000	20.5 (520)	8.6 (218)	9.8 (248)	119 (54.0)	-	-
4D	9X-9730	1300	400	12	190	LAC+	A - 1000	20.8 (527)	8.6 (218)	9.8 (248)	120 (54.0)	81 (36.8)	14.8 (14.0)
4D	153-5700	1125	305	12	145	C/MFA	A - 1000	20.5 (520)	8.6 (218)	9.8 (248)	101 (45.8)	-	-
4D	9X-9720	1000	275	12	140	LAC+	A - 1000	20.8 (527)	8.6 (218)	9.8 (248)	102 (45.8)	59 (26.8)	15.9 (15.0)
31	175-4390	1000	180	12	90	C/MFA/S	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	60 (27.2)	-	-
31	175-4370	825	190	12	100	C/MFA/S**	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	61 (27.2)	-	-
31	175-4360	710	185	12	100	C/MFA/S***	A - 1000	12.9 (329)	6.8 (172)	9.3 (236)	62 (28.1)	-	-
31/30H	115-2422	1000	170	12	90	C/MFA	A - 1000	12.9 (329)	6.8 (172)	9.5 (241)	63 (28.6)	-	-
31/30H	115-2421	950	170	12	90	C/MFA+	A - 1000	12.9 (329)	6.8 (172)	9.5 (241)	64 (29.1)	44 (20.0)	6.6 (6.2)
31/30H	9X-3404[1]	950	165	12	95/100	C/MF	NA	13.0 (331)	6.8 (172)	9.5 (241)	58 (26.3)	-	-
31/30H	3T-5760	750	165	12	95/100	C/MF	AV - 1000	13.0 (331)	6.8 (172)	9.5 (241)	56 (25.4)	-	-
65	230-6368	880	140	12	70	C/MF	NA	11.9 (304)	7.5 (191)	7.5 (191)	46 (20.9)	-	-
24	153-5656	650	110	12	52	C/MF	NA	11.0 (279)	6.9 (174)	9.0 (229)	39 (17.7)	-	-

Construction Notes:

Batteries use SAE taper post design and are shipped wet except as:

LAC = Low Maintenance - Hybrid Construction
C = Calcium Lead Alloy Grid Design
MF = Maintenance Free Non-Accessible
MFA = Maintenance Free Accessible
A = Accessible
NA = Non-Accessible
AV = Accessibily Varies - Accessiblity varies depending on supplier used. If it has caps, it is accessible and fluid levels should be checked.

S = Stud Terminals
+ = Shipped Dry Only
* = Side Terminals Only
** = Starting and Deep Cycle Battery
*** = Deep Cycle and Starting Battery
≈ = Cold Cranking Amps for 30 seconds at 0° F (-18° C)
† = Reserve Capacity Minutes minimum of 25 amp output at 80° F (27° C)
SDT = Dual, Top mounted Terminals - Stud and SAE Post. Marine Deep Cycle/ Starting Battery

Rugged Design-Built Tough-Reliable Starting

– Positive and negative plates are anchored to container bottom and locked at the top of celnelement for maximum vibration resistance.

– Heavy-duty forged terminal post bushings provide maximum strength and resistance to acid seepage.

– Hefty full-frame grids, no sharp edges, optimum acid/paste combination provides better charge acceptance after deep discharge.

– Manifold vented cover with built-in Flame Arrestor...a safety feature that directs corrosive gases away from the battery and holddowns.

– Thick, robust container resists rugged treatment typical of heavy-duty commercial use. Embossed part number & descriptors for easy serviceability.

1 not available in US

Battery Charger

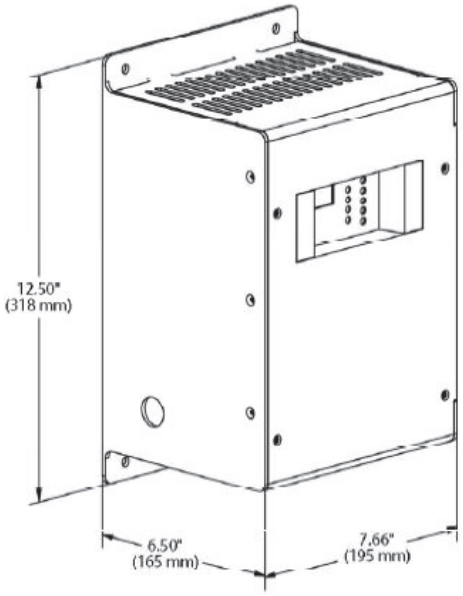


Image Shown may not Reflect Actual Package.

UL 10 Amp

Battery Charger

This battery charger offers accurate, automatic charging of lead-acid and nickel cadmium batteries. The output voltage automatically adjusts to changing input, load, battery and ambient conditions. This prevents battery over-charging and consequent loss of battery electrolyte.

Standard features include AC line compensation, precision voltage regulation, current limiting, automatic 2-rate charging, voltmeter and ammeter, temperature compensation and UL Listing.

The user interface is easy to understand with digital metering, NFPA 110 alarms and a battery fault alarm.

Features

- Electronically current limited at 105% of rated output
- Alarm system
- Digital display
- Lightning and voltage transient protection
- Protection of connected equipment against load dump protection
- Constant voltage, current limited, 4-rate automatic equalization
- IP 20 housing
- Temperature compensation
- On board temperature sensor with remote port
- Auto AC line compensation
- Output regulated by sensed battery voltage

Standards

- C-UL listed to UL 1236
- NFPA 70, NFPA 110
- CSA 22.2 No 107 certified
- CE DOC to EN 60335
- IBC Seismic Certification

Battery Charger

Specifications

Input supply	110 – 120 V 208 – 240 V
AC and DC fuses	2 input and 2 output)
Output voltage	24V
Output amps	10
Frequency	50 / 60 Hz
Operating temperature	-20°C (-4°F) to +60°C (140°F)
Housing constructed of rustproof anodized Aluminum	

Dimensions			
Width	Depth	Height	Weight
195 mm (7.66 in)	165 mm (6.5 in)	318 mm (12.5 in)	10.4 kg (23 lb)

NFPA 110 alarm package as follows:

- AC on Green led (indication)
- AC fail Red led and form C contact (2A)
- Float mode LED
- Fast charge LED
- Temp comp active LED
- Low battery volts Red led and Form C conta
- High Battery Volts Red led and Form C conta
- Charger fail Red led and Form C conta
- Battery fault Red led and Form C conta
- Battery disconnected
- Battery polarity reversed
- Mismatched charger battery voltage
- Open or high resistance charger to battery connection
- Open battery cell or excessive internal resistance

Feature Codes:

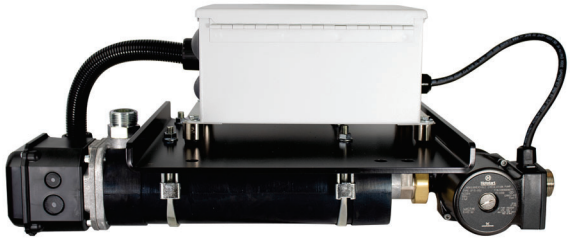
BTC1024 BTC1028 BTC1035 BTC1025 BTC1032

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LEHE0141-05 (02/19)



Picture shown may not reflect actual configuration

JACKET WATER HEATER With Pump

Diesel Gensets: 3512, 3516 and C175-16
Gas Gensets: G3412, G3512 and G3516

Caterpillar offers a factory-installed jacket water heater for improved cold-starting capability.

The Jacket Water Heater is a complete coolant preheater with thermostat, pump and all required controls. Forced circulation of the coolant delivers uniform heating throughout the entire engine, reduces wear from cold spots and offers a significant reduction in electrical consumption.

The Jacket Water Heater operates automatically when provided contacts are supplied with a 24 Volt DC signal from the engine.

FEATURES

- Factory Installed
- Complete with hoses, thermostat and pump
- Base frame mounting minimizes engine induced vibration
- Automatically disconnected when engine is running via the generator jacket water heater relay
- Supplied with UL recognized components
- Standard thermostat is factory preset to 54°C (130°F)
    - Optional High Temperature thermostat is available with factory preset to 71°C (160°F)

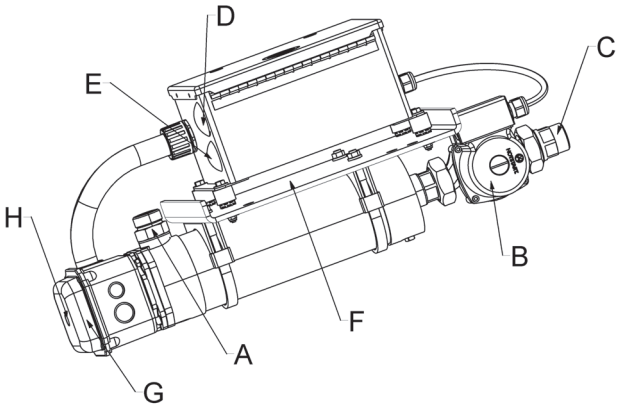
HEATER DESIGN DESCRIPTION

The jacket water heater package is designed to efficiently pre-heat the engine by heating and circulating the engine's coolant.
This design results in the following benefits

- Increase life of heater hoses, engine seals, and heating elements.
- Improve heat transfer efficiency from elements to engine coolant.
- More uniform engine temperature distribution.
- Application of a thermostat with a reduced thermal differential.
- Lower customer utility costs and increased heater reliability.
- Heater thermostat's setpoint is preset from the factory.

HEATER OPERATION/WIRING

A 38 L/pm (10 gpm) pump is located at the heater inlet to push the coolant through the heater.
A fixed thermostat is located inside Element enclosure box, near the outlet of the heater and responds to the temperature of the coolant inside the tank. The figure below shows the general heater design.



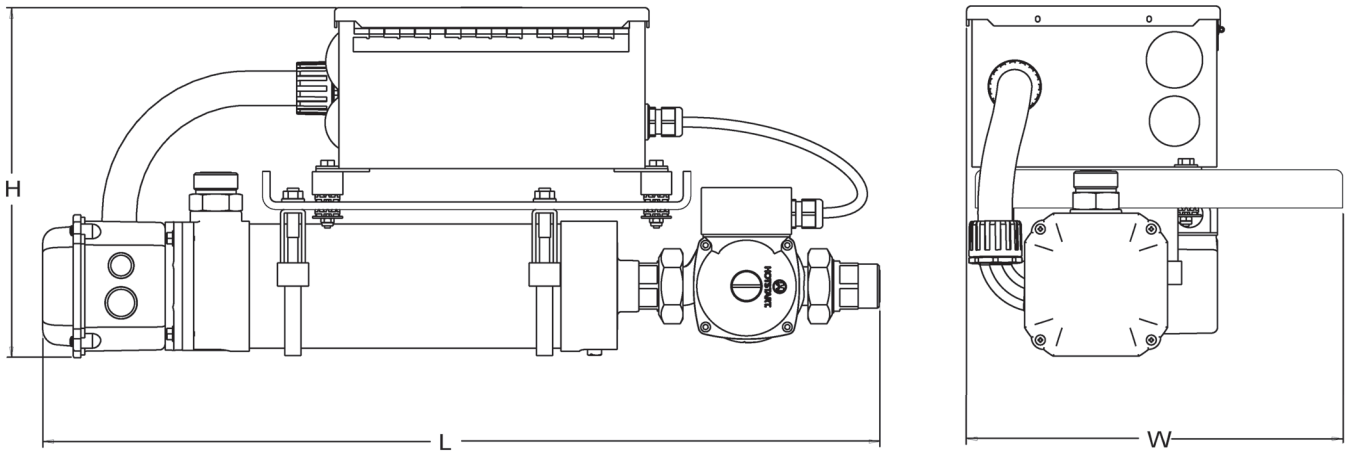
A. Discharge port
B. Pump/motor
C. Suction Port
D. Power Wiring Entrance
E. Control Wiring Entrance
F. Mounting base
G. Element assembly
H. Thermostat

SPECIFICATIONS

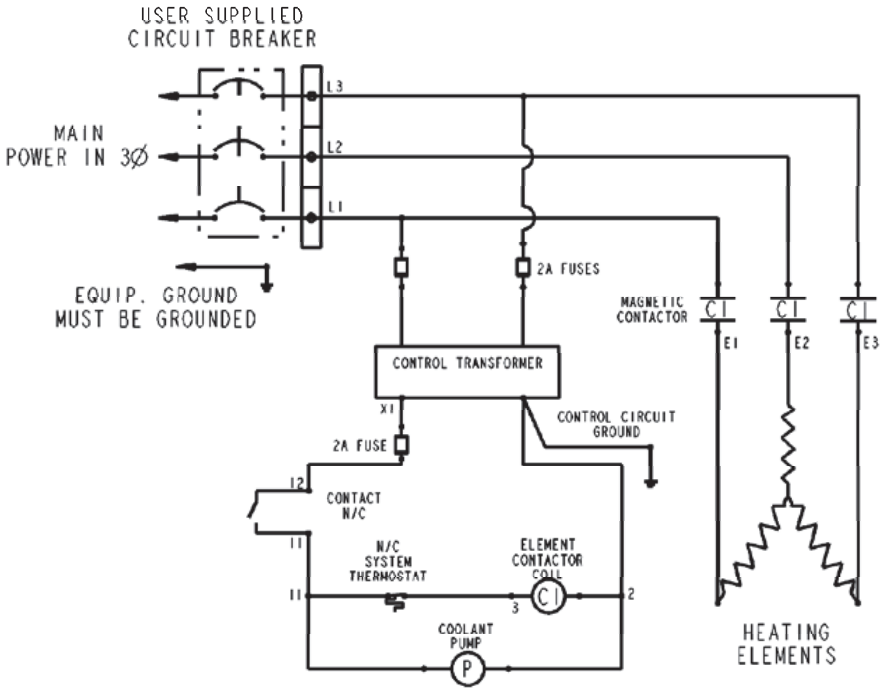
Voltage (VAC)	480	400*	240	220	208
Fixed Thermostat (Standard)	38°C - 54°C (100°F - 130°F)				
Power (with Standard Thermostat)	9 kW / 12 kW	9 kW / 12 kW	9 kW / 12 kW	9 kW	9 kW / 10.5 kW
Amperage (with Standard Thermostat)	10.8 A / 14.4 A	13.0 A / 17.4 A	37.5 A / 50.0 A	40.9 A	43.3 A / 50.5 A
Fixed Thermostat (High Temperature)	60°C - 71°C (140°F - 160°F)				
Power (with High Temperature Thermostat)	9 kW / 12 kW	9 kW	9 kW / 12 kW	9 kW / 12 kW	9 kW / 10.5 kW
Amperage (with High Temperature Thermostat)	10.8 A / 14.4 A	13.0 A	37.5 A / 50.0 A	40.9 A / 54.5 A	43.3 A / 50.5 A
Frequency	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Phase	Three Phase		Single Phase		
Flow Rate	38 LPM (10 GPM)				
Pump Power	97 W	95 W	97 W	95 W	97 W
Length (L)	695 mm (27.4")				
Width (W)	312 mm (12.3")				
Height (H)	291 mm (11.4")				
Weight	24.0 kg (52.8 lbs)	24.2 kg (53.4 lbs)	21.5 kg (47.5 lbs)	21.4 kg (47.2 lbs)	24.2 kg (53.4 lbs)

*Only available with diesel gensets

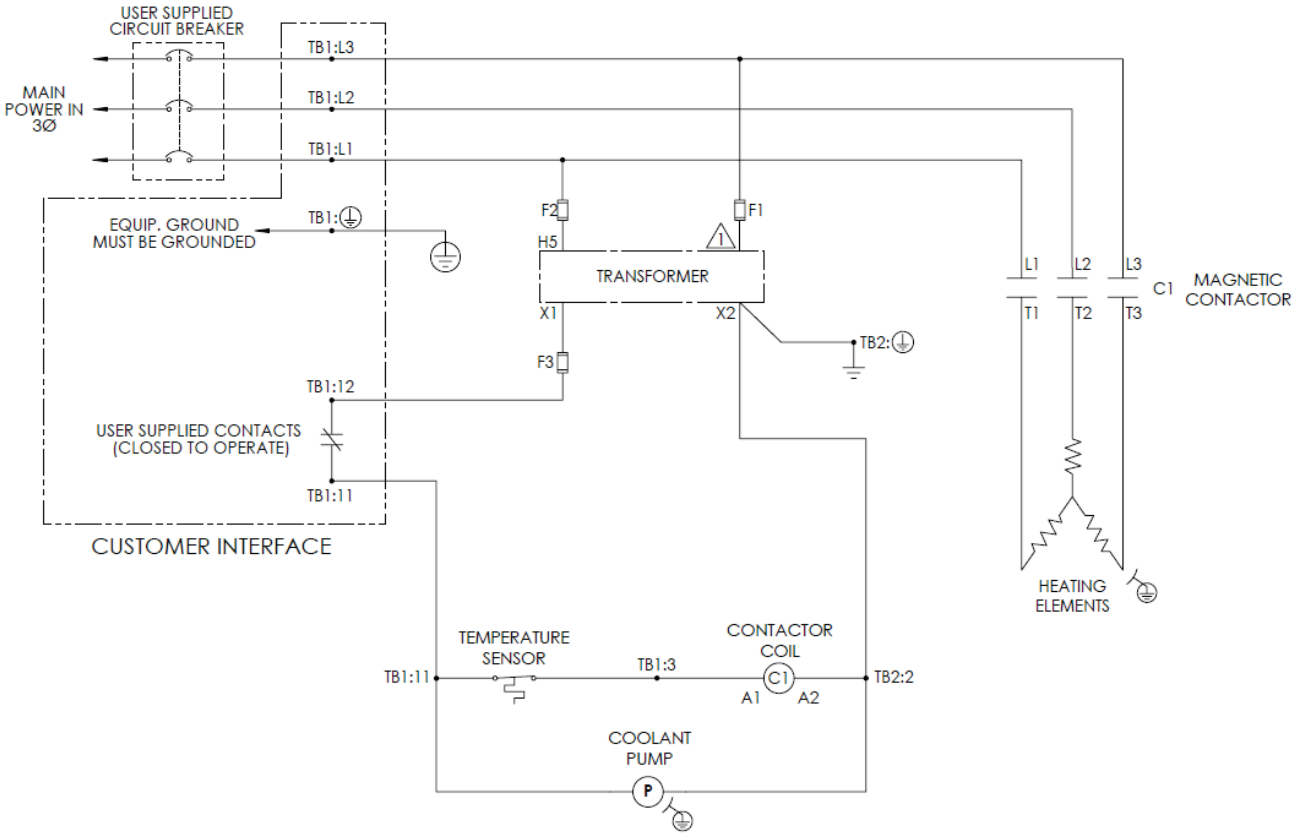
GENERAL DRAWING



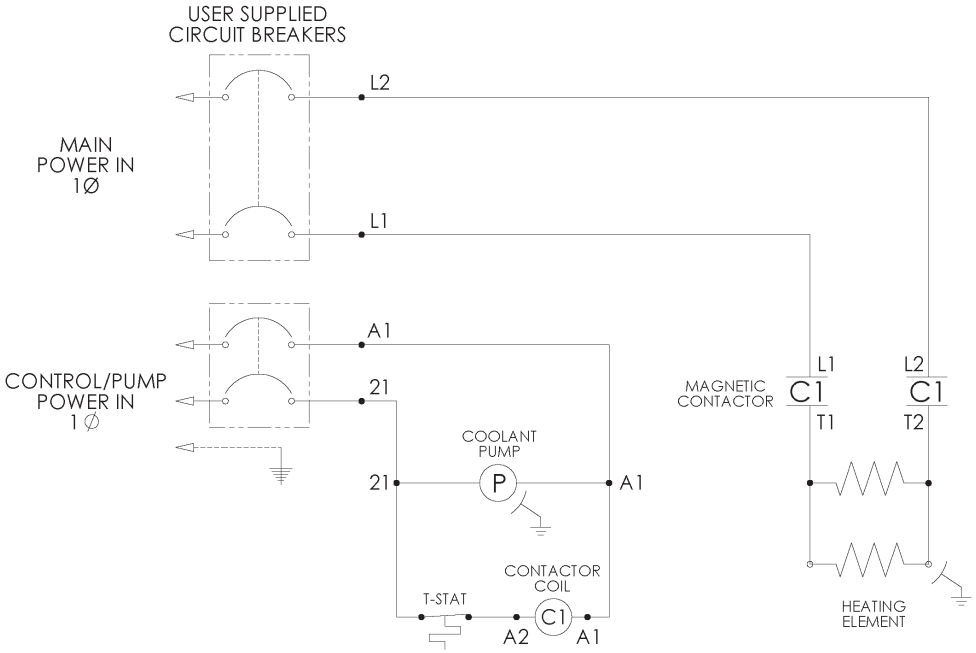
Wiring Diagram - 480 V Three Phase JWH (9 kW and 12 kW Heating Systems)



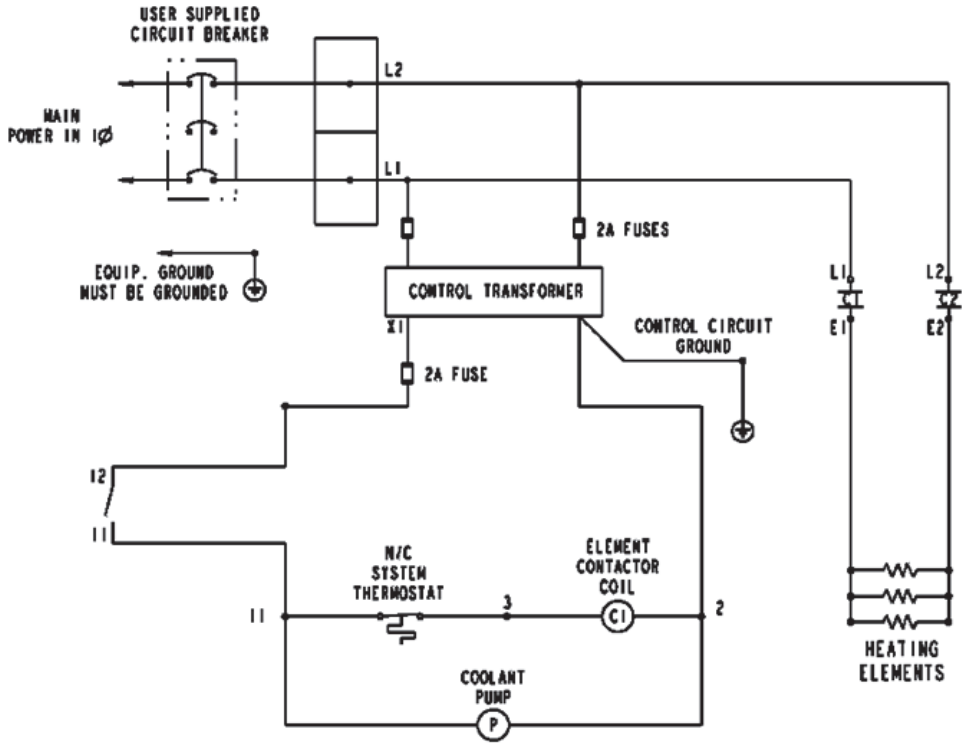
Wiring Diagram - 400 V Three Phase JWH (9 kW and 12 kW Heating Systems)



Wiring Diagram - 208, 220 and 240 V Single Phase JWH (9 kW Heating Systems) and 240 V Single Phase JWH (12 kW Heating Systems)



Wiring Diagram - 208 V Single Phase JWH (10.5 kW Heating Systems)



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AUTOMATIC TRANSFER SWITCH

LOAD TEST

Generator Startup Checklist

POWER SYSTEMS DIVISION

Installation job site_____ Date: _____

Caterpillar—Olympian Model_____ Rating_____KW Standby----Prime

Engine S/N_____ Generator S/N_____ GenSet Pkg. S/N_____

ATS Model_____ ATS S/N_____

ATS Model_____ ATS S/N_____

✓	Check Points	Notes
	Lube system connections	
	Oil Level	
	Check fuel system connections	
	Check fuel system linkages	
	Check air filter	
	Check vent piping and connections	
	Check and adjust fan belts	
	Check anti-freeze—top as needed	
	Check remote components (if applicable)	
	Check radiator core and tanks	
	Check jacket water heater connections and operation	
	Check battery electrolyte level	
	Check cables, lugs, and terminals	
	Check battery charger and operation Make necessary connections	
	Check power connections	
	Check circuit breaker connections and operation	
	Check panel light operation	
	Check annunciator lights and alarms	
	Check remote annunciator connections (if equipped)	
	Connect control wiring as necessary	
	Check transfer switch operation	
	Check phase rotation	
	Adjust time delays as required	
	Check shutdowns and alarms	
	Check exhaust system	

ENGINE RUNNING

Oil pressure_____PSI Engine RPM_____ Freq_____AC Voltage_____
Battery Charging Volts (if applicable)_____ Volts Water Temp_____

Note additional comments:_____

_____

_____

I hereby confirm that the above generator set has been correctly installed at the above location.

Field Technician_____Signature_____

INSTALLATION GUIDELINES

RECOMMENDED INSTALLATION GUIDELINES

The following outline contains general requirements for successful installation of a generator set . The list is not meant to be a substitute for other and more specific installation guides by equipment manufacturers, but rather as a general guideline to the installing personnel.

Important! Prior to beginning installation, please reference the enclosed map and contact your Boyd representative. This is your contact person for installation related questions. This no-charge service will save time and money!

Storage of Equipment

All-equipment, especially generators, control panels, transfer switches, etc., should be stored in a clean, dry, and non-corrosive atmosphere between the time of arrival on the jobsite and final installation. Medium-voltage equipment has specific and stricter storage requirements.

Care should be taken in abnormal environments. IE equipment should be properly protected from the effects of chlorine atmosphere as is often encountered in water treatment plants, etc.

Concrete Pad

The concrete pad on which the generator set is mounted should be reinforced with steel mesh or bars. The pad depth should be calculated to support the generator set, the housing and all associated equipment. If the unit includes a base fuel tank, the weight of the fuel must be included.

It is recommended that the pad extend at least 12" beyond all sides of the enclosure.

Ventilation

Enclosure sides and rear must be located a minimum of 48" from any obstruction or wall to insure proper ventilation and permit all doors to be opened fully. Please consult a Boyd representative if more than one side of the enclosure will be in close proximity to an obstruction.

Radiator end should be located to allow proper clearance from any obstruction or wall so no recirculation of hot air or exhaust gases will occur. Units with horizontal radiator discharge generally require clearance equal to the length of the generator set.

When possible, position unit so that the prevailing winds blow from rear to front over the Generator, (generally from south-west to north-east) to help dissipate the hot gases.

OPEN UNITS – verify proper ventilation to provide proper combustion and cooling air flow for unit operation while maintaining ½" H_2O maximum restriction. *** A general rule of thumb – intake surface area should be 1.5X the discharge area of the radiator. This is a rule of thumb only and does not guarantee sufficient flow in all cases.*

Exhaust Piping

Engine exhaust should be directed up and away from the generator air intake Rain caps or weather guards are recommended on the exhaust outlet elbow. Again, the prevailing winds must be considered when locating the exhaust outlet.

Extreme care should be taken to ensure that engine exhaust is not drawn into the buildings intake air system.

OPEN UNITS – must be installed with a stainless flex pipe at the turbo. Care should be taken to prevent any weight bearing on the turbocharger.

Starting and Battery Groups

Jacket water heaters are required for all engine generator sets to ensure NFPA 99/110 starting requirements and to prolong equipment life.

Batteries should be sized to provide at least 60 seconds of cranking time at the minimum ambient temperature. Battery heating pads can be harmful to batteries and are not recommended. Modern battery chargers are temperature compensated and must be located in the same ambient temperature as the batteries. Heating pads may cause temperature compensated chargers to over-charge their batteries.

The battery manufacturer's recommendations should be followed for any battery installation in an outdoor enclosure. Nickel Cadmium batteries are not intended for and should not be used in outdoor enclosure installations.

Electrical Wiring for Package Generator Set and ATS

- *Transfer switch(es) may be energized prior to the arrival of Boyd personnel. Refer to the O&M manual (located inside of the switch) for instructions prior to energizing.*
- *Boyd Technicians will land/terminate control wiring for the generator set and ATS.*
- *A separate interconnect diagram is provided for wiring specifics.*

Power wiring must be connected to the generator by means of a flexible element. In case of an engine mounted generator control panel, it is important that no extra weight be imposed by the flexible conduit on control panel mounts.

Boyd will furnish standard lugs as shipped by the manufacturer, an adder will be charged for providing lugs other than those shipped by the factory.

DC Control Wiring and AC feeds can NOT be in the same conduit.

Shielded cables must be continuous without splices. All control wiring must be clearly marked on both ends prior to technician arrival.

Remote auxiliary/support equipment (IE; fuel tanks, day tanks, pumps, battery chargers, etc.) will require additional wiring. Consult the individual component sections of this submittal or contact your Boyd representative.

Care must be taken not to connect AC voltage to the DC control voltage. AC Circuits should be in separate conduit from all DC control circuits.

Installation & Pre-Start-Up and Start-Up Guidelines

Before factory authorized start-up can be initiated, the following must be completed:

By Installing Contractor

- Generator installed and AC (primary) connections pulled, landed, and properly torqued
    - In certain cases where a load bank test is required the Boyd representative may request that primary cables not be terminated prior to technician arrival
- AC auxiliary service wiring pulled. A Boyd technician will land the aux wiring during start-up. Wiring should be clearly identified/labeled and contractor should be prepared to energize aux service during start-up
- Fuel tanks (main and day) plumbed and filled
- Transfer switch installed with AC (primary) connections pulled, landed, and properly torqued. Utility source must be available during commissioning.
- Enclosure is cleaned and free of debris.
- All other auxiliary equipment needed to operate the generator set shall be installed. Consult with Boyd representative if in doubt.

Prior to a technician being dispatched your Boyd service representative will pre-inspect the project. Please contact your service representative, contact information is on the cover of this submittal.

By Boyd Cat Power Systems Sales Department Representative

- Pre-inspect all applicable systems / Meet with installing contractor if any corrections or additions are necessary.
- Prepare pre-inspection report and authorize dispatch of technician
- Check all fuel levels – verify diesel tanks are filled
- Verify all AC and DC wiring is pulled
- Inspect diesel fuel system – complete and proper installation
- Inspect air intake and exhaust systems.
    - Inspect air cleaner(s) to ensure proper storage (clean/dry)
    - Verify sufficient air-flow/ventilation for installation
- Discuss testing requirements with contractor / coordinate testing.
    - ATS testing requires outages to fed loads, we cannot complete and certify a start-up without transferring the ATS.
- Review project information with assigned technician

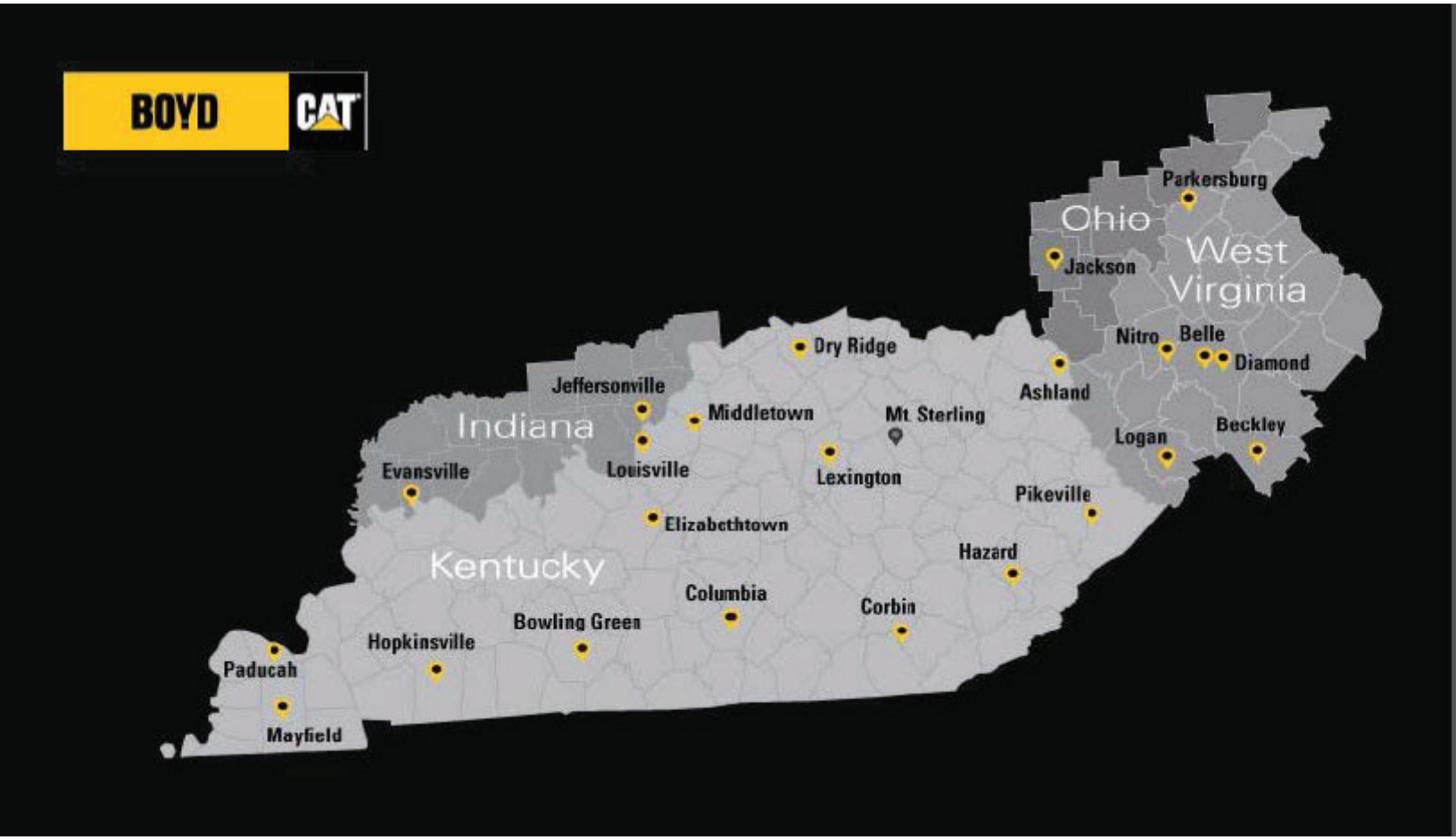
By Boyd Cat Technician

- Review submittal and testing requirements prior to job
- Land Gen/ATS/Annunciator control wiring
- Connect pre-charged batteries to engine or fill dry-batteries
- Land and energize shore-power (heater, charger, etc.)
- Start engine and check speed
- Check generator phase rotation against utility at the ATS
- Verify matched phase-phase and phase-neutral voltages

- Make sure automatic transfer switch operates correctly and is adjusted as job specifications requires
- Check all alarms, audible and visual
- Adjust the battery charger charge rate for the type of battery being used
- Check engine, cooling system and fuel system for leaks
- Check coolant protection level after running
- Set engine governors for proper operation if electronic or load share type.
- Perform load bank test or building load test as specified and maintain log if required
- Submit a copy of the factory start-up report for insertion into the branch service department history folder and have customer sign start-up report.

End-user instruction is normally provided by a Boyd Product Support Representative after completion of the start-up.

NOTE: If there are any questions regarding proper installation before, during, or after commissioning, please contact your Boyd Cat representative.


BOYD
CAT
Parkersburg
Ohio
West
Virginia
Jackson
Nitro
Belle
Diamond
Dry Ridge
Ashland
Jeffersonville
Middletown
Mt. Sterling
Indiana
Logan
Beckley
Evansville
Louisville
Lexington
Pikeville
Elizabethtown
Hazard
Kentucky
Columbia
Corbin
Bowling Green
Hopkinsville
Paducah
Mayfield

Effective with sales to the first user on or after December 1, 2010

CATERPILLAR LIMITED WARRANTY

Industrial, Petroleum, Locomotive, and Agriculture Engine Products and Electric Power Generation Products

Worldwide

Caterpillar Inc. or any of its subsidiaries ("Caterpillar") warrants new and remanufactured engines and electric power generation products sold by it (including any products of other manufacturers packaged and sold by Caterpillar), to be free from defects in material and workmanship.

This warranty does not apply to Caterpillar Motoren (CM) product; engines sold for use in on-highway vehicle or marine applications; engines in machines manufactured by or for Caterpillar; 3500 and 3600 Family engines used in locomotive applications; 3000 Family engines, C0.5 through C4.4 and ACERT (C6.6, C7, C7.1, C9, C9.3, C11, C13, C15, C18, C27, and C32) engines used in industrial applications; or Cat batteries. These products are covered by other Caterpillar warranties.

This warranty is subject to the following:

Warranty Period

- For new industrial engines, engines in a petroleum applications or Petroleum Power Systems, or engines in a Locomotive application, or Uninterruptible Power Supply (UPS) systems, the warranty period is 12 months after date of delivery to the first user.
- For Mobile Agricultural applications the warranty period is 24 months after date of delivery to the first user.
- For controls only (EPIC), configurable, and custom switchgear products, as well as automatic transfer switch products, the warranty period is 24 months after date of delivery to the first user.
- For electric power generation products in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For all Remanufactured Generator (GenEnds) products in prime or continuous applications the warranty period is 12 months. For standby applications the warranty period is 24 months/1000 hours. For emergency standby applications the warranty period is 24 months/400 hours. All terms begin after date of delivery to the first user.
- For all Remanufactured engines, the warranty period is 6 months (12 months for mobile agricultural and standby electric power generation applications) after date of delivery to the first user.

Caterpillar Responsibilities

If a defect in material or workmanship is found during the warranty period, Caterpillar will, during normal working hours and at a place of business of a Cat dealer or other source approved by Caterpillar:

- Provide (at Caterpillar's choice) new, Remanufactured, or Caterpillar approved repaired parts or assembled components needed to correct the defect.

Note: New, remanufactured, or Caterpillar approved repaired parts or assembled components provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product in which installed as if such parts were original components of that product. Items replaced under this warranty become the property of Caterpillar.

- Replace lubricating oil, filters, coolant, and other service items made unusable by the defect.
- Provide reasonable and customary labor needed to correct the defect, including labor to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems, if required.

For new 3114, 3116, and 3126 engines and electric power generation products (including any new products of other manufacturers packaged and sold by Caterpillar):

- Provide travel labor, up to four hours round trip, if in the opinion of Caterpillar, the product cannot reasonably be transported to a place of business of a Cat dealer or other source approved by Caterpillar (travel labor in excess of four hours round trip, and any meals, mileage, lodging, etc. is the user's responsibility).

For all other products:

- Provide reasonable travel expenses for authorized mechanics, including meals, mileage, and lodging, when Caterpillar chooses to make the repair on-site.

User Responsibilities

The user is responsible for:

- Providing proof of the delivery date to the first user.
- Labor costs, except as stated under "Caterpillar Responsibilities," including costs beyond those required to disconnect the product from and reconnect the product to its attached equipment, mounting, and support systems.
- Travel or transporting costs, except as stated under "Caterpillar Responsibilities."
- Premium or overtime labor costs.
- Parts shipping charges in excess of those that are usual and customary.
- Local taxes, if applicable.
- Costs to investigate complaints, unless the problem is caused by a defect in Caterpillar material or workmanship.
- Giving timely notice of a warrantable failure and promptly making the product available for repair.

(continue on the reverse side……..)

- Performance of the required maintenance (including use of proper fuel, oil, lubricants, and coolant) and items replaced due to normal wear and tear.
- Allowing Caterpillar access to all electronically stored data.

Limitations

Caterpillar is not responsible for:

- Failures resulting from any use or installation that Caterpillar judges improper.
- Failures resulting from attachments, accessory items, and parts not sold or approved by Caterpillar.
- Failures resulting from abuse, neglect, and/or improper repair.
- Failures resulting from user's delay in making the product available after being notified of a potential product problem.
- Failures resulting from unauthorized repairs or adjustments, and unauthorized fuel setting changes.
- Damage to parts, fixtures, housings, attachments, and accessory items that are not part of the engine or electric power generation product (including any products of other manufacturers packaged and sold by Caterpillar).
- Repair of components sold by Caterpillar that is warranted directly to the user by their respective manufacturer. Depending on type of application, certain exclusions may apply. Consult your Cat dealer for more information.

For products operating outside of Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

NEITHER THE FOREGOING EXPRESS WARRANTY NOR ANY OTHER WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED, IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXCEPT CATERPILLAR EMISSION-RELATED COMPONENTS WARRANTIES FOR NEW ENGINES, WHERE APPLICABLE. REMEDIES UNDER THIS WARRANTY ARE LIMITED TO THE PROVISION OF MATERIAL AND SERVICES, AS SPECIFIED HEREIN.

CATERPILLAR IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

For personal or family use engines or electric power generation products, operating in the USA, its territories and possessions, some states do not allow limitations on how long an implied warranty may last nor allow the exclusion or limitation of incidental or consequential damages. Therefore, the previously expressed exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary by jurisdiction. To find the location of the nearest Cat dealer or other authorized repair facility, call (800) 447-4986. If you have questions concerning this warranty or its applications, call or write:

In USA and Canada: Caterpillar Inc., Engine Division, P. O. Box 610, Mossville, IL 61552-0610, Attention: Customer Service Manager, Telephone (800) 447-4986. Outside the USA and Canada: Contact your Cat dealer.

For products operating in Australia, Fiji, Nauru, New Caledonia, New Zealand, Papua New Guinea, the Solomon Islands and Tahiti, the following is applicable:

THIS WARRANTY IS IN ADDITION TO WARRANTIES AND CONDITIONS IMPLIED BY STATUTE AND OTHER STATUTORY RIGHTS AND OBLIGATIONS THAT BY ANY APPLICABLE LAW CANNOT BE EXCLUDED, RESTRICTED OR MODIFIED ("MANDATORY RIGHTS"). ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED (BY STATUTE OR OTHERWISE), ARE EXCLUDED.

NEITHER THIS WARRANTY NOR ANY OTHER CONDITION OR WARRANTY BY CATERPILLAR, EXPRESS OR IMPLIED (SUBJECT ONLY TO THE MANDATORY RIGHTS), IS APPLICABLE TO ANY ITEM CATERPILLAR SELLS THAT IS WARRANTED DIRECTLY TO THE USER BY ITS MANUFACTURER.

TO THE EXTENT PERMITTED UNDER THE MANDATORY RIGHTS, IF CATERPILLAR IS THE SUPPLIER TO THE USER, CATERPILLAR'S LIABILITY SHALL BE LIMITED AT ITS OPTION TO (a) IN THE CASE OF SERVICES, THE SUPPLY OF THE SERVICES AGAIN OR THE PAYMENT OF THE COST OF HAVING THE SERVICES SUPPLIED AGAIN, AND (b) IN THE CASE OF GOODS, THE REPAIR OR REPLACEMENT OF THE GOODS, THE SUPPLY OF EQUIVALENT GOODS, THE PAYMENT OF THE COST OF SUCH REPAIR OR REPLACEMENT OR THE ACQUISITION OF EQUIVALENT GOODS.

CATERPILLAR EXCLUDES ALL LIABILITY FOR OR ARISING FROM ANY NEGLIGENCE ON ITS PART OR ON THE PART OF ANY OF ITS EMPLOYEES, AGENTS OR REPRESENTATIVES IN RESPECT OF THE MANUFACTURE OR SUPPLY OF GOODS OR THE PROVISION OF SERVICES RELATING TO THE GOODS.

CATERPILLAR IS NOT LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNLESS IMPOSED UNDER MANDATORY RIGHTS.

IF OTHERWISE APPLICABLE, THE VIENNA CONVENTION ON CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS IS EXCLUDED IN ITS ENTIRETY.

This warranty covers every major component of the products. Claims under this warranty should be submitted to a place of business of a Cat dealer or other source approved by Caterpillar. For further information concerning either the location to submit claims or Caterpillar as the issuer of this warranty, write Caterpillar Inc., 100 N. E. Adams St., Peoria, IL USA 61629.

PRODUCT SPECIFICATIONS FOR 3512C (60 HZ)

GENERATOR SET SPECIFICATIONS

Standby Rating	1500 ekW
Prime Power Rating	1360 ekW
Emissions/Fuel Strategy	U.S. EPA Certified
Voltage	380 to 13800 Volts
Frequency	60 Hz
Speed	1800 rpm
Duty Cycle	Standby, Mission Critical, Prime, Continuous
Maximum Rating	1500 ekW
Minimum Rating	1230 ekW

ENGINE SPECIFICATIONS

Engine Model	3512C ATAAC, V-12, 4-Stroke Water-Cooled Diesel
Bore	6.69 in
Stroke	7.48 in
Displacement	3161.03 in³
Compression Ratio	14.7:1
Aspiration	TA
Fuel System	Electronic unit injection
Governor Type	ADEM™ A3

GENERATOR SET DIMENSIONS

Length - Minimum	222.2 in
Length - Maximum	221.2 in
Width - Minimum	89.7 in
Width - Maximum	89.7 in
Height - Minimum	104.4 in
Height - Maximum	104.4 in
Dry Weight - Genset (minimum)	28971 lb
Dry Weight - Genset (maximum)	28971 lb

3512C (60 HZ) STANDARD EQUIPMENT

AIR INLET SYSTEM

- Air cleaner; single element canister type with service indicator

AIR INLET

- Air cleaner

COOLING

- Package mounted radiator

EXHAUST

- Exhaust flange outlet

FUEL

- Secondary fuel filters
- Primary fuel filter with integral water separator
- Fuel priming pump

GENERATOR

- Matched to the performance and output characteristics of Cat engines
- IP23 Protection

POWER TERMINATION

- Busbar

CONTROL PANEL

- Cat ECS Genset controller

CONTROL SYSTEM

- Alarm acknowledge
- Over/under frequency (81 o/u)
- Reverse power (kW) (32)
- Coolant temperature
- kVAr (per phase, average & percent)

- Overcurrent (50 / 51)
- High coolant temperature
- Environmental sealed front face
- Reverse reactive power (kVAr) (32RV)
- kVA (per phase, average & percent)
- Volts (L-L & L-N)
- Generator set packages include Caterpillar's voltage regulator (IVR). IVR includes reactive droop capability, 3-phase voltage sensing, KVAR / PF modes, RFI suppression, min/max exciter. Limiter and exciter diode monitor
- kW-hr (total)
- kW (per phase, average & percent)
- Low oil pressure
- Cat ECS 100
- Digital indication for:
- Engine cool-down timer
- Generator mounted - rear facing
- DC volts
- 1 programmable relay outputs (Form C)
- Overspeed
- kVAr-hr (total)
- 1 programmable digital outputs
- Communications
- Power factor (per phase & average)
- Oil pressure (psi, kPa or bar)
- True RMS AC metering, 3-phase, +/-2% accuracy
- Cat connect
- Customizable screens
- Low coolant temperature
- Over/under voltage (27 / 59)
- 4 programmable relay outputs (Form A)

- Accessory module data link
- Warning/shutdown with common LED indication of shutdowns for:
- Failure to start (overcrank)
- Amps (per phase & average)
- Auto/start/stop control
- Controls:
- Engine cycle crank
- Customer data link (Modbus RTU)
- Programmable protective relaying functions:
- Text alarm/event descriptions
- Emergency stop
- Speed adjust
- Number of I/O varies on options selected
- Lamp test
- RPM
- 24 Volt DC operation
- Emergency stop pushbutton
- Low coolant level
- Frequency (Hz)
- Generator phase sequence
- Load histogram feature
- PLC functionality

COOLING SYSTEM

- Coolant level sensors (Not included with packages without radiator)
- SCAC
- Radiator fan and fan drive
- Coolant drain line with valve
- Fan and belt guards

- Caterpillar extended life coolant (Not included with packages without radiator, installed SF44CTS
  

EXHAUST SYSTEM

- Flanged faced outlet(s)
- Dry exhaust manifold

FUEL SYSTEM

- Fuel cooler; not included with packages without radiator
- Secondary fuel filters
- Flexible fuel lines - shipped loose
- Fuel priming pump

GENERATORS AND ATTACHMENTS

- Medium voltage:
- Internal excitation (IE)
- High voltage
- Permanent magnet excitation (PMG)
- Winding temperature detectors
- NEMA Class H insulation system, Class H temperature rise at 40C ambient (125C prime/150C standby)
- Busbar connections, right side extension box, bottom cable entry
- Busbar connections, top center mounted, top cable entry
- Low voltage:
- Class H insulation, Class F temperature rise at 40C ambient (105C prime/130C standby)
- NEMA Class H insulation system, Class H temperature rise at 40C ambient (125C prime / 150C standby)
- NEMA standard hole pattern
- 3 phase brushless, Salient pole
- NEMA standard hole pattern
- 6 Leads
  

- Random wound
- NEMA standard hole pattern
- Form wound

GOVERNING SYSTEM

- ADEM III

LITERATURE

- Parts book

LUBE SYSTEM

- Gear type lube oil pump
- Oil filter, filler and dipstick
- Fumes disposal
- Lubricating oil
- Oil drain lines and valve
- Integral lube Oil cooler

MOUNTING SYSTEM

- Rubber anti-vibration mounts - shipped loose

STARTING / CHARGING SYSTEM

- 45 Amp Charging alternator
- Battery and battery rack w/cables
- Battery disconnect switch
- 24 Volt electric starting motor

GENERAL

- Flywheel and Flywheel housing-SAE No. 00
- SAE standard rotation
- Right hand servicing
- Paint - Caterpillar yellow with high gloss black rails & radiator

3512C (60 HZ) OPTIONAL EQUIPMENT

CONTROL PANELS

- EMCP 4.4

EXHAUST

- Exhaust mufflers

AIR INLET SYSTEM

- Heavy duty air cleaner
- Single element filter

GENERATOR

- Permanent magnet excitation (PMG)
- Oversize and premium generators
- Internal excitation (IE)
- Anti-condensation heater

COOLING SYSTEM

- Coolant
- Standard installed ATAAC radiators
- Optional installed ATAAC radiators
- Optional installed radiators
- Water level switch gauges
- Standard installed radiators

POWER TERMINATION

- Circuit breakers, IEC compliant
- Circuit breakers, UL listed

EXHAUST SYSTEM

- Flanges
- Flange and exhaust expanders

- Y Adapters
- Flexible fittings
- Elbows
- Mufflers

FUEL SYSTEM

- Primary fuel filter

GENERAL

- US aid emblem

MOUNTING

- IBC isolators
- Rubber anti-vibration mounts
- Spring type vibration isolators

GENERATORS AND ATTACHMENTS

- Differential current transformers (DCT) 15 kV class
- RW, IE, 6 Leads, Pitch 0.6667
- Differential current transformers (DCT) 8.7 kV class
- 1400, 1600, 2700 Frames
- Space heater
- Generator air cleaner
- Generator conversion from IE to PM
- Low voltage: 380,440 / 480 Volts, 3 Phase, 1800 rpm

STARTING/CHARGING

- Jacket water heater
- Air starting motor with control and silencer
- Battery chargers
- Charging alternator
- Heavy duty starting system

- Oversize batteries

INSTRUMENTATION

- Wiring GP W/O cyl sensors
- Pyrometer and thermocouples

LUBE SYSTEM

- Prelube pumps
- Oil level regulator
- Oil drains
- Lubrication oil in standard sump

CRANKCASE PROTECTION

- No explosion relief valves
- No crankcase explosion relief valves
- Explosion relief valves
- Crankcase ventilation system

MOUNTING SYSTEM

- Puck style low efficiency isolators
- IBC vibration isolators
- Spring type vibration isolators

POWER CONNECTIONS

- Cable entry - right side
- Center post buss bar
- Rear power connections
- Right side power connections
- 2000, 2500, 3200 Amp, 3 Pole, IEC rated Circuit breakers
- 1600 ,2000, 2500, 3000, 4000 Amp, 3 Pole, UL-100% rated Circuit breakers
- Left side power connections
- Six lead, six terminal option

- 2000, 2500 Amp, 4 Pole, IEC rated Circuit breakers
- Neutral ground connections
- Grounding groups

SPECIAL TESTS / REPORTS

- Standard engine test charge
- PGS Test report @ 1.0 power factor
- CSA Certification
- IBC seismic Certification
- Fuel consumption test
- Torsional vibration analysis
- Generator test report
- Generator fuel consumption test
- PGS Test report @ 0.8 power factor

STARTING / CHARGING SYSTEM

- 10 Amp Battery charger
- 24 Volt battery set - Dry
- Engine barring device
- 35 Amp Battery charger
- Air starting motor
- Air pressure regulator
- Batteries, racks and cables:
- Jacket water heaters
- Electric starting motors
- Starter cover

CONGLETON - HACKER CO.
Construction Managers / General Contractors

Submittal Review Cover Sheet

Project Name: UK Barnhart Building Improvements & Addition

Architect: **BHDP Architecture**

Congleton-Hacker Project Number: **23-104**

Spec Section and Description: 263213.01 Emergency Generator – Product data

Subcontractor: **Messer**

Congleton-Hacker Company Review Stamp & Comments

CONGLETON - HACKER CO.
Construction Managers / General Contractors

REVIEWED

Submittal # 263213.01 Emergency Generator

Job # 23-104 **Date** 05/07/2024 **By** Trevor Marcum

The data contained hereon & here within is for inspection only
- Not for Construction -
Unless stamped "Approved" by the architect and/or engineer

Consultant Review Stamp & Comments

☐ Reviewed ☑ Reviewed as Noted

☐ Rejected ☐ Revise and Resubmit

☐ Submittal Not Required

This review is only for general conformance of the design concept and the information given in the Construction Documents. The Contractor is responsible for compliance with the plans and specifications and applicable laws, codes and regulations. The Contractor is responsible for dimensions to be confirmed and correlated at the job-site: information that pertains solely to the fabrication processes or to the means, methods and techniques of construction; and coordination of the work with all trades.

BHDP
BHDP Architecture
274 Marconi Blvd., Suite 200
Columbus, Ohio 43215

By BRoot

Date 6/7/2024

Submittal Review Summary

Project: UK-2591-Barnhart Building

Submittal: 263213-01 – Emergency Generator – Product Data

CMTA Project Code: XKAB22 Reviewed by: BB/GC

Date Received: 2024-05-07 Date Returned: 2024-06-06

Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

☐ **Reviewed** ☒ **Furnish as Corrected**

☐ **Rejected** ☐ **Revise and Resubmit**

COMMENTS:

1. Submit fault current and coordination study.
2. Submit arc-flash hazard analysis.
3. Contractor shall supply a full fuel tank after all testing is complete and at Owner acceptance.
4. Warranty for generator shall include all required travel. Travel Time and Mileage limitation is not acceptable (19.). Item (7.) is not acceptable and shall be 5-year in lieu of 1 year indicated.
5. Submit warranty for automatic transfer switch.
    a. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for products provided.
6. Provide video-taped training. Furnish Owner with DVD copies of training.
7. Generator connection cabinet to be minimum 65kAIC rated.
8. All cabling on communication riser drawing shall be in conduit.
9. Fire pump controller/transfer switch to be included on communication riser.
10. Coordinate location of emergency stop button with Owner, Architect and Engineer prior to rough-in.
11. Coordinate location of emergency remote annunciator with Owner, Architect and Engineer prior to rough-in.

220 Lexington Green Circle, Suite 600, Lexington KY 40504 859.253.0892 www.cmta.com

MEP Engineering | Performance Contracting | Zero Energy Engineering | Technology | Commissioning

4/29/2024



NIXON POWER SERVICES

SUBMITTAL PACKAGE

UK Barnhart Building

CONTRACTOR / INSTALLER: UNIVERSITY OF KENTUCKY

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Francois Moolman
Mobile: 615-982-4111
Email: fmoolman@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

Sara Russell
PROJECT MANAGER

Francois Moolman
PROJECT ENGINEER

CONTACT:

615-693-2030
srussell@nixonpower.com
La Vergne, TN

CONTACT:

615-982-4111
fmoolman@nixonpower.com
Nashville , TN

WORK EXPERIENCE:

- **Nixon Power Services**
  Project Manager
- **US Marine Corps**
  Corporal

WORK EXPERIENCE:

- **Nixon Power Services**
  Inside Sales Engineer
- **Electrolux**
  Manufacturing Leader

RESPONSIBILITIES:

- **Internal Project Setup**
- **Submittal Requests**
- **Release Equipment**
- **Vendor POC**
- **Track Shipping Schedules**
- **Coordinate Delivery**
- **Invoice Management**
- **Close Out Documents**



RESPONSIBILITIES

- **Submittal Follow Up**
- **Submittal Approvals**
- **On-Site Walk Thru**
- **Engineering Diagrams**
- **Oversee Equip. Installation**
- **Pre-Startup Inspections**
- **Startup Planning/Scheduling**
- **Commissioning Assistance**

NIXON POWER SERVICES

KOHLER. IN POWER. SINCE 1920.



Project Engineer

T

SUBMITTAL **Preparation**



Project Engineer

I

FOLLOW UP **on Submittal STATUS**



Project Manager

M

Once Submittal Approved RELEASE EQUIPMENT **for MANUFACTURING**



Kohler

E

Build EQUIPMENT



Project Manager

L

COORDINATE **site DELIVERY**



Project Engineer

I

Equipment INSTALLATION



Project Engineer

N

STARTUP



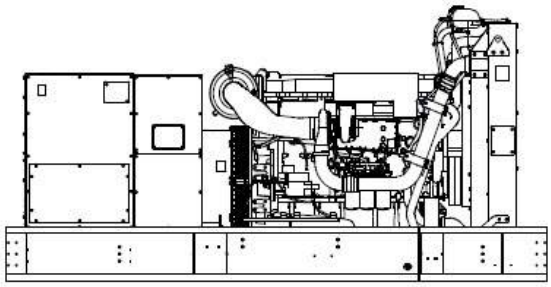
Project Manager

E

JOB CLOSE**OUT**

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator



Kohler Model: 500REOZVC

This diesel generator set equipped with a 5M4027 alternator operating at 120/208 volts is rated for 475 kW/594 kVA. Output amperage: 1649

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker® 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

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- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Qty	Description
	500REOZVC Generator System
1	500REOZVC Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	500REOZVC,24V,50/60Hz, EPA
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 120/208V, Wye, 3Ph, 4W
Alternator	5M4027
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Standard Duty
Controller	APM603
Enclosure Type	Sound
Enclosure Material	Aluminum
Enclosure Electrical Package	Basic Electrical Pkg, 1 Ph
Enclosure Electrical Acc.	Wire Block Heater
Enclosure Electrical Acc.	Wire Battery Charger
Enclosure DC Lighting	DC Lights
Enclosure Silencer	Internal Silencer
Enclosure Air Outlet	Aluminum Gravity Outlet
Fuel Tank Type	Standard
Fuel Runtime (Approx.)	24 Hours
Subbase Fuel Tank Capacity	1033 Gallons
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Failure Relay w/Harness,1Fault
Electrical Accy.,Installed	Generator Heater
Electrical Accy.,Installed	15 Relay I/O Board
Rating, LCB 1 Right	100% Rated
Amps, LCB 1 Right	1600

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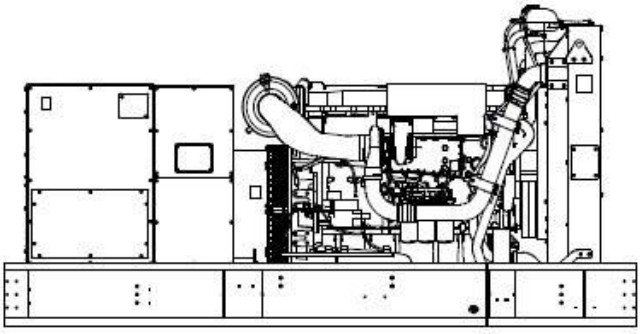
	Trip Type, LCB 1 Right	Electronic, LSI
	LCB 1 Right Interrupt Rating	65kA at 480V
	Frame, LCB 1 Right	RJ
	Position, LCB 1 Right	1
	LCB Accy. Installed	Ground Fault Relay Indication
	Fuel Lines, Installed	Flexible Fuel Lines
	Exceeds LTL Shipping Height	Add'l Shipping Charge Accepted
	Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
	Miscellaneous Accy,Installed	Coolant in Genset
	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	5 Year Comprehensive
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Total unit length in inches	247
	Total unit width in inches	75
	Total unit height in inches	137
	Total unit weight (lbs)	14,662
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	Battery Heater, 120V, 2/80W	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 500REOZVC	
1	RSA III, Annunciator only	
1	1600A Dual Purpose Docking Station	
3	400A Automatic Closed Transition Transfer Switches	

KOHLER®

Spec Sheets

KOHLER®

500REOZVC
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4027	120/208	3	60	475/594	1649

RATINGS: All three-phase units are rated at 0.8 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage.
There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.
A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Model: 500REOZVC, continued

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load (with <0.5% drift due to temp. variation)	3-Phase Sensing, +/-0.25%
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TAD1641GE- B
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	17:01
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	565 (757)
Cylinder head material	Cast Iron
Piston: type, material	Steel
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.4
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Field-Convertible
Air cleaner type, all models	Dry

Model: 500REOZVC, continued

Exhaust

Exhaust System

Exhaust flow at rated kW, m3/min. (cfm)	92.0 (3249)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	455 (851)
Maximum allowable back pressure, kPa (in. Hg)	10 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24 V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12
Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24 V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	8 (0.31)
Fuel return line, min. ID, mm (in.)	6 (0.25)
Max. fuel flow, Lph (gph)	204.4 (54)
Max. fuel pump restriction, kPa (in. Hg)	30 (8.9)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter: quantity, type	2, Primary, 10 Micron Secondary w/Water Separator, 3 Microns
Recommended fuel	#2 Diesel/HVO/RD

Model: 500REOZVC, continued

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-Cooled
Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-Cooled

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	39.7 (10.5)
Engine jacket water capacity, L (gal) (Non-IBC):	39.7 (10.5)
Radiator system capacity, including engine, L (gal.)	67 (17.7)
Engine jacket water flow, Lpm (gpm)	463.3 (122.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	231 (13137)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	890 (35)
Fan, kWm (HP)	19 (25.5)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

ᵏ Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5°C (9°F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	598 (21120)
Combustion air, m3/min. (cfm)	46 (1617)
Heat rejected to ambient air: Engine, kW (Btu/min.)	24 (1365)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	29 (1660)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	139.3 Lph (36.8 gph)
Standby Fuel Consumption at 75% load	101.4 Lph (26.8 gph)
Standby Fuel Consumption at 50% load	68.1 Lph (18.0 gph)
Standby Fuel Consumption at 25% load	38.6 Lph (10.2 gph)

KOHLER

Industrial Generator Set Accessories

Generator Set Controller



The APM603 generator set controller provides advanced control, system monitoring, and system diagnostics for a single generator set or paralleling multiple generator sets. The APM603 interfaces the generator set to other power system equipment and network management systems using standard industry network communications. It uses a patented digital voltage regulator and unique software logic to manage alternator thermal overload protection as well as serves as an overcurrent protective relay, features normally requiring additional hardware. The APM603 controller meets NFPA 110, Level 1.

Display, Interface, and Accessibility

- A 7-inch color TFT touchscreen for easy local access to data.
  - Home screen can be customized to show critical data at a glance.
  - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial bus and Ethernet networks, and supports SNMP and BACnet® through Ethernet networks.

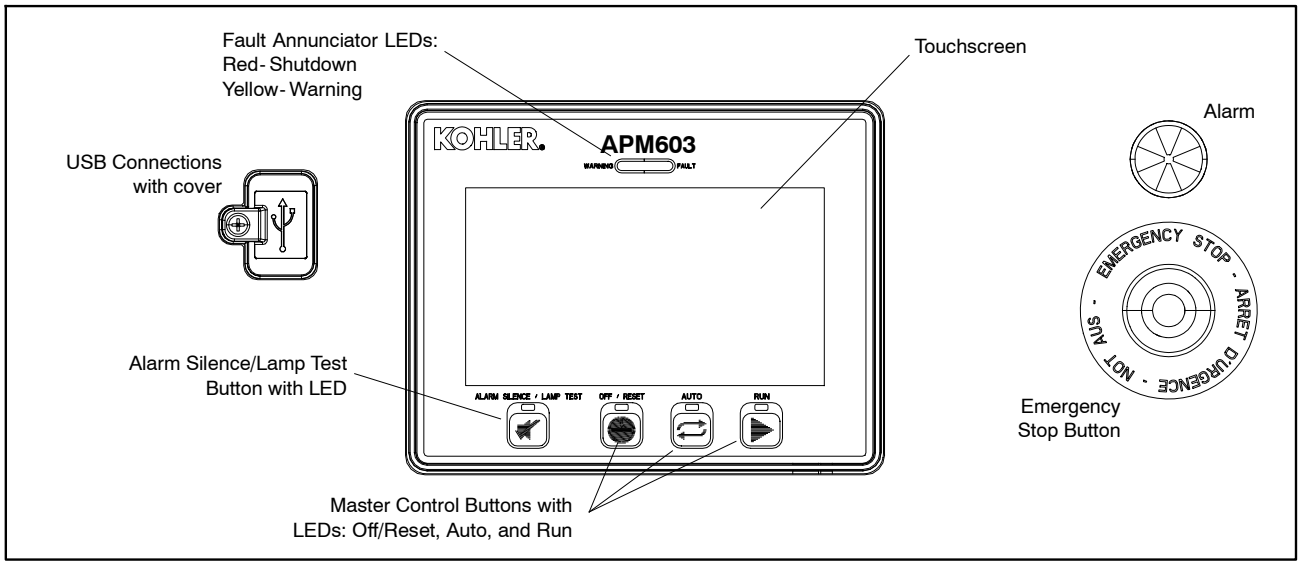
Global Support

- Sales, installation, and service support from more than 800 Kohler and SDMO service providers around the world.

On- board Diagnostics

- Immediate visibility of warnings and faults with text description and code display.
  - 15 seconds of critical data are captured around each warning and fault
  - Critical data can be viewed on the display and downloaded
- Store up to 10,000 events locally along with historical data logging of successful starts.
  - Accurate time stamp from real-time clock
  - Event log can be downloaded
- Data logging of customized parameter list for report generation and advanced troubleshooting.
  - Store to external USB drive for easy transfer to another device

Modbus® is a registered trademark of Schneider Electric.
BACnet® is a registered trademark of ASHRAE.



Controller Features

AC Output Voltage Regulator Adjustment	Maximum of ±10% of the system voltage
Alarm Horn	Indicates a generator set warning or shutdown condition
Alarm Silence	For NFPA-110 application or user convenience
Alternator Protection	Generator set overload and short circuit protection
Cyclic Cranking	Provides automatic restart after a failed start attempt with programmable on/off time and number of attempts
ECU Diagnostics	Displays engine ECU fault codes and descriptions for engine troubleshooting
Emergency Stop Button	Shuts down the generator set immediately, for emergency situations
Engine Start Aid	Control for an optional engine starting aid
Environmentally Sealed Membrane Keypad	Three master control buttons with LEDs: Off/Reset, Auto, and Run
Patented High-Speed RMS Digital Voltage Regulator	±0.25% no-load to full-load regulation with three-phase true RMS sensing
Lamp Test	Verifies functionality of the indicator LEDs
Real-time Clock	Includes battery back-up to retain date and time through controller power cycle
Remote Reset	Allows remote fault resets and restarting of the generator set
Remote Monitoring Panel	Compatible with the Kohler® Remote Serial Annunciator
Run Time Hourmeter	Displays generator set run time
Run Relay	Indicates that the generator set is running
Time Delay Engine Cooldown (TDEC)	Time delay before the generator set shuts down
Time Delay Engine Start (TDES)	Time delay before the generator set starts

Communication

USB Port	(1) Mini-USB port for PC connection (1) USB port for storage device
Serial (RS-485) Port	(1) Non-isolated for RSA III (1) Isolated for Modbus devices (1) Isolated for paralleling communication
Ethernet Port	(1) RJ45 for Modbus TCP, SNMP, and BACnet

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

- Isochronous control with real and reactive load sharing with other APM603 controller equipped generator sets
  - Supports paralleling up to 8 generators
- Random first-on logic to prevent two or more generator sets from closing to a dead bus and provides the fastest response for a single generator online
- Automatic synchronizer with dead bus closing
- Soft loading and unloading for generator management
- Protective relay functions:
  - Synch check (25C)
  - Over current (51)
  - Over frequency (81O)
  - Over power (32O)
  - Over voltage (59)
  - Reverse power (32R)
  - Reverse reactive power (32RQ)
  - Under frequency (81U)
  - Under voltage (27)
- Generator management to allow the start and stop of generators based on load demand or state of other generators
  - Fuel level
  - Run time
  - Manual order
  - Time of day
  - Efficiency
- Simplified paralleling system view from any generator controller in the system

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection
- Includes a maintenance mode for arc flash reduction per NEC 240.87

Load Management Features

- Programmable outputs included to command the connect and disconnect of loads based on generator or paralleling system state
  - Loads connected based on available capacity
  - Loads disconnected at system startup
  - Loads disconnected based on a maximum kW setting or underfrequency setting
- Supports up to 16 prioritized load steps per system
  - Can be used on a single generator system
  - Can be combined in a paralleling system for a total system load control capability
- Simplified load management system view from any generator controller in the system
- Requires input/output module option

Advanced Programmable I/O

- Configurable inputs and outputs can be programmed for customer specific use
- PLC-like capability for applying logic to customize generator system behavior

Troubleshooting Features

- 15 seconds of key data automatically captured around each warning and shutdown
  - Data can be exported for detailed analysis
  - Data can be viewed on controller for convenient on-site troubleshooting support
- Configurable data logger will allow you to select parameters to monitor
  - Data stored to USB device for flexibility on amount of data stored and ability to export for detailed analysis
  - Data capture controlled by user to allow capturing specific data required

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - High engine speed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence button
  - Remote emergency stop *

* Function requires optional input sensors or kits and is engine dependent, see Engine Data.

Standards

The generator set controller has been tested and verified for compliance with the following standards.

- NFPA 99
- NFPA 110, Level 1
- CSA 282-09
- UL 6200
- ASTM B117 (salt spray test)

Controller Functions

The controller displays warning, shutdown, and status messages. **All functions are available as relay outputs.**
Warning causes the yellow fault LED to show and sounds the alarm horn, signaling an impending problem.
Shutdown causes the red fault LED to show, sounds the alarm horn, and stops the generator set.

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here. This table highlights the items required for NFPA 110.

Event	Warning	Shutdown
Alternator Thermal Protection †		●
Battery Charger Fault *	▲	
CAN Option Board1 Comm Loss	▲	
Critically Low Fuel Level (diesel) *	▲	
ECU Diagnostic Event	▲	
ECU Mismatch Shutdown †		●
Fuel Leak Alarm (diesel) *	▲	
High Battery Voltage Warning	▲	
High Coolant Temperature Shutdown †		●
High Coolant Temperature Warning	▲	
High Fuel Level Warning (diesel) *	▲	
High Oil Temperature Shutdown †		●
High Oil Temperature Warning	▲	
Local Emergency Stop Shutdown †		●
Loss ECU Comms Shutdown †		●
Loss of Signal Low Coolant Level Voltage	▲	
Low Battery Voltage Warning	▲	
Low Coolant Level Shutdown †		●
Low Coolant Temperature Warning	▲	
Low Fuel Level Shutdown (diesel) * †		●
Low Fuel Level Warning (diesel) *	▲	
Low Fuel Pressure Warning (gas) *	▲	
Low Oil Pressure Shutdown †		●
Low Oil Pressure Warning	▲	
Low RTC (clock) Battery Voltage	▲	
Maintenance Reminder1	▲	
Maintenance Reminder2	▲	
Maintenance Reminder3	▲	
Maximum Power Shutdown †		●
Maximum Power Warning	▲	
Not In Auto Alarm	▲	
Over Crank Shutdown †		●
Over Current Shutdown (L1, L2, L3) †		●
Over Current Warning (L1, L2, L3)	▲	
Over Frequency Shutdown †		●
Over Frequency Warning	▲	
Over Power Shutdown †		●
Over Power Warning	▲	
Over Speed Shutdown †		●
Over Voltage Shutdown (L-L, L-N, each phase) †		●
Over Voltage Warning (L-L, L-N, each phase)	▲	

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		●
Reverse Power Shutdown †		●
Reverse VAR Shutdown †		●
Under Frequency Shutdown †		●
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		●
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1-8		
Run Button Pressed		

* Function requires optional input sensors or kits
† Items included with common fault shutdown 10

Mitsubishi Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Coolant Temperature, Degrees	Analog Input
Fuel Level %	
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Crank	
Horn	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	16 Dry Contact Digital
User Configurable Relay Outputs	8 NO/NC Relays
Note: Programmable I/O is configurable by a Kohler-authorized technician.	

Mitsubishi Engine Data

The following Mitsubishi engine data is displayed on the APM603 controller.

Parameter
Battery Voltage
Coolant Temperature
Engine Speed
Intercooler Temperature (NA on some engine sizes)
Oil Pressure
Total Run Time Hours

Volvo Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	2 Analog, 0- 5 VDC 4 Dry Contact Digital
User Configurable Relay Outputs	14 NO/NC Relays 1 Common Fault Relay
Note: Programmable I/O is configurable by a Kohler-authorized technician	

Volvo Engine Data

The following Volvo engine data is displayed on the APM603 controller.

Parameter
Air Intake Pressure
Air Intake Temperature
Ambient Temperature
Barometric Pressure
Coolant Temperature
ECU Battery Voltage
ECU Runtime Hours
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Mechanical Engine Load
Oil Pressure
Oil Temperature

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

APM603 Available Options

- ❑ **Common Failure Relay** provides a relay output to signal a generator set fault.
- ❑ **Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming capability.
- ❑ **Electrically Operated Circuit Breakers**
  - For paralleling systems
  - Available generator-mounted or remote-mounted
  - 24VDC
- ❑ **Ground Fault Relay** provides a relay output to signal a ground fault is detected.
- ❑ **Input/Output Module** for Kohler Diesel (KD) and Mitsubishi models provides:
  - 16 digital input connections with connection to ground
  - 8 relay output connections (Form C, rated 8A, 240 VAC or rated 0.5 A, 48 VDC)
- ❑ **Input/Output Module** for models other than KD or Mitsubishi provides:
  - 2 analog inputs (0- 5 VDC)
  - 4 digital input connections with connection to ground
  - 14 relay output connections (Form C, rated 10A, 120V)
  - 1 common fault relay output (NO, rated 2A, 24VDC)
- ❑ **Key Switch** to allow selection of RUN, OFF and AUTO modes. Lockable in the AUTO position by removing the key.
- ❑ **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- ❑ **Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- ❑ **Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

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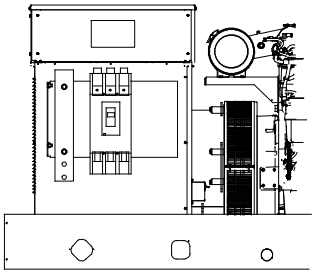
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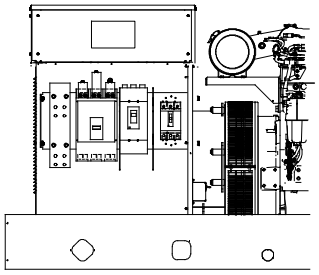
KOHLER

Industrial Generator Set Accessories

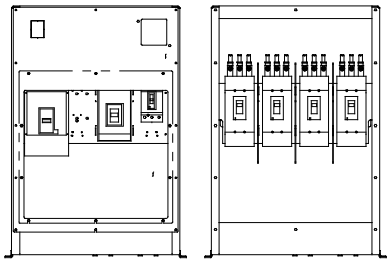
Line Circuit Breakers 15- 3250 kW



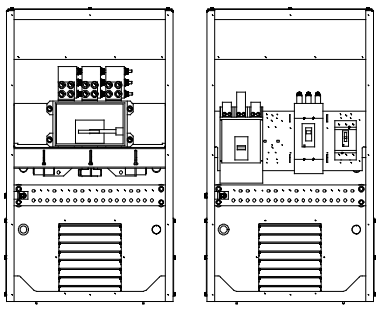
Single Circuit Breaker Kit with Neutral Bus Bar
15- 300 kW Model Shown



Multiple Circuit Breaker Kit with Neutral Bus Bar
180- 300 kW Model Shown



Multiple Circuit Breaker Kits with Neutral Bus Bar
350- 2250 kW Model Shown
(also applies to some 300 kW models)



Circuit Breaker Kits with Neutral Bus Bar
700- 2500 kW KD Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
  - Magnetic trip
  - Thermal magnetic trip
  - Electronic trip
  - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350- 2500 kW models and selected 80- 300 kW models).
- Up to four line circuit breakers can be used on 350- 2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
  - UL 489 Molded Case Circuit Breakers
  - UL 1077 Supplementary Protectors
  - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Magnetic Trip

The magnetic trip features an electromagnet in series with the load contacts and a moveable armature to activate the trip mechanism. When a sudden and excessive current such as a short circuit occurs, the electromagnet attracts the armature resulting in an instantaneous trip.

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory- calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

Electronic Trip

These line circuit breakers use electronic controls and miniature current transformers to monitor electrical currents and trip when preset limits are exceeded.

LI breakers are a combination of adjustable trip functions including long-time ampere rating, long-time delay, and instantaneous pickup. LSI breakers have all of the LI breaker features plus short-time pickup, short-time delay, and defeatable instantaneous pickup. LSIG breakers have all of the LSI breaker features plus ground-fault pickup and delay.

NOTE: MG-frame does not have a long-time delay when selected with LI breakers.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSIG in this document. Models with LSIG compare current flow in phase and neutral lines, and trip when current unbalance exists.

Ground fault trip units are an integral part of the circuit breaker and are not available as field-installable kits. The ground fault pickup switch sets the current level at which the circuit breaker will trip after the ground fault delay. Ground fault pickup values are based on circuit breaker sensor plug only and not on the rating plug multiplier. Changing the rating plug multiplier has no effect on the ground fault pickup values.

80% Rated Circuit Breaker

Most molded-case circuit breakers are 80% rated devices. An 80% rated circuit breaker can only be applied at 80% of its rating for continuous loads as defined by NFPA 70. Circuit conductors used with 80% rated circuit breakers are required to be rated for 100% of the circuit breaker's rating.

The 80% rated circuit breakers are typically at a lower cost than the 100% rated circuit breaker but load growth is limited.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

❑ Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

❑ Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.
15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

❑ Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

❑ Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

❑ Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

❑ Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

❑ Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

❑ Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	30	9- 325 A. Mag. Trip	HJ
	50	84- 546 A. Mag. Trip	
	100	180- 1040 A. Mag. Trip	
	150	348- 1690 A. Mag. Trip	
	250	684- 2500 A. Mag. Trip	JJ
	300- 400	Thermal Magnetic	LA
	400	500- 1000 A. Mag. Trip	
		750- 1600 A. Mag. Trip	
		1000- 2000 A. Mag. Trip	
		1125- 2250 A. Mag. Trip	
		1250- 2500 A. Mag. Trip	
		1500- 3000 A. Mag. Trip	
		1750- 3500 A. Mag. Trip	
		2000- 4000 A. Mag. Trip	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	
	1600- 2500	Electronic LSI	RJ
		Electronic LSIG	
	1600- 3000	Electronic LSI	NW
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers.*

Alt. Model	Amps	Trip Unit	Frame
4M 5M 7M	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

* P-frame breakers can be used with the Decision-Maker® 6000 Controller/DPS System or APM603 controller.
NW breakers are for use with the APM603 only.

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

Gen. Set kW	Alt. Model	Rating, Amperes	Type
350- 2250 kW	4M/ 5M/ 7M	3000	Load Bus

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

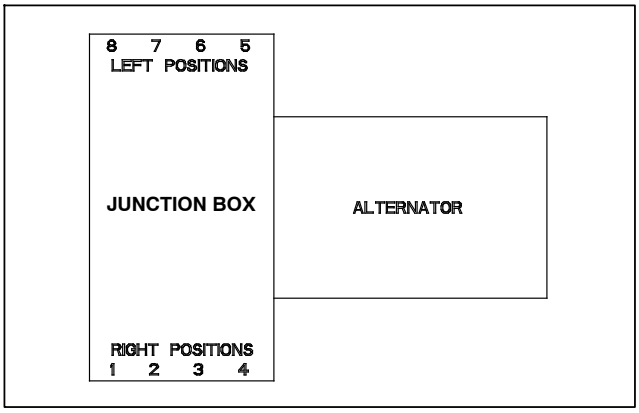
Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
NW	100	100	85
PG	65	35	18
PJ	100	65	25
PL	125	65	25
RJ	100	65	25

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
RJ	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600- 3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 kcmil

Breaker Positions



NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, HG, J, JG, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.

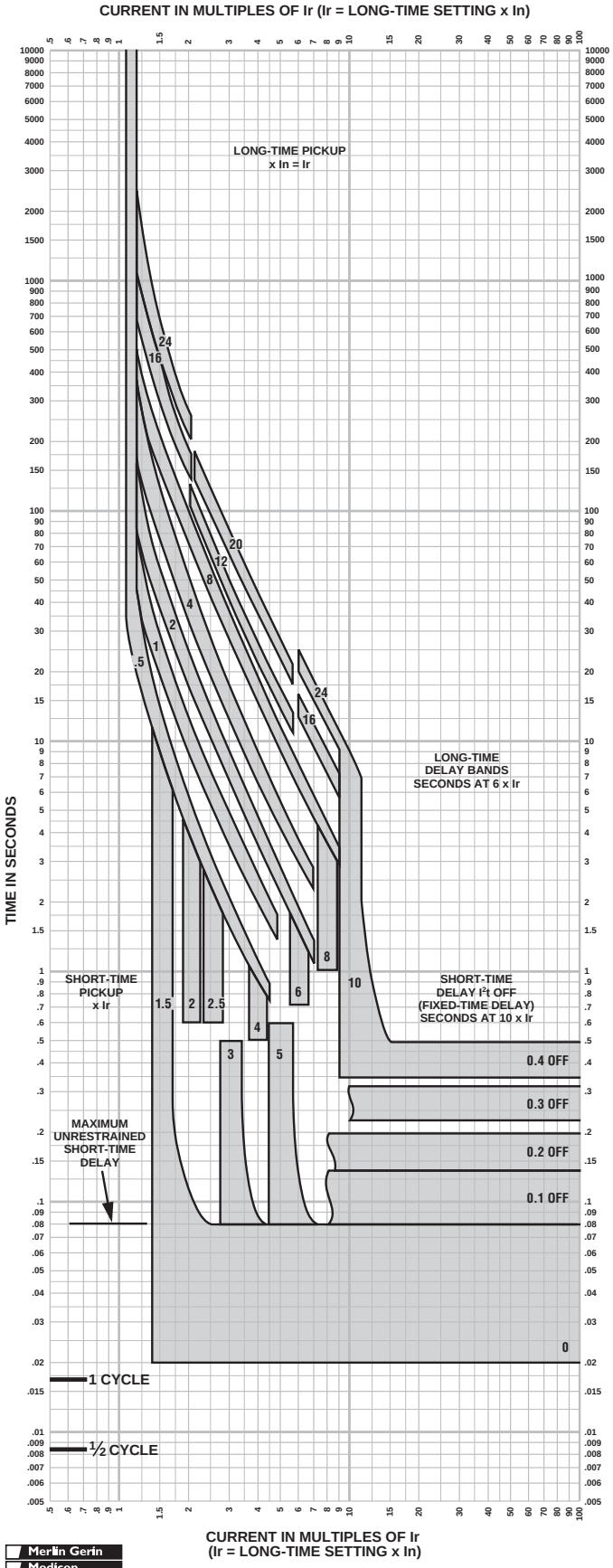
Multiple Circuit Breaker Combinations

Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	LA	LA	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG	LG	H/J	
	LG	LG	LA	
	LG	LG	LG	
	LG	H/J	H/J	H/J
	LG	LA	H/J	H/J
	LG	LA	LA	H/J
	LG	LA	LA	LA
	LG	LG	H/J	H/J
	LG	LG	LA	H/J
	LG	LG	LA	LA
	LG	LG	LG	H/J
	LG	LG	LG	LA
	LG	LG	LG	LG †
	M/P			
	M/P		H/J	
	M/P		LA	
	M/P		LG	
	M/P		M/P ‡	
	M/P		H/J	H/J
	M/P		LA	H/J
	M/P		LA	LA
	M/P		LG	H/J
	M/P		LG	LA
	M/P		LG	LG †
	R §			
	NW §			
	LOAD BUS KIT §			

† Frame size LG is not available in position 4 with 1219 mm (48 in.) junction box.

‡ Frame sizes M/P are not available in position 3 or 4 with 1219 mm (48 in.) junction box.

§ R breakers, NW breakers, and the load bus kit occupy all four positions on a side.



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific
Schneider Electric Brands

Schneider Electric

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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

POWERPACT Molded Case Circuit Breakers lead the industry with proven, reliable protection and innovative design. Providing unparalleled performance and control, this generation of P- and R-frame circuit breakers features exclusive MICROLOGIC® Trip Units, which allow for a range of sophisticated applications for metering and monitoring. In addition, units can be interchanged to allow for maximum flexibility and are field-installable for easy upgrades as needed.

The compact P- and R-frame circuit breakers permit smaller footprint and higher density installations using I-LINE® Panelboards and Switchboards. These circuit breakers are available in 100% rated construction up to 2500 A to meet a broad range of commercial and industrial application needs.

Full-Featured Performance

- P-frame – 1200 A available in both standard and 100% ratings with sensor sizes 250–1200 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- R-frame – 2500 A available in both standard and 100% ratings with sensor sizes 600–2500 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- Compact breaker size allows for smaller footprint installations using I-LINE Panelboards and Switchboards. 9" width on P-frame designs and 15" width on R-frame designs provide increased density installations
- Most field-installable accessories are common to all frame sizes for easier stocking and installation
- Selection of four interchangeable MICROLOGIC Trip Units with POWERLOGIC® power metering and monitoring capabilities available in advanced trip units
- Compatible with POWERLOGIC® systems and high amperage power circuit breakers
- Built-in MODBUS® protocol provides an open communications platform and eliminates the need to purchase additional, proprietary network solutions
- Connection options include bus, cable or I-Line for installation flexibility
- Additional options are available for 5-cycle closing, stored energy mechanisms and draw-out mounting of 1200 A breakers

Merlin Gerin
Modicon
Square D
Telemecanique

SQUARE D
Schneider Electric

POWERPACT® P- and R-Frame Molded Case Circuit Breakers
(Standard or 100% rated up to 2500 A)

Onboard Intelligence

For “smarter breakers,” a range of MICROLOGIC® Trip Units provides advanced functionality, such as a communications interface, and power metering and monitoring capabilities. With the appropriate MICROLOGIC Trip Unit, you can communicate with breakers, gather power information, monitor events and remotely control breakers based on predetermined conditions, leading to substantial savings in electrical system operating costs.

These interchangeable, microprocessor-controlled, plug-in devices provide the next generation of protection, measurement and control functions, delivering not only greater electrical system safety but also improved system integration and coordination.



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

- Basic circuit protection including long-time, instantaneous and optional short-time adjustments

MICROLOGIC 3.0A, 5.0A and 6.0A

- Long-time, instantaneous and optional short-time adjustments
- Integrated ammeter and phase loading bar graph
- LED trip indicator
- Zone selective interlocking with downstream and upstream breakers
- Optional ground-fault protection
- Optional MODBUS® communications interface

MICROLOGIC 5.0P and 6.0P

- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS communications interface compatibility with POWERLOGIC® installations
- Standard GF alarm on 5.0P. 6.0P has equipment ground-fault tripping protection

MICROLOGIC 5.0H and 6.0H

- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

Contact your Square D sales representative for additional information. Or, visit www.SquareD.com.

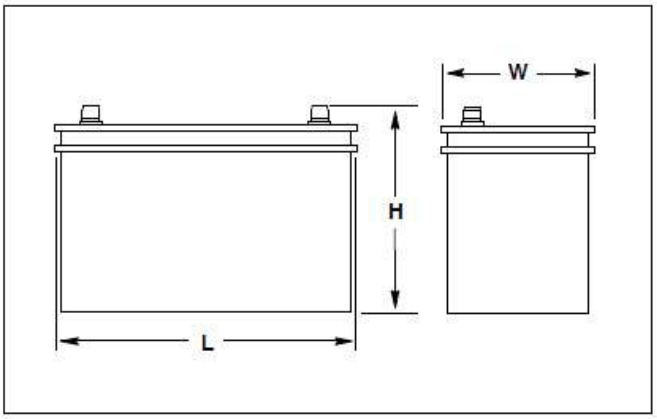
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KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

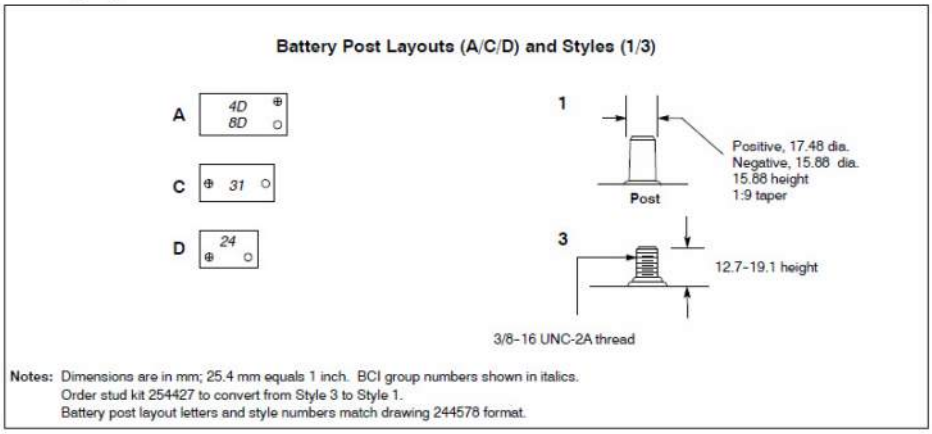


Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0°C (32°F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18ºC (0ºF) Min.	Reserve Capacity Minutes at 27º (80ºF) Min.	Battery Post Layout and Style
				L	W	H			
Wet	324586	2	31	330.2 (13.0)	173.0 (6.8)	239.8 (9.4)	950	185	C/3

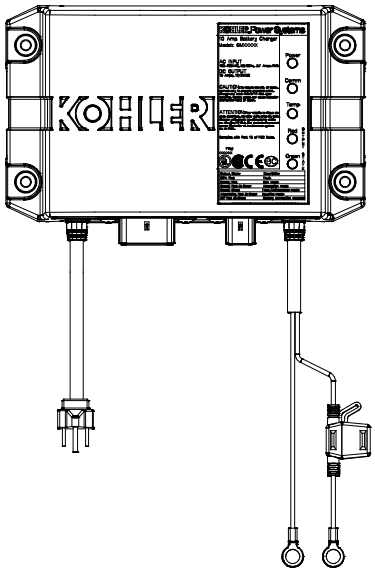
Battery Specifications



KOHLER

Industrial Generator Set Accessories

12/24 Volt, 10 Amp
Automatic Multi-Stage Battery Charger



The battery charger is a fully-automatic, high efficiency battery charger that charges batteries rapidly and safely. The battery charger is designed for an industrial environment.

The battery charger is designed for operation with an engine cranking battery.

The battery charger is universal voltage input capable, comes with a standard 120 V/60 Hz AC plug, and charges 12 VDC or 24 VDC battery systems.

Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

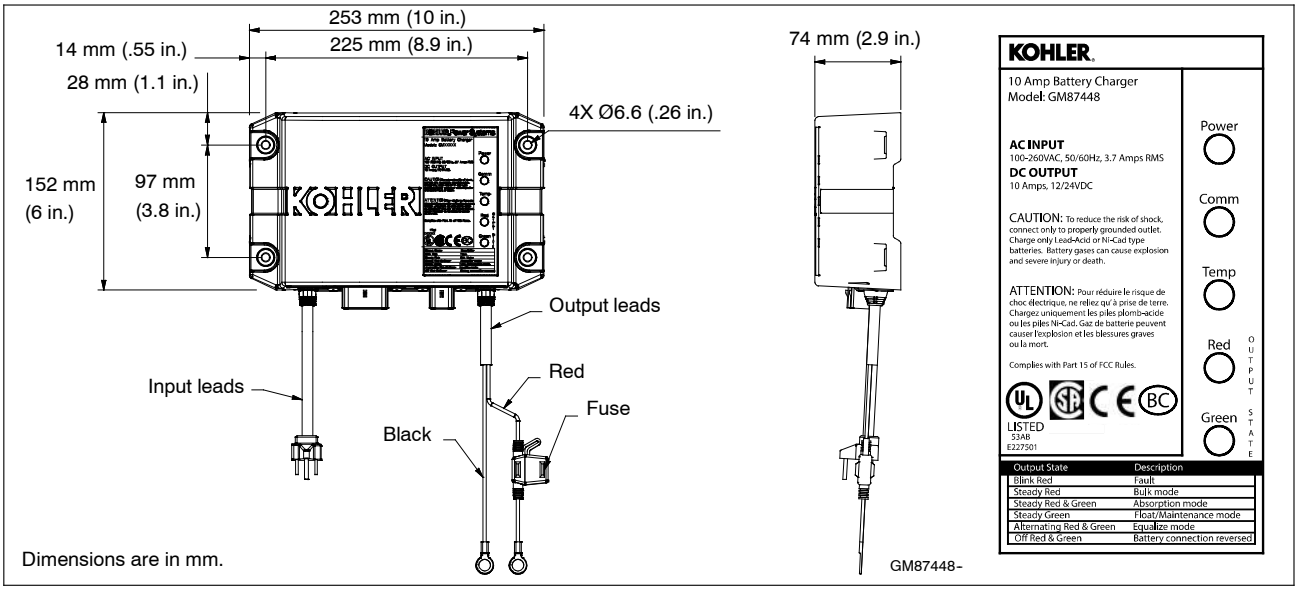
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

Standard Features

- 12 or 24 VDC output
  - Automatic voltage detection
- Automatic multi-stage charging modes
  - Recovery charge
  - Bulk charge
  - Absorption charge
  - Float charge
  - Equalize charge
- Charges the following type batteries:
  - Flooded lead acid (FLA)
  - AGM
  - Gel cell
  - High performance AGM
  - Nickel-cadmium (NiCad)
- 5 LED status indicators
- Durable potted assembly for waterproofing and vibration resistance
- Reverse-polarity protection
- Short-circuit protection
- Electronically limited output current
- Optional temperature compensation (FLA only)
- User adjustable parameters to support optimal manufacturer recommended charge curve.
- Code compliance:
  - UL 1236 Listed
  - NFPA 110, Level 1 compatible (when used with Kohler controller and connected to engine harness)
  - CSA - C22.2 No. 107.2-01
  - FCC - Title 47, Part 15 Class A
  - CE
  - IBC 2015
  - OSHPD

DC Output		AC Input		Overall Dimensions W x D x H	Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps		kgs	lbs
12/24	10	100-260	3.7	253 mm x 152 mm x 74 mm (10.0 in x 6.0 in x 2.9 in)	3.6	7.9

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel–Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ Red ○ Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

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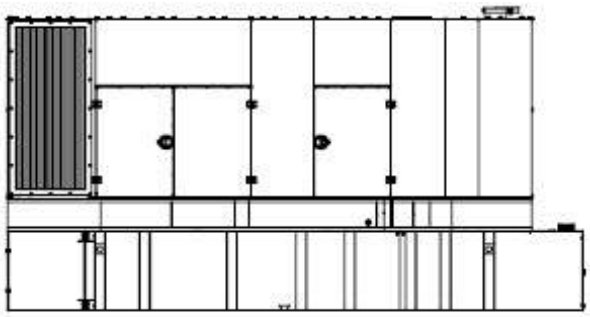
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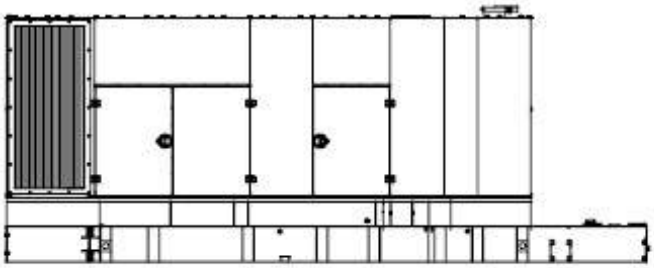
KOHLER®

Sound Enclosure with Subbase Fuel Tank Package

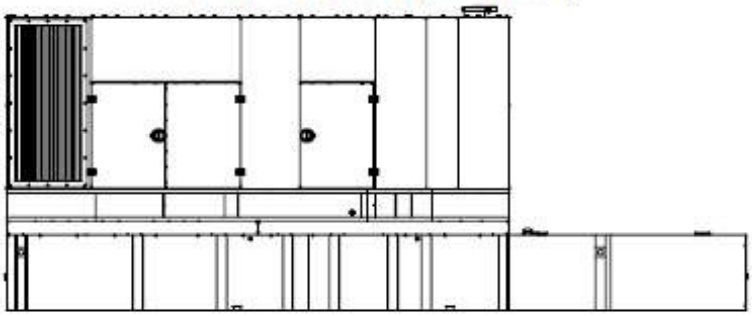
ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Enclosure with Standard Tank (12-48 Hour)



Enclosure with State Tank (12-48 Hour)



Enclosure with State Tank (72 Hour)

Sound Enclosure Standard Features

• Internal-mounted critical silencer, flexible exhaust connector, and rain cap.

• Skid mounted aluminum construction with hinged and removable doors. Aluminum enclosures recommended for high humidity and/or high salt/coastal regions.

• Fade-, scratch-, and corrosion-resistant Kohler® Power Armor automotive-grade textured finish.

• Enclosure has six large access doors which allow for easy maintenance.

• Lockable, flush-mounted door latches.

• Air inlet louvers reduce rain and snow entry.

• Vertical air outlet with 90 degree angles to redirect air and reduce noise.

• Acoustic insulation that meets UL94 HF1 flammability classification.

• Aluminum sound enclosure is certified to 186 mph (299 kph) wind load rating.

Subbase Fuel Tank Features

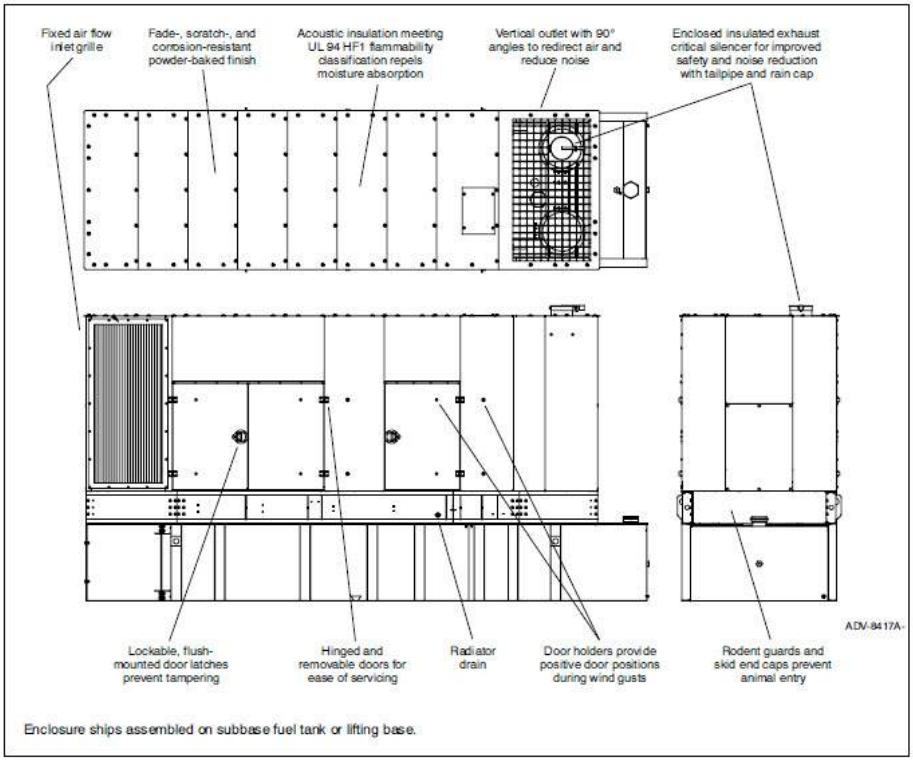
• The fuel tank has a Power Armor Plus textured epoxy-based rubberized coating.

• The above-ground rectangular secondary containment tank mounts directly to the generator set, below the generator set skid (subbase).

• Both the inner and outer tanks have emergency relief vents.

• Flexible fuel lines are provided with subbase fuel tank selection.

• The secondary containment tanks construction protects against fuel leaks or ruptures. The inner (primary) tank is sealed inside the outer (secondary) tank. The outer tank contains the fuel if the inner tank leaks or ruptures.



Sound Enclosure Features

- Available in aluminum (3mm [0.125 in.]) formed panel, solid construction. Preassembled package offering corrosion resistant (aluminum), dent resilient structure mounting directly to the lift base or fuel tank.
- Power Armor automotive-grade finish resulting in advanced corrosion and abrasion protection as well as advanced edge coverage and color retention.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Internal critical exhaust silencer. Offers maximum component life, operator safety, and includes rain shield and cap.
- Note: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Attenuated design. Acoustic insulation UL 94 HF1 listed for flame resistance.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Cooling/Combustion Air Intake. Attenuated models offering weather protective designs using fixed air inlet louvers.
- Cooling Air Discharge. Attenuated models offering 90 degree vertical air outlet. Redirects cooling air up and above enclosures to reduce noise ambient

- Extended operation. Usable tank capacities of up to 72 hours.
- Power Armor Plus textured epoxy-based rubberized coating that creates an ultra-thick barrier between the tank and harsh environmental conditions like humidity, saltwater, and extreme temperatures, and provides advanced corrosion and abrasion protection
- UL listed. Secondary containment generator set base tank meeting UL 142 tank requirements.
- NFPA compliant. Designed to comply with the installation standards of NFPA 30 and NFPA 37.
- Integral external lift lugs. Enables crane with spreader-bar lifting of the complete package (empty tank, mounted generator set, and enclosure) to ensure safety.
- Emergency pressure relief vents. Meets UL requirements; ensures adequate venting of inner and outer tank under extreme pressure and/or emergency conditions.
- Normal vent with cap. Vent is raised above lockable fuel fill.
- Low fuel level switch. Annunciates a 50% low fuel level condition at generator set control.
- Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
- Electrical stub-up.

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	Enclosure and Fuel Tank Length, mm (in.)	Enclosure and Fuel Tank Width, mm (in.)	Enclosure and Fuel Tank Weight, kg (lb.)	Enclosure and Fuel Tank Height, mm (in.)	Fuel Tank Height (H), mm (in.)	Sound Pressure Level, dB(A)
3910 (1033)	24	6045 (238)	1883 (74)	7052 (15547)	3309 (130)	737 (29)	75

Note: Data in table is for reference only, refer to the respective ADV drawings for details.
Max. weight includes the generator set (wet) with largest alternator option, enclosure, silencer, and tank (no fuel).
Log average sound pressure level of 8 measured positions around perimeter of the unit at a distance of 7 m (23 ft). Refer to TIB-114 for details.

Accessories

Battery Charger, Mounted.
Mounting, prewiring of DC output and AC input when optional BEP is selected. Battery charger located inside the enclosure and accessible through an access door.

Miscellaneous Package Options
Gravity Discharge, Aluminum construction (for aluminum or steel enclosures)

Basic Electrical Package (BEP)
Prewired AC power distribution of all factory-installed features including block heater, two GFCI-protected internal 120-volt service receptacles, internal lighting, and commercial grade wall switch.Load center powered by building source power and protected by a main circuit breaker, rated for 100 amps (single phase) or 125 amps (three phase) with capacity and circuit positions for future expansion.AC power distribution installed in accordance with NEC and all wiring within EMT thin wall conduit. LED AC lights located within UL-listed fixtures.

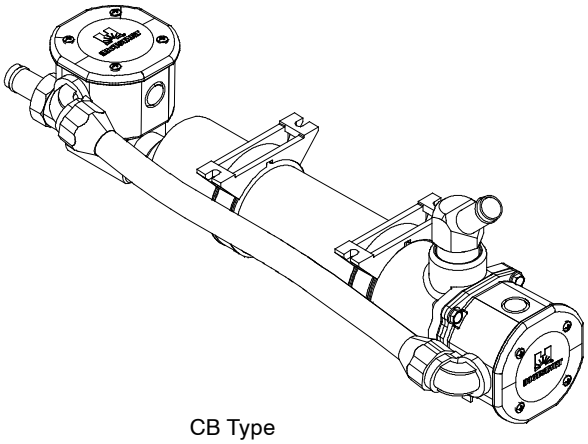
DC Light Package
Prewired DC light package offering an economical alternative light source within the enclosure, as a complement to the BEP or a source of light when AC power is not available.Battery drain limited with fuse protection and controlled through a 0-60 minute, spring-wound, no-hold timer.Available in LED for generator sets between 300-450 kW.

Block Heater, Junction Box.
Factory-supplied block heater prewired to a junction box providing a convenient location for the customer wiring of the block heater.

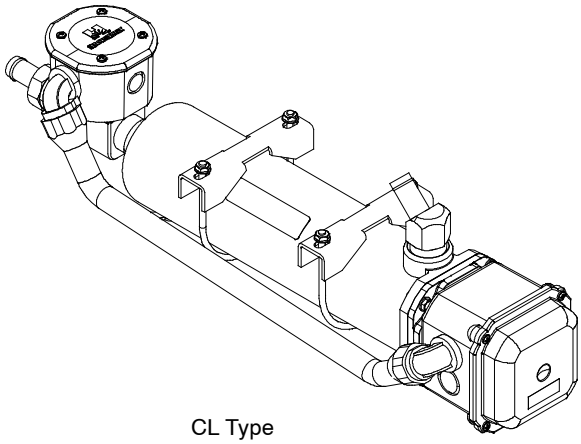
KOHLER

Industrial Generator Set Accessories

Engine Block Heater Kits



CB Type



CL Type

Block Heater Kit, Typical

Applicable Models

- 180- 200RZXB
- 180- 200REZXB
- 230- 275REOZJE
- 300- 500REOZJ
- 350- 500REOZJB
- 350- 500REOZJC
- 350- 400REOZJD
- 500REOZVC
- 550- 600REOZVB

Standard Features

- UL- C/US listed
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

Description

The engine block heater kit heats the engine coolant in cold ambient, warming the cylinders, oil, and charge air circuit which all help to give a faster starting time. The engine block heater uses thermosiphon action to circulate warm coolant into the engine and supplies constant heating to the engine. The engine block heater helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 27°C (80°F) and turns OFF when the engine coolant temperature reaches 38°C (100°F).

The engine block heater kit is recommended for ambient temperatures below 10°C (50°F).

The engine block heater kits are available in 120 V, 208 V, 240 V, and 480 V versions.

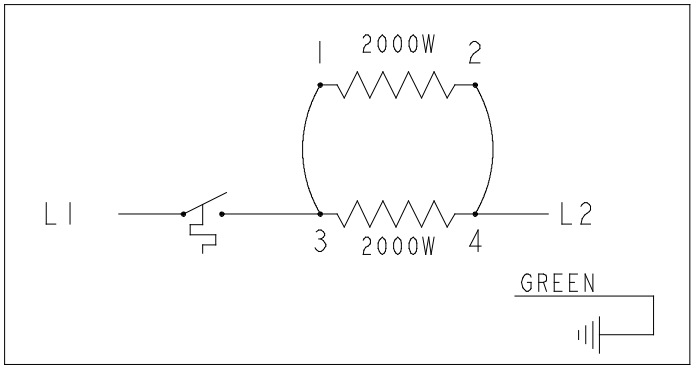
Block Heater Specifications

Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Thermostat Temperature Range	27°- 38°C (80°- 100°F)
Temperature High Limit	96°C (205°F)
Max. Pressure	125 psi (860 kPa)
Inlet/Outlet Plumbing	1 in. NPT
System Ingress	NEMA 4

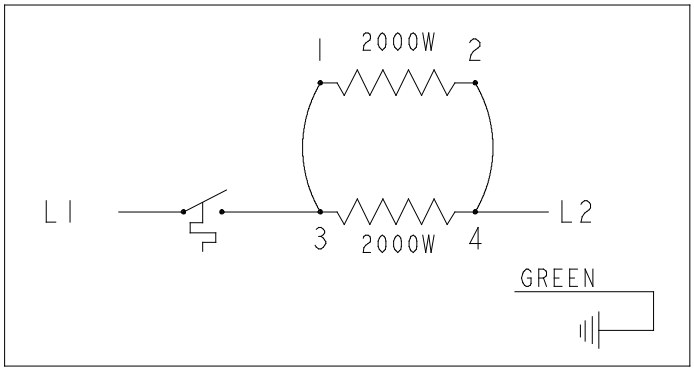
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase
GM75809- KA1	GM76113	2500	90- 120	1
GM75809- KA2	GM76114	2500	190- 208	1
GM75809- KA3	GM76115	2500	210- 240	1
GM75809- KA4	GM76116	2500	380- 480	1
GM76120- KA1	GM76113	2500	90- 120	1
GM76120- KA2	GM76114	2500	190- 208	1
GM76120- KA3	GM76115	2500	210- 240	1
GM76120- KA4	GM76116	2500	380- 480	1
GM79186- KA1	GM79182	4000	190- 208	1
GM79186- KA2	GM79183	4000	210- 240	1
GM79186- KA3	GM79184	4000	380- 480	1
GM79186- KP1	GM79182	4000	190- 208	1
GM79186- KP2	GM79183	4000	210- 240	1
GM79186- KP3	GM79184	4000	380- 480	1
GM79187- KA1	GM79182	4000	190- 208	1
GM79187- KA2	GM79183	4000	210- 240	1
GM79187- KA3	GM79184	4000	380- 480	1
GM79187- KP1	GM79182	4000	190- 208	1
GM79187- KP2	GM79183	4000	210- 240	1
GM79187- KP3	GM79184	4000	380- 480	1
GM84820- KA1	GM76113	2500	90- 120	1
GM84820- KA2	GM76114	2500	190- 208	1
GM84820- KA3	GM76115	2500	210- 240	1
GM84820- KA4	GM76116	2500	380- 480	1

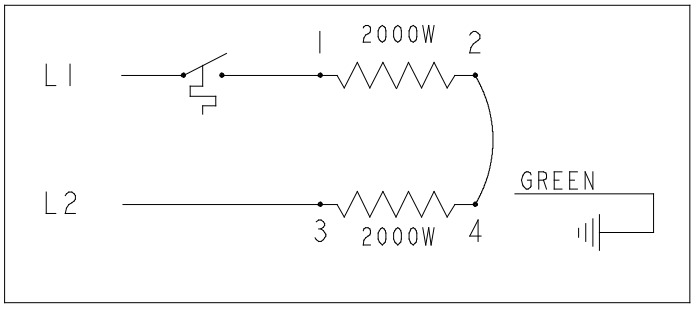
Wiring Diagram



208 VAC single phase- parallel



240 VAC single phase- parallel



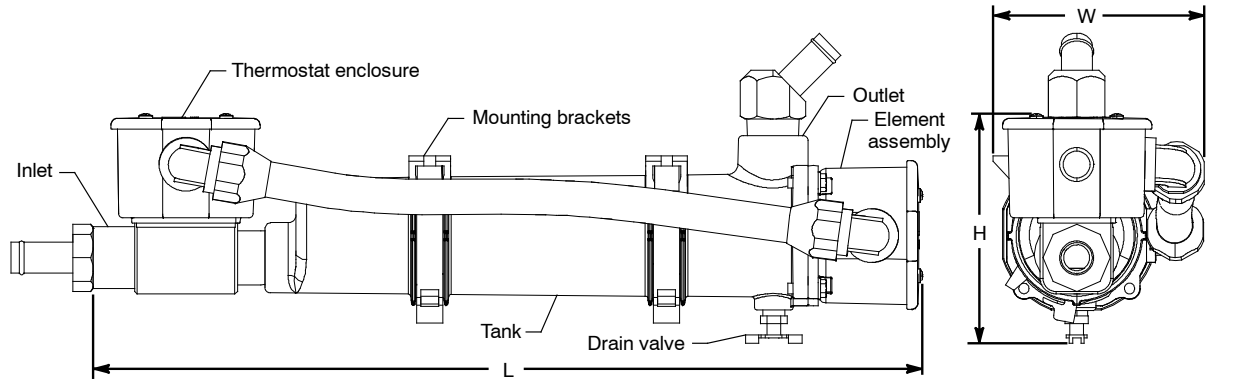
480 VAC single phase- parallel

GM79182

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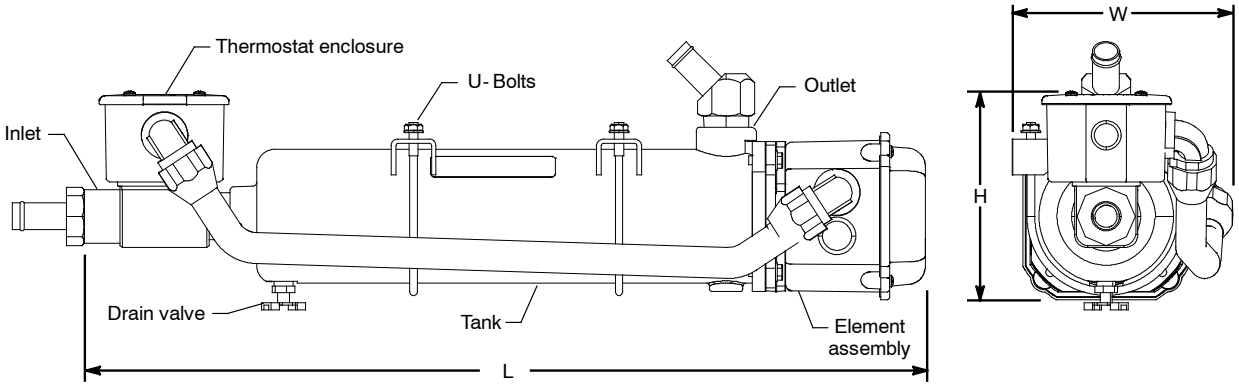
Dimensions and Weights

CB type block heater size, L x H x W, mm (in):	510 x 132 x 129 (20.1 x 5.2 x 5.1)
CL type block heater size, L x H x W, mm (in):	597 x 147 x 158 (23.5 x 5.8 x 6.2)
CB type block heater weight, kg (lb):	3 (6.9)
CL type block heater weight, kg (lb):	4.5 (10)



CB type

GM76113



CL type

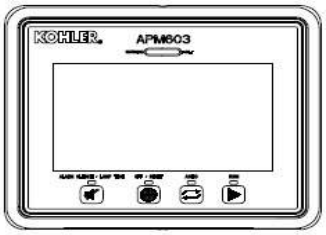
GM79182

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Integral Voltage Regulator with Kohler® APM603 Controllers and Menu-Driven Selections (80-4000 kW Generator Set Models)



APM603 Controller
with Integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented high speed digital voltage regulator design providing ±0.25% no-load to full-load regulation using root-mean-square (RMS) voltage sensing.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM603

Calibration	Range Settings	Default Selection
Voltage Adjustment	±10% of System Voltage	System Voltage
Controller Gain	40 to 70 Hz	P: 1.3 I: 1.0 D: 0.25
Underfrequency Unload or Frequency Setpoint	40 to 70 Hz	0.5 Hz Below System Frequency (ECM)
Underfrequency Unload Scope	0-10% of System Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	-50% to 110%	0 kVAR
PF Adjust Control	-0.50 to 1.0 to 0.50	0.8 Lagging
VAR/PF Gain Adjustment	P: 0.3 to 3.00 I: 0.3 to 3.00 D: 0.3 to 3.00	P: 1.0 I: 1.0 D: 0.25

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Specification/Feature	Integral with APM603
Generator Set Availability	80-4000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-600 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5.0 ADC with GM88453 Activator Board
Maximum Output	7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.25%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	3-phase: 1 mS 1-phase: 5 mS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Display
Remote Voltage Adjustment	Analog 0-5 VDC (±10%) Input Optional
Paralleling Capability	Full Load Share and Control plus Reactive Droop

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can control Fast Response™ II, Fast Responset™X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

- Voltage Regulator Configuration
  - Under Frequency Unload Settings
  - Single and Three Phase Sensing
  - Voltage Target
  - Voltage Regulator Gains

Paralleling Settings, APM603

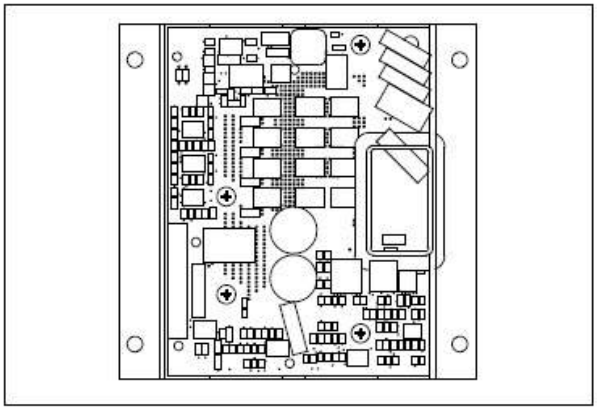
- Synchronizing parameters setup
  - Voltage matching
  - Frequency matching
  - Phase matching
  - Time delay
- Load sharing
  - kW sharing
  - kVAR sharing
  - Baseload settings
  - Droop

Paralleling Metering, APM603

- Paralleling State
- Paralleling Mode
- System Voltage
- System Frequency
- Connected Generators
- Sync Status
- Engine Speed

VAR/PF Control Input	VAR Control Mode, PF Control Mode, System VAR Control, System PF Control

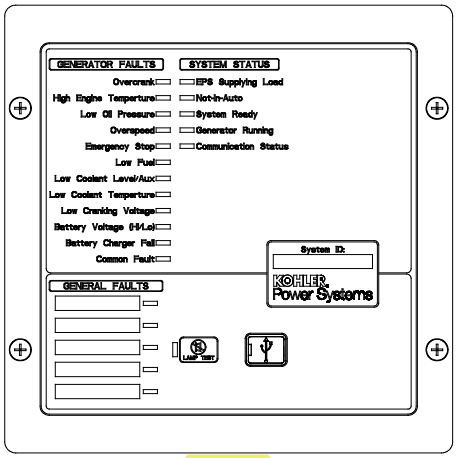
Activator Board GM88453



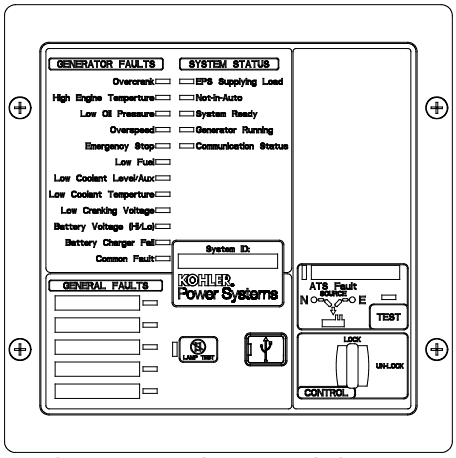
- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

Modbus® is a registered trademark of Schneider Electric.

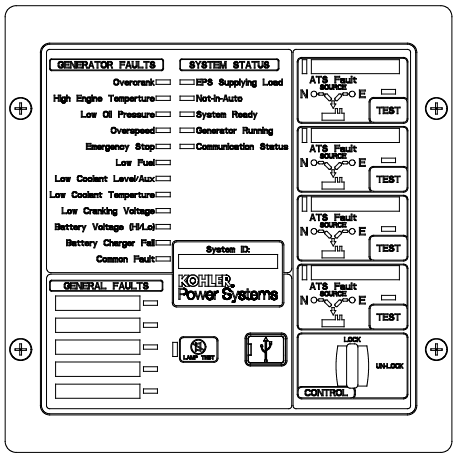
Remote Serial Annunciator III (RSA III)



RSA III



RSA III with a Single ATS Control



RSA III with Four ATS Controls

Remote Serial Annunciator III (RSA III) for Kohler® Controllers

- Monitors the generator set equipped with one of the following controllers:

APM402	Decision-Maker® 3000
APM603	Decision-Maker® 3500
APM802	Decision-Maker® 6000
Decision-Maker® 3+	Decision-Maker® 8000
Decision-Maker® 550	KPC 1000

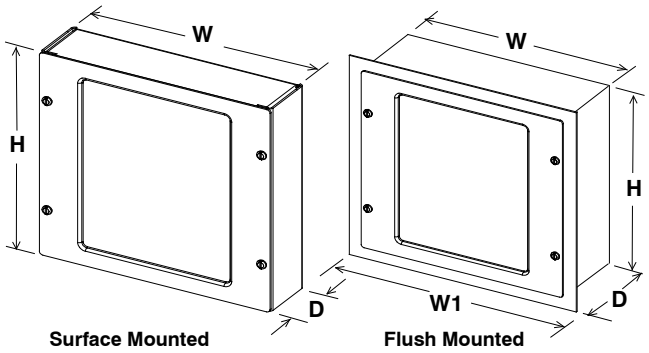
- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source for up to four ATS with any of the following controllers:
  - Decision-Maker® MPAC® 750, 1200, and 1500
  - MPAC® 1000 and 1500
- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:
  - RS-485 for serial bus network
  - USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
  - 12-/24-volt DC power supply
  - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

- Dimensions—W x H x D, mm (in.).
  - **Surface Mounted:**
    203 x 203 x 83 (8.0 x 8.0 x 3.3)
  - **Flush Mounted (Inside Wall):**
    203 x 203 x 76 (8.0 x 8.0 x 3.0)
    Flush mounting plate W1: 254 (10.0)

* SiteTech™ software is available to Kohler authorized distributors and dealers.

Modbus® is a registered trademark of Schneider Electric.



Surface Mounted **Flush Mounted**

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
User Input #4 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #4 (Shutdown) (1)	Red	On	Green	Off	Green
User Input #5 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #5 (Shutdown) (1)	Red	On	Green	Off	Green
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA III with ATS Controls only)	Red	On	Red or Yellow	Green or Off	Green

Green LEDs appear as steady on when activated.
Yellow LEDs slow flash when activated except steady on with EPS supplying load and high battery voltage.
Red LEDs slow flash when activated except fast flash with loss of communication and not-in-auto.

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.
(2) Decision-Maker® 3+ controller only.
* May require optional kit or user-provided device to enable function and LED indication.
† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.
Modbus® is a registered trademark of Schneider Electric.

ATS Controls (RSA III with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated lock/unlock switch for Test feature
- Test pushbutton

NFPA Requirements

- NFPA 110 compliant
- Engine functions:
  - High battery voltage warning *
  - High engine temperature shutdown
  - High engine temperature warning *
  - Low battery voltage warning *
  - Low coolant level/aux. shutdown
  - Low coolant temperature warning *
  - Low cranking voltage
  - Low fuel warning (level or pressure) *
  - Low oil pressure shutdown
  - Low oil pressure warning *
  - Overcrank shutdown
  - Overspeed shutdown
- General functions:
  - Audible alarm silence
  - Battery charger fault *
  - Lamp test
  - Master switch not-in-auto

Fault and Status LEDs and Lamp Test Switch

Alarm Horn. Horn sounds giving a minimum 90 dB at 0.1 m (0.3 ft.) audible alarm when a warning or shutdown fault condition exists except on high/low battery voltage or EPS supplying load.

Alarm Silenced. Red LED on lamp test switch lights when alarm horn is deactivated by alarm silence switch.

Alarm Silence Switch. Lamp test switch quiets the alarm during servicing. The horn will reactivate upon additional faults.

ATS Fault. Red LED lights when ATS fails to transfer.

Battery Charger Fail. LED lights if battery charger malfunctions. Requires battery charger with alarm contact.

Battery Voltage Hi/Lo. LED flashes if battery or charging voltage drops below preset level. LED lights steady if battery voltage exceeds preset level.

Common Fault. LED lights when a single or multiple common faults occur.

Communication Status. Green LED lights indicating annunciator communications functional. Red LED indicates communication fault.

EPS Supplying Load. LED lights when the Emergency Power System (EPS) generator set is supplying the load (APM402, APM603, APM802, and Decision-Maker® 550, 3000, 3500, 6000, and 8000 controllers) or when transfer switch is in the emergency position (Decision-Maker® 3+ controller).

Emergency Stop. LED lights and engine stops when emergency stop is made. May require a local emergency stop switch on some Decision-Maker® 3+ controllers.

Generator Running. LED lights when generator set is in operation.

High Engine Temperature. Red LED lights if engine has shut down because of high engine coolant temperature. Yellow LED lights if engine coolant temperature approaches shutdown range. Requires warning sender on some models.

Lamp Test (Switch). Switch tests all the annunciator indicator LEDs and horn.

Low Coolant Level/Aux. LED lights when engine coolant level is below acceptable range on radiator-mounted generator sets only. When used with a Decision-Maker® 3+ controller, the LED indicates low coolant level or an auxiliary fault shutdown. Requires user-supplied low coolant level switch on remote radiator models.

Low Coolant Temperature. LED lights if optional engine block heater malfunctions and/or engine coolant temperature is too low. Requires prealarm sender on some models.

Low Cranking Voltage. LED lights if battery voltage drops below preset level during engine cranking.

Low Fuel (Level or Pressure). LED lights if fuel level in tank approaches empty with diesel models or fuel pressure is low on gas models. Requires customer-supplied switch.

Low Oil Pressure. Red LED lights if generator set shuts down because of insufficient oil pressure. Yellow LED lights if engine oil pressure approaches shutdown range. Requires warning sender on some models.

Not In Auto. LED lights when the generator set controller is not set to automatic mode.

Overcrank. LED lights and cranking stops if engine does not start in either continuous cranking or cyclic cranking modes.

Overspeed. LED lights if generator set shuts down because of overspeed condition.

System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1-#5. Monitors five digital auxiliary inputs (can be configured as warnings or shutdowns). User-defined digital inputs are selected via the RSA III master for local or remote (generator set or ATS). The user-defined digital input can be assigned via PC using SiteTech™ setup software.

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Alternator Data

TECHNICAL INFORMATION BULLETIN

Alternator Data Sheet

Alternator Model: 5M4027 12-MAR-19

Kilowatt ratings at	1800 RPM	60 Hertz		12 Leads	
kW (kVA)	3 Phase	0.8 Power Factor		Dripproof or Open Enclosure	
	CONTINUOUS ①②			STANDBY ①②	
Voltage*	NEMA B / 80 °C	NEMA F / 105 °C	NEMA H / 125 °C	NEMA F / 130 °C	NEMA H / 150 °C
240/480	440 (550)	500 (625)	515 (644)	515 (644)	560 (700)
220/440	410 (513)	460 (575)	485 (606)	500 (625)	520 (650)
208/416	400 (500)	445 (556)	470 (588)	475 (594)	505 (631)
200/400	382 (478)	427 (534)	441 (551)	443 (554)	459 (574)
190/380	360 (450)	405 (506)	405 (506)	405 (506)	405 (506)

① Rise by resistance method, Mil-Std-705, Method 680.1b. ② Machine rated for Max Ambient of 40 °C, Max Altitude 3300 ft

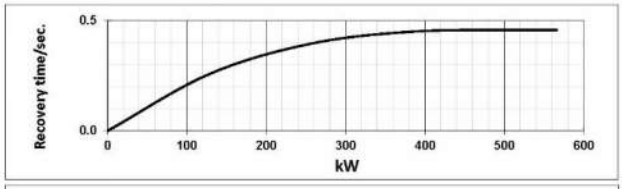
Submittal Data: 480 Volts*, 515 kW, 644 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase **High Wye CONNECTION**

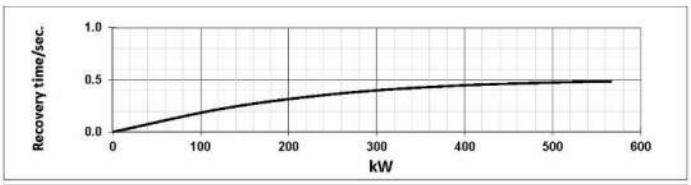
Mil-Std-705B Method	Description	Value	Units	Mil-Std-705C Method	Description	Value	Units
301.1b	Insulation Resistance	>1.5 Meg	Ohms	505.3b	Overspeed	2250	RPM
302.1a	High Potential Test			507.1c	Phase Sequence CCW-ODE	ABC	
	Main Stator	1960	Volts	508.1c	Voltage Balance, L-L or L-N	0.2%	
	Main Rotor	1500	Volts	601.4a	L-L Harmonic Max - Total (Distortion Factor)	5.0%	
	Exciter Stator	1500	Volts				
	Exciter Rotor	1500	Volts	601.4a	L-L Harmonic Max - Single	3.0%	
	PMG Stator	1500	Volts	601.1c	Deviation Factor	5.0%	
401.1a	Stator Resistance, Line to Line High Wye Connection	0.01260	Ohms	---	TIF (1960 Weightings)	<50	
				---	THF (IEC, BS & NEMA Weightings)	<2%	
	Rotor Resistance	0.398	Ohms				
	Exciter Stator	23	Ohms				
	Exciter Rotor	0.045	Ohms				
	PMG Stator	2.1	Ohms				
410.1a	No Load Exciter Field Amps at 480 Volts Line to Line	0.7	A DC	**Additional Prototype Mil-Std Methods are Available on Request.**			
420.1a	Short Circuit Ratio	0.591					
421.1a	Xd Synchronous Reactance	2.670	PU	--	Generator Frame	572	
		0.956	Ohms	--	Type	MagnaMax	
422.1a	X2 Negative Sequence React.	0.226	PU	--	Insulation	Class H	
		0.081	Ohms	--	Coupling - Single Bearing	Flexible	
423.1a	X0 Zero Sequence Reactance	0.056	PU	--	Amortisseur Windings	Full	
		0.020	Ohms	--	Excitation	Ext. Voltage Regulated, Brushless	
425.1a	X'd Transient Reactance	0.162	PU	--	Voltage Regulator	DVR2000E+	
		0.058	Ohms	--	Voltage Regulation	0.25%	
426.1a	X''d Subtransient Reactance	0.137	PU				
		0.049	Ohms				
--	Xq Quadrature Synchronous Reactance	1.100	PU	--	Cooling Air Volume	1520	CFM
		0.394	Ohms	--	Heat rejection rate	2033	Btu's/min
427.1a	T'd Transient Short Circuit Time Constant	0.114	Sec	--	Full load current	774.3	Amps
				--	Minimum Input hp required	738.3	HP
428.1a	T''d Subtransient Short Circuit Time Constant	0.01	Sec	--	Full load torque	2153	Lb-ft
				--	Efficiency at rated load :	93.5%	
430.1a	T'do Transient Open Circuit Time Constant	1.68	Sec				
432.1a	Ta Short Circuit Time Constant of Armature Winding	0.017	Sec	--	Weight	2840	lbs

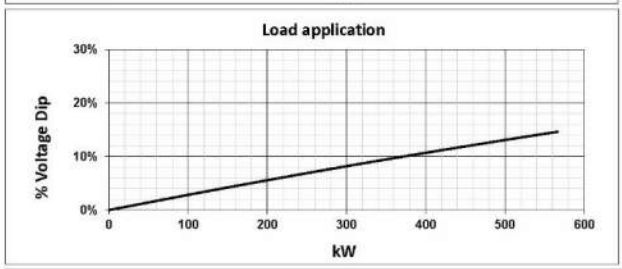
* Voltage refers to wye (star) connection, unless otherwise specified.

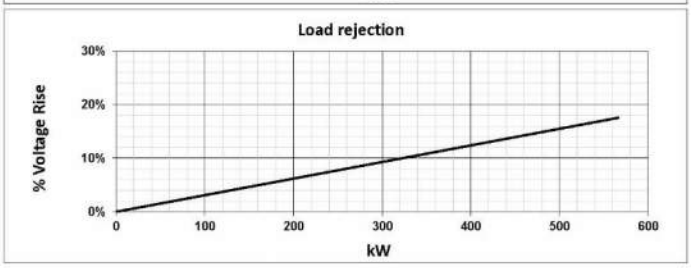
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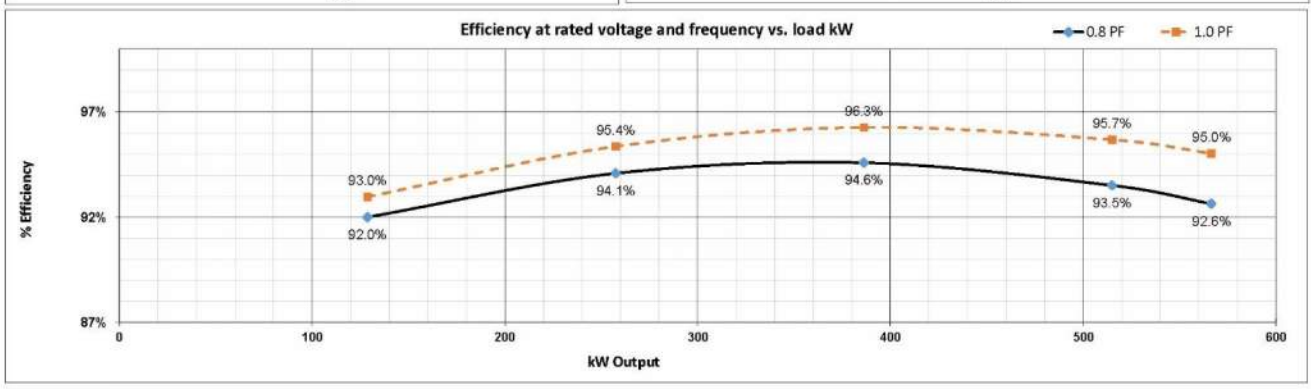
TYPICAL DYNAMIC CHARACTERISTICS

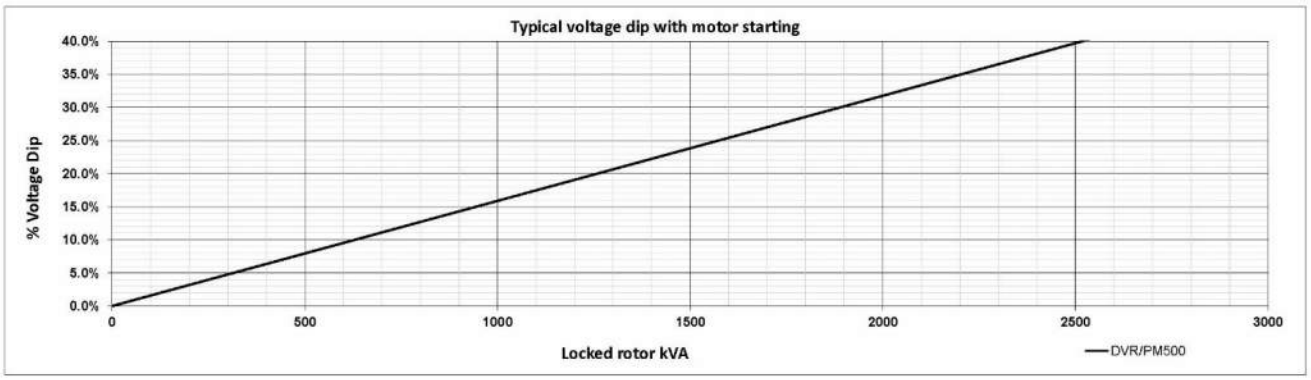








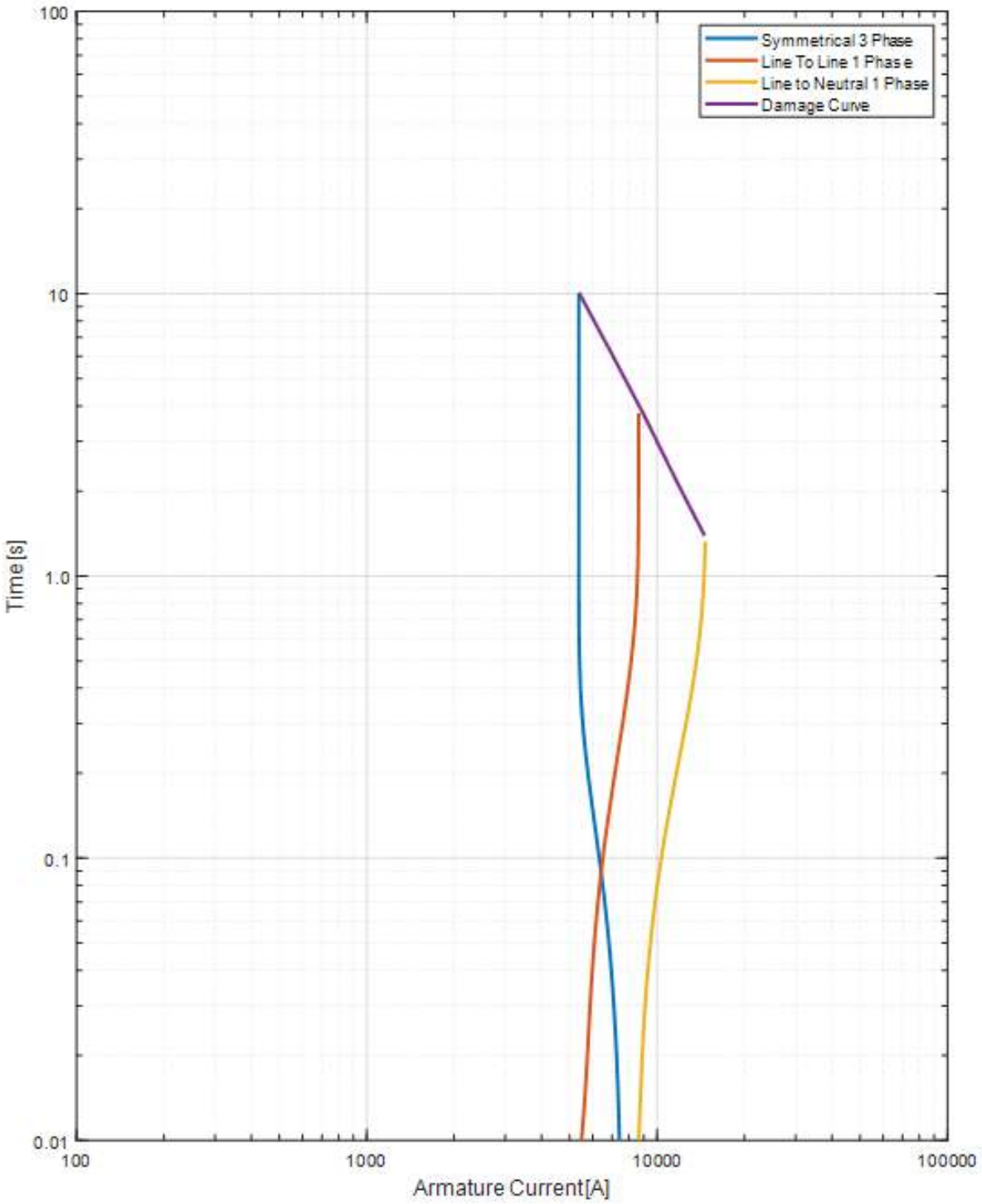




Voltage refers to wye (star) connection, unless otherwise specified..

SHORT CIRCUIT DECREMENT CURVE
60 Hz, Low Wye or Delta Connection

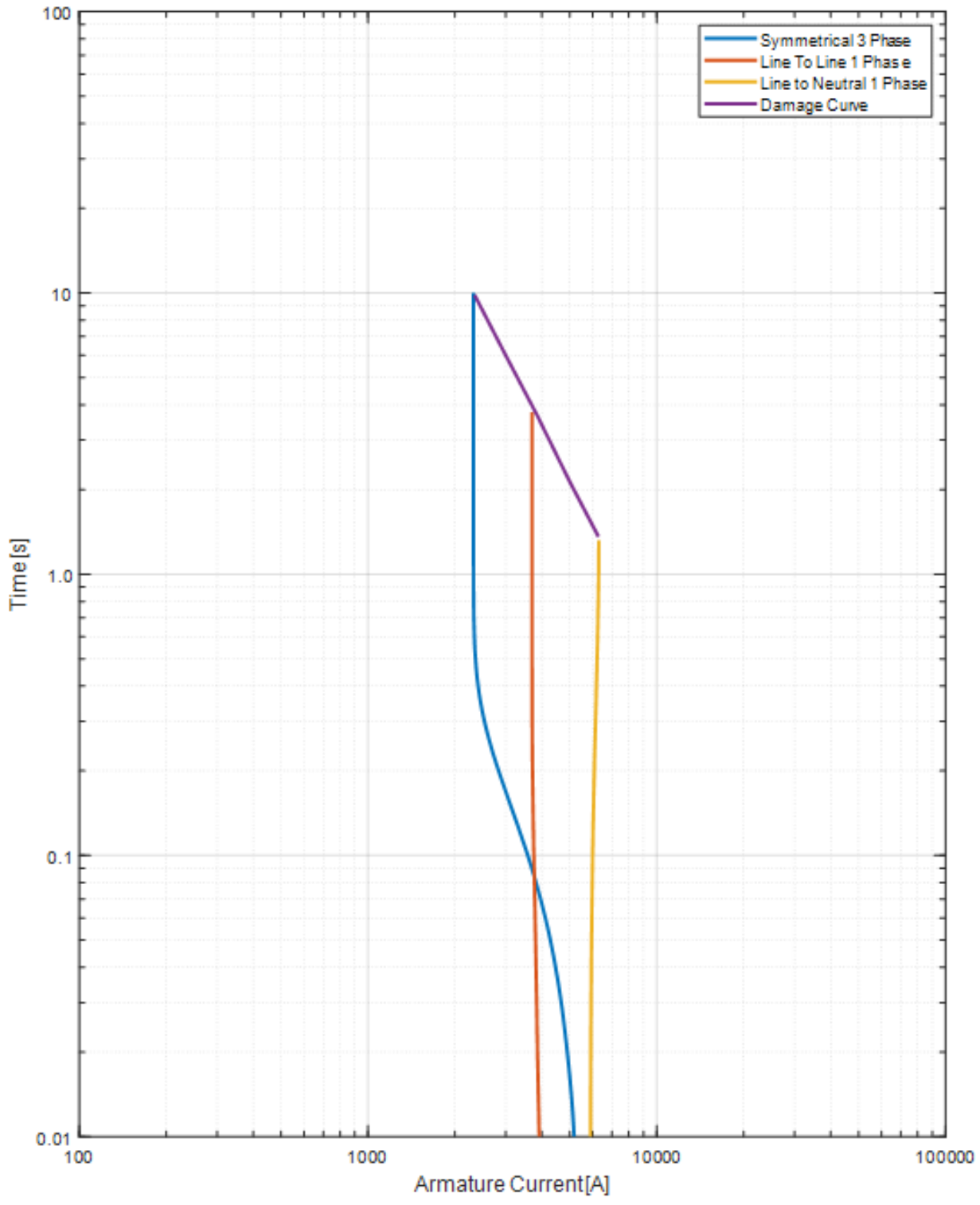
Full Load Current: 1788 Amps **Steady State S.C. Current:** 5364 Amps **Max. 3 ph. Symm. S.C. Current:** 9770 Amps



NOTE: Symmetrical component values are shown, maximum asymmetrical values are 1.732 times the symmetrical values.

SHORT CIRCUIT DECREMENT CURVE
60 Hz, High Wye Connection

Full Load Current: 775 Amps **Steady State S.C. Current:** 2325 Amps **Max. 3 ph. Symm. S.C. Current:** 5657 Amps



NOTE: Symmetrical component values are shown, maximum asymmetrical values are 1.732 times the symmetrical values.

KOHLER®

Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

500REOZVC 60Hz (Standby Duty)	**50°C Ambient Temperature Cooling System**								
	Total external restriction on open unit[7]	Pa *(in.H2O)*	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	**Enclosed Units**
	Maximum allowable ambient temperature	°C *(°F)*	53 (127)	52 (126)	51 (124)	50 (122)	49 (120)	48 (118)	47 (117)
	Cooling system airflow	m3/min *(ft3/min)*	615 (21700)	600 (21200)	585 (20700)	570 (20100)	555 (19600)	540 (19100)	NA (NA)

1. The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
2. Cooling performance is based on operation at 100 m (328 ft.) above sea level. For elevations higher than 100 m (328 ft.), typical cooling performance derate is 1°C (1.8°F) per 250 m (820 ft).
3. For high ambient conditions, check TIB-101 for the generator set power output derate schedule.
4. Incorrect installation, improper operation, fouling of the cooling system, and other variable conditions may reduce cooling performance.
5. Kohler manufactured sound enclosed models are rated in free air with no additional restriction. Consult factory for other variants or conditions such as additional ducting or hoods.
6. Performance is based on a 50/50 water and ethylene glycol mixture.
7. Total external restriction includes restriction upstream and downstream of the unit – any ducting supplying intake air to the unit and any ducting for the discharge.

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Sound Data

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)			
Generator Set Model	**Hz**	**Load**	**Raw Exhaust**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Sound Enclosure**
500REOZVC	60	100% Load	122.4	93.8	91.9	75.1
		No Load	107.8	90.9	89.0	73.8

Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.

500REOZVC **60 Hz**

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Sound	Right	56.8	64.8	69.4	69.3	66.3	63.6	58.8	52.5	74.5
			Front-Right	57.1	68.1	67.9	66.7	66.9	63.4	57.9	50.0	74.1
			Front	55.3	66.2	69.0	69.3	68.2	64.3	58.6	50.4	74.9
			Front-Left	57.0	65.7	72.7	71.2	68.9	65.2	57.4	53.4	76.8
			Left	56.3	66.1	70.1	69.3	66.7	66.2	58.0	55.6	75.2
			Back-Left	52.8	63.7	71.2	70.6	69.3	66.4	58.2	51.7	76.1
			Back	59.0	64.3	68.2	66.7	65.7	63.2	57.4	48.8	73.2
			Back-Right	54.7	67.3	68.8	67.9	67.6	65.6	57.1	56.7	74.8
			8-pos. log avg.	56.5	66.0	69.9	69.1	67.6	64.9	58.0	53.2	75.1

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Enclosure	Measurement Position	Right	Front-Right	Front	Front-Left	Left	Back-Left	Back	Back-Right	8-pos. log avg.
100% Load	7 (23)	Weather	Overall Levels	93.1	92.7	84.3	90.9	92.1	91.5	91.1	94.4	91.9

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)		Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	Right	71.3	76.6	87.5	83.7	86.5	87.6	85.0	89.6	95.0
			Front-Right	68.1	72.2	80.2	82.3	86.0	88.0	86.4	90.3	94.6
			Front	61.9	68.5	80.3	75.7	78.9	79.7	77.2	75.5	86.2
			Front-Left	60.1	71.2	80.5	82.3	87.9	88.0	84.0	80.2	92.8
			Left	66.3	73.0	84.4	82.7	87.3	89.8	85.8	81.7	94.0
			Back-Left	65.9	73.6	84.4	83.1	87.2	88.2	84.6	81.9	93.4
			Back	71.7	76.9	88.9	81.4	83.6	85.3	83.5	82.8	93.0
			Back-Right	62.3	75.9	86.4	83.1	88.1	89.5	87.5	91.1	96.3
			8-pos. log avg.	67.7	74.3	85.2	82.3	86.4	87.8	85.0	86.9	93.8

			Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Exhaust	Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	99.3	106.9	110.7	111.1	113.6	116.4	115.3	115.3	122.4

KOHLER®

Emissions Data

KOHLER®

500REOZVC

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TAD1641GE-B	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	565	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	NVPXL16.1ACC
Compression Ratio:	16.5:1	EPA Certificate:	NVPXL16.1ACC-020
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA:	**EPA D2 Cycle 5-mode weighted**	
HC	0.139	g/kWh
NOx (Oxides of Nitrogen as NO_2)	5.56	g/kWh
CO (Carbon Monoxide)	0.349	g/kWh
PM (Particulate Matter)	0.04	g/kWh

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2022
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACC-012**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACC

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

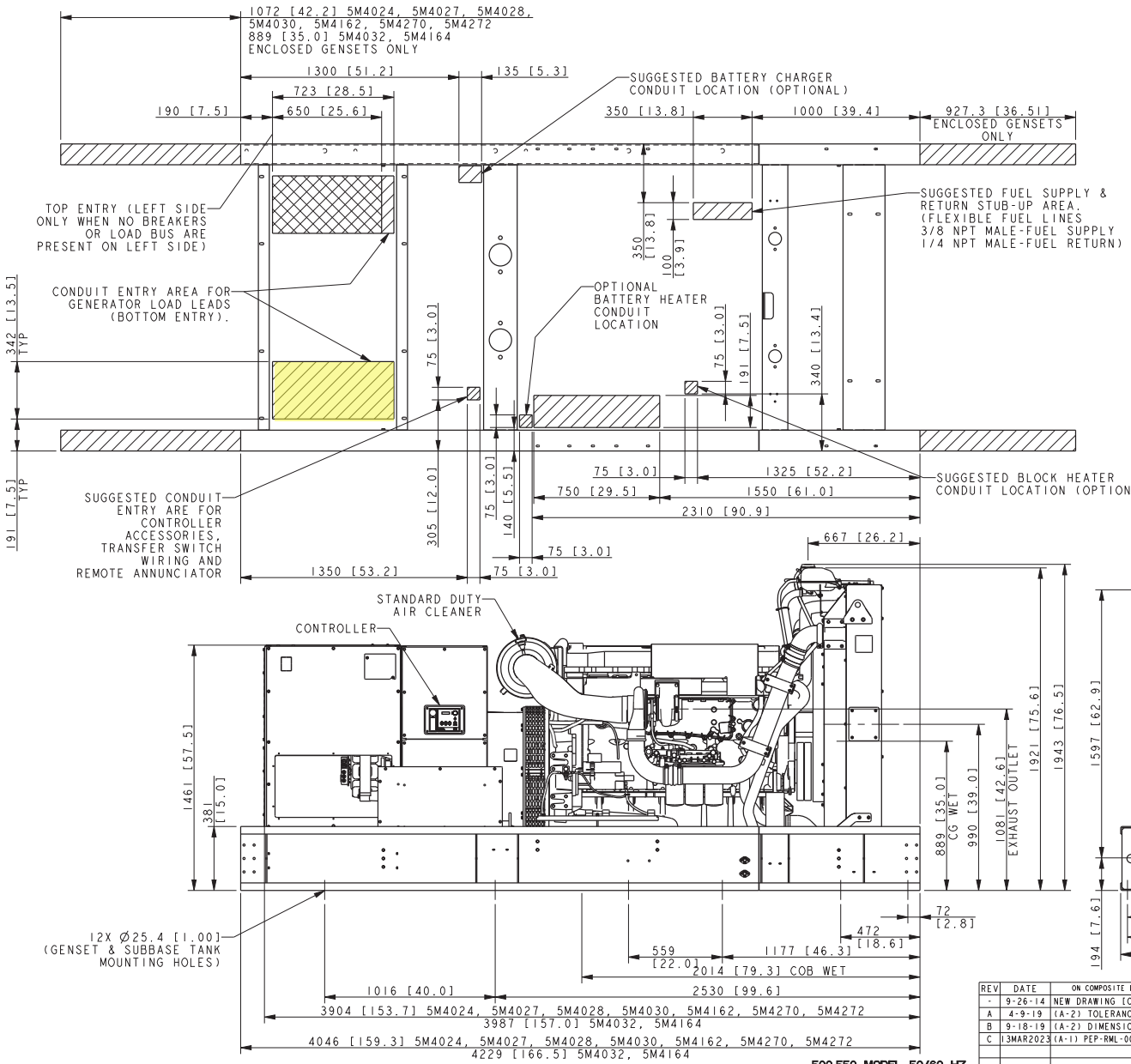
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

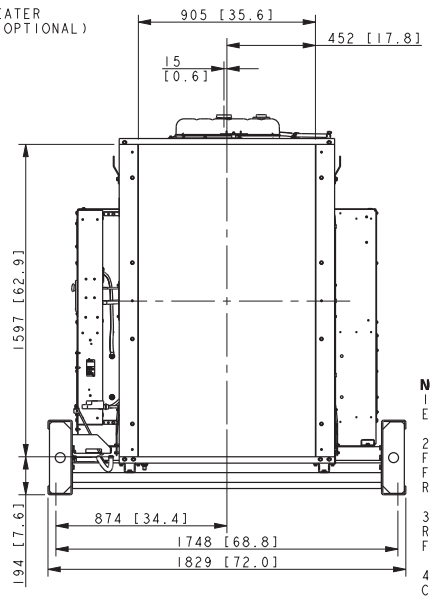
This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

KOHLER®

Dimensional Drawings

MODEL	ALTERNATOR FRAME	CONNECTION	GENSET WEIGHT (WET)
500 50/60 HZ	5M4024	10 LEAD	3778 KG [8330 LBS]
500 50/60 HZ	5M4027	12 LEAD	3828 KG [8440 LBS]
500 50/60 HZ	5M4028	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4030	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4032	10 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4162	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4164	4 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4270	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4272	4 LEAD	3924 KG [8650 LBS]





INSTALLATION NOTE
IF SUBBASE FUEL TANK AND/OR ENCLOSURE IS USED, REFER TO SUBBASE FUEL TANK/ENCLOSURE ADV TO DETERMINE MOUNTING LOCATIONS.

NOTES:
1) DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

2) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT. REFER TO ENCLOSURE ADV.

3) IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

4) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

500-550 MODEL 50/60 HZ
5M4024, 5M4027, 5M4028, 5M4030, 5M4032
5M4162, 5M4164, 5M4270, 5M4272
RECONN, 380V, 600V ALTERNATORS, VOLVO

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-26-14	NEW DRAWING [CT92986]	SAM
A	4-9-19	(A-2) TOLERANCES REMOVED [CT194818]	SUD
B	9-18-19	(A-2) DIMENSION 1829 [72.0] ADDED [CT198657]	HM
C	13MAR2023	(A-1) PEP-RML-001 NOTE ADDED; SEE SHEET 2 [CT226059]	PBG

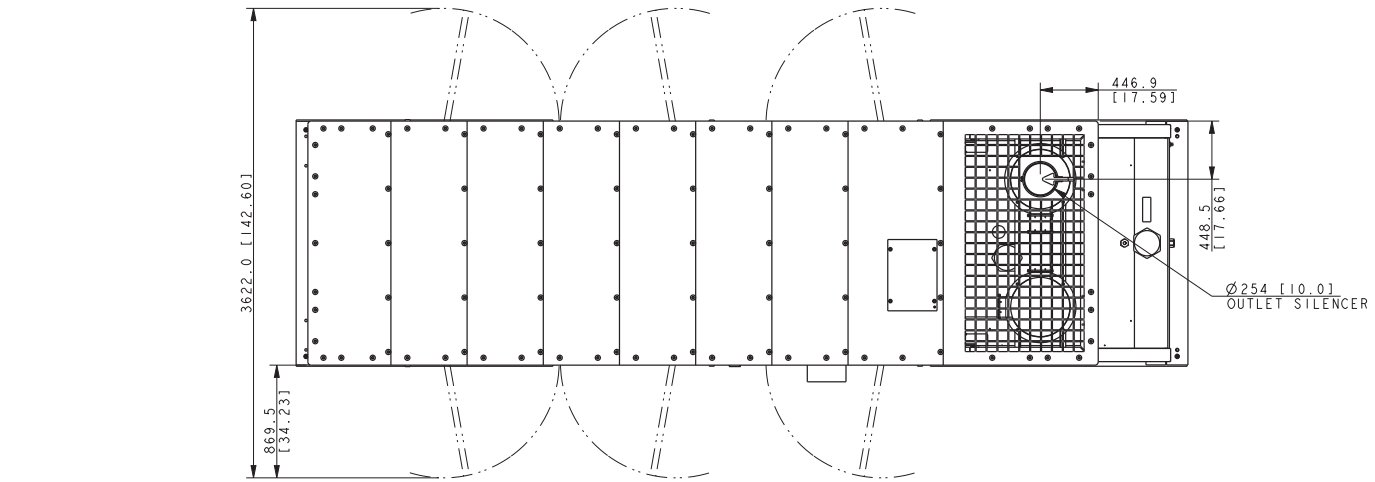
UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30' MAX.
SURFACE FINISH
THIRD ANGLE PROJECTION

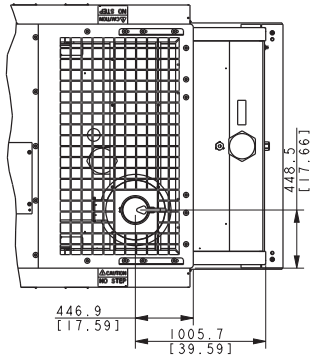
APPROVALS		DATE
DRAWN	SAM	9-26-14
CHECKED	SAM	9-26-14
APPROVED	PBT	9-26-14

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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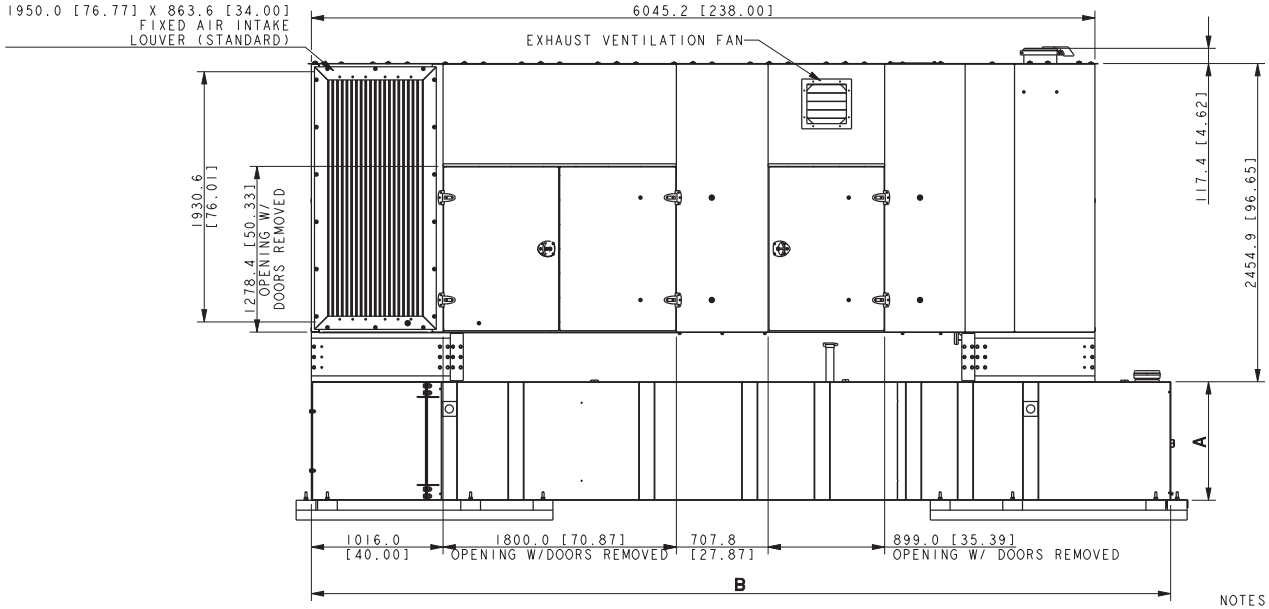
TITLE: **DIMENSION PRINT, 500 KW VOLVO**

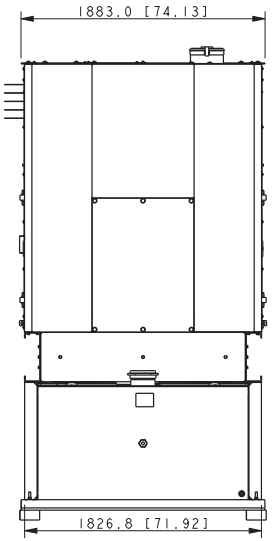
SCALE 0.08 | CAD NO. | SHEET 1 of 2
DWG NO. **ADV-8745** | **D**





WEATHER ENCLOSURE





NOTES:

FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

500-600 REOZVB	KG [LBS]
STEEL SOUND L2 ENCLOSURE WEIGHT	1483 [3270]
ALUM SOUND L2 ENCLOSURE WEIGHT	859 [1895]
STEEL WEATHER ENCLOSURE WEIGHT	1326 [2925]
ALUM WEATHER ENCLOSURE WEIGHT	703 [1550]

TANK INFORMATION

LITERS [GALLONS] MIN HOURS	GENSETS	DIM A MM [INCH]	DIM B MM [INCH]	TANK WEIGHT KG [LBS] (NO FUEL)
2049 [541] 12 HOURS	500-600KW	406.4 [16.0]	6045.2 [238.0]	1444 [3183]
3910 [1033] 24 HOURS		736.6 [29.0]		1793 [3952]
5730 [1513] 36 HOURS		914.4 [36.0]	6629.4 [261.0]	2201 [4853]
7645 [2019] 48 HOURS			8026.4 [316.0]	2665 [5876]
2039 [538] 12 HOURS STATE		381.0 [15.0]	6858.0 [270.0]	1591 [3508]
3930 [1038] 24 HOURS STATE		660.4 [26.0]		1893 [4173]
5757 [1520] 36 HOURS STATE		914.4 [36.0]		2177 [4800]
7658 [2023] 48 HOURS STATE			8458.2 [333.0]	2680 [5908]

500-600KW REOZVB/C
STEEL/ALUM ENCL & TANKS
SOUND & WEATHER

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-27-11	NEW DRAWING [91023-12]	RJS
A	3-19-12	(A-8) SEE SHEETS 5-6 [CT08748]	DJV
B	1-10-13	SHEET 7 ADDED [CT34883]	SDS
C	8/10/17	(D-4) ADD DIM Ø254.0 SEE SHEETS 2,4,5,6 [CT172496]	RMJ
D	11-25-19	(C-5) SAI1185 EXHAUST VENT FAN ADDED [CT199135]	SRB
E	02MAY2023	SEE SHEET 3 [CT227188]	APM

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS GENERAL TOLERANCES : NA

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	RJS	6-27-11
CHECKED	RJS	6-27-11
APPROVED	AJD	6-27-11

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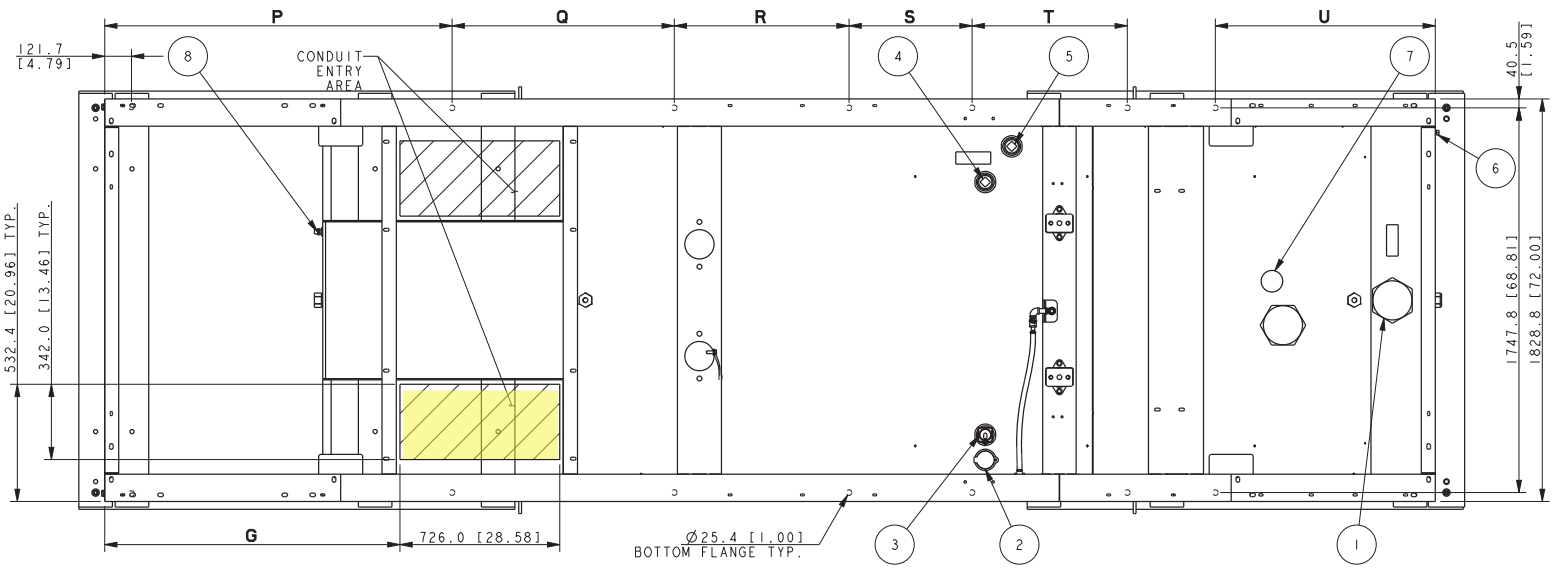
METRIC | PRO-E

TITLE: DIMENSION PRINT, 500-600KW ENCLS & TANKS

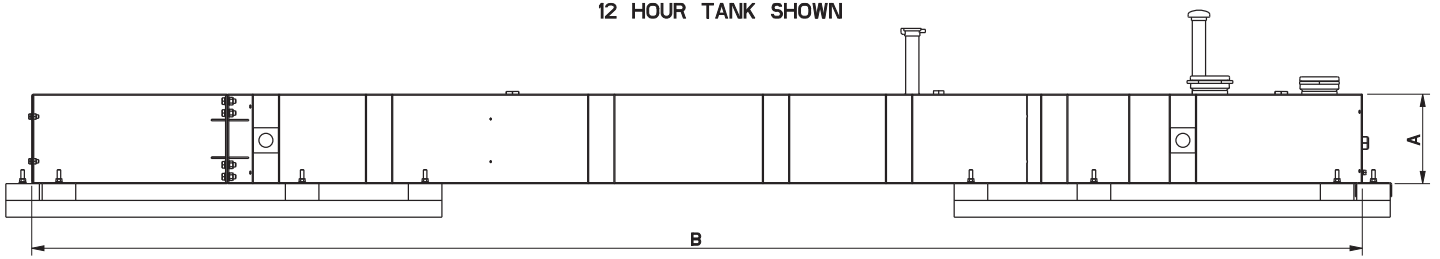
SCALE 0.05 | CAD NO. | SHEET 1 of 7

DWG NO. ADV-8417 | D

STANDARD TANK



12 HOUR TANK SHOWN



2049 L [541 GAL.] 12 HOUR TANK SHOWN.

ITEM	DESCRIPTION
8	SWITCH, FUEL IN BASIN
7	VENT, NORMAL
6	DRAIN, (1/2" NPT)
5	RETURN, FUEL
4	SUPPLY, FUEL
3	GAUGE, FUEL LEVEL, W/ SENDER
2	FILL CAP, 2" LOCKABLE W/PIPE RISER
1	CAP, EMERGENCY VENT

TANK INFORMATION										JUNCTION BOX G			
										500-550 KW		600 KW	
LITERS [GALLONS] MIN HOURS	A	B	P	Q	R	S	T	U	WEIGHT KG [LBS]	5M4024, 5M4027 5M4028, 5M4030 5M4162, 5M4270 5M4272	5M4032 5M4164	5M4030 5M4272	5M4032 5M4164 5M4276
2049 [541] 12 HOURS	406.4 [16.0]	6045.2 [238.0]	1578.2 [62.1]	1009.5 [39.7]	794.0 [31.3]	559.0 [22.0]	705.2 [27.8]	999.3 [39.3]	1444 [3183]	1341.3 [52.8]	1176.2 [46.3]	1174.2 [46.2]	1009.1 [39.7]
3910 [1033] 24 HOURS	736.6 [29.0]								1793 [3952]				
5730 [1513] 36 HOURS	914.4 [36.0]	6629.4 [261.0]						1583.5 [62.3]	2201 [4853]				
7645 [2019] 48 HOURS		8026.4 [316.0]						2980.5 [117.3]	2665 [5876]				

12 - 48 HOUR 500-600KW REOZVB/C GENSET & STANDARD TANKS WITH SOUND OR WEATHER ENCLOSURE

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-29-11	NEW DRAWING [91023-12]	JB2
A	3-19-12	(A-8) SEE SHEETS 5-6 [CT08748]	DJV
B	1-10-13	SEE SHEET 1 [CT34883]	SDS
C	8-10-17	(B-5) ADD NOTE, SEE SHEET 1,2,5,6 [CT172496]	RMJ
D	11-25-19	SEE SHEET 1 & 3 [CT199135]	SRB
E	02MAY2023	SEE SHEET 3 [CT227188]	APM

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS GENERAL TOLERANCES : NA

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	RJS	6-29-11
CHECKED	RJS	6-29-11
APPROVED	AJD	6-29-11

KOHLER CO. METRIC PRO-E

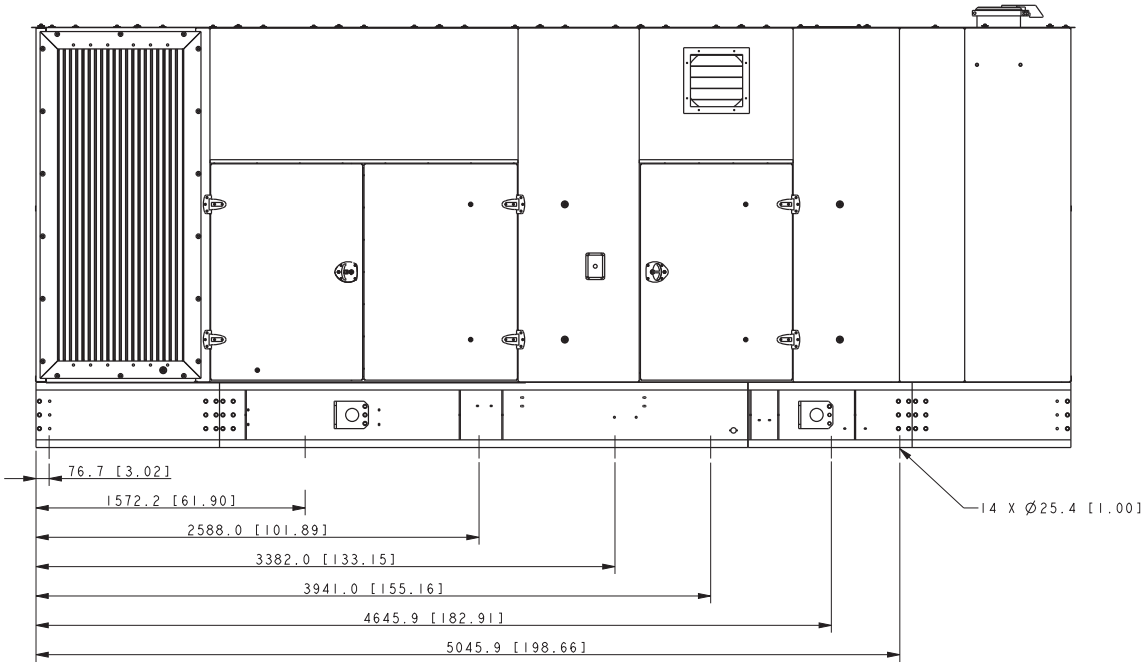
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

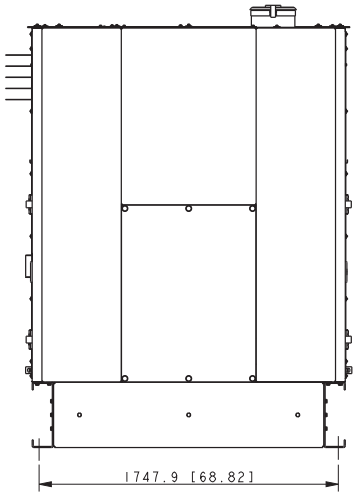
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TITLE: DIMENSION PRINT, 500-600KW ENCLS & TANKS

SCALE 0.40 | CAD NO. | SHEET 4 of 7

DWG NO. ADV-8417 | D





NOTES:

FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
B	1-10-13	SEE SHEET 1 [CT34883]	SDS
C	8-10-17	SEE SHEETS 1,2,4,5,6 [CT172496]	RMJ
D	11-25-19	SEE SHEET 1 & 3 [CT199135]	SRB
E	02MAY2023	SEE SHEET 3 [CT227188]	APM

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS GENERAL TOLERANCES : NA

THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SDS	1-10-13
CHECKED	RJS	1-10-13
APPROVED	AJD	1-10-13

500-600KW REOZVB/C
STEEL/ALUM ENCL & TANKS
SOUND & WEATHER

KOHLER CO. METRIC | PRO-E

POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

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TITLE: **DIMENSION PRINT, 500-600KW ENCLS & TANKS**

SCALE 0.05 | CAD NO. | SHEET 7 of 7

DWG NO. **ADV-8417** | **D**

KOHLER®

Wiring Schematics

SRC NO.	PART NO.	DESCRIPTION	OPTION	FIELD
1	XXXXXX	BATTERY CABLE POSITIVE	–	–
2	XXXXXX	BATTERY CABLE NEGATIVE	–	–
3	GM114916	HARNESS, APM603, PEDESTAL, VOLVO	–	–
4	GM110260	ENGINE HARNESS	–	–
5	GM105367	COMMON FAILURE RELAY	X	X
6	GM105366	15 RELAY DRY CONTACT	X	X
7	GM105663	RUN/OFF/AUTO KEYSWITCH	X	X
8	GM11501	CURRENT SENSE HARNESS	–	–
9	GM105377	VOLTAGE SENSE HARNESS	–	–
10	GM105845	4D ACTIVATOR/CURRENT/VOLT SENSE	–	–
11	GM105378	SHUNT TRIP RELAY HARNESS	X	X
12	GM105379	GROUND FAULT HARNESS	X	X
13	GM105380	LOCAL MOTORIZED BREAKER HARNESS	X	–
14	GM105382	REMOTE MOTORIZED BREAKER HARNESS	X	X
15	XXXXXX	FUEL LEVEL SENDER HARNESS	–	–
16	XXXXXX	FUEL LEAK ALARM HARNESS	–	–
17	GM114915	WIRING DIAGRAM	–	–

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BTCS – BATTERY TEMP COMPENSATION SENSOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENDER
DIAG – DIAGNOSTIC LAMP
ECM – ENGINE CONTROL MODULE
ESS – EMERGENCY STOP SWITCH
FLA – FUEL LEAK ALARM
FLS – FUEL LEVEL SENDER
LCT – LOW COOLANT TEMPERATURE SWITCH
P(#) – PLUG
QCON(#) – QUICK CONNECT
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
SW(#) – SWITCH
TB(#) – TERMINAL BLOCK
W(#) – WIRE WELD

EBG – ENGINE BLOCK GROUND
GND – CONTROLLER BOX GROUND
PGND – PANEL GROUND

GENERATOR ALTERNATOR SHEET 5
ALTERNATOR
ACTIVATOR
4D
P1
CONNECT AS PER ADV-5875
CT
J26
P26
J2
P2
CURRENT SENSING
VOLTAGE SENSING
P1D
J1D

OPTIONAL MANUAL BREAKER
SHUNT TRIP OPTIONAL
BREAKER BOX
OPTIONAL MOTORIZED BREAKER
BREAKER BATTERY
CHARGER
L1
L2
L3
L0
USER POWER SHEET 7 OR 8
SHUNT TRIP RELAY
OPTIONAL
GFI
OPTIONAL
JG1
PG1
JX1
PX1

CONTROL BOX SHEET 2
SEE NOTE1
BREAKER MOTOR RELAY'S
TX1
PX1
JX1
PB1
JB1
TX5
OPTIONAL
LOCAL E-STOP
APM603
RDO CONNECTOR FACTORY USE ONLY
RDO CONNECTOR FACTORY USE ONLY
PX3
PX2
PX1
JX1
OPTIONAL SHEET 2
AUTO/OFF/MANUAL KEY SWITCH
HORN
FUEL LEVEL SENDER
FUEL LEAK SWITCH
SHEET 6
QCONS
RUN RELAY
OPTIONAL
COMMON FAILURE RELAY
15 RELAY BOARD
OPTIONAL
P1 J1
WAKEUP, RUN, GP RELAYS
P2
J2
DIAGNOSTIC PORT
CUSTOMER CONNECTION
TB12 (DIN RAIL)

VOLVO ENGINE SHEET 3
ECM
P4 (ON VOLVO HARNESS)
ENGINE SENSOR'S
BCA
FUSE
SS
SM
RED
BLK
BATTERY SHEET 3
BATTERY CHARGER
SHEET 3
ENGINE BLOCK GROUND

NOTES:
1: TX1 ONLY USED FOR REMOTE MOUNTED BREAKERS.

TB12 CONNECTION CHART

FUNCTION	POS	SIGNAL DESCRIPTION	
REMOTE E-STOP	1	REMOTE EMERGENCY STOP	
	2		
REMOTE START	3	REMOTE START SIGNAL	
	4		
CUSTOMER INTERFACE	5	FUSED BATTERY POWER	
	6	BATT VOLTS WHEN RUNNING	
	7	BATTERY NEGATIVE	
CUSTOMER INTERFACE	8	A (–)	ISOLATED RS-485 #2 (PGEN)
	9	B (+)	
	10	SHIELD	
LOW FUEL	11	LOW FUEL LEVEL SWITCH	
RES IN RETURN	12	LOW FUEL LEVEL SWITCH RETURN	
BAT CHRG FLT	13	BATTERY CHARGER FAULT	
RES IN RETURN	14	BATTERY CHARGER FAULT RETURN	
AUX WARNING	15	AUXILIARY WARNING	
RES IN RETURN	16	AUXILIARY WARNING RETURN	
AUX FAULT	17	AUXILIARY FAULT	
RES IN RETURN	18	AUXILIARY FAULT RETURN	
CUSTOMER INTERFACE	19	A (–)	ISOLATED RS-485 #3 (MODBUS/PGEN)
	20	B (+)	
	21	SHIELD	
CUSTOMER INTERFACE	22	A (–)	NON-ISOLATED RS-485 #4 (MODBUS RSA)
	23	B (+)	
	24	SHIELD	
RUN RELAY	25	COMMON CONTACT	
	26	NORMALLY OPEN CONTACT	
	27	NORMALLY CLOSED CONTACT	
SPEED BIAS	28	SPEED BIAS (+)	
	29	SPEED BIAS (–)	
VOLTAGE BIAS	30	SHIELD	
	31	VOLTAGE BIAS (+)	
	32	VOLTAGE BIAS (–)	
	33	SHIELD	
SPARE	34	SPARE	
SPARE	35	SPARE	
DROOP SELECT	36	SPARE	
ANALOG THROTTLE CONTROL	37	SPARE	
	38	SPARE	
	39	SPARE	
IDLE MODE	40	SPARE	
	41		
SPARE	42	SPARE	
SPARE	43	SPARE	
SPARE	44	SPARE	

* REMOVE RESISTORS IF PARALLELING

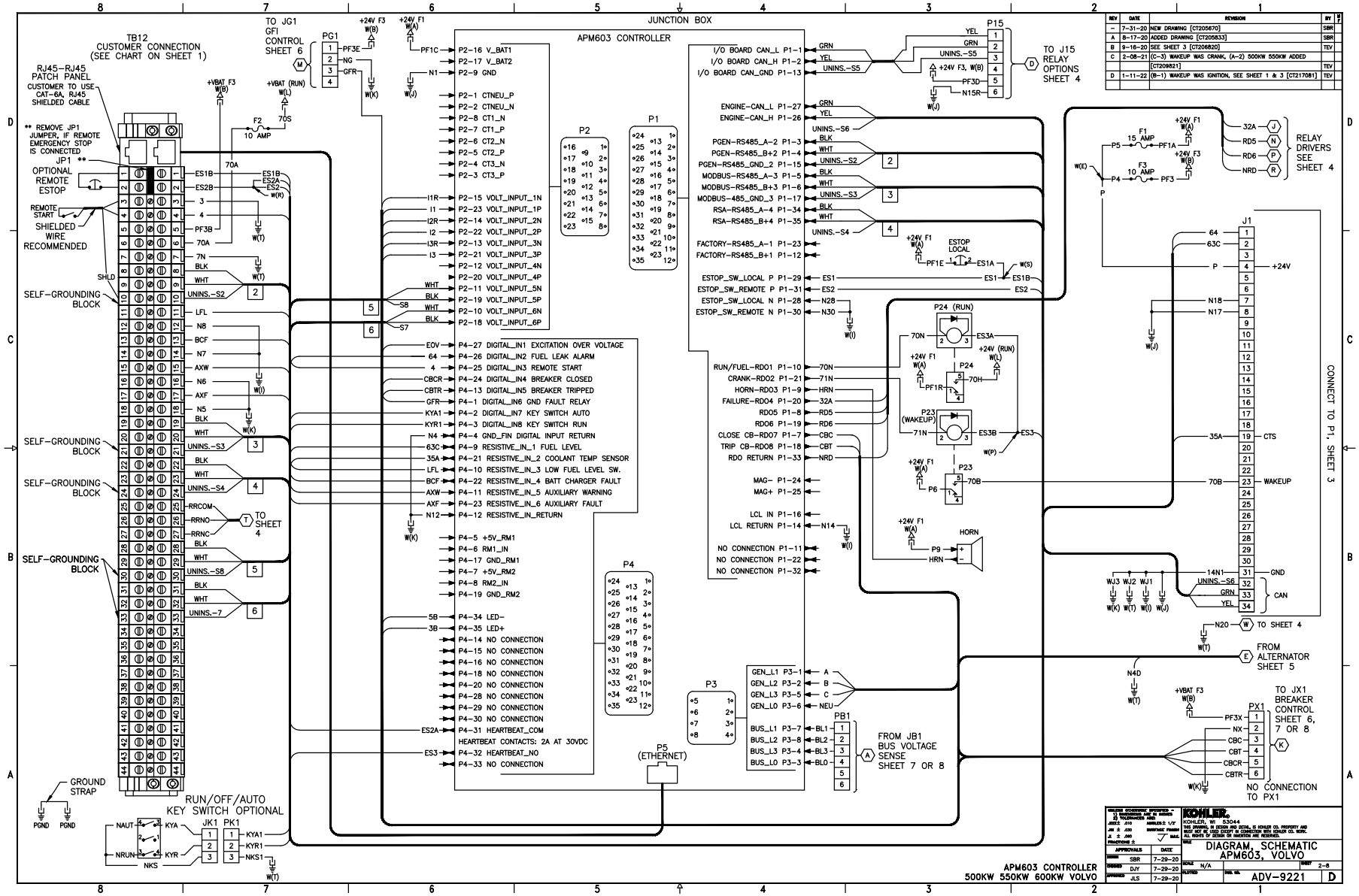
REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-5) WAKEUP WAS CRANK, (A-2) 500KW 550KW ADDED	
		[CT209821]	TEV
D	1-11-22	(B-7) ON VOLVO HARNESS WAS ON J.D. HARNESS,	
		SEE SHEETS 2 & 3 [CT217081]	TEV

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APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

TITLE: DIAGRAM, SCHEMATIC APM603, VOLVO
SCALE: N/A
SHEET: 1-8
DRAWING NO.: ADV-9221
D

APM603 CONTROLLER
500KW, 550KW, 600KW VOLVO



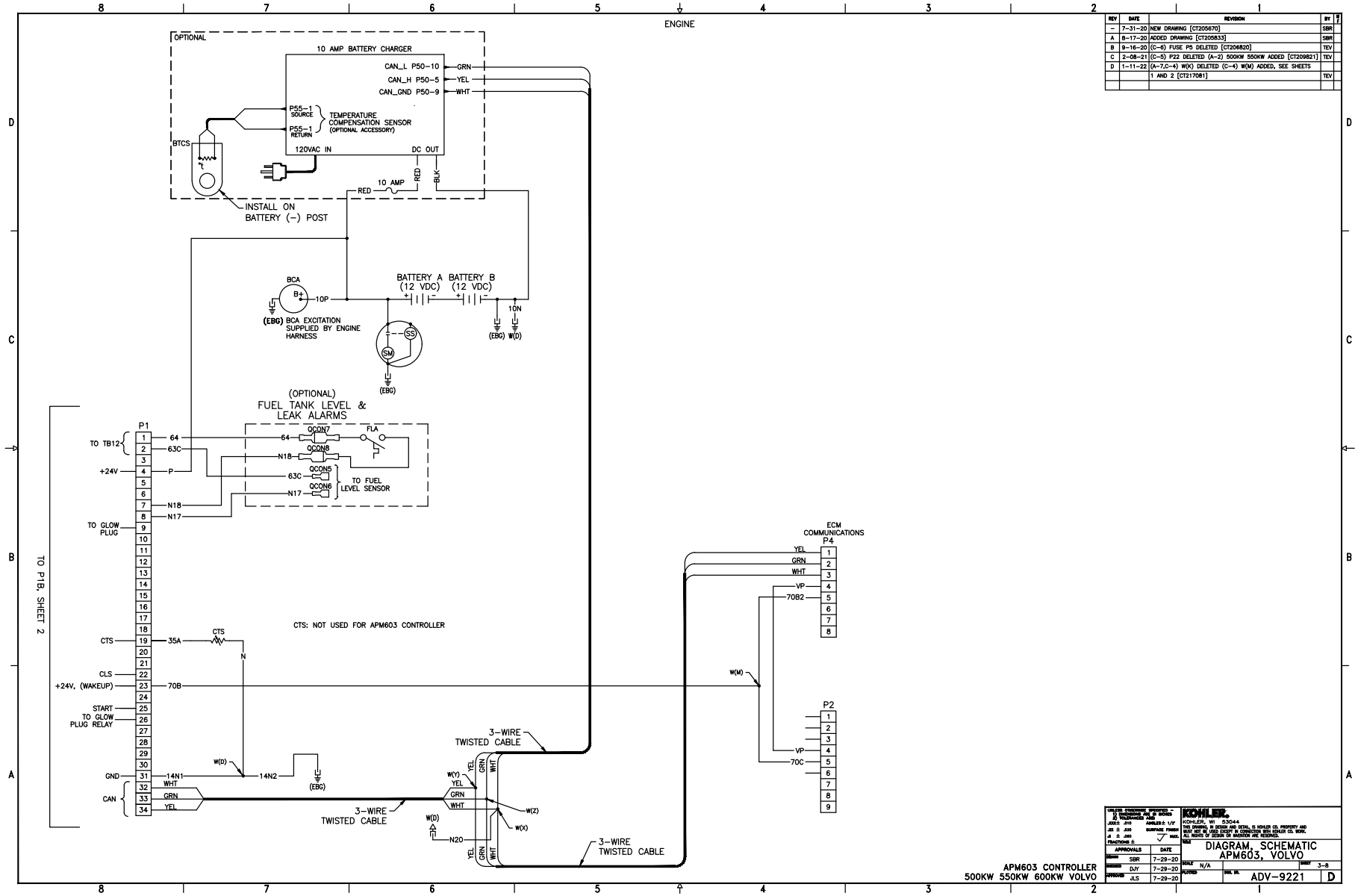
REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(C-3) WAKEUP WAS CRANK, (A-2) 500KW 550KW ADDED	
		[CT209821]	TEV
D	1-11-22	(B-1) WAKEUP WAS IGNITION, SEE SHEET 1 & 3 [CT217081]	TEV

APPROVALS	DATE
DRAWN SBR	7-29-20
CHECKED DJY	7-29-20
APPROVED JLS	7-29-20

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KOHLER, WI 53044

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A
SHEET 2-8
DWG NO. ADV-9221
REV D



REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	(C-6) FUSE P5 DELETED [CT206820]	TEV
C	2-08-21	(C-5) P22 DELETED (A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	(A-7,C-4) W(K) DELETED (C-4) W(M) ADDED. SEE SHEETS 1 AND 2 [CT217081]	TEV

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

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APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A | SHEET 3-8

DWG. NO. ADV-9221 | D

REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV

JUNCTION BOX

J15
1 YEL
2 GRN
3 UNINS. (S5)
4
5 P15R
6 N15R

FROM P15 SHEET 2 (D)

(OPTIONAL)
15 RELAY DRY CONTACT KIT
W/ NO & NC CONTACTS

P15R
UNINS. (S5)
YEL
GRN
N15R

RELAYS K1–K14
12VDC, 10A, SPDT
RELAY K15
5VDC, 2A, DPDT

TB5
42A 42A 42A C NO (+) (–) 2 2 2
CAN
K15

DIGIN RETURNS
P35
TB6
DI1 DI2 DI3 DI4
(DIGITAL INPUT)

GND VNEVP2+5VSRD VN1 VP1 +5V
P36
(ANALOG INPUT)

K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14

TB7 TB8 TB9 TB10 TB11 TB12 TB13

CUSTOMER CONNECTIONS

FROM SHEET 2
J 32A
N RD5
P RD6
R NRD

+24V F3
W(B)
PF3C
32A
W(K)

PR1 JR1
32A 1 1 32A
NR1 2 2 NR1
PF3C 3 3 PF3C
4 4

1 RELAY BOARD
C–294301
TB1 K1 2 42A
TB2 C NC NO

CUSTOMER CONNECTION

COMMON FAULT RELAY
(OPTIONAL)

+24V F3
W(B)
PF3F
RD5
NRD2

PR2
RD5 1
NRD2 2
PF3F 3
4

RDO PLUG
(FACTORY USE ONLY)

NRD
W(AE)
NRD3

+24V F3
W(B)
PF3G
RD6
NRD3

PR3
RD6 1
NRD3 2
PF3G 3
4

RDO PLUG
(FACTORY USE ONLY)

AUXILIARY RUN RELAY
291309=24VDC
248363=12VDC
RELAY

+24V (RUN)
W(L)

FROM TB12 SHEET 2 (T)
RRNC 1
RRNO 4
RRCOM 7

FROM SHEET 2 (W)
70K A
N20 B

1 2 3 4 5 6 7 8 9
A B

2 5 8 3 6 9

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

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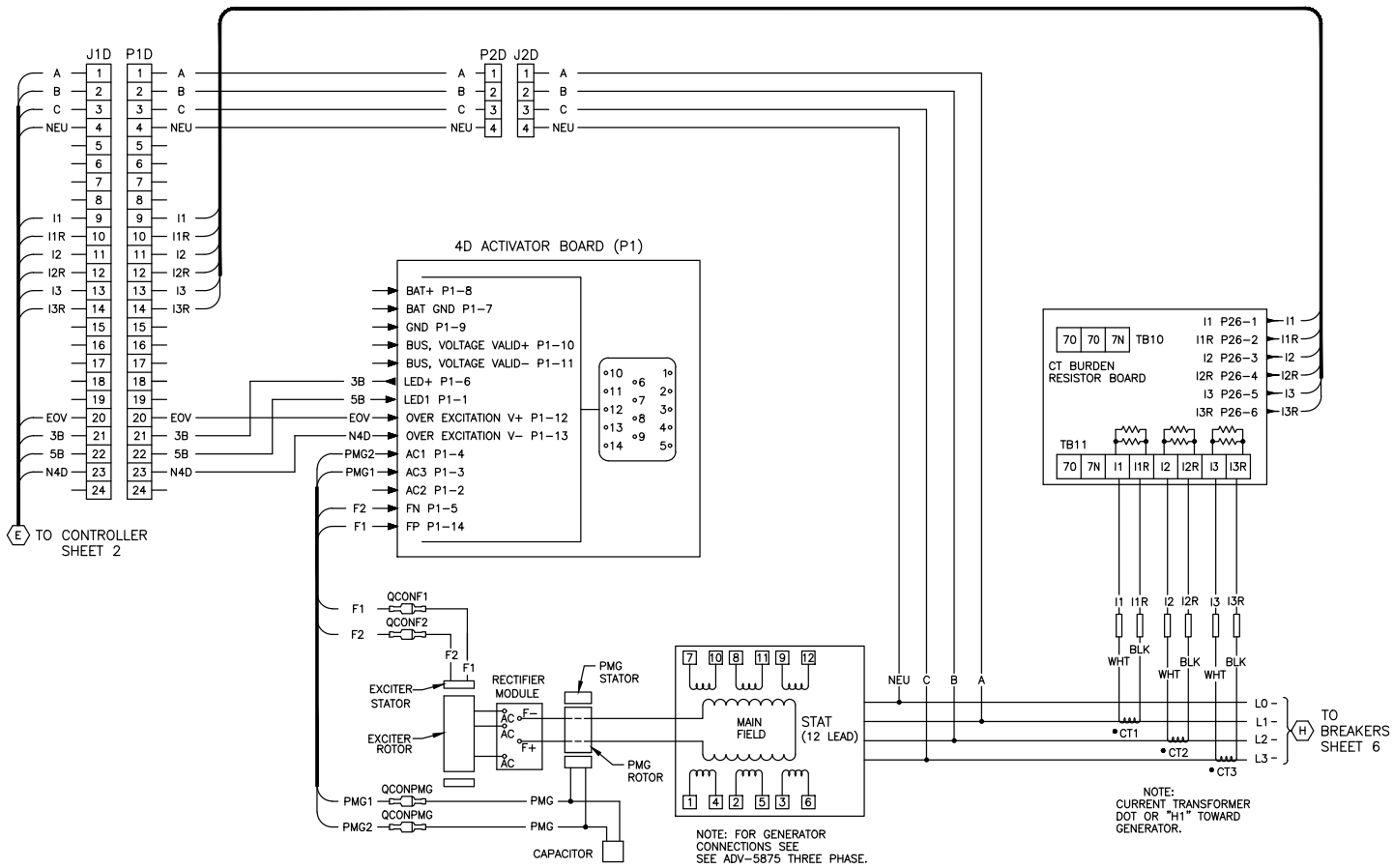
APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A
SHEET 4–8
DWG. NO. ADV-9221
REVISED D

ALTERNATOR

REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV



NOTE: FOR GENERATOR CONNECTIONS SEE SEE ADV-5875 THREE PHASE.

NOTE: CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.

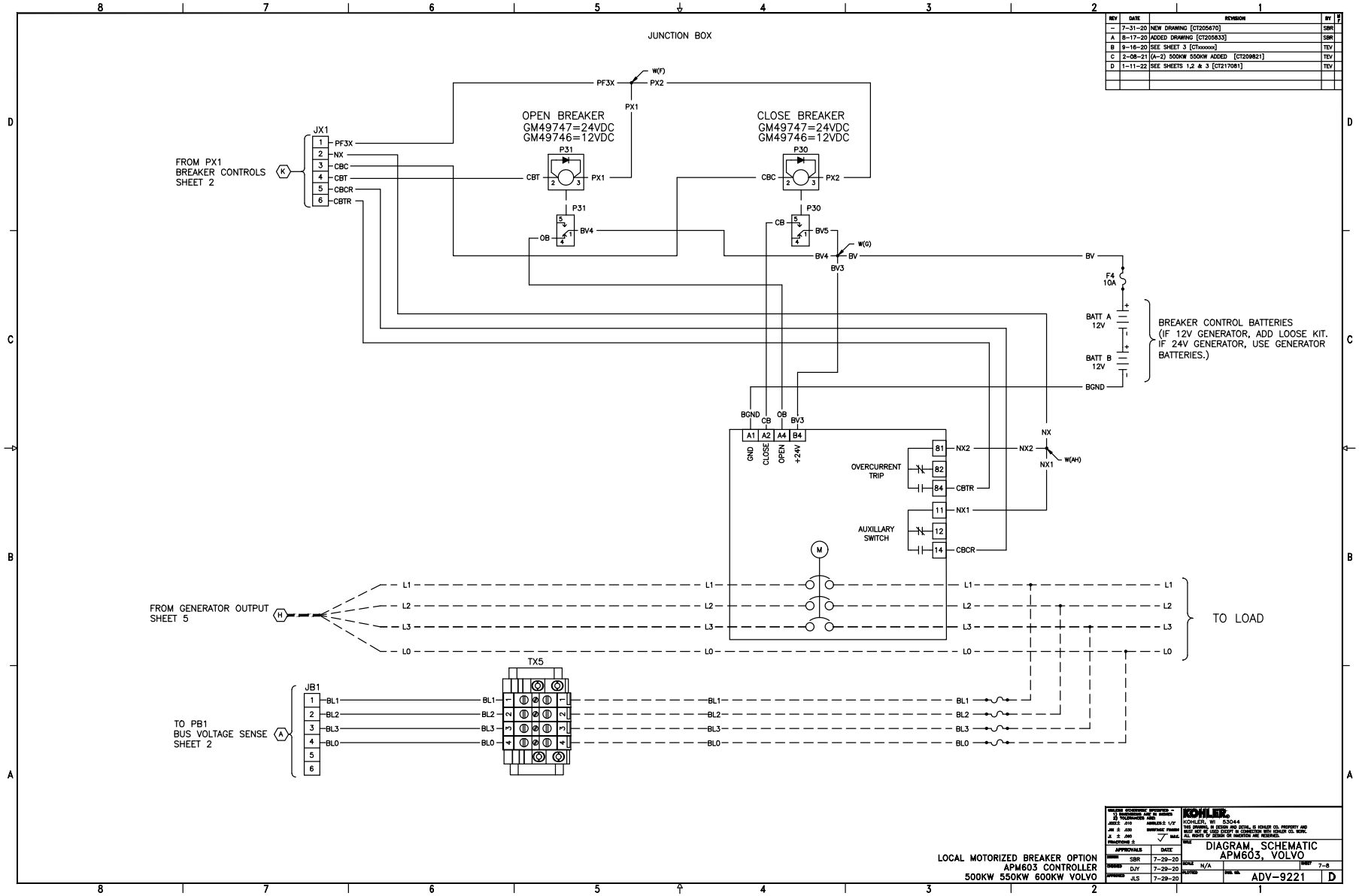
ALTERNATOR SIDE
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

KOHLER CO.
KOHLER, WI 53044

APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

TITLE: DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE: N/A
SHEET: 5-8
DWG. NO.: ADV-9221
REV: D



REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CTxxxxxx]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV

APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

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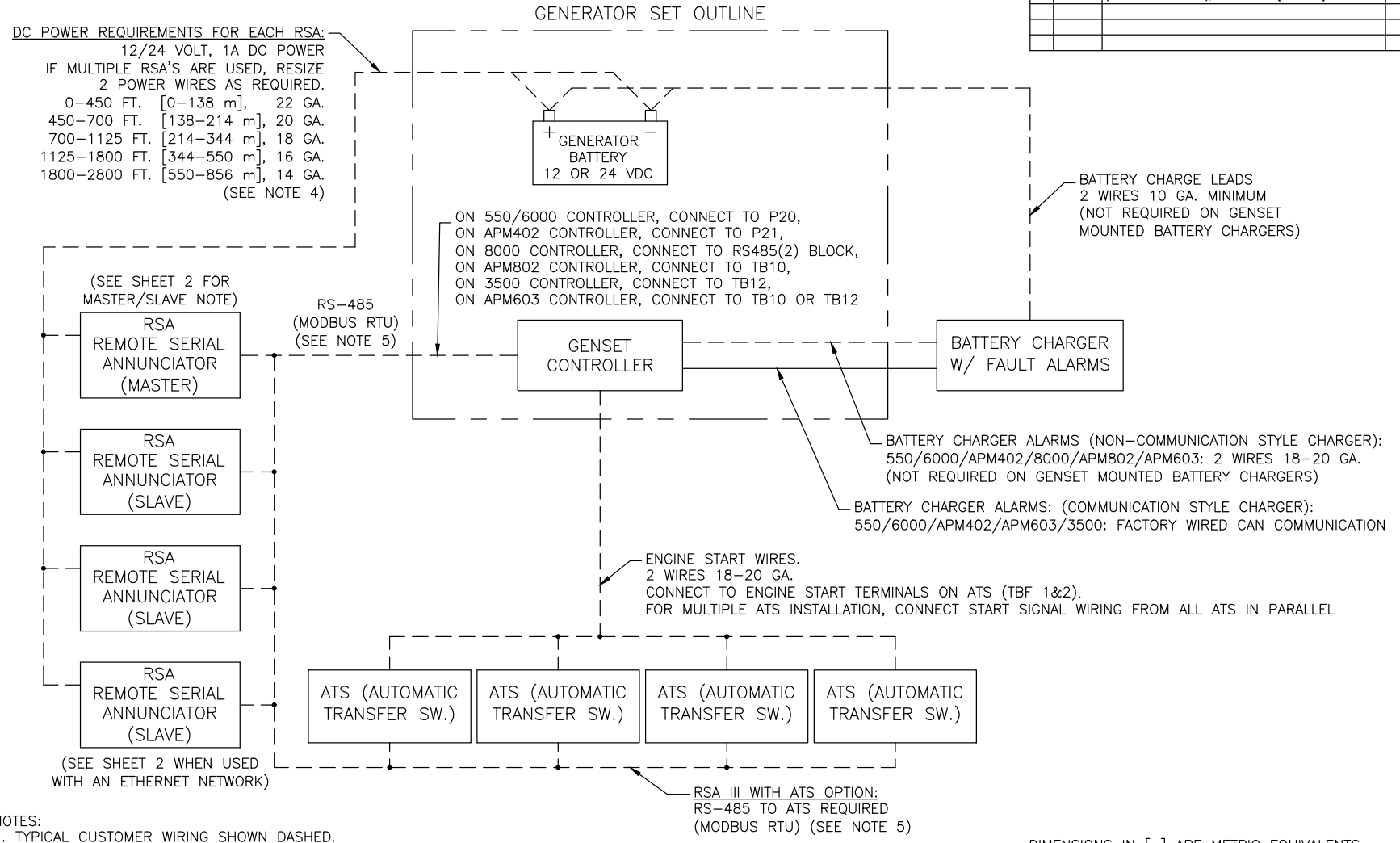
TITLE: DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE: N/A
SHEET: 7-8
DWG. NO.: ADV-9221
REVISED: D

LOCAL MOTORIZED BREAKER OPTION
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

RS–485 NETWORK CONNECTIONS

REV	DATE	REVISION	BY	M F
–	8–16–19	NEW DRAWING. REPLACES ADV–6990 [CT198499]	TLK	
A	5–27–22	(B–1–3) CONNECT TO ENGINE START TERMINALS ON ATS		
		(TBF 1&2) WAS CONNECT TO POSITION CONTACTS ON ATS		
		(CLOSED IN EMERGENCY); SEE SHEET 2 [CT220029]	BCC	



NOTES:
1. TYPICAL CUSTOMER WIRING SHOWN DASHED.
2. CUSTOMER RESPONSIBLE FOR ADDITIONAL WIRING SHOWN IF COMPONENTS ARE SHIPPED LOOSE (BATTERY CHARGER, DRY–CONTACT BOX, ETC.)
3. IF BATTERY CHARGER IS SHIPPED LOOSE ADDITIONAL WIRES MAY BE REQUIRED FOR PROPER VOLTAGE SENSING. REFERENCE DRAWING ADV–5971 FOR INTERCONNECT.
4. DC VOLTAGE FOR EACH RSA REMOTE ANNUNCIATOR MAY ALSO BE SUPPLIED BY A LOCALLY MOUNTED 12 OR 24 VDC, 200 mA MIN., AC ADAPTER KIT (GM62466–KP1).
5. USE BELDEN #9841 OR EQUIVALENT. MAXIMUM DISTANCE = 4000 FT. [1219 m]

REFER TO WIRING DIAGRAM GM62554 (NETWORK COMMUNICATIONS) FOR CONNECTION DETAIL.

INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR

DIMENSIONS IN [ ] ARE METRIC EQUIVALENTS.

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 MAX. FRACTIONS ±

APPROVALS		DATE
DRAWN	TLK	8–16–19
CHECKED	TLK	8–16–19
APPROVED	MD	8–16–19

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TITLE: DIAGRAM, RSA INTERCONNECTION

SCALE: / / / SHEET 1–2

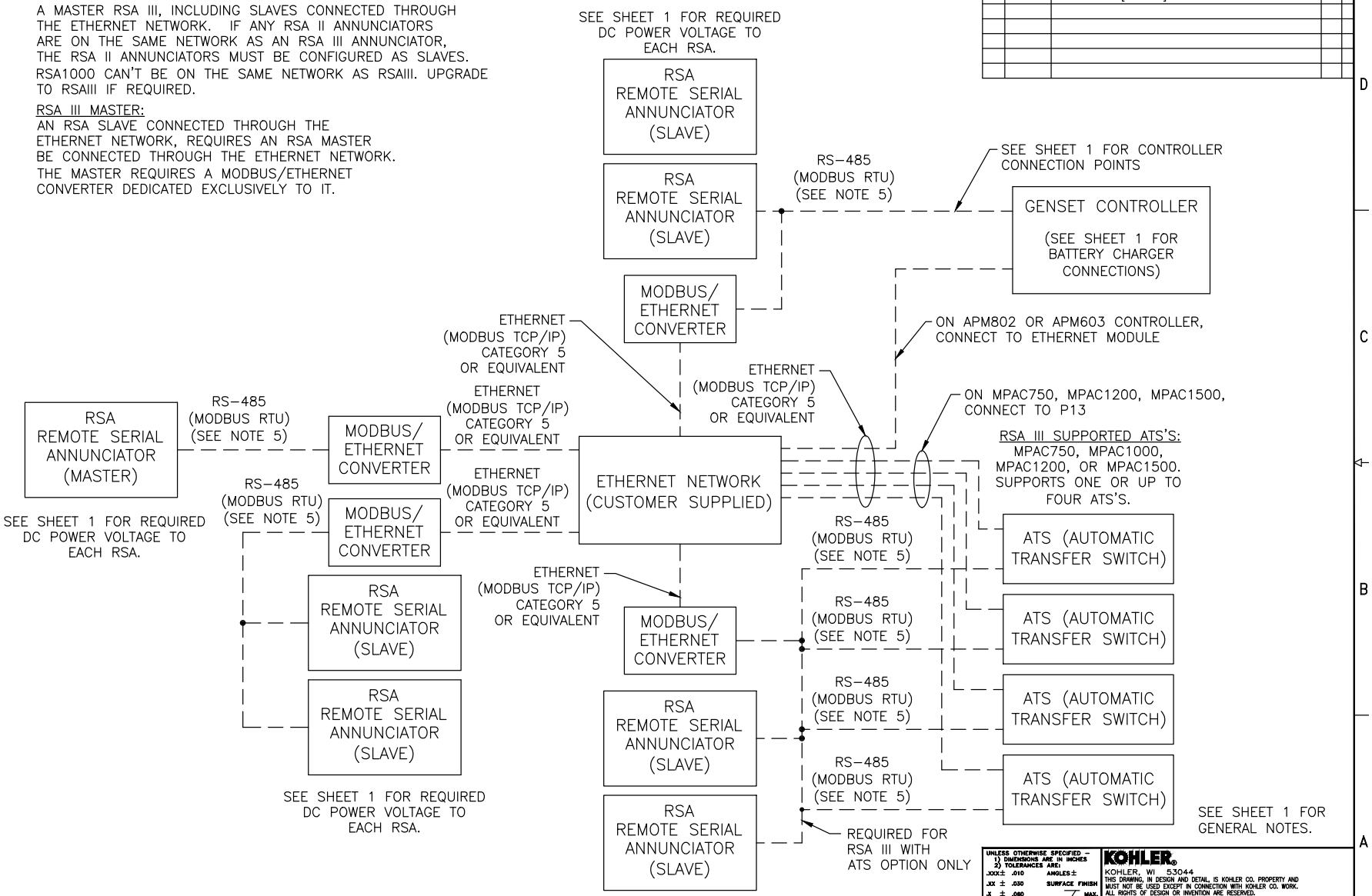
PLOTTED: DWG. NO. ADV–9169 C

ETHERNET NETWORK CONNECTIONS

REV	DATE	REVISION	BY	M F
–	8–16–19	NEW DRAWING. REPLACES ADV–6990 [CT198499]	TLK	
A	5–27–22	SHEET SHEET 1 [CT220029]	BCC	

RSA III:
A MAXIMUM OF 5 SLAVES CAN BE CONNECTED TO A MASTER RSA III, INCLUDING SLAVES CONNECTED THROUGH THE ETHERNET NETWORK. IF ANY RSA II ANNUNCIATORS ARE ON THE SAME NETWORK AS AN RSA III ANNUNCIATOR, THE RSA II ANNUNCIATORS MUST BE CONFIGURED AS SLAVES. RSA1000 CAN'T BE ON THE SAME NETWORK AS RSAIII. UPGRADE TO RSAIII IF REQUIRED.

RSA III MASTER:
AN RSA SLAVE CONNECTED THROUGH THE ETHERNET NETWORK, REQUIRES AN RSA MASTER BE CONNECTED THROUGH THE ETHERNET NETWORK. THE MASTER REQUIRES A MODBUS/ETHERNET CONVERTER DEDICATED EXCLUSIVELY TO IT.



INTERCONNECTION DIAGRAM
CONTROLLER
WITH RSA ANNUNCIATOR

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX ± .010 ANGLES ± .XX ± .030 SURFACE FINISH .X ± .060 √ MAX. FRACTIONS ±

APPROVALS		DATE
DRAWN	TLK	8–16–19
CHECKED	TLK	8–16–19
APPROVED	MD	8–16–19

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TITLE: DIAGRAM, RSA INTERCONNECTION

SCALE: / / / SHEET 2–2

PLOTTED: DWG. NO. ADV–9169 C

Drawing Sheet Reference	
Sheet	Description
1	Networked Devices, General Notes, This Sheet
2	Converters, Ethernet Network, PC, Data Interface System
3	16-Light (DEC3+), 550 (DEC550), KPC 1000 Legacy Genset Controllers
4	DEC3000 / APM402 Genset Controller
5	DEC6000 Genset Controller
6	APM603 Genset Controller for non-KD series, Standard PGEN Network
7	This Sheet Reserved for Future Features
8	APM603 Genset Controller for KD Series, Standard PGEN Network
9	This Sheet Reserved for Future Features
10	APM802 Genset Controller
11	DEC8000 Genset Controller
12	DEC3500 Genset Controller, Towable 10 Position Customer Terminal Block
13	Series 1000 (MPAC1000), 340 (M340/M340+), Power Monitor Legacy ATS (Automatic Transfer Switch Controllers)
14	MPAC1500, MPAC-DM 750/1200/1500 ATS (Automatic Transfer Switch Controllers)
15	Legacy RSAII (Remote Serial Annunciator)
16	RSAIII (Remote Serial Annunciator)

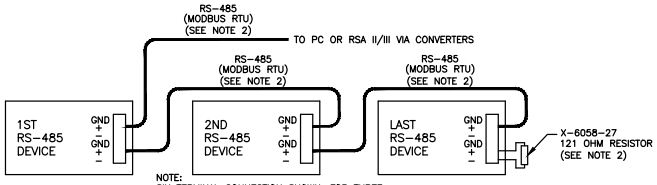
REV	DATE	REVISION	BY
N	5-30-19	THIS SHEET ADDED; COMPATIBILITY CHART, STANDARD NOTES,	
		AND NETWORKED DEVICES MOVED TO THIS SHEET; ISOLATED/	
		NON-ISOLATED RS-485 IDENTIFIED ON ALL SHEETS [CT197795]	TLK
P	6-24-20	(D-8) SHEET 6 NOTE: NON-KD SERIES WAS JOHN DEERE	
		80-500 KW, SHEET 12 NOTE: ADDED	
		TOWABLE 10 POSITION CUSTOMER TERMINAL BLOCK [CT204963]	TLK
R	28APR202	(A-8,7) "PEP-RML-001" NOTE ADDED; SEE SHEET 15 [CT212605]	CLN

Controller/Annunciator Compatibility Chart

	Monitor III	SiteTech	RSA2	RSA3
550 Genset	X	X	X	X
16-Light Genset	X		X	X
DEC 3000 / APM402 Genset	X	X	X	X
KPC 1000 Genset			X	X
6000 Genset	X	X	X	X
8000 Genset				4
APM802				X
APM603		X		X
DEC-3500 Genset		X		X
MPAC 1500	X		X	X
MPAC-DM 750, 1200, 1500		X	X	X
Series 1000 ATS	X		X	X
340 ATS	X			
340 Power Monitor	X			

"X" Designates supported devices. "4" Designates RS-485 Only.

DETAIL A (EXAMPLE OF)
NETWORKED RS-485 DEVICES



NOTE:
SIX TERMINAL CONNECTION SHOWN. FOR THREE TERMINAL CONNECTION, USE TWO WIRES PER TERMINAL STRIP SCREW.

NOTES:

1.) MAXIMUM CABLE LENGTH FOR RS-232 IS 50 FEET. USE RS-485 IF LONGER THAN 50 FEET IS REQ'D.

2.) CUSTOMER SUPPLIED WIRE. USE BELDEN #9841 OR EQUIVALENT CABLE. USE A MAXIMUM CABLE LENGTH OF 1219 METERS (4000 FT.) FROM THE RS-485 CONVERTER TO THE LAST RS-485 DEVICE IN THE NETWORK. THE "LAST DEVICE" IS THE DEVICE FURTHEST FROM THE CONTROLLER. CONNECT "+" TO "+", "-" TO "-". CONNECT THE CABLE SHIELD TO "GND" AT ONE END OF CABLE ONLY, LEAVE OTHER END DISCONNECTED. IF OPERATING OVER 19.2 K BAUD RATE AND WIRE LENGTH > 305 METERS (1000 FT.), CONNECT 121 OHM TERMINATING RESISTOR (X-6058-27) TO "+" AND "-" ON THE LAST DEVICE ON THE NETWORK. IF ONLY ONE DEVICE IS USED, IT IS THE LAST DEVICE. THE TERMINATING RESISTOR IS SELECTABLE INSIDE THE MODBUS/ETHERNET CONVERTER AND REMOTE SERIAL ANNUNCIATOR2 (RSA2) VIA P34. PLACE THE P34 JUMPER ON THE "IN" PINS IF THE MODBUS/ETHERNET CONVERTER, RSA2, OR RSA3 IS THE LAST DEVICE IN THE NETWORK. IF NOT THE LAST DEVICE, PLACE THE P34 JUMPER ON THE "OUT" PINS.

3.) THE 550 & 6000 CONTROLLER CAN BE USED AS A RS-232/RS-485 CONVERTER. CONNECT THE 9-PIN SERIAL PORT ON THE PC TO P18 ON THE 550 OR 6000 CONTROLLER AS SHOWN. THEN CONNECT P20 ON THE 550 OR 6000 CONTROLLER TO THE OTHER RS-485 DEVICES IN THE NETWORK.

4.) EACH MODBUS/ETHERNET CONVERTER CAN COMMUNICATE WITH UP TO 4 ETHERNET NETWORK DEVICES SIMULTANEOUSLY. IF A MODBUS/ETHERNET CONVERTER IS ATTACHED TO A SLAVE REMOTE SERIAL ANNUNCIATOR, A MODBUS/ETHERNET CONVERTER CONNECTED TO A MASTER REMOTE SERIAL ANNUNCIATOR IS REQUIRED. SEE NOTE 2 FOR P34 (TERMINATING RESISTOR) SETTING.

5.) ONLY ONE MASTER IS ALLOWED PER RS-485 NETWORK. ANY COMBINATION OF MASTERS IS ALLOWED IF COMMUNICATING VIA MODBUS/ETHERNET CONVERTERS.

6.) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES. TOLERANCES ARE: .XXX ± .010, .XX ± .020, .X ± .040, FRACTIONS ± 1/64, ANGLES ± 1/2°, SURFACE FINISH 125 MAX.

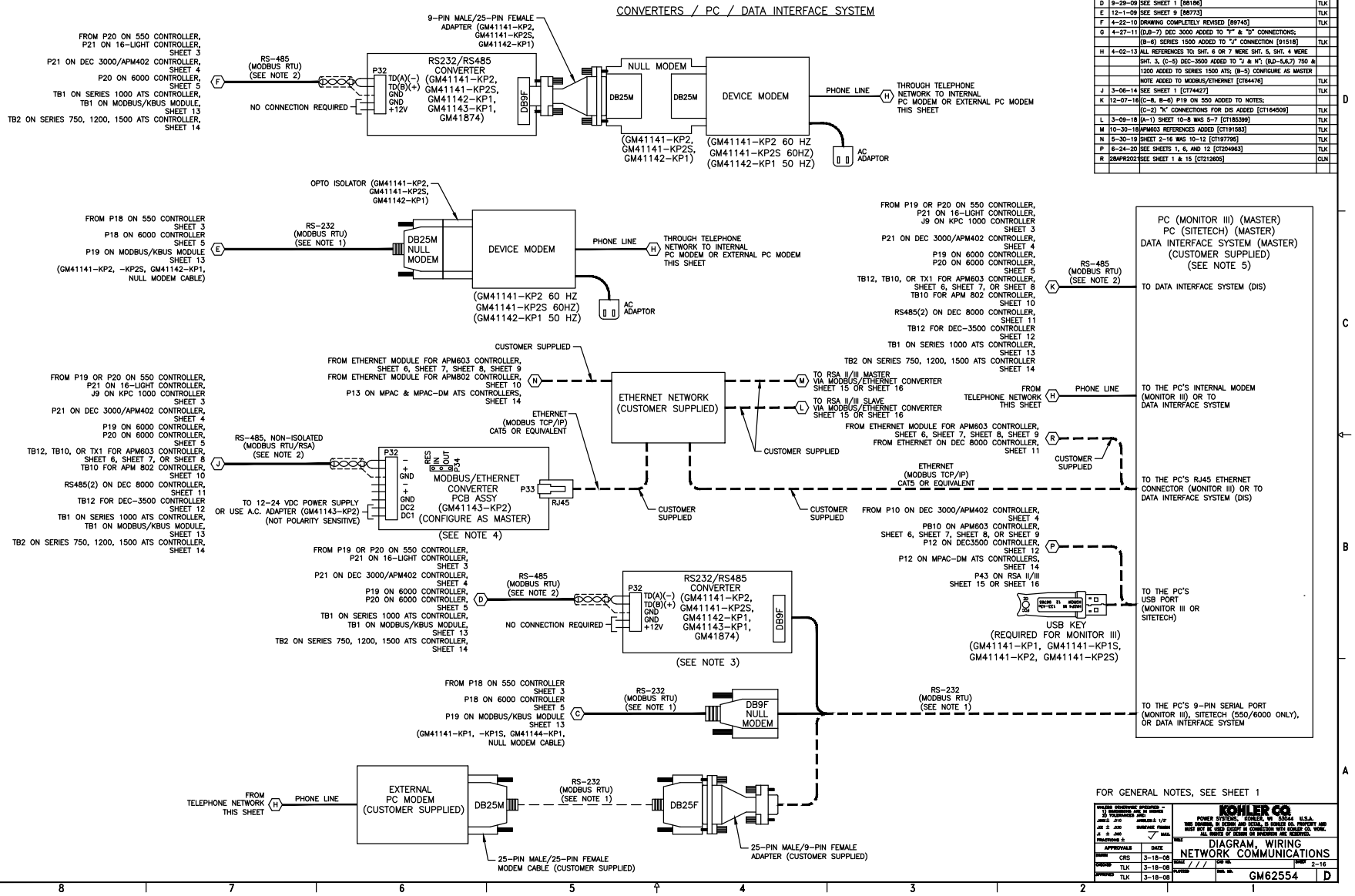
APPROVALS	DATE
DRAWN TLK	5-30-19
CHECKED TLK	5-30-19
APPROVED MD	5-30-19

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TITLE: DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE: / / / | SHEET: 1-16
DWG. NO.: GM62554 | REV: D

CONVERTERS / PC / DATA INTERFACE SYSTEM



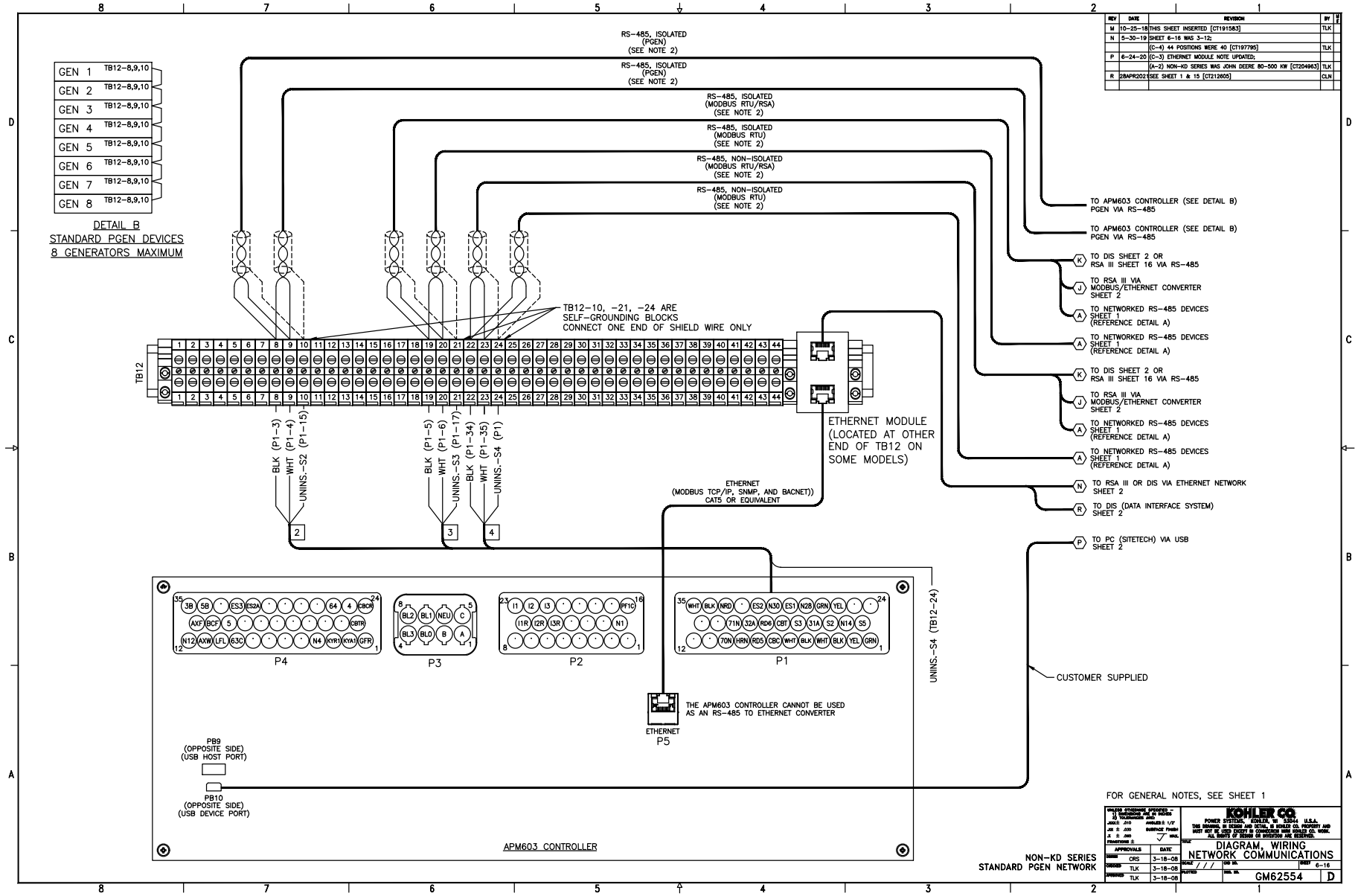
REV	DATE	REVISION	BY
D	9-29-09	SEE SHEET 1 [88186]	TLK
E	12-1-09	SEE SHEET 9 [88773]	TLK
F	4-22-10	DRAWING COMPLETELY REVISED [89745]	TLK
G	4-27-11	(D,B-7) DEC 3000 ADDED TO "F" & "D" CONNECTIONS;	
		(B-6) SERIES 1500 ADDED TO "J" CONNECTION [91518]	TLK
H	4-02-13	ALL REFERENCES TO: SHT. 6 OR 7 WERE SHT. 5, SHT. 4 WERE	
		SHT. 3, (C-5) DEC-3500 ADDED TO "J & N"; (B,D-5,6,7) 750 &	
		1200 ADDED TO SERIES 1500 ATS; (B-5) CONFIGURE AS MASTER	
		NOTE ADDED TO MODBUS/ETHERNET [C164476]	TLK
J	3-06-14	SEE SHEET 1 [C174427]	TLK
K	12-07-16	(C-8, B-6) P19 ON 550 ADDED TO NOTES;	
		(C-2) "K" CONNECTIONS FOR DIS ADDED [C164509]	TLK
L	3-09-18	(A-1) SHEET 10-8 WAS 5-7 [C185399]	TLK
M	10-30-18	APM603 REFERENCES ADDED [C191583]	TLK
N	5-30-19	SHEET 2-16 WAS 10-12 [C1197795]	TLK
P	6-24-20	SEE SHEETS 1, 6, AND 12 [C1204963]	TLK
R	28APR202	SEE SHEET 1 & 15 [C1212605]	CLN

FOR GENERAL NOTES, SEE SHEET 1

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APPROVALS	DATE
DRS	3-18-08
TLK	3-18-08
TLK	3-18-08

TITLE: DIAGRAM, WIRING NETWORK COMMUNICATIONS
SCALE: /// DWG NO. SHEET 2-16
PLOTTED: DWG. NO. GM62554 D



REV	DATE	REVISION	BY	MFG
M	10-25-18	THIS SHEET INSERTED [CT191583]	TLK	
N	5-30-19	SHEET 6-16 WAS 3-12;		
		(C-4) 44 POSITIONS WERE 40 [CT197795]	TLK	
P	6-24-20	(C-3) ETHERNET MODULE NOTE UPDATED;		
		(A-2) NON-KD SERIES WAS JOHN DEERE 80-500 KW [CT204963]	TLK	
R	28APR202	SEE SHEET 1 & 15 [CT212605]	CLN	

FOR GENERAL NOTES, SEE SHEET 1

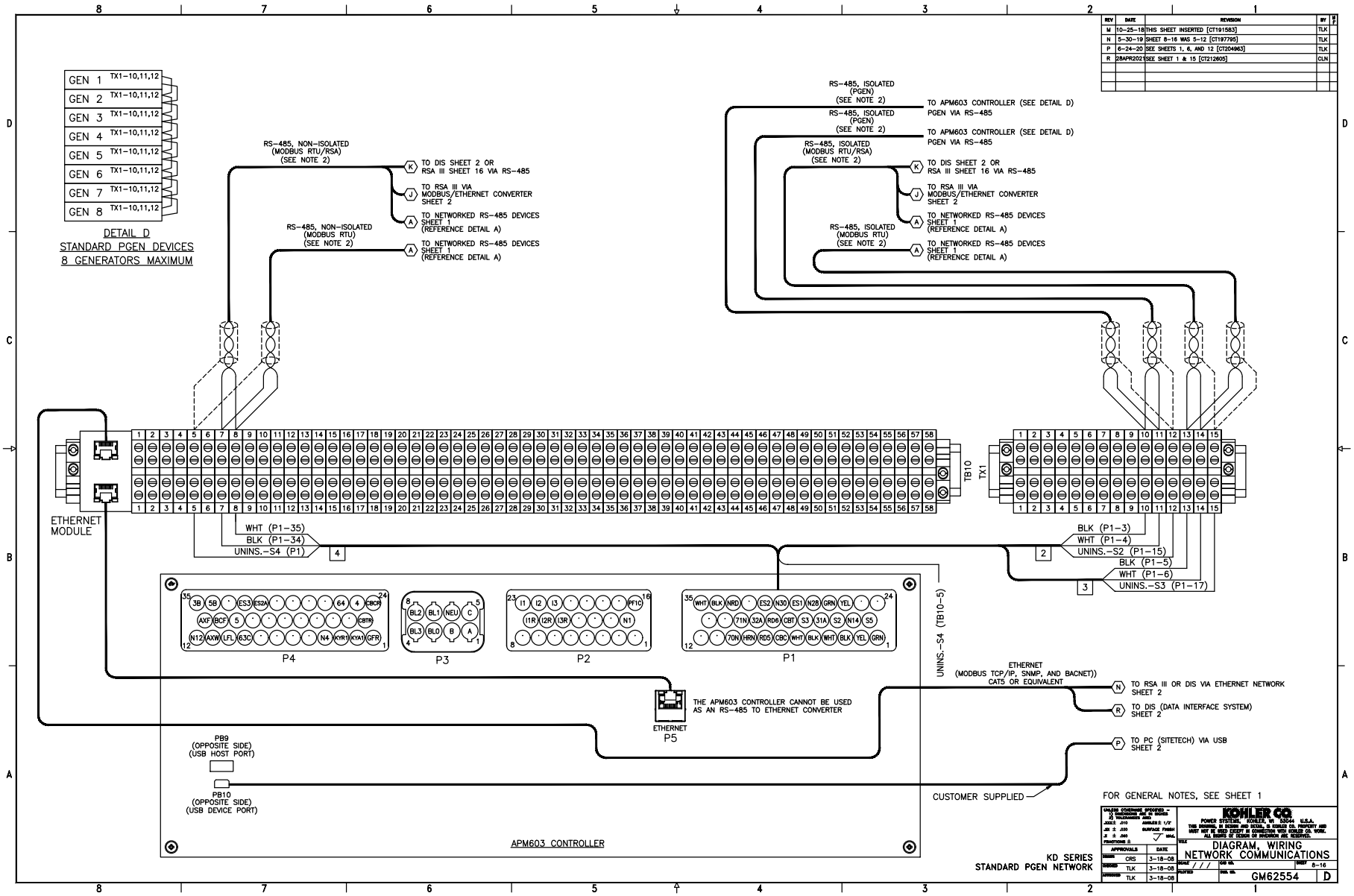
NON-KD SERIES
STANDARD PGEN NETWORK

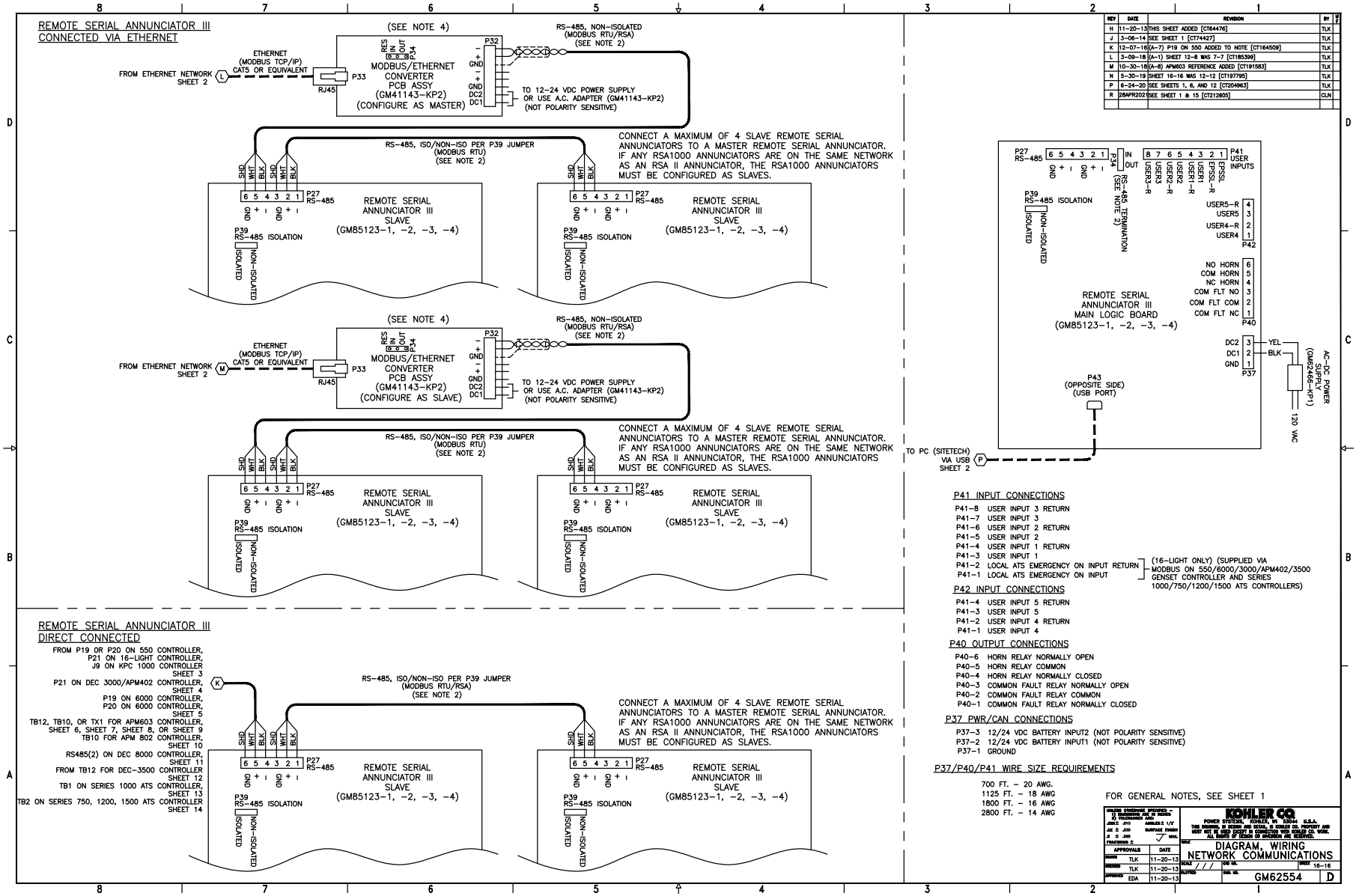
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

APPROVALS	DATE
ORS	3-18-08
TLK	3-18-08
TLK	3-18-08

DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE / / / DWG NO. SHEET 6-16
PLOTTED DWG NO. GM62554 D


REV | DATE | REVISION | BY
M 10-25-18 THIS SHEET INSERTED [CT191583] TLK
N 5-30-19 SHEET 8-16 WAS 5-12 [CT197795] TLK
P 6-24-20 SEE SHEETS 1, 6, AND 12 [CT204963] TLK
R 28APR2021 SEE SHEET 1 & 15 [CT212605] CLN
GEN 1 TX1-10,11,12
GEN 2 TX1-10,11,12
GEN 3 TX1-10,11,12
GEN 4 TX1-10,11,12
GEN 5 TX1-10,11,12
GEN 6 TX1-10,11,12
GEN 7 TX1-10,11,12
GEN 8 TX1-10,11,12
DETAIL D
STANDARD PGEN DEVICES
8 GENERATORS MAXIMUM
RS-485, NON-ISOLATED (MODBUS RTU/RSA) (SEE NOTE 2)
K TO DIS SHEET 2 OR RSA III SHEET 16 VIA RS-485
J TO RSA III VIA MODBUS/ETHERNET CONVERTER SHEET 2
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, NON-ISOLATED (MODBUS RTU) (SEE NOTE 2)
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, ISOLATED (PGEN) (SEE NOTE 2)
TO APM603 CONTROLLER (SEE DETAIL D) PGEN VIA RS-485
RS-485, ISOLATED (PGEN) (SEE NOTE 2)
TO APM603 CONTROLLER (SEE DETAIL D) PGEN VIA RS-485
RS-485, ISOLATED (MODBUS RTU/RSA) (SEE NOTE 2)
K TO DIS SHEET 2 OR RSA III SHEET 16 VIA RS-485
J TO RSA III VIA MODBUS/ETHERNET CONVERTER SHEET 2
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, ISOLATED (MODBUS RTU) (SEE NOTE 2)
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
ETHERNET MODULE
TB10
TX1
WHT (P1-35)
BLK (P1-34)
UNINS.-S4 (P1)
4
BLK (P1-3)
WHT (P1-4)
UNINS.-S2 (P1-15)
2
BLK (P1-5)
WHT (P1-6)
UNINS.-S3 (P1-17)
3
P4
P3
P2
P1
UNINS.-S4 (TB10-5)
ETHERNET
P5
THE APM603 CONTROLLER CANNOT BE USED AS AN RS-485 TO ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP, SNMP, AND BACNET)) CAT5 OR EQUIVALENT
N TO RSA III OR DIS VIA ETHERNET NETWORK SHEET 2
R TO DIS (DATA INTERFACE SYSTEM) SHEET 2
P TO PC (SITETECH) VIA USB SHEET 2
PB9 (OPPOSITE SIDE) (USB HOST PORT)
PB10 (OPPOSITE SIDE) (USB DEVICE PORT)
CUSTOMER SUPPLIED
APM603 CONTROLLER
FOR GENERAL NOTES, SEE SHEET 1
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
DIAGRAM, WIRING NETWORK COMMUNICATIONS
KD SERIES
STANDARD PGEN NETWORK
GM62554 D
SHEET 8-16


REMOTE SERIAL ANNUNCIATOR III
CONNECTED VIA ETHERNET
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS MASTER)
RJ45
P33
P32
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
P27
RS-485
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
SHD
WHT
BLK
GND
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS SLAVE)
RJ45
P33
P32
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
REMOTE SERIAL ANNUNCIATOR III
DIRECT CONNECTED
FROM P19 OR P20 ON 550 CONTROLLER,
P21 ON 16-LIGHT CONTROLLER,
J9 ON KPC 1000 CONTROLLER
SHEET 3
P21 ON DEC 3000/APM402 CONTROLLER,
SHEET 4
P19 ON 6000 CONTROLLER,
P20 ON 6000 CONTROLLER,
SHEET 5
TB12, TB10, OR TX1 FOR APM603 CONTROLLER,
SHEET 6, SHEET 7, SHEET 8, OR SHEET 9
TB10 FOR APM 802 CONTROLLER,
SHEET 10
RS485(2) ON DEC 8000 CONTROLLER,
SHEET 11
FROM TB12 FOR DEC-3500 CONTROLLER
SHEET 12
TB1 ON SERIES 1000 ATS CONTROLLER,
SHEET 13
TB2 ON SERIES 750, 1200, 1500 ATS CONTROLLER
SHEET 14
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU/RSA)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
P27
RS-485
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
SHD
WHT
BLK
GND
P27
RS-485
P14
IN
OUT
RS-485 TERMINATION
(SEE NOTE 2)
P41
USER
INPUTS
USER3-R
USER3
USER2-R
USER2
USER1-R
USER1
EPSSL-R
EPSSL
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
USER5-R
USER5
USER4-R
USER4
P42
REMOTE SERIAL
ANNUNCIATOR III
MAIN LOGIC BOARD
(GM85123-1, -2, -3, -4)
NO HORN
COM HORN
NC HORN
COM FLT NO
COM FLT COM
COM FLT NC
P40
DC2
DC1
GND
P37
YEL
BLK
AC-DC POWER
SUPPLY
(GM62466-KP1)
120 VAC
P43
(OPPOSITE SIDE)
(USB PORT)
TO PC (SITETECH)
VIA USB
SHEET 2
P41 INPUT CONNECTIONS
P41-8 USER INPUT 3 RETURN
P41-7 USER INPUT 3
P41-6 USER INPUT 2 RETURN
P41-5 USER INPUT 2
P41-4 USER INPUT 1 RETURN
P41-3 USER INPUT 1
P41-2 LOCAL ATS EMERGENCY ON INPUT RETURN
P41-1 LOCAL ATS EMERGENCY ON INPUT
(16-LIGHT ONLY) (SUPPLIED VIA
MODBUS ON 550/6000/3000/APM402/3500
GENSET CONTROLLER AND SERIES
1000/750/1200/1500 ATS CONTROLLERS)
P42 INPUT CONNECTIONS
P41-4 USER INPUT 5 RETURN
P41-3 USER INPUT 5
P41-2 USER INPUT 4 RETURN
P41-1 USER INPUT 4
P40 OUTPUT CONNECTIONS
P40-6 HORN RELAY NORMALLY OPEN
P40-5 HORN RELAY COMMON
P40-4 HORN RELAY NORMALLY CLOSED
P40-3 COMMON FAULT RELAY NORMALLY OPEN
P40-2 COMMON FAULT RELAY COMMON
P40-1 COMMON FAULT RELAY NORMALLY CLOSED
P37 PWR/CAN CONNECTIONS
P37-3 12/24 VDC BATTERY INPUT2 (NOT POLARITY SENSITIVE)
P37-2 12/24 VDC BATTERY INPUT1 (NOT POLARITY SENSITIVE)
P37-1 GROUND
P37/P40/P41 WIRE SIZE REQUIREMENTS
700 FT. - 20 AWG.
1125 FT. - 18 AWG
1800 FT. - 16 AWG
2800 FT. - 14 AWG
FOR GENERAL NOTES, SEE SHEET 1
REV DATE REVISION BY
H 11-20-13 THIS SHEET ADDED [CT64476] TLK
J 3-06-14 SEE SHEET 1 [CT74427] TLK
K 12-07-16 (A-7) P19 ON 550 ADDED TO NOTE [CT164509] TLK
L 3-09-18 (A-1) SHEET 12-8 WAS 7-7 [CT185399] TLK
M 10-30-18 (A-8) APM603 REFERENCE ADDED [CT191583] TLK
N 5-30-19 SHEET 16-16 WAS 12-12 [CT197795] TLK
P 5-24-20 SEE SHEETS 1, 6, AND 12 [CT204963] TLK
R 28APR2021 SEE SHEET 1 & 15 [CT212605] CLN
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
DIAGRAM, WIRING
NETWORK COMMUNICATIONS
APPROVALS DATE
DRAWN TLK 11-20-13
CHECKED TLK 11-20-13
APPROVED EDA 11-20-13
SCALE NONE
SHEET 16-16
GM62554
D

KOHLER®

Miscellaneous

OVERVIEW:
THE AUTOMATIC MULTI-LEVEL FLOAT/ EQUALIZE CHARGER SPECIFIED BELOW IS INTENDED TO CHARGE ENGINE STARTING BATTERIES EITHER INDEPENDENT OR IN CONJUNCTION WITH AN ENGINE DRIVEN CHARGING SYSTEM.

BATTERY TYPES TO BE CHARGED:
- LEAD ACID
  - AGM
  - GEL CELL
  - HIGH PERFORMANCE AGM
  - FLOODED
- NICKEL CADMIUM (NiCd)

INPUT AC:
- INPUT VOLTAGE: 90-265V SINGLE PHASE
- INPUT FREQUENCY: 47-63 Hz

INPUT LEAD:
APPROXIMATELY 1.8M (72") (REF) TYPE SJTOW -40°C TO 105°C UL RATED WIRE AND INSULATION. TERMINATED IN PRE-MOLDED UL RATED 3 PRONG NEMA 5-15 MALE AC PLUG.

DC OUTPUT:
10A @ 12V
10A @ 24V
VOLTAGE REGULATION: +/-1% (VOLTAGE AT EACH STAGE IS TOPOLOGY DEPENDENT)

OUTPUT LEAD:
APPROX. 1.8M (72") (REF) TYPE SJTOOW -40°C TO 105°C UL RATED WIRE WITH RED AND BLACK WIRE INSULATION. TERMINATED IN 9.5 mm (REF) RING STYLE TERMINALS.

FUSES:
THE FUSE MUST BE LOCATED APPROXIMATELY 6" FROM RING TERMINAL ON RED OUTPUT LEAD.
20A ATC

ENVIRONMENTAL:
- STORAGE TEMPERATURE RANGE: -40 TO +85°C (-40 TO +185°F)
- OPERATING TEMPERATURE RANGE: -20 TO +70°C (-4 TO +158°F)
- HUMIDITY: 5 TO 95% (NON-CONDENSING)
- SALT SPRAY TESTING - ASTM B117
- CORROSIN RESISTANT FROM GASSING OF BATTERIES

REVERSE POLARITY PROTECTION:
THE CHARGER SHALL SUSTAIN NO DAMAGE WHEN INCORRECTLY CONNECTED TO THE BATTERY IN REVERSE ORIENTATION.

MOUNTING:
4 NON-THREADED THROUGH HOLES FOR M6 FASTENERS TO PASS THOUGH

ENCLOSURE:
SHALL PROTECT THE CHARGER COMPONENTS FROM RAIN, SNOW, DUST AND DRIPPING WATER AND UNINTENTIONAL INPACTS. ALL INTERNAL COMPONENTS PROTECTED FROM WATER DROPLETS.

INDICATORS:
- POWER: INDICATES THE ACCEPTABILITY OF AC INPUT TO THE CHARGER
- COMMUNICATION: INDICATES THE STATE OF THE COMMUNICATION SYSTEM
- TEMPERATURE COMPENSATION: INDICATES THE STATE OF THE TEMPERATUARE COMPENSATION SUBSYSTEM WHEN INSTALLED
- VOLTAGE OUTPUT: INDICATES THE STATE OF THE BATTERY AND CERTAIN FAULT CONDITIONS.

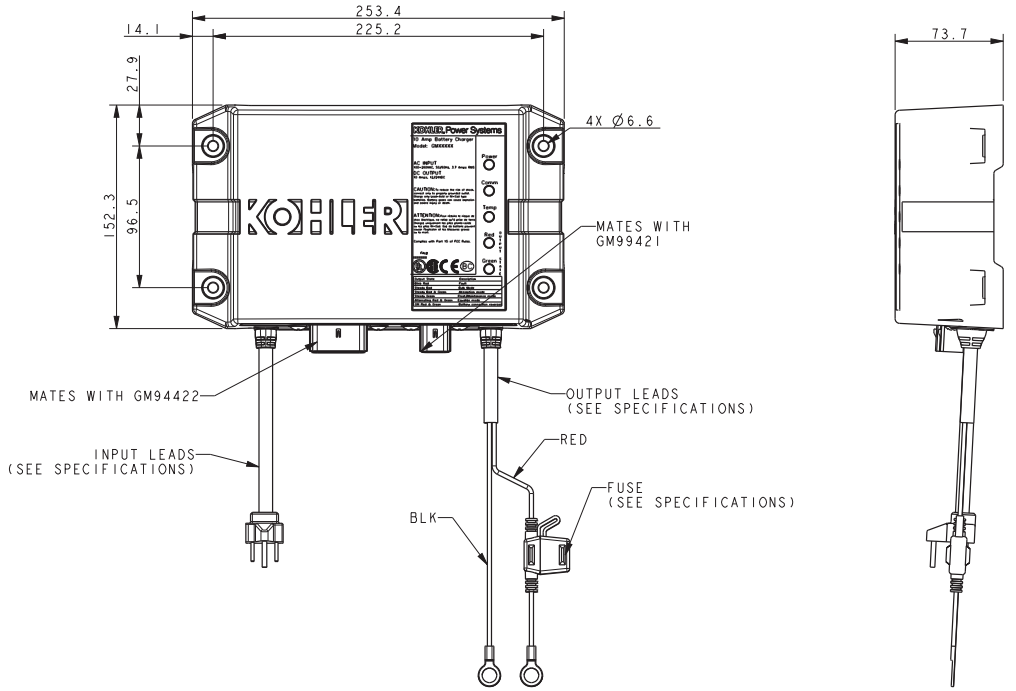
DOCUMENTATION:
THERE SHALL BE AN INSTALLATION / OPERATIONAL MANUAL SUPPLIED WITH EACH CHARGER. PER KOHLER SUPPLIED ARTWORK.

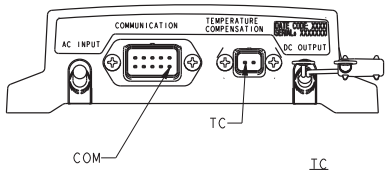
CERTIFICATIONS (US AND CANADA):
- UL1236
- CSA - C22.2 NO 107.2-01
- FCC- TITLE 47, PART 15 CLASS A
- CE
- EN 61000-6-2
- CEC AND DOE
- NFPA-110 LEVEL1 (WHEN SUPPORTED WITH APPLICABLE KOHLER CONTROLLER)
- IBC

PRODUCT LABELING:
THE LABEL ATTACHED TO THE CHARGER SHALL HAVE THE FOLLOWING INFORMATION:
- UL LISTING
- KOHLER PART NUMBER
- DESCRIPTION OF ALL INDICATOR
- OUTPUT CURRENT AND VOLTAGE
- INPUT VOLTAGE AND FREQUENCY

PACKAGING LABEL:
THE PACKAGING LABEL SHALL CONTAIN THE FOLLOWING INFORMATION:
- KOHLER P/N
- DESCRIPTION - BATTERY CHARGER
- MFG. MODEL NO.
- MFG. PART NUMBER
- DATE CODE

WARRANTY:
2 YEAR FROM DATE OF PURCHASE FROM MANUFACTURE.





COM
PIN 1 N/C
2 ID SEL 1
3 ID SEL 2
4 N/C
5 CAN-H
6 N/C
7 ID SEL 1 RTN
8 ID SEL 2 RTN
9 CAN-GND
10 CAN-L

TC
PIN 1 TC SENSOR W1
2 TC SENSOR W2

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-22-14	NEW DRAWING [CT91634]	SAM
A	5-9-17	(C-4,2) MATING NOTE ADDED (A-2, 4) PIN CONNECTIONS ADDED [CT174256]	SAM

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH ✓ MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-22-14
CHECKED	SAM	9-22-14
APPROVED	AGT	9-22-14

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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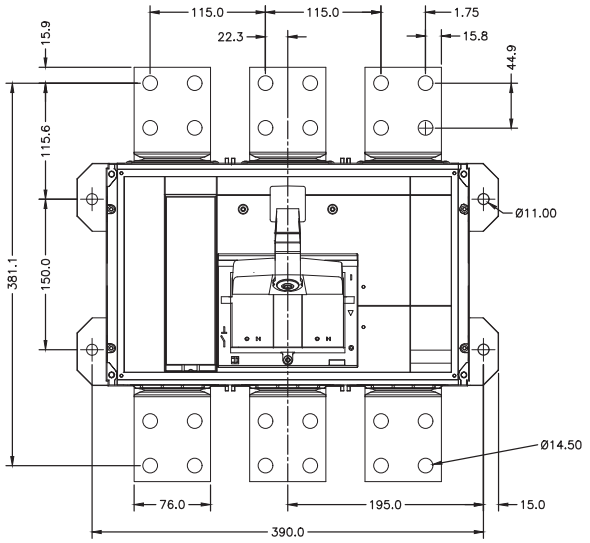
TITLE
CHARGER, BATTERY 10 AMP

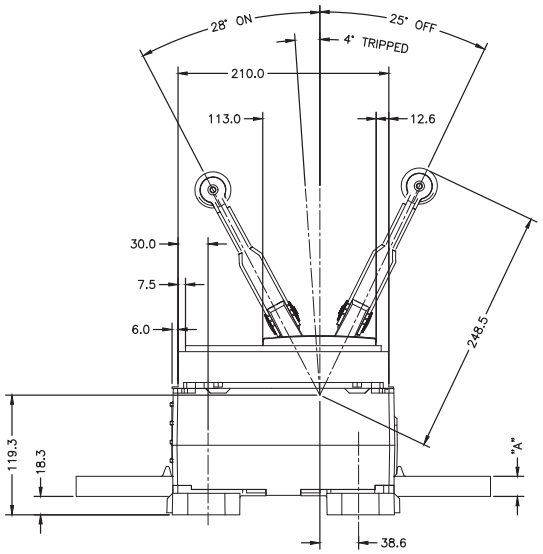
SCALE 0.50 | CAD NO. | SHEET 1 of 1
DWG NO. GM87448 | D

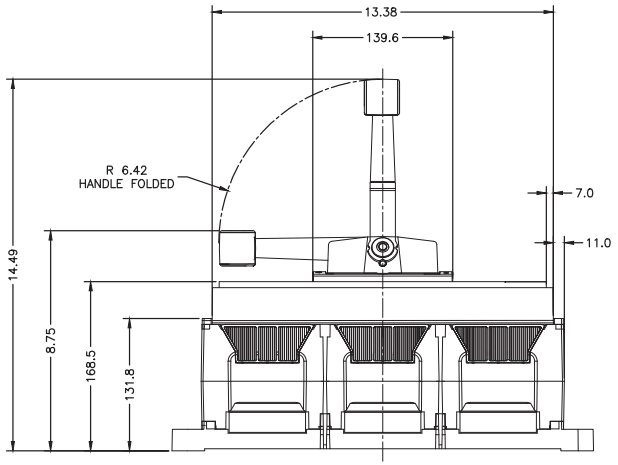
MICROLOGIC CIRCUIT BREAKERS							
PART NO.	REV		DIM "A"	AMPS	% RATING	GFI	VENDOR NO.
GM48156-1	A				80	NO	RJF36160U33A
GM48156-2	A					YES	RJF36160U44A
GM48156-3	A		12.7	1600	100	NO	RJF36160CU33A
GM48156-4	A					YES	RJF36160CU44A
GM48156-17	–	□			80	YES	RLF36160U44AY065
GM48156-18	–	□			100	YES	RLF36160CU44AY065
GM48156-5	A				80	NO	RJF36200U33A
GM48156-6	A					YES	RJF36200U44A
GM48156-7	A		16.0	2000	100	NO	RJF36200CU33A
GM48156-8	A					YES	RJF36200CU44A
GM48156-19	–	□			80	YES	RLF36200U44AY065
GM48156-20	–	□			100	YES	RLF36200CU44AY065
GM48156-9	A				80	NO	RJF36250U33A
GM48156-10	A					YES	RJF36250U44A
GM48156-11	A		20.0	2500	100	NO	RJF36250CU33A
GM48156-12	A					YES	RJF36250CU44A
GM48156-21	–	□			100	YES	RLF36250CU44AY065
GM48156-22	–	□	20.1	3000	100	YES	RLF36300CU44AY065
GM48156-13	A				80	YES	RJF36120U44A
GM48156-14	B		12.7	1200		NO	RJF36120U33A
GM48156-15	B				100	NO	RJF36120CU33A
GM48156-16	B					YES	RJF36120CU44A

REV	DATE	REVISION	BY
–	1-31-06	NEW DRAWING [77272]	RAC
A	2-23-07	(A-1) NOTE ADDED [78285]	GFR
B	8-1-07	(D-8) GM48156-14, -15 & -16 ADDED; [79677]	BTW
C	4-28-21	(C,D-6-8) ADDED GM48156-17 THRU -22; ADDED REV COLUMN; [CT216232]	ZHK

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.







NOTE:
KOHLER PART # TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

METRIC CAD FILE

SQUARE D R-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN RAC	1-31-06
CHECKED WSD	2-1-06
APPROVED AJH	2-1-06
PLOTTED DATE	

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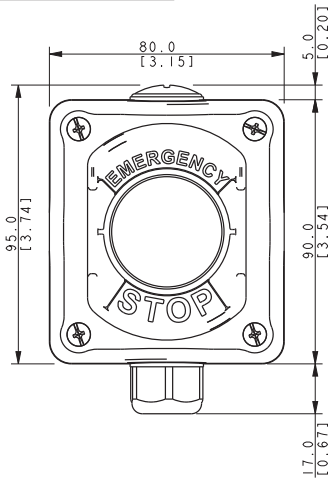
TITLE: DWG, CIRCUIT BREAKER

SCALE .5 | CAD NO. GM48156.DWG | SHEET 1-1

DWG. NO. GM48156 | D6

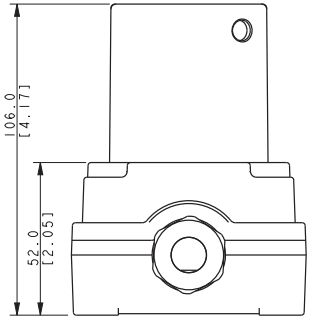
KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM103743				E-STOP, NEC REMOTE
	1	GM103743-1	1	E-STOP W/ YELLOW SHROUD, LOTO
	2	GM103743-2	4	#10 X 1.25□ Sheetmetal Screw
	3	GM103743-3	1	TERMINAL, FAST-ON, MALE, 18-22 AWG
	4	GM103743-4	1	TERMINAL, FAST-ON, FEMALE, 18-22 AWG
	5	GM103743-5	2	TERMINAL, SPADE, 22-16 AWG
	6	GM103743-6	1	LITERATURE, TT-1736

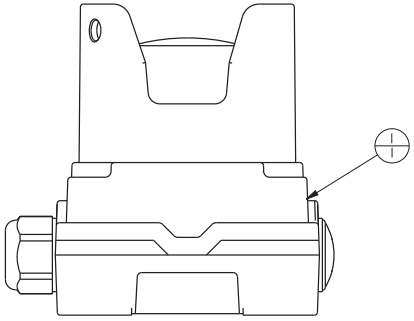
THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.





SCALE 1.50





NOTE:

DIMENSIONS IN [ ] ARE IN INCH EQUIVALENTS.

SCREWS AND TERMINALS ARE TO BE BAGGED AND PLACED IN THE BOX

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-12-18	NEW DRAWING [CT176728]	CCL

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH 63 MAX.
THIRD ANGLE PROJECTION

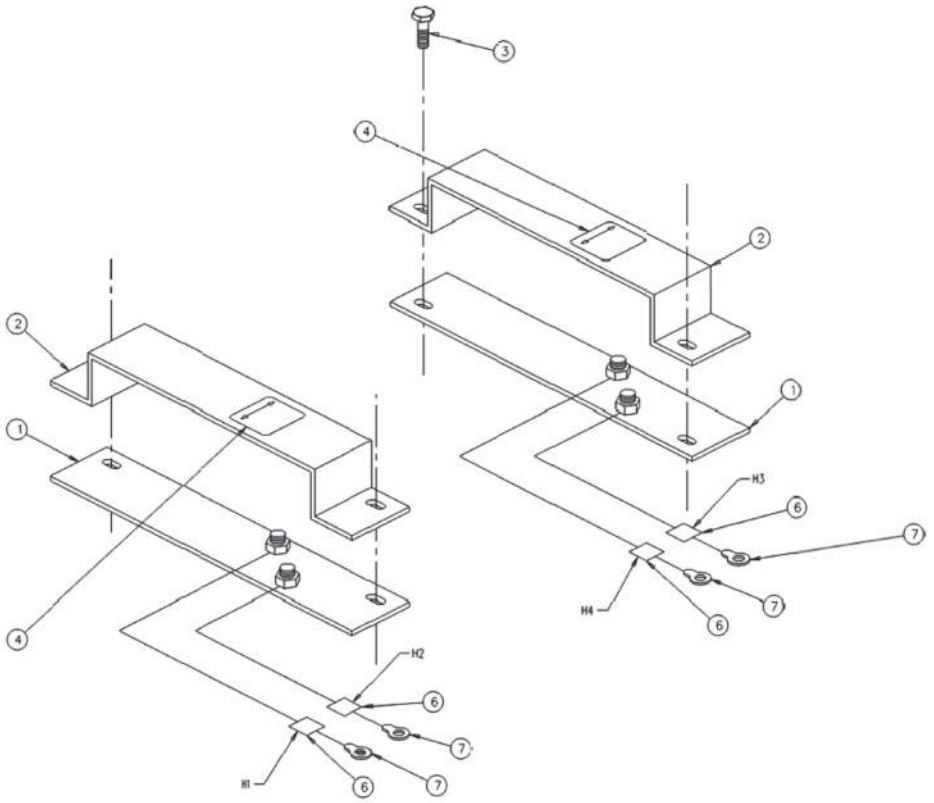
APPROVALS		DATE
DRAWN	CCL	2-12-18
CHECKED	KJB	2-12-18
APPROVED	KJB	2-12-18

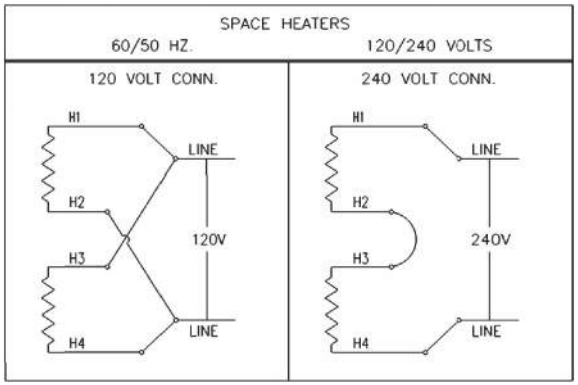
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

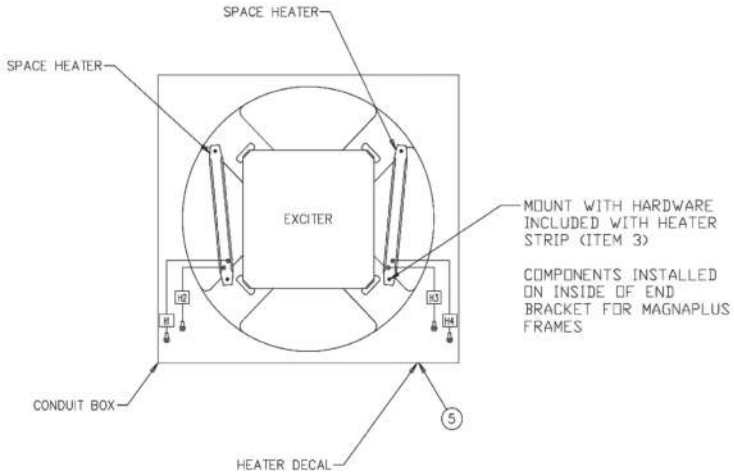
TITLE: E-STOP, NEC REMOTE

SCALE 1.50 | CAD NO. | SHEET 1 of 1

DWG NO. GM103743 | D







NOTE:

1. ALIGN THE SPACE HEATER AND GUARDS WITH THE PREDRILLED HOLES IN THE FRONT BRACKET AND MOUNT WITH THE SCREWS PROVIDED IN THE SPACE HEATER KIT.
2. APPLY THE SPACE HEATER CONNECTION DECAL ON THE BOTTOM OF THE CONDUIT BOX IN A VISIBLE LOCATION.
3. WIRE THE SPACE HEATER TO EITHER 120 VOLTS OR 240 VOLTS ACCORDING TO THE CONNECTION DIAGRAM. INSULATE THE CONNECTION.
4. ASSEMBLE CAUTION DECAL IN DIRECTION OF ARROW.

DESCRIPTION			FOR #572-575 AND #740 FRAMES			FOR #431-433 FRAME - MAGNAMAX			FOR #430-433 FRAME - MAGNAPLUS		
			REV			REV			REV		
KOHLER KIT NUMBER				H	272800		H	279750	☐	-	GM109472-KA1
PURCHASED COMPLETE FROM MARATHON			☐	A	272803	☐	A	279749	☐	-	GM10947I
1	2	SPACE HEATER			A-21138-33			A-21138-32			A-21138-32
2	2	GUARD			A-525855			A-525591			B-527461
3	4	SCREW			A-9646-75			A-9646-75			A-9646-75
4	2	DECAL, CAUTION			A-525590			A-525590			A-525590
5	1	DECAL, CONNECTION			A-510663			A-510663			A-510663
6	8	MARKERS			A-57829B			A-57829B			A-57829B
7	4	LEAD ASSEMBLY			L6H16W-24B8B8			L6H16W-24B8B8			L6H16W-42B8B8
ITEM	QTY.	DESCRIPTION			PART NO. MARATHON			PART NO. MARATHON			PART NO. MARATHON

350-1000 KW DDC
120/240 VOLT MARATHON GENERATOR HEATER
TOTAL HEATER WATTAGE 500 WATTS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
D	6-24-97	(A-2) 1000 KW WAS 800 KW [50803]	JDH
E	5-18-98	(A-2,A-7) #572, 573, 574, 575 & 740 WAS #570;	
		#433 WAS #430 [54622]	LDS
F	10-29-98	(A-6,7,8) KIT # AND DESCRIPTION ADDED [56529]	LDS
G	9-21-09	(B-1) X-101-8 (4), X-465-7 (4) AND X-25-53 (8)	
		REMOVED (C-1) NOTE REVISED [88337]	SAM
H	7-11-12	(B-1) VIEW A-A REMOVED , HARDWARE NOTE ADDED [CT15979]	SAM
J	7-31-19	CREO FORMAT WAS AUTOCAD; (A-7,8) TABLE UPDATED;	
		(A-6) GM10947I AND GM109472-KA1 ADDED; (B-2)	
		NOTE ADDED [CT197472]	HM

DO NOT SCALE, REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN MILLIMETERS
GENERAL TOLERANCES:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH 1.6 MAX.
THIRD-ANGLE PROJECTION

APPROVALS	DATE
DRAWN DCC/RD	10-20-86
CHECKED RLD	10-26-86
APPROVED DRF	11-29-86

KOHLER.
KOHLER, WISCONSIN 53044
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TITLE: **DRAWING, ASSEMBLY**

SCALE | CAD NO. | SHEET 1 of 1

DWG NO. **S-272000** **D**

ASCO Power Technologies™

Submittal Data
for:

UK BARNHART BUILDING

Item1: ATS-ESB; Item2: ATS-ELS; and Item3: ATS-E

Automatic Closed Transition Transfer Switch

Quantity of three (3) ASCO model **J7ACTSB30400C50C** 7000 Series Automatic Closed Transition Transfer Switch, rated 400 amps, 120/208 VAC, 60 HZ. Normal and Emergency, 3 phase, 4 pole, 4 wire, with a Group 5 Microprocessor Control Panel & Keypad, with the standard features described on the following pages.

Feature No.	**Function**
7ACTS***B***…	Switched Neutral
Acc. 27	Inphase Monitor

This unit has withstand current ratings of 65kAIC "Specific breaker", 65kAIC 'Time Based breaker' for a period of 0.05 seconds (3 Cycles), 7.5kAIC 'Short Time' for a period of 0.2 secs (12cycles) all at 240VAC max.

This unit is housed in a NEMA Type 1 enclosure.

Please refer to the outline drawing attached for lug / cable accommodations.

CMBUCK POWER
Established in 1941

SUGGESTED SPECIFICATION

For

Automatic Closed-Transition Transfer Switches

PART 1 GENERAL

1.1 Codes and Standards

The closed transition transfer switches and controls shall conform to the requirements of:

A. UL 1008 - Standard for Transfer Switch Equipment

B. CSA certified to CSA 22.2 No. 178 – 1978 Automatic Transfer Switches

C. IEC 60947-6-1 Low-voltage Switchgear and Controlgear; Multifunction equipment; Automatic Transfer Switching Equipment

D. NFPA 70 - National Electrical Code

E. NFPA 99 - Essential Electrical Systems for Health Care Facilities

F. NFPA 110 - Emergency and Standby Power Systems

G. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

H. NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches

I. International Standards Organization ISO 9001:2008

J. UL 508 Industrial Control Equipment

PART 2 PRODUCTS

2.01 Mechanically Held Transfer Switch

A. The transfer switch shall be electrically operated and mechanically held. The electrical operator shall be a momentarily energized, solenoid mechanism. Main operators which include overcurrent disconnect devices, linear motors or gears shall not be acceptable.

B. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.

C. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.

D. All main contacts shall be silver composition. Switches rated 800 amperes and above shall have segmented, blow-on construction for high withstand and

close-on capability and be protected by separate arcing contacts.

E. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 800 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.

F. The unit is provided with fully rated **Switched Neutral** contacts.

2.02 Microprocessor Controller

A. The controller's sensing and logic shall be provided by a single built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.

B. A single controller shall provide twelve selectable nominal voltages for maximum application flexibility and minimal spare part requirements. Voltage sensing shall be true RMS type and shall be accurate to ± 1% of nominal voltage. Frequency sensing shall be accurate to ± 0.2%. The panel shall be capable of operating over a temperature range of -20 to +60 degrees C and storage from -55 to +85 degrees C.

C. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator's manuals.

D. All customer connections shall be wired to a common terminal block to simplify field-wiring connections.

E. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:

1.	EN 55011:1991	Emission standard - Group 1, Class A
2.	EN 50082-2:1995	Generic immunity standard, from which:
	EN 61000-4-2:1995	Electrostatic discharge (ESD) immunity
	ENV 50140:1993	Radiated Electro-Magnetic field immunity
	EN 61000-4-4:1995	Electrical fast transient (EFT) immunity
	EN 61000-4-5:1995	Surge transient immunity
	EN 61000-4-6:1996	Conducted Radio-Frequency field immunity

2.03 Enclosure

A. The CTTS shall be furnished in a **NEMA Type 1 Enclosure**.

B. All standard and optional door-mounted switches and pilot lights shall be 16-mm industrial grade type or equivalent for easy viewing & replacement. Door controls shall be provided on a separate removable plate, which can be supplied loose for open type units.

PART 3 OPERATION

3.01 Controller Display and Keypad

A. A four line, 20 character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port. The following parameters shall only be adjustable via DIP switches on the controller:

1. Nominal line voltage and frequency

2. Single or three phase sensing

3. Operating parameter protection

4. Transfer operating mode configuration
(Open transition, Closed transition or Delayed transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

3.02 Voltage, Frequency and Phase Rotation Sensing

A. Voltage and frequency on both the normal and emergency sources (as noted below) shall be continuously monitored, with the following pickup, dropout and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Sources	Dropout / Trip	Pickup / Reset
Undervoltage	N&E,3ϕ	70 to 98%	85 to 100%
Overvoltage	N&E,3ϕ	102 to 115%	2% below trip
Underfrequency	N&E	85 to 98%	90 to 100%
Overfrequency	N&E	102 to 110%	2% below trip
Voltage unbalance	N&E	5 to 20%	1% below dropout

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 60°C.

C. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.

D. Source differential sensing shall be provided for the closed transition operating mode. The sensor shall enable transfer/re-transfer between live sources in the closed transition mode only when the two sources have a maximum voltage differential of 5%, frequency differential of 0.2 Hz and are within 5 electrical degrees.

General

E. Closed transition transfer shall be accomplished with no power interruption and without altering or actively controlling standby generator set.

F. The controller shall be capable (when activated by the keypad or through the serial port) of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).

G. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases, frequency, and phase rotation.

H. The controller shall include a user selectable algorithm to prevent repeated transfer cycling to a source on an installation which experiences primary side, single phase failures on a Grounded Wye – Grounded Wye transformer which regenerates voltage when unloaded. The algorithm shall also inhibit retransfer to the normal (utility) source upon detection of a single phasing condition until a dedicated timer expires, the alternate source fails, or the normal source fails completely and is restored during this time delay period. The time delays associated with this feature shall be adjustable by the user through the controller keypad and LCD.

3.03 Time Delays

A. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 24 VDC power supply.

B. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. An adjustable time delay of 0 to 6 seconds to override momentary emergency source outage to delay all retransfer signals during initial loading of engine generator set.

D. Two time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

E. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

F. A time delay activated output signal shall also be provided to drive an optional external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:

1. Prior to transfer only.

2. Prior to and after transfer.

3. Normal to emergency only.

4. Emergency to normal only.

5. Normal to emergency and emergency to normal.

6. All transfer conditions or only when both sources are available.

General

G. The controller shall also include the following built-in time delays for Closed Transition operation:

1. 1 to 5 minute time delay on failure to synchronize normal and emergency sources prior to closed transition transfer.

2. 0.1 to 9.99 second time delay on an extended parallel condition of both power sources during closed transition operation.

H. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.

I. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port. The time delay value displayed on the LCD or remote device shall be the remaining time until the next event occurs.

3.04 Additional Features

A. A three position momentary-type test switch shall be provided for the ***test / automatic / reset*** modes. The test position will simulate a normal source failure. The reset position shall bypass the time delays on either transfer to emergency or retransfer to normal. Switches which require utilizing the keypad and display function or have no manual time delay bypass means are not acceptable.

B. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the CTTS is connected to the normal source and one contact closed, when the CTTS is connected to the emergency source.

D. LED indicating lights (16 mm industrial grade, type 12) shall be provided; one to indicate when the CTTS is connected to the normal source (green) and one to indicate when the CTTS is connected to the emergency source (red).

E. LED indicating lights (16 mm industrial grade, type 12) shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal and emergency sources, as determined by the voltage sensing trip and reset settings for each source.

The following features shall be built-in to the controller, but capable of being activated through keypad programming or the serial port only when required by the user:

F. Provide the ability to select “commit/no commit to transfer” to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

G. An Inphase monitor shall be provided in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase

General

monitor shall be specifically designed for and be the product of the CTTS manufacturer. The inphase monitor shall be equal to ASCO Feature 27.

H. The controller shall be capable of accepting a normally open contact that will allow the transfer switch to function in a non-automatic mode using an external control device.

I. Engine Exerciser - The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to seven different exercise routines. For each routine, the user shall be able to:

1. Enable or disable the routine.

2. Enable or disable transfer of the load during routine.

3. Set the start time, .
- time of day
- day of week
- week of month (1st, 2nd, 3rd, 4th, alternate or every)

4. Set the duration of the run.

At the end of the specified duration the switch shall transfer the load back to normal and run the generator for the specified cool down period. A 10-year life battery that supplies power to the real time clock in the event of a power loss will maintain all time and date information.

The following feature shall be built - into the controller, but capable of being activated through keypad programming or the communications interface port.

Note: The transfer switch will operate in a non-automatic mode with this feature activated.

J. Terminals shall be provided for a remote contact which opens to signal the CTTS to transfer to emergency and for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or serial port.

K. System Status - The controller LCD display shall include a “System Status” screen which shall be readily accessible from any point in the menu by depressing the “ESC” key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example,

Normal Failed
Load on Normal
TD Normal to Emerg
2min15s

Controllers that require multiple screens to determine system status or display “coded” system status messages, which must be explained by references in the operator’s manual, are not permissible.

L. Self Diagnostics - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

M. Data Logging – The controller shall have the ability to log data and to maintain

General

the last 99 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory:

1. Event Logging
1. Date and time and reason for transfer normal to emergency.
2. Date and time and reason for transfer emergency to normal.
3. Date and time and reason for engine start.
4. Date and time engine stopped.
5. Date and time emergency source available.
6. Date and time emergency source not available.

2. Statistical Data
1. Total number of transfers.
2. Total number of transfers due to source failure.
3. Total number of days controller is energized.
4. Total number of hours both normal and emergency sources are available.

PART 4 ADDITIONAL REQUIREMENTS

4.01 Withstand and Closing Ratings

A. The CTTS shall be rated to close on and withstand the available RMS symmetrical short circuit current at the CTTS terminals with the type of overcurrent protection shown on the plans.

B. The CTTS shall be UL listed in accordance with UL 1008 and be labeled in accordance with .025 and .050 second, time based ratings, or appropriate short time rating(s) as applicable. CTTSs which are not tested and labeled with .025 and .050 time based ratings, or appropriate short time rating(s) and have series, or specific breaker ratings only, are not acceptable.

4.02 Tests and Certification

A. The complete CTTS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

B. ASCO is certified to ISO 9001:2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001:2008

4.03 Service Representation

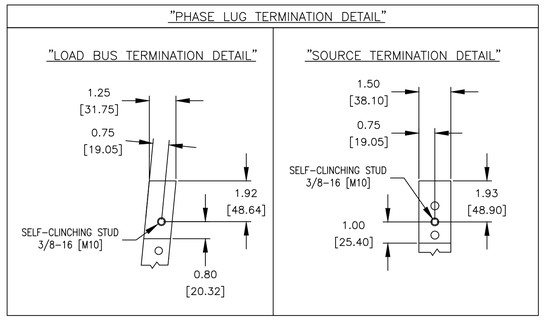
A. ASCO maintains a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. B. ASCO maintains records of each switch, by serial number, for a minimum of 20 years.

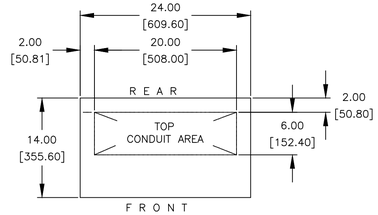
4.4 Accessories

ASCO Accessory 27 – Inphase monitor

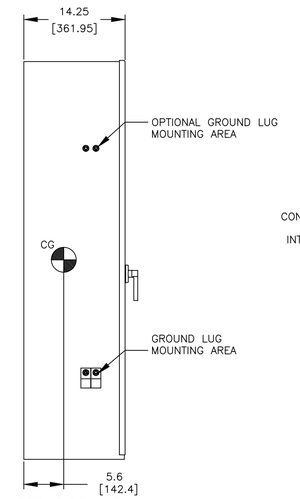
General



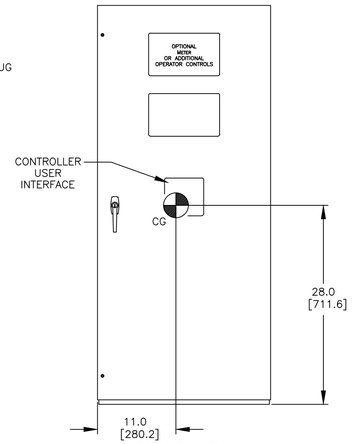
"DETAIL – A"



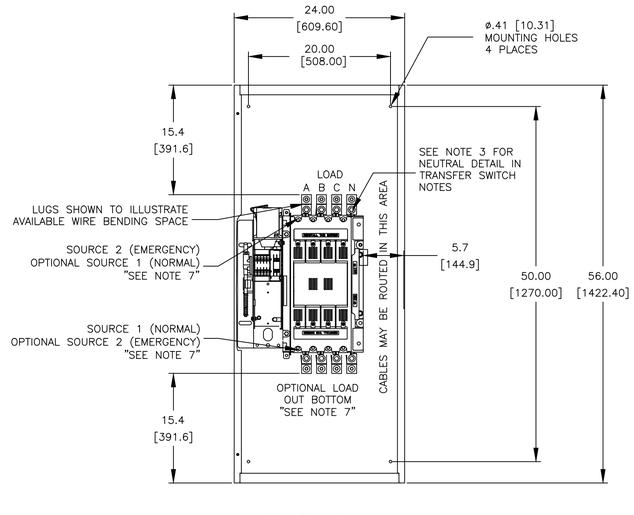
TOP VIEW



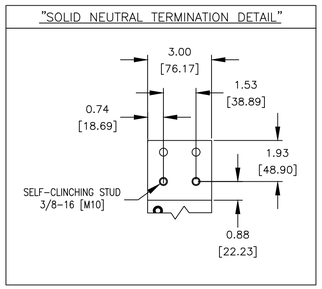
LEFT SIDE VIEW

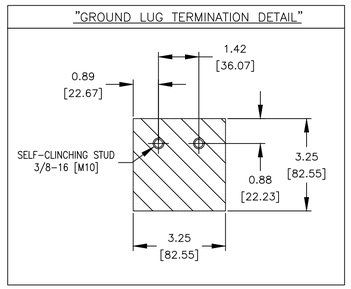


FRONT VIEW

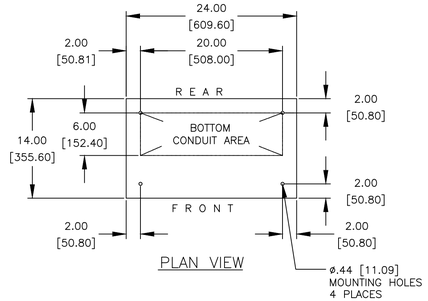


FRONT VIEW
WITHOUT DOOR





"DETAIL – B"



PLAN VIEW

GENERAL NOTES

1. FLOOR MOUNTED OR WALL MOUNTED ENCLOSURE.
   TYPE 1 (C) CONSTRUCTED FROM CODE GAUGE STEEL.
   FINISH: ANSI 61 GRAY POLYESTER SEMI GLOSS ELECTROSTATIC POWDER.
2. DOOR EQUIPPED WITH A KEY LOCKING HANDLE
3. DESIGNED FOR FRONT ACCESS.
4. RECOMMENDED CLEARANCES: FRONT: 36 [914.40] REAR: NONE.
5. ⊕ CENTER OF GRAVITY
6. APPROXIMATE SHIPPING WEIGHT: 290 LB [131.5 KG].
7. ACCESSORY 40, OPTIONAL LOAD AND SOURCE LOCATIONS IS AVAILABLE ON SERIES 7000 ONLY.

TRANSFER SWITCH

1. J FRAME AUTOMATIC/NON–AUTOMATIC TRANSFER SWITCH.
2. TRANSFER SWITCH RATING: 150 AMPS, 200 AMPS, 260 AMPS, 400 AMPS.
   WITHSTAND AND CLOSING RATING WHEN PROTECTED BY A CIRCUIT BREAKER WITHOUT
   AN ADJUSTABLE SHORT TIME RESPONSE,
   MAXIMUM 0.05 SECONDS, 65,000 AMPS RMS SYM @ 240V (SWITCHED, SOLID AND OVERLAPPING NEUTRAL).
   MAXIMUM 0.05 SECONDS, 42,000 RMS SYM @ 480V (SWITCHED AND SOLID NEUTRAL).
   MAXIMUM 0.05 SECONDS, 35,000 RMS SYM @ 480V (OVERLAPPING NEUTRAL).
   MAXIMUM 0.05 SECONDS, 35,000 RMS SYM @ 600V (SWITCHED, SOLID AND OVERLAPPING NEUTRAL).
   WITHSTAND AND CLOSING RATING WHEN PROTECTED BY A CIRCUIT BREAKER WITH
   AN ADJUSTABLE SHORT TIME RESPONSE,
   MAXIMUM 0.20 SECONDS: 7,500 RMS SYM @ 240V, 480V.
3. A FULL RATED NEUTRAL CONNECTION FOR EACH SOURCE AND THE LOAD IS OPTIONAL.
   WHEN PROVIDED IT IS IN ONE OF THE FOLLOWING FORMATS.
   A. SOLID NEUTRAL (SEE DETAIL B FOR TERMINATION)
   B. SWITCHED NEUTRAL POLE (SEE DETAIL A FOR TERMINATION)
   C. OVERLAPPING NEUTRAL POLE (NOT AVAILABLE ON ADTS, ACTS, NDTS & NCTS UNITS) (SEE DETAIL A FOR TERMINATION)
4. UL 1008 OR CSA C22.2 No. 178.1

TERMINATIONS 150A–400A

1. SWITCH CAN BE SUPPLIED WITHOUT LUGS (SEE SHEET 2).
   A. SOURCES, LOAD AND GROUND LUG KITS ARE ORDERED SEPARATELY.
2. MECHANICAL (SCREW TYPE) LUGS FOR COPPER (CU) OR ALUMINUM (AL) CABLE WHEN ORDERED WITH SWITCH.
   SOURCE 1 (NORMAL): (1) 1/0–600MCM [50–300mm²] OR (2) 1/0–250MCM [50–120mm²] PER PHASE & NEUTRAL
   LOAD: (1) 1/0–600MCM [50–300mm²] OR (2) 1/0–250MCM [50–120mm²] PER PHASE & NEUTRAL
   SOURCE 2 (EMERGENCY): (1) 1/0–600MCM [50–300mm²] OR (2) 1/0–250MCM [50–120mm²] PER PHASE & NEUTRAL
   GROUND: (3) #4–600MCM [25–300mm²] OR (6) 1/0–250MCM [50–120mm²]
   A. SUITABLE WIRE BENDING SPACE IS PROVIDED AS PER NEC.

WIRING/CABLING

1. USE 75°C MINIMUM CU/AL WIRE FOR POWER CABLES.
2. USE 60°C MINIMUM CU WIRE FOR CONTROLS.

REV. TO SHEET	ECN NO.	BY	APP.	DATE
N	308222	SV	JPB	03–22–24
	SEE ECN			
M	302560	SV		09–05–23
	SEE ECN			

PROJECT NAME:

OUTLINE | MOUNTING

JATS 150A–400A, PROVISION FOR MECHANICAL LUG
TYPE 1 56 X 24 X 14

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	SV	03–17–23
CHECKED	RN	03–17–23
PROJECT APPROVAL		
FINAL APPROVAL	RN	09–04–23
	JPB	09–04–23

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–1–003. FOR PLASTIC PARTS SEE MP–1–055

ASSEM. REF. NO.

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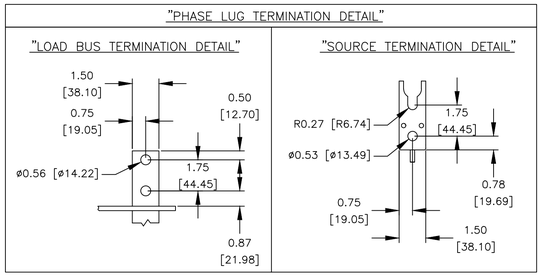
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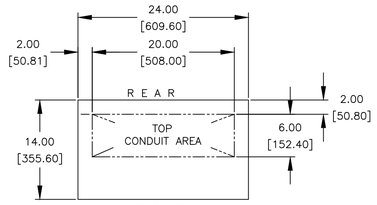
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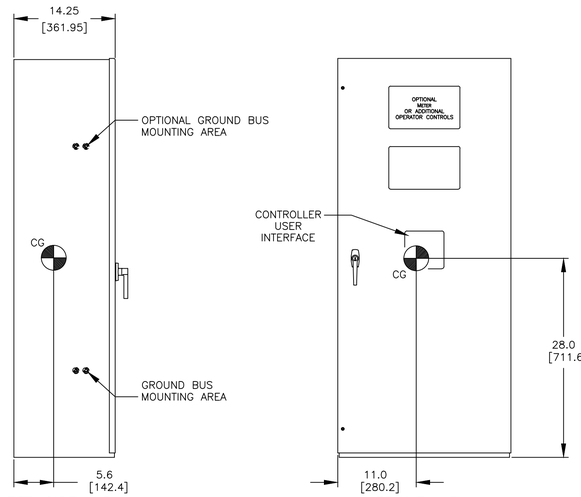
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"DETAIL – A"

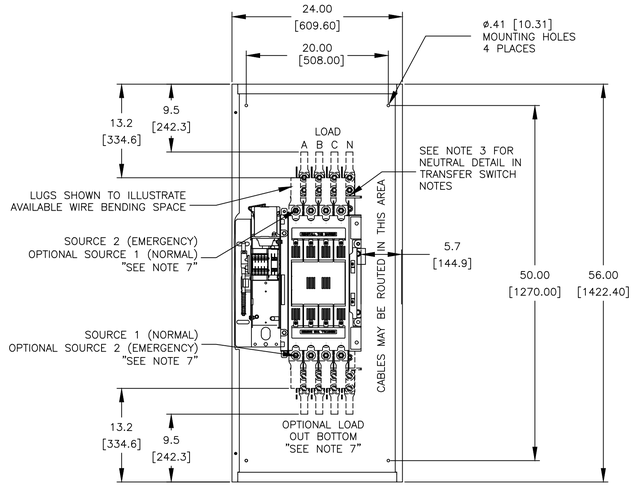


TOP VIEW

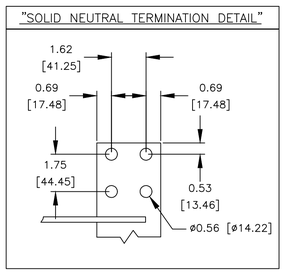


LEFT SIDE VIEW

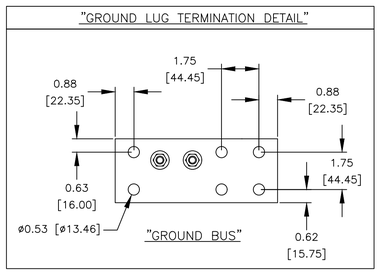
FRONT VIEW

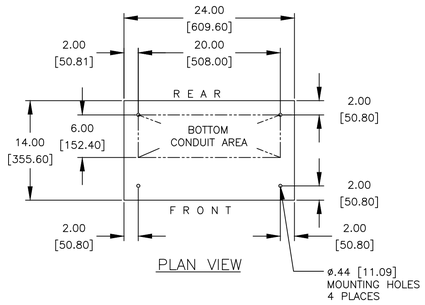


FRONT VIEW
WITHOUT DOOR



"DETAIL – B"





PLAN VIEW

GENERAL NOTES

1. FLOOR MOUNTED OR WALL MOUNTED ENCLOSURE.
   TYPE 1 (C) CONSTRUCTED FROM CODE GAUGE STEEL.
   FINISH: ANSI 61 GRAY POLYESTER SEMI GLOSS ELECTROSTATIC POWDER.
2. DOOR EQUIPPED WITH A KEY LOCKING HANDLE
3. DESIGNED FOR FRONT ACCESS.
4. RECOMMENDED CLEARANCES: FRONT: 36 [914.40] REAR: NONE.
5. ⊕ CENTER OF GRAVITY
6. APPROXIMATE SHIPPING WEIGHT: 290 LB [131.5 KG].
7. ACCESSORY 40, OPTIONAL LOAD AND SOURCE LOCATIONS IS AVAILABLE ON SERIES 7000 ONLY.

TRANSFER SWITCH

1. J FRAME 7000 SERIES AUTOMATIC/NON–AUTOMATIC TRANSFER SWITCH ONLY.
2. TRANSFER SWITCH RATING: 150 AMPS, 200 AMPS, 260 AMPS, 400 AMPS.
   WITHSTAND AND CLOSING RATING WHEN PROTECTED BY A CIRCUIT BREAKER WITHOUT
   AN ADJUSTABLE SHORT TIME RESPONSE,
   MAXIMUM 0.05 SECONDS, 65,000 AMPS RMS SYM @ 240V (SWITCHED, SOLID AND OVERLAPPING NEUTRAL).
   MAXIMUM 0.05 SECONDS, 42,000 RMS SYM @ 480V (SWITCHED AND SOLID NEUTRAL).
   MAXIMUM 0.05 SECONDS, 35,000 RMS SYM @ 480V (OVERLAPPING NEUTRAL).
   MAXIMUM 0.05 SECONDS, 35,000 RMS SYM @ 600V (SWITCHED, SOLID AND OVERLAPPING NEUTRAL).
   WHEN CONNECTED WITH ONLY 1 LUG 1 CABLE PER PHASE THE 240V RATING IS REDUCED TO 50,000 RMS.
   WITHSTAND AND CLOSING RATING WHEN PROTECTED BY A CIRCUIT BREAKER WITH
   AN ADJUSTABLE SHORT TIME RESPONSE,
   MAXIMUM 0.20 SECONDS: 7,500 RMS SYM @ 240V, 480V.
3. A FULL RATED NEUTRAL CONNECTION FOR EACH SOURCE AND THE LOAD IS OPTIONAL.
   WHEN PROVIDED IT IS IN ONE OF THE FOLLOWING FORMATS.
   A. SOLID NEUTRAL (SEE DETAIL B FOR TERMINATION)
   B. SWITCHED NEUTRAL POLE (SEE DETAIL A FOR TERMINATION)
   C. OVERLAPPING NEUTRAL POLE (NOT AVAILABLE ON ADTS, ACTS, NDTS & NCTS UNITS) (SEE DETAIL A FOR TERMINATION)
4. UL 1008 OR CSA C22.2 No. 178.1

TERMINATIONS 150A–400A

1. SWITCH SUPPLIED WITHOUT LUGS.
   A. SOURCES, LOAD AND GROUND LUG KITS ARE ORDERED SEPARATELY.
2. CRIMP LUGS FOR COPPER (CU) OR ALUMINUM (AL) CABLE.
   SOURCE 1 (NORMAL): (1) 600MCM [300mm²] OR (2) 500MCM [240mm²] PER PHASE & NEUTRAL
   LOAD: (1) 300MCM [150mm²] OR (2) 300MCM [150mm²] PER PHASE & NEUTRAL
   SOURCE 2 (EMERGENCY): (1) 600MCM [300mm²] OR (2) 500MCM [240mm²] PER PHASE & NEUTRAL
   A. SUITABLE WIRE BENDING SPACE IS PROVIDED AS PER NEC.
   B. OPTIONAL LUGS MAY BE SUPPLIED (MAY AFFECT ENCLOSURE SIZE).

WIRING/CABLING

1. USE 75°C MINIMUM CU/AL WIRE FOR POWER CABLES.
2. USE 60°C MINIMUM CU WIRE FOR CONTROLS.

REV. TO SHEET	ECN NO.	BY	APP.	DATE
N	308222	SV	JPB	03–22–24
	SEE ECN			
M	302560	SV		09–05–23
	SEE ECN			

PROJECT NAME:

OUTLINE | MOUNTING

JATS 150A–400A, PROVISION FOR CRIMP LUG
TYPE 1 56 X 24 X 14, 7000 SERIES TRANSFER SWITCH ONLY

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	SV	03–17–23
CHECKED	RN	03–17–23
PROJECT APPROVAL		
FINAL APPROVAL	RN	09–04–23
	JPB	09–04–23

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–1–003. FOR PLASTIC PARTS SEE MP–1–055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE 3/32" = 1" | SIZE DS

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DWG. NO. 780145

DRAWING REV. N | ECN NO. 308222 | SHEET 2 OF 2

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DIMENSION ARE IN INCHES [MILLIMETERS]

THREE PHASE WIRING FOR ASCO® 7000 SERIES AUTOMATIC CLOSED TRANSITION TRANSFER SWITCHES TYPE J7ACTS RATED 150, 260, 400, & 600 AMPERES

FEATURES, SETTINGS, OPERATION, ACCESSORIES & NOTES

THE FOLLOWING FEATURES AND RELATED SETTINGS ARE PART OF THE GROUP 5 CONTROL PANEL'S USER CONFIGURABLE PARAMETERS. FOR DETAILED INFORMATION REGARDING THE CONFIGURATION OF THESE PARAMETERS AND OTHER FEATURES OF THE GROUP 5 CONTROL PANEL, REFER TO THE GROUP 5 CONTROL PANEL FOR ASCO® 7000 SERIES AUTOMATIC TRANSFER SWITCHES USER'S GUIDE (PART NO. 381333–126) PROVIDED WITH EVERY 7000 SERIES AUTOMATIC TRANSFER SWITCH.

THE NOMINAL OPERATING VOLTAGE & FREQUENCY IS PRE–PROGRAMMED AT THE FACTORY BASED ON THE NAMEPLATE DATA PRINTED ON THE TRANSFER SWITCH & CONTROL PANEL NAMEPLATES.

VOLTAGE & FREQUENCY SENSING

THE FOLLOWING SETTINGS ARE EXPRESSED AS A PERCENTAGE OF THE CONTROL PANEL'S NOMINAL VOLTAGE SETTING UNLESS STATED OTHERWISE. ALL SETTINGS ARE ADJUSTABLE IN INCREMENTS OF 1%.

A. RMS VOLTAGE SENSING ON ALL PHASES OF THE NORMAL & EMERGENCY SOURCES.

PARAMETER	RANGE OF SETTINGS	DEFAULT SETTING
NORMAL VOLTAGE DROPOUT	70–98%	85%
NORMAL VOLTAGE PICKUP	85–100%	90%
NORMAL OVER VOLTAGE TRIP	102–115%	OFF
NORMAL VOLTAGE UNBALANCE	YES/NO	NO
NORMAL VOLTAGE UNBALANCE DROPOUT	5–20% OF AVG. NORMAL VOLTAGE	20% (if ON)
NORMAL VOLTAGE UNBALANCE PICKUP	3–18% OF AVG. NORMAL VOLTAGE	10% (if ON)
EMERGENCY VOLTAGE DROPOUT	70–98%	75%
EMERGENCY VOLTAGE PICKUP	85–100%	90%
EMERGENCY OVER VOLTAGE TRIP	102–115%	OFF
EMERGENCY VOLTAGE UNBALANCE	YES/NO	NO
EMERGENCY VOLTAGE UNBALANCE DROPOUT	5–20% OF AVG. EMERGENCY VOLTAGE	20% (if ON)
EMERGENCY VOLTAGE UNBALANCE PICKUP	3–18% OF AVG. EMERGENCY VOLTAGE	10% (if ON)

B. FREQUENCY SENSING OF THE NORMAL & EMERGENCY SOURCES.

PARAMETER	RANGE OF SETTINGS	DEFAULT SETTING
NORMAL FREQUENCY DROPOUT	85–98%	90%
NORMAL FREQUENCY PICKUP	90–100%	95%
NORMAL OVER FREQUENCY TRIP	102–110%	OFF
EMERGENCY FREQUENCY DROPOUT	85–98%	90%
EMERGENCY FREQUENCY PICKUP	90–100%	95%
EMERGENCY OVER FREQUENCY TRIP	102–110%	OFF

TIME DELAYS

THE FOLLOWING TIME DELAY SETTINGS ALL HAVE AN ADJUSTABLE RANGE OF 0–60 min 59 sec UNLESS STATED OTHERWISE. ADJUSTABLE IN INCREMENTS OF 1 sec.
NOTE: SOME TIME DELAYS MAY BE EFFECTED BY CUSTOMER REQUESTED ACCESSORIES PROVIDED WITH THE UNIT. REFER TO THE DESCRIPTIONS PROVIDED UNDER THE "ACCESSORIES" NOTES ON THIS PAGE.

FEATURE	NAME	DEFAULT SETTING
1C	NORMAL SOURCE FAILURE TO ENGINE START	1 sec
2B	TRANSFER TO EMERGENCY ON AVAILABILITY OF EMERGENCY SOURCE	0 sec
1F	EMERGENCY SOURCE FAILURE RETRANSFER (NORMAL SOURCE AVAILABLE)	0 sec
2E	ENGINE COOLDOWN FOLLOWING RETRANSFER TO NORMAL	5 min
3A	RETRANSFER TO NORMAL (NORMAL FAILURE MODE)	30 min
3A	RETRANSFER TO NORMAL (TEST MODE)	30 sec
–	DELAYED TRANSFER (LOAD "OFF" TIME), [0–5 min 59 sec]	3 sec

DESCRIPTIONS OF TIME DELAYS:

FEAT. 1C – DELAY ON NORMAL SOURCE OUTAGE. STARTS ON FAILURE OF NORMAL SOURCE. RESETS IF NORMAL SOURCE IS ACCEPTED BEFORE EXPIRATION. INHIBITS ENGINE STARTING AND AUTOMATIC TRANSFER UNTIL EXPIRATION.

FEAT. 2B – DELAY PRIOR TO TRANSFER TO THE EMERGENCY SOURCE. DELAY STARTS ON EXPIRATION OF FEAT. 1C AND WHEN THE EMERGENCY SOURCE HAS BEEN ACCEPTED. DELAY RESETS IF THE EMERGENCY SOURCE FAILS PRIOR TO EXPIRATION. ON EXPIRATION, TRANSFER TO EMERGENCY IS INITIATED UNLESS THE NORMAL SOURCE HAS RECOVERED AND THE "COMMIT TO TRANSFER" FEATURE IS SET TO "NO" COMMIT. PROVIDES A PERIOD FOR EMERGENCY SOURCE STABILIZATION OR STAGING OF MULTIPLE TRANSFER SWITCH CONTROLLED LOADS TO THE EMERGENCY SOURCE.

FEAT. 1F – DELAY ON RETRANSFER TO NORMAL IN THE EVENT OF EMERGENCY SOURCE FAILURE. DELAY BEGINS ON FAILURE OF THE EMERGENCY SOURCE IF THE NORMAL SOURCE IS ACCEPTABLE. ON EXPIRATION, RETRANSFER TO NORMAL WILL BE INITIATED.

FEAT. 2E – DELAY ON ENGINE SHUTDOWN (ENGINE COOL DOWN PERIOD). DELAY STARTS FOLLOWING RETRANSFER TO THE NORMAL SOURCE. PROVIDES A PERIOD FOR THE ENGINE–GENERATOR SET TO RUN UNLOADED PRIOR TO SHUTDOWN.

FEAT. 3A – RETRANSFER TO NORMAL DELAY (NORMAL FAILURE MODE)
DELAY STARTS WHEN NORMAL SOURCE IS ACCEPTED (FOLLOWING IT'S FAILURE) AND WHILE THE LOAD IS CONNECTED TO EMERGENCY. RESETS IF NORMAL FAILS PRIOR TO EXPIRATION OR IF THE EMERGENCY SOURCE FAILS BEFORE EXPIRATION AND FEAT. 1F EXPIRES (AUTOMATIC BYPASS ON EMERGENCY SOURCE FAILURE). PROVIDES A PERIOD FOR THE NORMAL SOURCE TO STABILIZE PRIOR TO RETRANSFER.

FEAT. 3A – RETRANSFER TO NORMAL DELAY (TEST MODE)
DELAY STARTS WHEN THE "TRANSFER TEST" SWITCH IS RESET TO "AUTO" (FOLLOWING A USER INITIATED TRANSFER TEST) AND WHILE THE LOAD IS CONNECTED TO EMERGENCY. RESETS IF NORMAL FAILS PRIOR TO EXPIRATION OR IF THE EMERGENCY SOURCE FAILS BEFORE EXPIRATION AND FEAT. 1F EXPIRES (AUTOMATIC BYPASS ON EMERGENCY SOURCE FAILURE).

IN SYNC – IN SYNC TIME DELAY BEGINS BEFORE A CLOSED TRANSITION TRANSFER FOLLOWING ACCEPTANCE OF THE SOURCE TO WHICH TRANSFER IS BEING MADE. ON EXPIRATION OF THE DELAY, THE LOGIC AWAITS AN IN SYNC CONDITION FOR SUBSEQUENT CLOSED TRANSITION TRANSFER.

EXTENDED PARALLEL – EXTENDED PARALLEL TIMER BEGINS WHEN THE SOURCES ARE PARALLELED (CN & CE CLOSED). IF THE TWO SOURCES REMAIN IN PARALLEL WHEN THE DELAY EXPIRES, THE CONTROL LOGIC TAKES THE FOLLOWING ACTIONS:

- THE LOGIC WILL ATTEMPT TO OPERATE THE TRANSFER SWITCH TO A "SAFE" STATE WHERE THE SOURCES WILL NO LONGER BE PARALLELED AND THE LOAD WILL BE SERVICED BY AN AVAILABLE SOURCE.
- THE CONTROL PANEL IS LOCKED OUT FROM ANY FURTHER AUTOMATIC OPERATION.
- THE "TS LOCKED OUT" INDICATOR (RED LED) IS LIT.
- THE UNIT WILL REMAIN LOCKED OUT UNTIL THE "TS LOCKED OUT" PUSH–BUTTON IS DEPRESSED FOR RESET.

FAIL TO SYNC – FAILURE TO SYNC TIMER BEGINS WHEN THE LOGIC BEGINS TO CHECK FOR AN IN SYNC CONDITION FOR WHICH TO ALLOW CLOSED TRANSITION TRANSFER. IF THE DELAY EXPIRES PRIOR TO AN IN SYNC CONDITION OCCURRING, THE "FAILURE TO SYNCHRONIZE" SIGNAL IS ACTIVATED (RED LED) AND CLOSURE OF THE TFR RELAY CONTACT AVAILABLE AT THE FIELD CONNECTIONS TERMINAL BLOCK (TB).

FEAT. 62F – EXTENDED PARALLEL ALARM TIMER BEGINS TIMING WHEN THE SOURCES ARE PARALLELED (CN & CE CLOSED). THE ENABLING OF THE EXTENDED PARALLEL ALARM TIMER OCCURS AT THE SAME TIME THAT THE CONTROLLER'S EXTENDED PARALLEL TIMER BEGINS.

THE FEATURE 62F EXTENDED PARALLEL ALARM TIMER IS INDEPENDENT OF THE CONTROLLER'S EXTENDED PARALLEL TIMER DESCRIBED UNDER "DESCRIPTION OF TIME DELAYS".

ON EXPIRATION OF THE FEATURE 62F EXTENDED PARALLEL ALARM TIME DELAY, OUTPUT RELAY (RL3) (2) FORM C CONTACTS, CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB), TRANSFER.

THE FEATURE 62F EXTENDED PARALLEL ALARM DELAY IS ADJUSTABLE VIA POTENTIOMETER (P2) LOCATED ON THE DUAL OPERATOR CONTROL (DOC) WHICH IS ADJUSTABLE FROM 0–1 SECOND. FACTORY SET AT 1 SEC.

NOTE: THE TIMER SHOULD BE SET ABOVE 0.7 SECONDS TO PERMIT THE CONTROLLER TO ATTEMPT TO OPERATE THE TRANSFER SWITCH TO A "SAFE" STATE WHERE THE SOURCES WILL NO LONGER BE PARALLELED. THE TIMER CAN BE SET LOWER TO BE USED TO ISOLATE THE TWO SOURCES WITH AN EXTERNALLY CONTROLLED FEEDER CIRCUIT BREAKER. HOWEVER THE CONTROLLER MAY NOT BE ABLE TO PLACE THE TRANSFER SWITCH IN A "SAFE" STATE.

ENGINE EXERCISER

THE ENGINE EXERCISER FEATURE PROVIDES A MEANS TO PERFORM AUTOMATIC EXERCISING OF THE ENGINE–GENERATOR SET EITHER WITH OR WITHOUT LOAD TRANSFER.
THE USER CAN PROGRAM UP TO SEVEN DIFFERENT EXERCISE ROUTINES. EACH ROUTINE INCLUDES;

1. ENABLE OR DISABLE THE ROUTINE
2. ENABLE OR DISABLE TRANSFER OF THE LOAD DURING THE ROUTINE
3. SET START TIME OF ROUTINE –
   - TIME OF DAY
   - DAY OF WEEK
   - WEEK OF MONTH (1st, 2nd, 3rd, 4th, ALTERNATE OR ALL)
4. SET THE DURATION OF THE ROUTINE

PARAMETER	RANGE OF SETTING	DEFAULT SETTING
MONTH (CLOCK SET)	JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC	CURRENT DATE
DAY	1–31	
YEAR	00–99	
HOUR	0–23	Eastern Standard Time
MINUTE	0–59	
ENABLE ROUTINE (ROUTINE 1–7)	YES/NO	NO
TRANSFER LOAD	YES/NO	NO
START HOUR	0–23	0
START MINUTE	0–59	0
RUN WEEK	ALL, ALTERNATE, 1st, 2nd, 3rd, 4th, 5th	ALL
RUN DAY	SUN MON TUE WED THU FRI SAT	SUN
DURATION HOURS	0–23	0
DURATION MINUTES	0–59	0

OPERATION

IF THE NORMAL SOURCE FAILS, THE TRANSFER SWITCH INITIATES STARTING OF THE ENGINE–GENERATOR SET. WHEN PROPER VOLTAGE AND FREQUENCY HAVE BEEN ATTAINED, THE LOAD WILL BE TRANSFERRED IN AN OPEN TRANSITION (BREAK BEFORE MAKE) OPERATION TO THE EMERGENCY SOURCE.

WHEN THE NORMAL SOURCE IS RESTORED FOR THE DURATION OF THE FEATURE 3A, RETRANSFER TO NORMAL TIME DELAY SETTING, THE CONTROLS WILL BEGIN MONITORING PHASE, FREQUENCY, AND VOLTAGE DIFFERENTIAL BETWEEN NORMAL AND EMERGENCY SOURCES.

WHEN THE TWO SOURCES ARE APPROACHING SYNCHRONISM, A CLOSED TRANSITION (MAKE BEFORE BREAK) TRANSFER TO THE NORMAL SOURCE WILL BE INITIATED. THE NORMAL AND EMERGENCY CONTACTORS (CN & CE) WILL BE IN AN OVERLAP CONDITION FOR LESS THAN 0.1 SECONDS.

CLOSED TRANSITION TRANSFER WILL ALSO BE INITIATED DURING A TRANSFER TEST OPERATION CAUSED BY OPERATION OF THE FEATURE 5 TRANSFER TEST SELECTOR SWITCH. RETRANSFER WILL ALSO OCCUR IN A CLOSED TRANSITION MANNER AT THE END OF THE TEST.

CLOSED TRANSITION BYPASS OPERATION: THE "CT BYPASS OPTIONS" DISPLAY OF THE CONTROL PANEL ALLOWS SETTING THE TRANSFER SWITCH'S CLOSED TRANSITION BYPASS BEHAVIOR. CLOSED TRANSITION BYPASS CAUSES THE TRANSFER SWITCH TO INTERRUPT POWER TO THE LOAD DURING TRANSFER. THE AVAILABLE OPTIONS ARE:

- FAIL TO SYNC AUTO BYPASS ENABLE – CAUSES A "FAILURE TO SYNCHRONIZE" CONDITION TO RESULT IN AN AUTOMATIC CLOSED TRANSITION BYPASS. DEFAULT SETTING IS NO AUTOMATIC BYPASS.
- CT BYPASS – ALLOWS SELECTIONS AS TO WHETHER THE CLOSED TRANSITION BYPASS WILL OCCUR WITH OR WITHOUT A DELAYED TRANSITION (LOAD "OFF" TIME). DEFAULT SETTING IS OPEN TRANSITION (NO DELAY).
- DT BYPASS – SETS THE LENGTH OF THE DELAYED TRANSFER (LOAD "OFF" TIME) IF THE PREVIOUS PARAMETER HAS BEEN SELECTED TO OPERATE WITH DELAYED TRANSITION. THE DELAY ("OFF" PERIOD) BEGINS FOLLOWING THE OPENING OF THE SOURCE CONTACTOR, (CN OR CE), CONNECTED TO THE SOURCE FROM WHICH TRANSFER IS BEING MADE. UPON EXPIRATION, CLOSURE OF THE OPPOSITE SOURCE CONTACTOR IN INITIATED.

SIGNALS & AUXILIARIES

A. FEATURES 7 & 8– ENGINE START SIGNAL
SIGNAL INITIATED BY DROPOUT OF CONTROL PANEL RELAY (NR) FOLLOWING EXPIRATION OF THE FEATURE 1C TIME DELAY (DELAY TO OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES). FEATURE 7 CLOSES TO SIGNAL ENGINE START. FEATURE 8 OPENS TO SIGNAL ENGINE START. ENGINE STARTING SIGNAL RESETS FOLLOWING RETRANSFER TO THE NORMAL SOURCE AND EXPIRATION OF THE FEATURE 2E (ENGINE COOL DOWN) TIME DELAY. FEATURES 7 & 8 ARE PROVIDED AS A SINGLE FORM C CONTACT CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB). CONTACT RATED 5 AMPS AT 32 VDC/120VAC RESISTIVE.

B. FEATURES 14AE & 14BE – TRANSFER SWITCH AUXILIARY POSITION INDICATING CONTACTS. SIX (6) FORM A CONTACTS EACH TO INDICATE CONNECTION OF THE TRANSFER SWITCH TO NORMAL (14A) OR EMERGENCY (14B). CONTACTS CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB). CONTACTS RATED 10 AMPS, 32 VDC, 250 VAC.

C. FEATURE 17 – REMOTE TRANSFER TO EMERGENCY.
REQUIRES A CUSTOMER SUPPLIED NORMALLY OPEN CONTACT. CLOSING OF THE CONTACT CAUSES ENGINE START AND TRANSFER TO THE EMERGENCY SOURCE. OPENING OF THE CONTACT ACTIVATES THE FEATURE 3A (RETRANSFER TO NORMAL) DELAY PRIOR TO RETRANSFER. IN THE EVENT THE EMERGENCY SOURCE FAILS WHILE THE TRANSFER SWITCH IS CONNECTED TO EMERGENCY AND THE REMOTE CONTACT IS CLOSED, THE TRANSFER SWITCH WILL RETRANSFER TO THE NORMAL SOURCE. CONNECTED TO THE FIELD CONNECTIONS TERMINAL BLOCK (TB).

USER CONTROLS AND INDICATIONS

A. FEATURES 5 & 6B – TRANSFER TEST/RETRANSFER TIME DELAY BYPASS CONTROLS.
TRANSFER TEST:
OPERATION CAUSES A NORMAL SOURCE FAILURE SEQUENCE. ACTIVATE AND HOLD FOR AT LEAST 15 SECONDS TO ALLOW TIME FOR THE ENGINE–GENERATOR TO START.
RETRANSFER TIME DELAY BYPASS:
OPERATION WILL BYPASS THE FEATURE 3A (RETRANSFER TO NORMAL DELAY).

B. FEATURES 9A & 9B – TRANSFER SWITCH POSITION INDICATORS.
FEATURE 9A: TRANSFER SWITCH CLOSED ON NORMAL (GREEN LED)
FEATURE 9B: TRANSFER SWITCH CLOSED ON EMERGENCY (RED LED)

C. FEATURES 9C & 9D – SOURCE ACCEPTANCE INDICATORS.
FEATURE 9C: NORMAL SOURCE ACCEPTED (GREEN LED)
FEATURE 9D: EMERGENCY SOURCE ACCEPTED (RED LED)

D. EXTENDED PARALLEL TIME – INDICATES THAT THE MAIN CONTACTORS (CN & CE) HAVE BEEN SIMULTANEOUSLY CLOSED FOR A PERIOD EXCEEDING THE TIME ALLOTTED. (RED LED)

E. FAILURE TO SYNCHRONIZE – INDICATES THE THE TWO SOURCES DID NOT MEET THE PARAMETERS REQUIRED FOR A CLOSED TRANSITION TRANSFER. (RED LED)

F. TS LOCKED OUT – INDICATES THAT A FAILURE OF THE TRANSFER SWITCH OPERATOR HAS OCCURRED AND THAT THE TRANSFER SWITCH HAS TAKEN CORRECTIVE ACTION AS REQUIRED. ONCE THIS FAILURE RECOVERY OPERATION TAKES PLACE, THE TRANSFER SWITCH IS PREVENTED FROM FURTHER OPERATION UNTIL THE CONDITION IS CORRECTED. ONCE THE CONDITION IS CORRECTED, THE TS LOCKED OUT SWITCH MAY BE DEPRESSED TO RESET THE CONTROL PANEL (RED LED).

G. TS LOCKED OUT RESET – ONCE A LOCK OUT CONDITION IS CORRECTED, THE TS LOCKED OUT RESET MAY BE ACTUATED TO RESET THE CONTROL PANEL.

H. ALARM RESET – RESETS FAILURE TO SYNCHRONIZE AND EXTENDED PARALLEL ALARMS.

I. CLOSED TRANSITION BYPASS – BYPASSES CLOSED TRANSITION TRANSFER WHEN ACTUATED DURING THE PERIOD WHILE THE TRANSFER SWITCH CONTROL PANEL IS MONITORING FOR AN INPHASE CONDITION. CAUSES OPEN TRANSITION TRANSFER TO THE OPPOSITE SOURCE IF CONDITIONS PERMIT.

GENERAL NOTES

1. SWITCH SHOWN DE–ENERGIZED AND CONNECTED TO THE NORMAL SOURCE.
2. DEVICE SYMBOLS AND DESIGNATIONS ARE IN ACCORDANCE WITH NEMA PUBLICATION ICS 1–1983, PART 1–101A.
3. ALL WIRING IS #16 AWG, TINNED, STRANDED COPPER UNLESS OTHERWISE INDICATED.
4. ○ ON TERMINAL BLOCKS INDICATES AVAILABLE FIELD CONNECTION POINT.
5. ● ON TERMINAL BLOCKS INDICATES FACTORY CONNECTION POINT.
6. CONTROL AND ACCESSORY WIRING IS ROUTED IN ACCORDANCE WITH ASCO ASSEMBLY PROCEDURE GS451261.
7. AN OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE UNIT.

BASE CATALOG NUMBER					CATALOG NUMBER SUFFIXES			
TS FRAME	CATALOG TYPE	NEUTRAL TYPE	PHASE POLES	AMPS	VOLT CODE	CONTROLLER	OPTIONAL ACCESSORY	ENCLOSURE CODE
J	7ACTS	A B	3	150 260 400 600	C D E F H J K L M N P Q R	5	X	C E F G H J K L M N P Q BLANK FOR OPEN TYPE
		BLANK FOR NONE					BLANK FOR NONE	

EXPLANATION OF CATALOG NUMBER CODES

NEUTRAL TYPE		VOLTAGE CODES 3 PHASE (3 OR 4 WIRE) 50 OR 60 Hz		ENCLOSURE CODES		
CODE	DESCRIPTION	CODE	NOMINAL VOLTAGE	CODE	TYPE	DESCRIPTION
BLANK	NONE			BLANK		OPEN TYPE (NO ENCLOSURE)
A	SOLID			C	1	GENERAL PURPOSE, INDOOR
B	SWITCHING	C	208	E	2	INDOOR, WATER & DUST RESISTANT
		D	220	F	3R	OUTDOOR, RAINPROOF, SLEET & ICE RESISTANT
		E	230	G	4	INDOOR/OUTDOOR, WATERTIGHT & DUST TIGHT
		F	240	H	4X	TYPE 4 PLUS CORROSION RESISTANCE (STAINLESS STEEL)
				J	4X	TYPE 4 PLUS CORROSION RESISTANCE (FIBERGLASS)
		H	380	K	7	EXPLOSION PROOF
		J	400	L	12	INDOOR, INDUSTRIAL ENVIRONMENTS, OIL TIGHT & DUST TIGHT
		K	415			
		L	440			(SECURE ENCLOSURES)
		M	460	M	3R	OUTDOOR, RAINPROOF, SLEET & ICE RESISTANT
		N	480	N	4	INDOOR/OUTDOOR, WATERTIGHT & DUSTTIGHT
		P	550	P	4X	TYPE 4 PLUS CORROSION RESISTANCE (STAINLESS STEEL)
		Q	575	Q	12	INDOOR, INDUSTRIAL ENVIRONMENTS, OILTIGHT & DUSTTIGHT
		R	600			

REV	ECN NO.	BY	APP.	DATE
E	290887	AVK	HSL	08/17/21
	SEE ECN			
D	279028	TR	BK	05/29/19
	SEE ECN			
C	236733	TR	BK	04/23/12
	SEE ECN			
B	206834	TR	WK	12/6/05
	SEE ECN			
A	205857	JPB	JPB	9/12/05
	SEE ECN			
—	204419	BWM	SDH	5/05
	ISSUE			

CATALOG NUMBER _____
ASCO® CERTIFIED TO
S.O. _____
BY _____
DATE _____
FORM REV E

PROJECT NAME:

WIRING DIAGRAM
7000 SERIES (J7ACTS) 3PH 150–600 AMPS
"J" FRAME, GROUP 5 CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	BWM	5/05
CHECKED		
PROJECT APPROVAL		
FINAL APPROVAL	SDH	5/05

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP–1–003. FOR PLASTIC PARTS SEE MP–1–055
ASSEM. REF. NO.

COMPUTER GENERATED DRAWING
SCALE NONE SIZE DS

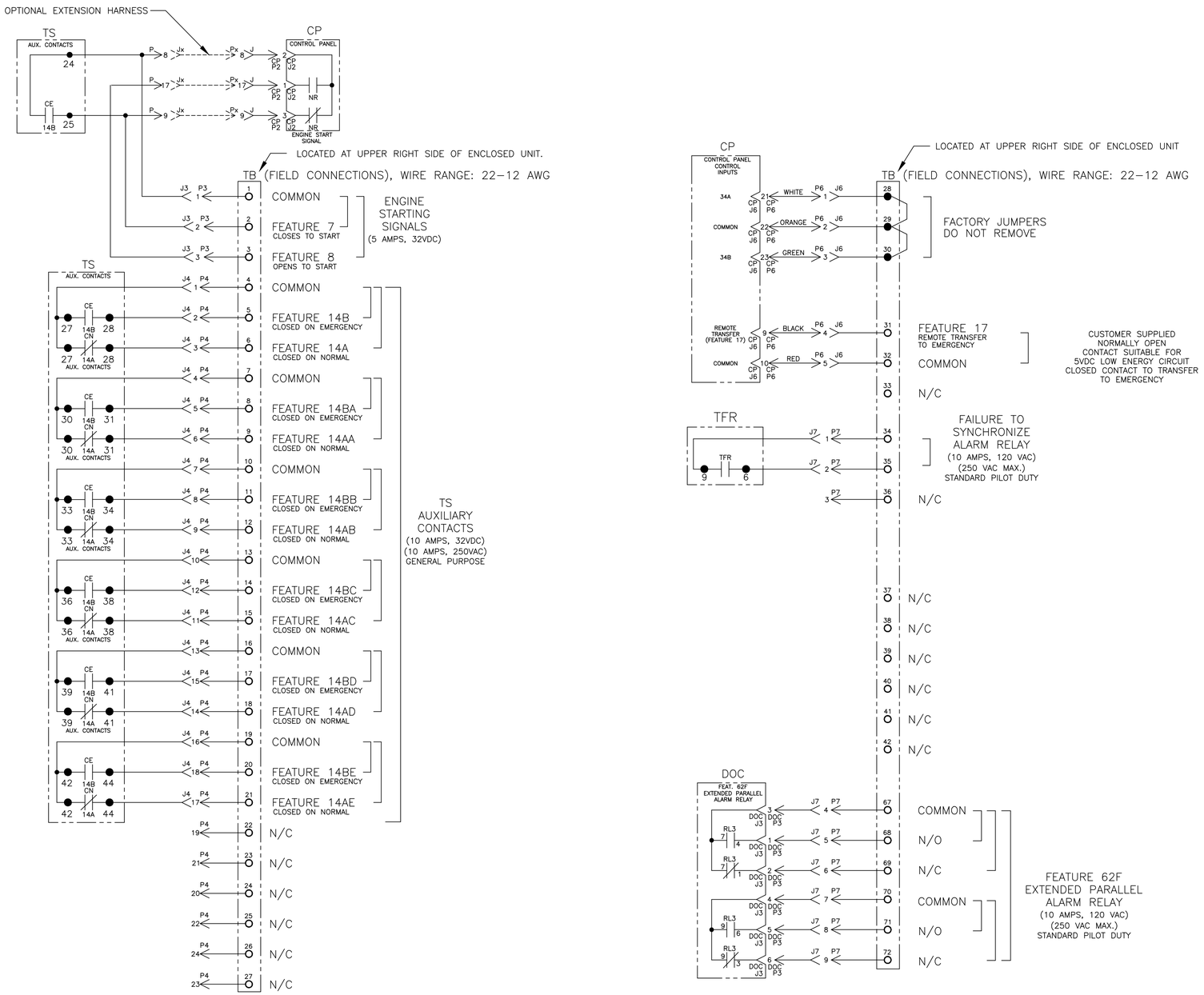
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DWG. NO. 777226

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FLORHAM PARK, NEW JERSEY 07932 U.S.A.

DRAWING REV. E ECN NO. 290887 SHEET 1 OF 6

FIELD CONNECTIONS



E	290887	AVK	HSL	08/17/21
	SEE ECN			
D	279028	TR	BK	05/29/19
	SEE ECN			
C	236733	TR	BK	04/23/12
	SEE ECN			
B	206834	TR	WK	12/6/05
	SEE ECN			
A	205857	JPB	JPB	9/12/05
	SEE ECN			
—	204419	BWM	SDH	5/05
	ISSUE			
REV. TO SHEET	ECN NO.	BY	APP.	DATE

PROJECT NAME:

WIRING DIAGRAM

7000 SERIES (J7ACTS) 3PH 150–600 AMPS
"J" FRAME, GROUP 5 CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	BWM	5/05
CHECKED		
PROJECT APPROVAL		
FINAL APPROVAL	SDH	5/05

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

DWG. NO. 777226

DRAWING REV. E ECN NO. 290887 SHEET 2 OF 6

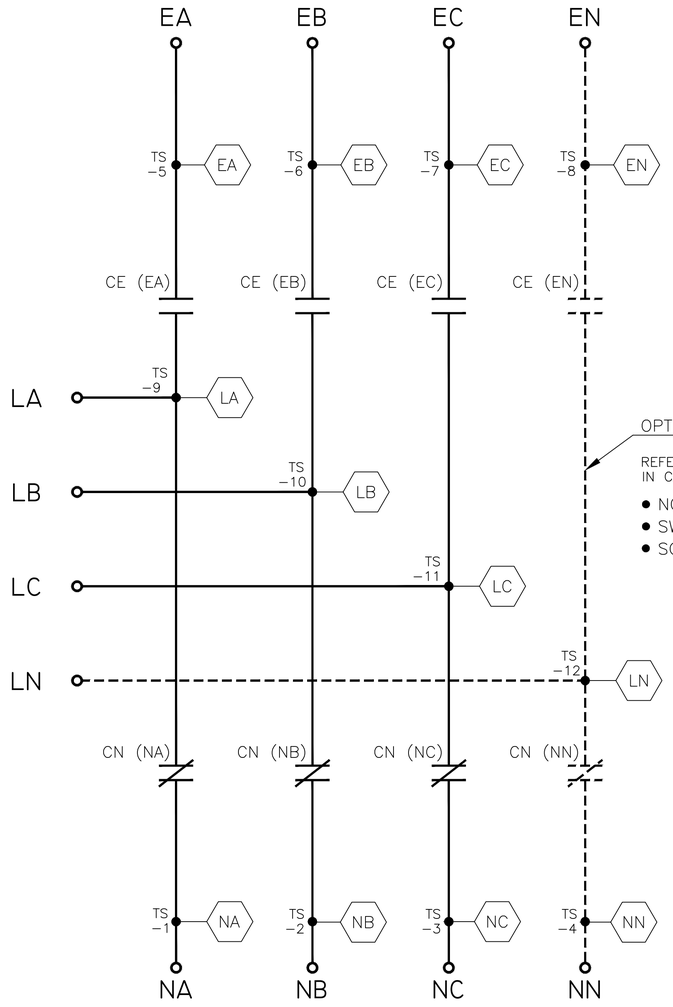
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MAIN POWER POLES

TS OPERATOR CIRCUIT

EMERGENCY



OPTIONAL NEUTRAL TYPES

REFER TO "EXPLANATION OF CATALOG NUMBER CODES" IN CATALOG NUMBER CHART ON SHEET 1.

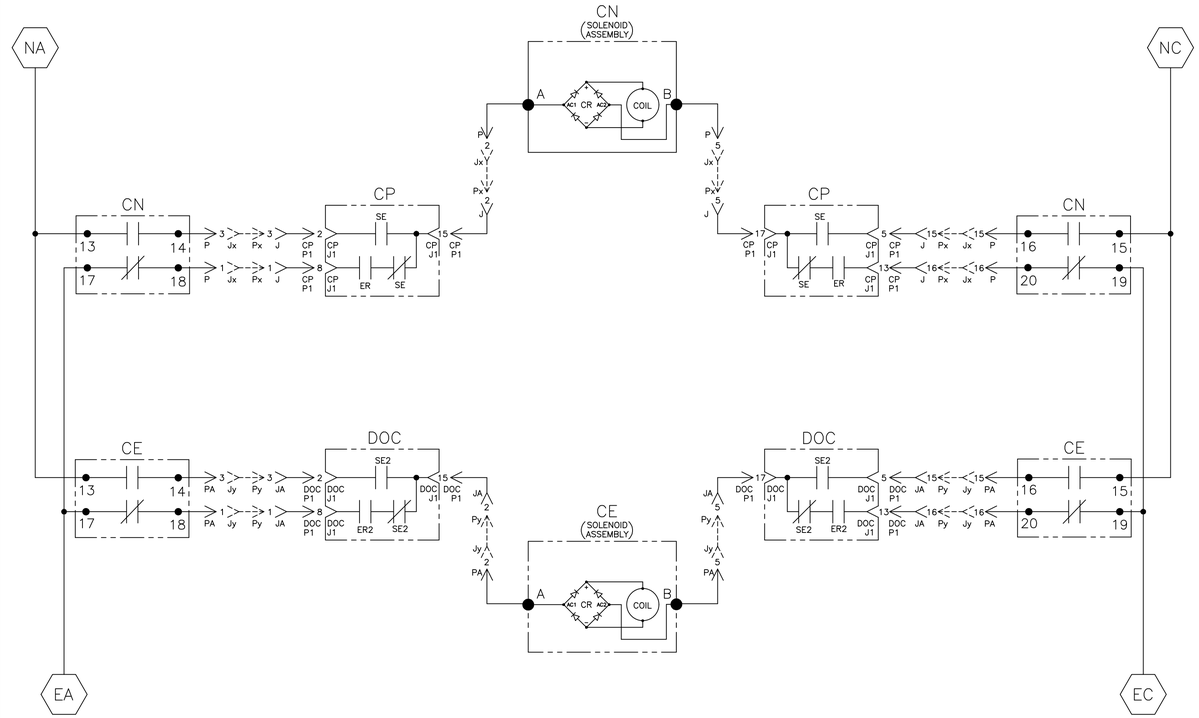
- NONE
- SWITCHING
- SOLID BUS PLATE

NORMAL

NOTE:

ATS SHOWN CLOSED ON NORMAL SOURCE.

NORMAL



EMERGENCY

CN CONTROL CONTACTS						
CN	SOLENOID POSITION					
	CLOSED NORMAL	BEFORE TDC*>	>	<	BEFORE <TDC	OPEN
13–14						
15–16						
17–18						
19–20						

CE CONTROL CONTACTS						
CE	SOLENOID POSITION					
	OPEN	BEFORE TDC*>	>	<	BEFORE <TDC	CLOSED EMERG.
13–14						
15–16						
17–18						
19–20						

TDC (TOP DEAD CENTER) TRANSFER SWITCH TEST & ADJUSTMENT PROCEDURE SPECIFIES CONTROL CUT-OFF (CONTACT OPENING) SETTING.

REV.	REV. TO SHEET	ECN NO.	BY	APP.	DATE
E		290887	AVK	HSL	08/17/21
		SEE ECN			
D		279028	TR	BK	05/29/19
		SEE ECN			
C		236733	TR	BK	04/23/12
		SEE ECN			
B		206834	TR	WK	12/6/05
		SEE ECN			
A		205857	JPB	JPB	9/12/05
		SEE ECN			
—		204419	BWM	SDH	5/05
		ISSUE			

PROJECT NAME:

WIRING DIAGRAM

7000 SERIES (J7ACTS) 3PH 150–600 AMPS
"J" FRAME, GROUP 5 CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	BWM	5/05
CHECKED		
PROJECT APPROVAL		
FINAL APPROVAL	SDH	5/05

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-055

ASSEM. REF. NO.

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COMPUTER GENERATED DRAWING

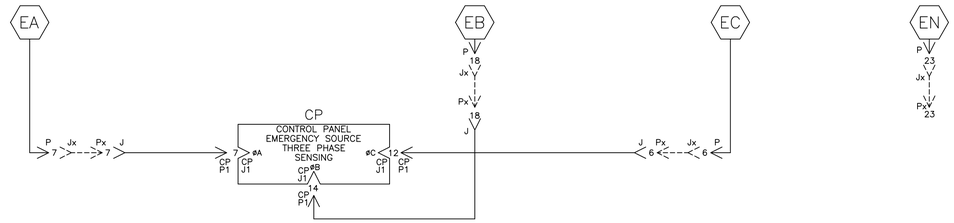
SCALE NONE SIZE DS

DWG. NO. 777226

DRAWING REV. E ECN NO. 290887 SHEET 3 OF 6

EMERGENCY SOURCE CIRCUITS

EMERGENCY



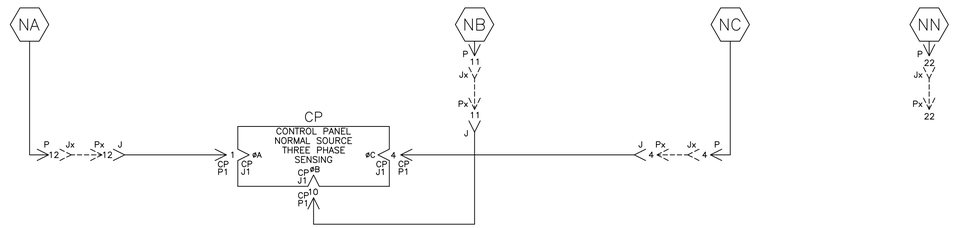
LOAD TERMINAL CIRCUITS

LOAD



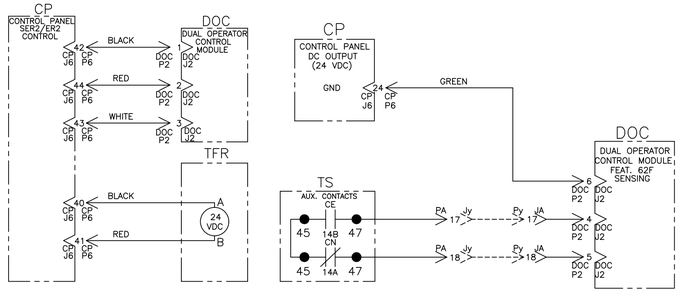
NORMAL SOURCE CIRCUITS

NORMAL

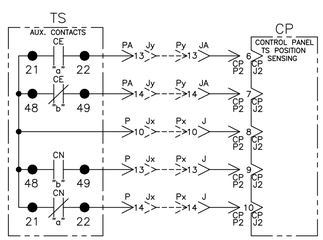


CONTROL CIRCUITS

SER2/ER2 CONTROL



TS POSITION SENSING



ADDITIONAL CIRCUITS

E	290887	AVK	HSL	08/17/21
	SEE ECN			
D	279028	TR	BK	05/29/19
	SEE ECN			
C	236733	TR	BK	04/23/12
	SEE ECN			
B	206834	TR	WK	12/6/05
	SEE ECN			
A	205857	JPB	JPB	9/12/05
	SEE ECN			
—	204419	BWM	SDH	5/05
	ISSUE			

PROJECT NAME:

WIRING DIAGRAM

7000 SERIES (J7ACTS) 3PH 150-600 AMPS
"J" FRAME, GROUP 5 CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	BWM	5/05
CHECKED		
PROJECT APPROVAL		
FINAL APPROVAL	SDH	5/05

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-I-003. FOR PLASTIC PARTS SEE MP-I-055

ASSEM. REF. NO.

COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

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DWG. NO. 777226

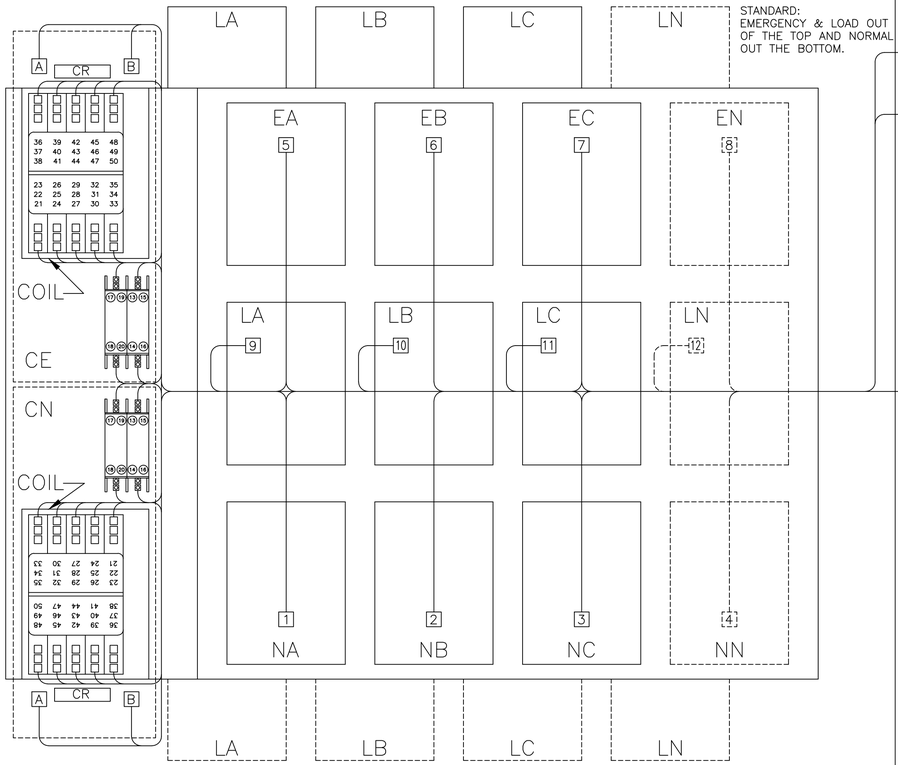
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DRAWING REV. E ECN NO. 290887 SHEET 4 OF 6

PHYSICAL DIAGRAM

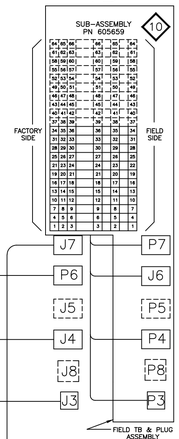
ENCLOSURE

TS (TRANSFER SWITCH) VIEW FROM INSIDE FRONT



OPTIONAL:
EMERGENCY OUT OF THE TOP
AND NORMAL & LOAD
OUT THE BOTTOM.
*NOT AVAILABLE ON 600 AMP UNITS.

TB



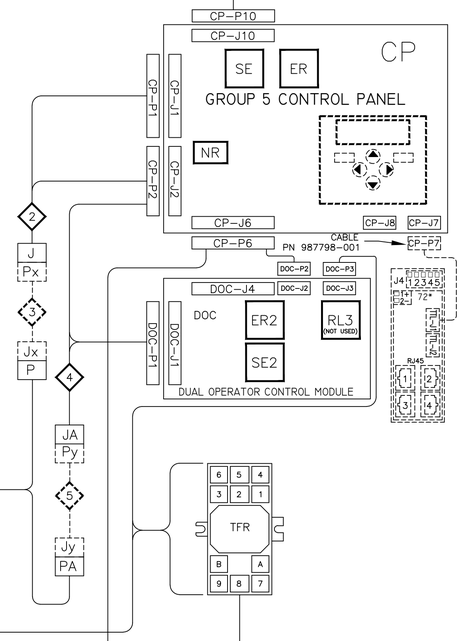
DOOR HINGE

BONDING STRAP
PN 098323-019

DOOR (INSIDE)

OPTIONAL
POWERMANAGER
OR ADDITIONAL
OPERATOR CONTROLS
ESCUTCHEON MOUNTING

OPERATOR CONTROLS
ESCUTCHEON MOUNTING
PN 613657-001
(REFER TO ASSEMBLY DRAWING FOR WIRING)



AP

OPTIONAL
ACCESSORY ADD-ON PANEL
MOUNTING

NOTE: PHYSICAL MAY VARY BASED ON ENCLOSURE USED.

REV.	REV. TO SHEET	ECN NO.	BY	APP.	DATE
E		290887	AVK	HSL	08/17/21
		SEE ECN			
D		279028	TR	BK	05/29/19
		SEE ECN			
C		236733	TR	BK	04/23/12
		SEE ECN			
B		206834	TR	WK	12/6/05
		SEE ECN			
A		205857	JPB	JPB	9/12/05
		SEE ECN			
—		204419	BWM	SDH	5/05
		ISSUE			

PROJECT NAME:

WIRING DIAGRAM

7000 SERIES (J7ACTS) 3PH 150-600 AMPS
"J" FRAME, GROUP 5 CONTROLS

THIRD ANGLE PROJECTION

	BY	DATE
DRAWN BY	BWM	5/05
CHECKED		
PROJECT APPROVAL		
FINAL APPROVAL	SDH	5/05

MANUFACTURING TOLERANCES TO BE IN ACCORDANCE WITH ASCO PROCEDURE MP-1-003. FOR PLASTIC PARTS SEE MP-1-055

ASSEM. REF. NO.

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FLORHAM PARK, NEW JERSEY 07932 U.S.A.

COMPUTER GENERATED DRAWING

SCALE NONE SIZE DS

DWG. NO. 777226

DRAWING REV. E ECN NO. 290887 SHEET 5 OF 6

WIRE RUN LISTING

① HARNESS LOCATOR — BOX CHECKED IF HARNESS IS MODIFIED ☐

HARNESS 619510-061 (P,PA,J3,J4) MAIN TS

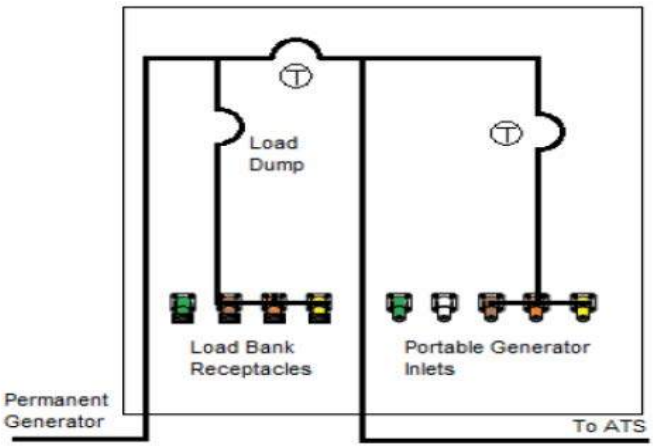
WIRE No.		CLR	AWG
1	P-1,CN-18		18
2	P-2,CN-A		
3	P-3,CN-14		
4	P-4,TS-3		
4	TS-3,CE-15		
4	CE-15,CN-15		
5	P-5,CN-B		
6	P-6,TS-7		
6	TS-7,CE-19		
6	CE-19,CN-19		
7	P-7,TS-5		
7	TS-5,CE-17		
7	CE-17,CN-17		
8	P-8,CE-24		
8	CE-24,J3-1		
9	P-9,CE-25		
9	CE-25,J3-2		
10	P-10,CE-21		
10	CE-21,CN-21		
10	CN-21,CN-48		
10	CE-48,CN-48		
11	P-11,TS-2		
12	P-12,TS-1		
12	TS-1,CE-13		
12	CE-13,CN-13		
13	P-13,CN-49		
14	P-14,CN-22		
15	P-15,CN-16		
16	P-16,CN-20		
17	P-17,J3-3		
18	P-18,TS-6		
19	P-19,TS-9		
20	P-20,TS-10		
21	P-21,TS-11		
22	P-22,TS-4		
23	P-23,TS-8		
24	P-24,TS-12		
25	J4-1,CE-27		
25	CE-27,CN-27		
26	J4-2,CE-28		
27	J4-3,CN-28		
28	J4-4,CE-30		
28	CE-30,CN-30		
29	J4-5,CE-31		
30	J4-6,CN-31		
31	J4-7,CE-33		
31	CE-33,CN-33		
32	J4-8,CE-34		
33	J4-9,CN-34		
34	J4-10,CE-36		
34	CE-36,CN-36		
35	J4-11,CN-38		
36	J4-12,CE-38		
37	J4-13,CE-39		
37	CE-39,CN-39		
38	J4-14,CN-41		
39	J4-15,CE-41		
40	J4-16,CE-42		
40	CE-42,CN-42		
41	J4-17,CN-44		
42	J4-18,CE-44		
43	J4-19,CE-45		
43	CE-45,CN-45		
107	PA-1,CE-18		
108	PA-2,CE-A		
109	PA-3,CE-14		
111	PA-5,CE-B		
119	PA-13,CE-22		
120	PA-14,CE-49		
121	PA-15,CE-16		
122	PA-16,CE-20		
123	PA-17,CE-47		
124	PA-18,CN-47		
	REMOVE WIRES		

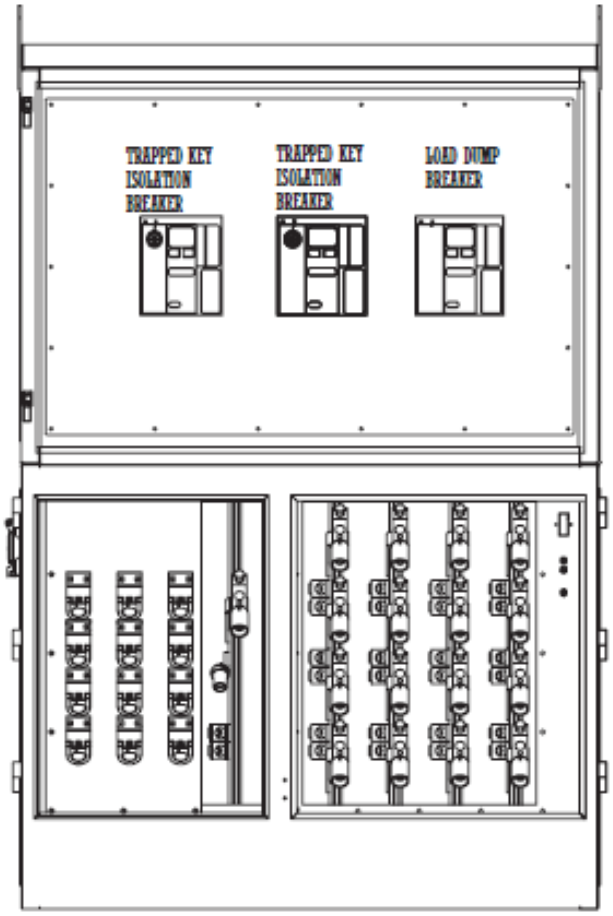
power temp systems INC.
WE PUT THE POWER WHERE YOU NEED IT™

1600A DUAL PURPOSE PAD MOUNT QUICK CONNECT PANEL

QCPM16L2MFHW20G30T2XISO16ALDB16ALEDPG

1600A 208/120V 3 PH DUAL PURPOSE PAD MOUNT QUICK CONNECT PANEL WITH ISOLATION SWITCHES AND LOAD DUMP SWITCH





Material: NEMA 3RX Powder Coated Aluminum ANSI Gray

Description: 1600A 208/120V Dual Purpose Pad Mount Quick Connect Panel
(2) 1600A 3 Pole ABB Isolation Switches with Trapped Key Interlocks
(1) 1600A 3 Pole ABB Load Dump Switch with 24VDC Shunt Trip
Male Angled Cam-Loks with Smart Lugs and Hardwire Access
Pad Lockable and Tamper Resistant While In Use
Female Load Bank Cam-Loks with Flip Covers and Pad Lockable Cover Door
Plated Copper T-Slot Buss with Mechanical Lugs
Phase Rotation Monitor
2 Wire Auto-Start Terminals with Signal Destination Switch
Voltage Test Port
LED "Permanent Gen"
20A GFCI Duplex Receptacle and Breaker (120V External Power Required)
30A L5-30 Twist Lock Receptacle and Breaker (120V External Power Required)
Trapped Key Interlock FS Lock (Located on Isolation Switches)
Bottom, Top, Back and Side Conduit Access
Side and Back Access Plates
cETLus Listed, Conforms to UL STD 1008, Certified to CAN/CSA STD C22.2 NO. 178

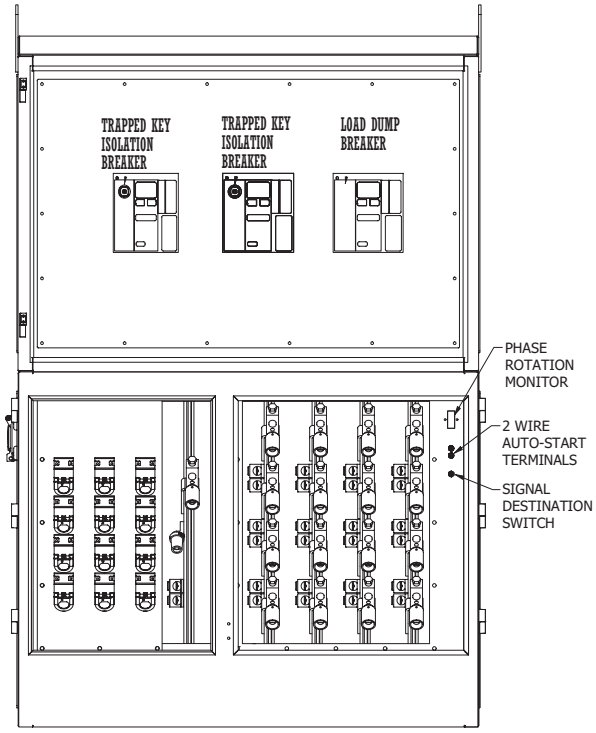
1646 Rankin Road. Suite 300 | Houston, TX 77073 | Office 281.286.3303 | Fax 281.286.3393 | www.powertemp.com

power temp systems INC.

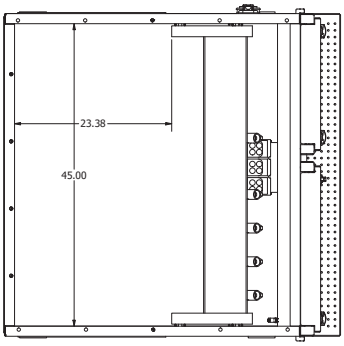
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GENERAL NOTES

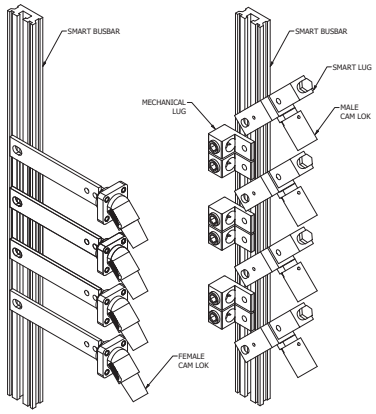
1. TYPE 3RX ENCLOSURE. 1/8" ALUMINUM OR OPTIONAL 14 GA. 304SS OR 316SS.
2. INLET PANEL IS FOR USE ONLY FOR CONNECTION OF A GENERATOR TO THE SOURCE TERMINALS OF A TRANSFER SWITCH SUCH THAT THE INLETS ARE ENERGIZED FROM THE GENERATOR.
3. cETLus LISTED, CONFORMS TO UL STD 1008, CERTIFIED TO CAN/CSA STD C22.2 NO. 178
4. SHORT CIRCUIT CURRENT RATINGS AS SPECIFIED IN PURCHASE DOCUMENTS.
5. REMOVABLE 11 GAUGE ALUMINUM OR OPTIONAL 316SS HINGE DOOR WITH PADLOCK PROVISIONS.
6. FINISH: ANSI 61 GRAY POWDER COAT.
7. REMOVABLE GASKETED SIDE ACCESS PANELS ARE ADDITIONAL CONDUIT ENTRY AREAS.
8. RECOMMENDED CLEARANCES: FRONT 24 TO 30 INCHES
9. REMOVABLE GROUNDING STRAP(S) ARE INCLUDED CONNECTING THE GREEN CAMLOCKS TO THE ENCLOSURE.
10. NO NEUTRAL TO GROUND BONDING PROVISIONS INCLUDED.
11. CAMLOCK CONNECTORS ARE SERIES 16 COMPATIBLE. 400A RATED.
12. INSTALLATION: SURFACE TO WHICH THE PANEL IS TO BE INSTALLED AND THE INSTALLATION METHOD / HARDWARE MUST BE CAPABLE OF SUPPORTING THE WEIGHT OF THE PANEL AS WELL AS THE WEIGHT OF THE TEMPORARY CABLES TO BE ATTACHED TO IT. THE INSTALLATION IS TO BE DONE BY QUALIFIED PERSONNEL IN ACCORDANCE WITH LOCAL AND NATIONAL CODES AND GOOD ENGINEERING PRACTICES. THE PANEL MUST BE LEVEL AND PLUMB TO ALLOW FOR PROPER DRAINAGE / WATER RUNOFF.



FRONT VIEW
WITHOUT DOORS

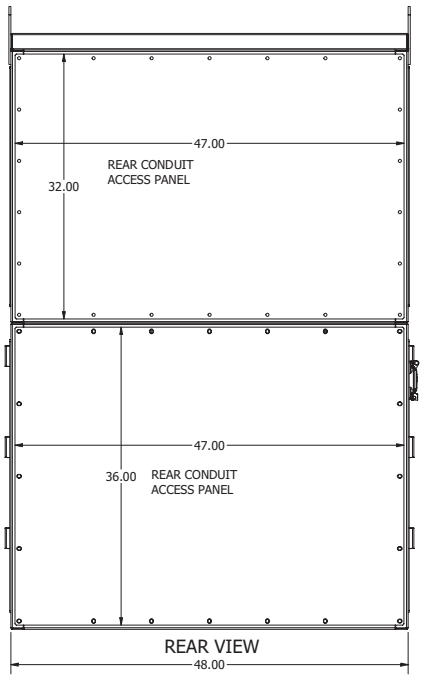


BOTTOM VIEW
CONDUIT ACCESS

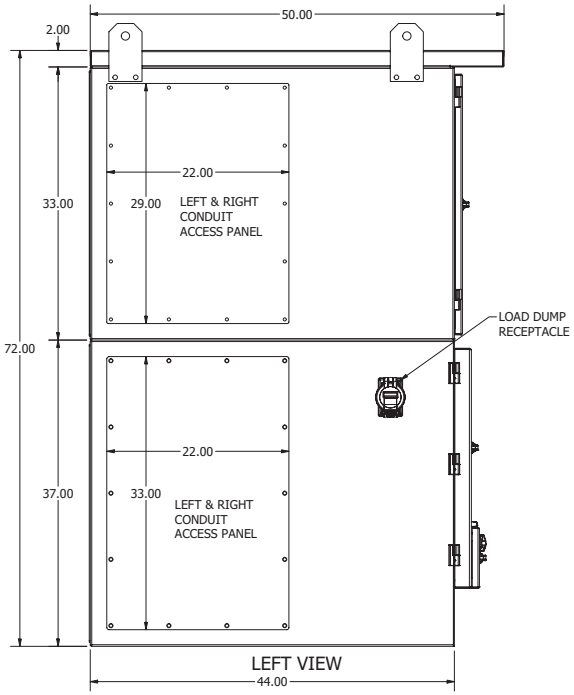


TYPICAL LOAD BANK CONNECTION INLETS

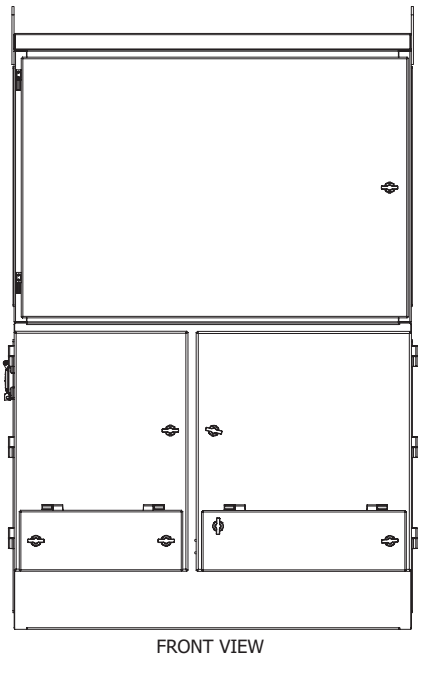
TYPICAL GENERATOR CONNECTION INLETS



REAR VIEW



LEFT VIEW



FRONT VIEW

1646 Rankin Road. Suite 300 | Houston, TX 77073 | Office 281.286.3303 | Fax 281.286.3393 | www.powertemp.com

power temp systems INC.
WE PUT THE POWER WHERE YOU NEED IT™

CL 16 Series Bus Bar Mount Inlet (400A / 600V) Male Offset - Black (A)
Part # CL40MR-OFFSET-A



CL 16 Series Bus Bar Mount Inlet (400A / 600V) Male Offset - Black (A)
CL40MR-OFFSET-A

CL Offset Panel Mount with 0.50 inch diameter thru hole for mounting.

- UV Resistant Santoprene
- One Piece Brass Contact
- 400A 600V
- Black

Each in Package Height (in) *	1.500
Each in Package Width (in) *	1.500
Each in Package Length/Depth (in) *	3.750
Each in Package Weight (oz) *	8.800

product specifications for:

CLS 45 Degree Panel Mounts

Item #: CLS45FRB-BB2



Description
CAM CLS 45 Two hole bus bar 5/16"-18 thread Female Panel Mount

Electrical Specifications
Max. Amperage: 400A
Max. Voltage: 600V AC/DC

Material Specifications
Housing Material: Santoprene TPV
Contact Material: One piece solid Brass
Temperature Rating: -40°C to 105°C

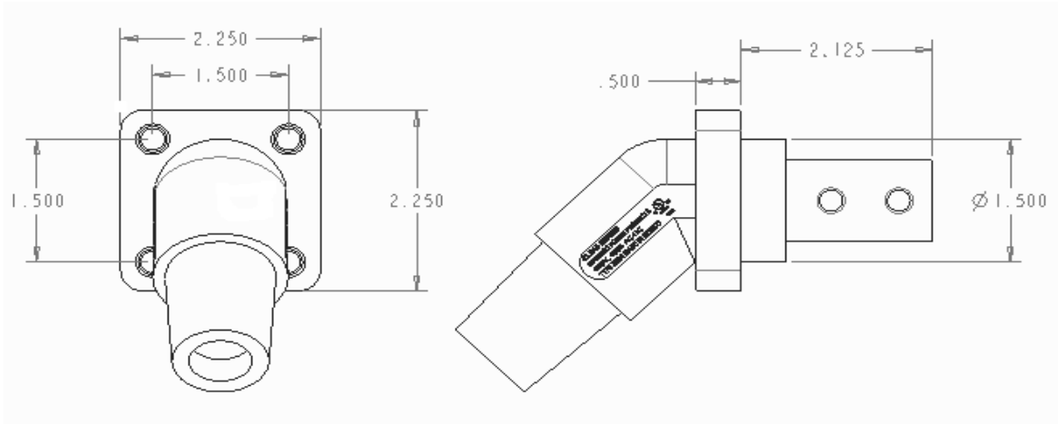
Mechanical Specification
Gender: Female
Connection Type: Two hole 5/16"-18 thread bus bar
(Torque to 100 in.-lbs., do not over tighten)
Mounting: Brass eyelet for #10-32 through bolt
(Bolts Not Provided)

c UL us LISTED

Standards and Certifications
UL Listed: File E111198
Environmental Rating: Type 3R & 4

Example: **CLS45FRB-BB2 + A = CLS45FRB-BB2-A**

A	B	C	D	E	F	G	H



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MARINCO power products

product specifications for:

Cam Protective Covers

Item #: 203445



Description
45 Degree Panel Mount - cover adapter bracket

Material Specifications
Bracket Material: Stainless Steel
Mounting Screws: Stainless Steel

Mechanical Specification
Fits all Marinco Power Products 45 Degree Panel Mounts (Male and Female)

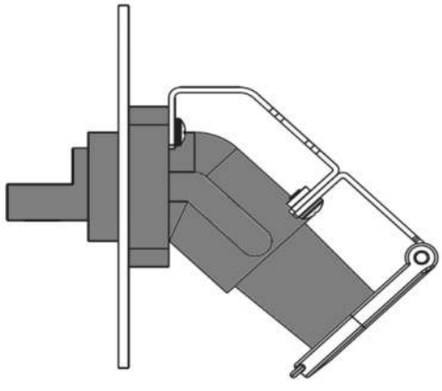
- CLS45MRSB and CLS45FRSB
- CLS45MRB and CLS45FRB
- CLS45MR2SB and CLS45FR2SB
- CLS45MRB-BB and CLS45FRB-BB
- CLS45MRB-BB2 and CLS45FRB-BB2

Fits all Marinco Power Products CL40WTC covers:

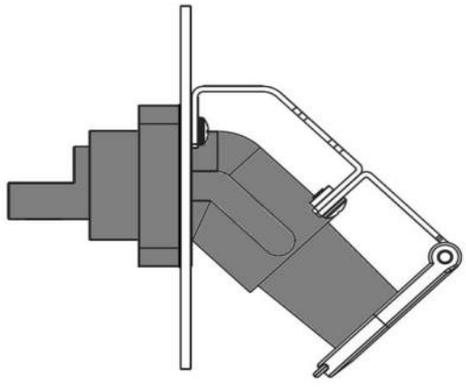
- CL40WTC-L-125: Surface Mount Cover
- CL40WTC-S-062: Through Mount (.370" to .400" panel thickness)
- CL40WTC-L-187: Through Mount (.070" to .090" panel thickness)

Qty: 2 #10-32 Phillips drive screws included to mount bracket to CL40WTC cover
Screws not inluced to mount bracket to panel mount (#10-32 recommended)

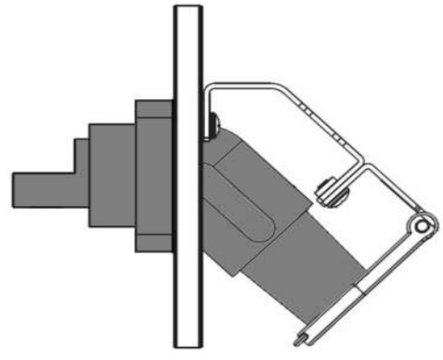
Standards and Certifications
Environmental Rating: Type 1R with CL40WTC cover



CL40WTC-L-125



CL40WTC-L-187



CL40WTC-S-062

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MARINCO power products



CAM Technology

CL/CLS/CLM Protective Covers & Caps

Manufactured in UV-resistant polycarbonate, all snap back plastic covers are made with stainless steel offset, spring and pin. Designed for surface mount, the new snap back plastic covers are fully gasketed and NEMA 3R rated for weathertight protection.



Now available in Clear(Z)

Mini CAM Cover

- For 150 amp panel mounts
- NEMA 3R
- All Plastic Construction
- Comes with gasket pre-applied

Item # CLM3R

A B C D E F G H Z



Now available in Clear(Z)

CAM Cover

- For 400 amp panel mounts
- NEMA 3R
- All Plastic Construction
- Comes with gasket pre-applied

Item # CLL3R

A B C D E F G H Z



Through Mount Cover

- For 400 amp panel mounts
- NEMA 1
- Metal Standoff with Plastic Lid
- For use with through mounted Panel Mounts
- Snap back cover

Item # CL40WTC-S-062 0.370"–.400" panel thickness

Item # CL40WTC-L-187 0.070"–.090" panel thickness

A B C D E F G H



Surface Mount Cover

- For 400 amp panel mounts
- NEMA 1
- Metal Standoff with Plastic Lid
- For use with surface mounted Panel Mounts
- Snap back cover

Item # CL40WTC-L-062

Item # CL40WTC-L-125

A B C D E F G H



Santoprene Caps

- Protective cap with lanyard

Item # CL40FC fits female
Item # CL40MC fits male
Item # CLMFC mini—fits female
Item # CLMMC mini—fits male

A B C D E F G H

WHEN YOU ORDER

Item # + Color Letter = Ordering Number

A B C D E F G H

Examples: **CLM3R + -E = CLM3R-E** **CLL3R + -H = CLL3R-H**

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SAFE-TEST

Voltage Test Port

High impedance protected device that allows for a closed-door absence of voltage test



NEW
5-Wire
Safe-Test Point™
now available!

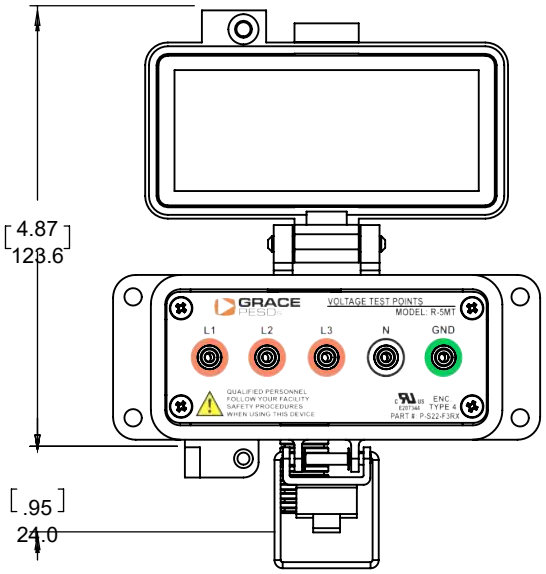
SAFE-TEST POINT™ FEATURES

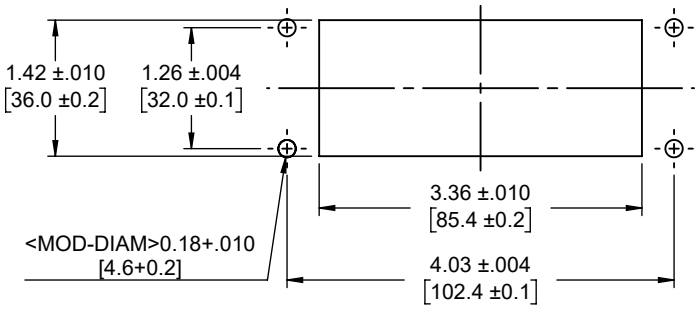
- **Safe-Test Point™** is a Permanent Electrical Safety Device (PESD) that allows workers to safely perform an Absence of Voltage Test (AVT) from outside the electrical cabinet with a portable test instrument.
- The **Safe-Test Point™** contains test point jacks that are hardwired directly to energy sources and allows measurement of both AC and DC voltages by inserting the insulated meter probes into any two test point jacks to take a voltage reading.
- The 4-Wire option comes complete with a tool-entry dust cap that also includes a label and the 5-Wire option is featured in a pad-lockable housing that also includes tool-entry.
- Provides a safer and more productive method of performing Lockout/Tagout (LOTO), while enhancing compliance with NFPA 70E and the OSHA energy isolation principle.

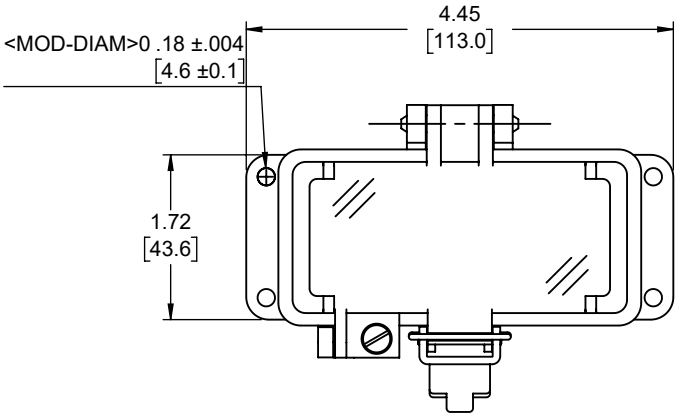
c UL us LISTED

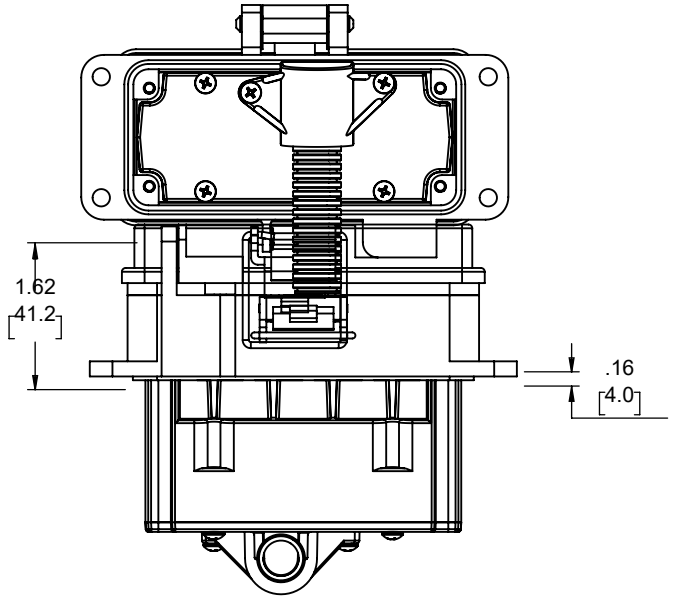
RoHS CE

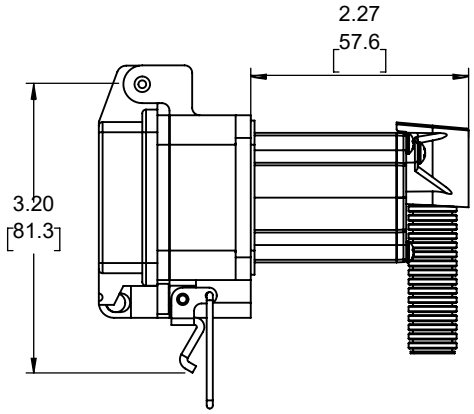
Panel Cutout R-5MT











NOTE:

1) REFER TO INSTALLATION INSTRUCTIONS TO ENSURE PROPER INSTALLATION.
2) ALWAYS FOLLOW YOUR LOCAL/FACILITY ELECTRICAL CODES AND PROCEDURES.
3) FOR DETAILED COMPONENT WIRING AND SPECIFICATIONS, REFER TO THE APPLICABLE DATA SHEETS.
4) COMPONENT LOCATIONS OUTLINED IN DRAWING ARE APPROXIMATE
5) FOR ACTUAL PRODUCT CONFORMITY, LISTINGS AND CERTIFICATIONS, REFER TO FINISHED PRODUCT FACEPLATE DRAWING, OR CONSULT FACTORY.

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CAT #	PART NUMBER	"L"	MASS
BBTC-2T-3000-01200-NH	N1340C12TNH	12 in ± .031	11.634 LBS
BBTC-2T-3000-01800-NH	N1340C18TNH	18 in ± .031	17.452 LBS
BBTC-2T-3000-02400-NH	N1340C24TNH	24 in ± .031	23.269 LBS
BBTC-2T-3000-03600-NH	N1340C36TNH	36 in ± .062	34.903 LBS
BBTC-2T-3000-07200-NH	N1340C72TNH	72 in ± .062	69.807 LBS
BBTC-2T-3000-09600-NH	N1340C96TNH	96 in ± .062	93.076 LBS
BBTC-2T-3000-12000-NH	N1340C120TNH	120 in ± .125	116.345 LBS
BBTC-2T-3000-14400-NH	N1340C144TNH	144 in ± .125	139.614 LBS

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SMART BUSBAR SYSTEM

- Heat Dissipation Jumpers
- T-Slot Adjustable Plated Copper Main Buss
- 100 kAIC Rated







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SMART LUG

Alleviates to problems associated with standard allen wrench lugs and extends the life of the lug exponentially.



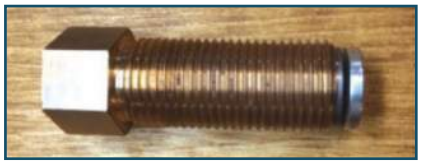
The **Smart Lug** is a patented repetitive and multi-use lug designed to alleviate the problems associated with standard aluminum alien wrench lugs.

The **Smart Lug** can be used for a variety applications that require wiring and unwiring cable on a regular basis. It can accommodale both bare ended or eyelet wire, features an oblong shaped hole which makes connecting frayed cable easier, and allows for greater tourque and cable compression.

The lug bolt features a compression end with a patented spinning tip that stays in place as the cable is compressed and does not twist and knurl the wire, extending the usability of the cable end and reducing the need to trim the cable ends after each use.

Additional Features

- Plated copper or aluminum
- Stud or Bolt, Tang w/ Hole, or Slotted Types
- 1 /2" threaded holes for ring terminals & eyelets
- 2 x 1 /4" threaded holes on Stud Type for anti-Spin
- Square stock for added wrench support & torque
- Rated for 600A and cable sizes #6 to 350 MCM
- Spinning bolt tip compresses wire with no knurling
- UL Listed
- UL Tested to 30,000V



Patented Spinning Bolt End with Hex Head and Allen Insert.







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Product data sheet
Characteristics



RM17TG00
phase control relay RM17-T range 183..528 V AC

Main

Range of product	Zelio Control
Product or component type	Modular measurement and control relays
Relay type	Control relay
Product specific application	For 3-phase supply
Relay name	RM17TG
Relay monitored parameters	Phase sequence Phase failure detection
Time delay	Without
Switching capacity in VA	1250 VA
Measurement range	208...480 V voltage AC

Complementary

Maximum switching voltage	250 V AC 250 V DC
Minimum switching current	10 mA 5 V DC
Supply voltage limits	183…528 V AC
Control circuit voltage limits	- 12 % + 10 % Un
Power consumption in VA	0…22 VA 400 V AC 50 Hz
Voltage detection threshold	< 100 V AC
Control circuit frequency	50...60 Hz +/- 10 %
Output contacts	1 C/O
Nominal output current	5 A
Measurement voltage limits	183…528 V AC
Delay at power up	650 ms
Voltage range	183...528 V
Response time	<= 130 ms in the event of a fault)
Marking	CE
Overvoltage category	III IEC 60664-1
Insulation resistance	> 500 MOhm 500 V DC IEC 60255-5 > 500 MOhm 500 V DC IEC 60664-1
[Ui] rated insulation voltage	400 V IEC 60664-1
Supply frequency	50/60 Hz +/- 10 %
Operating position	Any position without
Connections - terminals	Screw terminals, 1 x 0.5...1 x 4 mm² AWG 20...AWG 11) solid without cable end Screw terminals, 2 x 0.5...2 x 2.5 mm² AWG 20...AWG 14) solid without cable end Screw terminals, 1 x 0.2...1 x 2.5 mm² AWG 24...AWG 12) flexible with cable end Screw terminals, 2 x 0.2...2 x 1.5 mm² AWG 24...AWG 16) flexible with cable end
Tightening torque	5.31…8.85 lbf.in (0.6…1 N.m) IEC 60947-1
Housing material	Self-extinguishing plastic
Local signalling	Relay ON LED yellow)
Mounting support	35 mm symmetrical DIN rail EN/IEC 60715
Electrical durability	100000 cycles
Mechanical durability	30000000 cycles
Operating rate	<= 360 operations/hour full load

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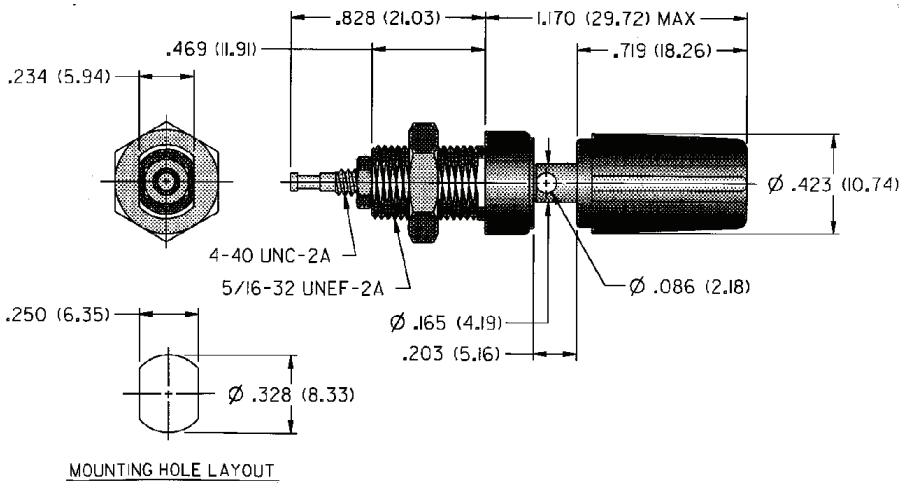
Binding Post - Insulated Standard

SPECIFICATIONS
Stud: Brass per QQ-B-626D
Finish: Silver
Insulating Material: Nylon 6/6 per ASTM D4066
Hardware: Nickel plated nut (unassembled)
Body Thread Stripping Torque: 6.0 lb. in. (7.0 kg cm)
Panel Thickness: Up to .281 (7.15)

RATINGS
Current: 15 amps
Contact Resistance: 0.010 ohms maximum
Breakdown Voltage: 5700 Vrms minimum
Stud-to-Panel: 3.3 pF nominal



SILVER PLATING	
111-0103-001	Black



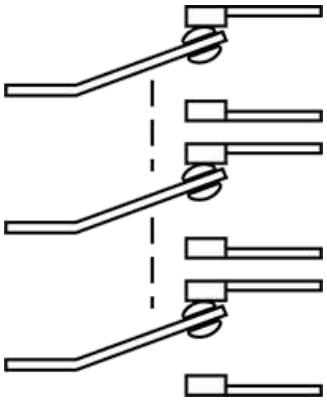
MOUNTING HOLE LAYOUT

For Standard Banana Plug: .175 (4.44) Dia.
FEATURES:
- Turret terminal
- Captive thumb nut
- Insulated body is flatted to prevent turning
- Nylon UL approved for self-extinguishing

Toggle Switch

2 Position, Round, Maintained, 9 Terminals, 3PDT, 15A



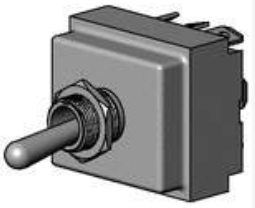


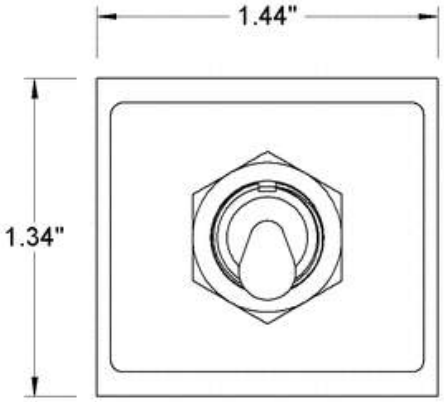
3PDT Wiring Diagram

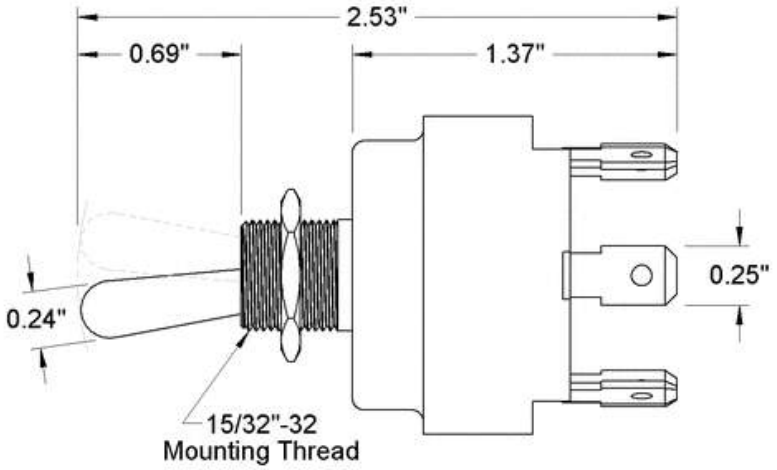
Actuator Style	Toggle
Toggle Style	Rounded
Illumination	Not Illuminated
Number of Positions	2
Number of Circuits Controlled	3
Switch Starting Position	3 Off (Normally Open) or 3 On (Normally Closed)
Switch Action	Stays Switched (Maintained)
Number of Terminals	9
Industry Designation	3PDT
Position Designation	On-On
Switching Current @ Voltage	15 A @ 125 V AC/28 V DC
Maximum Voltage	28V DC 250V AC
Mounting Location	Panel
For Panel Cutout Diameter	1/2"
For Maximum Panel Thickness	0.13"
Toggle	
Depth	0.69"
Diameter	0.24"
Mounting Thread	
Size	15/32"-32
Type	UNS
Mounting Hardware Included	Yes
Wire Connection Type	Quick-Disconnect Terminals, Screw Terminals, Solder Lugs
Specifications Met	UL Recognized Component, CSA Certified
RoHS	Not Compliant
REACH	Not Compliant
DFARS	Specialty Metals COTS-Exempt
Country of Origin	Mexico
USMCA Qualifying	No
Schedule B	853650.9065
ECCN	EAR99

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LEVITON

GFWT2-GY



20 Amp, 125 Volt Receptacle/Outlet, 20 Amp Feed-Through, Self-test SmartlockPro Slim Weather & Tamper-Resistant GFCI, Monochromatic, Residential/Commercial applications, back and side wired, wallplate/faceplate sold separately - Gray

Peace of mind, all the time. The SmartlockPro Self-Test GFCI tests itself even if you forget. Designed to meet the latest UL standard for auto-monitoring (self-test) our complete line of self-test GFCIs periodically conduct an automatic internal test to confirm that it can respond to a ground fault. With the slimmest profile on the market, the device allows for fast and easy installation, while Leviton's patented reset lockout mechanism prevents reset of the GFCI if it is not wired or operating correctly. The SmartlockPro Self-Test GFCI is the smart choice in ground fault circuit interrupter protection.

Color : Gray

UPC Code : 078477709139

Country Of Origin : China

RoHS Compliant : Yes

NEMA : 

5-20R

Available Colors :

Black

Ivory

Light Almond

White

Technical Information

Product Features

Amperage : 20 A

At Rated Voltage : 1 HP

Brand : SmartlockPro

Color : Gray

Feature : Self-Test

Fed Spec WC-596 : Yes

Grade : Residential/Commercial Specification Grade

Grounding : Green Ground Screw

NEMA : 5-20R

Pole : 2

Standards and Certifications : UL/CSA, NEMA WD6, NEMA WD1

Strap Material : Stainless Steel

Tamper Resistant : Yes

Termination : Back & Side

Trip Level : Class A, 5mA plus or minus 1mA

Type : Weather Resistant

Voltage : 125 VAC

Wallplate : Not Included

Warranty : 2-Year Limited

Wire : 3

AC Horsepower Ratings

At Rated Voltage : 1 HP

Dielectric Voltage : Withstands 1250VAC per UL 943 and CSA-C22.2 No. 144.1-06

Short Circuit Current Rating : 10KA

Temperature Rise : Max 30C after 100 cycles OL at 150 percent rated current

Electrical Specifications

Dielectric Voltage : Withstands 1250VAC per UL 943 and CSA-C22.2 No. 144.1-06

Operating Temperature : -35C to +66C

Short Circuit Current Rating : 10KA

Temperature Rise : Max 30C after 100 cycles OL at 150 percent rated current

Environmental Specifications

Grounding Screw : Stainless Steel

Line Contacts : Brass Triple-Wipe .031 Thick

Notes : Wallplate Sold Separately

Product ID : Ratings are permanently marked on device

Terminal Accom. : 14-10 AWG

Terminal ID : Brass-Hot, Green-Ground, Silver-Neutral

Terminal Screws : Stainless Steel

Yoke : Stainless Steel

Mechanical Specifications

Amperage : 20 A

Body Material : Polycarbonate

Brand : SmartlockPro

Color : Gray

Face Material : Polypropylene

Feature : Self-Test

Fed Spec WC-596 : Yes

Grade : Residential/Commercial Specification Grade

Grounding : Green Ground Screw

NEMA : 5-20R

Notes : Wallplate Sold Separately

Pole : 2

Product ID : Ratings are permanently marked on device

Standards and Certifications : UL/CSA, NEMA WD6, NEMA WD1

Strap Material : Stainless Steel

Tamper Resistant : Yes

Terminal Accom. : 14-10 AWG

Terminal ID : Brass-Hot, Green-Ground, Silver-Neutral

Termination : Back & Side

Trip Level : Class A, 5mA plus or minus 1mA

Type : Weather Resistant

Voltage : 125 VAC

Warranty : 2-Year Limited

Wire : 3

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LEVITON



2610

30 Amp, 125 Volt, NEMA L5-30R, 2P, 3W, Flush Mtg Locking Receptacle, Industrial Grade, Grounding, V-0-MAX - BLACK

Leviton's Industrial Grade Locking Devices are built to provide unparalleled quality and superior performance in the most severe industrial settings. Leviton combines the best materials available with superior production standards to produce a broad selection of Locking Devices of unmatched flexibility and dependability.

- Ideal for generators and camper trailers

UPC Code : 078477809471

Country Of Origin : Please Contact Customer Service.

NEMA :  L5-30R

Technical Information

AC Horsepower Ratings

At Rated Voltage : 2 HP

Electrical Specifications

Amperage : 30 A

Current Limiting : Full Rated Current

Dielectric Voltage : Withstands 2000V per UL498

Grounding : Grounding

Pole : 2

Temperature Rise : Max 30C after 250 cycles OL at 200 percent rated current

Voltage : 125 VAC

Wire : 3

Environmental Specifications

Environment : Corrosive

Flammability : Rated V-0 per UL 94

Operating Temperature : -40°C to 60°C

Material Specifications

Base Material : Valox

Body Material : Nylon

Color : Black

Cover Material : Valox 357

Face Material : Ultramid

Ground Contacts : Brass

Grounding Screw : Chromated Brass

Line Contacts : Brass

Strap Material : Nickel-Plated Brass

Terminal Clamps : Nickel-Plated Brass

Terminal Screws : Chromated Brass

Mechanical Specifications

Cord Range : 0.595 to 1.150

Product ID : Ratings and NEMA I.D. permanently marked on device

Terminal Accom. : 14-8 AWG

Terminal ID : Marked on Device

Termination : Back & Side

Product Features

Base Material : Valox

Brand : V-0-Max

Color : Black

Device Type : Locking Receptacle

Face Material : Ultramid

NEMA : L5-30R

Warranty : Lifetime Limited

Standards and Certifications

ANSI : C-73

CSA : C22.2 No. 42

NEMA : WD-1 & WD-6

NOM : 057

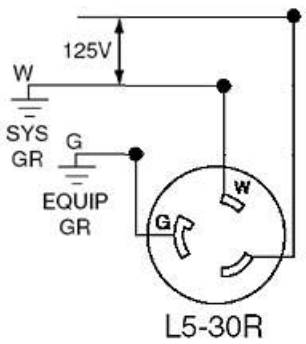
UL : 498

UL Fed Spec : W-C-596

Warranty

Warranty : Lifetime Limited

Wiring Diagram



USAGE

The H50 switchgear interlocks should be used as part of an integrated safety system.

The H50 interlocks are note made for security purposes.

No hazardous substances were used in the manufacture of this interlock product.

INSTALLATION

» H50 switchgear interlock should be mounted to a panel using suitable fasteners.

» Are normally mounted front side of the panel. "PA" version is suitable for back panel mounting.

» You must use M4/M6 (PA version) stainless steel screws (anti-temper if needed) using threadlock set to a torque of 5N/M max.

» H50 interlocks and all AREL's interlocks must be installed by competent and qualified person who as read understood these instructions.

MAINTENANCE

Do NOT lubricate with any kind of oil and grease. Use Graphite powder only if necessary.

Periodic visual check should carried-out by site manager. Remove dust powder with a light blow of air.

Interlock should be inspected every 6 months.

TECHNICAL DATA

Temperature rating	**Minimum**: -40°C **Maximum**: 130°C
Type of mounting	Front Panel mounting (front and back panel for "PA" version)
Weight	0.3 kg
Material	Brass (NICKELED BRASS - HC50) - Stainless Steel (mounting plate)
PL rating	PLd
B10d	1,100,000

New Arel Srl cannot be held responsible for eventual malfunctioning of tampered products.
Please contact our offices in case of unsolvable problems according to the maintenance conditions.

MC
Switchgear interlock

H50.MC3533



PRODUCT FEATURES

» Switchgear interlock;

» Designed for use as a mechanical interlock for electrical panels through a mechanical connection to the isolation lever/maneuver;

» Equipped with a squared 9.5mm and 22mm long pin that can be used to drive an insulator;

» The movement of the spigot works on the operation control system;

» Material: brass;

» Ideal for use in corrosive, non-corrosive or aggressive environments;

» Clockwise rotation direction (to insert the key).

OPERATION

H50 switchgear interlocks are designed to use as a mechanical interlock to control the operation on HV/MV switchgear.

It works through a mechanical connection of the spigot to the isolation equipment. The standard version is equipped with a square 9.5mm (0.37'') x 22mm (0.86'') used to drive an isolator. Inserting and turning the key 90° clockwise, moves the spigot to close. The free key can be used to operate on other interlocks to operate on a supply or to get the access on a dangerous area.

New Arel Srl cannot be held responsible for eventual malfunctioning of tampered products.
Please contact our offices in case of unsolvable problems according to the maintenance conditions.

power temp systems INC.
WE PUT THE POWER WHERE YOU NEED IT™

HOME → POWER/AIR CIRCUIT BREAKERS → EMAX 2

ABB

Selector | Quotes (3) | Contact Us

Emax 2

USCON Code [ ] → OK

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Configuration

Breaker/Switch	Switch Disconnector (non-autom.
Application Information	Standard AC
Version	UL 1066
Operation Method	Manually operated
Max System Voltage (Vac)	508 (480) UL
Max Withstand Current (kA)	65
Breaking Capacity Class	S
Frame Amperage (A)	1600
Frame Size	E2.2
Number of Poles	3 poles
Fixed/Drawout	Fixed
Terminal Types	Alternative
Upper Terminals	Rear Vertical
Lower Terminals	Rear Vertical
Warranty Extension	None
Test Report	No

Product Info

Part Number
Z2SE00J0000A000008XX
Description
E2.2S-A/MS 1600 3p FHR
Bill of Material
(Z2SE00B00000000000XX) : E2.2S-A/MS 1600 3p FHR: [1SDA079565R1]
(ZE2HRVRFW) : Kit Adj HR/VR E2.2 F-W 3P (UL): [1SDA079852R1]
(ZE2HRVRFW) : Kit Adj HR/VR E2.2 F-W 3P (UL): [1SDA079854R1]
(ZEBAUX4) : AUX 4Q (4 Form C) 400V E2.2...E6.2: [1SDA073753R1]
(ZEBPLC8) : PLC E2.2..E6.2 Padlock open D=8mm/0.31": [1SDA073805R1]



- Product Website Link
- Product Catalog Link
- Trip Unit Demo Simulator Link

⚠ Warning

This configurator should not be used for quotation purposes, please refer to the configurators in Empower.

Switch disconnectors
Fixed version



SACE Emax 2 E1.2 B-A/MS, N-A/MS • Front terminals (F)

Size	Frame Amps	Withstand (kA)	Type	3 Poles		4 Poles	
				Global PN	US / CA PN	Global PN	US / CA PN
E1.2B-A/MS	800	42	E1.2B-A/MS 800	1SDA079548R1	Z1BC00B000000000000XX	1SDA079552R1	ZABC00B000000000000XX
	1200	42	E1.2B-A/MS 1200	1SDA079549R1	Z1BD00B000000000000XX	1SDA079553R1	ZABD00B000000000000XX
E1.2N-A/MS	800	50	E1.2N-A/MS 800	1SDA079550R1	Z1NC00B000000000000XX	1SDA079554R1	ZANC00B000000000000XX
	1200	50	E1.2N-A/MS 1200	1SDA079551R1	Z1ND00B000000000000XX	1SDA079555R1	ZAND00B000000000000XX

About wall mount is standard; for floor fixing must order: 1SDA076020R1 ZE1FFPF



SACE Emax 2 E2.2 N-A/MS, S-A/MS, V-A/MS • Orientable rear terminals (HR)

Size	Frame Amps	Withstand (kA)	Type	3 Poles		4 Poles	
				Global PN	US / CA PN	Global PN	US / CA PN
E2.2N-A/MS	1600	50	E2.2N-A/MS 1600	1SDA079570R1	Z2NE00B000000000000XX	1SDA079578R1	ZBNE00B000000000000XX
	2000	50	E2.2N-A/MS 2000	1SDA079571R1	Z2NF00B000000000000XX	1SDA079579R1	ZBNF00B000000000000XX
E2.2S-A/MS	800	65	E2.2S-A/MS 800	1SDA079564R1	Z2SC00B000000000000XX	1SDA079572R1	ZBSC00B000000000000XX
	1600	65	E2.2S-A/MS 1600	1SDA079565R1	Z2SE00B000000000000XX	1SDA079573R1	ZBSE00B000000000000XX
	2000	65	E2.2S-A/MS 2000	1SDA079566R1	Z2SF00B000000000000XX	1SDA079574R1	ZBSF00B000000000000XX
E2.2V-A/MS	800	85	E2.2V-A/MS 800	1SDA079567R1	Z2VC00B000000000000XX	1SDA079575R1	ZBVC00B000000000000XX
	1600	85	E2.2V-A/MS 1600	1SDA079568R1	Z2VE00B000000000000XX	1SDA079576R1	ZBVE00B000000000000XX
	2000	85	E2.2V-A/MS 2000	1SDA079569R1	Z2VF00B000000000000XX	1SDA079577R1	ZBVF00B000000000000XX

Accessories

Mechanical accessories



Mechanical operation counter - MOC

Size	Type	Global PN	US / CA PN
E1.2	MOC mechanical operation counter (1)	1SDA073780R1	ZE1MOC
E2.2...E6.2	MOC mechanical operation counter	1SDA073781R1	ZEBMOC

1) Only available with motor



Key lock in open position - KLC

Size	Type	Global PN	US / CA PN
E1.2	KLC-D Key lock open E1.2	1SDA073782R1	ZE1KLCD
E1.2	KLC-S Key lock open N.20005 E1.2	1SDA073783R1	ZE1KLCS5
E1.2	KLC-S Key lock open N.20006 E1.2	1SDA073784R1	ZE1KLCS6
E1.2	KLC-S Key lock open N.20007 E1.2	1SDA073785R1	ZE1KLCS7
E1.2	KLC-S Key lock open N.20008 E1.2	1SDA073786R1	ZE1KLCS8
E1.2	KLC-S Key lock open N.20009 E1.2	1SDA073787R1	ZE1KLCS9
E1.2	KLC-A Key lock open Castell E1.2 (1) (2)	1SDA073788R1	ZE1KLAC
E1.2	KLC-A Key lock open Kirk E1.2 (1)	1SDA073789R1	ZE1KLAK
E1.2	KLC-A Key lock open Ronis Profalux E1.2 (1)	1SDA073790R1	ZE1KLAR
E2.2...E6.2	KLC-D Key lock open E2.2...E6.2	1SDA073791R1	ZEBKLCD
E2.2...E6.2	KLC-S Key lock open N.20005 E2.2..E6.2	1SDA073792R1	ZEBKLCS5
E2.2...E6.2	KLC-S Key lock open N.20006 E2.2..E6.2	1SDA073793R1	ZEBKLCS6
E2.2...E6.2	KLC-S Key lock open N.20007 E2.2..E6.2	1SDA073794R1	ZEBKLCS7
E2.2...E6.2	KLC-S Key lock open N.20008 E2.2..E6.2	1SDA073795R1	ZEBKLCS8
E2.2...E6.2	KLC-S Key lock open N.20009 E2.2..E6.2	1SDA073796R1	ZEBKLCS9
E2.2...E6.2	KLC-A Key lock open Castell E2.2...E6.2 (1) (2)	1SDA073797R1	ZEBKLAC
E2.2...E6.2	KLC-A Key lock open Kirk E2.2..E6.2 (1)	1SDA073798R1	ZEBKLAK
E2.2...E6.2	KLC-A Key lock open Ronis Profalux E2.2..E6.2 (1)	1SDA073799R1	ZEBKLAR

1) Arrangement only: 2) Only mounted. For loose supply contact ABB SACE.



Padlocks in open position - PLC

Size	Type	Global PN	US / CA PN
E1.2	PLC E1.2 Padlock open D=4mm/0.15"	1SDA073800R1	ZE1PLC4
E1.2	PLC E1.2 Padlock open D=7mm/0.27"	1SDA073801R1	ZE1PLC7
E1.2	PLC E1.2 Padlock open D=8mm/0.31"	1SDA073802R1	ZE1PLC8
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=4mm/0.15"	1SDA073803R1	ZEBPLC4
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=7mm/0.27"	1SDA073804R1	ZEBPLC7
E2.2...E6.2	PLC E2.2..E6.2 Padlock open D=8mm/0.31"	1SDA073805R1	ZEBPLC8

The lock shackle/shank diameter must match for proper operation.
The PLC is an alternative to the protection device for opening and closing pushbuttons (PBC)

Fixed or Mobile Part with neutral on right side

Size	Type	Global PN	US / CA PN
E1.2...E6.2	Installation with neutral on right side sequence L1, L2, L3, N (1)	1SDA076153R1	Factory installed only

(1) When this configuration is selected, the circuit-breaker is certified for IEC61557-12 (Class 1 accuracy)

Floor fixing plate - F

Size	Type	Global PN	US / CA PN
E1.2	Floor fixing plate for fixed unit	1SDA076020R1	ZE1FFPF



Toroid for differential protection (Rc residual current protection sensor input) (IEC only)

Size	Type	Global PN	US / CA PN
E1.2 & E2.2 3p	Toroid RC E1.2, E2.2 3p (1)	1SDA073741R1	ZE12RCT1
E2.2 4p & E4.2	Toroide RC E2 4p, E4.2 (1)	1SDA073742R1	ZE24RCT2

The toroid for differential protection is an alternative to the homopolar toroid for the earthing conductor of the main power supply;
1) Only as loose part



Dedicated terminal for Modified Differential Ground Fault (MDGF) protection

Size	Type	Global PN	US / CA PN
E1.2..E6.2	MDGF Terminal for fixed circuit breaker (1)	1SDA114800R1	ZEAMDGFF
E1.2..E6.2	MDGF Terminal for withdrawable circuit breaker (1)	1SDA114798R1	ZEAMDGFW

1) The commercial code includes one piece.
External phase current transformers and summing current transformers must be purchased separately.









Open closed auxiliary contacts - AUX

Size	Type	Global PN	US / CA PN
E1.2 (4)	AUX 4Q (4 Form C) 400V E1.2	1SDA073750R1	ZE1AUX4
E1.2	AUX 4Q (4 Form C) 24V E1.2	1SDA073751R1	ZE1AUX4D
E1.2	AUX 2Q (2 Form C) 400V + 2Q (2 Form C) 24V E1.2	1SDA073752R1	ZE1AUX2-2D
E2.2..E6.2 (4)	AUX 4Q (4 Form C) 400V E2.2...E6.2	1SDA073753R1	ZEBAUX4
E2.2..E6.2	AUX 4Q (4 Form C) 24V E2.2...E6.2	1SDA073754R1	ZEBAUX4D
E2.2..E6.2	AUX 2Q (2 Form C) 400V + 2Q (2 Form C) 24V E2.2...E6.2	1SDA073755R1	ZEBAUX2-2D
E2.2..E6.2	AUX 6Q 400V E2.2...E6.2 (1)	1SDA073756R1	ZEBAUX6
E2.2..E6.2	AUX 6Q 24V E2.2...E6.2 (1)	1SDA073757R1	ZEBAUX6D
E2.2..E6.2	AUX 3Q (3 Form C) 400V + 3Q (3 Form C) 24V E2.2...E6.2 (1)	1SDA075973R1	ZEBAUX3-3D
E1.2	AUX 15Q (15 Form C) 400V E1.2 (2) (3)	1SDA073758R1	ZE1AUX15
E1.2	AUX 15Q (15 Form C) 24V E1.2 (2) (3)	1SDA073759R1	ZE1AUX15D
E2.2..E6.2	AUX 15Q (15 Form C) 400V (for fixed/drawout with signalling in racked in) E2.2...E6.2 (2) (3)	1SDA073760R1	ZEBAUX15
E2.2..E6.2	AUX 15Q (15 Form C) 24V (for fixed/drawout with signalling in racked in) E2.2...E6.2 (2) (3)	1SDA073761R1	ZEBAUX15D
E2.2..E6.2	AUX 15Q (15 Form C) 400V (for fixed/drawout with signalling in racked in/test isolated) E2.2...E6.2 (2) (3)	1SDA073846R1	ZEBAUX15RT
E2.2..E6.2	AUX 15Q (15 Form C) 24V (for fixed/drawout with signalling in racked in/test isolated) E2.2...E6.2 (2) (3)	1SDA073847R1	ZEBAUX15DRT

1) AUX 6Q (6 Form C) is an alternative to the Ekip Signalling 4k module
2) Aux 15 Q (15 Form C) is an alternative to the Mechanical interlock (MI), the lock to prevent door opening when the circuit breaker is in the closed position (DLC) or the lock to prevent door opening when the circuit breaker is in the racked in or test position (DCP) when mounted on the right side.
For E1.2 one of the mounting plates is also needed.
For E1.2 you need to order also one of the following items:

Plate for fixed - floor mounted	1SDA079783R1	ZE1AUX15PLF
Plate for fixed - wall mounted	1SDA079782R1	ZE1AUX15PLW
Plate for withdrawable	1SDA079784R1	ZE1AUX15PLMP

3) Not compatible with mechanical locks on compartment doors or mechanical interlocks
4) Standard supply with automatic circuit-breakers

Accessories

Electrical accessories



First and second shunt coil - YO

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YO E1.2..E6.2 24 Vac/dc	1SDA073668R1	ZEASA
E1.2..E6.2	YO E1.2..E6.2 30 Vac/dc	1SDA073669R1	ZEASB
E1.2..E6.2	YO E1.2..E6.2 48 Vac/dc	1SDA073670R1	ZEASC
E1.2..E6.2	YO E1.2..E6.2 60 Vac/dc	1SDA073671R1	ZEASD
E1.2..E6.2	YO E1.2..E6.2 110-120 Vac/dc	1SDA073672R1	ZEASE
E1.2..E6.2	YO E1.2..E6.2 120-127 Vac/dc	1SDA073673R1	ZEASF
E1.2..E6.2	YO E1.2..E6.2 220-240 Vac/dc	1SDA073674R1	ZEASG
E1.2..E6.2	YO E1.2..E6.2 240-250 Vac/dc	1SDA073675R1	ZEASH
E1.2..E6.2	YO E1.2..E6.2 380-400 Vac	1SDA073677R1	ZEASK
E1.2..E6.2	YO E1.2..E6.2 415-440 Vac	1SDA073678R1	ZEASL
E1.2..E6.2	YO E1.2..E6.2 480-500 Vac	1SDA073679R1	ZEASM

Second shunt coils are an alternative to a UVR or anti-racking out device (fail safe)

First and second closing coil - YC

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YC E1.2..E6.2 24 Vac/dc	1SDA073681R1	ZEACA
E1.2..E6.2	YC E1.2..E6.2 30 Vac/dc	1SDA073682R1	ZEACB
E1.2..E6.2	YC E1.2..E6.2 48 Vac/dc	1SDA073683R1	ZEACC
E1.2..E6.2	YC E1.2..E6.2 60 Vac/dc	1SDA073684R1	ZEACD
E1.2..E6.2	YC E1.2..E6.2 110-120 Vac/dc	1SDA073685R1	ZEACE
E1.2..E6.2	YC E1.2..E6.2 120-127 Vac/dc	1SDA073686R1	ZEACF
E1.2..E6.2	YC E1.2..E6.2 220-240 Vac/dc	1SDA073687R1	ZEACG
E1.2..E6.2	YC E1.2..E6.2 240-250 Vac/dc	1SDA073688R1	ZEACH
E1.2..E6.2	YC E1.2..E6.2 380-400 Vac	1SDA073690R1	ZEACK
E1.2..E6.2	YC E1.2..E6.2 415-440 Vac	1SDA073691R1	ZEACL
E1.2..E6.2	YC E1.2..E6.2 480-500 Vac	1SDA073692R1	ZEACM

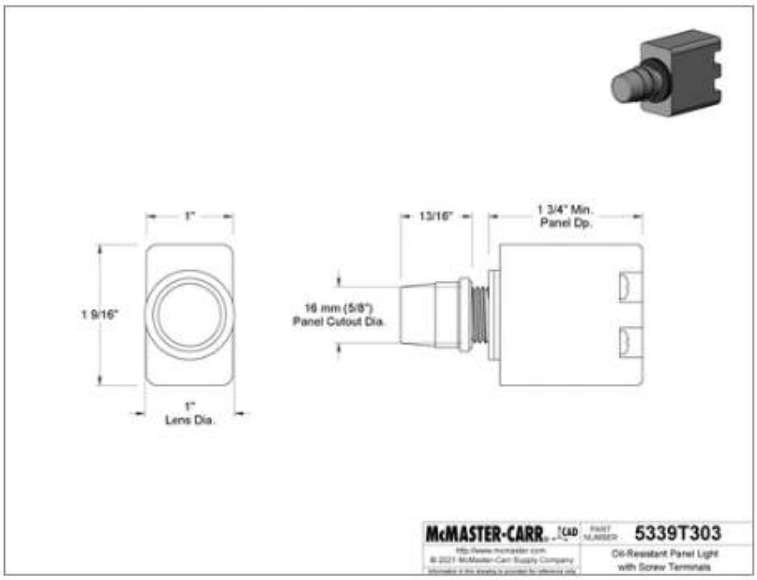
Shunt coil and closing coil test unit - YO/YC Test Unit (IEC only)

Size	Type	Global PN	US / CA PN
E1.2..E6.2	YO/YC test unit E1.2...E6.2	1SDA082751R1	ZEAYOYCT

power temp systems INC.

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Signal Type	Signal Light
Power Source	Electric
Bulb Type	LED
For Panel Cutout Diameter	16 mm (5/8")
Voltage	20-277V AC/20-277V DC
For Min. Panel Depth	1 3/4"
Lens Diameter	1"
Mount Type	Panel
Material	Plastic
Lens Material	Plastic
Bezel Material	Metal
Environment	Outdoor, Washdown
Electrical Connection	Screw Terminals
Environmental Rating	IP65, NEMA 4X, NEMA 13
Specifications Met	C-UL Listed, CE Marked, IEC 60947-1, IEC 60947-5-1, UL Listed
Light Pattern	Continuous
Light Color	Green
RoHS	RoHS 3 (2015/863/EU) Compliant
REACH	Not Compliant
DFARS	Specialty Metals COTS-Exempt
Country of Origin	El Salvador
Schedule B	854141.0000
ECCN	EAR99

These lights meet NEMA 13 for oil resistance and have an LED bulb for years of maintenance-free operation. Note: When bulb burns out, the entire light must be replaced, except for lights that have a replacement bulb available.

Lights that meet NEMA 4X are rated for protection from corrosion and washdowns.

KOHLER®

Warranty

Stationary Standby Industrial Generator Set Extended Five-Year or Three Thousand (3000)-Hour Comprehensive Limited Warranty

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product	**Warranty Coverage**
Stationary Standby Generator Set & Accessories	Five (5) years from registered startup or three thousand (3000) hours (whichever occurs first).

Extended warranty purchase must take place prior to expiration of standard warranty. Extended warranty is effective upon submission of purchase order in the online warranty system.

The following will **not** be covered by the warranty:

1. Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by operation at speeds, or with fuel, loads, conditions, modifications or installation contrary to published specifications.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide the specified type and sufficient quantity of lubricating oil.
   b. Failure to keep the air intake and cooling fin areas clean.
   c. Failure to service the air cleaner.
   d. Failure to provide sufficient coolant and/or cooling air.
   e. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   f. Failure to regularly exercise the generator set under load (stationary applications only).
5. Original installation charges and startup costs.
6. Starting batteries and the following related expenses:
   a. Labor charges related to battery service.
   b. Travel expenses related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year of the warranty period.
8. Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
9. Rental of equipment during the performance of warranty repairs.
10. Removal and replacement of non-Kohler-supplied options and equipment.
11. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
12. Radiators replaced rather than repaired.
13. Fuel injection pumps not repaired by an authorized Kohler service representative.
14. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
15. Engine fluids such as fuel, oil, or coolant/antifreeze.
16. Shop supplies such as adhesives, cleaning solvents, and rags.
17. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
18. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
19. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

TP-5561 9/23g

KOHLER®

Certification

Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Kohler Power Systems
N7650 Lakeshore Road
Sheboygan
Wisconsin
53083
USA

Holds Certificate No: **FM 727336**

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

Design, manufacture, and distributor support for electrical generators, alternators, fuel tanks, automatic transfer switches and switchgear.

For and on behalf of BSI:

Carlos Pitanga, Chief Operating Officer Assurance – Americas

Original Registration Date: 1995-02-28
Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07
Expiry Date: 2024-11-06

...making excellence a habit.™

This certificate remains the property of BSI and shall be returned immediately upon request.
An electronic certificate can be authenticated online. Printed copies can be validated at www.bsigroup.com/ClientDirectory
To be read in conjunction with the scope above or the attached appendix.
Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
A Member of the BSI Group of Companies.

Certificate No: **FM 727336**

Location	Registered Activities
Kohler Power Systems - GK 900 Highland Drive Bldg 604 Kohler Wisconsin 53004 USA	Manufacture of leads and harness, automatic transfer switches and switchgear. Distribution of generator sets.
Kohler Power Systems N7650 Lakeshore Road Sheboygan Wisconsin 53083 USA	Design, manufacture, and distributor support for electrical generators, automatic transfer switches and switchgear.
Kohler Power Systems 300 N Dekora Woods Blvd Saukville Wisconsin 53080 USA	Manufacture of fuel tanks, skids, fabricated components and generators.
Kohler Power Systems Muth Warehouse 2821 Muth Court Sheboygan Wisconsin 53083 USA	The distribution of generator sets.
Kohler Power Systems KWIP Warehouse 4327 County EE Sheboygan Wisconsin 53081 USA	Receiving, sequencing and warehousing of generator components.

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

This certificate remains the property of BSI and shall be returned immediately upon request.
An electronic certificate can be authenticated online. Printed copies can be validated at www.bsigroup.com/ClientDirectory
To be read in conjunction with the scope above or the attached appendix.
Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
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Technical Evaluation Report

DIVISION: 48 10 00–ELECTRICAL POWER GENERATION EQUIPMENT

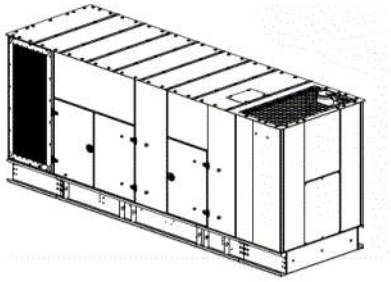
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(Issued April 5, 2019 Subject to Renew January 1, 2021) or next code cycle

EVALUATION SUBJECT: **500-600REOZVB Sound Aluminum Enclosure**

TER-18-6258.2

REPORT HOLDER:
KOHLER POWER SYSTEMS
7650 LAKESHORE ROAD
SHEBOYGAN, WI 53083 USA
(920) 457-4441 | KOHLERPOWER.COM



SCOPE OF EVALUATION (compliance with the following codes):

THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY. NO ELECTRICAL OR TEMPERATURE PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.

This Product Evaluation Report is being issued in accordance with the requirements of the **Florida Building Code Sixth Edition (2017)** per FBC Section 104.11.1, FMC 301.15, FBC Building Ch. 16, ASCE-7-10, and FBC Residential M1202.1, FS 471.025. The product noted on this report has been tested and/or evaluated as summarized herein.
IN ACCORDANCE WITH THESE CODES EACH OF THESE REPORTS MUST BEAR THE ORIGINAL SIGNATURE & RAISED SEAL OF THE EVALUATING ENGINEER.

SUBSTANTIATING DATA:

• **Product Evaluation Documents**
Substantiating documentation has been submitted to provide this TER and is summarized in the sections below.
• **Structural Engineering Calculations**
Structural engineering calculations have been prepared which evaluate the product based on comparative and/or rational analysis to qualify the following design criteria:

- Maximum allowable unit enclosure wind pressure integrity
- Maximum allowable uplift, sliding, & overturning moment for ground.

Calculation summary is included in this TER and appears below. NOTE: No 33% increase in allowable stress has been used in the design of this product.

INSTALLATION:

The product(s) listed above shall be installed in strict compliance with this TER & manufacturer-provided enclosure model specifications.
The product components shall be of the material specified in the manufacturer-provided product specifications. All screws, bolts and rivet must be installed in accordance with the applicable provisions & anchor manufacturer's published installation instructions.

LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with this TER as noted herein. The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. No evaluation is offered for the host supporting structure by use of this document; Adjustment factors noted herein, and the applicable codes must be considered, where applicable. All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times. This evaluation does not offer any evaluation to meet large missile impact debris requirements if requires.
Yearly inspections, during equipment maintenance or after named storm, all screws, cabinet components, and anchor bolts are to be verified. All damaged cabinet components, loosen, corroded, broken screws or anchor bolts shall be replaced to ensure structural integrity for hurricane wind forces.

NOTE: THE GRAPHICAL DEPICTIONS IN THIS REPORT ARE FOR ILLUSTRATIVE PURPOSES ONLY AND MAY DIFFER IN APPEARANCE.

FINISH:

Baked enamel.

UNIT CASING MATERIAL:

1/8" Al 5052-H32 top panel. 1/8" Al 5052-H32 for side panels and 1/4" steel ASTM A36 for bottom skids, secured with 3/16" rivets grade 51, M6 bolts class 5.8, and M8-M16 bolts class 8.8 (see dimensional drawing for specific locations).

OPTIONS:

This evaluation is valid for KOHLER 500-600REOZVB Sound Aluminum Enclosure model dimensions shown on the final page of this report.
This evaluation includes standard product only. Contact Factory for Engineering Special (ES) orders. Any structural changes outside of the factory would void this certificate.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:
ASCE-710 Exposure Category D
Risk Category III / IV
HVHZ Rated* (& NON-HVHZ)
Only for ground installations
Flat terrain only

Maximum Wind Speed:
$V_{(Ultimate)}$ = 186 MPH

ABOUT THIS DOCUMENT:

ENGINEER CERTIFIED ORIGINALS, VARIATIONS & HELP CAN BE FOUND BY VISITING THE WEB ADDRESS OR SCANNING THE QR CODE TO THE RIGHT >

VISIT ENGINEERINGEXPRESS.COM/STORE FOR MORE REPORTS

ECALC.IO/186258

ORIGINAL SIGNATURE AND RAISED SEAL
OR DIGITAL SEAL REQUIRED TO BE VALID PER CODE:

P.E. SEAL REQUIRED

April 5, 2019

Frank L. Bennardo, P.E., SECB
ENGINEERING EXPRESS®
FL PE #0046549 FLCA #9885

☐ Signed by If Checked:
TROY BISHOP, PE
FL PE #76131

NOTICE: IF THIS PAGE DOES NOT CONTAIN AN ORIGINAL SIGNATURE & ENGINEER SEAL:
IF THERE IS A DIGITAL SIGNATURE ON PAGE 1, THIS DOCUMENT IS PART OF A DIGITALLY SIGNED FILE, SHALL REMAIN IN DIGITAL FORMAT & **PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED**. IF THERE IS NO DIGITAL SIGNATURE ON PAGE 1 **OR THIS PAGE DOES NOT CONTAIN AN ENGINEER'S ORIGINAL SIGNATURE & SEAL, THIS DOCUMENT IS A COPY/DRAFT.**

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The FBC 6th Edition (2017) defines APPROVED SOURCE (Section 202) as: "An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses." Engineering Express® professionals meet the competency requirements as defined in the FBC and can seal their work. Engineering Express® is regularly engaged in conducting and providing engineering evaluations of single-element and full-scale building systems tests.

*MIAMI DADE AND BROWARD COUNTY

SECTION 2 SUMMARY

Engineering Express has reviewed the design requirements per the Florida Building Code Sixth Edition (2017) and ASCE 7-10 for the structural integrity of the above referenced Kohler aluminum housing unit with steel skid to withstand a $V_{ULTIMATE}$ wind speed=186 MPH, Exposure "D" Risk Category III/ IV. Our analysis includes the unit framing and housing only and requires that a permanent near-grade (non-rooftop) attachment to a concrete, metal, or wood host structure as certified/verified by others. Steel skid tie-down anchor locations shall conform to those illustrated on sheet 3 of this TER. Additionally, the unit shall not be installed in a location susceptible to channeling effects from upwind obstacles. It shall be the installer's responsibility to ensure that the criteria for the unit housing integrity, as listed above, is applicable for use at the location of installation and the mounting method meets or exceeds the requirements of the local code and it is approved by the appropriate local authority before installation.

This certification is intended to certify the structural capacity and integrity of the structural framing members, wall and roof sheet metal skins, generator skid and internal structural connections only for the sound aluminum enclosure aforementioned. Design of the generator itself, mechanical designs, energy/electrical criteria, generator slab support, anchorage and tie-down method accompanying components and all non-structural items shall be verified by others and outside the scope of this certification. Upon analysis of the aluminum housing unit vs. the critical ultimate design loads illustrated below, this engineer has concluded that the aluminum housing enclosure provides adequate resistance to the specified ultimate design loads.

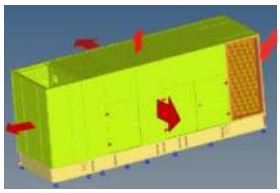
Structural Engineering Calculations

Structural engineering calculations have been prepared which evaluate the aluminum unit housing based on rational analysis using Finite Element Analysis to qualify the following design criteria:

1. Maximum ultimate design pressure as a result of the aforementioned design criteria:

Load Case 1

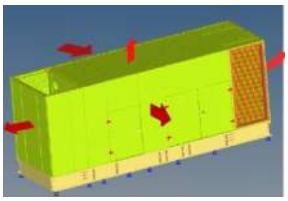
(Wind parallel to long side)



		Pressure, psf (x 10^{-3} MPa)				
Load Case	Wind Direction	Rear Wall	Front Wall	Left Wall	Right Wall	Roof
1		61.26 (2.933)	-48.85 (-2.339)	-48.85 (-2.339)	-47.30 (-2.265)	-96.92 (-4.641)

Load Case 2

(Wind perpendicular to long side)

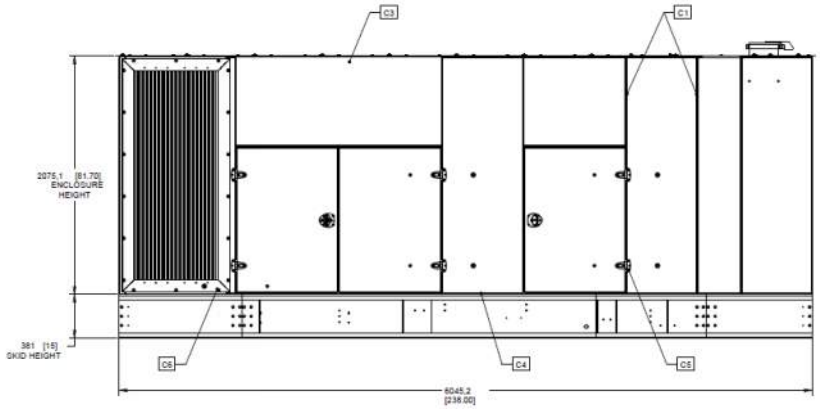


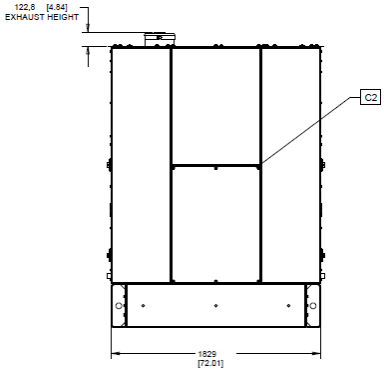
		Pressure, psf (x 10^{-3} MPa)				
Load Case	Wind Direction	Rear Wall	Front Wall	Left Wall	Right Wall	Roof
2		-48.85 (-2.339)	-48.85 (-2.339)	61.26 (2.933)	-47.30 (-2.265)	-96.92 (-4.641)

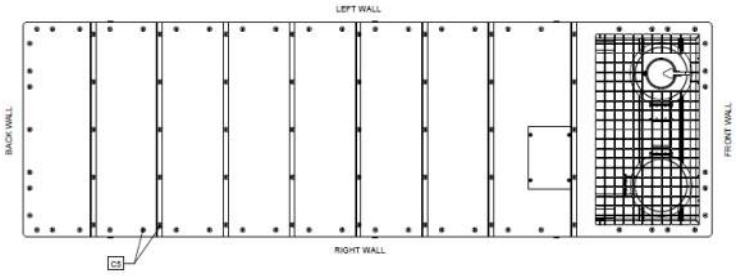
2. Maximum housing unit dimensions: 238.00"L x 72.01"W x 96.70" H.
3. Enclosure materials have been analyzed for yield and ultimate stresses using Von Mises stress criteria in accordance with the 2015 Aluminum Design Manual & AISC Steel Construction Manual 14th Edition. For both load case Von Mises Stress stood below ultimate strength; therefore, the sound aluminum enclosure will provide enough structural capacity to resist wind pressures shown.
4. All internal connection capacities, including bolted and welded components, have been checked for applicable tension and shear by applying a unity interaction equation where applicable and have been approved by this office.

All installation work shall follow the minimum requirements of the Florida Building Code Sixth Edition (2017) in addition to any additional site-specific requirements for tie-down certification which is not included in this letter. Except as expressly provided herein, no additional affirmations are intended. Thank you for your attention to this matter.

SECTION 3 DIMENSIONS & ELEVATIONS





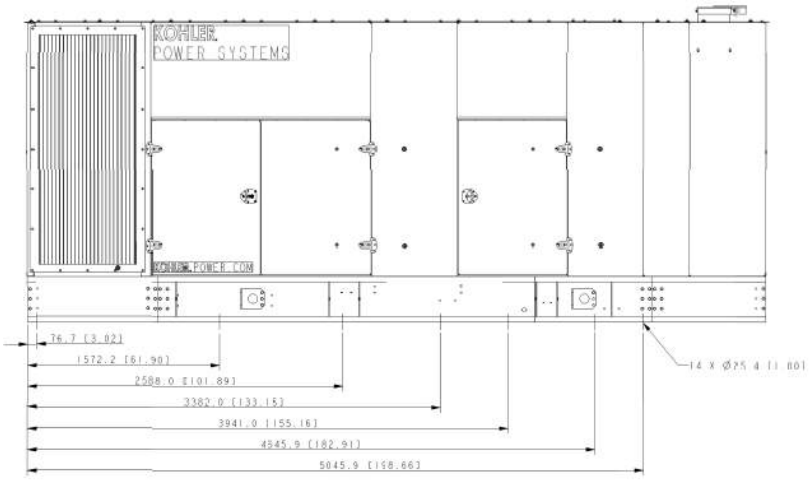


Note:

Enclosure housing must bear the official insignia of Kohler Power with model name referenced above for applicability and validity of this letter.

NO	DESCRIPTION	CONNECTION QTY PER WALL				
		RIGHT WALL	LEFT WALL	FRONT WALL	BACK WALL	ROOF
C1	PANEL TO PANEL	6	6	2	2	NA
C2	PANEL TO ACCESS PANEL	0	0	1	1	NA
C3	PANEL TO Z-FLAT	10	10	4	4	NA
C4	PANEL TO SKID	6	6	2	2	NA
C5	PANEL TO ROOF / ROOF PANEL TO ROOF PANEL	21	21	6	7	55
C6	PANEL TO HINGE / HINGE TO DOOR PANEL	6	6	0	0	NA
C7	LOUVER TO PANEL	1	1	0	0	NA

SECTION 4 ANCHORS LOCATION



Note:

Anchors to be calculated on a site-specific basis. (14) anchors location per manufacturer, (7) per long side. Additionally, holes might be added as needed.

IN ALL CONDITIONS IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER TO ENSURE THE HOST STRUCTURE IS CAPABLE OF WITHSTANDING THE RATED GRAVITY, LATERAL, AND UPLIFT FORCES BY SITE-SPECIFIC DESIGN. NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IS OFFERED BY ENGINEERING EXPRESS AS TO THE INTEGRITY OF THE HOST STRUCTURE TO CARRY DESIGN FORCE LOADS INCURRED BY THIS UNIT.

SECTION 5 ENCLOSURE MODELS INCLUDED

GENERATOR	ENCLOSURE TYPE	ENCLOSURE DRAWING NUMBER	REVISION & DATE	ADV	REVISION & DATE
500REOZVC	500REOZVC Sound Level 2 Aluminum Enclosure	GM81040-TA10	Revision H 06/15/16	ADV-8417	Revision C 08/10/17
550REOZVB	550REOZVB Sound Level 2 Aluminum Enclosure	GM81040-TA10	Revision H 06/15/16		
600REOZVB	600REOZVB Sound Level 2 Aluminum Enclosure	GM81040-TA7	Revision H 06/15/16		

LIMITATIONS & CONDITIONS OF USE (cnt'd):

Production Drawings**:**
The following drawings shall be accessible if required for a full permit application to be submitted to the Authority Having Jurisdiction in conjunction with this TER:

- Electrical schematic(s)
- Final assembly drawings and parts lists sufficient to detail primary components, operator controls, and their locations
- Complete set of mechanical drawings for all machined parts
- Complete part specifications (including manufacturer's model numbers, size, ratings, etc.) for all purchased parts
- Specification sheets for all parts/components
- Drawings showing all construction details
- Product label drawing(s) showing all required marking information. The label drawing shall show the proposed label location on the equipment and artwork showing the manufacturer's name, address, model and serial numbers, equipment ratings, warning markings.

Drawing and Change Control**:**
The manufacturer shall establish a system of product configuration control that shall allow no unauthorized changes to the product. Changes to critical documents, identified in this Technical Evaluation Report, must be reported to, and authorized by, this office prior to implementation for production.

Survivability**:**
This evaluation report is valid for a newly installed unit and does not include certification of the product beyond a design event if impacted, contact this office for any reevaluation needs as designated by the Authority Having Jurisdiction.

Durability
Components or component assemblies shall not deteriorate, crack, fail, or lose functionality due to galvanic corrosion or weathering.
Each component or component assembly shall be supported and oriented in its intended installation position. All exposed *plastic* components shall be certified to resist sunlight exposure as specified by ASTM B117, or ASTM G155 in Broward or Miami Dade counties.

PROTOTYPE TEST REPORT

KOHLER

Models Covered: **500REOZVC**
Model Tested: **500REOZVB**
Cooling System Tested: **50C**
Alternator Tested: **5M4028**
Engine Tested: **TAD1641GE**
Voltage Tested: **480V**

GENSET

Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.

Meets Rated Load

Steady-state load test to ensure voltage stability meets or exceeds ISO8528-5 requirements and to verify compliance with steady state speed control specifications.

± 0.25 % Frequency Band
± 0.50 % Voltage Deviation

Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time. Values shown for model tested above. Please contact factory for additional details.

Full Load Acceptance	Full Load Rejection
25.6 % Voltage Dip	**17.5** % Voltage Overshoot
3.20 Seconds of Recovery Time	**0.60** Seconds of Recovery Time
21.2 % Frequency Dip	**6.80** % Frequency Overshoot
4.20 Seconds of Recovery Time	**1.00** Seconds of Recovery Time

G3 ISO8528-5 Class (G1, G2, G3)

NFPA 110 one step testing to determine the amount of time required for the generator set to reach 90% voltage and frequency to allow the ATS to transfer.

Complies with NFPA 110 Type 10

Vibrational analysis to verify that generator vibrations are within acceptable limits per ISO 8528-9.

Complies

Torsional analysis data to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified.

Complies

Generator set cooling and air flow tests to verify maximum operating ambient temperature. (Cooling system test results are available on TIB-118)

Acoustical noise intensity and sound attenuation effects tests (Acoustical noise results are available on TIB-114 &115)

Exhaust Back Pressure test completed to demonstrate within engine limitation
(Exhaust back pressure test results are available on TIB-119)

PROTOTYPE TEST REPORT

Models Covered: **500REOZVC**
Model Tested: **500REOZVB**
Cooling System Tested: **50C**

Alternator Tested: **5M4028**
Engine Tested: **TAD1641GE**
Voltage Tested: **480V**

ALTERNATOR

Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.

Alternator overload test per NEMA MG1-32.8. Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.

Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.

Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.

(Alternator detailed test results are available on TIB-102)

Kohler Standby/Prime Generator Set Test Program

Testing is an integral part of quality assurance. In keeping with our uncompromising commitment to quality, safety, and reliability, every Kohler Standby/Prime power generator set undergoes an extensive series of prototype and production testing.

Prototype Testing

Prototype testing includes the potentially destructive tests necessary to verify design, proper function of protective devices and safety features, and reliability expectations. Kohler's prototype testing includes the following:

- Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.
- Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.
- Alternator overload test per NEMA MG1-32.8.
- Steady-state load test to ensure voltage regulation meets or exceeds ANSI C84.1, NEMA MG1-32.17 requirements and to verify compliance with steady-state speed control specifications.
- Transient test to verify speed controls meets or exceeds specifications.
- Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time.
- Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.
- Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.
- Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.
- Generator set cooling and air flow tests to verify maximum operating ambient temperature.
- Reliability tests to demonstrate product durability, followed by root cause analysis of discovered failures and defects. Corrective action is taken to improve the design, workmanship, or components.
- Acoustical noise intensity and sound attenuation effects tests.

Production Testing

In production, Kohler Standby/Prime generator sets are built to the stringent standards established by the prototype program. Every Kohler generator set is fully tested prior to leaving the factory. Production testing includes the following:

- Stator and exciter winding high-potential test on all generators. Surge transient tests on stators for generators 180 kW or larger. Continuity and balance tests on all rotors.
- One-step, full-load pickup tests to verify that the performance of each generator set, regulator, and governor meets published specifications.
- Regulation and stability of voltage and frequency are tested and verified at no load, 1/4 load, 1/2 load, 3/4 load, and full-rated load.
- Voltage, amperage, frequency and power output ratings verified by full-load test.
- The proper operation of controller logic circuitry, prealarm warnings, and shutdown functions is tested and verified.
- Any defect or variation from specification discovered during testing is corrected and retested prior to approval for shipment to the customer.

Torsional analysis data, to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified, is available upon request.

Kohler offers other testing at the customer's request at an additional charge. These optional tests include power factor testing, customized load testing for specific application, witness testing, and a broad range of MIL-STD-705c testing. A certified test report is also available at an additional charge.

KOHLER®

KOHLER CO. Kohler, Wisconsin 53044
Phone 920-565-3381, Fax 920-459-1646
For the nearest sales/service outlet in the US and Canada, phone 1-800-544-2444
KohlerPowerSystemscom

G18-56 12/05b

KOHLER®

PreStartup Checklist

PRE-STARTUP **CHECKLIST**

Job Name: UK Barnhart Building

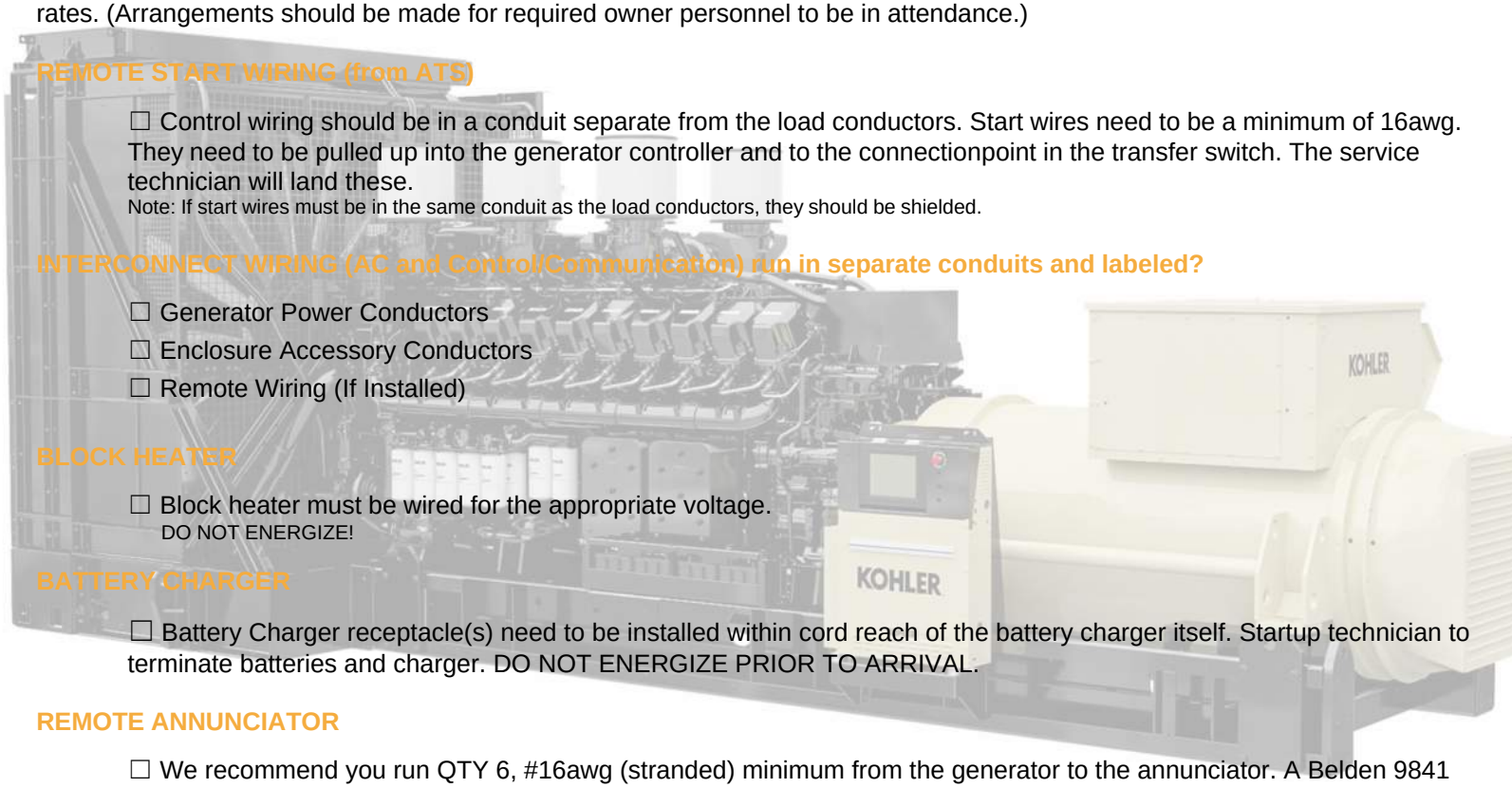
Address: 1398 Nicholasville Rd
City: Lexington **State:** KY

Onsite Contact:

START UP CHECKLIST

The Nixon Power Services Kohler Certified Technician will connect batteries, and ensure proper oil and coolant levels. They will test the system for proper operation per the Kohler Start-up Checklist and per the specifications of this project. The technician will notify the customer of any onsite issues.

Unless otherwise specified, demonstration and training will be done during start-up. Return visits will be invoiced at published rates. (Arrangements should be made for required owner personnel to be in attendance.)



REMOTE START WIRING (from ATS)

☐ Control wiring should be in a conduit separate from the load conductors. Start wires need to be a minimum of 16awg. They need to be pulled up into the generator controller and to the connectionpoint in the transfer switch. The service technician will land these.
Note: If start wires must be in the same conduit as the load conductors, they should be shielded.

INTERCONNECT WIRING (AC and Control/Communication) run in separate conduits and labeled?

☐ Generator Power Conductors
☐ Enclosure Accessory Conductors
☐ Remote Wiring (If Installed)

BLOCK HEATER

☐ Block heater must be wired for the appropriate voltage.
DO NOT ENERGIZE!

BATTERY CHARGER

☐ Battery Charger receptacle(s) need to be installed within cord reach of the battery charger itself. Startup technician to terminate batteries and charger. DO NOT ENERGIZE PRIOR TO ARRIVAL.

REMOTE ANNUNCIATOR

☐ We recommend you run QTY 6, #16awg (stranded) minimum from the generator to the annunciator. A Belden 9841 cable is also required. On a standard RSA without a key switch, pull one Belden 9841 from the generator to the RSA.If using an RSA with a key switch for testing an ATS, then the one Belden 9841 should be pulled from the generator to the ATS and an additional Belden 9841 from the ATS to the RSA. If using with an Ethernet connection contact the service department for proper installation requirements.

UTILITY POWER

☐ Utility power must be connected and available to the transfer switch.
NOTE: DON'T PLUG THE CONTROLLER IN

☐ Building loads must be available. Transfer switch must be allowed to be tested. Transfer Switch must be powered down to plug in controller. Power interruptions will occur during testing.

ELEVATOR CONTACTS

☐ If programming of Automatic Transfer Switch contacts are required for elevators, wires need to be present at time of start up. Please confirm signals required from elevator vendor. (ie, switch position, time delay until transfer

DIESEL FUEL SYSTEM

☐ The tank should be at least 75% full with #2 diesel.
NOTE: IF REQUIRED, FUEL TANK MUST HAVE TAKE PRESSURE TEST COMPLETED BEFORE SCHEDULING STARTUP

☐ Tank Pressure Test & Fire Marshall permits (if applicable, by others)

NATURAL GAS / LP ENGINES

☐ Fuel system must be installed per the Kohler installation manual, TP-5700, pages 21-24 and 32. Gas pressure MUST be 7-11 inches of water column at the generator fuel inlet on the secondary side of the customer supplied regulator Supply volume must be sized for 100% rated load. Recommended flexible fuel line installed between regulator and customer connection.

☐ Have fuel lines been run and is fuel available to the generator set?

☐ Is gaseous fuel pressure at the inlet solenoid of the generator set at 7-11 inches water column?

☐ Are gaseous fuel lines sized per the generator specifications?

GENERATOR LOCATION & ANCHORING

☐ Generator and/or Tank secured to floor/pad according to install manual TP-5700

☐ Working clearances are adequate and equipment accessible

☐ Loadbank access, if applicable drive up access will be required for trailer mounted loadbanks

END USER CONTACT INFORMATION

Name:
Phone Number:
Email Address:

I have read the above guidelines and have made all the necessary inspections to verify that all these requirements have been completed as specified. Omission of installation of items or devices required for startupmay incur additional cost to the contractor, and are not included in initial job proposal.

Customer/Contractor:

Authorized Signature:

Date:

Items shown in this diagram are examples only and are not true depictions of equipment ordered. Enclosures, colors, and styles may vary

NIXON POWER SERVICES

KOHLER REMOTE ANNUNCIATOR



KOHLER GENERATOR
APM603 CONTROLLER





AUTOMATIC TRANSFER SWITCH



Docking Station



MODBUS
Belden 9841

CONTROL WIRES
6ea. THHN 16ga.

REMOTE START
5ea. THHN 16ga.

E-STOP BUTTON
2ea. THHN 16ga.

COMMUNICATION DRAWING

AS BUILT DRAWINGS FOR EPSS COMMUNICATION SYSTEM

DRAWN BY	NIXON POWER
Francois M.	(800) 766-4966

KOHLER
IN POWER. SINCE 1920.

CONGLETON - HACKER CO.
Construction Managers / General Contractors

Submittal Review Cover Sheet

Project Name: UK Barnhart Building Improvements & Addition

Architect: **BHDP Architecture**

Congleton-Hacker Project Number: **23-104**

Spec Section and Description: 230200.02 Heat Exchangers – Product Data

Subcontractor: **Hussung**

Congleton-Hacker Company Review Stamp & Comments

CONGLETON - HACKER CO.
Construction Managers / General Contractors

REVIEWED

Submittal # 230200.02 Heat Exchanger - Product data

Job # 23-104 **Date** 07/03/2024 **By** Trevor Marcum

The data contained hereon & here within is for inspection only
- Not for Construction -
Unless stamped "Approved" by the architect and/or engineer

Consultant Review Stamp & Comments

- [x] **Reviewed**
- [ ] **Reviewed as Noted**
- [ ] **Rejected**
- [ ] **Revise and Resubmit**
- [ ] **Submittal Not Required**

This review is only for general conformance of the design concept and the information given in the Construction Documents. The Contractor is responsible for compliance with the plans and specifications and applicable laws, codes and regulations. The Contractor is responsible for dimensions to be confirmed and correlated at the job-site: information that pertains solely to the fabrication processes or to the means, methods and techniques of construction; and coordination of the work with all trades.

BHDP
BHDP Architecture
274 Marconi Blvd., Suite 200
Columbus, Ohio 43215

By BRoot

Date 7/24/2024

Submittal Review Summary

Project: UK-2591-Barnhart Building

Submittal: #49-230200-Heat Exchangers

CMTA Project Code: XKAB22 Reviewed by: RSJ

Date Received: 2024-07-08 Date Returned: 2024-07-19

Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with requirements of the drawings and specifications. This check is only for review of general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

☒ **Reviewed** ☐ **Furnish as Corrected**

☐ **Rejected** ☐ **Revise and Resubmit**

COMMENTS:

1. No exceptions

220 Lexington Green Circle, Suite 600, Lexington KY 40504 859.253.0892 www.cmta.com

MEP Engineering | Performance Contracting | Zero Energy Engineering | Technology | Commissioning

Hussung Mechanical Contractors
6913 Enterprise Drive
Louisville, Kentucky 40214
P: +15023753500

Project: 24-M-036 UK Barnhart Building
1398 Nicholasville Road
Lexington, Kentucky 40503

Submittal #23 02 00-8.0 - Heat Exchanger
23 02 00 - HVAC Equipment and Hydronic Specialties

Revision	0	**Submittal Manager**	Luke Fears (Hussung Mechanical Contractors)
Status	Open	**Date Created**	Jul 2, 2024
Issue Date	Jul 2, 2024	**Spec Section**	23 02 00 - HVAC Equipment and Hydronic Specialties
Responsible Contractor	Blackmore and Glunt	**Received From**	Kyle Browning (Blackmore and Glunt)
Received Date		**Submit By**	
Final Due Date	Jul 22, 2024	**Lead Time**	
		Cost Code	
Location		**Type**	Product Information
Approvers	Luke Fears (Hussung Mechanical Contractors), Luke Fears (Hussung Mechanical Contractors)		
Ball in Court	Luke Fears (Hussung Mechanical Contractors)		
Distribution			
Description			

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					
Kyle Browning		Jul 2, 2024	Jul 2, 2024	Submitted	UK Barnhart Heat Exchanger.pdf
Luke Fears	Jul 2, 2024	Jul 2, 2024	Jul 2, 2024	HMC Reviewed & Submitted	
Luke Fears		Jul 22, 2024		Pending	

Qty	Description & Tag
	Tag: HX-1
1	B&G Model - SU-66-2 Shell-and-Tube Heat Exchanger Tube
2	B&G Strap Cradle 6 Inch
1	Hoffman Model 62 Vacuum Breaker

Job Name: **UK Barhart Bldg**
Engineer: **CMTA**
Contractor: **Hussung**

blackmore and glunt inc.

11435 Williamson Rd. **Cincinnati, OH 45241** **PH: 513.489.5225**

Prepared By: **Kyle Browning** **Date: 7/2/2024**

Bell & Gossett™

Shell & Tube Heat Exchanger Specification Sheet

175 Standard Parkway
Cheektowaga, New York 14227
1-800-447-7700
www.xylem.com/bellgossett

Customer		Date	Tuesday, May 14, 2024
Inquiry Number	24-07272-2C	Item Number	NA

Performance of One Unit: SU-66-2 **Units Connected in Parallel:** 1

	Shell Side	Tube Side
Fluid Name	Steam	Water
Total Flow	1,545.45 lb/hr	100 GPM
Inlet Temperature	249.1 °F	150.0 °F
Outlet Temperature	249.1 °F	180.0 °F
Operating Pressure	15 PSIG	0 PSIG
Pressure Drop, Allow./Calc	5.94 / 0.31 PSIG	2.6 / 2.53 PSIG
Velocity	42.78 ft/s	7.36 ft/s
Density	0.07 lb/ft3	60.91 lb/ft3
Viscosity, Mean	0.01 cp	0.4 cp
Viscosity, Wall	0.01 cp	0.39 cp
Specific Heat	0.5 Btu/lbm,°F	1.0 Btu/lbm,°F
Thermal Conductivity	0.02 Btu/ft,h,°F	0.38 Btu/ft,h,°F
Specified Fouling Factor	0.000000 hr,ft2,°F/Btu	0.000500 hr,ft2,°F/Btu

Total Heat Exchanged	1,467,172.76 Btu/h
LMTD	83.16 °F
Overall Heat Transfer Coefficient, Clean/Dirty	1,039.32/660.66 Btu/hr,ft2,°F
Overall Heat Transfer Coefficient, Service	646.22 Btu/hr,ft2,°F
Surface Area	27.3 ft2
Excess Surface Area	2.23 %

Construction

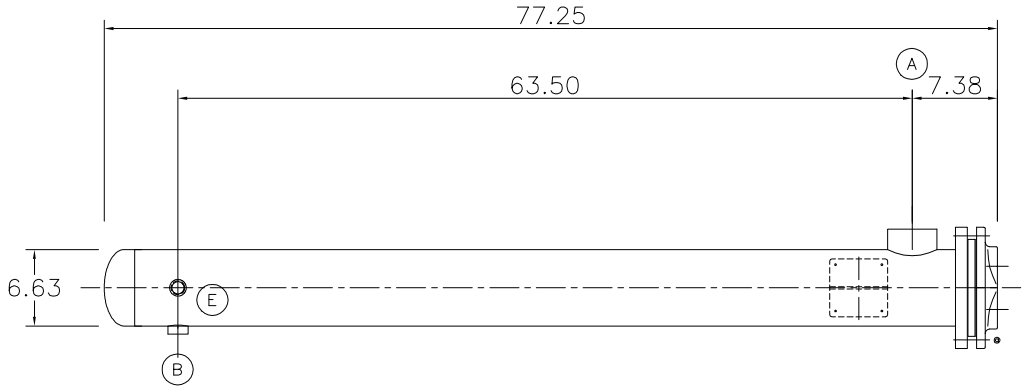
	Shell Side	Tube Side
Number of Passes	1	2
Design Pressure	150PSI	150PSIG
Design Temperature	375(°F)	375(°F)
Inlet Connection (Location) Type	3.0 in NPT	2.0 in NPT
Outlet Connection (Location) Type	1.0 in NPT	2.0 in NPT

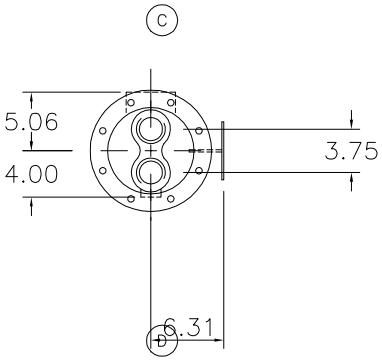
Tube Material / Diameter	COPPER / 3/4 in
No. Tubes / Gauge / Length / Pitch	24 / 20 BWG / 72 / 15/16 TRI
Shell Material	STEEL
Head Type/Material	CAST IRON
Tubesheet Material	STEEL
Baffle Material	STEEL
Gasket Material	COMP.FIBER
Tube to Tubesheet Joint	Roller Expanded
Approvals	ASME Sect VIII Div 1 w/U stamp.

- Customer to verify fluid/material compatibility.

Performance evaluation is dependent on customers' ability to provide sufficiently accurate measurements.
NOTES:

76.000 IN. REQ'D
TO REMOVE BUNDLE





(E) .75 NPT CONN.
(D) 2 PIPE TAP OUTLET
(C) 2 PIPE TAP INLET
(B) 1.00 PIPE TAP OUTLET
(A) 3 PIPE TAP INLET

NOZZLE SCHEDULE

	D.P.	T.P.	MAX.TEMP	MIN.TEMP
SHELLSIDE	150 PSI	300 PSI	375 °F	−20 °F
TUBESIDE	150 PSI	300 PSI	375 °F	−20 °F

REPLACEMENT PARTS	
DESCRIPTION/MATERIAL	PART NUMBER
BUNDLE KIT W/GSKT & PKNG	4−245−06−072−001
GASKET COMP.FIBER	3−299−8−00−928−06
GASKET COMP.FIBER	3−298−8−00−926−06
WEIGHT WET: 269 DRY: 188 BDL: 48 LBS.	

MATERIAL SPECIFICATION	
FRONT HEAD: C. IRON	SHELL: STEEL
REAR HEAD:	TUBE SUP: STEEL
TUBESHEET: STEEL	
TUBES: COPPER	0.750DIA.x20BWG

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MADE REP	DATE 05-14-24
CHECK REP	DATE 05-14-24
SCALE: .062IN.=1.000IN.	

Bell & Gossett
Buffalo, NY 14227 USA

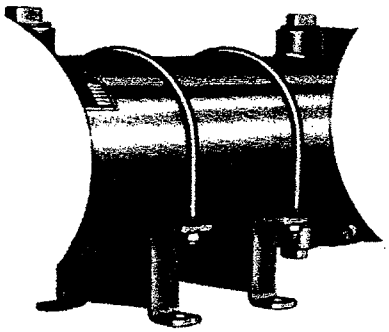
TITLE
SU66−2 EXCHANGER

INQUIRY NUMBER
5−260−06−072−001

BELL & GOSSETT

SUBMITTAL

C-225A

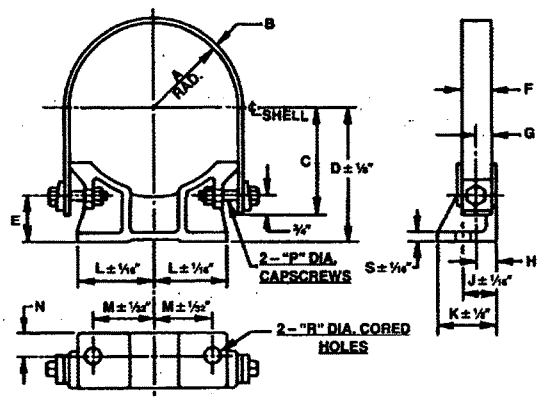


SUPPORT LEGS

Heat Transfer Products

JOB	B & G REPRESENTATIVE
UNIT TAG NO.	ORDER NO. DATE
ENGINEER	SUBMITTED BY DATE
CONTRACTOR	APPROVED BY DATE

Strap Cradles



Materials of Construction
Base: Cast Iron
Strap: Carbon Steel

SHELL DIA.	LEG DIMENSIONS IN INCHES																PART NUMBER	APPROX. SHIP. WT. IN LBS. (PER PAIR)
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S		
4	2¼	⅛	3⅝	4½	1¾	1¼	⅝	¾	1¼	2¼	2½	1⅞	1	⅜	⅝	5/16	4-540-04-302-002	9
5	2 25/32	⅛	4⅛	5	1¾	1¼	⅝	¾	1¼	2¼	2½	1⅞	1	⅜	⅝	5/16	4-540-05-202-001	9
6	3 5/16	⅛	4½	5½	1⅞	1¼	⅝	¾	1¼	2¼	3	2⅜	1	⅜	⅝	5/16	4-540-06-302-001	10
8	4 5/16	⅛	5½	6½	1⅞	1¼	⅝	¾	1⅜	2½	3¾	3⅛	1⅛	⅜	⅝	5/16	4-540-08-302-001	16
10	5⅜	3/16	6	7½	2⅜	1½	¾	1	1⅝	3	4¾	4	1⅜	½	¾	⅜	4-540-10-302-001	22
12	6⅜	3/16	7	9	2⅞	1½	¾	1	1⅝	3	6	5	1⅜	½	¾	7/16	4-540-12-302-001	32
14	7	3/16	7½	10½	3⅞	1½	¾	1	2¾	4	5¼	3¾	1¼	½	¾	7/16	4-540-13-302-001	50

NOTE: Support legs are OPTIONAL and will be furnished only when shown as a separate item on order (give size and type).

For further information, contact ITT Bell & Gossett Heat Transfer Products, 175 Standard Parkway, Cheektowaga, NY 14227, Phone: (716) 862-4171 — Facsimile: (716) 862-4176.

ITT Bell & Gossett
ITT Fluid Technology Corporation

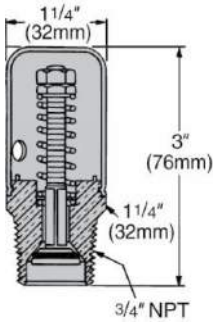
PRINTED IN U.S.A. 3-89

Vacuum Breakers

Model 62 Part No. 401446

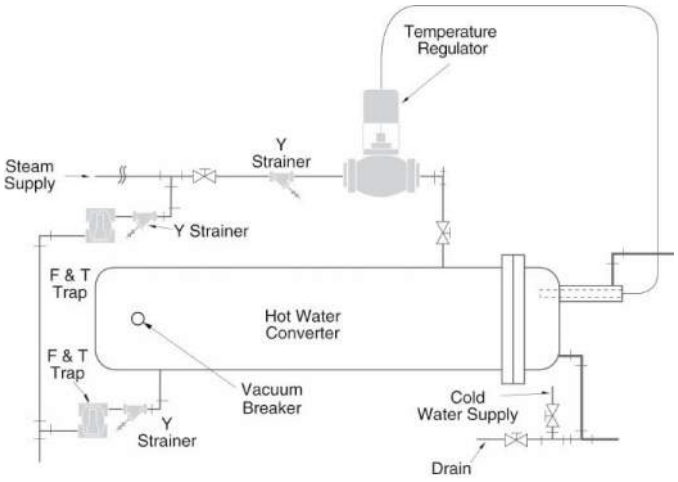
- For use on closed vessels and piping systems to control induced vacuum within safe limits
- Adjustable from ¼" - 20" (8-508mm) Hg vacuum - factory set at 2" (51mm) Hg vacuum
- ¾" NPT straight shank
- Maximum operating temperature 366°F (186°C)
- Maximum operating pressure 150 psig (10.3 bar)



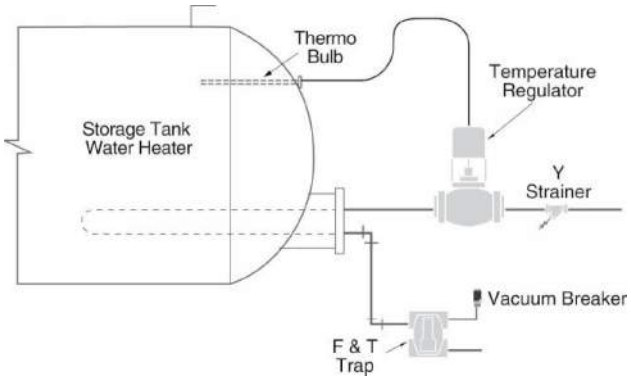


Typical Installations

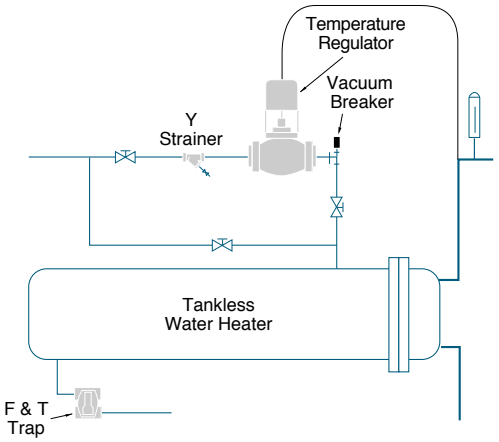
Hot Water Converter



Storage Tank Water Heater

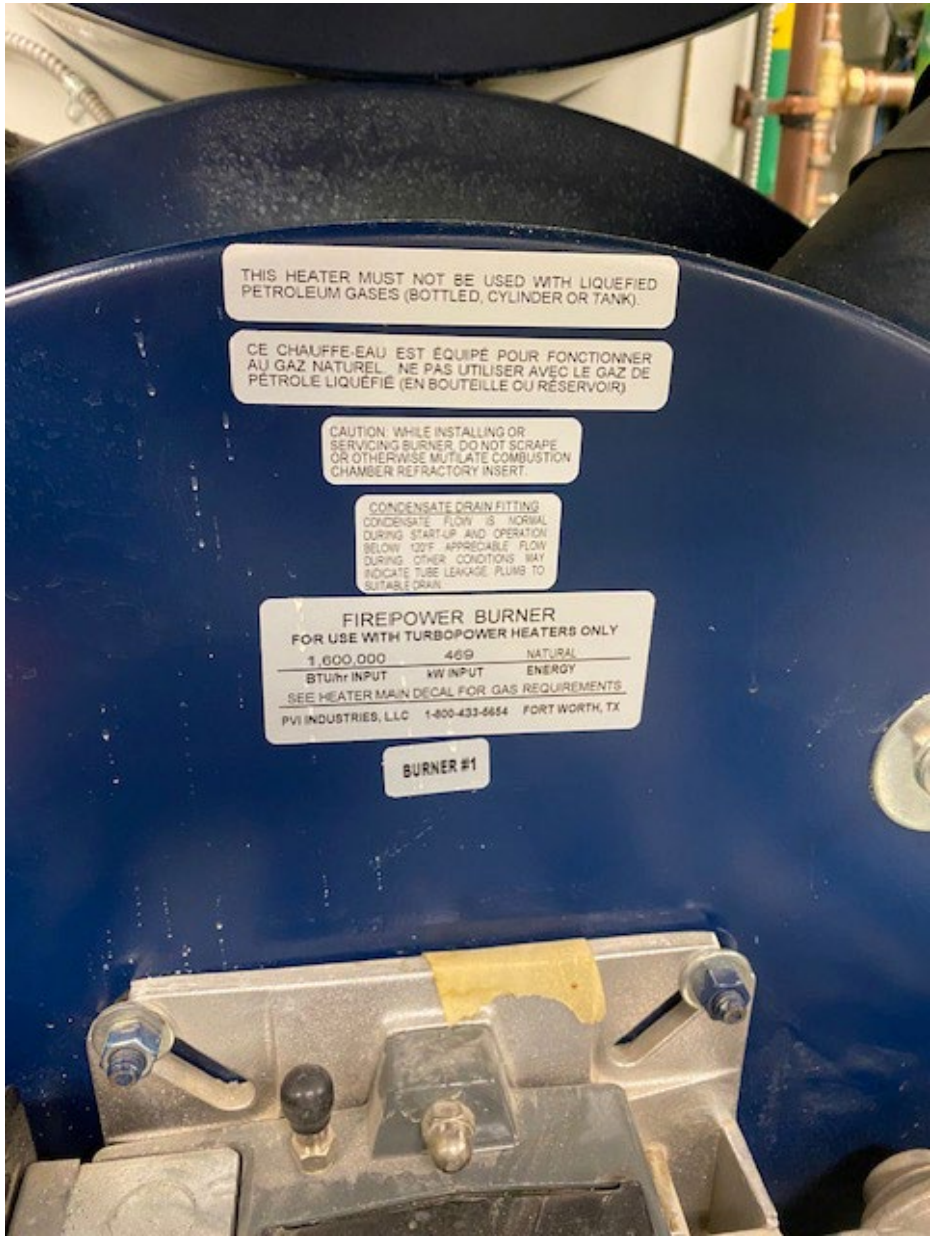


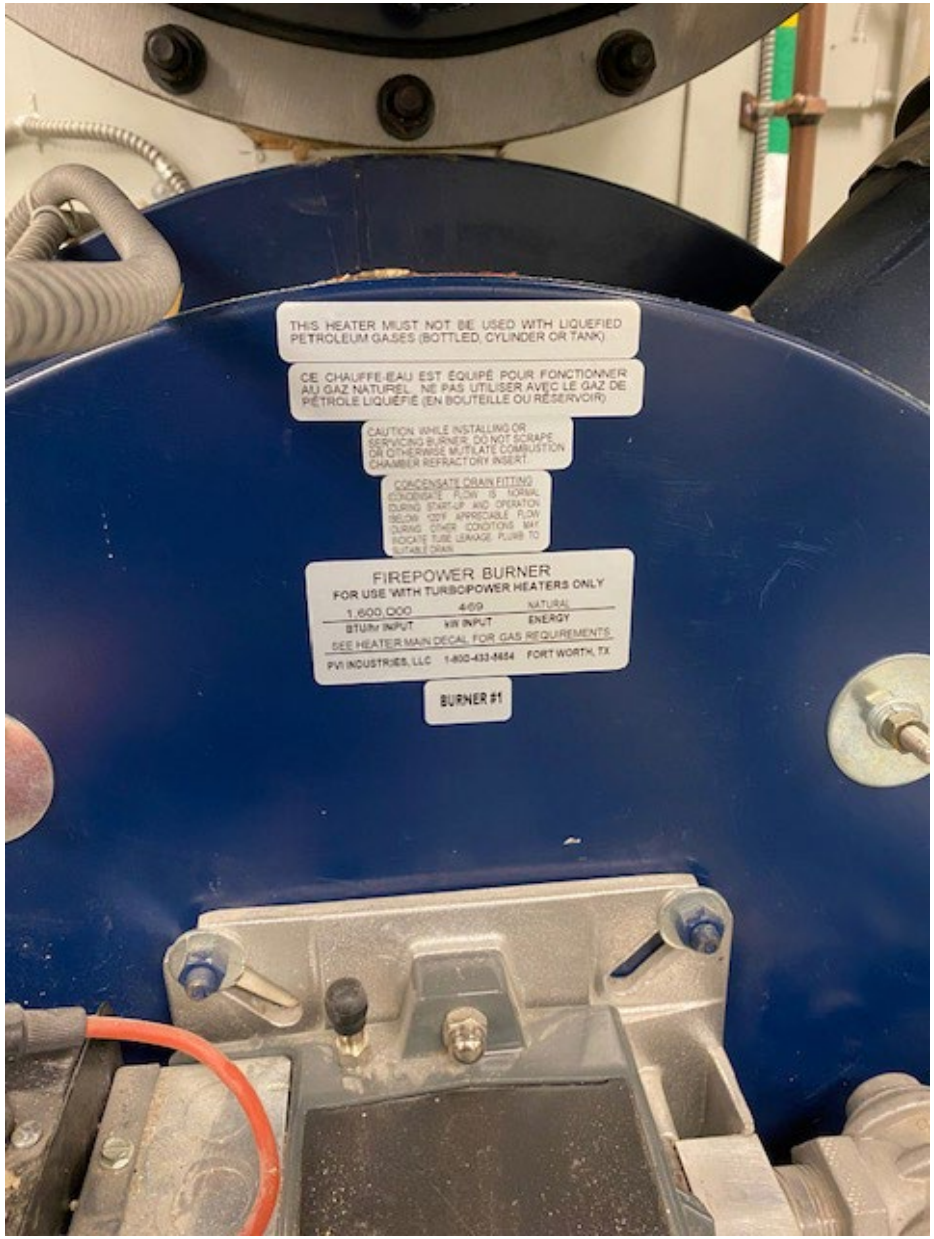
Tankless Water Heater

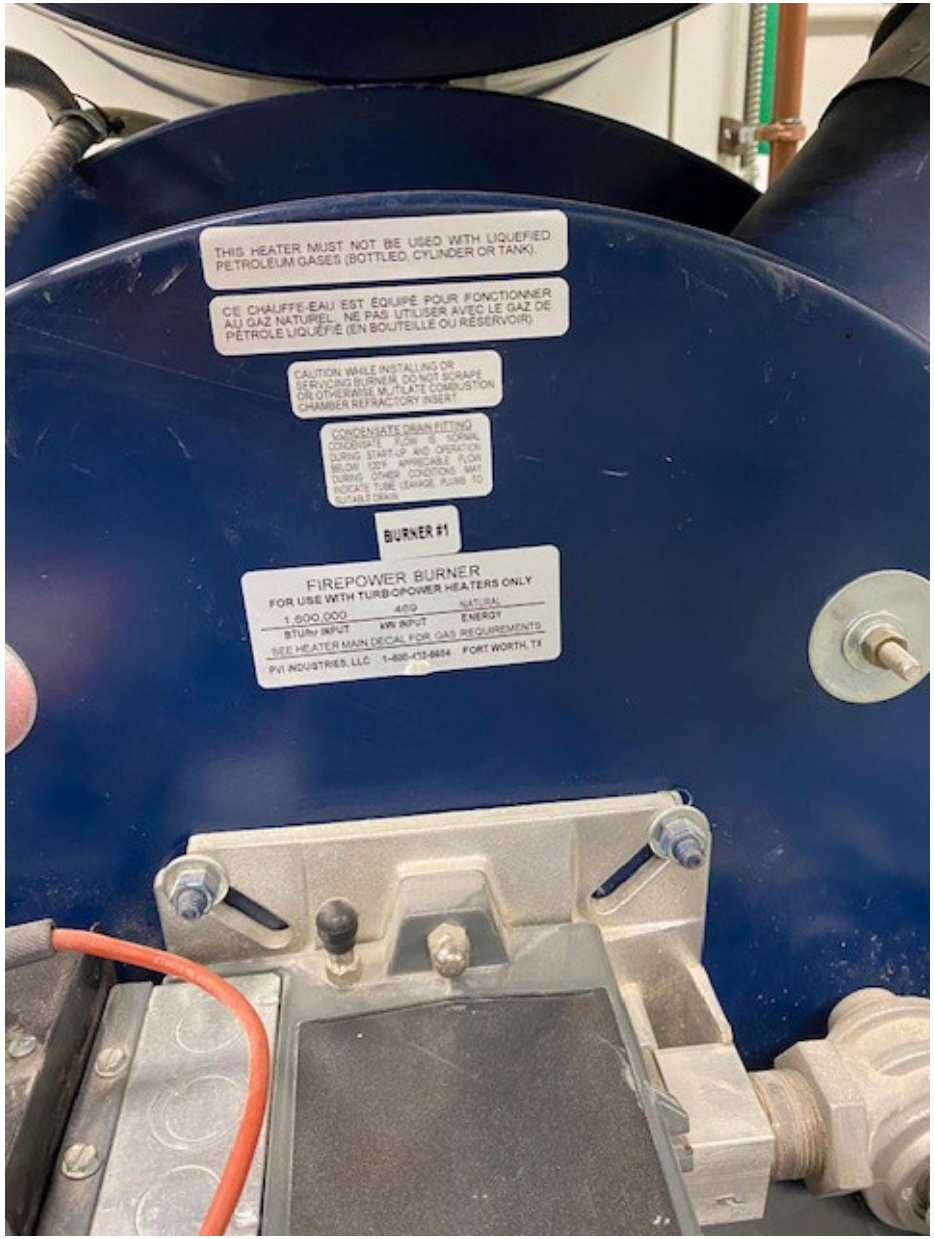


From: Smith, Andrea L.
To: Smith, Andrea L.
Subject: Training boilers
Date: Thursday, May 22, 2025 2:18:20 PM




THIS HEATER MUST NOT BE USED WITH LIQUEFIED PETROLEUM GASES (BOTTLED, CYLINDER OR TANK).
CE CHAUFFE-EAU EST ÉQUIPÉ POUR FONCTIONNER AU GAZ NATUREL. NE PAS UTILISER AVEC LE GAZ DE PÉTROLE LIQUÉFIÉ (EN BOUTEILLE OU RÉSERVOIR)
CAUTION: WHILE INSTALLING OR SERVICING BURNER, DO NOT SCRAPE OR OTHERWISE MUTILATE COMBUSTION CHAMBER REFRACTORY INSERT.
CONDENSATE DRAIN FITTING
CONDENSATE FLOW IS NORMAL DURING START-UP AND OPERATION BELOW 120°F. APPRECIABLE FLOW DURING OTHER CONDITIONS MAY INDICATE TUBE LEAKAGE. PLUMB TO SUITABLE DRAIN.
FIREPOWER BURNER
FOR USE WITH TURBOPOWER HEATERS ONLY
1,600,000 BTU/hr INPUT
469 kW INPUT
NATURAL ENERGY
SEE HEATER MAIN DECAL FOR GAS REQUIREMENTS.
PVI INDUSTRIES, LLC 1-800-433-5654 FORT WORTH, TX
BURNER #1

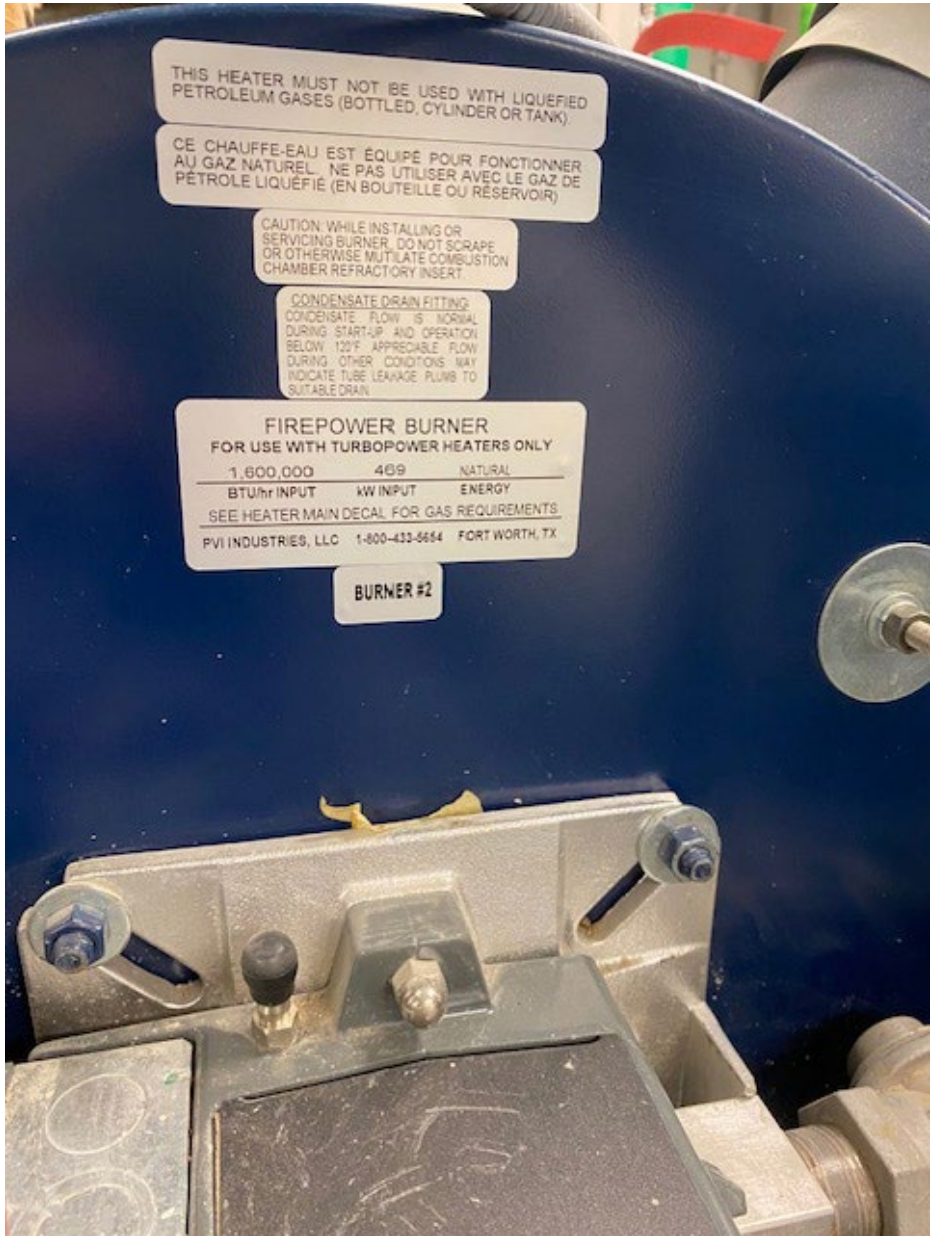

THIS HEATER MUST NOT BE USED WITH LIQUEFIED PETROLEUM GASES (BOTTLED, CYLINDER OR TANK)
CE CHAUFFE-EAU EST ÉQUIPÉ POUR FONCTIONNER AU GAZ NATUREL. NE PAS UTILISER AVEC LE GAZ DE PÉTROLE LIQUÉFIÉ (EN BOUTEILLE OU RÉSERVOIR)
CAUTION: WHILE INSTALLING OR SERVICING BURNER, DO NOT SCRAPE OR OTHERWISE MUTILATE COMBUSTION CHAMBER REFRACTORY INSERT.
CONDENSATE DRAIN FITTING
CONDENSATE FLOW IS NORMAL DURING START-UP AND OPERATION BELOW 120°F. APPRECIABLE FLOW DURING OTHER CONDITIONS MAY INDICATE TUBE LEAKAGE. PLUMB TO SUITABLE DRAIN
FIREPOWER BURNER
FOR USE WITH TURBOPOWER HEATERS ONLY
1,600,000
BTU/hr INPUT
4-6"
kW INPUT
NATURAL
ENERGY
SEE HEATER MAIN DECAL FOR GAS REQUIREMENTS.
PVI INDUSTRIES, LLC
1-800-433-6654
FORT WORTH, TX
BURNER #1


THIS HEATER MUST NOT BE USED WITH LIQUEFIED PETROLEUM GASES (BOTTLED, CYLINDER OR TANK).
CE CHAUFFE-EAU EST ÉQUIPÉ POUR FONCTIONNER AU GAZ NATURIEL. NE PAS UTILISER AVEC LE GAZ DE PÉTROLE LIQUÉFIÉ (EN BOUTEILLE OU RÉSERVOIR)
CAUTION: WHILE INSTALLING OR SERVICING BURNER, DO NOT SCRAPE OR OTHERWISE MUTILATE COMBUSTION CHAMBER REFRACTORY INSERT.
CONDENSATE DRAIN FITTING
BURNER #1
FIREPOWER BURNER
FOR USE WITH TURBOPOWER HEATERS ONLY
1,600,000
BTU/hr INPUT
469
kW INPUT
NATURAL
ENERGY
SEE HEATER MAIN DECAL FOR GAS REQUIREMENTS
PVI INDUSTRIES, LLC
1-800-433-8464
FORT WORTH, TX

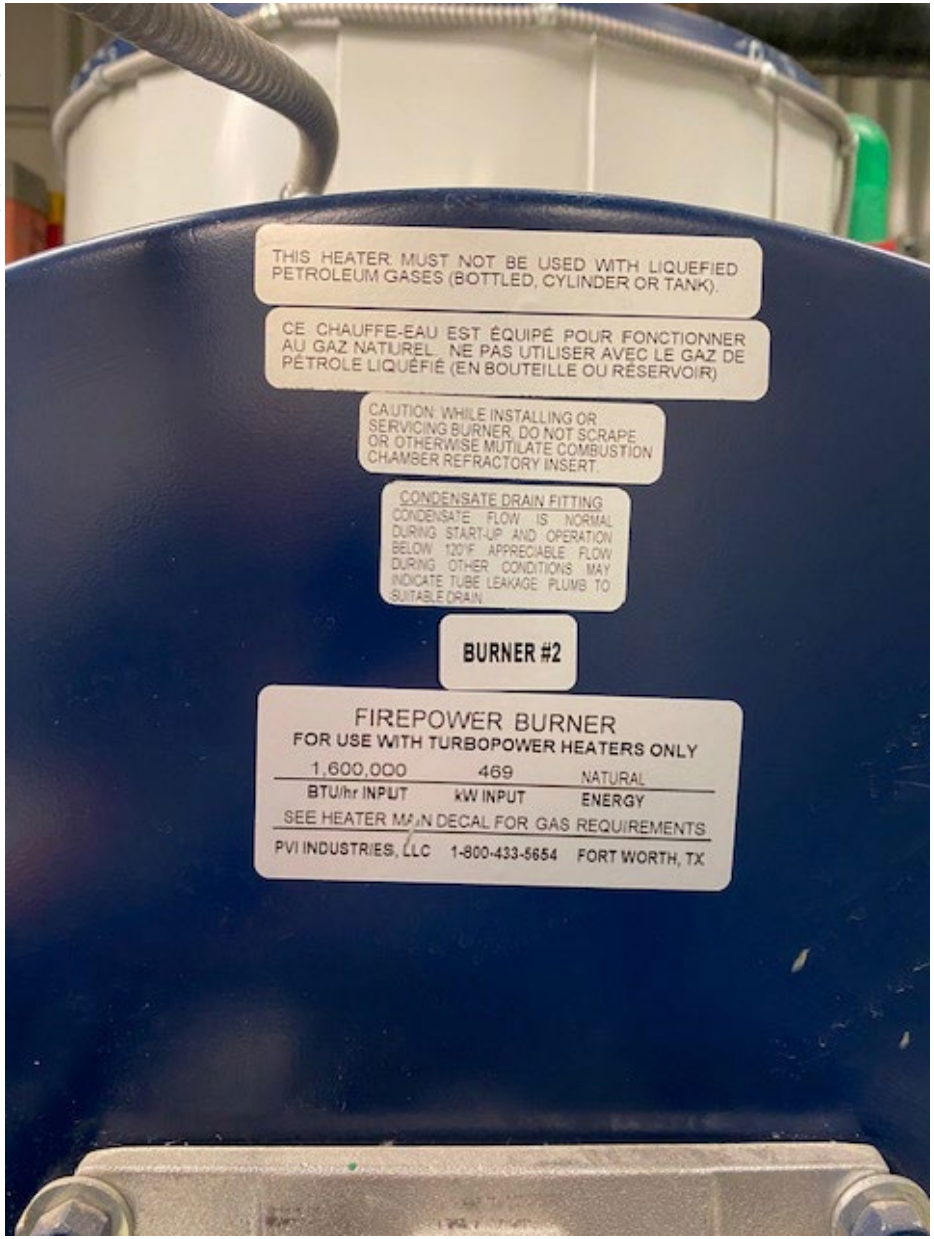

DHW-3
PG. 110.B
SPEC. 220800


EXHAUST AIR


THIS HEATER MUST NOT BE USED WITH LIQUIFIED PETROLEUM GASES (BOTTLED, CYLINDER OR TANK)
CE CHAUFFE-EAU EST EQUIPÉ POUR FONCTIONNER AU GAZ NATUREL. NE PAS UTILISER AVEC LE GAZ DE PÉTROLE LIQUÉFIÉ (EN BOUTEILLE OU RÉSERVOIR)
CAUTION: WHILE INSTALLING OR SERVICING BURNER, DO NOT SCRAPE OR OTHERWISE MUTILATE COMBUSTION CHAMBER REFRACTORY INSERT.
CONDENSATE DRAIN FITTING
FIREPOWER BURNER
FOR USE WITH TURBOPOWER HEATERS ONLY
1,600,000
BTU/hr INPUT
469
kW INPUT
NATURAL
ENERGY
SEE HEATER MAIN DECAL FOR GAS REQUIREMENTS
PVI INDUSTRIES, LLC 1-800-433-8684 FORT WORTH, TX
BURNER #2

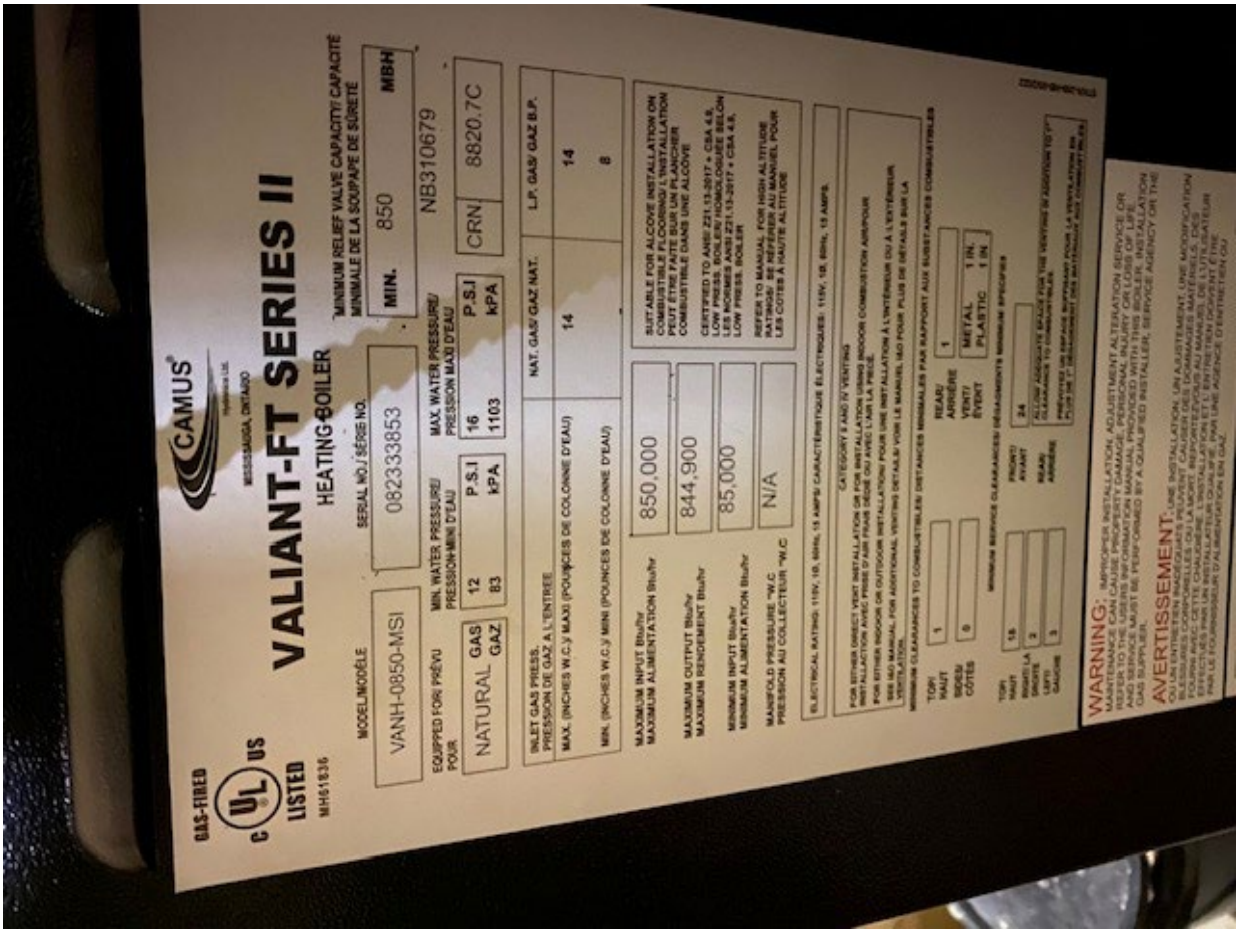

THIS HEATER MUST NOT BE USED WITH LIQUEFIED PETROLEUM GASES (BOTTLED, CYLINDER OR TANK).
CE CHAUFFE-EAU EST ÉQUIPÉ POUR FONCTIONNER AU GAZ NATUREL. NE PAS UTILISER AVEC LE GAZ DE PÉTROLE LIQUÉFIÉ (EN BOUTEILLE OU RÉSERVOIR)
CAUTION: WHILE INSTALLING OR SERVICING BURNER, DO NOT SCRAPE OR OTHERWISE MUTILATE COMBUSTION CHAMBER REFRACTORY INSERT.
CONDENSATE DRAIN FITTING:
CONDENSATE FLOW IS NORMAL DURING START-UP AND OPERATION BELOW 120°F. APPRECIABLE FLOW DURING OTHER CONDITIONS MAY INDICATE TUBE LEAKAGE. PLUMB TO SUITABLE DRAIN.
FIREPOWER BURNER
FOR USE WITH TURBOPOWER HEATERS ONLY
1,600,000 BTU/hr INPUT
469 kW INPUT
NATURAL ENERGY
SEE HEATER MAIN DECAL FOR GAS REQUIREMENTS
PVI INDUSTRIES, LLC 1-800-433-5654 FORT WORTH, TX
BURNER #2

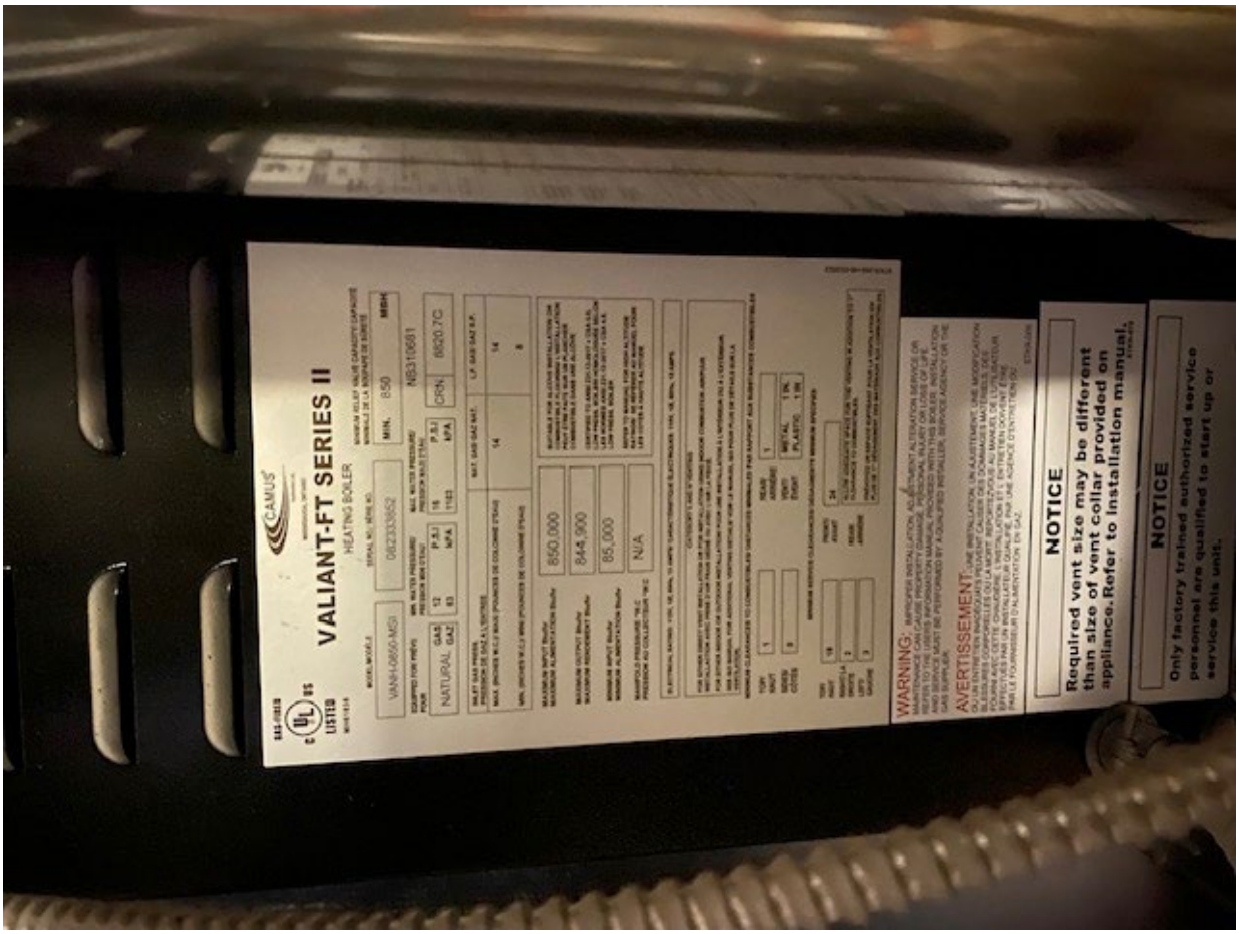
Sent from my iPhone



From: Andrea Smith
To: Smith, Andrea L.
Subject: Bosworth Boilers
Date: Friday, May 16, 2025 9:02:47 AM

CAUTION: External Sender





Sent from my iPhone

SUBMITTAL SHEET

Messer Construction Co.

Job: University of Kentucky Educe Lab Renovation Project
Address: 1020 Export St, Lexington, KY 40504

Submittal: 382
Spec Section: 235239
Spec Sub Section: 1.3-A,1.4-B&E,1.8-A
Revision:
Package: Plumbing & HVAC
Sent Date: 2/24/23

Title: 382-235239-1.3-A,1.4-B&E,1.8-A- Fire-Tube Boilers PD, Installation, and Warranty
Description: Fire-Tube Boilers PD, Installation, and Warranty
Type: Product Data, Installation Instructions, Warranty
Status: For Review
Due Date: 3/3/23

Messer Construction:
Name: Ted MacDonald

Messer's Stamp

For Review
02/24/2023 1:29:27 PM

Architect:
Name: Elisabeth Hunt
Company: Lord Aeck Sargent

Architect's Stamp

REVIEWED X FURNISH AS CORRECTED

REJECTED REVISE AND RESUBMIT

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Any action shown is subject to the requirements of the drawings and specification. Contractor is responsible for : Quantities, dimensions which shall be confirmed and correlated at the job site, and fabrication processes and techniques of construction.

KFI ENGINEERS

BY

DATE: February 26, 2023

Comment: Messer has no comments upon review. The proposed equipment seems to be from Basis of Design.

INDUSTRIAL

Submittal Data

Action: Approved as Corrected

Reviewed for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents, and with action taken noted below.
Architect's review is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Contractor remains responsible for determining and verifying materials, field measurements and field construction criteria related thereto, and checking and coordinating the information contained within the submittal with the requirements of the Work and of the Contract Documents.

DATE RECEIVED	2/24/2023
DATE REVIEWED	2/28/2023
BY	Taylor Stephens
LAS PROJECT NO.	11934-00
SUBMITTAL NO.	23 52 39-001

LORD AECK SARGENT

Project: UK Educe Lab Renovation

Bid Category: Mechanical

Project Number: 23C-007

Construction Manager: Messer Construction

Spec Section: 23-52-39

Submittal For: Fulton Boilers

Supplier: Blackmore and Glunt

Contact Name: Adam Berning

The attached submittal data has been reviewed by C&C Industrial for compliance with the specifications and plan schedule for this project.

In order to maintain the project schedule, we request that this submittal be returned to C&C Industrial within **7 days.**

NOTES:

Submittal #010

This submittal includes specifications for the Fire-Tube Fulton Boilers, Tag #'s B-1A & B-1B.

_____x__ Reviewed

_____ Drawing

_____ Rejected

02/13/2023 Date

Reviewed BY: Denver Calhoun/PM

C&C Industrial

Qty	Description & Tag
	Hydronic Equipment
	Tag: PU-1A & 1B
2	B&G In-Line Pump, Series e-80, Model 3 x 3 x 7C, SS Fitted, 6.625" Impeller, Standard Seal, 3 HP, 1800 RPM, 230/460/3/60, ODP, Premium Efficient Motor. Capacity: 132 GPM at 40 ft. 3" Flanged Connections.
2	Metraflex LPD0400, Low Pressure Drop Y-Strainer, 4" Flanged.
2	B&G ED-3X Suction Diffuser Plus, 4" x 3" Flanged.
2	B&G CB-4 Circuit Setter Balance Valve, 4" Flanged.
2	Metraflex Model 904 Ductile Iron Globe Style Silent Check, 4" Flanged.
2	Flow Conditioning Hydronic Indicator System-4 Port Trumpet Valve
	Tag: PU-2
1	B&G In-Line Pump Series e-60, Model 2 x 6.25, Bronze Fitted, 5.5" Impeller, Standard Seal, 1 HP, 1800 RPM, 208-230/460/3/60, ODP, Standard Efficient, Motor. 2" Companion Flanges. Capacity: 70.2 GPM at 25 ft.
	Tag: AS-1
1	B&G RL-4F Rolairtrol ASME Air Separator, 4" Flanged.
1	B&G #107A High Capacity Air Vent.
	Tag: ET-1
1	Wessels Model NLA-HP 130, Bladder Type Expansion Tank, ASME.
1	B&G #87 Automatic Air Vent.
	Tag: B-1A & 1B
2	Fulton Model EDR-1000, Natural Gas Fired, Modulating and Condensing Boiler. Rated for 1,000 MBH Input, Duplex SS alloy heat exchanger, 11:1 turndown, PURE Technology O2 Compensation. Requires 4 – 28" w.c. gas pressure and 115/1/60 power. Includes Standard CSD-1 Gas Train and LWCO. Relief Valve set to 100 psi. Includes BACnet communication gateway and condensate neutralizers, loose.

Job Name: **UK Educe Lab**
Engineer: **KFI Engineers**
Contractor: **C & C Industrial**

blackmore and glunt, inc.

11435 Williamson Rd. **Cincinnati, OH 45241** **PH: 513.489.5225**

Prepared By: Adam Berning **Date: February 10, 2023**

Tag: Chemical Pot Feeder

1 Neptune DBF-5HP Chemical Pot Feeder, 5 Gallon.

Plumbing Equipment

Tag: DWRP-1

1 B&G Series PL 36B Pump, All Bronze, with 1/6 HP, 115/1/60 Motor.
Includes Companion Flanges.

Tag: ET-1

1 Wessels Model TTA 12 Diaphragm Type Expansion Tank, Rated for Potable Water, ASME.

Job Name: **UK Educe Lab**
Engineer: **KFI Engineers**
Contractor: **C & C Industrial**

blackmore and glunt, inc.

11435 Williamson Rd. **Cincinnati, OH 45241** **PH: 513.489.5225**

Prepared By: Adam Berning **Date: February 10, 2023**

Fulton®

ENDURA®

Ultra-High Efficiency Condensing Boilers

750,000 – 2 Million BTU/HR



- Duplex Stainless Heat Exchanger
- Flame-by-Wire™ Combustion
- Real-Time O_2 Compensation™

LIFETIME
THERMAL SHOCK WARRANTY

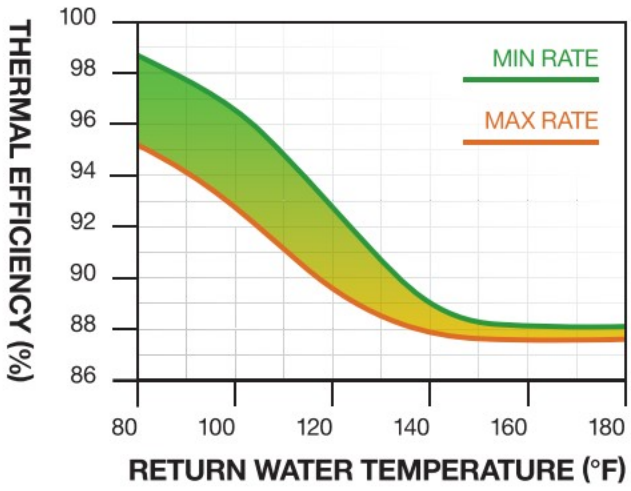
Low NOx CERTIFIED

GREATER THAN THE SUM OF ITS PARTS

ENDURA® condensing boilers provide quiet and reliable operation in a compact firetube platform with efficiencies up to 99%. The highly engineered construction is built to last with thicker, higher-strength materials, and a premium fit and finish reflecting Fulton's paramount quality.



- **Flame-by-Wire™ Combustion Control**
- **Up to 15:1 Turndown Burner**
- **Feed Forward O_2 Compensation™**
- **Low NOx Emissions of <20 ppm**
- **Lower Cost of Ownership**



COMPLEXITY SIMPLIFIED

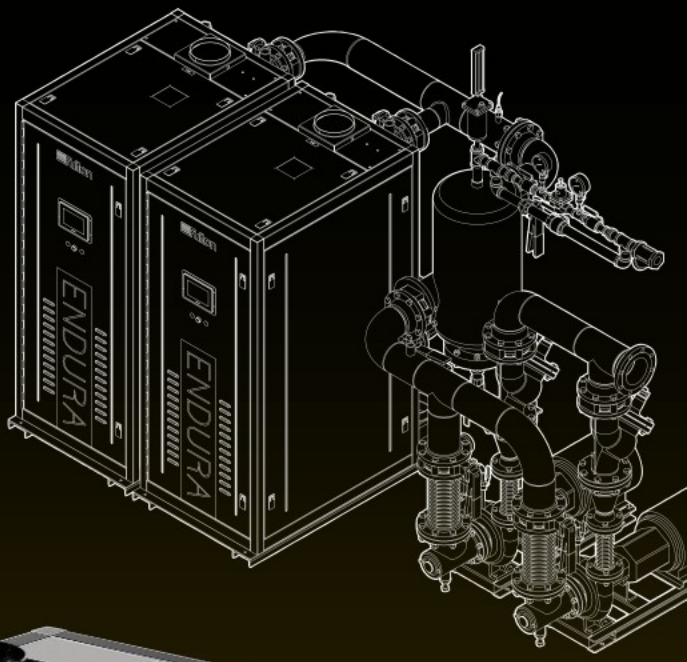
PURE Control™ provides rapid access to operating details and configuration. It efficiently sequences up to 10 boilers and eliminates the need for a master boiler or standalone panel. When a boiler is powered off, the plant seamlessly transitions to the next available stage for reliable heat you can count on.

- **Outdoor Reset with Setback Mode**
- **Motorized Isolation Valve Control**
- **Variable Speed Pump Control**
- **Saves Energy by Reducing Cycling**
- **Modbus / BACnet Configurable**



DESIGNED FOR VARIABLE PRIMARY FLOW

Variable primary flow is a simplified piping method which enhances temperature control, reduces design complexity, and maximizes efficiencies by delivering the lowest temperature water directly to the boiler with no blending.



- **No Dedicated Circulator Pump**
- **Reduced Installation Cost**
- **Smaller Plant Footprints**

BETTER BY DESIGN

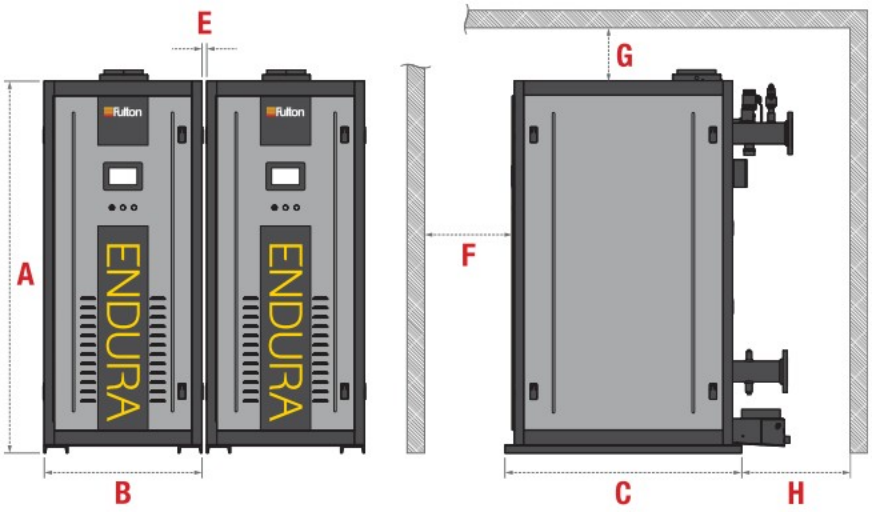
Proven as the premier choice for long-lasting rugged construction, Fulton's 3-pass design architecture has been the industry's trusted condensing boiler for more than 30 years.



- Duplex stainless steel heat exchanger features 160% greater yield strength and a 22% reduction in thermal expansion compared to conventional 316L used by the competition.
- High-mass and high volume firetube design operates with lower stresses and therefore greater durability.
- Exceptionally tolerant of varying and sometimes unpredictable system flow rates; will not be harmed by a zero flow condition.

SPECIFICATIONS & DIMENSIONS

MODEL		EDR-750	EDR-1000	EDR-1500	EDR-2000
SPECIFICATIONS					
Input Capacity	MBH	750	1,000	1,500	2,000
Water Content	GAL	50	50	104	102
Pressure Drop at 20°F ΔT	PSI	0.5	0.7	0.8	1.5
Operating Weight	LBS	1,848	1,848	3,128	3,210
AHRI Thermal Efficiency	%	97.1	95.3	93.5	93.7
Turndown Ratio		8:1	11:1	11:1	15:1
DIMENSIONS					
(A) Height	IN	67.9	67.9	80.25	80.25
(B) Width	IN	28	28	34	34
(C) Depth	IN	42	42	50.8	50.8
CLEARANCES					
(E) Sides	IN	1	1	1	1
(F) Front	IN	36	36	36	36
(G) Top	IN	18	18	18	18
(H) Rear	IN	24	24	24	24





NOTE: Specifications and dimensions are approximate and for reference only. Fulton practices continuous product improvement and reserves the right to change data without notice.

Reliability & Lower Emissions

Flame-by-Wire™ combustion technology replaces the use of conventional "neg-reg" and mechanical linkages with a modern system of independent electronic air and gas valves. It is easier to service and tune by empowering technicians to dial in air-fuel ratios with surgical precision.

Space-Saving Design

A compact footprint allows ENDURA boilers to fit through a standard door and requires only one-inch of side clearance between boilers, freeing up valuable mechanical room space.

Easy to Install and Maintain

ENDURA's latched cabinet panels detach in seconds, providing easy access for commissioning and maintenance. Complete boiler service can be performed through the front, top, and rear.

Fulton®

Low NOx CERTIFIED Intertek ASME AHRI CERTIFIED® www.ahridirectory.org

Call: (315) 298-5121

972 Centerville Road
Pulaski, NY 13142

www.fulton.com/endura

TECHNICAL DATA SHEET

ENDURA (EDR) SERIES:
EDR-750, EDR-1000, EDR-1500, EDR-2000

750,000 to 2,000,000 BTU/HR:
Duplex Stainless Steel Firetube Condensing Boilers



Fulton's Endura (EDR) line of condensing boilers are a durable three-pass firetube derived from a rugged pressure vessel architecture with over thirty years of proven performance. The packaged boiler features an ultra-compact footprint that fits through a standard doorway, reliable quiet operation, access panels which detach in seconds, and simplified service & maintenance. The highly-engineered robust construction is built to last with thicker, higher-strength materials, and a premium fit and finish reflecting Fulton's paramount quality. The high-turndown combustion technology utilizes the surgical precision of independent air and gas servo motors and continuously tunes the air/fuel ratio for ideal excess O_2 levels to automatically adjust for seasonality. This maximizes condensing potential, and outperforms all conventional platforms in durability, reliability and repeatability.

STANDARD FEATURES:

- Factory Packaged and Test Fired Boiler Assembly
- Duplex Stainless Steel Firetube Heat Exchanger
- Fully Condensing Ultra-High Efficiency Operation
- Designed for Variable Primary Flow Arrangements
- Fully Modulating Burner; Up to 15:1 Turndown
- Low NOx Emissions <20 ppm
- Flame-by-Wire™ Combustion Control; ± 0.2° Precision
- Real-Time O_2 Compensation™; Feed Forward
- Variable Speed Combustion Blower
- Direct Spark Ignition System
- 160 PSIG Maximum Allowable Working Pressure
- 210°F Maximum Allowable Working Temperature
- Factory Recommended Maximum Setpoint 190°F
- Operating and High Limit Aquastats; 200°F Setting
- Low Water Cut Off Probe with Manual Reset
- 50 Micron Combustion Air Intake Filter
- Air and Blocked Flue Switches
- Ventless Gas Train
- Low and High Gas Pressure Switches
- Emergency Stop (E-Stop) Contact

PURE CONTROL™ CAPABILITIES: v1.0.0.0+

- 7-inch Color Touchscreen Display
- Integrated Lead-Lag of 2 to 10 Boilers
- Universal Data over Ethernet/IP; No Master Boiler Req.
- Modbus Communication Protocol
- Flue Gas Exhaust Temperature Monitoring
- Inlet and Outlet Water Temperature Sensors
- Combustion Air Temperature Sensor
- Outdoor Air Temperature Reset with Plant Cutoff
- Trending Data Logging
- Setback Modes via Internal Clock
- Accept 4-20mA or 0-10VDC Remote Setpoint Signal
- Two Safety Interlock Contacts for External Device(s)
- Monitoring Contacts (Status, Demand, Alarm)
- Remote Boiler Enable Contact
- Motorized Isolation Valve Control
- Variable Speed Secondary Pump Control (2 Pumps)
- Automatic Rotation of Secondary Pumps
- Variable Speed Primary Pump Control
- Domestic Hot Water Priority with DHW Pump Start/Stop
- Two-Stage Freeze Protection

PROJECT DETAILS:

Project Name	UK Educe Lab Renovation
Date Submitted	2/10/23
Fulton Representative	Blackmore & Glunt

City, State (Province)	Lexington, KY
Engineer of Record	KFI Engineers
Contractor	C & C Industrial

LISTINGS & COMPLIANCE:

- ASME Section IV, "H" Stamp
- ETL Listed to UL-795
- CSD-1 and CSA Controls and Fuel Train
- AXA XL Compliant; Supersedes IRI
- AHRI Certified to BTS-2000
- FM Compliant Fuel Train Components
- SCAQMD Certified; TCEQ Compliant

TRIM KIT ITEMS:

- ASME Safety Relief Valve ☐60, ☐100, ☐125, or ☐160 PSIG
- Pressure & Temperature Gauge
- Installation, Operation and Maintenance Manual

OPTIONAL ACCESSORIES: PARTS SHIP LOOSE FOR FIELD INSTALLATION

- ☑ BACnet Protonode with Remote Cloud Access *2-45-001058-30*
- ☐ Lead/Lag IP Switch (8 Port, 120VAC) *2-45-315010*
- ☐ Lead/Lag IP Switch (5 Port, DIN Mount, 24VDC) *2-45-315044-31*
- ☐ Second (Auxiliary) Low Water Cut Off Kit *4-30-000330*
- ☐ Multiple Boiler Condensate Drain Trap (12MM Max) *4-57-000440*
- ☐ Individual Boiler Condensate Drain Trap (4MM Max) *4-57-005500*
- ☐ pH Neutralization Kit (12MM Max) *4-50-000008*
- ☐ PVC/CPVC Flue Gas Exhaust Kit for EDR-750/1000/1500 *4-50-071005*
- ☐ PVC/CPVC Flue Gas Exhaust Kit for EDR-2000 *4-50-072005*
- ☐ 2-Inch Ball Valve with 120VAC 2-Position Actuator *2-30-001382*
- ☐ 4-Inch Butterfly Valve with 120VAC 2-Position Actuator *2-30-001385*
- ☑ Supply Header Temperature Sensor *4-30-000510*
- ☑ Outdoor Air Temperature Sensor Kit *4-30-000500*
- ☐ Domestic Hot Water Temperature Sensor *4-30-315300*
- ☑ Spare Combustion Air Filter for 750/1000 *2-30-071039*
- ☐ Spare Combustion Air Filter for 1500/2000 *2-30-000739*
- ☐ Outdoor Installation Kit for EDR-750/1000 *4-50-001910-37*
- ☐ Outdoor Installation Kit for EDR-1500/2000 *4-50-001909-37*
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

CONFIRM ISOLATION VALVES ARE NOT REQUIRED FOR MULTIPLE BOILER OPERATION

NOTE:
Information provided in this document is based on standard boiler configurations only. Alternate or custom configurations may result in deviations.

CAPACITIES: STANDARD NATURAL GAS; REFER TO ENGINEERING DATA FOR CAPACITY AT HIGH ELEVATION

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Rated Input at High Fire	**BTU/hr**	**750,000**	**1,000,000**	**1,500,000**	**2,000,000**
	kW	*220*	*293*	*440*	*586*
Minimum Input at Low Fire	**BTU/hr**	**90,000**	**90,000**	**133,000**	**133,000**
	kW	*26*	*26*	*39*	*39*
Rated Output (BTS-2000)	**BTU/hr**	**728,250**	**953,000**	**1,402,500**	**1,874,000**
	Boiler HP	21.8	28.5	41.9	56.0
	kW	*213*	*279*	*411*	*549*
Thermal Efficiency (BTS-2000)	**%**	**97.1**	**95.3**	**93.5**	**93.7**
Burner Turndown	**-**	**8:1**	**11:1**	**11:1**	**15:1**

CONNECTION SIZES:

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Boiler Supply Water Outlet	**inches**	**2**	**2**	**4**	**4**
	mm	*51*	*51*	*102*	*102*
Boiler Return Water Inlet	**inches**	**2**	**2**	**4**	**4**
	mm	*51*	*51*	*102*	*102*
Flue Gas Condensate Drain (NPT)	**inches**	**1**	**1**	**1**	**1**
	mm	*25*	*25*	*25*	*25*
Boiler Pressure Vessel Drain (NPT)	**inches**	**1**	**1**	**3/4**	**3/4**
	mm	*25*	*25*	*19*	*19*
Natural Gas Train Inlet (NPT)	**inches**	**1**	**1**	**1-1/2**	**1-1/2**
	mm	*25*	*25*	*38*	*38*
Combustion Air Inlet (ID) *(Adapter Required)*	**inches**	**6**	**6**	**8**	**8**
	mm	*152*	*152*	*203*	*203*
Minimum Flue Gas Exhaust Vent (ID) *(Adapter Required)*	**inches**	**6**	**6**	**6**	**8**
	mm	*152*	*152*	*152*	*203*
Boiler Exhaust Outlet (ID)	**inches**	**6**	**6**	**6**	**8**
	mm	*152*	*152*	*152*	*203*
Boiler Exhaust Outlet (OD)	**inches**	**6-1/4**	**6-1/4**	**6-1/4**	**8-1/4**
	mm	*159*	*159*	*159*	*210*

NOTE:

- EDR-750 and EDR-1000 water connections are NPT, the EDR-1500 and EDR-2000 are ANSI 150# FLG.

FUEL REQUIREMENTS: STANDARD NATURAL GAS AT 1,020 BTU/SCF (9,082 KCAL/M³)

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Fuel Usage at Rated Input	**SCFH**	**735**	**980**	**1,471**	**1,961**
	m³/hr	*20.8*	*27.8*	*41.7*	*55.5*
Minimum Gas Pressure *(Req. at High Fire)*	**in W.C.**	**4**	**4**	**4**	**4**
	kPa	*1*	*1*	*1*	*1*
Maximum Gas Pressure	**in W.C.**	**28**	**28**	**28**	**28**
	kPa	*7*	*7*	*7*	*7*

NOTE:
- Canada only: 14 in W.C. maximum gas pressure.

FUEL REQUIREMENTS: STANDARD HD5 PROPANE AT 2,500 BTU/SCF (22,260 KCAL/M³)

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Fuel Usage at Rated Input	**SCFH**	**300**	**400**	**600**	**800**
	m³/hr	*8.5*	*11.3*	*17.0*	*22.7*
Minimum Gas Pressure *(Req. at High Fire)*	**in W.C.**	**7**	**7**	**7**	**7**
	kPa	*1.74*	*1.74*	*1.74*	*1.74*
Maximum Gas Pressure	**in W.C.**	**14**	**14**	**14**	**14**
	kPa	*3.5*	*3.5*	*3.5*	*3.5*

NOTES:
- Endura boilers are factory tested on Natural Gas. Field conversion to Propane during commissioning is required by an authorized service technician.
- Maximum burner turndown ratio up to 4:1 when operating on Propane.
- Model EDR-1500 is not available for propane operation, a derated EDR-2000 is available for these applications with up to 3:1 burner turndown.
- Propane-fired operation is suitable for use with HD5 grade Liquid Petroleum Gases conforming to ASTM D1835-82 only.

ELECTRICAL REQUIREMENTS: APPLIES TO <20 PPM NOx STANDARD BLOWER AND CONTROLS

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Electrical Supply	**Volts**	**120**	**120**	**120**	**120**
	ø	1	1	1	1
	Hz	*60*	*60*	*60*	*60*
Full Load Amps (FLA)	**Amps**	**10**	**10**	**20**	**20**
Minimum Current Ampacity (MCA)	**Amps**	**12.5**	**12.5**	**25**	**25**
SCCR	**Amps**	**5,000**	**5,000**	**5,000**	**5,000**

NOTES:
- Voltages under specification may result in increased amperage and burner de-rate.
- Provide separate power supplies for external devices. Do not power external devices through the boiler control circuits.

WATER AND FLOW REQUIREMENTS: SPECIFICATIONS APPLY TO 100% WATER SYSTEMS; SEE IOM FOR GLYCOL SYSTEMS

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Typical Flow Rate at Rated Output 20°F ΔT	**GPM**	**73**	**95**	**140**	**187**
	LPM	*276*	*360*	*530*	*708*
Typical Flow Rate at Rated Output 40°F ΔT	**GPM**	**37**	**48**	**70**	**94**
	LPM	*138*	*180*	*265*	*354*
Water Pressure Drop at Rated Output 20°F ΔT	**PSI**	**0.5**	**0.7**	**0.8**	**1.5**
	kPa	*3.5*	*4.8*	*5.5*	*10.3*
Water Pressure Drop at Rated Output 40°F ΔT	**PSI**	**0.1**	**0.2**	**0.2**	**0.4**
	kPa	*0.7*	*1.4*	*1.4*	*2.6*
Maximum ΔT Capable	**°F**	**100**	**100**	**100**	**100**
	°C	*55.5*	*55.5*	*55.5*	*55.5*
Minimum Flow Rate	**GPM**	**N/A**	**N/A**	**N/A**	**N/A**
	LPM				
Maximum Flow Rate	**GPM**	**N/A**	**N/A**	**N/A**	**N/A**
	LPM				

COORDINATE WITH CONTROLS CONTRACTOR FOR 3-WAY VALVES TO PROVIDE 10 GPM MIN FLOW (TO PREVENT NUISANCE TRIPS)

NOTES:

- No minimum flow requirement means a low or zero flow situation will not cause harm to the heat exchanger.
- The system will require proper design flow for the given conditions to heat the building and prevent nuisance high limit manual reset lockouts at the boiler.
- Flow rates will vary for glycol systems. Review Engineering Guide for details.
- Refer to the Installation, Operation, and Maintenance Manual for the water pressure drop at flow rates not listed above.

WEIGHTS AND VOLUMES:

	Endura Model	EDR-750	EDR-1000	EDR-1500	EDR-2000
Dry Weight	**lbs**	**1,430**	**1,430**	**2,260**	**2,360**
	kg	*649*	*649*	*1,025*	*1,070*
Operating Weight	**lbs**	**1,848**	**1,848**	**3,128**	**3,210**
	kg	*838*	*838*	*1,419*	*1,456*
Approximate Shipping Weight	**lbs**	**1,660**	**1,660**	**2,600**	**2,700**
	kg	*753*	*753*	*1,179*	*1,225*
Pressure Vessel Water Volume	**Gallons**	**50**	**50**	**104**	**102**
	Liters	*189*	*189*	*394*	*386*

VENTING REQUIREMENTS:

Endura Model		EDR-750	EDR-1000	EDR-1500	EDR-2000
Combustion Air Intake Flow Rate	**SCFM**	**153**	**203**	**305**	**407**
Flue Gas Exhaust Flow Rate	**SCFM**	**165**	**220**	**330**	**440**
	ACFM	*203*	*271*	*407*	*543*
Minimum Allowable Draft Pressure	**in W.C.**	**-0.04**	**-0.04**	**-0.04**	**-0.04**
	kPa	*-0.01*	*-0.01*	*-0.01*	*-0.01*
Maximum Allowable Draft Pressure	**in W.C.**	**+1.50**	**+1.50**	**+1.50**	**+1.50**
	kPa	*+0.374*	*+0.374*	*+0.374*	*+0.374*

NOTES:
- Maximum draft pressure is the total sum of the venting system and is inclusive of both the flue gas vent and combustion air intake pressure losses.
- Refer to the Installation, Operation, and Maintenance Manual for complete venting guidelines including certifications, materials, common venting requirements.

EMISSIONS: STANDARD NATURAL GAS AT 1,020 BTU/SCF (9,082 KCAL/M³)

Endura Model		EDR-750	EDR-1000	EDR-1500	EDR-2000
NOx	**ppm**	**< 20**	**< 20**	**< 20**	**< 20**
CO_2	**%**	**8 to 10**	**8 to 10**	**8 to 10**	**8 to 10**
CO	**ppm**	**< 50**	**< 50**	**< 50**	**< 50**
	lbs/hr	0.0268	0.0358	0.0536	0.0715
	g/hr	*12.2*	*16.2*	*24.3*	*32.4*
SOx	**lbs/hr**	**0.0004**	**0.0006**	**0.0009**	**0.0012**
	g/hr	*0.2*	*0.3*	*0.4*	*0.54*
Total Particulates (PM)	**lbs/hr**	**0.0056**	**0.0075**	**0.0112**	**0.0149**
	g/hr	*2.5*	*3.4*	*5.08*	*6.76*
Total Organics (TOC)	**lbs/hr**	**0.0081**	**0.0108**	**0.0162**	**0.0216**
	g/hr	*3.7*	*4.90*	*7.35*	*9.80*
Lead	**lbs/hr**	**4×10^{-7}**	**5×10^{-7}**	**7×10^{-7}**	**1.0×10^{-6}**
	g/hr	*2×10^{-4}*	*2×10^{-4}*	*3×10^{-4}*	*4×10^{-4}*
Volatile Organic Compounds (VOC)	**lbs/hr**	**0.0040**	**0.0054**	**0.0081**	**0.0108**
	g/hr	*1.8*	*2.4*	*3.7*	*4.90*

NOTES:
- NOx and CO are stated at a 3% O_2 correction.
- Emissions data is typical for standard natural gas operation.
- Emissions will vary based on site specific factors and operating parameters.
- Site specific conditions and emissions requirements will determine the appropriate CO_2 settings for each application.
- VOC, SOx, PM, TOC and Lead are achieved through calculation using the AP 42 method as published by the US EPA, and are stated at rated input.
- AP 42, Fifth Edition, Vol 1, Ch 1, Table 1.4-2 determines the emissions components that cannot be measured with a combustion analyzer.
- Jacket losses: 0.2% of output at maximum capacity, IAW ASHRAE Standard 103-2007.

MINIMUM CLEARANCES:

Endura Model		EDR-750	EDR-1000	EDR-1500	EDR-2000
Front	**inches**	**36**	**36**	**36**	**36**
	mm	*914*	*914*	*914*	*914*
Rear	**inches**	**24**	**24**	**24**	**24**
	mm	*610*	*610*	*610*	*610*
Top	**inches**	**18**	**18**	**18**	**18**
	mm	*457*	*457*	*457*	*457*
Sides	**inches**	**1**	**1**	**1**	**1**
	mm	*25*	*25*	*25*	*25*

NOTE:

- Local codes may supersede Fulton clearance requirements.

DIMENSIONS:

Refer to the 7-91 type Product Data Submittal End Assembly Drawing for dimensions.

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Certificate of Product Ratings

AHRI Certified Reference Number: 7110215 Date: 2/15/2017 †Status: Active

Product: Commercial Boiler Heating Equipment
Model Number: EDR-1000
Manufacturer: FULTON HEATING SOLUTIONS
Trade/Brand name: FULTON HEATING SOLUTIONS
Series Name: ENDURA

Rated as follows in accordance with Department of Energy (DOE) Boiler test procedures as published in the latest edition of the Code of Federal Regulations, 10 CFR Part 431 and subject to verification of rating accuracy by AHRI-sponsored, independent, third party testing:

Combustion Efficiency:	93.0 %
Thermal Efficiency:	95.3 %

The following data is for reference only and is not certified by AHRI:

Material:	Stainless Steel
Location:	Indoor
Fuel Type:	Natural Gas; Propane Gas
Input:	1000 MBTUH
Gross Output:	953 MBTUH
Ignition Type:	Intermittent/Electronic Ignition
Heating Medium:	Water
Draft Type:	Forced Draft
CO2:	10.0

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* Ratings followed by an asterisk (*) indicate a voluntary rerate of previously published data, unless accompanied with a WAS, which indicates an involuntary rerate.

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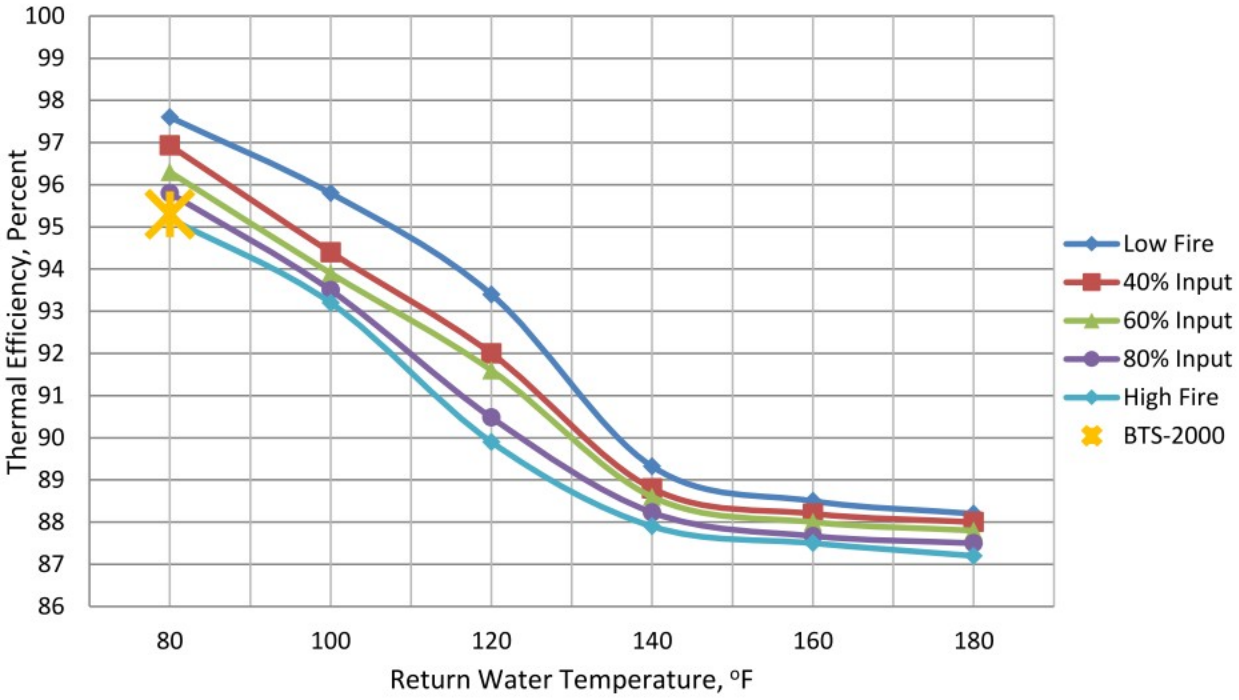
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CERTIFICATE NO.: 131316466161748000

PERFORMANCE DATA

SUBJECT:	ENDURA (EDR) SERIES:	DATE:
Thermal Efficiency Curve	EDR-1000	October 20, 2021



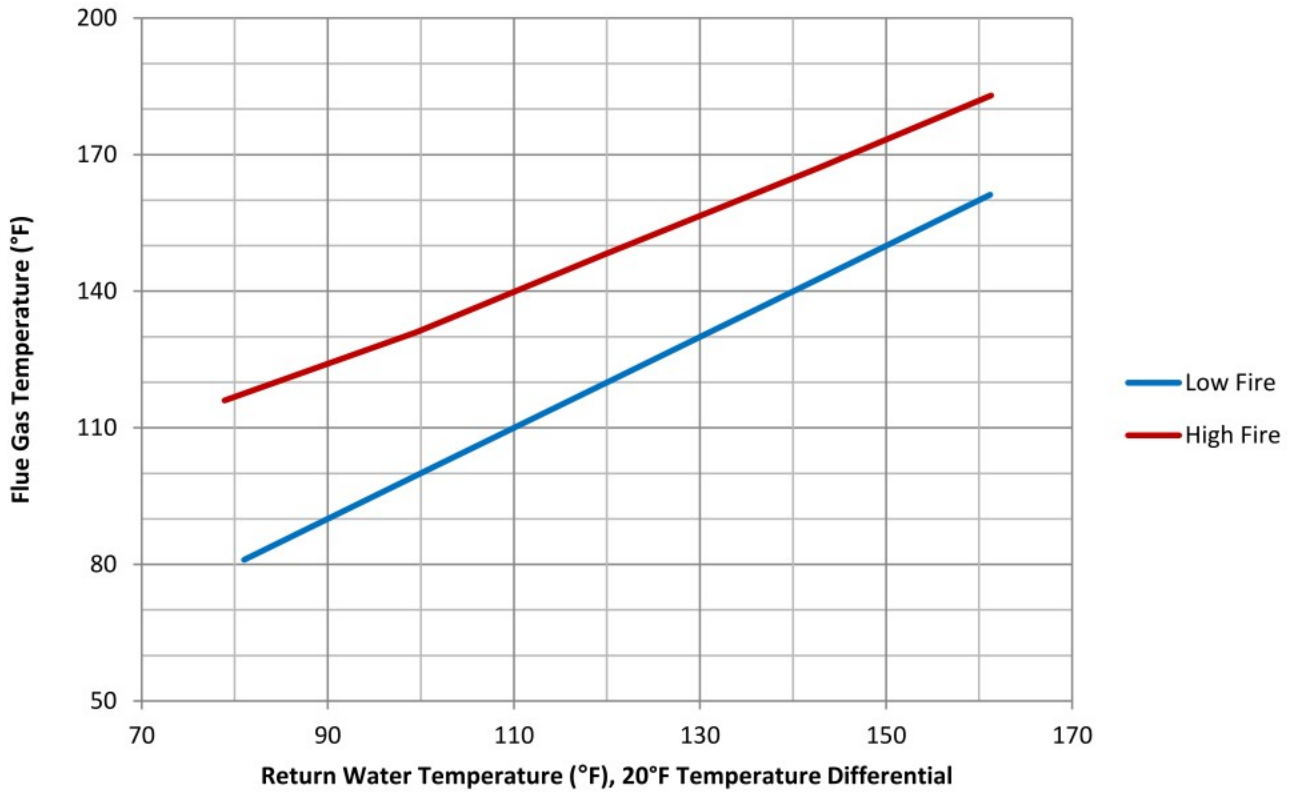
Notes:

1. Laboratory data collected by Fulton research & development.
2. Thermal efficiency curves obtained using a 20°F differential temperature and modified methodology from the BTS-2000 test procedures.
3. Field performance may vary based on site conditions, maintenance history, and combustion parameters configured by the service technician.
4. Fuel is standard natural gas.

Fulton practices continuous product improvement and reserves the right to change specifications and/or dimensions without notice. Always refer to the current documentation available for download on Fulton.com.

PERFORMANCE DATA

SUBJECT:	ENDURA (EDR) SERIES:	DATE:
Flue Gas Temperature Curves	EDR-750, EDR-1000, EDR-1500, EDR-2000	October 20, 2021



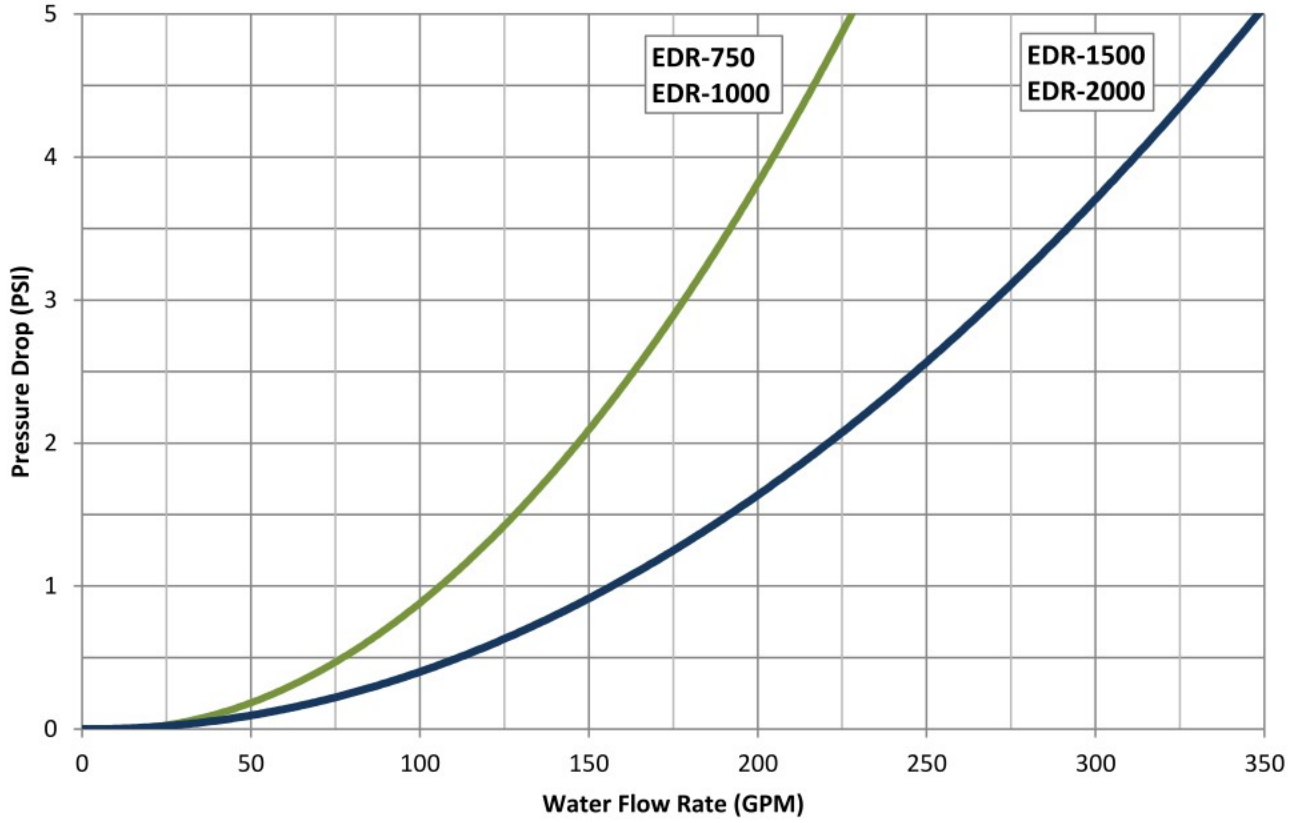
Notes:

1. Laboratory data collected by Fulton research & development.
2. Field performance may vary based on site conditions, maintenance history, and combustion parameters configured by the service technician.
3. Fuel is standard natural gas.

Fulton practices continuous product improvement and reserves the right to change specifications and/or dimensions without notice. Always refer to the current documentation available for download on Fulton.com.

PERFORMANCE DATA

SUBJECT:	ENDURA (EDR) SERIES:	DATE:
Water Side Pressure Drop	EDR-750, EDR-1000, EDR-1500, EDR-2000	October 20, 2021



Notes:

1. Laboratory data collected by Fulton research & development.
2. Endura (EDR) series boilers do not have a minimum or maximum flow rate required to protect the heat exchanger, however, as is the case with any hydronic boiler, proper design flow will be required to properly heat the building and avoid nuisance safety device lockout conditions.
3. Always consider the major and minor losses associated with piping, fittings and valves in addition to the boiler when selecting pumps.

Fulton practices continuous product improvement and reserves the right to change specifications and/or dimensions without notice. Always refer to the current documentation available for download on Fulton.com.

TECHNICAL DATA SHEET

Supply Header Temperature Sensor Kit:
PT100 RTD with Insertion Well

FOR USE WITH:
ModSync, Endura (EDR) and Endura+ (EDR+) PURE Control

OVERVIEW

The supply header temperature sensor kit (PN 4-30-000510) is used in multiple boiler applications where the Fulton ModSync or EDR/EDR+ PURE Control™ are controlling boiler lead/lag. This kit is not for use with the Endura XE (EXE) series PURE Control.

This kit includes a 2-1/2" long 1/2" NPT insertion well, heat conducting compound, a 1/2" x 1/4" reducing bushing, and a PT100 RTD.



SPECIFICATIONS

- Tolerance: Class B
- Temp. Range: -58 to 392°F (-50 to 200°C)
- Connection: 3-wire
- Lead Length: 180 inch (457 cm)

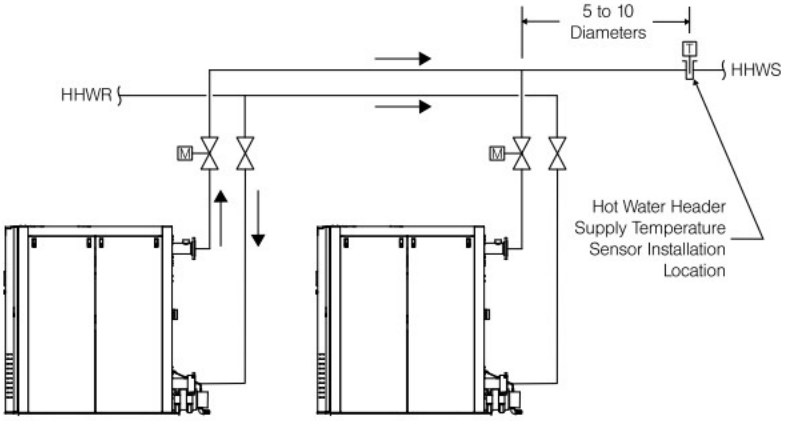


Figure 1 - Variable Primary Piping

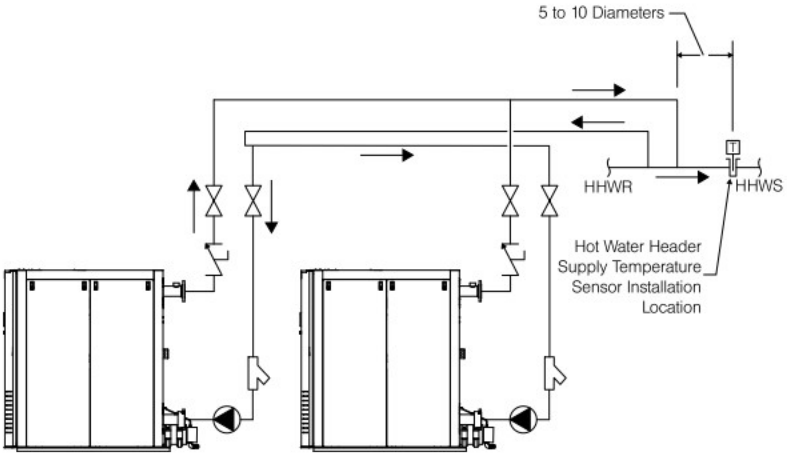


Figure 2 - Primary-Secondary Piping

INSTALLATION REQUIREMENTS

1. Install the insersion well downstream of the last boiler in the common supply header piping.
2. Ensure both the chosen location and the depth will effectively read a blended temperature.
3. For variable primary piping arrangements (Fig 1) install the sensor in the common supply header 5 to 10 pipe diameters downstream of the last boiler tie in point.
4. For primary-secondary piping arrangements (Fig 2), install the sensor in the secondary (system) supply piping, 5 to 10 piping diameters downstream of the primary manifold tie in point.
5. When extending the wire lead, use 18 to 22awg twisted 3 conductor stranded copper with insulated jacket. Ensure connections are tight with no shorts. Soldered with heat shrink tubing connections are strongly recommended.
6. Do not use wire nuts to join lead to extension.
7. Use of 3-wire connections is recommended.
8. Some applications may allow for a 2-wire connection to the control device where the red leads from the RTD are joined. A 2-wire connection may result in less accurate measurements.
9. This sensor may also be installed in the common return piping for the purpose of monitoring of return water temperature. This is in addition to the supply header sensor. Return water temperature must never be used as a process variable.

TECHNICAL DATA SHEET

Outdoor Air Temperature Sensor Kit:
PT100 RTD with Enclosure

FOR USE WITH:
ModSync, Endura (EDR) and Endura+ (EDR+) PURE Control

OVERVIEW

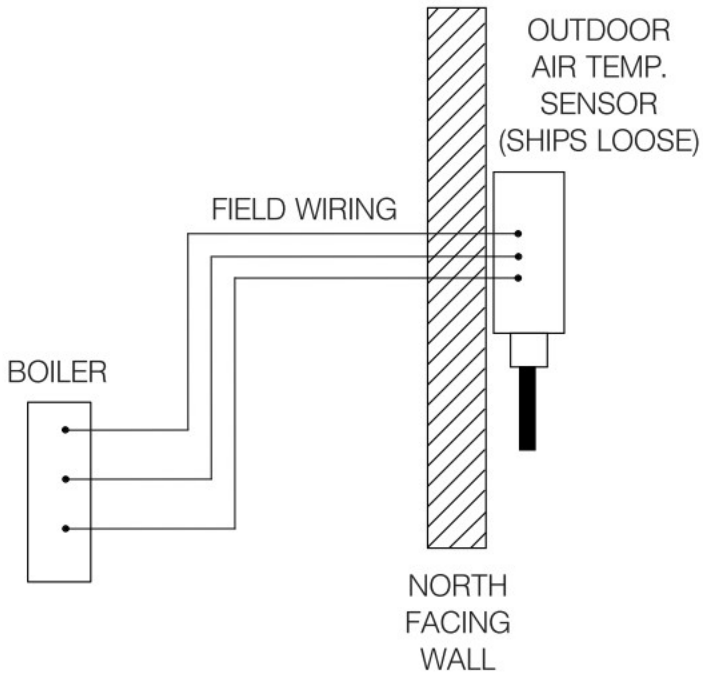
The Outdoor Air Temperature (OAT) Sensor (PN 4-30-000500) is used with Fulton ModSync or EDR/EDR+ Pure Control™ boiler applications where the ModSync or PURE Control™ is calculating hot water supply temperature via OAT reset, or performing plant enable/disable through OAT cutoff (warm weather shutdown). This kit is not for use with the Endura XE (EXE) series PURE Control.

The sensor is housed in a 4-inch (102 mm) weather protected enclosure.



SPECIFICATIONS

- Tolerance: Class B
- Temp. Range: -58 to 392°F (-50 to 200°C)
- Connection: 3-wire
- Lead Length: 144 inch (366 cm)



INSTALLATION REQUIREMENTS

1. Mount in the vertical position, sensor sheath pointing downward, in a shaded area on a north facing wall only.
2. Do not install the sensor near mechanical equipment or other possible sources of heat such as exhaust vents, operable windows, or louvers.
3. When extending the wire lead, use 18 awg twisted 3 conductor stranded copper with insulated jacket. Ensure connections are tight with no shorts. Soldered and heat shrink tubing connections are recommended. Do not use wire nuts to join lead to extension.
4. Do not run wires parallel or close to data or power cables. Cross all data and power cables at right angles.
5. Some applications may allow for a 2-wire connection to the control device where the red leads from the RTD are joined. A 2-wire connection is acceptable but may result in less accurate measurement. Use of 3-wire connections is recommended.

TECHNICAL DATA SHEET

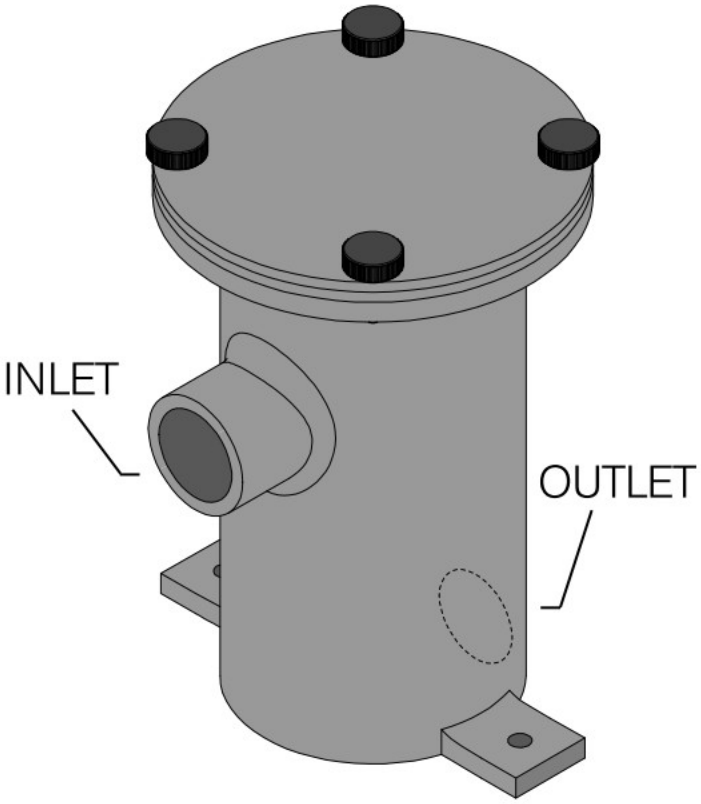
Flue Gas Condensate Trap:
For Single Boiler Installation up to 6,000,000 BTU/hr

FOR USE WITH:
Fulton Condensing Boilers

OVERVIEW

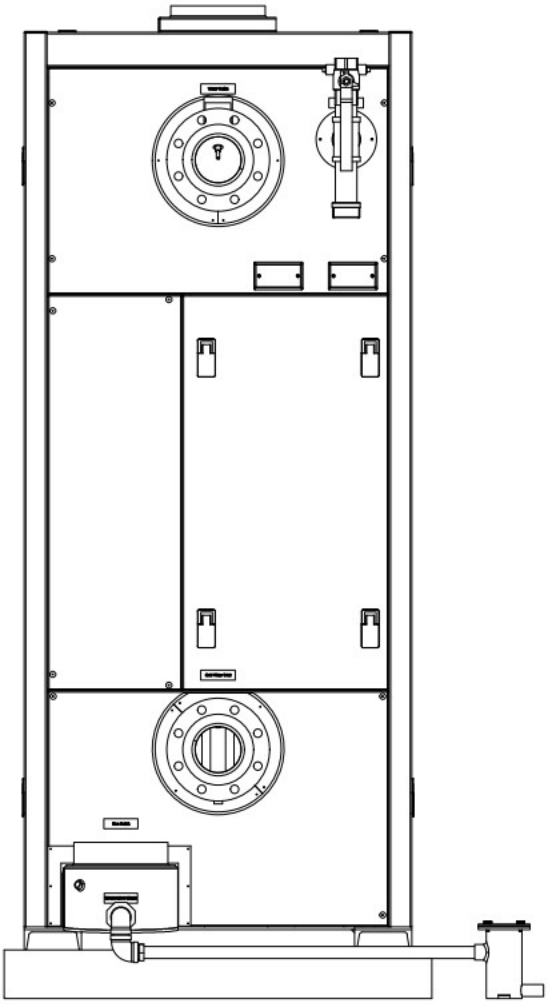
The single boiler condensate drain trap (PN 4-57-005500) will allow for the safe drainage and disposal of flue gas condensate, while preventing flue gases from escaping into the boiler room. Condensate drain traps are required for every Fulton condensing boiler installation.

The outlet of the condensate drain trap is piped to either the inlet of the pH Neutralization Kit, or to an open floor drain.



SPECIFICATIONS

- Material: Cast Aluminum
- Inlet: 3/4" NPT
- Outlet: 3/4" NPT
- Capacity: Maximum 6,000,000 BTU/hr
- Pad Height: Minimum 4" (102 mm) Required



INSTALLATION REQUIREMENTS

1. Minimum 4-inch (102 mm) boiler housekeeping pad height required.
2. Install the trap at floor level, a minimum of 4-inches (102 mm) below the boiler housekeeping pad.
3. Verify inlet and outlet orientation is correct.
4. One trap is required per each boiler.
5. The piping must be pitched downward towards the condensate drain trap and the floor drain.
6. Copper, carbon steel/iron pipe, and PVC are not acceptable drain piping materials.
7. Installation and piping material requirements vary by boiler type and model, refer to the respective boiler Installation, Operation and Maintenence Manual for product specific requirements.
8. A pipe reducer (not supplied) and additional fittings may be required.
9. Not for use with Pulse combustion boilers.

Fulton practices continuous product improvement and reserves the right to change specifications and/or dimensions without notice. Always refer to the current documentation available for download on Fulton.com

Limited Warranty

Endura (EDR) Condensing Hydronic Boilers

Provided the boiler is installed, commissioned, controlled, operated, and maintained in accordance with the Installation, Operation and Maintenance Manual, Fulton Heating Solutions ("Fulton") provides the following limited warranty:

LIFETIME THERMAL SHOCK WARRANTY

The pressure vessel is warranted for the lifetime of the boiler against defects in materials and/or workmanship that result in leakage determined by Fulton to have been caused by thermal shock (defined as abrupt, rapid heating and/or cooling). If so determined, Fulton will repair, or replace, exchange or credit, at its sole discretion, the pressure vessel, FOB factory.

TEN (10) YEAR PRESSURE VESSEL WARRANTY

The pressure vessel is warranted for ten (10) years from the date of shipment from the factory against failures determined by Fulton to be the result of defective materials, workmanship, or heat exchanger fireside flue gas condensate corrosion. If so determined, Fulton will repair, replace, exchange or credit, at its sole discretion, the pressure vessel, FOB factory. Waterside corrosion or scaling is not covered. Fireside corrosion due to contaminated combustion air or fuel is not covered. Failures outside of the ASME pressure vessel boundary are not covered.

FIVE (5) YEAR BURNER HEAD WARRANTY

The burner head is warranted for five (5) years from the date of shipment from the factory against failures determined by Fulton to be the result of defective materials or workmanship. If so determined, Fulton will repair or replace, at its sole discretion, FOB factory. This warranty does not cover damage due to wear and tear, misuse, or contaminated combustion air. This warranty does not cover other parts associated with the burner region such as gaskets, o-rings, pre-mix delivery components, and hardware.

TWO (2) YEAR PARTS WARRANTY

Other boiler parts are warranted against workmanship or material defects for two (2) years from shipment from the factory. Fulton will repair or replace, at its sole discretion, FOB factory. Defective parts must be returned to Fulton for evaluation and warranty credit consideration in accordance with the Returned Materials Authorization policy. This warranty does not cover loose ancillary equipment and accessories shipped with the boiler such as communication gateways, lead-lag sequencing control devices, regulators, pumps, or motorized isolation valves. This warranty does not cover consumables or wear items such as gaskets, o-rings, pressure relief valves, fuses, oxygen sensors, electrodes or filters.

CONDITIONS OF WARRANTY

The warranty is valid for the original installation and original owner only. The boiler must be installed, commissioned, controlled, operated, and maintained in accordance with the *Installation, Operation and Maintenance Manual*. There shall be no modifications, adjustments, or repairs to the equipment not authorized by Fulton in writing. There shall be no replacement parts used not manufactured or authorized by Fulton in writing.

Fulton shall be notified in writing as soon as any defect or failure becomes apparent. Failure to do so may limit Fulton's obligations under this warranty or render the warranty invalid in whole or in part. No agent or representative of Fulton other than the Warranty Manager or an officer of the company has authority to modify or alter the conditions of warranty. A formal Purchase Order is required prior to shipment of any replacement warranty item. This warranty does not include freight, handling or labor charges.

To the extent not prohibited by law in the state, province, jurisdiction or country of purchase, this warranty and the remedies set forth are exclusive and in lieu of all other warranties, remedies and conditions, whether oral, written, statutory, express or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. In no event or under any circumstances shall Fulton be liable for any consequential, incidental, special, punitive or other indirect damages arising in any way including, but not limited to, loss of profits or business, even if Fulton has been advised of the possibility of such damages. Under no circumstances shall Fulton's liability exceed the amount paid to Fulton for the original equipment.

THIS LIMITED WARRANTY IS GOVERNED BY AND CONSTRUED UNDER THE LAWS OF THE STATE, COUNTRY, JURISDICTION, OR PROVINCE IN WHICH THE PRODUCT WAS ORIGINALLY PURCHASED. THE LIMITED WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT, OR MODIFY BUT ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO THE PURCHASER. OUTSIDE THE UNITED STATES AND CANADA AND TO THE EXTENT SUCH WARRANTIES, TERMS AND CONDITIONS CANNOT BE DISCLAIMED AND ARE PERMITTED BY APPLICABLE LAW, FULTON LIMITS THE DURATION AND REMEDIES OF SUCH WARRANTIES AND CONDITIONS TO EIGHTEEN (18) MONTHS OF SHIPMENT FROM THE FACTORY OR TWELVE (12) MONTHS FROM STARTUP, WHICHEVER COMES FIRST. THIS LIMITED WARRANTY GIVES THE PURCHASER SPECIFIC LEGAL RIGHTS, AND THE PURCHASER MAY HAVE OTHER LEGAL RIGHTS, WHICH MAY VARY BY STATE, COUNTRY, JURISDICTION, OR PROVINCE.

University of Kentucky
Facilities Management
Office of the Vice President

August 4, 2025

Mr. Zack Bittner
Ky Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: Revision to the October 10, 2023 Permit Application
University of Kentucky, V-18-052 R1; 21-067-00003, AI 1104

Dear Mr. Bittner:

On October 10, 2023 the University of Kentucky submitted permit applications to install the equipment listed below. The original application proposed the construction of a 237 Hp Kohler 150REOZJF emergency generator located at Pence Hall. The generator installed is a 201 Hp Caterpillar C15D500GC. It was installed in April and started on July 10, 2025. The emission reduction is minimal and all other permitting condition remain the same. Specifically, Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generators. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines. The boiler meets the definition of an insignificant activity as defined in Section 6 of regulation 401 KAR 52:020, *Title V Permits*. Construction of the generators and boiler do not add any additional regulations to the current V-18-052 R1 permit, and all existing conditions of the permit will be met after the addition. Therefore, we request the Division for Air Quality continue to process the revision as a 502(b)(10) change in accordance with 401 KAR 52:020, Section 18.

Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement
Remove the 587 hp generator (EU54-07) and replace it with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.

Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)

Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement
Remove the 94 Hp generator (EU59-13) and replace it with a 757 Hp generator (EU93)

Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement
Remove the 1.3 MMBtu/hr boiler (57-11) and replace it with a 0.85 MMBtu/hr boiler (IA item #11). Refer to the permit application dated May 27, 2025 for the addition of a second 0.85 MMBtu/boiler.

We appreciate your consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Barry K. Swanson
Acting Vice President and
Chief Facilities Officer

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: August 8, 2025

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: 500 ft **Property Area:** 1500 **Is this source portable?** ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity: ☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☑ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Refer to DEP7007A

Proposed Operation Start-Up Date: *(MM/YYYY)* Refer to DEP7007A

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ Yes ☐ No

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

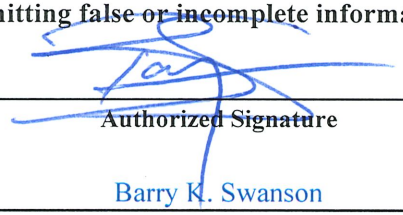
Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.



Authorized Signature

8/8/25

Date

Barry K. Swanson

Type or Printed Name of Signatory

Acting VP and Chief Facilites Officer

Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.
Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement Remove the 1.3 MMBtu/hr boiler (57-11) and replace with a 0.85 MMBtu/hr boiler (IA item #11)
Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement Remove the 587 hp (EU54-07) and replace with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.
Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)
Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement Remove the 94 Hp generator (EU59-13) and replace with a 757 Hp generator (EU93)
Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information
___ Section A.2: Operating and Fuel Information
___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky
KY EIS (AFS) #: 21-067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903Hp Diesel Generator-Sanders Brown	1	Diesel Fuel Usage	Emergency Generator		Kohler	600REOZVB	06/2023, ordered 06/2024, install est.	20300101	1000 gal	None	1
92	201 Hp Diesel Generator-Pence Hall	1	Diesel Fuel Usage	Emergency Generator		Caterpillar	D150 GC	08/2023, ordered 4/2025, install est.	20300101	1000 gal	None	1
93	757 Hp Diesel Generator-Memorial Coliseum	1	Diesel Fuel Usage	Emergency Generator		Kohler	500REOZVC	02/2024, install est.	20300101	1000 gal	None	1
94	762 Hp Diesel Generator-Parking Structure #8	1	Diesel Fuel Usage	Emergency Generator		Caterpillar	D500 GC	07/2023, ordered 02/2025, install est.	20300101	1000 gal	None	1
IA	0.85 MMBtu Natural Gas Boiler-Bosworth	1	Natural Gas Usage	Indirect Heat Exchanger		Valiant Series II	VA0850	11/2023, install est	10100602	MMft3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
91				100	6.32	674 903	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
92				100	1.41	150 201	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
93				100	5.30	565 757	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
94				100	5.33	568 762	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
IA		100, hot water			0.85	4980	gal/hr		Primary	Natural Gas	1020	Btu/scf	8760		NA

Section A.3: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.06997	0.06997	0.30648	0.30648
	Bldg 0652							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.08330	0.08330	0.36485	0.36485
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.00633	0.00633	0.02773	0.02773
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00050	0.00050	0.00219	0.00219
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00458	0.00458	0.02007	0.02007
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-09	2.00E-09	8.76E-09	8.76E-09
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.33E-08	1.33E-08	5.84E-08	5.84E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-06	1.00E-06	4.38E-06	4.38E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-09	2.50E-09	1.09E-08	1.09E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.33E-09	2.33E-09	1.02E-08	1.02E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	6.25E-05	6.25E-05	2.74E-04	2.74E-04
								3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
	Bldg 0652							n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-03	1.50E-03	6.57E-03	6.57E-03
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.08E-07	5.08E-07	2.23E-06	2.23E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.42E-08	1.42E-08	6.20E-08	6.20E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.17E-09	4.17E-09	1.82E-08	1.82E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.83E-06	2.83E-06	1.24E-05	1.24E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.67E-07	1.67E-07	7.30E-07	7.30E-07
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.00E-08	1.00E-08	4.38E-08	4.38E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	9.16E-07	9.16E-07	4.01E-06	4.01E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.17E-06	1.17E-06	5.11E-06	5.11E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.00E-08	7.00E-08	3.06E-07	3.06E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.17E-06	3.17E-06	1.39E-05	1.39E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.17E-07	2.17E-07	9.49E-07	9.49E-07
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.58E-03	1.58E-03	6.90E-03	6.90E-03
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	100.0	100.0	437.8	437.8

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300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

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Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
57-11 replaced with IA-11	Removed 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.10668	-0.10668	-0.46726	-0.46726
57-11 =	COMB0015							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.12700	-0.12700	-0.55626	-0.55626
	Bldg 0652							PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	-0.00965	-0.00965	-0.04228	-0.04228
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	-0.00076	-0.00076	-0.00334	-0.00334
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	-0.00699	-0.00699	-0.03059	-0.03059
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-09	-3.05E-09	-1.34E-08	-1.34E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.03E-08	-2.03E-08	-8.90E-08	-8.90E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-06	-1.52E-06	-6.68E-06	-6.68E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.81E-09	-3.81E-09	-1.67E-08	-1.67E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.56E-09	-3.56E-09	-1.56E-08	-1.56E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
57-11 replaced with IA-11	**Removed** 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	-9.53E-05	-9.53E-05	-4.17E-04	-4.17E-04
57-11 =	COMB0015							3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
	Bldg 0652							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-03	-2.29E-03	-1.00E-02	-1.00E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	-7.75E-07	-7.75E-07	-3.39E-06	-3.39E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.16E-08	-2.16E-08	-9.46E-08	-9.46E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-6.35E-09	-6.35E-09	-2.78E-08	-2.78E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	-4.32E-06	-4.32E-06	-1.89E-05	-1.89E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	-2.54E-07	-2.54E-07	-1.11E-06	-1.11E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.52E-08	-1.52E-08	-6.68E-08	-6.68E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.40E-06	-1.40E-06	-6.12E-06	-6.12E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.78E-06	-1.78E-06	-7.79E-06	-7.79E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.07E-07	-1.07E-07	-4.67E-07	-4.67E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	-4.83E-06	-4.83E-06	-2.11E-05	-2.11E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	-3.30E-07	-3.30E-07	-1.45E-06	-1.45E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	-2.40E-03	-2.40E-03	-1.05E-02	-1.05E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	-152.4	-152.4	-667.5	-667.5

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(502) 564-3999

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Source Emissions Profile

__ Section N.1: Emission Summary
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__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
91	903 Hp Diesel Generator-Sanders Brown	1	Diesel Usage	NA	NA	1	0.0427	CO	13.2	mfg cert	0.00%	0.00%	0.5636	0.5636	0.1409	0.1409
	Bldg 0230							NO2	181.1	mfg cert	0.00%	0.00%	7.7338	7.7338	1.9335	1.9335
								PM10	2.45	mfg cert	0.00%	0.00%	0.1046	0.1046	0.0262	0.0262
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0090	0.0090	0.0022	0.0022
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	2.0475	2.0475	0.5119	0.5119
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	1.49E-04	1.49E-04	3.74E-05	3.74E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	4.70E-05	4.70E-05	1.17E-05	1.17E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	4.53E-03	4.53E-03	1.13E-03	1.13E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	4.61E-04	4.61E-04	1.15E-04	1.15E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	1.64E-03	1.64E-03	4.11E-04	4.11E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	1.13E-03	1.13E-03	2.82E-04	2.82E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	1.24E-03	1.24E-03	3.10E-04	3.10E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	968.52	968.52	242.1	242.1

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(502) 564-3999

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Source Emissions Profile

__ Section N.1: Emission Summary
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__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
54-07 replaced with EU91	**REMOVED** 587 Hp Diesel Generator-Sanders Brown	2	Diesel Usage	NA	NA	1	-0.0300	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-3.9060	-3.9060	-0.9765	-0.9765
54-07 =	COMB0012	2	0.03 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-18.1290	-18.1290	-4.5323	-4.5323
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-1.2744	-1.2744	-0.3186	-0.3186
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0018	-0.0018	-0.0004	-0.0004
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.4385	-1.4385	-0.3596	-0.3596
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-3.15E-03	-3.15E-03	-7.88E-04	-7.88E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-3.81E-04	-3.81E-04	-9.53E-05	-9.53E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-3.84E-03	-3.84E-03	-9.60E-04	-9.60E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-4.85E-03	-4.85E-03	-1.21E-03	-1.21E-03
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.68E-03	-1.68E-03	-4.20E-04	-4.20E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-1.17E-03	-1.17E-03	-2.93E-04	-2.93E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-6.90E-04	-6.90E-04	-1.73E-04	-1.73E-04
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-674.04	-674.04	-168.5	-168.5

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	201 Hp Diesel Generator-Pence	1	Diesel Usage	NA	NA	1	0.0100	CO	38.60	mfg cert	0.00%	0.00%	0.39	0.39	0.10	0.10
	Bldg 0041							NO2	122.00	mfg cert	0.00%	0.00%	1.22	1.22	0.31	0.31
								PM10	3.860	mfg cert	0.00%	0.00%	0.039	3.86E-02	9.65E-03	9.65E-03
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	0.001	5.96E-04	1.49E-04	1.49E-04
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.480	0.480	1.20E-01	0.120
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00105	1.05E-03	2.63E-04	2.63E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00013	1.27E-04	3.18E-05	3.18E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00128	1.28E-03	3.20E-04	3.20E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00162	1.62E-03	4.04E-04	4.04E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00056	5.60E-04	1.40E-04	1.40E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00039	3.90E-04	9.75E-05	9.75E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00023	2.30E-04	5.75E-05	5.75E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	225	225	56.17	56

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
93	757 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	0.03680	CO	11.2	mfg cert	0.00%	0.00%	0.4122	0.4122	0.1030	0.1030
	Bldg 0019							NO2	178.9	mfg cert	0.00%	0.00%	6.5835	6.5835	1.6459	1.6459
								PM10	1.3	mfg cert	0.00%	0.00%	0.0478	0.0478	0.0120	0.0120
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0077	0.0077	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7646	1.7646	0.4411	0.4411
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00013	0.00013	3.22E-05	3.22E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	1.01E-05	1.01E-05
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00391	0.00391	0.0010	0.0010
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00040	0.00040	9.94E-05	9.94E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00142	0.00142	3.54E-04	3.54E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00097	0.00097	2.43E-04	2.43E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00107	0.00107	2.67E-04	2.67E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	832	832	208	208

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
59-13 Replaced with EU93	REMOVED 94 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	-0.00480	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-0.6250	-0.6250	-0.1562	-0.1562
59-13 =	COMB0017	1	0.0048 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-2.9006	-2.9006	-0.7252	-0.7252
	Bldg 0019							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.2039	-0.2039	-0.0510	-0.0510
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0003	-0.0003	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-0.2302	-0.2302	-0.0575	-0.0575
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-0.00050	-0.00050	-1.26E-04	-1.26E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-0.00006	-0.00006	-1.52E-05	-1.52E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-0.00061	-0.00061	-1.54E-04	-0.0002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-0.00078	-0.00078	-1.94E-04	-1.94E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-0.00027	-0.00027	-6.72E-05	-6.72E-05
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-0.00019	-0.00019	-4.68E-05	-4.68E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-0.00011	-0.00011	-2.76E-05	-2.76E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-108	-108	-27	-27

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
94	762 HP Diesel Generator-Parking #8	1	Diesel Usage	NA	NA	1	0.03570	CO	25.9	mfg cert	0.00%	0.00%	0.9246	0.9246	0.2312	0.2312
	Bldg 0601							NO2	198.3	mfg cert	0.00%	0.00%	7.0793	7.0793	1.7698	1.7698
								PM10	1.3	mfg cert	0.00%	0.00%	0.0464	0.0464	0.0116	0.0116
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0075	0.0075	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7118	1.7118	0.4280	0.4280
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00012	0.00012	3.12E-05	3.12E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	9.82E-06	9.82E-06
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00379	0.00379	0.0009	0.0009
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00039	0.00039	9.64E-05	9.64E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00137	0.00137	3.44E-04	3.44E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00094	0.00094	2.36E-04	2.36E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00104	0.00104	2.59E-04	2.59E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	807	807	202	202

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-0003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								CO					-2.281	-2.281	-0.722	-0.722
								NO2					1.543	1.543	0.205	0.205
								PM10					-1.244	-1.244	-0.325	-0.325
								SO2					0.022	0.022	0.005	4.53E-03
								VOC					4.332	4.332	1.073	1.073
								Acenaphthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acenaphthylene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acetaldehyde					-2.20E-03	-2.20E-03	-5.51E-04	-5.51E-04
								Acrolein					-1.88E-04	-1.88E-04	-4.71E-05	-4.71E-05
								Anthracene					-1.05E-09	-1.05E-09	-4.59E-09	-4.59E-09
								Benz(a)anthracene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzene					9.06E-03	9.06E-03	2.26E-03	2.26E-03
								Benzo(b)fluoranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzo(a)pyrene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(g,h,i)perylene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(k)flouranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Chrysene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								7,12-Dimethylbenz(a)anthracene					-6.99E-09	-6.99E-09	-3.06E-08	-3.06E-08
								Dibenzo(a,h)anthracene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Dichlorobenzene					-5.24E-07	-5.24E-07	-2.30E-06	-2.30E-06
								Fluoranthene					-1.31E-09	-1.31E-09	-5.74E-09	-5.74E-09
								Fluorene					-1.22E-09	-1.22E-09	-5.36E-09	-5.36E-09
								Formaldehyde					-4.01E-03	-4.01E-03	-1.24E-03	-1.24E-03
								3-Methylchloranthrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								2-Methylnaphthalene					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								n-Hexane					-7.87E-04	-7.87E-04	-3.45E-03	-3.45E-03
								Indeno(1,2,3-cd)pyrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Naphthalene					-2.67E-07	-2.67E-07	-1.17E-06	-1.17E-06
								Phenanthrene					-7.43E-09	-7.43E-09	-3.25E-08	-3.25E-08
								Pyrene					-2.19E-09	-2.19E-09	-9.57E-09	-9.57E-09
								Toluene					3.04E-03	3.04E-03	7.55E-04	7.55E-04
								Xylene					2.07E-03	2.07E-03	5.19E-04	5.19E-04
								Arsenic					-8.74E-08	-8.74E-08	-3.83E-07	-3.83E-07
								Beryllium					-5.24E-09	-5.24E-09	-2.30E-08	-2.30E-08
								Cadmium					-4.81E-07	-4.81E-07	-2.11E-06	-2.11E-06
								Chromium					-6.12E-07	-6.12E-07	-2.68E-06	-2.68E-06
								Cobalt					-3.67E-08	-3.67E-08	-1.61E-07	-1.61E-07
								Manganese					-1.66E-06	-1.66E-06	-7.27E-06	-7.27E-06
								Mercury					-1.14E-07	-1.14E-07	-4.98E-07	-4.98E-07
								Nickel					-9.18E-07	-9.18E-07	-4.02E-06	-4.02E-06
								Selenium					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08
								PAH					2.77E-03	2.77E-03	6.93E-04	6.93E-04
								Total HAP					9.75E-03	9.75E-03	-1.08E-03	-1.08E-03
								CO2					1998	1998	283	283

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
91	91 01	1.0, est	30, est				4044	923	
92	92 01	0.33, est	30, est				1197	950	
93	93 01	0.6	30, est				3249	851	
94	94 01	0.6, est	30, est				3606	988	
IA	IA	0.33	20, est					230	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.
Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement Remove the 1.3 MMBtu/hr boiler (57-11) and replace with a 0.85 MMBtu/hr boiler (IA item #11)
Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement Remove the 587 hp (EU54-07) and replace with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.
Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)
Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement Remove the 94 Hp generator (EU59-13) and replace with a 757 Hp generator (EU93)
Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirement
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	201 Hp Diesel Generator-Pence Hall	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
91 93 94	903 Hp Diesel Generator-Sanders Brown 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (c), (f), (g)(2-3)) 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(c), the engine must be EPA certified by the manufacturer to theemission standards for the same model year and engine power in 60.4205(b). Engine must be installed and configured to manufacture's emission-related specifications. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g)(2-3), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN:** **EU92 -** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performance test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. **EU91, 93, 94** - demonstrate compliance with 60.4211(g)(2) and additionally with (g)(3) which requires subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2-3) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations

Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.

Cat® D150 GC
Diesel Generator Sets

Pence Hall

Standby : 60 Hz



Image shown may not reflect actual configuration.

Engine Model	Cat® C7.1 In-line 6, 4-cycle diesel
Bore x Stroke	105 mm x 135 mm (4.1 in x 5.3 in)
Displacement	7.01 L (428 in³)
Compression Ratio	16.7:1
Aspiration	Turbocharged Air-to-Air-Aftercooled
Fuel Injection System	Electronic, Common Rail
Governor	Electronic

Model	Standby	Emission Strategy
D150 GC	150 ekW	EPA TIER III

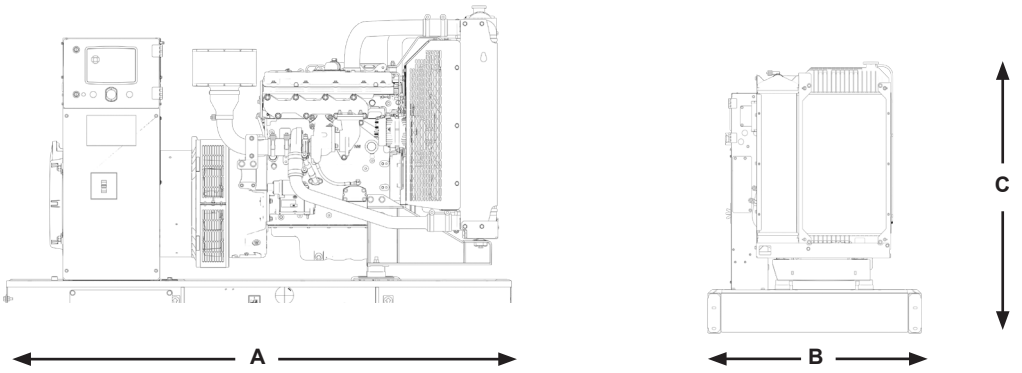
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	187.5 kVA
Genset power rating with fan, 3p@ 0.8 & 1p@1.0 power factor	150 ekW
Performance Number	P4390A-00
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	37.8 (10.0)
75% load with fan, L/hr (gal/hr)	30.3 (8.0)
50% load with fan, L/hr (gal/hr)	21.9 (5.8)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in. Water)	0.12 (0.48)
Engine coolant capacity, L (gal)	9.5 (2.5)
Radiator coolant capacity, L (gal)	11.5 (3.0)
Total coolant capacity, L (gal)	21 (5.5)
Inlet Air	
Combustion air inlet flow rate, m³/min (cfm)	15.3 (540.3)
Max. Allowable Combustion Air Inlet Temp, °C (°F)	51 (124)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	441 (825)
Exhaust gas flow rate, m³/min (cfm)	31.2 (1102)
Exhaust system backpressure (maximum allowable) kPa (in. water)	15.0 (60.2)
Heat Rejection	
Heat rejection to exhaust (total) kW (Btu/min)	132.0 (7496)
Heat rejection to aftercooler, kW (Btu/min)	38.0 (2138)
Heat rejection to atmosphere from engine, kW (Btu/min)	29.0 (1649)
Emissions (Nominal)[2]	
NOx + HC, g/kW-hr	4.0
CO, g/kW-hr	1.0
PM, g/kW-hr	0.2

D150 GC Diesel Generator Sets
Electric Power

Alternator[3]			
Voltages	480V	208V	600V
Motor starting capability @ 30% Voltage Dip, skVA	257	280	625
Current Amps	226	520	180
Frame Size	M2256L4	M2294L4	M2275L4
Excitation	SE	SE	AREP
Temperature Rise, °C	130	105	130

WEIGHTS & DIMENSIONS



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
2634 (103.7)	1300 (51.2)	1402 (52.2)	1562 (3443)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

PRIME: Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

LEHE2665-02 (06/22)

www.Cat.com/electricpower
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Engine Emissions Data

For Emissions / Certification feedback and questions, please submit a ticket via our ERC Request Portal

This emission data is Caterpillar's best estimate for this rating. If actual emissions are required then an emission test needs to be run on your engine.

Serial Number (Machine)	
Serial Number (Engine)	**45506947**
Generator Number	M2808646
Genset Number	T9900484
Sales Model	C7.1
Regulatory Build Date	09-OCT-2023
Engine ReRated	
Engine Arrangement Number	4696211
Certification Arrangement	
Test Spec Number	
Regulatory Status	CAT_Const_EPA Emergency Stationary_CH Exp_EU_Exp
Labeled Model Year	2023
EPA Family Code	PPKXL07.0PW1
CORR FL Power at RPM	
Advertised Power	
Total Displacement	7.01 L

Disclaimer: The information provided has been compiled from third party sources and is accurate to the best of Caterpillar's knowledge. However, Caterpillar cannot guarantee the accuracy, completeness, or validity of the information and is not liable for any errors or omissions contained therein. All information provided should be independently verified and confirmed, including by examining the emissions label located on the engine.

Need emission replacement label? Click here!

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Perkins Engines Co Ltd**
(U.S. Manufacturer or Importer)

Certificate Number: PPKXL07.0PW1-001

Effective Date: 09/06/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 09/06/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PPKXL07.0PW1

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 225<=kW<450
Fuel Type: Diesel, Non-Standard Fuel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

CONGLETON - HACKER CO.
Construction Managers / General Contractors

Submittal Review Cover Sheet

Project Name: UK Memorial Coliseum

UK job #: 2604.0

CHC Project #: 20-101

Submittal Description: Generator and ATS – Product Data

Subcontractor/Vendor: Nixon

Date Submittal Rec'd: 4/26/2023

CHC Review Stamp & Comments

Congleton-Hacker Company

Job # 20-101 Submittal: 263200-01
Date 4/26/23 By: Avery Gray .

The data contained hereon & here within is for inspection only
- Not for construction-
Unless stamped "Approved" by the architect and/or engineer.

Notes:

A/E Review Stamp & Comments

4/26/2023



NIXON POWER SERVICES

SUBMITTAL PACKAGE

UK Memorial Coliseum

CONTRACTOR / INSTALLER: UNIVERSITY OF KENTUCKY

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

KOHLER®

TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 500REOZVC Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Specification Sheet	Transfer Switch	Spec ATS Accessories
Specification Sheet	Transfer Switch Controls	G11-127
Alternator Data		
	Alternator Data Sheet	5M4028
Sound Data		
	Sound Data Sheet	Sound Data
Cooling Data		
	Cooling Systems Data Sheet	Cooling Data
Emissions Data		
	Emissions Data	Emissions Data
	EPA Certificate	EPA Certificate

KOHLER®

Certification

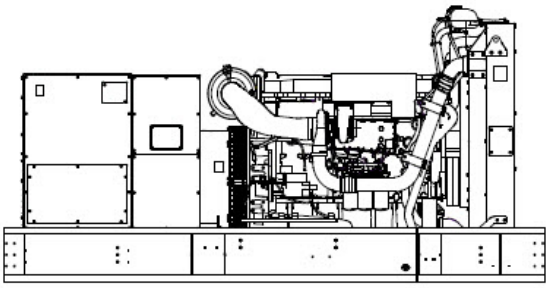
ISO9001 Certificate	G15-152
Prototype Test Summary	G18-489
Prototype Test Certificate	G18-56
ATS Test Program	G18-414

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator





Kohler Model: 500REOZVC

This diesel generator set equipped with a 5M4028 alternator operating at 277/480 volts is rated for 510 kW/638 kVA. Output amperage: 767

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P: 502-267-0474
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Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	500REOZVC Generator System
1	500REOZVC Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	500REOZVC,24V,50/60Hz, EPA
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4028
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Heavy Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Generator Heater
Rating, LCB 1 Right	100% Rated
Amps, LCB 1 Right	600
Trip Type, LCB 1 Right	Electronic, LSI
LCB 1 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Right	Shunt Trip
Frame, LCB 1 Right	PG
Position, LCB 1 Right	1
Rating, LCB 2 Right	100% Rated
Amps, LCB 2 Right	600
Trip Type, LCB 2 Right	Electronic, LSI
LCB 2 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Right	Shunt Trip
Frame, LCB 2 Right	PG
Position, LCB 2 Right	2
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Fuel Lines, Installed	Flexible Fuel Lines
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset

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Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	Standard
	Testing, Additional	Power Factor Test,0.8,3Ph Only
1	Silencer,Critical,10"Flange,SIEO	
1	Flexible Exhaust Connection 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 500REOZVC	
1	RSA III, Annunciator only	
	660 Gallon Subbase Fuel Tank	
	Remote Fill Station Panel	
Qty 2	600A Wall Mount Quick Connect Panel	

Automatic Transfer Switch



Kohler Model: KSS-AMTA-0600S

3 Pole, 4 Wire, Solid Neutral, 600 amp, Kohler Specific Breaker rated Standard automatic transfer switch, Model KSS-AMTA-0600S, rated 480V, 60 Hz complete with all standard equipment and housed in a NEMA Type 1 enclosure.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	ATS KSSB Transfer Switch System
2	KSS-AMTA-0600S

Includes the following:

Literature Languages	English
Mechanism	Specific Breaker
Transition	Standard
Logic	1200
Voltage	480V / 60 Hz
Poles & Wires	3 Pole/4 Wire, Solid Neutral
Enclosure	Nema 1
Amps	600 Amps
Connection	Standard
IBC Seismic Certification	None
CSA Certification	None
Miscellaneous Acc.,Installed	Supervised Transfer Control
Miscellaneous Acc.,Installed	Lockable User Interface Cover
Warranty	1-YR STANDARD

Items shown in this diagram are examples only and are not true depictions of equipment ordered. Enclosures, colors, and styles may vary

NIXON POWER SERVICES

KOHLER GENERATOR
APM402 CONTROLLER





Emergency Stop



KOHLER REMOTE ANNUNCIATOR

AUTOMATIC TRANSFER SWITCH



AUTOMATIC TRANSFER SWITCH



MODBUS
Belden 9841

CONTROL WIRES
4ea. THHN 16ga.

REMOTE START
4ea. THHN 16ga.

E-STOP SWITCH
2ea. THHN 16ea.

COMMUNICATION DRAWING

AS BUILT DRAWINGS FOR EPSS COMMUNICATION SYSTEM

NIXON POWER
(800) 766-4966

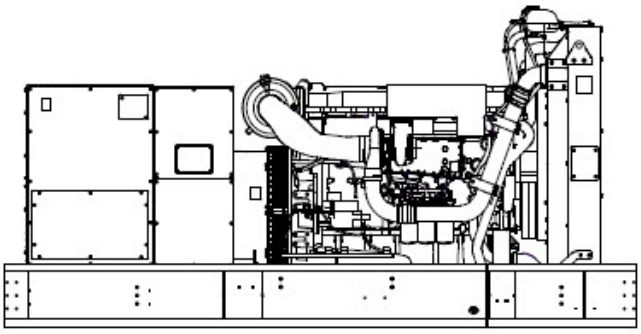
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IN POWER. SINCE 1920.

KOHLER®

Spec Sheets

KOHLER®

500REOZVC
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4028	277/480	3	60	510/638	767

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130 ° C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load (with <0.5% drift due to temp. variation)	3-Phase Sensing, +/-0.25%
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TAD1642GE-B
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	17:01
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	565 (757)
Cylinder head material	Cast Iron
Piston: type, material	Steel
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.4
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Field-Convertible
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust flow at rated kW, m3/min. (cfm)	92.0 (3249)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	455 (851)
Maximum allowable back pressure, kPa (in. Hg)	10 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24 V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	8 (0.31)
Fuel return line, min. ID, mm (in.)	6 (0.25)
Max. fuel flow, Lph (gph)	204.4 (54)
Max. fuel pump restriction, kPa (in. Hg)	30 (8.9)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter: quantity, type	2, Primary, 10 Micron Secondary w/Water Separator, 3 Microns
Recommended fuel	#2 Diesel/HVO/RD

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-Cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122)
Engine jacket water capacity, L (gal.)	39.7 (10.5)
Engine jacket water capacity, L (gal) (Non-IBC):	39.7 (10.5)
Radiator system capacity, including engine, L (gal.)	67 (17.7)
Engine jacket water flow, Lpm (gpm)	463.3 (122.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	231 (13137)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	890 (35)
Fan, kWm (HP)	19 (25.5)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	598 (21120)
Combustion air, m3/min. (cfm)	46 (1617)
Heat rejected to ambient air: Engine, kW (Btu/min.)	24 (1365)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	29 (1660)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	139.3 Lph (36.8 gph)
Standby Fuel Consumption at 75% load	101.4 Lph (26.8 gph)
Standby Fuel Consumption at 50% load	68.1 Lph (18.0 gph)
Standby Fuel Consumption at 25% load	38.6 Lph (10.2 gph)
Prime Fuel Consumption at 100% load	121.9 Lph (32.0 gph)
Prime Fuel Consumption at 75% load	89.7 Lph (23.7 gph)
Prime Fuel Consumption at 50% load	60.6 Lph (16.0 gph)
Prime Fuel Consumption at 25% load	33.7 Lph (8.9 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1942 (166.5 x 72.0 x 76.5)
Weight (radiator model), wet, kg (lb.):	4082 (9000)

KOHLER®

Emissions Data

KOHLER®

500REOZVC

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TAD1641GE-B	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	565	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	NVPXL16.1ACC
Compression Ratio:	16.5:1	EPA Certificate:	NVPXL16.1ACC-020
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA:	**EPA D2 Cycle 5-mode weighted**	
HC	0.139	g/kWh
NOx (Oxides of Nitrogen as NO_2)	5.56	g/kWh
CO (Carbon Monoxide)	0.349	g/kWh
PM (Particulate Matter)	0.04	g/kWh

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2022
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACC-012**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACC

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Cat® D500 GC
Diesel Generator Sets

UK - Parking Structure #8

Standby : 60 Hz



Image shown may not reflect actual configuration.

Engine Model	Cat® C15 In-line 6, 4-cycle diesel
Bore x Stroke	137 mm x 171 mm (5.4 in x 6.8 in)
Displacement	15.2 L (928 in³)
Compression Ratio	16.1:1
Aspiration	Turbocharged Air-to-Air Aftercooled
Fuel Injection System	MEUI
Governor	Electronic ADEM™ A4

Model	Standby	Emission Strategy
D500 GC	500 ekW, 625 kVA	EPA Certified for Stationary Emergency Application

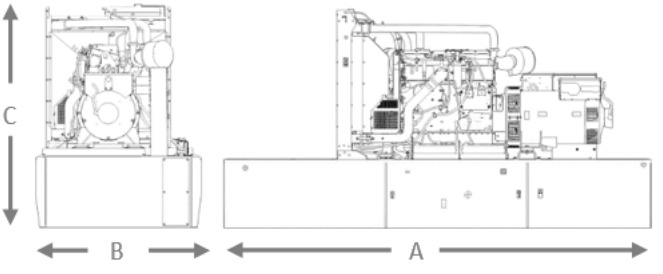
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	625 kVA
Genset power rating with fan @ 0.8 power factor	500 ekW
Emissions	EPA TIER 2
Performance Number	DM8155
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	135.2 (35.7)
75% load with fan, L/hr (gal/hr)	109.1 (28.8)
50% load with fan, L/hr (gal/hr)	70.4 (18.6)
25% load with fan, L/hr (gal/hr)	41.3 (10.9)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in water)	0.12 (0.48)
Radiator air flow, m³/min (cfm)	720 (25426)
Engine coolant capacity, L (gal)	20.8 (5.5)
Radiator coolant capacity, L (gal)	54 (14)
Total coolant capacity, L (gal)	75 (20)
Inlet Air	
Combustion air inlet flow rate m³/min (cfm)	38.2 (1347.7)
Max. allowable combustion air inlet temp, °C (°F)	49 (120)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	531.1 (988.0)
Exhaust gas flow rate, m³/min (cfm)	102.1 (3605.5)
Exhaust system backpressure (maximum allowable) kPa (in. water)	10.0 (40.0)
Heat Rejection	
Heat rejection to jacket water, kW (Btu/min)	182 (10375)
Heat rejection to exhaust (total), kW (Btu/min)	493 (28039)
Heat rejection to aftercooler, kW (Btu/min)	121 (6860)
Heat rejection to atmosphere from engine, kW (Btu/min)	91 (5182)
Heat rejection from alternator, kW (Btu/min)	29 (1655)
Emissions (Nominal)[2]	
NOx, mg/Nm³ (g/hp-hr)	2129.1 (4.6)
CO, mg/Nm³ (g/hp-hr)	301.5 (0.6)
HC, mg/Nm³ (g/hp-hr)	8.8 (0.03)
PM, mg/Nm³ (g/hp-hr)	9.5 (0.03)

D500 GC Diesel Generator Sets
Electric Power

Alternator[3]		
Voltages	480V	600V
Motor starting capability @ 30% Voltage Dip, skVA	1160	1350
Current Amps	751.8	601.4
Frame Size	M3154L41	M3136L41
Excitation	S.E	AREP
Temperature Rise, °C	105	130

WEIGHTS & DIMENSIONS – OPEN SET



FUEL TANK CAPACITY

Tank Design	Total Capacity L (gal)	Useable Capacity L (gal)
Integral	3671 (969.7)	3323 (877.8

Base	Length "A" mm (in)	Width "B" mm (in)	Height "C" mm (in)	Generator Set Weight kg (lb)
Skid (Wide Base)	4815 (189.6)	1630 (64.2)	2034 (80.1)	3756 (8280.6)
Integral Tank Base	4815 (189.6)	1630 (64.2)	2584 (101.7)	4693 (10346.3)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

FUEL RATES: Based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/litre (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details.
For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

LEHE2011-09 (09/22)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: PCPXL15.2NZS-011

Effective Date: 07/05/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 07/05/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PCPXL15.2NZS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

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This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

UK Sanders-Brown Center on Aging/Neuroscience Facilities

26 3213 Emergency Generator

Submittal

GLENWOOD ELECTRIC INC.

12250 CHANDLER DR.

WALTON, KY 41094

5/16/2023

5/16/2023

NIXON POWER SERVICES



SUBMITTAL PACKAGE

Sanders Brown Renovation Gen Only

CONTRACTOR / INSTALLER: Glenwood Electric

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

KOHLER®

TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 600REOZVB Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Alternator Data		
	Alternator Data Sheet	5M4032
Sound Data		
	Sound Data Sheet	Sound Data
Emissions Data		
	EPA Certificate	EPA Certificate
DimensionalDrawings		
	Generator	ADV-8743
	Accessories	ADV-8231
	Controller	ADV-7985
	Remote Serial Annunciator	GM85123

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WiringSchematicDiagrams

Controller Schematic Diagram	ADV-9221
Controller Wiring Diagram	GM94316
Remote Serial Annunciator	ADV-9169
Remote Serial Annunciator	GM62554
Voltage Diagram	ADV-5875

Misc

Battery	244578
Battery Charger	GM87448
Battery Charger Assembly	GM95114
Block Heater	GM79182
Block Heater	GM79187
Circuit Breaker	GM24181
Circuit Breaker Mounting	ADV-8030
Emergency Stop	GM103743
Flexible Exhaust Tube	GM64276
Silencer, Critical	343615
Weld-On Flange	343609

Warranty

Warranty	TP-5374
Warranty	TP-5498

Certification

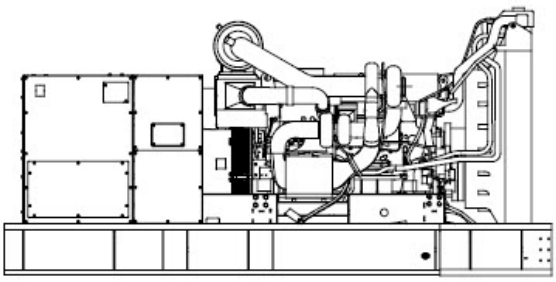
ISO9001 Certificate	G15-152
Prototype Test Certificate	G18-56

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator



Kohler Model: 600REOZVB

This diesel generator set equipped with a 5M4032 alternator operating at 277/480 volts is rated for 600 kW/750 kVA. Output amperage: 903

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	600REOZVB Generator System
1	600REOZVB Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	600REOZVB, TWD1644
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4032
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Standard Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Rating, LCB 1 Left	100% Rated
Amps, LCB 1 Left	600
Trip Type, LCB 1 Left	Electronic, LSI
LCB 1 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Left	Shunt Trip
Frame, LCB 1 Left	PG
Position, LCB 1 Left	5
Rating, LCB 2 Left	100% Rated
Amps, LCB 2 Left	600
Trip Type, LCB 2 Left	Electronic, LSI
LCB 2 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Left	Shunt Trip
Frame, LCB 2 Left	PG
Position, LCB 2 Left	6
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset
Miscellaneous Accy,Installed	Oil in Genset
Warranty	5 Year Basic

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

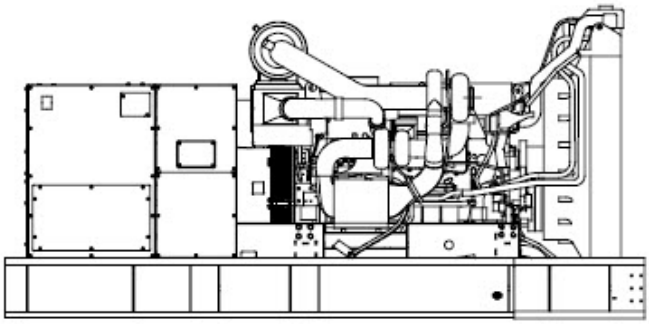
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Total unit length in inches	182
	Total unit width in inches	75
	Total unit height in inches	85
	Total unit weight (lbs)	10,925
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	Silencer,Hospital,10"Flange,SIEO	
1	Flexible Exhaust Connection, 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 600REOZVB	
1	RSA III, Annunciator only	

KOHLER®

Spec Sheets

KOHLER®

600REOZVB
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
5M4032	277/480	3	60	2200	600/750	903

RATINGS: All three-phase units are rated at 0.8 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage.
There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.
A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.4% per 100 m (328 ft.) elevation above 1400 m (4593 ft.).

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Leads, quantity	10, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhydroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TWD1643GE (IBC Only), TWD1644GE (W/O IBC)
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	16.5:1 (IBC Only), 16.8:1
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	674 (903)
Cylinder head material	Cast Iron
Piston: type, material	Swirl Chamber, Graphite-Coated Aluminum
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.0 (IBC Only), EMS 2.3
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	130 (4594) IBC Only, 114.5 (4044)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	461 (862) IBC Only, 495 (923)
Maximum allowable back pressure, kPa (in. Hg)	10 (2.95)
Exh. outlet size at eng. hookup, mm (in.)	See ADV drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	10.0 (0.38)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. fuel flow, Lph (gph)	210 (55.5) IBC Only, 185 (48.9)
Max. fuel pump restriction, kPa (in. Hg)	10 (3.0)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter: quantity, type	2
Fuel Filter Secondary	5 Micron (IBC Only), 5 Micron
Fuel Filter Primary	10 Micron (IBC Only), 30 Micron
Recommended fuel	#2 Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122) IBC Only, 45 (113)
Engine jacket water capacity, L (gal.)	33 (8.7) IBC Only, 25 (6.6)
Radiator system capacity, including engine, L (gal.)	166 (43.9) IBC Only, 151.1 (39.9)
Engine jacket water flow, Lpm (gpm)	360 (95.4)
Charge cooler water flow, Lpm (gpm)	150 (39.6) IBC Only, 126 (33)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	245 (13933) IBC Only, 246 (13990)
Heat rejected to charge air cooling water at rated kW, dry exhaust, Kw Btu/min.	216 (12284) IBC Only, 147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38.0)
Fan, kWm (HP)	30 (41) IBC Only, 34 (46)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	760 (26839) IBC Only, 665 (23484)
Combustion air, m3/min. (cfm)	55 (1937) IBC Only, 48 (1649)
Heat rejected to ambient air: Engine, kW (Btu/min.)	29 (1649) IBC Only, 24 (1342)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	45 (2560)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

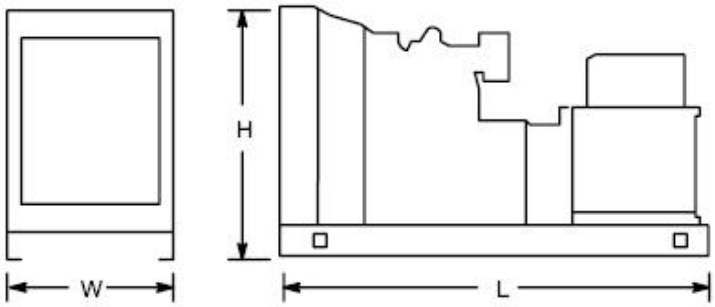
Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	161.8 Lph (42.7 gph) IBC Only, 157.0 Lph (41.5 gph)
Standby Fuel Consumption at 75% load	117.8 Lph (31.1 gph) IBC Only, 118.4 Lph (31.3 gph)
Standby Fuel Consumption at 50% load	79.3 Lph (21.0 gph) IBC Only, 80.1Lph (21.2 gph)
Standby Fuel Consumption at 25% load	43.6 Lph (11.5 gph) IBC Only, 45.0 Lph (111.9 gph)
Prime Fuel Consumption at 100% load	146.1 Lph (38.6 gph) IBC Only, 144.2 Lph (38.1 gph)
Prime Fuel Consumption at 75% load	106.9 Lph (28.2 gph) IBC Only, 108.2 Lph (28.6 gph)
Prime Fuel Consumption at 50% load	72.7 Lph (19.2 gph) IBC Only, 73.9 Lph (19.5 gph)
Prime Fuel Consumption at 25% load	40.5 Lph (10.7 gph) IBC Only, 42.6 Lph (11.3 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1973 (166.5 x 72.0 x 77.7)
Weight (radiator model), wet, kg (lb.):	4885 (10770)

Model: 600REOZVB, continued



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

KOHLER®

Emissions Data

KOHLER®

600REOZVB

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TWD1643GE,TWD1644GE	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	674	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	PVPXL16.1ACW
Compression Ratio:	16.5:1	EPA Certificate:	PVPXL16.1ACW-011
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA (g/kWh):	**EPA D2 Cycle 5-mode weighted**	
	TWD1643GE	TWD1644GE
HC	0.11	0.11
NOx (Oxides of Nitrogen as NO_2)	5.63	5.59
CO (Carbon Monoxide)	0.41	0.39
PM (Particulate Matter)	0.076	0.04

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2023
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACW-011**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACW

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

SUBMITTAL COVER SHEET – SS03 REVISION 1

SUBMITTAL STATUS: **SUBMITTED**

H&R Project: 23-111 - Bosworth Building Boiler Replacement **Submittal Date:** 7/28/2023

Submitted By: Chad Walter
Company: H&R Mechanical Contractors, Inc.
PO Box 797

Georgetown, KY 40324
cwalter2@hrmech.com | 502-863-4955

Submitted To: Jason Murphy
Company: University of Kentucky
Accounts Payable
PO Box 77-00056
Lexington, KY 40506
jtmup0@uky.edu | 859-257-9103

Submittal # SS03, Revision 1

HOT WATER BOILER AND PUMP

Spec Section	Type	Supplier	Manufacturer
23 25 16	Product Data	Stoermer Anderson, Inc	Camus

Attachment(s):

S03 R1 Revision_1 Submittal UK Bossworth Boilers 23 25 16 N3D.pdf

Notes:

1. Boiler supplier shall provide dedicated boiler pumps. 2. Provide boilers with gas regulators if pressure drop is exceeded during startup and gas system has to be increased above 14". 3. Provide blocked drain switch. 4. High and Low Gas Pressure Switches Required.

N3D GROUP

REVIEWED FOR GENERAL CONFORMANCE WITH CONSTRUCTION DOCUMENTS ONLY. NOTES AND MARKINGS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS. THIS REVIEW DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS AND OMISSIONS IN DESIGNS WHICH THE CONTRACTOR IS RESPONSIBLE.

☐ NO EXCEPTIONS ☐ RESUBMIT
☒ NOTE MARKINGS ☐ REJECTED

BY: JAN DATE: 8/1/23

Previous submittal items have been addressed above in this letter.

Equipment Submittal

Project Name:	Bosworth Building Boiler Replacement CCK-2731-24	**Spec Section:**	23 52 16
Manufacturer:	Camus Hydronics & Armstrong Pumps	**Date Submitted:**	7/28/2023
Description:	Fire Tube Boilers & Pumps	**Original or Revision #:**	Revision #1

PROJECT INFO: University of Kentucky Bosworth Building
631 S Limestone
Lexington KY 40508

MECHANICAL ENGINEER: ND3 Group
1204 Winchester Rd. Suite 200
Lexington Ky 40506
John A Newman 859-303-5708

CONSTRUCTION MANAGER:

MECHANICAL CONTRACTOR: H & R Mechanical Contractors
106 Demand Ct.
Georgetown KY 40325
Rick Napier 502-863-4955

EQUIPMENT SUPPLIER: Stoermer-Anderson, Inc.
3818 Red Bank Road
Cincinnati, OH 45227

Area below reserved for approval stamps:

Date: 7/18/23
Job: UK Bosworth Boiler Replacement
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H&R Mechanical
End User: University of Kentucky
Prepared By: CET



VALIANT-FT SERIES II

Condensing Boiler – Hydronic Heating

The Valiant-FT Series II is a condensing, commercial boiler, designed for use with a hydronic heating system at working pressures up to 160 PSI.

- ANSI Z21.13/CSA 4.9 Certified
- ASME Certified; “H” Stamp / National Board Listed
- Canadian Registration Number (CRN)
- CSD-1 Compliant
- AHRI Certified

Performance Overview:

- Capable of up to 99.4% Thermal Efficiency and up to 99.2% Combustion Efficiency.
- Available in a broad capacity range, with inputs from 400 to 850 KBtu/h.
- Fully condensing vertical cylindrical counter-flow firetube design heat exchanger, with stainless steel construction and all welded design allowing constant system return temperatures as low as 40F°.
- 10:1 gas input turn-down ratio with sustained combustion characteristics throughout the entire range.
- NOx < 9 ppm corrected to 3% oxygen (Pending Approval).
- Category II & IV venting.
- Fully factory fire-tested to obtain optimum combustion characteristics and to establish certified gas input rates.
- Safety and operating devices and controls fully configured, calibrated and factory tested.
- Complies with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard.
- Certified by CSA to the Requirements of ANSI Z21.13, And CSA 4.9.

H

Date: 7/20/23 Engineer: ND3 Group
Job: UK Bosworth Building Boiler Replace Contractor: H&R Mechanical Contractors
Model #: VA0850 End User: University of Kentucky
Representative: SAI Prepared By: CET

CAMUS Hydronics Ltd.

Heat Exchanger

- ASME Section IV Welded Stainless-Steel Heat Exchanger
- VA0400 to VA0850 – 160 PSI Operating Pressure
- 50°F to 208°F Supply Temperature Range
- Fully welded construction with stainless steel pressure vessel, tubes, tube sheets and combustion chamber
- ASME Relief Valve
- Drain valve

Combustion Features

- Direct Vent (Sealed Combustion)
- Standard Air Filter for combustion air
- Modulating Stainless Steel knitted metal fiber Premix Burner
- Venturi Air/Gas Ratio Combustion Control
- "Inherent O2 Trim" Via Air Density Response
- Low NOx (SCAQMD Pending)
- Natural Gas or Propane Fuel Operation (Field Convertible)
- Input gas pressure is 4"-14" W.C. for Natural Gas (5" W.C. min gas pressure for NG VA0500); and 8"-14" W.C. for Propane.
- 10:1 Turndown for NG (5:1 for LP)
- Category II Venting
- Category IV Venting (120' Flue & 120' Air Intake vent)
- Approved for Thermoplastic Venting (PVC, CPVC, PPE)
- Direct Ignition
- Flame Sensor
- Optional UV flame detection
- Flame view port for visual inspection of ignition and/or the boiler combustion during firing.

Standard Safeties

- Air Pressure Switch
- Blocked Flue Switch
- Water Flow Switch
- High & Low Air Pressure Switches (Blocked Air Intake & Blocked Flue Switch)
- Manual Reset High Temperature Limit
- ΔT heat exchanger protection algorithm

Standard Control Features

- Externally mounted 7" Touchscreen
- System Temperature Sensor
- Inlet & Outlet Temperature Sensors
- Flue Temperature Sensor
- Local/Remote switch for building management, remote modulation and set-point control
- Built-in audible alarm
- SOLA Controller featuring cascade controls lead lag up to 8 boilers
- Manual Reset Soft High Limit (through touchscreen)
- Outdoor Reset
- Alarm Contacts
- Pump Enable Contacts
- Air Inlet Damper (or Damper Contacts)
- PWM (pulse width modulation) signal output for modulating fan speeds.
- Native Modbus Communication
- Lead-Lag Staging
- Flame Signal Monitoring
- Error History w/ Cycle Stamp
- Manual Override of Boiler Modulation Rate

Optional Features

- CSD-1
- Motorized isolation valves
- Condensate neutralization kit
- BMS gateway – BACnet MSTP/IP, LonWorks or Metasys N2
- Outdoor installation kit (Consult Factory)
- Outdoor sensor
- Outdoor vent kit (Consult Factory)
- High & Low Gas Pressure Switch
- Optional Low Water Cut-Off w/manual reset
- Spring return air inlet damper with wire harness
- Vent adapter to Stainless Steel

Venting Options

- Category II and IV venting
- Direct venting
- Standard PVC/CPVC flue vent connection
- Room air
- Horizontal & vertical venting
- Outdoor venting (Consult Factory)

Venting Materials

- PVC
- CPVC
- PPE
- AL29-4C Stainless Steel

The following guideline shall be used to determine the suitability of vent material:

Vent Material	Maximum Flue Temperature (°F)
PVC	149
CPVC	194
Polypropylene	230
AL29-4C	300+, limited only by rating of seals
316L Stainless Steel	300+, limited only by rating of seals

Date: 7/20/23
Job: UK Bosworth Building Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.

Approx. Heat Exchanger Head Loss and Flow

		Model Size									
		400,000		500,000		600,000		725,000		850,000	
		GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd
Temperature Differential (ΔT)	20	39.00	3.50	49.00	4.80	59.00	4.40	71.00	4.90	83.00	5.70
	30	26.00	2.80	33.00	3.40	39.00	3.20	47.00	3.50	55.00	3.90
	40	20.00	2.50	24.00	2.90	29.00	2.80	35.00	3.00	41.00	3.30
	60	13.00	2.40	16.00	2.50	20.00	2.50	24.00	2.70	28.00	2.80
	80	10.00	2.30	12.00	2.40	15.00	2.30	18.00	2.60	21.00	2.60

Input / Output / High altitude

Model	Max Input Btu/hr (kw)	Max Output Btu/hr (kw)	Max Input > 2000 ft Btu/hr (kw)	Max Output > 2000 ft Btu/hr (kw)	Min input Btu/hr (kw) [NG]	Min Input > 2000 ft Btu/hr (kw) [NG]	Min input Btu/hr (kw) [LP]	Min Input > 2000 ft Btu/hr (kw) [LP]
VA0400	400,000 (117.2)	396,400 (116.2)	360,000 (105.5)	356,760 (104.5)	40000 (11.5)	35,676 (10.4)	80,000 (23.4)	72,000 (21.1)
VA0500	500,000 (146.5)	496,000 (145.3)	450,000 (131.9)	446,400 (130.8)	50000 (14.3)	44,640 (13.0)	100,000 (29.3)	90,000 (26.3)
VA0600	600,000 (175.8)	595,200 (174.4)	540,000 (158.2)	535,680 (157.0)	60000 (17.2)	53,568 (15.7)	120,000 (35.2)	108,000 (31.6)
VA0725	725,000 (212.4)	719,925 (211.0)	652,500 (191.2)	647,932 (189.9)	72500 (20.7)	64,793 (18.9)	145,000 (42.5)	130,500 (38.2)
VA0850	850,000 (249.1)	844,900 (247.6)	765,000 (224.1)	760,410 (222.8)	85000 (24.2)	76,041 (22.3)	170,000 (49.8)	153,000 (44.8)

Minimum Power Requirements

Model	Voltage Requirement	Maximum Over Protection
VA0400	115VAC, 60Hz, Single Phase	15
VA0500	115VAC, 60Hz, Single Phase	15
VA0600	115VAC, 60Hz, Single Phase	15
VA0725	115VAC, 60Hz, Single Phase	15
VA0850	115VAC, 60Hz, Single Phase	15

Model	Weight (lb)	Weight (kg)
VA0400	366	166.02
VA0500	387	175.54
VA0600	417	189.15
VA0725	492	223.17
VA0850	518	234.96

Minimum Service Clearance

Model	Top	Right	Left	Back	Front
VA0400	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0500	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0600	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0725	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0850	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)

*Minimum clearance of 10” recommended on right hand side of appliance for ease of filter replacement.

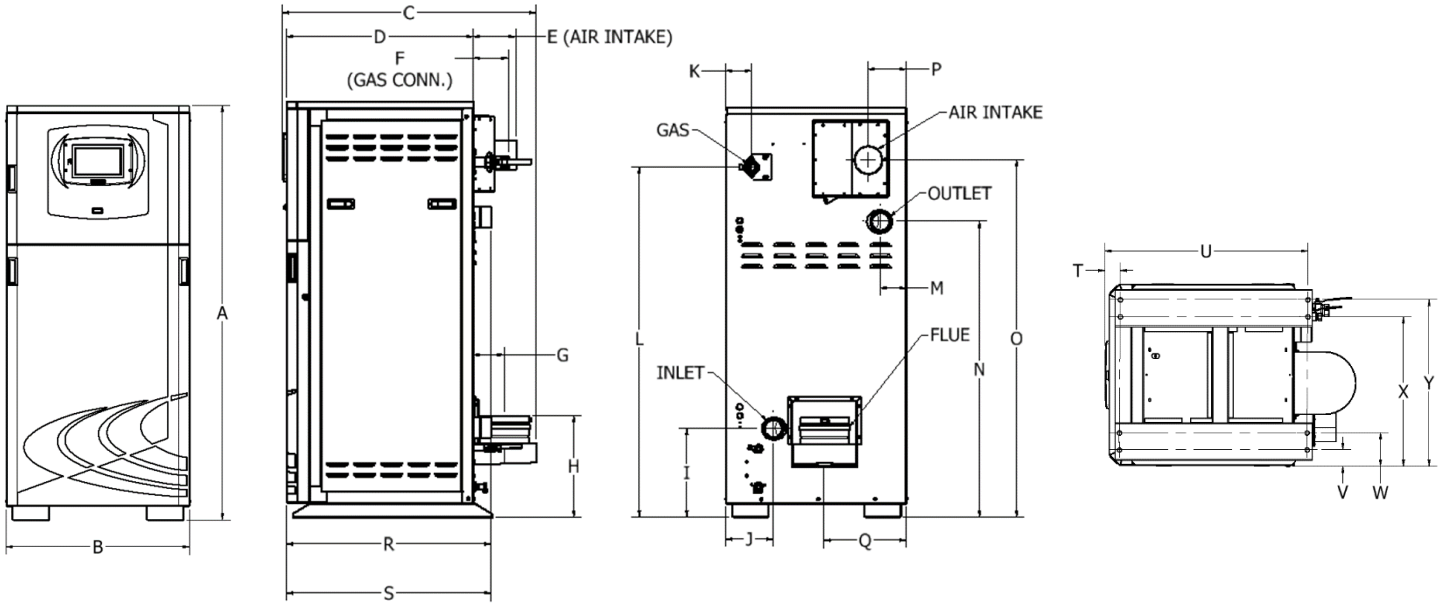
Clearance to Combustibles

Model	Top	Right	Left	Back	Flue Vent
All Models	1” (2.5 cm)	0” (0 cm)	0” (0 cm)	1” (2.5 cm)	1” (2.5 cm)

Date: 7/20/23
Job: UK Bosworth Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.



	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Inches)	400	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	500	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	600	57 1/2	25 1/4	31 3/8	23 3/8	6 5/8	5 3/8	4 3/8	14	12 1/8	7 5/8	2	48 1/2
	725	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8
	850	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Inches)	400	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	500	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	600	3 1/4	41 1/2	49 5/8	5 1/8	10 7/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/4	4 5/8	20 5/8	23
	~~725~~	~~3 5/8~~	~~41 1/2~~	~~50 1/8~~	~~5 3/8~~	~~11 1/2~~	~~28 7/8~~	~~28 7/8~~	~~2 1/8~~	~~28 1/4~~	~~2 1/4~~	~~4 5/8~~	~~20 7/8~~	~~23 1/4~~
	850	3 5/8	41 1/2	50 1/8	5 3/8	11 1/2	28 7/8	28 7/8	2 1/8	28 1/4	2 1/4	4 5/8	20 7/8	23 1/4

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Inches)	400	2	2	1	4	4
	500	2	2	1	4	4
	600	2	2	1	5	6
	~~725~~	~~2 1/2~~	~~2 1/2~~	~~1~~	~~5~~	~~6~~
	850	2 1/2	2 1/2	1	5	6

	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Millimeters)	400	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	500	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	600	1460.5	641.4	796.9	593.7	168.3	136.5	111.1	355.6	308.0	193.7	50.8	1231.9
	725	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8
	850	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Millimeters)	400	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	500	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	600	82.6	1054.1	1260.5	130.2	276.2	692.2	692.2	54.0	650.9	57.2	117.5	523.9	584.2
	725	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6
	850	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Millimeters)	400	50.8	50.8	25.4	101.6	101.6
	500	50.8	50.8	25.4	101.6	101.6
	600	50.8	50.8	25.4	101.6	152.4
	725	63.5	63.5	25.4	127	152.4
	850	63.5	63.5	25.4	127	152.4

Submittal

Ref. #: SQFNR000569_1

E.2 series dry motor circulator

Model: Series E21.2 STD125

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag number:	BP-1 & BP-2	Pipe orientation:	Single
Service:	Boiler Pumps	Suction pressure:	0 ft
Location:		Fluid:	Non-Potable Fluid - Water
Quantity:	2	Operating temperature:	60˚F
Duty flow per pump:	60 USgpm	Viscosity:	31 SSU
Duty head:	15 ft	Specific gravity:	1.0000
Total dissolved solids:	0 ppm	Efficiency at Design:	N/A
NPSHR:	1 ft	Impeller diameter:	2.7 in

Materials of construction

Construction:	STD 125	Impeller:	Glass-filled Noryl
Rating:	ANSI-125	Bearings:	Permanently Lubricated SS
Connections:	Inlet:1.5 in, Outlet: 1.5 in		

Mechanical seal data

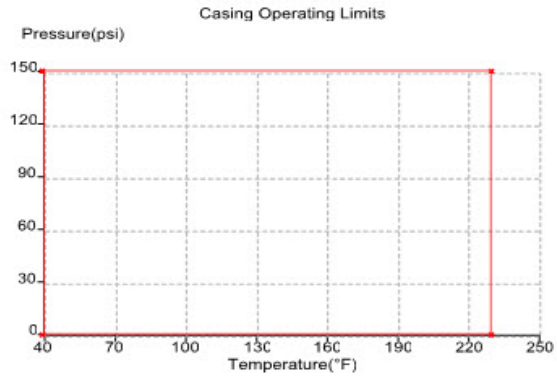
Manufacturer:	Armstrong	Seal:	Silicon Carbide
Seal type:	Bellows-style Silicon Carbide	Maximum Total Dissolved Solid (TDS)*:	2000 PPM

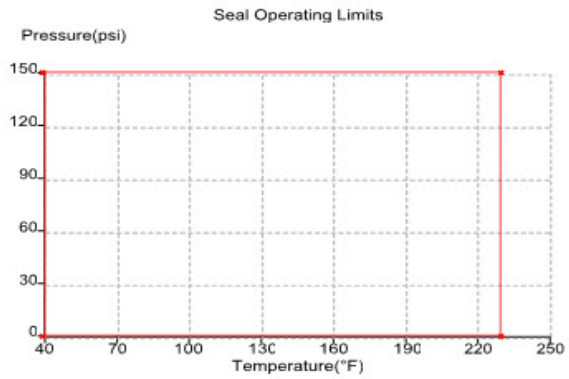
*Note: Please ensure proper seal is selected by inputting Total Dissolved Solids (TDS) in PPM in ADEPT if water quality is poor at site. Also select Flush Line Filter or Cyclone Separator if there are other contaminants in the fluid.

Motor electrical data

Supplier:	Factory Choice	Insulation class:	Class F Insulation
Size:	0.4 hp	Inverter motor type:	[none]
Frame size:	Not applicable	Efficiency:	Std
Enclosure:	ODP	Speed:	3350 rpm
Motor power supply:	115/1/60		

Operating limits (temperature - pressure)



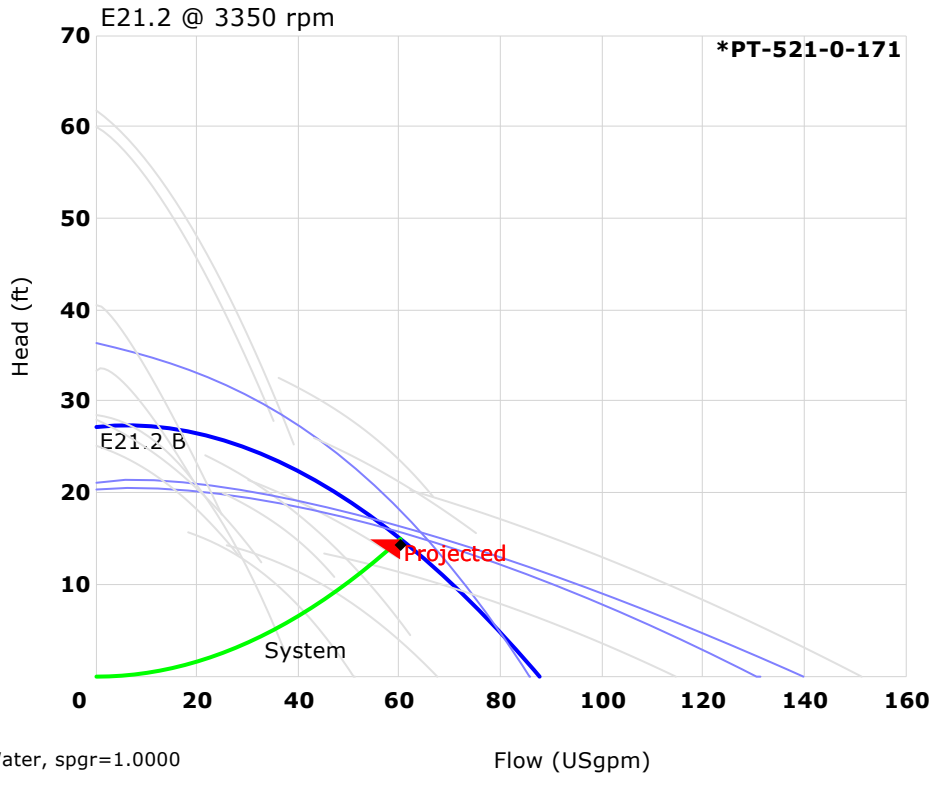


Maximum pressure: 150 psi

Maximum temperature: 230 ˚F

All Pump casings are hydrostatically tested to requirements of ANSI/HI 14.6 standard.

Performance curve



----Admin Data—-
Tag Num: BP-1 & BP-2
Service: Boiler Pumps
Locaion:

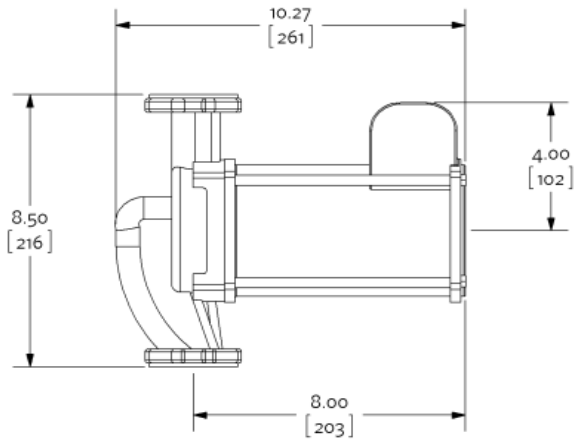
----Motor Data----
Motor Size: 0.4 hp
Motor Speed: 3350 rpm

----Design Duty Points---
Flow: 60 USgpm
Head: 15 ft

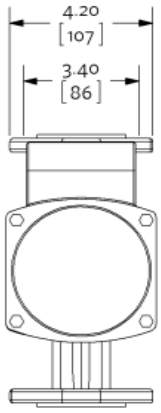
----Pump Data----
Pump Size: E21.2 STD125
Impeller: 2.7 in
Suction Head:0 ft
Projected Flow: 60.0991 USgpm
Projected Head: 15.0404 ft

Dimensional data (not for construction)

Side view



Top view



Weight: 26 lb [11.79 kg], Units of measure: inches [millimeters]

- Not to scale
- Tolerance of ± 0.125 inch (± 3 mm) should be used
- For certified dimensions, please contact your Armstrong representative

Connection details

Connection	Size	Rating	OD	Bolt quantity*	BCD	Bolt size
Inlet	1.5	ANSI-125	5.00	2	3.88	0.5
Outlet	1.5	ANSI-125	5.00	2	3.88	0.5

*Equally spaced straddling centreline

Submittal

Ref. #: SQFNR000569_1

Flo-trex valve

Model: FTV-2TS-Flo-Trex Valve-Straight

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag	Qty	Model	Size Inlet/Outlet	Config	Pipe Type	Design flowrate	Pressure Drop*	Associated pump
BP-1 & BP-2	2	FTV-2TS	2 in	Straight	NPT	60 USgpm	3.75 ft	N/A

*at design flow

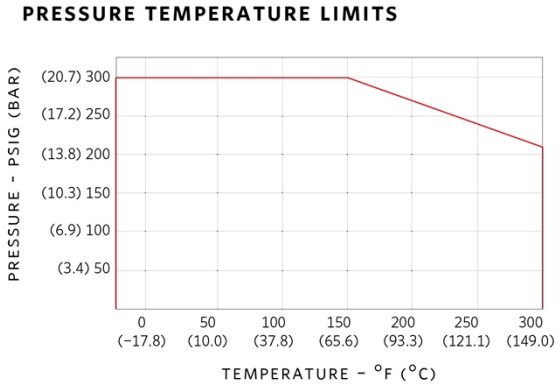
Materials of construction

FTV-2TS-Flo-Trex Valve-Straight

Body:	304 Stainless Steel	Spring:	304 Stainless Steel
Disc:	Brass	O rings:	EPDM
Seat:	Not Applicable	2 metering ports:	Brass Body with EPDM Check and Gasketed Cap
Stem:	Brass	2 drain tappings:	1/4in NPT with SS 304 Plug

Operating limits (temperature - pressure)

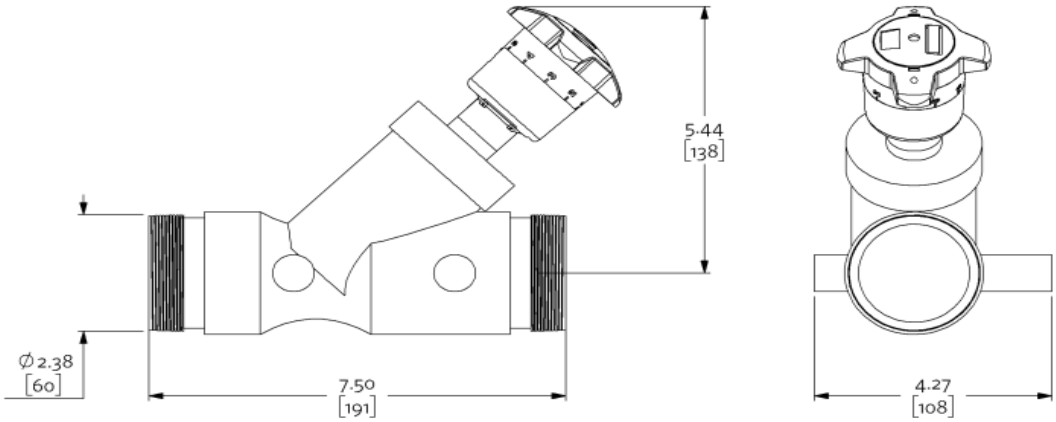
FTV-2TS-Flo-Trex Valve-Straight



Maximum pressure: 300 psi
Maximum temperature: 300 F

Dimensional data (not for construction)

Model: FTV-2TS-Flo-Trex Valve-Straight	Weight: 6 lb [2.72 kg]
Side view	Front view



Not to scale
Units of measure: inches [millimeters]
Tolerance of +/- 0.125 inch (+/- 3 mm) should be used
For certified dimensions, please contact your Armstrong representative

University of Kentucky
Facilities Management
Office of the Vice President

August 4, 2025

Mr. Zack Bittner
Ky Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: Revision to the October 10, 2023 Permit Application
University of Kentucky, V-18-052 R1; 21-067-00003, AI 1104

Dear Mr. Bittner:

On October 10, 2023 the University of Kentucky submitted permit applications to install the equipment listed below. The original application proposed the construction of a 237 Hp Kohler 150REOZJF emergency generator located at Pence Hall. The generator installed is a 201 Hp Caterpillar C15D500GC. It was installed in April and started on July 10, 2025. The emission reduction is minimal and all other permitting condition remain the same. Specifically, Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generators. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines. The boiler meets the definition of an insignificant activity as defined in Section 6 of regulation 401 KAR 52:020, *Title V Permits*. Construction of the generators and boiler do not add any additional regulations to the current V-18-052 R1 permit, and all existing conditions of the permit will be met after the addition. Therefore, we request the Division for Air Quality continue to process the revision as a 502(b)(10) change in accordance with 401 KAR 52:020, Section 18.

Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement
Remove the 587 hp generator (EU54-07) and replace it with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.

Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)

Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement
Remove the 94 Hp generator (EU59-13) and replace it with a 757 Hp generator (EU93)

Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement
Remove the 1.3 MMBtu/hr boiler (57-11) and replace it with a 0.85 MMBtu/hr boiler (IA item #11). Refer to the permit application dated May 27, 2025 for the addition of a second 0.85 MMBtu/boiler.

We appreciate your consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Barry K. Swanson
Acting Vice President and
Chief Facilities Officer

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: August 8, 2025

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: 500 ft **Property Area:** 1500 **Is this source portable?** ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity: ☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☑ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Refer to DEP7007A

Proposed Operation Start-Up Date: *(MM/YYYY)* Refer to DEP7007A

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ Yes ☐ No

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

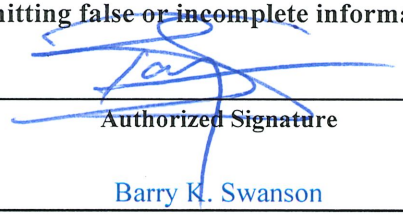
Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.



Authorized Signature

8/8/25

Date

Barry K. Swanson

Type or Printed Name of Signatory

Acting VP and Chief Facilites Officer

Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.
Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement Remove the 1.3 MMBtu/hr boiler (57-11) and replace with a 0.85 MMBtu/hr boiler (IA item #11)
Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement Remove the 587 hp (EU54-07) and replace with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.
Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)
Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement Remove the 94 Hp generator (EU59-13) and replace with a 757 Hp generator (EU93)
Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information
___ Section A.2: Operating and Fuel Information
___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky
KY EIS (AFS) #: 21-067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903Hp Diesel Generator-Sanders Brown	1	Diesel Fuel Usage	Emergency Generator		Kohler	600REOZVB	06/2023, ordered 06/2024, install est.	20300101	1000 gal	None	1
92	201 Hp Diesel Generator-Pence Hall	1	Diesel Fuel Usage	Emergency Generator		Caterpillar	D150 GC	08/2023, ordered 4/2025, install est.	20300101	1000 gal	None	1
93	757 Hp Diesel Generator-Memorial Coliseum	1	Diesel Fuel Usage	Emergency Generator		Kohler	500REOZVC	02/2024, install est.	20300101	1000 gal	None	1
94	762 Hp Diesel Generator-Parking Structure #8	1	Diesel Fuel Usage	Emergency Generator		Kohler	150REOZJF	07/2023, ordered 02/2025, install est.	20300101	1000 gal	None	1
IA	0.85 MMBtu Natural Gas Boiler-Bosworth	1	Natural Gas Usage	Indirect Heat Exchanger		Valiant Series II	VA0850	11/2023, install est	10100602	MMft3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
91				100	6.32	674 903	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
92				100	1.41	150 201	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
93				100	5.30	565 757	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
94				100	5.33	568 762	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
IA		100, hot water			0.85	4980	gal/hr		Primary	Natural Gas	1020	Btu/scf	8760		NA

Section A.3: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.06997	0.06997	0.30648	0.30648
	Bldg 0652							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.08330	0.08330	0.36485	0.36485
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.00633	0.00633	0.02773	0.02773
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00050	0.00050	0.00219	0.00219
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00458	0.00458	0.02007	0.02007
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-09	2.00E-09	8.76E-09	8.76E-09
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.33E-08	1.33E-08	5.84E-08	5.84E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-06	1.00E-06	4.38E-06	4.38E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-09	2.50E-09	1.09E-08	1.09E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.33E-09	2.33E-09	1.02E-08	1.02E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	6.25E-05	6.25E-05	2.74E-04	2.74E-04
								3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
	Bldg 0652							n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-03	1.50E-03	6.57E-03	6.57E-03
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.08E-07	5.08E-07	2.23E-06	2.23E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.42E-08	1.42E-08	6.20E-08	6.20E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.17E-09	4.17E-09	1.82E-08	1.82E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.83E-06	2.83E-06	1.24E-05	1.24E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.67E-07	1.67E-07	7.30E-07	7.30E-07
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.00E-08	1.00E-08	4.38E-08	4.38E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	9.16E-07	9.16E-07	4.01E-06	4.01E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.17E-06	1.17E-06	5.11E-06	5.11E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.00E-08	7.00E-08	3.06E-07	3.06E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.17E-06	3.17E-06	1.39E-05	1.39E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.17E-07	2.17E-07	9.49E-07	9.49E-07
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.58E-03	1.58E-03	6.90E-03	6.90E-03
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	100.0	100.0	437.8	437.8

Division for Air Quality

300 Sower Boulevard
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
57-11 replaced with IA-11	Removed 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.10668	-0.10668	-0.46726	-0.46726
57-11 =	COMB0015							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.12700	-0.12700	-0.55626	-0.55626
	Bldg 0652							PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	-0.00965	-0.00965	-0.04228	-0.04228
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	-0.00076	-0.00076	-0.00334	-0.00334
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	-0.00699	-0.00699	-0.03059	-0.03059
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-09	-3.05E-09	-1.34E-08	-1.34E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.03E-08	-2.03E-08	-8.90E-08	-8.90E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-06	-1.52E-06	-6.68E-06	-6.68E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.81E-09	-3.81E-09	-1.67E-08	-1.67E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.56E-09	-3.56E-09	-1.56E-08	-1.56E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
57-11 replaced with IA-11	**Removed** 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	-9.53E-05	-9.53E-05	-4.17E-04	-4.17E-04
57-11 =	COMB0015							3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
	Bldg 0652							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-03	-2.29E-03	-1.00E-02	-1.00E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	-7.75E-07	-7.75E-07	-3.39E-06	-3.39E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.16E-08	-2.16E-08	-9.46E-08	-9.46E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-6.35E-09	-6.35E-09	-2.78E-08	-2.78E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	-4.32E-06	-4.32E-06	-1.89E-05	-1.89E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	-2.54E-07	-2.54E-07	-1.11E-06	-1.11E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.52E-08	-1.52E-08	-6.68E-08	-6.68E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.40E-06	-1.40E-06	-6.12E-06	-6.12E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.78E-06	-1.78E-06	-7.79E-06	-7.79E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.07E-07	-1.07E-07	-4.67E-07	-4.67E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	-4.83E-06	-4.83E-06	-2.11E-05	-2.11E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	-3.30E-07	-3.30E-07	-1.45E-06	-1.45E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	-2.40E-03	-2.40E-03	-1.05E-02	-1.05E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	-152.4	-152.4	-667.5	-667.5

Division for Air Quality

300 Sower Boulevard
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
91	903 Hp Diesel Generator-Sanders Brown	1	Diesel Usage	NA	NA	1	0.0427	CO	13.2	mfg cert	0.00%	0.00%	0.5636	0.5636	0.1409	0.1409
	Bldg 0230							NO2	181.1	mfg cert	0.00%	0.00%	7.7338	7.7338	1.9335	1.9335
								PM10	2.45	mfg cert	0.00%	0.00%	0.1046	0.1046	0.0262	0.0262
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0090	0.0090	0.0022	0.0022
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	2.0475	2.0475	0.5119	0.5119
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	1.49E-04	1.49E-04	3.74E-05	3.74E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	4.70E-05	4.70E-05	1.17E-05	1.17E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	4.53E-03	4.53E-03	1.13E-03	1.13E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	4.61E-04	4.61E-04	1.15E-04	1.15E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	1.64E-03	1.64E-03	4.11E-04	4.11E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	1.13E-03	1.13E-03	2.82E-04	2.82E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	1.24E-03	1.24E-03	3.10E-04	3.10E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	968.52	968.52	242.1	242.1

Division for Air Quality

300 Sower Boulevard
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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
54-07 replaced with EU91	**REMOVED** 587 Hp Diesel Generator-Sanders Brown	2	Diesel Usage	NA	NA	1	-0.0300	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-3.9060	-3.9060	-0.9765	-0.9765
54-07 =	COMB0012	2	0.03 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-18.1290	-18.1290	-4.5323	-4.5323
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-1.2744	-1.2744	-0.3186	-0.3186
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0018	-0.0018	-0.0004	-0.0004
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.4385	-1.4385	-0.3596	-0.3596
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-3.15E-03	-3.15E-03	-7.88E-04	-7.88E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-3.81E-04	-3.81E-04	-9.53E-05	-9.53E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-3.84E-03	-3.84E-03	-9.60E-04	-9.60E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-4.85E-03	-4.85E-03	-1.21E-03	-1.21E-03
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.68E-03	-1.68E-03	-4.20E-04	-4.20E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-1.17E-03	-1.17E-03	-2.93E-04	-2.93E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-6.90E-04	-6.90E-04	-1.73E-04	-1.73E-04
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-674.04	-674.04	-168.5	-168.5

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	201 Hp Diesel Generator-Pence	1	Diesel Usage	NA	NA	1	0.0100	CO	38.60	mfg cert	0.00%	0.00%	0.39	0.39	0.10	0.10
	Bldg 0041							NO2	122.00	mfg cert	0.00%	0.00%	1.22	1.22	0.31	0.31
								PM10	3.860	mfg cert	0.00%	0.00%	0.039	3.86E-02	9.65E-03	9.65E-03
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	0.001	5.96E-04	1.49E-04	1.49E-04
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.480	0.480	1.20E-01	0.120
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00105	1.05E-03	2.63E-04	2.63E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00013	1.27E-04	3.18E-05	3.18E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00128	1.28E-03	3.20E-04	3.20E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00162	1.62E-03	4.04E-04	4.04E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00056	5.60E-04	1.40E-04	1.40E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00039	3.90E-04	9.75E-05	9.75E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00023	2.30E-04	5.75E-05	5.75E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	225	225	56.17	56

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
93	757 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	0.03680	CO	11.2	mfg cert	0.00%	0.00%	0.4122	0.4122	0.1030	0.1030
	Bldg 0019							NO2	178.9	mfg cert	0.00%	0.00%	6.5835	6.5835	1.6459	1.6459
								PM10	1.3	mfg cert	0.00%	0.00%	0.0478	0.0478	0.0120	0.0120
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0077	0.0077	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7646	1.7646	0.4411	0.4411
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00013	0.00013	3.22E-05	3.22E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	1.01E-05	1.01E-05
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00391	0.00391	0.0010	0.0010
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00040	0.00040	9.94E-05	9.94E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00142	0.00142	3.54E-04	3.54E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00097	0.00097	2.43E-04	2.43E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00107	0.00107	2.67E-04	2.67E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	832	832	208	208

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
59-13 Replaced with EU93	REMOVED 94 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	-0.00480	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-0.6250	-0.6250	-0.1562	-0.1562
59-13 =	COMB0017	1	0.0048 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-2.9006	-2.9006	-0.7252	-0.7252
	Bldg 0019							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.2039	-0.2039	-0.0510	-0.0510
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0003	-0.0003	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-0.2302	-0.2302	-0.0575	-0.0575
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-0.00050	-0.00050	-1.26E-04	-1.26E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-0.00006	-0.00006	-1.52E-05	-1.52E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-0.00061	-0.00061	-1.54E-04	-0.0002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-0.00078	-0.00078	-1.94E-04	-1.94E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-0.00027	-0.00027	-6.72E-05	-6.72E-05
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-0.00019	-0.00019	-4.68E-05	-4.68E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-0.00011	-0.00011	-2.76E-05	-2.76E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-108	-108	-27	-27

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
94	762 HP Diesel Generator-Parking #8	1	Diesel Usage	NA	NA	1	0.03570	CO	25.9	mfg cert	0.00%	0.00%	0.9246	0.9246	0.2312	0.2312
	Bldg 0601							NO2	198.3	mfg cert	0.00%	0.00%	7.0793	7.0793	1.7698	1.7698
								PM10	1.3	mfg cert	0.00%	0.00%	0.0464	0.0464	0.0116	0.0116
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0075	0.0075	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7118	1.7118	0.4280	0.4280
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00012	0.00012	3.12E-05	3.12E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	9.82E-06	9.82E-06
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00379	0.00379	0.0009	0.0009
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00039	0.00039	9.64E-05	9.64E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00137	0.00137	3.44E-04	3.44E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00094	0.00094	2.36E-04	2.36E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00104	0.00104	2.59E-04	2.59E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	807	807	202	202

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary

__ Section N.2: Stack Information

__ Section N.3: Fugitive Information

__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-0003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: August 8, 2025

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								CO					-2.281	-2.281	-0.722	-0.722
								NO2					1.543	1.543	0.205	0.205
								PM10					-1.244	-1.244	-0.325	-0.325
								SO2					0.022	0.022	0.005	4.53E-03
								VOC					4.332	4.332	1.073	1.073
								Acenaphthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acenaphthylene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acetaldehyde					-2.20E-03	-2.20E-03	-5.51E-04	-5.51E-04
								Acrolein					-1.88E-04	-1.88E-04	-4.71E-05	-4.71E-05
								Anthracene					-1.05E-09	-1.05E-09	-4.59E-09	-4.59E-09
								Benz(a)anthracene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzene					9.06E-03	9.06E-03	2.26E-03	2.26E-03
								Benzo(b)fluoranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzo(a)pyrene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(g,h,i)perylene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(k)flouranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Chrysene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								7,12-Dimethylbenz(a)anthracene					-6.99E-09	-6.99E-09	-3.06E-08	-3.06E-08
								Dibenzo(a,h)anthracene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Dichlorobenzene					-5.24E-07	-5.24E-07	-2.30E-06	-2.30E-06
								Fluoranthene					-1.31E-09	-1.31E-09	-5.74E-09	-5.74E-09
								Fluorene					-1.22E-09	-1.22E-09	-5.36E-09	-5.36E-09
								Formaldehyde					-4.01E-03	-4.01E-03	-1.24E-03	-1.24E-03
								3-Methylchloranthrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								2-Methylnaphthalene					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								n-Hexane					-7.87E-04	-7.87E-04	-3.45E-03	-3.45E-03
								Indeno(1,2,3-cd)pyrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Naphthalene					-2.67E-07	-2.67E-07	-1.17E-06	-1.17E-06
								Phenanthrene					-7.43E-09	-7.43E-09	-3.25E-08	-3.25E-08
								Pyrene					-2.19E-09	-2.19E-09	-9.57E-09	-9.57E-09
								Toluene					3.04E-03	3.04E-03	7.55E-04	7.55E-04
								Xylene					2.07E-03	2.07E-03	5.19E-04	5.19E-04
								Arsenic					-8.74E-08	-8.74E-08	-3.83E-07	-3.83E-07
								Beryllium					-5.24E-09	-5.24E-09	-2.30E-08	-2.30E-08
								Cadmium					-4.81E-07	-4.81E-07	-2.11E-06	-2.11E-06
								Chromium					-6.12E-07	-6.12E-07	-2.68E-06	-2.68E-06
								Cobalt					-3.67E-08	-3.67E-08	-1.61E-07	-1.61E-07
								Manganese					-1.66E-06	-1.66E-06	-7.27E-06	-7.27E-06
								Mercury					-1.14E-07	-1.14E-07	-4.98E-07	-4.98E-07
								Nickel					-9.18E-07	-9.18E-07	-4.02E-06	-4.02E-06
								Selenium					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08
								PAH					2.77E-03	2.77E-03	6.93E-04	6.93E-04
								Total HAP					9.75E-03	9.75E-03	-1.08E-03	-1.08E-03
								CO2					1998	1998	283	283

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
91	91 01	1.0, est	30, est				4044	923	
92	92 01	0.33, est	30, est				1197	950	
93	93 01	0.6	30, est				3249	851	
94	94 01	0.6, est	30, est				3606	988	
IA	IA	0.33	20, est					230	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.
Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement Remove the 1.3 MMBtu/hr boiler (57-11) and replace with a 0.85 MMBtu/hr boiler (IA item #11)
Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement Remove the 587 hp (EU54-07) and replace with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.
Pence Hall (bldg 0041) – install a 201 hp emergency generator (EU92)
Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement Remove the 94 Hp generator (EU59-13) and replace with a 757 Hp generator (EU93)
Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Division for Air Quality

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(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirement
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 8, 2025

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	201 Hp Diesel Generator-Pence Hall	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
91 93 94	903 Hp Diesel Generator-Sanders Brown 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (c), (f), (g)(2-3)) 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(c), the engine must be EPA certified by the manufacturer to theemission standards for the same model year and engine power in 60.4205(b). Engine must be installed and configured to manufacture's emission-related specifications. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g)(2-3), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN:** **EU92 -** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performance test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. **EU91, 93, 94** - demonstrate compliance with 60.4211(g)(2) and additionally with (g)(3) which requires subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
91-94	903 Hp Diesel Generator-Sanders Brown 201 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2-3) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations

Application replaces the original application submitted on 10/10/23 to amend the Pence Hall generator from a Kohler 237Hp to a Catepillar 201 Hp.

Cat® D150 GC
Diesel Generator Sets

Pence Hall

Standby : 60 Hz



Image shown may not reflect actual configuration.

Engine Model	Cat® C7.1 In-line 6, 4-cycle diesel
Bore x Stroke	105 mm x 135 mm (4.1 in x 5.3 in)
Displacement	7.01 L (428 in³)
Compression Ratio	16.7:1
Aspiration	Turbocharged Air-to-Air-Aftercooled
Fuel Injection System	Electronic, Common Rail
Governor	Electronic

Model	Standby	Emission Strategy
D150 GC	150 ekW	EPA TIER III

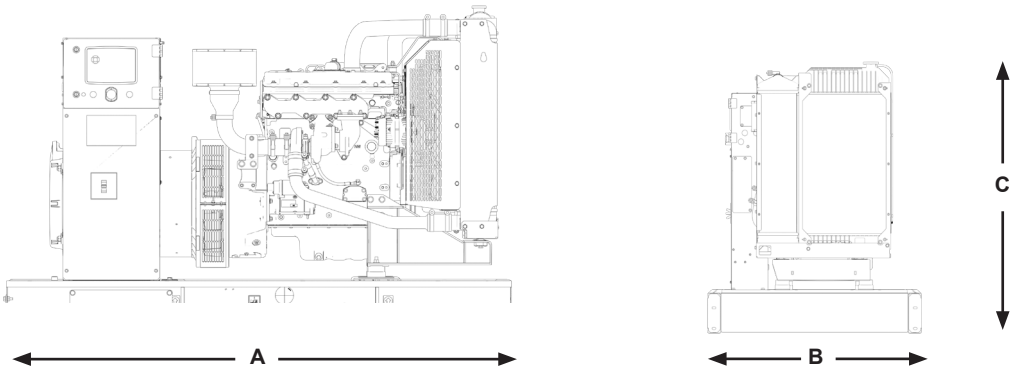
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	187.5 kVA
Genset power rating with fan, 3p@ 0.8 & 1p@1.0 power factor	150 ekW
Performance Number	P4390A-00
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	37.8 (10.0)
75% load with fan, L/hr (gal/hr)	30.3 (8.0)
50% load with fan, L/hr (gal/hr)	21.9 (5.8)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in. Water)	0.12 (0.48)
Engine coolant capacity, L (gal)	9.5 (2.5)
Radiator coolant capacity, L (gal)	11.5 (3.0)
Total coolant capacity, L (gal)	21 (5.5)
Inlet Air	
Combustion air inlet flow rate, m³/min (cfm)	15.3 (540.3)
Max. Allowable Combustion Air Inlet Temp, °C (°F)	51 (124)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	441 (825)
Exhaust gas flow rate, m³/min (cfm)	31.2 (1102)
Exhaust system backpressure (maximum allowable) kPa (in. water)	15.0 (60.2)
Heat Rejection	
Heat rejection to exhaust (total) kW (Btu/min)	132.0 (7496)
Heat rejection to aftercooler, kW (Btu/min)	38.0 (2138)
Heat rejection to atmosphere from engine, kW (Btu/min)	29.0 (1649)
Emissions (Nominal)[2]	
NOx + HC, g/kW-hr	4.0
CO, g/kW-hr	1.0
PM, g/kW-hr	0.2

D150 GC Diesel Generator Sets
Electric Power

Alternator[3]			
Voltages	480V	208V	600V
Motor starting capability @ 30% Voltage Dip, skVA	257	280	625
Current Amps	226	520	180
Frame Size	M2256L4	M2294L4	M2275L4
Excitation	SE	SE	AREP
Temperature Rise, °C	130	105	130

WEIGHTS & DIMENSIONS



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
2634 (103.7)	1300 (51.2)	1402 (52.2)	1562 (3443)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

PRIME: Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

LEHE2665-02 (06/22)

www.Cat.com/electricpower
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Engine Emissions Data

For Emissions / Certification feedback and questions, please submit a ticket via our ERC Request Portal

This emission data is Caterpillar's best estimate for this rating. If actual emissions are required then an emission test needs to be run on your engine.

Serial Number (Machine)	
Serial Number (Engine)	**45506947**
Generator Number	M2808646
Genset Number	T9900484
Sales Model	C7.1
Regulatory Build Date	09-OCT-2023
Engine ReRated	
Engine Arrangement Number	4696211
Certification Arrangement	
Test Spec Number	
Regulatory Status	CAT_Const_EPA Emergency Stationary_CH Exp_EU_Exp
Labeled Model Year	2023
EPA Family Code	PPKXL07.0PW1
CORR FL Power at RPM	
Advertised Power	
Total Displacement	7.01 L

Disclaimer: The information provided has been compiled from third party sources and is accurate to the best of Caterpillar's knowledge. However, Caterpillar cannot guarantee the accuracy, completeness, or validity of the information and is not liable for any errors or omissions contained therein. All information provided should be independently verified and confirmed, including by examining the emissions label located on the engine.

Need emission replacement label? Click here!

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Perkins Engines Co Ltd**
(U.S. Manufacturer or Importer)

Certificate Number: PPKXL07.0PW1-001

Effective Date: 09/06/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 09/06/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PPKXL07.0PW1

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 225<=kW<450
Fuel Type: Diesel, Non-Standard Fuel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

CONGLETON - HACKER CO.
Construction Managers / General Contractors

Submittal Review Cover Sheet

Project Name: UK Memorial Coliseum

UK job #: 2604.0

CHC Project #: 20-101

Submittal Description: Generator and ATS – Product Data

Subcontractor/Vendor: Nixon

Date Submittal Rec'd: 4/26/2023

CHC Review Stamp & Comments

Congleton-Hacker Company

Job # 20-101 Submittal: 263200-01
Date 4/26/23 By: Avery Gray .

The data contained hereon & here within is for inspection only
- Not for construction-
Unless stamped "Approved" by the architect and/or engineer.

Notes:

A/E Review Stamp & Comments

4/26/2023



NIXON POWER SERVICES

SUBMITTAL PACKAGE

UK Memorial Coliseum

CONTRACTOR / INSTALLER: UNIVERSITY OF KENTUCKY

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

KOHLER®

TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 500REOZVC Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Specification Sheet	Transfer Switch	Spec ATS Accessories
Specification Sheet	Transfer Switch Controls	G11-127
Alternator Data		
	Alternator Data Sheet	5M4028
Sound Data		
	Sound Data Sheet	Sound Data
Cooling Data		
	Cooling Systems Data Sheet	Cooling Data
Emissions Data		
	Emissions Data	Emissions Data
	EPA Certificate	EPA Certificate

KOHLER®

Certification

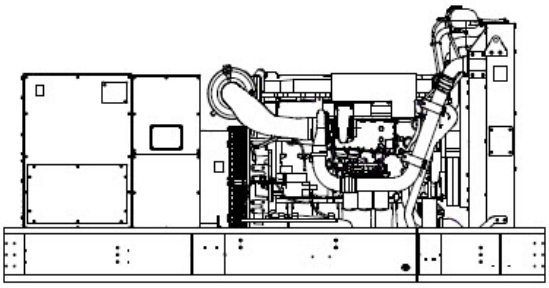
ISO9001 Certificate	G15-152
Prototype Test Summary	G18-489
Prototype Test Certificate	G18-56
ATS Test Program	G18-414

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator





Kohler Model: 500REOZVC

This diesel generator set equipped with a 5M4028 alternator operating at 277/480 volts is rated for 510 kW/638 kVA. Output amperage: 767

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	500REOZVC Generator System
1	500REOZVC Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	500REOZVC,24V,50/60Hz, EPA
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4028
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Heavy Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Generator Heater
Rating, LCB 1 Right	100% Rated
Amps, LCB 1 Right	600
Trip Type, LCB 1 Right	Electronic, LSI
LCB 1 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Right	Shunt Trip
Frame, LCB 1 Right	PG
Position, LCB 1 Right	1
Rating, LCB 2 Right	100% Rated
Amps, LCB 2 Right	600
Trip Type, LCB 2 Right	Electronic, LSI
LCB 2 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Right	Shunt Trip
Frame, LCB 2 Right	PG
Position, LCB 2 Right	2
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Fuel Lines, Installed	Flexible Fuel Lines
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset

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Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	Standard
	Testing, Additional	Power Factor Test,0.8,3Ph Only
1	Silencer,Critical,10"Flange,SIEO	
1	Flexible Exhaust Connection 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 500REOZVC	
1	RSA III, Annunciator only	
	660 Gallon Subbase Fuel Tank	
	Remote Fill Station Panel	
Qty 2	600A Wall Mount Quick Connect Panel	

Automatic Transfer Switch



Kohler Model: KSS-AMTA-0600S

3 Pole, 4 Wire, Solid Neutral, 600 amp, Kohler Specific Breaker rated Standard automatic transfer switch, Model KSS-AMTA-0600S, rated 480V, 60 Hz complete with all standard equipment and housed in a NEMA Type 1 enclosure.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	ATS KSSB Transfer Switch System
2	KSS-AMTA-0600S

Includes the following:

Literature Languages	English
Mechanism	Specific Breaker
Transition	Standard
Logic	1200
Voltage	480V / 60 Hz
Poles & Wires	3 Pole/4 Wire, Solid Neutral
Enclosure	Nema 1
Amps	600 Amps
Connection	Standard
IBC Seismic Certification	None
CSA Certification	None
Miscellaneous Acc.,Installed	Supervised Transfer Control
Miscellaneous Acc.,Installed	Lockable User Interface Cover
Warranty	1-YR STANDARD

Items shown in this diagram are examples only and are not true depictions of equipment ordered. Enclosures, colors, and styles may vary

NIXON POWER SERVICES

KOHLER GENERATOR
APM402 CONTROLLER





Emergency Stop



KOHLER REMOTE ANNUNCIATOR

AUTOMATIC TRANSFER SWITCH



AUTOMATIC TRANSFER SWITCH



MODBUS
Belden 9841

CONTROL WIRES
4ea. THHN 16ga.

REMOTE START
4ea. THHN 16ga.

E-STOP SWITCH
2ea. THHN 16ea.

COMMUNICATION DRAWING

AS BUILT DRAWINGS FOR EPSS COMMUNICATION SYSTEM

NIXON POWER
(800) 766-4966

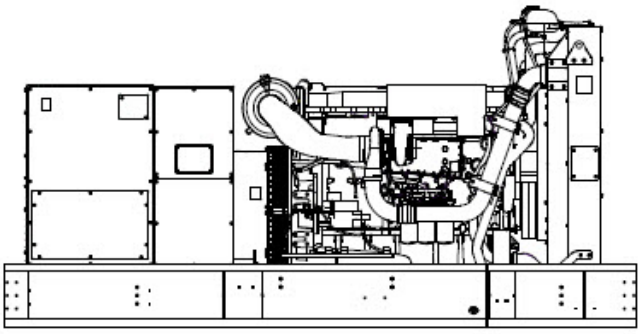
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IN POWER. SINCE 1920.

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Spec Sheets

KOHLER®

500REOZVC
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4028	277/480	3	60	510/638	767

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130 ° C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load (with <0.5% drift due to temp. variation)	3-Phase Sensing, +/-0.25%
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TAD1642GE-B
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	17:01
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	565 (757)
Cylinder head material	Cast Iron
Piston: type, material	Steel
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.4
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Field-Convertible
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust flow at rated kW, m3/min. (cfm)	92.0 (3249)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	455 (851)
Maximum allowable back pressure, kPa (in. Hg)	10 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24 V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	8 (0.31)
Fuel return line, min. ID, mm (in.)	6 (0.25)
Max. fuel flow, Lph (gph)	204.4 (54)
Max. fuel pump restriction, kPa (in. Hg)	30 (8.9)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter: quantity, type	2, Primary, 10 Micron Secondary w/Water Separator, 3 Microns
Recommended fuel	#2 Diesel/HVO/RD

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-Cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122)
Engine jacket water capacity, L (gal.)	39.7 (10.5)
Engine jacket water capacity, L (gal) (Non-IBC):	39.7 (10.5)
Radiator system capacity, including engine, L (gal.)	67 (17.7)
Engine jacket water flow, Lpm (gpm)	463.3 (122.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	231 (13137)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	890 (35)
Fan, kWm (HP)	19 (25.5)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	598 (21120)
Combustion air, m3/min. (cfm)	46 (1617)
Heat rejected to ambient air: Engine, kW (Btu/min.)	24 (1365)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	29 (1660)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	139.3 Lph (36.8 gph)
Standby Fuel Consumption at 75% load	101.4 Lph (26.8 gph)
Standby Fuel Consumption at 50% load	68.1 Lph (18.0 gph)
Standby Fuel Consumption at 25% load	38.6 Lph (10.2 gph)
Prime Fuel Consumption at 100% load	121.9 Lph (32.0 gph)
Prime Fuel Consumption at 75% load	89.7 Lph (23.7 gph)
Prime Fuel Consumption at 50% load	60.6 Lph (16.0 gph)
Prime Fuel Consumption at 25% load	33.7 Lph (8.9 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1942 (166.5 x 72.0 x 76.5)
Weight (radiator model), wet, kg (lb.):	4082 (9000)

KOHLER®

Emissions Data

KOHLER®

500REOZVC

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TAD1641GE-B	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	565	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	NVPXL16.1ACC
Compression Ratio:	16.5:1	EPA Certificate:	NVPXL16.1ACC-020
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA:	**EPA D2 Cycle 5-mode weighted**	
HC	0.139	g/kWh
NOx (Oxides of Nitrogen as NO_2)	5.56	g/kWh
CO (Carbon Monoxide)	0.349	g/kWh
PM (Particulate Matter)	0.04	g/kWh

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2022
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACC-012**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACC

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Cat® D500 GC
Diesel Generator Sets

UK - Parking Structure #8

Standby : 60 Hz



Image shown may not reflect actual configuration.

Engine Model	Cat® C15 In-line 6, 4-cycle diesel
Bore x Stroke	137 mm x 171 mm (5.4 in x 6.8 in)
Displacement	15.2 L (928 in³)
Compression Ratio	16.1:1
Aspiration	Turbocharged Air-to-Air Aftercooled
Fuel Injection System	MEUI
Governor	Electronic ADEM™ A4

Model	Standby	Emission Strategy
D500 GC	500 ekW, 625 kVA	EPA Certified for Stationary Emergency Application

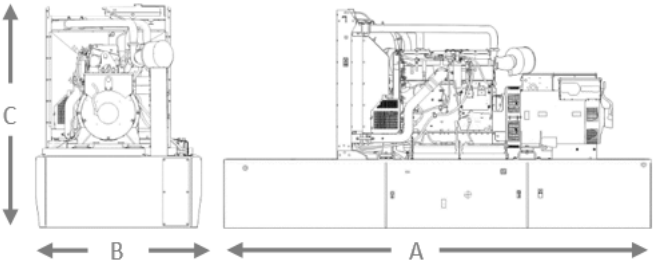
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	625 kVA
Genset power rating with fan @ 0.8 power factor	500 ekW
Emissions	EPA TIER 2
Performance Number	DM8155
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	135.2 (35.7)
75% load with fan, L/hr (gal/hr)	109.1 (28.8)
50% load with fan, L/hr (gal/hr)	70.4 (18.6)
25% load with fan, L/hr (gal/hr)	41.3 (10.9)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in water)	0.12 (0.48)
Radiator air flow, m³/min (cfm)	720 (25426)
Engine coolant capacity, L (gal)	20.8 (5.5)
Radiator coolant capacity, L (gal)	54 (14)
Total coolant capacity, L (gal)	75 (20)
Inlet Air	
Combustion air inlet flow rate m³/min (cfm)	38.2 (1347.7)
Max. allowable combustion air inlet temp, °C (°F)	49 (120)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	531.1 (988.0)
Exhaust gas flow rate, m³/min (cfm)	102.1 (3605.5)
Exhaust system backpressure (maximum allowable) kPa (in. water)	10.0 (40.0)
Heat Rejection	
Heat rejection to jacket water, kW (Btu/min)	182 (10375)
Heat rejection to exhaust (total), kW (Btu/min)	493 (28039)
Heat rejection to aftercooler, kW (Btu/min)	121 (6860)
Heat rejection to atmosphere from engine, kW (Btu/min)	91 (5182)
Heat rejection from alternator, kW (Btu/min)	29 (1655)
Emissions (Nominal)[2]	
NOx, mg/Nm³ (g/hp-hr)	2129.1 (4.6)
CO, mg/Nm³ (g/hp-hr)	301.5 (0.6)
HC, mg/Nm³ (g/hp-hr)	8.8 (0.03)
PM, mg/Nm³ (g/hp-hr)	9.5 (0.03)

D500 GC Diesel Generator Sets
Electric Power

Alternator[3]		
Voltages	480V	600V
Motor starting capability @ 30% Voltage Dip, skVA	1160	1350
Current Amps	751.8	601.4
Frame Size	M3154L41	M3136L41
Excitation	S.E	AREP
Temperature Rise, °C	105	130

WEIGHTS & DIMENSIONS – OPEN SET



FUEL TANK CAPACITY

Tank Design	Total Capacity L (gal)	Useable Capacity L (gal)
Integral	3671 (969.7)	3323 (877.8

Base	Length "A" mm (in)	Width "B" mm (in)	Height "C" mm (in)	Generator Set Weight kg (lb)
Skid (Wide Base)	4815 (189.6)	1630 (64.2)	2034 (80.1)	3756 (8280.6)
Integral Tank Base	4815 (189.6)	1630 (64.2)	2584 (101.7)	4693 (10346.3)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

FUEL RATES: Based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/litre (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details.
For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

LEHE2011-09 (09/22)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: PCPXL15.2NZS-011

Effective Date: 07/05/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 07/05/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PCPXL15.2NZS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

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This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

UK Sanders-Brown Center on Aging/Neuroscience Facilities

26 3213 Emergency Generator

Submittal

GLENWOOD ELECTRIC INC.

12250 CHANDLER DR.

WALTON, KY 41094

5/16/2023

5/16/2023

NIXON POWER SERVICES



SUBMITTAL PACKAGE

Sanders Brown Renovation Gen Only

CONTRACTOR / INSTALLER: Glenwood Electric

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

KOHLER®

TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 600REOZVB Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Alternator Data		
	Alternator Data Sheet	5M4032
Sound Data		
	Sound Data Sheet	Sound Data
Emissions Data		
	EPA Certificate	EPA Certificate
DimensionalDrawings		
	Generator	ADV-8743
	Accessories	ADV-8231
	Controller	ADV-7985
	Remote Serial Annunciator	GM85123

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WiringSchematicDiagrams

Controller Schematic Diagram	ADV-9221
Controller Wiring Diagram	GM94316
Remote Serial Annunciator	ADV-9169
Remote Serial Annunciator	GM62554
Voltage Diagram	ADV-5875

Misc

Battery	244578
Battery Charger	GM87448
Battery Charger Assembly	GM95114
Block Heater	GM79182
Block Heater	GM79187
Circuit Breaker	GM24181
Circuit Breaker Mounting	ADV-8030
Emergency Stop	GM103743
Flexible Exhaust Tube	GM64276
Silencer, Critical	343615
Weld-On Flange	343609

Warranty

Warranty	TP-5374
Warranty	TP-5498

Certification

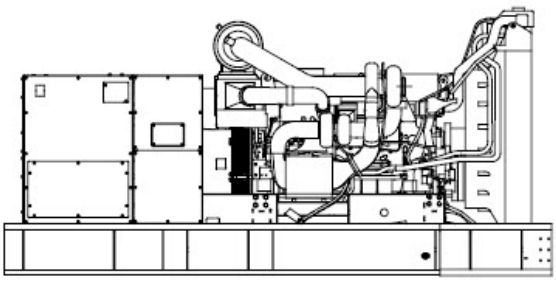
ISO9001 Certificate	G15-152
Prototype Test Certificate	G18-56

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator



Kohler Model: 600REOZVB

This diesel generator set equipped with a 5M4032 alternator operating at 277/480 volts is rated for 600 kW/750 kVA. Output amperage: 903

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	600REOZVB Generator System
1	600REOZVB Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	600REOZVB, TWD1644
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4032
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Standard Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Rating, LCB 1 Left	100% Rated
Amps, LCB 1 Left	600
Trip Type, LCB 1 Left	Electronic, LSI
LCB 1 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Left	Shunt Trip
Frame, LCB 1 Left	PG
Position, LCB 1 Left	5
Rating, LCB 2 Left	100% Rated
Amps, LCB 2 Left	600
Trip Type, LCB 2 Left	Electronic, LSI
LCB 2 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Left	Shunt Trip
Frame, LCB 2 Left	PG
Position, LCB 2 Left	6
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset
Miscellaneous Accy,Installed	Oil in Genset
Warranty	5 Year Basic

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

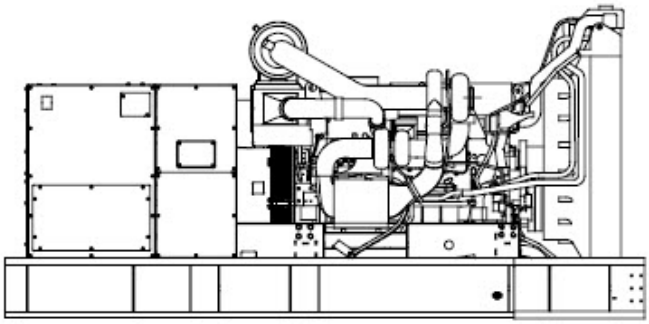
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Total unit length in inches	182
	Total unit width in inches	75
	Total unit height in inches	85
	Total unit weight (lbs)	10,925
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	Silencer,Hospital,10"Flange,SIEO	
1	Flexible Exhaust Connection, 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 600REOZVB	
1	RSA III, Annunciator only	

KOHLER®

Spec Sheets

KOHLER®

600REOZVB
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
5M4032	277/480	3	60	2200	600/750	903

RATINGS: All three-phase units are rated at 0.8 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage.
There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.
A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.4% per 100 m (328 ft.) elevation above 1400 m (4593 ft.).

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Leads, quantity	10, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhydroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TWD1643GE (IBC Only), TWD1644GE (W/O IBC)
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	16.5:1 (IBC Only), 16.8:1
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	674 (903)
Cylinder head material	Cast Iron
Piston: type, material	Swirl Chamber, Graphite-Coated Aluminum
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.0 (IBC Only), EMS 2.3
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	130 (4594) IBC Only, 114.5 (4044)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	461 (862) IBC Only, 495 (923)
Maximum allowable back pressure, kPa (in. Hg)	10 (2.95)
Exh. outlet size at eng. hookup, mm (in.)	See ADV drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	10.0 (0.38)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. fuel flow, Lph (gph)	210 (55.5) IBC Only, 185 (48.9)
Max. fuel pump restriction, kPa (in. Hg)	10 (3.0)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter: quantity, type	2
Fuel Filter Secondary	5 Micron (IBC Only), 5 Micron
Fuel Filter Primary	10 Micron (IBC Only), 30 Micron
Recommended fuel	#2 Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122) IBC Only, 45 (113)
Engine jacket water capacity, L (gal.)	33 (8.7) IBC Only, 25 (6.6)
Radiator system capacity, including engine, L (gal.)	166 (43.9) IBC Only, 151.1 (39.9)
Engine jacket water flow, Lpm (gpm)	360 (95.4)
Charge cooler water flow, Lpm (gpm)	150 (39.6) IBC Only, 126 (33)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	245 (13933) IBC Only, 246 (13990)
Heat rejected to charge air cooling water at rated kW, dry exhaust, Kw Btu/min.	216 (12284) IBC Only, 147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38.0)
Fan, kWm (HP)	30 (41) IBC Only, 34 (46)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	760 (26839) IBC Only, 665 (23484)
Combustion air, m3/min. (cfm)	55 (1937) IBC Only, 48 (1649)
Heat rejected to ambient air: Engine, kW (Btu/min.)	29 (1649) IBC Only, 24 (1342)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	45 (2560)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

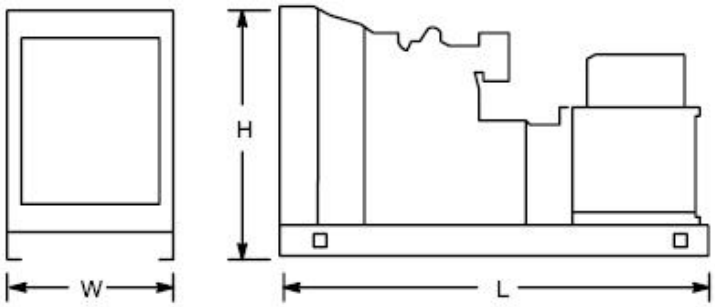
Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	161.8 Lph (42.7 gph) IBC Only, 157.0 Lph (41.5 gph)
Standby Fuel Consumption at 75% load	117.8 Lph (31.1 gph) IBC Only, 118.4 Lph (31.3 gph)
Standby Fuel Consumption at 50% load	79.3 Lph (21.0 gph) IBC Only, 80.1Lph (21.2 gph)
Standby Fuel Consumption at 25% load	43.6 Lph (11.5 gph) IBC Only, 45.0 Lph (111.9 gph)
Prime Fuel Consumption at 100% load	146.1 Lph (38.6 gph) IBC Only, 144.2 Lph (38.1 gph)
Prime Fuel Consumption at 75% load	106.9 Lph (28.2 gph) IBC Only, 108.2 Lph (28.6 gph)
Prime Fuel Consumption at 50% load	72.7 Lph (19.2 gph) IBC Only, 73.9 Lph (19.5 gph)
Prime Fuel Consumption at 25% load	40.5 Lph (10.7 gph) IBC Only, 42.6 Lph (11.3 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1973 (166.5 x 72.0 x 77.7)
Weight (radiator model), wet, kg (lb.):	4885 (10770)

Model: 600REOZVB, continued



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

KOHLER®

Emissions Data

KOHLER®

600REOZVB

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TWD1643GE,TWD1644GE	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	674	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	PVPXL16.1ACW
Compression Ratio:	16.5:1	EPA Certificate:	PVPXL16.1ACW-011
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA (g/kWh):	**EPA D2 Cycle 5-mode weighted**	
	TWD1643GE	TWD1644GE
HC	0.11	0.11
NOx (Oxides of Nitrogen as NO_2)	5.63	5.59
CO (Carbon Monoxide)	0.41	0.39
PM (Particulate Matter)	0.076	0.04

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2023
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACW-011**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACW

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

SUBMITTAL COVER SHEET – SS03 REVISION 1

SUBMITTAL STATUS: **SUBMITTED**

H&R Project: 23-111 - Bosworth Building Boiler Replacement **Submittal Date:** 7/28/2023

Submitted By: Chad Walter
Company: H&R Mechanical Contractors, Inc.
PO Box 797

Georgetown, KY 40324
cwalter2@hrmech.com | 502-863-4955

Submitted To: Jason Murphy
Company: University of Kentucky
Accounts Payable
PO Box 77-00056
Lexington, KY 40506
jtmup0@uky.edu | 859-257-9103

Submittal # SS03, Revision 1

HOT WATER BOILER AND PUMP

Spec Section	Type	Supplier	Manufacturer
23 25 16	Product Data	Stoermer Anderson, Inc	Camus

Attachment(s):

S03 R1 Revision_1 Submittal UK Bossworth Boilers 23 25 16 N3D.pdf

Notes:

1. Boiler supplier shall provide dedicated boiler pumps. 2. Provide boilers with gas regulators if pressure drop is exceeded during startup and gas system has to be increased above 14". 3. Provide blocked drain switch. 4. High and Low Gas Pressure Switches Required.

N3D GROUP

REVIEWED FOR GENERAL CONFORMANCE WITH CONSTRUCTION DOCUMENTS ONLY. NOTES AND MARKINGS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS. THIS REVIEW DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS AND OMISSIONS IN DESIGNS WHICH THE CONTRACTOR IS RESPONSIBLE.

☐ NO EXCEPTIONS ☐ RESUBMIT
☒ NOTE MARKINGS ☐ REJECTED

BY: JAN DATE: 8/1/23

Previous submittal items have been addressed above in this letter.

Equipment Submittal

Project Name:	Bosworth Building Boiler Replacement CCK-2731-24	**Spec Section:**	23 52 16
Manufacturer:	Camus Hydronics & Armstrong Pumps	**Date Submitted:**	7/28/2023
Description:	Fire Tube Boilers & Pumps	**Original or Revision #:**	Revision #1

PROJECT INFO: University of Kentucky Bosworth Building
631 S Limestone
Lexington KY 40508

MECHANICAL ENGINEER: ND3 Group
1204 Winchester Rd. Suite 200
Lexington Ky 40506
John A Newman 859-303-5708

CONSTRUCTION MANAGER:

MECHANICAL CONTRACTOR: H & R Mechanical Contractors
106 Demand Ct.
Georgetown KY 40325
Rick Napier 502-863-4955

EQUIPMENT SUPPLIER: Stoermer-Anderson, Inc.
3818 Red Bank Road
Cincinnati, OH 45227

Area below reserved for approval stamps:

Date: 7/18/23
Job: UK Bosworth Boiler Replacement
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H&R Mechanical
End User: University of Kentucky
Prepared By: CET



VALIANT-FT SERIES II

Condensing Boiler – Hydronic Heating

The Valiant-FT Series II is a condensing, commercial boiler, designed for use with a hydronic heating system at working pressures up to 160 PSI.

- ANSI Z21.13/CSA 4.9 Certified
- ASME Certified; “H” Stamp / National Board Listed
- Canadian Registration Number (CRN)
- CSD-1 Compliant
- AHRI Certified

Performance Overview:

- Capable of up to 99.4% Thermal Efficiency and up to 99.2% Combustion Efficiency.
- Available in a broad capacity range, with inputs from 400 to 850 KBtu/h.
- Fully condensing vertical cylindrical counter-flow firetube design heat exchanger, with stainless steel construction and all welded design allowing constant system return temperatures as low as 40F°.
- 10:1 gas input turn-down ratio with sustained combustion characteristics throughout the entire range.
- NOx < 9 ppm corrected to 3% oxygen (Pending Approval).
- Category II & IV venting.
- Fully factory fire-tested to obtain optimum combustion characteristics and to establish certified gas input rates.
- Safety and operating devices and controls fully configured, calibrated and factory tested.
- Complies with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard.
- Certified by CSA to the Requirements of ANSI Z21.13, And CSA 4.9.

H

Date: 7/20/23 Engineer: ND3 Group
Job: UK Bosworth Building Boiler Replace Contractor: H&R Mechanical Contractors
Model #: VA0850 End User: University of Kentucky
Representative: SAI Prepared By: CET

CAMUS Hydronics Ltd.

Heat Exchanger

- ASME Section IV Welded Stainless-Steel Heat Exchanger
- VA0400 to VA0850 – 160 PSI Operating Pressure
- 50°F to 208°F Supply Temperature Range
- Fully welded construction with stainless steel pressure vessel, tubes, tube sheets and combustion chamber
- ASME Relief Valve
- Drain valve

Combustion Features

- Direct Vent (Sealed Combustion)
- Standard Air Filter for combustion air
- Modulating Stainless Steel knitted metal fiber Premix Burner
- Venturi Air/Gas Ratio Combustion Control
- "Inherent O2 Trim" Via Air Density Response
- Low NOx (SCAQMD Pending)
- Natural Gas or Propane Fuel Operation (Field Convertible)
- Input gas pressure is 4"-14" W.C. for Natural Gas (5" W.C. min gas pressure for NG VA0500); and 8"-14" W.C. for Propane.
- 10:1 Turndown for NG (5:1 for LP)
- Category II Venting
- Category IV Venting (120' Flue & 120' Air Intake vent)
- Approved for Thermoplastic Venting (PVC, CPVC, PPE)
- Direct Ignition
- Flame Sensor
- Optional UV flame detection
- Flame view port for visual inspection of ignition and/or the boiler combustion during firing.

Standard Safeties

- Air Pressure Switch
- Blocked Flue Switch
- Water Flow Switch
- High & Low Air Pressure Switches (Blocked Air Intake & Blocked Flue Switch)
- Manual Reset High Temperature Limit
- ΔT heat exchanger protection algorithm

Standard Control Features

- Externally mounted 7" Touchscreen
- System Temperature Sensor
- Inlet & Outlet Temperature Sensors
- Flue Temperature Sensor
- Local/Remote switch for building management, remote modulation and set-point control
- Built-in audible alarm
- SOLA Controller featuring cascade controls lead lag up to 8 boilers
- Manual Reset Soft High Limit (through touchscreen)
- Outdoor Reset
- Alarm Contacts
- Pump Enable Contacts
- Air Inlet Damper (or Damper Contacts)
- PWM (pulse width modulation) signal output for modulating fan speeds.
- Native Modbus Communication
- Lead-Lag Staging
- Flame Signal Monitoring
- Error History w/ Cycle Stamp
- Manual Override of Boiler Modulation Rate

Optional Features

- CSD-1
- Motorized isolation valves
- Condensate neutralization kit
- BMS gateway – BACnet MSTP/IP, LonWorks or Metasys N2
- Outdoor installation kit (Consult Factory)
- Outdoor sensor
- Outdoor vent kit (Consult Factory)
- High & Low Gas Pressure Switch
- Optional Low Water Cut-Off w/manual reset
- Spring return air inlet damper with wire harness
- Vent adapter to Stainless Steel

Venting Options

- Category II and IV venting
- Direct venting
- Standard PVC/CPVC flue vent connection
- Room air
- Horizontal & vertical venting
- Outdoor venting (Consult Factory)

Venting Materials

- PVC
- CPVC
- PPE
- AL29-4C Stainless Steel

The following guideline shall be used to determine the suitability of vent material:

Vent Material	Maximum Flue Temperature (°F)
PVC	149
CPVC	194
Polypropylene	230
AL29-4C	300+, limited only by rating of seals
316L Stainless Steel	300+, limited only by rating of seals

Date: 7/20/23
Job: UK Bosworth Building Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.

Approx. Heat Exchanger Head Loss and Flow

		Model Size									
		400,000		500,000		600,000		725,000		850,000	
		GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd
Temperature Differential (ΔT)	20	39.00	3.50	49.00	4.80	59.00	4.40	71.00	4.90	83.00	5.70
	30	26.00	2.80	33.00	3.40	39.00	3.20	47.00	3.50	55.00	3.90
	40	20.00	2.50	24.00	2.90	29.00	2.80	35.00	3.00	41.00	3.30
	60	13.00	2.40	16.00	2.50	20.00	2.50	24.00	2.70	28.00	2.80
	80	10.00	2.30	12.00	2.40	15.00	2.30	18.00	2.60	21.00	2.60

Input / Output / High altitude

Model	Max Input Btu/hr (kw)	Max Output Btu/hr (kw)	Max Input > 2000 ft Btu/hr (kw)	Max Output > 2000 ft Btu/hr (kw)	Min input Btu/hr (kw) [NG]	Min Input > 2000 ft Btu/hr (kw) [NG]	Min input Btu/hr (kw) [LP]	Min Input > 2000 ft Btu/hr (kw) [LP]
VA0400	400,000 (117.2)	396,400 (116.2)	360,000 (105.5)	356,760 (104.5)	40000 (11.5)	35,676 (10.4)	80,000 (23.4)	72,000 (21.1)
VA0500	500,000 (146.5)	496,000 (145.3)	450,000 (131.9)	446,400 (130.8)	50000 (14.3)	44,640 (13.0)	100,000 (29.3)	90,000 (26.3)
VA0600	600,000 (175.8)	595,200 (174.4)	540,000 (158.2)	535,680 (157.0)	60000 (17.2)	53,568 (15.7)	120,000 (35.2)	108,000 (31.6)
VA0725	725,000 (212.4)	719,925 (211.0)	652,500 (191.2)	647,932 (189.9)	72500 (20.7)	64,793 (18.9)	145,000 (42.5)	130,500 (38.2)
VA0850	850,000 (249.1)	844,900 (247.6)	765,000 (224.1)	760,410 (222.8)	85000 (24.2)	76,041 (22.3)	170,000 (49.8)	153,000 (44.8)

Minimum Power Requirements

Model	Voltage Requirement	Maximum Over Protection
VA0400	115VAC, 60Hz, Single Phase	15
VA0500	115VAC, 60Hz, Single Phase	15
VA0600	115VAC, 60Hz, Single Phase	15
VA0725	115VAC, 60Hz, Single Phase	15
VA0850	115VAC, 60Hz, Single Phase	15

Model	Weight (lb)	Weight (kg)
VA0400	366	166.02
VA0500	387	175.54
VA0600	417	189.15
VA0725	492	223.17
VA0850	518	234.96

Minimum Service Clearance

Model	Top	Right	Left	Back	Front
VA0400	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0500	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0600	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0725	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0850	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)

*Minimum clearance of 10” recommended on right hand side of appliance for ease of filter replacement.

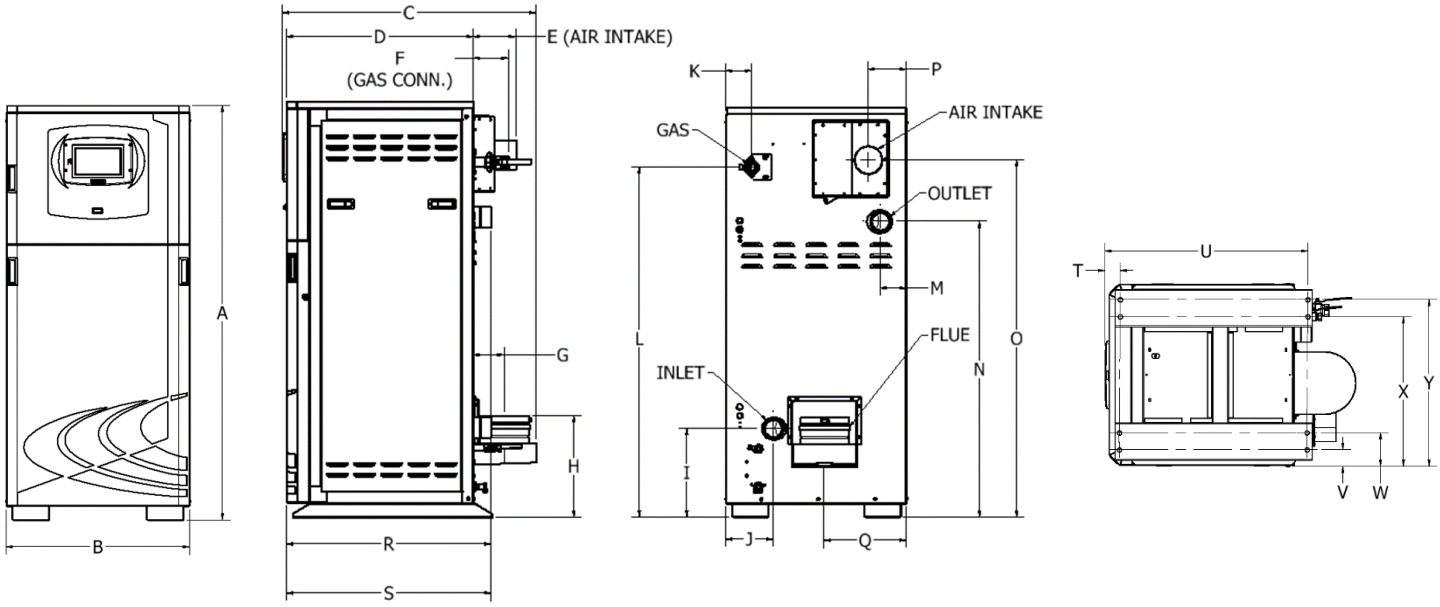
Clearance to Combustibles

Model	Top	Right	Left	Back	Flue Vent
All Models	1” (2.5 cm)	0” (0 cm)	0” (0 cm)	1” (2.5 cm)	1” (2.5 cm)

Date: 7/20/23
Job: UK Bosworth Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.



	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Inches)	400	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	500	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	600	57 1/2	25 1/4	31 3/8	23 3/8	6 5/8	5 3/8	4 3/8	14	12 1/8	7 5/8	2	48 1/2
	725	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8
	850	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Inches)	400	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	500	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	600	3 1/4	41 1/2	49 5/8	5 1/8	10 7/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/4	4 5/8	20 5/8	23
	~~725~~	~~3 5/8~~	~~41 1/2~~	~~50 1/8~~	~~5 3/8~~	~~11 1/2~~	~~28 7/8~~	~~28 7/8~~	~~2 1/8~~	~~28 1/4~~	~~2 1/4~~	~~4 5/8~~	~~20 7/8~~	~~23 1/4~~
	850	3 5/8	41 1/2	50 1/8	5 3/8	11 1/2	28 7/8	28 7/8	2 1/8	28 1/4	2 1/4	4 5/8	20 7/8	23 1/4

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Inches)	400	2	2	1	4	4
	500	2	2	1	4	4
	600	2	2	1	5	6
	~~725~~	~~2 1/2~~	~~2 1/2~~	~~1~~	~~5~~	~~6~~
	850	2 1/2	2 1/2	1	5	6

	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Millimeters)	400	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	500	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	600	1460.5	641.4	796.9	593.7	168.3	136.5	111.1	355.6	308.0	193.7	50.8	1231.9
	725	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8
	850	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Millimeters)	400	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	500	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	600	82.6	1054.1	1260.5	130.2	276.2	692.2	692.2	54.0	650.9	57.2	117.5	523.9	584.2
	725	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6
	850	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Millimeters)	400	50.8	50.8	25.4	101.6	101.6
	500	50.8	50.8	25.4	101.6	101.6
	600	50.8	50.8	25.4	101.6	152.4
	725	63.5	63.5	25.4	127	152.4
	850	63.5	63.5	25.4	127	152.4

Submittal

Ref. #: SQFNR000569_1

E.2 series dry motor circulator

Model: Series E21.2 STD125

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag number:	BP-1 & BP-2	Pipe orientation:	Single
Service:	Boiler Pumps	Suction pressure:	0 ft
Location:		Fluid:	Non-Potable Fluid - Water
Quantity:	2	Operating temperature:	60˚F
Duty flow per pump:	60 USgpm	Viscosity:	31 SSU
Duty head:	15 ft	Specific gravity:	1.0000
Total dissolved solids:	0 ppm	Efficiency at Design:	N/A
NPSHR:	1 ft	Impeller diameter:	2.7 in

Materials of construction

Construction:	STD 125	Impeller:	Glass-filled Noryl
Rating:	ANSI-125	Bearings:	Permanently Lubricated SS
Connections:	Inlet:1.5 in, Outlet: 1.5 in		

Mechanical seal data

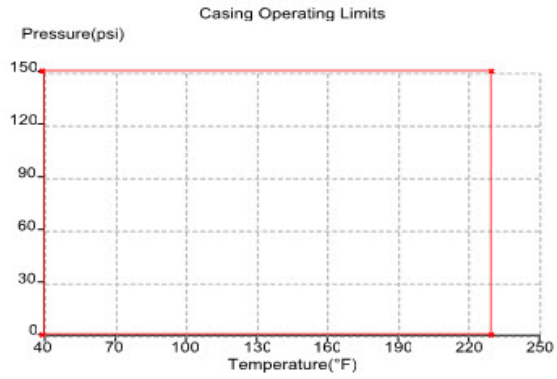
Manufacturer:	Armstrong	Seal:	Silicon Carbide
Seal type:	Bellows-style Silicon Carbide	Maximum Total Dissolved Solid (TDS)*:	2000 PPM

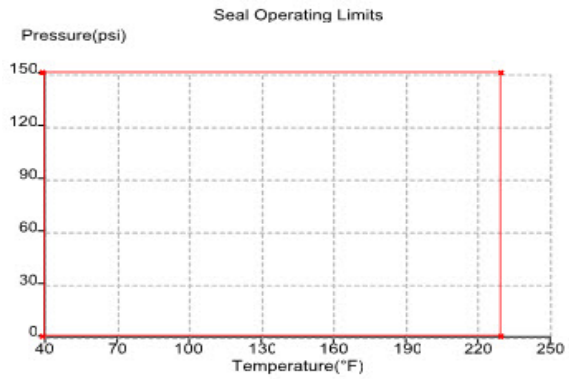
*Note: Please ensure proper seal is selected by inputting Total Dissolved Solids (TDS) in PPM in ADEPT if water quality is poor at site. Also select Flush Line Filter or Cyclone Separator if there are other contaminants in the fluid.

Motor electrical data

Supplier:	Factory Choice	Insulation class:	Class F Insulation
Size:	0.4 hp	Inverter motor type:	[none]
Frame size:	Not applicable	Efficiency:	Std
Enclosure:	ODP	Speed:	3350 rpm
Motor power supply:	115/1/60		

Operating limits (temperature - pressure)



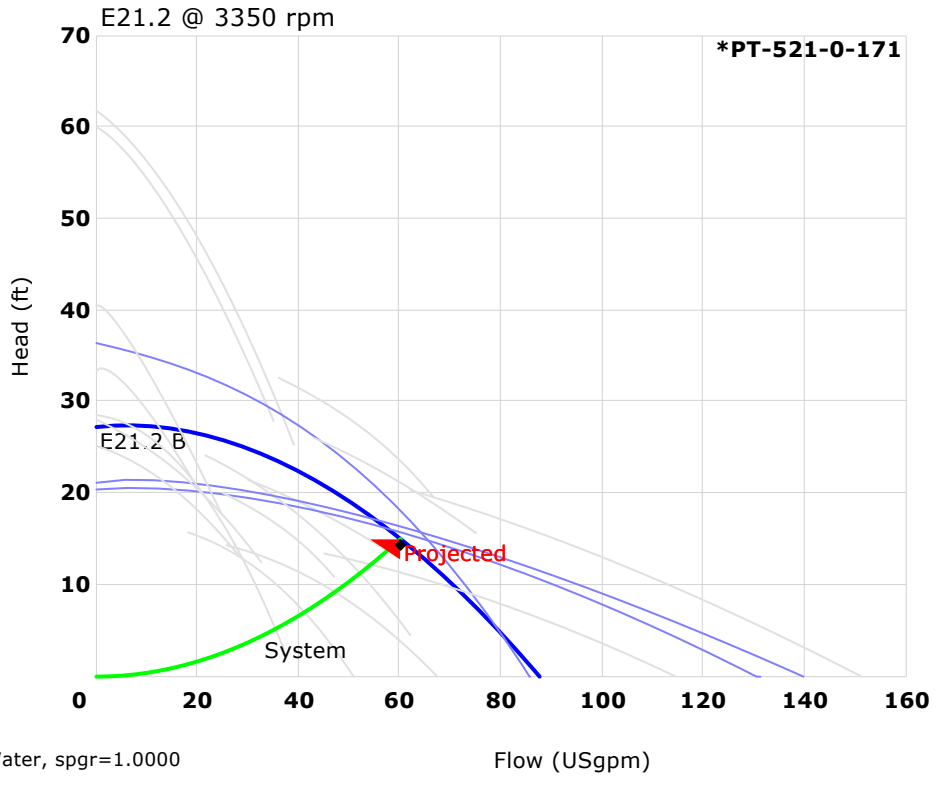


Maximum pressure: 150 psi

Maximum temperature: 230 ˚F

All Pump casings are hydrostatically tested to requirements of ANSI/HI 14.6 standard.

Performance curve



----Admin Data—-
Tag Num: BP-1 & BP-2
Service: Boiler Pumps
Locaion:

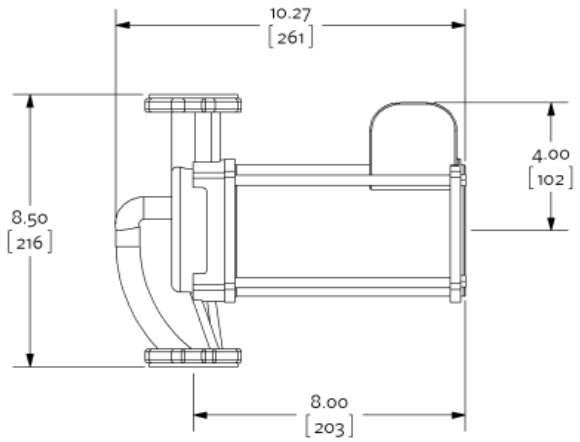
----Motor Data----
Motor Size: 0.4 hp
Motor Speed: 3350 rpm

----Design Duty Points---
Flow: 60 USgpm
Head: 15 ft

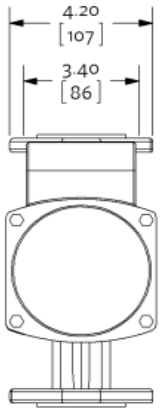
----Pump Data----
Pump Size: E21.2 STD125
Impeller: 2.7 in
Suction Head:0 ft
Projected Flow: 60.0991 USgpm
Projected Head: 15.0404 ft

Dimensional data (not for construction)

Side view



Top view



Weight: 26 lb [11.79 kg], Units of measure: inches [millimeters]

- Not to scale
- Tolerance of ± 0.125 inch (± 3 mm) should be used
- For certified dimensions, please contact your Armstrong representative

Connection details

Connection	Size	Rating	OD	Bolt quantity*	BCD	Bolt size
Inlet	1.5	ANSI-125	5.00	2	3.88	0.5
Outlet	1.5	ANSI-125	5.00	2	3.88	0.5

*Equally spaced straddling centreline

Submittal

Ref. #: SQFNR000569_1

Flo-trex valve

Model: FTV-2TS-Flo-Trex Valve-Straight

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag	Qty	Model	Size Inlet/Outlet	Config	Pipe Type	Design flowrate	Pressure Drop*	Associated pump
BP-1 & BP-2	2	FTV-2TS	2 in	Straight	NPT	60 USgpm	3.75 ft	N/A

*at design flow

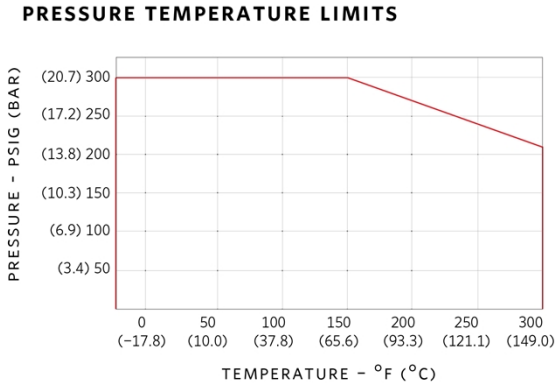
Materials of construction

FTV-2TS-Flo-Trex Valve-Straight

Body:	304 Stainless Steel	Spring:	304 Stainless Steel
Disc:	Brass	O rings:	EPDM
Seat:	Not Applicable	2 metering ports:	Brass Body with EPDM Check and Gasketed Cap
Stem:	Brass	2 drain tappings:	1/4in NPT with SS 304 Plug

Operating limits (temperature - pressure)

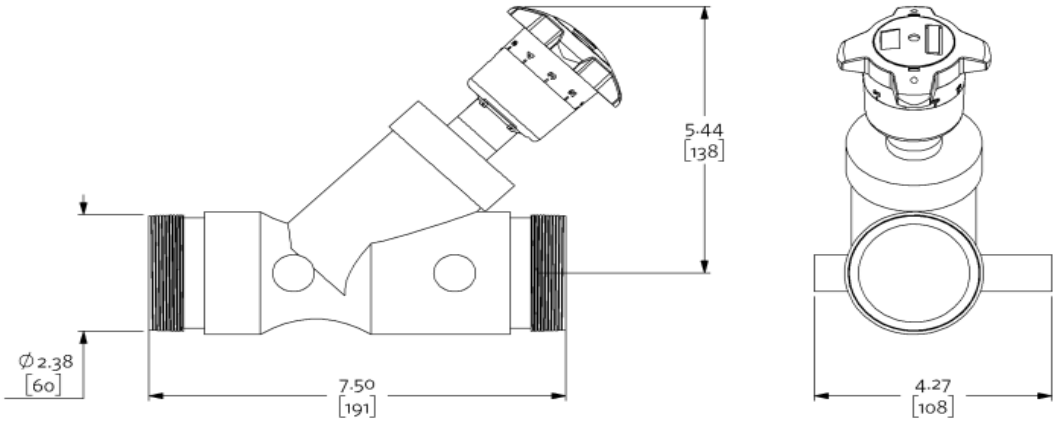
FTV-2TS-Flo-Trex Valve-Straight



Maximum pressure: 300 psi
Maximum temperature: 300 F

Dimensional data (not for construction)

Model: FTV-2TS-Flo-Trex Valve-Straight	Weight: 6 lb [2.72 kg]
Side view	Front view



Not to scale
Units of measure: inches [millimeters]
Tolerance of +/- 0.125 inch (+/- 3 mm) should be used
For certified dimensions, please contact your Armstrong representative

Cat® C15 DIESEL GENERATOR SETS

Standby & Prime: 60Hz



Image shown might not reflect actual configuration

Engine Model	Cat® C15 In-line 6, 4-cycle Diesel
Bore x Stroke	137 mm x 171 mm (5.4 in x 6.8 in)
Displacement	15.2 L (928 in³)
Compression Ratio	16.1:1
Aspiration	Turbocharged Air-to-Air Aftercooled
Fuel Injection System	MEUI
Governor	Electronic ADEM™ A4

Model	Standby	Prime	Emission Strategy
C15	500 ekW, 625 kVA	455 ekW, 569 kVA	TIER II Non-Road

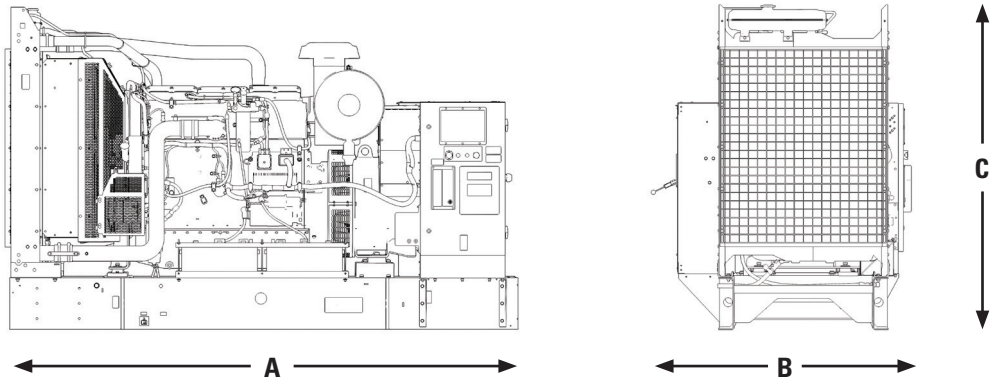
PACKAGE PERFORMANCE

Performance	Standby	Prime
Frequency	60 Hz	
Genset Power Rating	625 kVA	569 kVA
Genset power rating with fan @ 0.8 power factor	500 ekW	455 ekW
Emissions	TIER II Non-Road	
Performance Number	DM8155	DM8154
Fuel Consumption		
100% load with fan, L/hr (gal/hr)	133.9 (35.3)	126.3 (33.3)
75% load with fan, L/hr (gal/hr)	108.0 (28.5)	97.2 (25.6)
50% load with fan, L/hr (gal/hr)	69.7 (18.4)	63.9 (16.8)
25% load with fan, L/hr (gal/hr)	40.9 (10.8)	38.2 (10.0)
Cooling System[1]		
Radiator air flow restriction (system), kPa (in. water)	0.12 (0.48)	0.12 (0.48)
Radiator air flow, m³/min (CFM)	720 (25426)	720 (25426)
Engine coolant capacity, L (gal)	20.8 (5.5)	20.8 (5.5)
Radiator coolant capacity, L (gal)	54 (14)	54 (14)
Total coolant capacity, L (gal)	75 (20)	75 (20)
Inlet Air		
Combustion air inlet flow rate, m³/min (CFM)	38.2 (1349)	38.2 (1349)
Max. Allowable Combustion Air Inlet Temp, °C (°F)	49 (120)	49 (120)
Exhaust System		
Exhaust stack gas temperature, °C (°F)	531 (988)	524 (975)
Exhaust gas flow rate, m³/min (CFM)	109.6 (3870)	101.2 (3573.4)
Exhaust system backpressure (maximum allowable), kPa (in. water)	10.0 (40.0)	10.0 (40.0)
Heat Rejection		
Heat rejection to jacket water, kW (BTU/min)	182 (10375)	172 (9781)
Heat rejection to exhaust (total), kW (BTU/min)	493 (28036)	483 (27467)
Heat rejection to aftercooler, kW (BTU/min)	121 (6881)	120 (6824)
Heat rejection to atmosphere from engine, kW (BTU/min)	91 (5175)	87 (4947)

Emissions (Nominal)[2]	Standby	Prime
NOx, mg/Nm³ (g/hp-hr)	2129.1 (4.6)	1554.5 (3.6)
CO, mg/Nm³ (g/hp-hr)	301.5 (0.6)	362.9 (0.8)
HC, mg/Nm³ (g/hp-hr)	8.8 (0.03)	12.2 (0.04)
PM, mg/Nm³ (g/hp-hr)	9.5 (0.03)	11.9 (0.03)

Alternator[3]											
Duty Cycle		Standby					Prime				
Phase		3-Phase					3-Phase				
Voltages, V		208	220	240	480	600	208	220	240	480	600
Current, Amps		1735	1640	1504	752	601	1579	1493	1368	684	547
Frame: LC6124F Excitation: AREP	Temperature Rise @ 40°C	150	130	130	130	130	125	105	105	105	105
	Motor Starting Capability @ 30% Voltage Dip, skVA	1325	1466	1712	1712	1714	1325	1466	1712	1712	1714
Frame: LC6124G Excitation: AREP	Temperature Rise @ 40°C	130	130	105	105	105	105	105	105	105	105
	Motor Starting Capability @ 30% Voltage Dip, skVA	1335	1479	1729	1729	1731	1335	1479	1729	1729	1731
Frame: LC7024H Excitation: AREP	Temperature Rise @ 40°C					130					105
	Motor Starting Capability @ 30% Voltage Dip, skVA					2023					2023
Frame: LC7024J Excitation: AREP	Temperature Rise @ 40°C	105	105	105	105		80	80	80	80	
	Motor Starting Capability @ 30% Voltage Dip, skVA	1524	1694	1993	1993		1524	1694	1993	1993	
Frame: LC7024F Excitation: AREP	Temperature Rise @ 40°C	130	105	105			105	105	80		
	Motor Starting Capability @ 30% Voltage Dip, skVA	1248	1387	1633			1248	1387	1633		
Frame: LC6114F Excitation: SE	Temperature Rise @ 40°C	150	130	130	130		125	105	105	105	
	Motor Starting Capability @ 30% Voltage Dip, skVA	1104	1222	1428	1428		1104	1222	1428	1428	
Frame: LC6114G Excitation: SE	Temperature Rise @ 40°C	130	130	105	105		105	105	105	105	
	Motor Starting Capability @ 30% Voltage Dip, skVA	1116	1236	1445	1445		1116	1236	1445	1445	

WEIGHTS & DIMENSIONS



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
3476 (137)	1628 (64)	2128 (84)	4365 (9623)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

CSA C22.2 No 100-04, UL142, UL489, UL869, cUL/UL2200, NFPA 37, NFPA 70, NFPA 99,NFPA 110, IBC, IEC60034-1, ISO 3046, ISO 8528, NEMA MG 1-33.

Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

PRIME: Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

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LEHE1577-04 (10/24)

BURNER SPECIFICATION

ADAPTED FROM: **API STANDARD 560** and **API RECOMMENDED PRACTICE 535**

JOHN ZINK™ A KOCH ENGINEERED SOLUTIONS BUSINESS

JOHN ZINK QUOTE NUMBER:		
202411-357350-A1		
REVISION:	DATE:	SHEET
2	31-Mar-25	1 of 4

CUSTOMER: The Babcock & Wilcox Company **OPPORTUNITY NUMBER:**

END USER: University of Kentucky **JOB SITE LOCATION:** Lexington, Kentucky

									REV
BOILER GENERAL DATA									
1	FURNACE CATEGORY	*PACKAGE, FIELD-ERECT, TANGENTIAL, OTSG*	**Packaged**						
2	BOILER MANUFACTURER		Babcock & Wilcox						
3	NUMBER OF BOILERS		1						
4	TYPE / MODEL OF BOILER								
5	STEAM FLOW - 100% MCR	PPH	100,000						
6	TOTAL TURNDOWN [GAS / OIL]	:1	6				6		
7	STEAM PRESSURE	psig	150						
8	STEAM TEMPERATURE	°F							
9	FEEDWATER TEMPERATURE	°F	227						
10	FURNACE PRESSURE	inch w.c.	5.8						
11	FURNACE HEIGHT	Ft	8.56						
12	FURNACE WIDTH	Ft	6.09						
13	FURNACE DEPTH	Ft	27.8						
14	FURNACE DEPTH PASS	Ft	22.0						
15	FRONT WALL CONSTRUCTION	*% REFRACTORY or TUBES if ≤50*	100%						
16	FLOOR, REFRACTORY	%							
17	CEILING / LEFT WALL / RIGHT WALL / REAR WALL, REFRACTORY	%							
18	INSTALLATION	*INDOORS or OUTDOORS*	Outdoor						
19	AMBIENT TEMPERATURE	°F	90						
20	SITE ELEVATION	FASL	988						
BURNER DATA									
21	BURNER PROJECT CLASSIFICATION	*NEW or RETROFIT*	**New Equipment**						
22	QUANTITY of BURNERS PER BOILER		1						
23	FIRING CONFIGURATION	*WALL-FIRED / UP-FIRED / DOWNFIRED / OPPOSED*	Wall-Fired						
24	TYPE OF BURNER - SIZE		DRMB			14.5			
25	FURNACE FRONT WALL DEPTH (Esimate / Confirmed)	in			Estimate				
26	BURNER ARRANGEMENT (SINGLE or COLUMNS x ROWS)				1	1			
27	VERTICAL BURNER PITCH, CENTERLINE TO TUBE CENTERLINE	Ft	4.0						
28	HORIZONTAL BURNER PITCH, CENTERLINE TO CENTERLINE	Ft	5.0						
29	BOTTOM BURNER TO FLOOR	Ft							
30	BURNER THROAT SIZE	in	38.5						
31	BURNER MINIMUM TUBE NEST ID	in	50.5						
IGNITER DATA									
32	PILOT TYPE / MODEL		**Stabelite 5MM**						
33	ELECTRODE MODEL		SmartSpark						
34	IGNITER CLASS	*NFPA*	3						
35	FLAME ROD	*YES or NO*	NO						
36	IGNITER FUEL		NG						
37	FUEL PRESSURE at IGNITER	psig	5						
38	AIR PRESSURE / FLOW REQUIRED	inch w.c. / SCFM	29%		30				
39	IGNITER HEAT RELEASE	MMBtu/hr	3						
OPERATING DATA									
40	BURNER FUEL TYPE	*GAS or OIL or GAS & OIL*	GAS				OIL		
41	GAS FUEL		NG						
42	OIL FUEL						#2 Oil		
43	OPERATING STEAM FLOW	% MCR	100				100		
44	TOTAL HEAT RELEASE per BURNER	* **[HHV]** MMBtu/hr	130				124.46		2
45	TOTAL HEAT RELEASE	* **[HHV]** MMBtu/hr	130				124.46		2
46	HEAT RELEASE per BURNER, **GAS**	* **[HHV]** MMBtu/hr	130						2
47	GAS FUEL FLOW per BURNER	SCFM	2,171						2
48	HEAT RELEASE per BURNER, **OIL**	* **[HHV]** MMBtu/hr					124.46		
49	OIL FUEL FLOW per BURNER	lb/hr					6,506		
50	EXCESS AIR	%	15				20		
51	COMBUSTION AIR TEMPERATURE	°F	80				80		
52	COMBUSTION AIR FLOW (WET), per BURNER	lb/hr	109,922				113,235		2
53		SCFM	24,698				25,443		2
54	FLUE GAS RECIRCULATION	%	30				25		
55	FLUE GAS RECIRCULATION TEMPERATURE	°F	350				350		
56	FLUE GAS RECIRCULATION FLOW, per BURNER	lb/hr	34,765				29,935		2
57		SCFM	8,090				6,602		2

BURNER SPECIFICATION

ADAPTED FROM: **API STANDARD 560** and **API RECOMMENDED PRACTICE 535**

JOHN ZINK
A KOCH ENGINEERED SOLUTIONS BUSINESS

JOHN ZINK QUOTE NUMBER: 202411-357350-A1

REVISION:	DATE:	SHEET
2	31-Mar-25	2 of 4

OPERATING DATA (CONT.)

									REV
58	FLOW, BULK MIX, per BURNER		lb/hr	144,687				143,170	2
59			SCFM	32,788				32,045	2
60	AIR / FGR MIX TEMPERATURE		°F	144.88				136.45	2
61	COMBUSTION AIR FLOW (WET), TOTAL		lb/hr	109,922				113,235	2
62			SCFM	24,698				25,443	2
63	FLUE GAS RECIRCULATION FLOW, TOTAL		lb/hr	34765.28				29935.21	2
64			SCFM	8089.99				6602.49	2
65	FLOW, BULK MIX, TOTAL		lb/hr	144,687				143,170	2
66			SCFM	32,788				32,045	2
67	GAS FUEL PRESSURE REQUIRED at BURNER		psig	12.0					
68	BURNER DROP PRESSURE at HEAT RELEASE		inch w.c.	8.2				7.9	
69	STEAM / WATER INJECTION RATE		lb/lb, fuel						
70	STEAM / WATER INJECTION TEMPERATURE		°F						
71	ESTIMATED FLAME LENGTH		ft	19.3				19.3	
72	ESTIMATED FLAME DIAMETER		ft	8.0				8.0	

GAS FUEL CHARACTERISTICS

73	FUEL GAS DESIGNATION			NG					
74	HEATING VALUE	* [HHV]	Btu/scf	998					
75	SPECIFIC GRAVITY [AIR = 1.0]			0.60					
76	FUEL TEMPERATURE at BURNER		°F	60					
77	SUPPLY PRESSURE at TRAIN INLET		psig						
78	FUEL GAS COMPOSITION		*Mol% or Mass%*	Mole%					
79	Hydrogen	(H_2)							
80	Oxygen	(O_2)							
81	Nitrogen	(N_2)		5.00%					
82	Carbon Monoxide	(CO)							
83	Carbon Dioxide	(CO_2)							
84	Methane	(CH_4)		90.00%					
85	Ethane	(C_2H_6)		5.00%					
86	Propane	(C_3H_8)							
87	n-Butane	(C_4H_{10})							
88	Iso-Butane	(C_4H_{10})							
89	n-Pentane	(C_5H_{12})							
90	Iso-Pentane	(C_5H_{12})							
91	Neo-Pentane	(C_5H_{12})							
92	n-Hexane	(C_6H_{14})							
93	Heptane	(C_7H_{16})							
94	Octane	(C_8H_{18})							
95	Toluene	(C_7H_8)							
96	Ethylene	(C_2H_4)							
97	Propylene	(C_3H_6)							
98	n-Butene	(C_4H_8)							
99	Iso-Butene	(C_4H_8)							
100	n-Pentene	(C_5H_{10})							
101	Benzene	(C_6H_6)							
102	Methylbenzene	(C_7H_8)							
103	Ethylbenzene	(C_8H_{10})							
104	Acetylene	(C_2H_2)							
105	Methylacetylene	(C_3H_4)							
106	Butadiene	(C_4H_6)							
107	Naphthalene	($C_{10}H_8$)							
108	Acetone	(C_3H_6O)							
109	Methanol	(CH_3OH)							
110	Ethanol	(C_2H_5OH)							
111	Propanol	($C3H_7OH$)							
112	Ammonia	(NH_3)							
113	Hydrogen Cyanide	(HCN)							
114	Hydrogen Sulfide	(H_2S)							
115	Sulfur Dioxide	(SO_2)							
116	Water	(H_2O)							
117									
118									
119									
120			TOTAL	100.00%					

BURNER SPECIFICATION

ADAPTED FROM: **API STANDARD 560** and **API RECOMMENDED PRACTICE 535**

JOHN ZINK
A KOCH ENGINEERED SOLUTIONS BUSINESS

JOHN ZINK QUOTE NUMBER: 202411-357350-A1

REVISION:	DATE:	SHEET
2	31-Mar-25	3 of 4

LIQUID FUEL CHARACTERISTICS

									REV
121	FUEL OIL DESIGNATION							#2 Oil	
122	HEATING VALUE	* [HHV]	Btu/lb					19,130	
123	VISCOSITY REQUIRED at BURNER		SSU					32	
124	SUPPLY PRESSURE at TRAIN INLET		psig						
125	FUEL PRESSURE REQUIRED at BURNER		psig					102	
126	ATOMIZING MEDIA	*AIR or STEAM or MECHANICAL or GAS*						Steam	
127	ATOMIZING MEDIA TEMPERATURE		°F						
128	ATOMIZING MEDIA PRESSURE at BURNER		psig					100	
129	FUEL OIL METALS: Vanadium, Potassium, Sodium, Nickel		wppm						
130	FUEL OIL COMPOSITION		weight %						
131	Carbon	(C)						87.8%	
132	Hydrogen	(H)						12.1%	
133	Oxygen	(O)							
134	Nitrogen	(N)						0.020%	
135	Sulfur	(S)						0.050%	
136	Ash							0.050%	
137	Conradson Carbon Residue	CCR						0.4%	
138	Bottom Sediment & Water	BS&W							
139			TOTAL					100%	

MISCELLANEOUS DATA

140	AREA CLASSIFICATION	*SAFE or HAZARDOUS*	**Non-Hazardous**			
141	NEC/IEC RATING		**NA**			
142	NEMA RATING		NEMA 4X			
143	POWER SUPPLY AVAILABLE, MOTORS	V/Ph/Hz	460V/3Ph/60Hz			
144	POWER SUPPLY AVAILABLE, CONTROL	V/Ph/Hz or VDC	110V/1Ph/60Hz			
145	INSTRUMENT AIR SUPPLY (CLEAN/DRY/OIL-FREE)	psig	80			
146	NUMBER OF SCANNERS PER BURNER		3			
147	COOLING AIR REQUIRED, PER SCANNER	SCFM / inch w.c.	5	5		
148	VALVE TRAIN CONSTRUCTION	*GAS / OIL*	NFPA 31			
149	PIPING / WELDING SPECIFICATIONS	*STANDARD or ASME B31.1/3*	ASME/ANSI B31.1			
150	COATING AND PAINTING SPECIFICATIONS	*STANDARD or CUSTOMER SPEC'S*	Per John Zink Standard			
151	QUALITY CONTROL	*STANDARD or CUSTOMER SPEC'S*	Per John Zink Standard			
152	CODE GUIDELINES	*NFPA 85 or OTHER (specify)*	NFPA 85			
153	OPERATING SYSTEM TYPE	*AUTOMATIC or NON-RECYCLING*	Non-Recycling			
154	BURNER(S) CONFIGURATION/MODE	*SINGLE or UNISON or MULTI*	Single			
155	CONTROLS TYPE	*SPP or PP or FULLY-METERED*	Fully Metered			
156	FGR TYPE	*INDUCED or FORCED (BULK/MIX) or SELECTIVE (SCROLL)*	Induced			
157	GAS & OIL COFIRING	*YES or NO or NA*	NO			
158	LOW FIRE CHANGEOVER	*YES or NO or NA*	NA			
159	NOISE THRESHOLD SPECIFICATION	dBA at 3 ft	85			

EMISSION REQUIREMENTS

160	NOx	ppm, dry	**9**				**60**		
161	CO	ppm, dry	50				50	2	
162	PARTICULATE	lb/MMBtu, HHV	0.006				0.037	2	
163	VOC	ppm, dry							
164	SOx	ppm, dry							
165	**Emission exclude background emissions present in the ambient air used for combustion**								
166	***'ppm' CORRECTED TO 3% O_2 [VOLUME, DRY BASIS]**								
167	**All emissions are relevant to the fuel(s) specified herein only, based on HHV.**								
168	**Emission guarantees are extended from twenty-five (25) to one hundred (100) percent of design boiler MCR, provided that the system is operated at steady state conditions, in accordance with the Burner Design Specifications herein.**								
169									
170									
171									
172									
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174									
175									
176									

BURNER SPECIFICATION

ADAPTED FROM: **API STANDARD 560** and **API RECOMMENDED PRACTICE 535**

JOHN ZINK
A KOCH ENGINEERED SOLUTIONS BUSINESS

JOHN ZINK QUOTE NUMBER:		
202411-357350-A1		
REVISION:	DATE:	**SHEET**
2	31-Mar-25	**4 of 4**

NOTES, COMMENTS, AND CLARIFICATIONS

		REV
177	**Notes:**	
178	1. The burner(s) will maintain a stable flame with no deleterious impingement over the entire burner turndown range as per the American Boiler Manufacturers Association Definition: “Flame impingement is defined as the condition which exists when the flame resulting from the combustion of the fuel comes into contact with any interior surface of the furnace in such a way as to result in localized incomplete combustion of the fuel and such condition manifests itself in the formation of hard carbonaceous deposits at the contact location. Flame impingement is a condition of firing a fuel which may cause failure and/or excessive maintenance of combustion chamber wall surfaces”.	
179	2. Packaged boilers shall be designed and operate with the inboard row of furnace tubes forming a gas tight wall baffle to prevent the short circuiting of furnace gases to the boiler gas outlet, for performance guarantees to be in effect.	
180	3. Emission guarantees for Field Erect boilers of balanced or negative draft design are provided there's no air leakage into the furnace and all combustion air goes through the burners only.	
181	4. The PM/PM10/PM2.5 emission guarantee is limited to filterable particulate as measured by EPA Method V (filterable), and specifically excludes condensable particulate as measured by Method 202 (condensable). PM/PM10/PM2.5 emission guarantees do not include non-combustible inorganic material such as salt in air, dust, dirt, gasket material, refractory, etc.	
182	5. SOx Emissions are a direct result of the fuel bound sulphur and cannot be controlled by the combustion process, for this reason we do not offer as a guarantee point	
183	6. Multi-Burner Boilers. It is essential that combustion air flow deviation to each burner not exceed: a) Individual burner flow deviation about the mean +/- 2.5% b) Circumferential air flow deviation about the mean +/- 5.0% It has been assumed that normal operation is all burners firing, within the turndown range, all firing on the same fuel and with the same heat input.	
184	7. Testing for performance guarantees shall be run within thirty (30) days after the equipment has been installed and operated. Others shall furnish all operating personnel and equipment for such tests. A John Zink trained service engineer shall fine tune the burner as required and observe the operation of auxiliary equipment to assure that performance guarantees will be met, prior to testing, unless John Zink, in its sole discretion, waives this requirement because it deems on-site tuning to be a safety risk or commercially or legally unreasonable. John Zink's representative will have access to the records at all times and the tests will be conducted in a manner to ensure that the specified performance conditions are being maintained. For oil fired systems, others shall take samples of the fuel oil during the performance test and have its nitrogen content measured by an independent test laboratory. John Zink will be supplied a complete copy of all test results and data.	
185	8. The equipment shall be considered accepted if tests show that the guarantees have been fulfilled, or if others fail to have the equipment tested within the specified period. In case of the failure to meet the guarantees, JZHC/Coen reserves the right to change or replace, on a straight time basis, the equipment furnished so that the guaranteed performance will be obtained.	
186	9. Stack Damper and Draft Controls for common stacks or stacks taller than 50' above ground level is required.	
187	**Comments & Clarifications:**	
188	**Air Controls:**	
189	Requires Two (2) forms of air control. Either VFD and Fan Discharge Damper, or IVC and Fan Discharge Damper. Fan Discharge Damper and VFD preferred.	
190	For Stack higher than 50 ft, Draft Control via Stack Damper is required and position feedback recommended.	
191	O2 Trim is required	
192	FGR trim recommended	
193	FGR control uses fixed FGR damper and Modulating Fresh Air Damper	
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1. A list of all emissions guarantees for both the NG and ULSD burners on lines 160-164.

   See Datasheet Rev 2

   - Confirm NOx guarantee of 9 ppm (NG) and 60 ppm (ULSD) listed in the spec sheet apply, not either listed in section 1.5.5 “Emissions”
   - Provide confirmation if the CO requirement of 50 ppm for NG and ULSD in UK’s RFP can be met by B&W (this spec sheet includes 100 ppm for each; however, there are no technical exceptions listed in section 1.6)
   - Confirm there will not be a guarantee for condensable or filterable particulate.

2. Maximum heat input / total heat release lines 44-46 (these appear to be for a much larger boiler)

   See Datasheet Rev 2

3. Maximum gas fuel flow (scfm) line 47 (appears to be for larger boiler)

   See Datasheet Rev 2

4. Combustion air flow lines 52 and 53 (appears to be for larger boiler)

   See Datasheet Rev 2

5. Flue gas recirculation flow rate lines 55 and 56

   See Datasheet Rev 2

6. igniter heat release row 39 (possibly for the larger boiler – listed as 3 MMBtu/hr versus the 1 MMBtu/hr documented for the FM boiler)*

   3 MMBtu/hr ignitor is correct for DRMB application, this is a Class 3 intermittent pilot

*As a separate question, does the 3 MMBtu/hr pilot stay lit at all times during operation, or only for boiler startups?"

University of Kentucky
Facilites Management
Office of the Vice President

October 10, 2023

Mr. Zack Bittner
Ky Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: Application to amend emergency generators and boilers to permit V-18-052 R1
University of Kentucky, 21-067-00003, AI 1104

Dear Mr. Bittner:

On June 12 and July 27, 2023, the University of Kentucky submitted permit applications to install diesel-fired emergency generators at Sanders-Brown and Pence Hall. As part of the University modernization project, three additional projects were proposed after the application submittals. The University combined the five projects to determine the emissions impact and request the original applications submitted be replaced with this updated application. The application consists of:

Sanders-Brown (bldg 0230) – diesel-fired emergency generator replacement
Remove the 587 hp generator (EU54-07) and replace with a 903 hp generator (EU91). Remove the 434 hp generator (EU54-07) and relocate to a trailer to use as a campus portable generator.

Pence Hall (bldg 0041) – install a 237 hp emergency generator (EU92)

Memorial Coliseum (bldg 0019) – diesel-fired emergency generator replacement
Remove the 94 Hp generator (EU59-13) and replace with a 757 Hp generator (EU93)

Parking Structure #8 – install a 762 Hp emergency generator (EU94)

Bosworth Hall (bldg 0652) – natural gas-fired boiler replacement
Remove the 1.3 MMBtu/hr boiler (57-11) and replace with a 0.85 MMBtu/hr boiler (IA item #11)

Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generators. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines. The boiler meets the definition of an insignificant activity as defined in Section 6 of regulation 401 KAR 52:020, *Title V Permits*. Construction of the generators and boiler do not add any additional regulations to the current V-18-052 R1 permit, and all existing conditions of the permit will be met after the addition. Therefore, we request the Division for Air Quality process the construction as an Off-Permit Change in accordance with 401 KAR 52:020, Section 17.

We appreciate your timely review and consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Mary S. Vosevich
Vice President, Facilities Management
Chief Facilities Officer

cc: Mike Duffy/Andrea Smith

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: October 10, 2023

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: 500 ft **Property Area:** 1500 **Is this source portable?** ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity: ☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____ ☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☑ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Refer to DEP7007A

Proposed Operation Start-Up Date: *(MM/YYYY)* Refer to DEP7007A

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☐ **No**

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Mary S Vosevich

Authorized Signature

10/23/23

Date

Mary S. Vosevich

Type or Printed Name of Signatory

VP for Facilities Management

Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations
Bosworth natural gas boiler replacement. Removed 1.3 MMBtu/hr boiler (57-11) and replaced with 0.85 MMBtu/hr boiler (IA11), bldg 0652.
Sanders-Brown emergency generator replacement. Removed 587 Hp and 434 Hp generators (EU54-07 and EU56-03) and replaced with one 903 Hp generator (EU91, bldg 0230).
Memorial Coliseum emergency generator replacement. Removed 94 Hp generator (EU59-13) and replaced with 757 Hp generator (EU93, bldg 0019).
Pence Hall 237 Hp emergency generator addition (bldg 0041, EU92).
Parking Structure #8 762 Hp emergency generator addition (EU94, bldg 0601).

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information
___ Section A.2: Operating and Fuel Information
___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky
KY EIS (AFS) #: 21-067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
91	903Hp Diesel Generator-Sanders Brown	1	Diesel Fuel Usage	Emergency Generator		Kohler	600REOZVB	06/2023, ordered 06/2024, install est.	20300101	1000 gal	None	1
92	237 Hp Diesel Generator-Pence Hall	1	Diesel Fuel Usage	Emergency Generator		Kohler	150REOZJF	08/2023, ordered 07/2024, install est.	20300101	1000 gal	None	1
93	757 Hp Diesel Generator-Memorial Coliseum	1	Diesel Fuel Usage	Emergency Generator		Kohler	500REOZVC	02/2024, install est.	20300101	1000 gal	None	1
94	762 Hp Diesel Generator-Parking Structure #8	1	Diesel Fuel Usage	Emergency Generator		Kohler	150REOZJF	07/2023, ordered 02/2025, install est.	20300101	1000 gal	None	1
IA	0.85 MMBtu Natural Gas Boiler-Bosworth	1	Natural Gas Usage	Indirect Heat Exchanger		Valiant Series II	VA0850	11/2023, install est	10100602	MMft3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
91				100	6.32	674 903	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
92				100	1.66	177 237	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
93				100	5.30	565 757	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
94				100	5.33	568 762	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.0015
IA		100, hot water			0.85	4980	gal/hr		Primary	Natural Gas	1020	Btu/scf	8760		NA

Section A.3: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	0.06997	0.06997	0.30648	0.30648
	Bldg 0652							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	0.08330	0.08330	0.36485	0.36485
								PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	0.00633	0.00633	0.02773	0.02773
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	0.00050	0.00050	0.00219	0.00219
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	0.00458	0.00458	0.02007	0.02007
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-09	2.00E-09	8.76E-09	8.76E-09
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.33E-08	1.33E-08	5.84E-08	5.84E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-09	1.00E-09	4.38E-09	4.38E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	1.00E-06	1.00E-06	4.38E-06	4.38E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.50E-09	2.50E-09	1.09E-08	1.09E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	2.33E-09	2.33E-09	1.02E-08	1.02E-08
								Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	6.25E-05	6.25E-05	2.74E-04	2.74E-04
								3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
IA Addition to IA No.11	0.85 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	0.000833	2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
	Bldg 0652							n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-03	1.50E-03	6.57E-03	6.57E-03
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	1.50E-09	1.50E-09	6.57E-09	6.57E-09
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	5.08E-07	5.08E-07	2.23E-06	2.23E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	1.42E-08	1.42E-08	6.20E-08	6.20E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	4.17E-09	4.17E-09	1.82E-08	1.82E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	2.83E-06	2.83E-06	1.24E-05	1.24E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	1.67E-07	1.67E-07	7.30E-07	7.30E-07
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	1.00E-08	1.00E-08	4.38E-08	4.38E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	9.16E-07	9.16E-07	4.01E-06	4.01E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.17E-06	1.17E-06	5.11E-06	5.11E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	7.00E-08	7.00E-08	3.06E-07	3.06E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	3.17E-06	3.17E-06	1.39E-05	1.39E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	2.17E-07	2.17E-07	9.49E-07	9.49E-07
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	1.75E-06	1.75E-06	7.66E-06	7.66E-06
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	2.00E-08	2.00E-08	8.76E-08	8.76E-08
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	1.58E-03	1.58E-03	6.90E-03	6.90E-03
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	100.0	100.0	437.8	437.8

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
57-11 replaced with IA-11	Removed 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	CO	84.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.10668	-0.10668	-0.46726	-0.46726
57-11 =	COMB0015							NO2	100.00	AP-42 Table 1.4-2	0.00%	0.00%	-0.12700	-0.12700	-0.55626	-0.55626
	Bldg 0652							PM10	7.600	AP-42 Table 1.4-2	0.00%	0.00%	-0.00965	-0.00965	-0.04228	-0.04228
								SO2	0.6	AP-42 Table 1.4-2	0.00%	0.00%	-0.00076	-0.00076	-0.00334	-0.00334
								VOC	5.5	AP-42 Table 1.4-2	0.00%	0.00%	-0.00699	-0.00699	-0.03059	-0.03059
								Acenaphthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Acenaphthylene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Anthracene	2.40E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-09	-3.05E-09	-1.34E-08	-1.34E-08
								Benz(a)anthracene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzene	2.10E-03	AP-42 Table 1.4-3	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Benzo(b)fluoranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Benzo(a)pyrene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(g,h,i)perylene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Benzo(k)flouranthene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Chrysene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								7,12-Dimethylbenz(a)anthracene	1.60E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.03E-08	-2.03E-08	-8.90E-08	-8.90E-08
								Dibenzo(a,h)anthracene	1.20E-06	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-09	-1.52E-09	-6.68E-09	-6.68E-09
								Dichlorobenzene	1.20E-03	AP-42 Table 1.4-3	0.00%	0.00%	-1.52E-06	-1.52E-06	-6.68E-06	-6.68E-06
								Fluoranthene	3.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.81E-09	-3.81E-09	-1.67E-08	-1.67E-08
								Fluorene	2.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-3.56E-09	-3.56E-09	-1.56E-08	-1.56E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
57-11 replaced with IA-11	**Removed** 1.3 MMBtu/hr Boiler-Bosworth	1	Natural Gas Usage	NA	NA	1	-0.00127	Formaldehyde	7.50E-02	AP-42 Table 1.4-3	0.00%	0.00%	-9.53E-05	-9.53E-05	-4.17E-04	-4.17E-04
57-11 =	COMB0015							3-Methylchloranthrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
	Bldg 0652							2-Methylnaphthalene	2.40E-05	AP-42 Table 1.4-3	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								n-Hexane	1.8	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-03	-2.29E-03	-1.00E-02	-1.00E-02
								Indeno(1,2,3-cd)pyrene	1.80E-06	AP-42 Table 1.4-3	0.00%	0.00%	-2.29E-09	-2.29E-09	-1.00E-08	-1.00E-08
								Naphthalene	6.10E-04	AP-42 Table 1.4-3	0.00%	0.00%	-7.75E-07	-7.75E-07	-3.39E-06	-3.39E-06
								Phenanthrene	1.70E-05	AP-42 Table 1.4-3	0.00%	0.00%	-2.16E-08	-2.16E-08	-9.46E-08	-9.46E-08
								Pyrene	5.00E-06	AP-42 Table 1.4-3	0.00%	0.00%	-6.35E-09	-6.35E-09	-2.78E-08	-2.78E-08
								Toluene	3.40E-03	AP-42 Table 1.4-3	0.00%	0.00%	-4.32E-06	-4.32E-06	-1.89E-05	-1.89E-05
								Arsenic	2.00E-04	AP-42 Table 1.4-4	0.00%	0.00%	-2.54E-07	-2.54E-07	-1.11E-06	-1.11E-06
								Beryllium	1.20E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.52E-08	-1.52E-08	-6.68E-08	-6.68E-08
								Cadmium	1.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.40E-06	-1.40E-06	-6.12E-06	-6.12E-06
								Chromium	1.40E-03	AP-42 Table 1.4-4	0.00%	0.00%	-1.78E-06	-1.78E-06	-7.79E-06	-7.79E-06
								Cobalt	8.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-1.07E-07	-1.07E-07	-4.67E-07	-4.67E-07
								Manganese	3.80E-03	AP-42 Table 1.4-4	0.00%	0.00%	-4.83E-06	-4.83E-06	-2.11E-05	-2.11E-05
								Mercury	2.60E-04	AP-42 Table 1.4-4	0.00%	0.00%	-3.30E-07	-3.30E-07	-1.45E-06	-1.45E-06
								Nickel	2.10E-03	AP-42 Table 1.4-4	0.00%	0.00%	-2.67E-06	-2.67E-06	-1.17E-05	-1.17E-05
								Selenium	2.40E-05	AP-42 Table 1.4-4	0.00%	0.00%	-3.05E-08	-3.05E-08	-1.34E-07	-1.34E-07
								Total HAP	1.89E+00	AP-42 Tables 1.4-3 & 1.4-4	0.00%	0.00%	-2.40E-03	-2.40E-03	-1.05E-02	-1.05E-02
								CO2	120000	AP-42 Table 1.4-2	0.00%	0.00%	-152.4	-152.4	-667.5	-667.5

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
91	903 Hp Diesel Generator-Sanders Brown	1	Diesel Usage	NA	NA	1	0.0427	CO	13.2	mfg cert	0.00%	0.00%	0.5636	0.5636	0.1409	0.1409
	Bldg 0230							NO2	181.1	mfg cert	0.00%	0.00%	7.7338	7.7338	1.9335	1.9335
								PM10	2.45	mfg cert	0.00%	0.00%	0.1046	0.1046	0.0262	0.0262
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0090	0.0090	0.0022	0.0022
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	2.0475	2.0475	0.5119	0.5119
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	1.49E-04	1.49E-04	3.74E-05	3.74E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	4.70E-05	4.70E-05	1.17E-05	1.17E-05
								Benzene	0.106	AP-42, 3.4-3	0.00%	0.00%	4.53E-03	4.53E-03	1.13E-03	1.13E-03
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	4.61E-04	4.61E-04	1.15E-04	1.15E-04
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	1.64E-03	1.64E-03	4.11E-04	4.11E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	1.13E-03	1.13E-03	2.82E-04	2.82E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	1.24E-03	1.24E-03	3.10E-04	3.10E-04
								CO2	22682	AP-42, 3.4-1	0.00%	0.00%	968.52	968.52	242.1	242.1

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
54-07 replaced with EU91	**REMOVED** 587 Hp Diesel Generator-Sanders Brown	2	Diesel Usage	NA	NA	1	-0.0300	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-3.9060	-3.9060	-0.9765	-0.9765
54-07 =	COMB0012	2	0.03 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-18.1290	-18.1290	-4.5323	-4.5323
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-1.2744	-1.2744	-0.3186	-0.3186
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0018	-0.0018	-0.0004	-0.0004
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.4385	-1.4385	-0.3596	-0.3596
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-3.15E-03	-3.15E-03	-7.88E-04	-7.88E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-3.81E-04	-3.81E-04	-9.53E-05	-9.53E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-3.84E-03	-3.84E-03	-9.60E-04	-9.60E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-4.85E-03	-4.85E-03	-1.21E-03	-1.21E-03
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.68E-03	-1.68E-03	-4.20E-04	-4.20E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-1.17E-03	-1.17E-03	-2.93E-04	-2.93E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-6.90E-04	-6.90E-04	-1.73E-04	-1.73E-04
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-674.04	-674.04	-168.5	-168.5

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
56-03 Replaced with EU91	**REMOVED** 434 Hp Diesel Generator-Sanders Brown		Diesel Usage	NA	NA	1	-0.0220	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-2.8644	-2.8644	-0.2864	-0.2864
56-03 =	COMB0014	1	0.022 (Mgal)	200 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-13.2946	-13.2946	-1.3295	-1.3295
	Bldg 0230							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.9346	-0.9346	-0.0935	-0.0935
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0013	-0.0013	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-1.0549	-1.0549	-0.1055	-0.1055
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-2.31E-03	-2.31E-03	-2.31E-04	-2.31E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-2.79E-04	-2.79E-04	-2.79E-05	-2.79E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-2.82E-03	-2.82E-03	-2.82E-04	-2.82E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-3.56E-03	-3.56E-03	-3.56E-04	-3.56E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-1.23E-03	-1.23E-03	-1.23E-04	-1.23E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-8.58E-04	-8.58E-04	-8.58E-05	-8.58E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-5.06E-04	-5.06E-04	-5.06E-05	-5.06E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-494.30	-494.30	-49.4	-49.4

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	237 Hp Diesel Generator-Pence	1	Diesel Usage	NA	NA	1	0.0117	CO	38.60	mfg cert	0.00%	0.00%	0.45	0.45	0.11	0.11
	Bldg 0041							NO2	122.00	mfg cert	0.00%	0.00%	1.43	1.43	0.36	0.36
								PM10	3.860	mfg cert	0.00%	0.00%	0.045	4.52E-02	1.13E-02	1.13E-02
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	0.001	6.97E-04	1.74E-04	1.74E-04
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.561	0.561	1.40E-01	0.140
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00123	1.23E-03	3.07E-04	3.07E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00015	1.49E-04	3.71E-05	3.71E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00150	1.50E-03	3.74E-04	3.74E-04
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00189	1.89E-03	4.73E-04	4.73E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00066	6.55E-04	1.64E-04	1.64E-04
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00046	4.56E-04	1.14E-04	1.14E-04
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00027	2.69E-04	6.73E-05	6.73E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	263	263	65.72	66

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
93	757 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	0.03680	CO	11.2	mfg cert	0.00%	0.00%	0.4122	0.4122	0.1030	0.1030
	Bldg 0019							NO2	178.9	mfg cert	0.00%	0.00%	6.5835	6.5835	1.6459	1.6459
								PM10	1.3	mfg cert	0.00%	0.00%	0.0478	0.0478	0.0120	0.0120
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0077	0.0077	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7646	1.7646	0.4411	0.4411
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00013	0.00013	3.22E-05	3.22E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	1.01E-05	1.01E-05
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00391	0.00391	0.0010	0.0010
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00040	0.00040	9.94E-05	9.94E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00142	0.00142	3.54E-04	3.54E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00097	0.00097	2.43E-04	2.43E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00107	0.00107	2.67E-04	2.67E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	832	832	208	208

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
59-13 Replaced with EU93	REMOVED 94 HP Diesel Generator-Memorial Coliseum	1	Diesel Usage	NA	NA	1	-0.00480	CO	130.2	AP-42, 3.3-1	0.00%	0.00%	-0.6250	-0.6250	-0.1562	-0.1562
59-13 =	COMB0017	1	0.0048 (Mgal)	500 hrs				NO2	604.3	AP-42, 3.3-1	0.00%	0.00%	-2.9006	-2.9006	-0.7252	-0.7252
	Bldg 0019							PM10	42.48	AP-42, 3.3-1	0.00%	0.00%	-0.2039	-0.2039	-0.0510	-0.0510
								SO2	0.0596	AP-42, 3.3-1	0.00%	0.00%	-0.0003	-0.0003	-0.0001	-0.0001
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	-0.2302	-0.2302	-0.0575	-0.0575
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	-0.00050	-0.00050	-1.26E-04	-1.26E-04
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	-0.00006	-0.00006	-1.52E-05	-1.52E-05
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	-0.00061	-0.00061	-1.54E-04	-0.0002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	-0.00078	-0.00078	-1.94E-04	-1.94E-04
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	-0.00027	-0.00027	-6.72E-05	-6.72E-05
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	-0.00019	-0.00019	-4.68E-05	-4.68E-05
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	-0.00011	-0.00011	-2.76E-05	-2.76E-05
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	-108	-108	-27	-27

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 10, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
94	762 HP Diesel Generator-Parking #8	1	Diesel Usage	NA	NA	1	0.03570	CO	25.9	mfg cert	0.00%	0.00%	0.9246	0.9246	0.2312	0.2312
	Bldg 0601							NO2	198.3	mfg cert	0.00%	0.00%	7.0793	7.0793	1.7698	1.7698
								PM10	1.3	mfg cert	0.00%	0.00%	0.0464	0.0464	0.0116	0.0116
								SO2	0.21	AP-42, 3.4-1	0.00%	0.00%	0.0075	0.0075	0.0019	0.0019
								VOC	47.95	AP-42, 3.4-1	0.00%	0.00%	1.7118	1.7118	0.4280	0.4280
								Acetaldehyde	0.0035	AP-42, 3.4-3	0.00%	0.00%	0.00012	0.00012	3.12E-05	3.12E-05
								Acrolein	0.0011	AP-42, 3.4-3	0.00%	0.00%	0.00004	0.00004	9.82E-06	9.82E-06
								Benzene	0.1063	AP-42, 3.4-3	0.00%	0.00%	0.00379	0.00379	0.0009	0.0009
								Formaldehyde	0.0108	AP-42, 3.4-3	0.00%	0.00%	0.00039	0.00039	9.64E-05	9.64E-05
								Toluene	0.0385	AP-42, 3.4-3	0.00%	0.00%	0.00137	0.00137	3.44E-04	3.44E-04
								Xylene	0.0264	AP-42, 3.4-3	0.00%	0.00%	0.00094	0.00094	2.36E-04	2.36E-04
								PAH	0.029	AP-42, 3.4-4	0.00%	0.00%	0.00104	0.00104	2.59E-04	2.59E-04
								CO2	22605	AP-42, 3.4-1	0.00%	0.00%	807	807	202	202

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-0003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 10/10/2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								CO					-5.080	-5.080	-0.992	-0.992
								NO2					-11.544	-11.544	-1.072	-1.072
								PM10					-2.172	-2.172	-0.417	-0.417
								SO2					0.021	0.021	4.42E-03	4.42E-03
								VOC					3.359	3.359	0.988	0.988
								Acenaphthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acenaphthylene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Acetaldehyde					-4.34E-03	-4.34E-03	-7.37E-04	-7.37E-04
								Acrolein					-4.46E-04	-4.46E-04	-6.96E-05	-6.96E-05
								Anthracene					-1.05E-09	-1.05E-09	-4.59E-09	-4.59E-09
								Benz(a)anthracene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzene					6.46E-03	6.46E-03	2.03E-03	2.03E-03
								Benzo(b)fluoranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Benzo(a)pyrene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(g,h,i)perylene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Benzo(k)flouranthene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Chrysene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								7,12-Dimethylbenz(a)anthracene					-6.99E-09	-6.99E-09	-3.06E-08	-3.06E-08
								Dibenzo(a,h)anthracene					-5.24E-10	-5.24E-10	-2.30E-09	-2.30E-09
								Dichlorobenzene					-5.24E-07	-5.24E-07	-2.30E-06	-2.30E-06
								Fluoranthene					-1.31E-09	-1.31E-09	-5.74E-09	-5.74E-09
								Fluorene					-1.22E-09	-1.22E-09	-5.36E-09	-5.36E-09
								Formaldehyde					-7.50E-03	-7.50E-03	-1.60E-03	-1.60E-03
								3-Methylchloranthrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								2-Methylnaphthalene					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
Net emissions from the addition of IA11, EU91-94 and the removal of EU57-11, EU54-07, EU 56-03 and EU59-13.								n-Hexane					-7.87E-04	-7.87E-04	-3.45E-03	-3.45E-03
								Indeno(1,2,3-cd)pyrene					-7.87E-10	-7.87E-10	-3.45E-09	-3.45E-09
								Naphthalene					-2.67E-07	-2.67E-07	-1.17E-06	-1.17E-06
								Phenanthrene					-7.43E-09	-7.43E-09	-3.25E-08	-3.25E-08
								Pyrene					-2.19E-09	-2.19E-09	-9.57E-09	-9.57E-09
								Toluene					1.91E-03	1.91E-03	6.56E-04	6.56E-04
								Xylene					1.28E-03	1.28E-03	4.49E-04	4.49E-04
								Arsenic					-8.74E-08	-8.74E-08	-3.83E-07	-3.83E-07
								Beryllium					-5.24E-09	-5.24E-09	-2.30E-08	-2.30E-08
								Cadmium					-4.81E-07	-4.81E-07	-2.11E-06	-2.11E-06
								Chromium					-6.12E-07	-6.12E-07	-2.68E-06	-2.68E-06
								Cobalt					-3.67E-08	-3.67E-08	-1.61E-07	-1.61E-07
								Manganese					-1.66E-06	-1.66E-06	-7.27E-06	-7.27E-06
								Mercury					-1.14E-07	-1.14E-07	-4.98E-07	-4.98E-07
								Nickel					-9.18E-07	-9.18E-07	-4.02E-06	-4.02E-06
								Selenium					-1.05E-08	-1.05E-08	-4.59E-08	-4.59E-08
								PAH					2.30E-03	2.30E-03	6.52E-04	6.52E-04
								Total HAP					-1.12E-03	-1.12E-03	-2.08E-03	-2.08E-03
								CO2					1542	1542	243	243

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(°F)*	Exit Velocity *(ft/sec)*
91	91 01	1.0, est	30, est				4044	923	
92	92 01	0.33, est	30, est				1197	950	
93	93 01	0.6	30, est				3249	851	
94	94 01	0.6, est	30, est				3606	988	
IA	IA	0.33	20, est					230	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
Bosworth natural gas boiler replacement. Removed 1.3 MMBtu/hr boiler (57-11) and replaced with 0.85 MMBtu/hr boiler (IA11), bldg 0652.
Sanders-Brown emergency generator replacement. Removed 587 Hp and 434 Hp generators (EU54-07 and EU56-03) and replaced with one 903 Hp generator (EU91, bldg 0230).
Memorial Coliseum emergency generator replacement. Removed 94 Hp generator (EU59-13) and replaced with 757 Hp generator (EU93, bldg 0019).
Pence Hall 237 Hp emergency generator addition (bldg 0041, EU92).
Parking Structure #8 762 Hp emergency generator addition (EU94, bldg 0601).

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirement
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: August 29, 2023

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	237 Hp Diesel Generator-Pence Hall	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
91 93 94	903 Hp Diesel Generator-Sanders Brown 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (c), (f), (g)(2-3)) 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(c), the engine must be EPA certified by the manufacturer to theemission standards for the same model year and engine power in 60.4205(b). Engine must be installed and configured to manufacture's emission-related specifications. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g)(2-3), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN:** **EU92 -** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performance test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. **EU91, 93, 94** - demonstrate compliance with 60.4211(g)(2) and additionally with (g)(3) which requires subsequent performance testing every 8,760 hours of engine operation or 3 years, whichever comes first, thereafter to demonstrate compliance with the applicable emission standards. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
91-94	903 Hp Diesel Generator-Sanders Brown 237 Hp Diesel Generator-Pence Hall 757 Hp Diesel Generator-Memorial Coliseum 762 Hp Diesel Generator-Parking Structure #8	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2-3) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations
None

UK Sanders-Brown Center on Aging/Neuroscience Facilities

26 3213 Emergency Generator

Submittal

GLENWOOD ELECTRIC INC.

12250 CHANDLER DR.

WALTON, KY 41094

5/16/2023

5/16/2023

NIXON POWER SERVICES



SUBMITTAL PACKAGE

Sanders Brown Renovation Gen Only

CONTRACTOR / INSTALLER: Glenwood Electric

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

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TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 600REOZVB Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Alternator Data		
	Alternator Data Sheet	5M4032
Sound Data		
	Sound Data Sheet	Sound Data
Emissions Data		
	EPA Certificate	EPA Certificate
DimensionalDrawings		
	Generator	ADV-8743
	Accessories	ADV-8231
	Controller	ADV-7985
	Remote Serial Annunciator	GM85123

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WiringSchematicDiagrams

Controller Schematic Diagram	ADV-9221
Controller Wiring Diagram	GM94316
Remote Serial Annunciator	ADV-9169
Remote Serial Annunciator	GM62554
Voltage Diagram	ADV-5875

Misc

Battery	244578
Battery Charger	GM87448
Battery Charger Assembly	GM95114
Block Heater	GM79182
Block Heater	GM79187
Circuit Breaker	GM24181
Circuit Breaker Mounting	ADV-8030
Emergency Stop	GM103743
Flexible Exhaust Tube	GM64276
Silencer, Critical	343615
Weld-On Flange	343609

Warranty

Warranty	TP-5374
Warranty	TP-5498

Certification

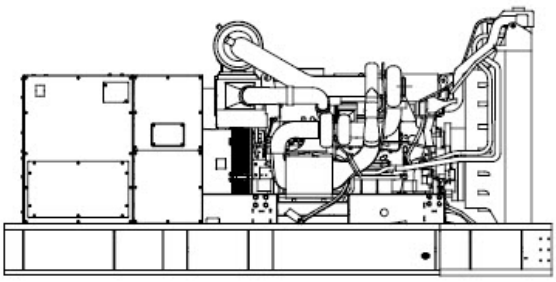
ISO9001 Certificate	G15-152
Prototype Test Certificate	G18-56

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator



Kohler Model: 600REOZVB

This diesel generator set equipped with a 5M4032 alternator operating at 277/480 volts is rated for 600 kW/750 kVA. Output amperage: 903

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	600REOZVB Generator System
1	600REOZVB Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	600REOZVB, TWD1644
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4032
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Standard Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Rating, LCB 1 Left	100% Rated
Amps, LCB 1 Left	600
Trip Type, LCB 1 Left	Electronic, LSI
LCB 1 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Left	Shunt Trip
Frame, LCB 1 Left	PG
Position, LCB 1 Left	5
Rating, LCB 2 Left	100% Rated
Amps, LCB 2 Left	600
Trip Type, LCB 2 Left	Electronic, LSI
LCB 2 Left Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Left	Shunt Trip
Frame, LCB 2 Left	PG
Position, LCB 2 Left	6
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset
Miscellaneous Accy,Installed	Oil in Genset
Warranty	5 Year Basic

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Louisville, KY 40299
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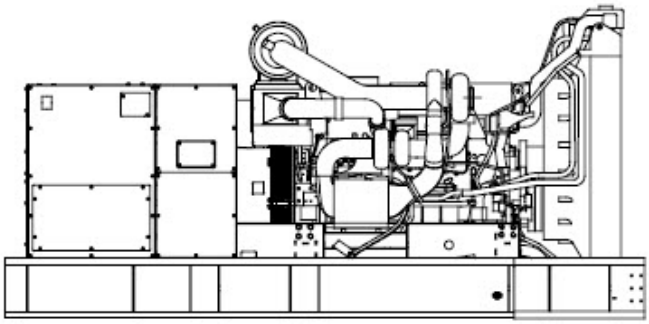
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Total unit length in inches	182
	Total unit width in inches	75
	Total unit height in inches	85
	Total unit weight (lbs)	10,925
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	Silencer,Hospital,10"Flange,SIEO	
1	Flexible Exhaust Connection, 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 600REOZVB	
1	RSA III, Annunciator only	

KOHLER®

Spec Sheets

KOHLER®

600REOZVB
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
5M4032	277/480	3	60	2200	600/750	903

RATINGS: All three-phase units are rated at 0.8 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage.
There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.
A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 0.4% per 100 m (328 ft.) elevation above 1400 m (4593 ft.).

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Leads, quantity	10, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H, Synthetic, Nonhydroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Rotor balancing (50Hz)	125%
Rotor balancing (60Hz)	125%
Voltage regulation, no-load to full-load RMS	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TWD1643GE (IBC Only), TWD1644GE (W/O IBC)
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	16.5:1 (IBC Only), 16.8:1
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	674 (903)
Cylinder head material	Cast Iron
Piston: type, material	Swirl Chamber, Graphite-Coated Aluminum
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.0 (IBC Only), EMS 2.3
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW, m3/min. (cfm)	130 (4594) IBC Only, 114.5 (4044)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	461 (862) IBC Only, 495 (923)
Maximum allowable back pressure, kPa (in. Hg)	10 (2.95)
Exh. outlet size at eng. hookup, mm (in.)	See ADV drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	10.0 (0.38)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. fuel flow, Lph (gph)	210 (55.5) IBC Only, 185 (48.9)
Max. fuel pump restriction, kPa (in. Hg)	10 (3.0)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel filter: quantity, type	2
Fuel Filter Secondary	5 Micron (IBC Only), 5 Micron
Fuel Filter Primary	10 Micron (IBC Only), 30 Micron
Recommended fuel	#2 Diesel

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122) IBC Only, 45 (113)
Engine jacket water capacity, L (gal.)	33 (8.7) IBC Only, 25 (6.6)
Radiator system capacity, including engine, L (gal.)	166 (43.9) IBC Only, 151.1 (39.9)
Engine jacket water flow, Lpm (gpm)	360 (95.4)
Charge cooler water flow, Lpm (gpm)	150 (39.6) IBC Only, 126 (33)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	245 (13933) IBC Only, 246 (13990)
Heat rejected to charge air cooling water at rated kW, dry exhaust, Kw Btu/min.	216 (12284) IBC Only, 147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	965 (38.0)
Fan, kWm (HP)	30 (41) IBC Only, 34 (46)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	760 (26839) IBC Only, 665 (23484)
Combustion air, m3/min. (cfm)	55 (1937) IBC Only, 48 (1649)
Heat rejected to ambient air: Engine, kW (Btu/min.)	29 (1649) IBC Only, 24 (1342)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	45 (2560)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

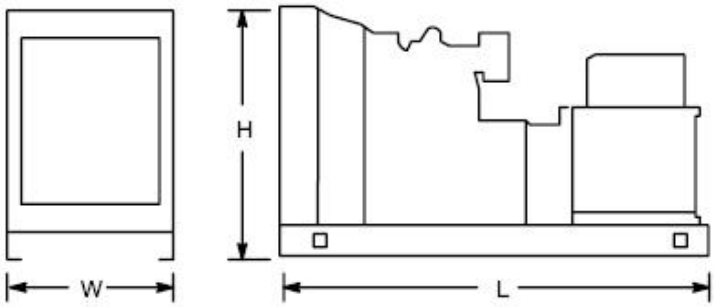
Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	161.8 Lph (42.7 gph) IBC Only, 157.0 Lph (41.5 gph)
Standby Fuel Consumption at 75% load	117.8 Lph (31.1 gph) IBC Only, 118.4 Lph (31.3 gph)
Standby Fuel Consumption at 50% load	79.3 Lph (21.0 gph) IBC Only, 80.1Lph (21.2 gph)
Standby Fuel Consumption at 25% load	43.6 Lph (11.5 gph) IBC Only, 45.0 Lph (111.9 gph)
Prime Fuel Consumption at 100% load	146.1 Lph (38.6 gph) IBC Only, 144.2 Lph (38.1 gph)
Prime Fuel Consumption at 75% load	106.9 Lph (28.2 gph) IBC Only, 108.2 Lph (28.6 gph)
Prime Fuel Consumption at 50% load	72.7 Lph (19.2 gph) IBC Only, 73.9 Lph (19.5 gph)
Prime Fuel Consumption at 25% load	40.5 Lph (10.7 gph) IBC Only, 42.6 Lph (11.3 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1973 (166.5 x 72.0 x 77.7)
Weight (radiator model), wet, kg (lb.):	4885 (10770)

Model: 600REOZVB, continued



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

Industrial Generator Set Accessories

Generator Set Controller



The APM603 generator set controller provides advanced control, system monitoring, and system diagnostics for a single generator set or paralleling multiple generator sets. The APM603 interfaces the generator set to other power system equipment and network management systems using standard industry network communications. It uses a patented digital voltage regulator and unique software logic to manage alternator thermal overload protection as well as serves as an overcurrent protective relay, features normally requiring additional hardware. The APM603 controller meets NFPA 110, Level 1.

Display, Interface, and Accessibility

- A 7-inch color TFT touchscreen for easy local access to data.
  - Home screen can be customized to show critical data at a glance.
  - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial bus and Ethernet networks, and supports SNMP and BACnet® through Ethernet networks.

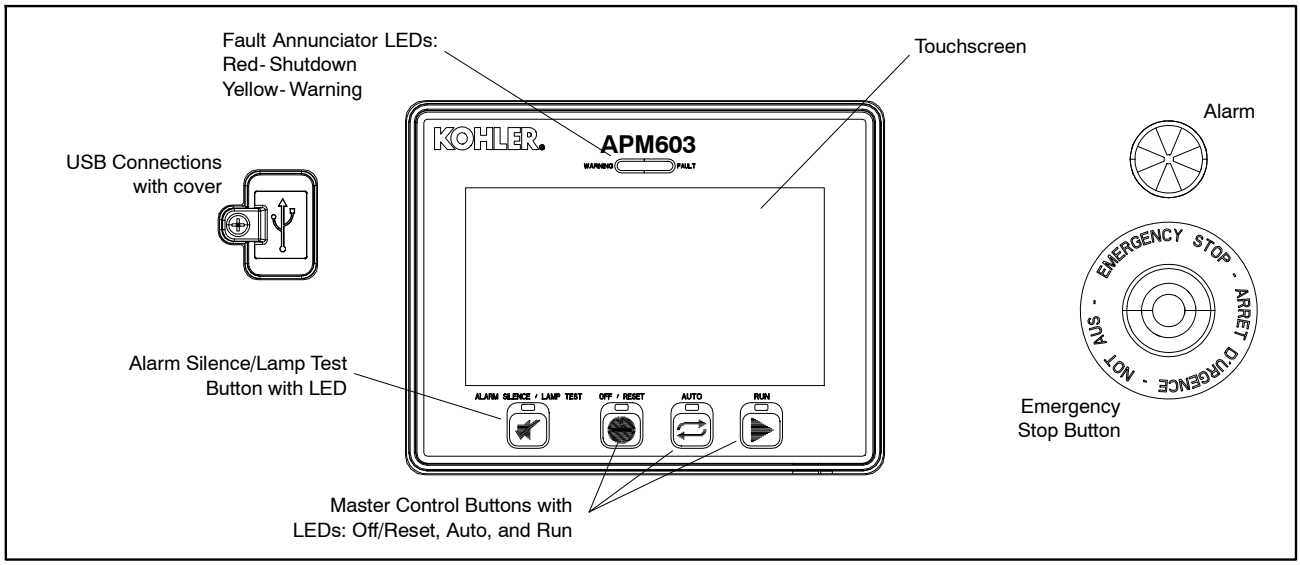
Global Support

- Sales, installation, and service support from more than 800 Kohler and SDMO service providers around the world.

On- board Diagnostics

- Immediate visibility of warnings and faults with text description and code display.
  - 15 seconds of critical data are captured around each warning and fault
  - Critical data can be viewed on the display and downloaded
- Store up to 10,000 events locally along with historical data logging of successful starts.
  - Accurate time stamp from real-time clock
  - Event log can be downloaded
- Data logging of customized parameter list for report generation and advanced troubleshooting.
  - Store to external USB drive for easy transfer to another device

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Controller Features

AC Output Voltage Regulator Adjustment	Maximum of ±10% of the system voltage
Alarm Horn	Indicates a generator set warning or shutdown condition
Alarm Silence	For NFPA-110 application or user convenience
Alternator Protection	Generator set overload and short circuit protection
Cyclic Cranking	Provides automatic restart after a failed start attempt with programmable on/off time and number of attempts
ECU Diagnostics	Displays engine ECU fault codes and descriptions for engine troubleshooting
Emergency Stop Button	Shuts down the generator set immediately, for emergency situations
Engine Start Aid	Control for an optional engine starting aid
Environmentally Sealed Membrane Keypad	Three master control buttons with LEDs: Off/Reset, Auto, and Run
Patented High-Speed RMS Digital Voltage Regulator	±0.25% no-load to full-load regulation with three-phase true RMS sensing
Lamp Test	Verifies functionality of the indicator LEDs
Real-time Clock	Includes battery back-up to retain date and time through controller power cycle
Remote Reset	Allows remote fault resets and restarting of the generator set
Remote Monitoring Panel	Compatible with the Kohler® Remote Serial Annunciator
Run Time Hourmeter	Displays generator set run time
Run Relay	Indicates that the generator set is running
Time Delay Engine Cooldown (TDEC)	Time delay before the generator set shuts down
Time Delay Engine Start (TDES)	Time delay before the generator set starts

Communication

USB Port	(1) Mini-USB port for PC connection (1) USB port for storage device
Serial (RS-485) Port	(1) Non-isolated for RSA III (1) Isolated for Modbus devices (1) Isolated for paralleling communication
Ethernet Port	(1) RJ45 for Modbus TCP, SNMP, and BACnet

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

- Isochronous control with real and reactive load sharing with other APM603 controller equipped generator sets
  - Supports paralleling up to 8 generators
- Random first-on logic to prevent two or more generator sets from closing to a dead bus and provides the fastest response for a single generator online
- Automatic synchronizer with dead bus closing
- Soft loading and unloading for generator management
- Protective relay functions:
  - Synch check (25C)
  - Over current (51)
  - Over frequency (81O)
  - Over power (32O)
  - Over voltage (59)
  - Reverse power (32R)
  - Reverse reactive power (32RQ)
  - Under frequency (81U)
  - Under voltage (27)
- Generator management to allow the start and stop of generators based on load demand or state of other generators
  - Fuel level
  - Run time
  - Manual order
  - Time of day
  - Efficiency
- Simplified paralleling system view from any generator controller in the system

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection
- Includes a maintenance mode for arc flash reduction per NEC 240.87

Load Management Features

- Programmable outputs included to command the connect and disconnect of loads based on generator or paralleling system state
  - Loads connected based on available capacity
  - Loads disconnected at system startup
  - Loads disconnected based on a maximum kW setting or underfrequency setting
- Supports up to 16 prioritized load steps per system
  - Can be used on a single generator system
  - Can be combined in a paralleling system for a total system load control capability
- Simplified load management system view from any generator controller in the system
- Requires input/output module option

Advanced Programmable I/O

- Configurable inputs and outputs can be programmed for customer specific use
- PLC-like capability for applying logic to customize generator system behavior

Troubleshooting Features

- 15 seconds of key data automatically captured around each warning and shutdown
  - Data can be exported for detailed analysis
  - Data can be viewed on controller for convenient on-site troubleshooting support
- Configurable data logger will allow you to select parameters to monitor
  - Data stored to USB device for flexibility on amount of data stored and ability to export for detailed analysis
  - Data capture controlled by user to allow capturing specific data required

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - High engine speed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence button
  - Remote emergency stop *

* Function requires optional input sensors or kits and is engine dependent, see Engine Data.

Standards

The generator set controller has been tested and verified for compliance with the following standards.

- NFPA 99
- NFPA 110, Level 1
- CSA 282-09
- UL 6200
- ASTM B117 (salt spray test)

Controller Functions

The controller displays warning, shutdown, and status messages. **All functions are available as relay outputs.**
Warning causes the yellow fault LED to show and sounds the alarm horn, signaling an impending problem.
Shutdown causes the red fault LED to show, sounds the alarm horn, and stops the generator set.

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here. This table highlights the items required for NFPA 110.

Event	Warning	Shutdown
Alternator Thermal Protection †		●
Battery Charger Fault *	▲	
CAN Option Board1 Comm Loss	▲	
Critically Low Fuel Level (diesel) *	▲	
ECU Diagnostic Event	▲	
ECU Mismatch Shutdown †		●
Fuel Leak Alarm (diesel) *	▲	
High Battery Voltage Warning	▲	
High Coolant Temperature Shutdown †		●
High Coolant Temperature Warning	▲	
High Fuel Level Warning (diesel) *	▲	
High Oil Temperature Shutdown †		●
High Oil Temperature Warning	▲	
Local Emergency Stop Shutdown †		●
Loss ECU Comms Shutdown †		●
Loss of Signal Low Coolant Level Voltage	▲	
Low Battery Voltage Warning	▲	
Low Coolant Level Shutdown †		●
Low Coolant Temperature Warning	▲	
Low Fuel Level Shutdown (diesel) * †		●
Low Fuel Level Warning (diesel) *	▲	
Low Fuel Pressure Warning (gas) *	▲	
Low Oil Pressure Shutdown †		●
Low Oil Pressure Warning	▲	
Low RTC (clock) Battery Voltage	▲	
Maintenance Reminder1	▲	
Maintenance Reminder2	▲	
Maintenance Reminder3	▲	
Maximum Power Shutdown †		●
Maximum Power Warning	▲	
Not In Auto Alarm	▲	
Over Crank Shutdown †		●
Over Current Shutdown (L1, L2, L3) †		●
Over Current Warning (L1, L2, L3)	▲	
Over Frequency Shutdown †		●
Over Frequency Warning	▲	
Over Power Shutdown †		●
Over Power Warning	▲	
Over Speed Shutdown †		●
Over Voltage Shutdown (L-L, L-N, each phase) †		●
Over Voltage Warning (L-L, L-N, each phase)	▲	

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		●
Reverse Power Shutdown †		●
Reverse VAR Shutdown †		●
Under Frequency Shutdown †		●
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		●
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1-8		
Run Button Pressed		

* Function requires optional input sensors or kits
† Items included with common fault shutdown 10

Mitsubishi Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Coolant Temperature, Degrees	Analog Input
Fuel Level %	
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Crank	
Horn	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	16 Dry Contact Digital
User Configurable Relay Outputs	8 NO/NC Relays
Note: Programmable I/O is configurable by a Kohler-authorized technician.	

Mitsubishi Engine Data

The following Mitsubishi engine data is displayed on the APM603 controller.

Parameter
Battery Voltage
Coolant Temperature
Engine Speed
Intercooler Temperature (NA on some engine sizes)
Oil Pressure
Total Run Time Hours

Volvo Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	2 Analog, 0- 5 VDC 4 Dry Contact Digital
User Configurable Relay Outputs	14 NO/NC Relays 1 Common Fault Relay
Note: Programmable I/O is configurable by a Kohler-authorized technician	

Volvo Engine Data

The following Volvo engine data is displayed on the APM603 controller.

Parameter
Air Intake Pressure
Air Intake Temperature
Ambient Temperature
Barometric Pressure
Coolant Temperature
ECU Battery Voltage
ECU Runtime Hours
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Mechanical Engine Load
Oil Pressure
Oil Temperature

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

APM603 Available Options

- ❑ **Common Failure Relay** provides a relay output to signal a generator set fault.
- ❑ **Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming capability.
- ❑ **Electrically Operated Circuit Breakers**
  - For paralleling systems
  - Available generator-mounted or remote-mounted
  - 24VDC
- ❑ **Ground Fault Relay** provides a relay output to signal a ground fault is detected.
- ❑ **Input/Output Module** for Kohler Diesel (KD) and Mitsubishi models provides:
  - 16 digital input connections with connection to ground
  - 8 relay output connections (Form C, rated 8A, 240 VAC or rated 0.5 A, 48 VDC)
- ❑ **Input/Output Module** for models other than KD or Mitsubishi provides:
  - 2 analog inputs (0- 5 VDC)
  - 4 digital input connections with connection to ground
  - 14 relay output connections (Form C, rated 10A, 120V)
  - 1 common fault relay output (NO, rated 2A, 24VDC)
- ❑ **Key Switch** to allow selection of RUN, OFF and AUTO modes. Lockable in the AUTO position by removing the key.
- ❑ **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- ❑ **Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- ❑ **Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

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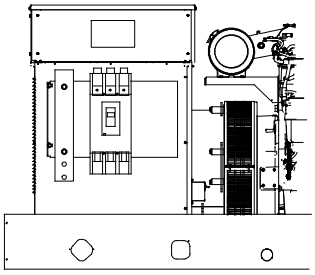
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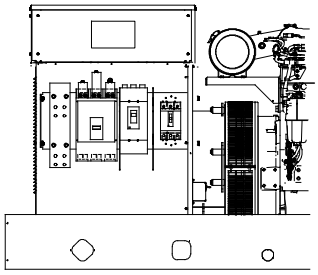
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Industrial Generator Set Accessories

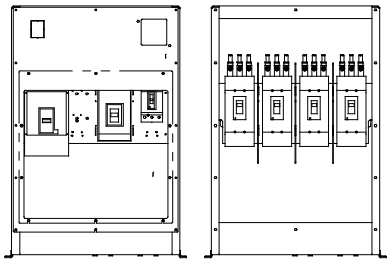
Line Circuit Breakers 15- 3250 kW



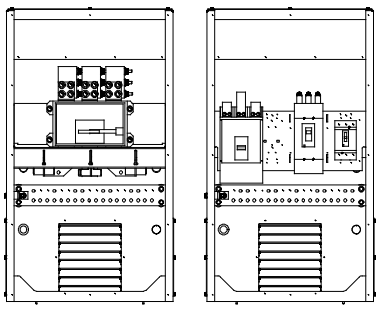
Single Circuit Breaker Kit with Neutral Bus Bar
15- 300 kW Model Shown



Multiple Circuit Breaker Kit with Neutral Bus Bar
180- 300 kW Model Shown



Multiple Circuit Breaker Kits with Neutral Bus Bar
350- 2250 kW Model Shown
(also applies to some 300 kW models)



Circuit Breaker Kits with Neutral Bus Bar
700- 2500 kW KD Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
  - Magnetic trip
  - Thermal magnetic trip
  - Electronic trip
  - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350- 2500 kW models and selected 80- 300 kW models).
- Up to four line circuit breakers can be used on 350- 2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
  - UL 489 Molded Case Circuit Breakers
  - UL 1077 Supplementary Protectors
  - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Magnetic Trip

The magnetic trip features an electromagnet in series with the load contacts and a moveable armature to activate the trip mechanism. When a sudden and excessive current such as a short circuit occurs, the electromagnet attracts the armature resulting in an instantaneous trip.

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory- calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

Electronic Trip

These line circuit breakers use electronic controls and miniature current transformers to monitor electrical currents and trip when preset limits are exceeded.

LI breakers are a combination of adjustable trip functions including long-time ampere rating, long-time delay, and instantaneous pickup. LSI breakers have all of the LI breaker features plus short-time pickup, short-time delay, and defeatable instantaneous pickup. LSIG breakers have all of the LSI breaker features plus ground-fault pickup and delay.

NOTE: MG-frame does not have a long-time delay when selected with LI breakers.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSIG in this document. Models with LSIG compare current flow in phase and neutral lines, and trip when current unbalance exists.

Ground fault trip units are an integral part of the circuit breaker and are not available as field-installable kits. The ground fault pickup switch sets the current level at which the circuit breaker will trip after the ground fault delay. Ground fault pickup values are based on circuit breaker sensor plug only and not on the rating plug multiplier. Changing the rating plug multiplier has no effect on the ground fault pickup values.

80% Rated Circuit Breaker

Most molded-case circuit breakers are 80% rated devices. An 80% rated circuit breaker can only be applied at 80% of its rating for continuous loads as defined by NFPA 70. Circuit conductors used with 80% rated circuit breakers are required to be rated for 100% of the circuit breaker's rating.

The 80% rated circuit breakers are typically at a lower cost than the 100% rated circuit breaker but load growth is limited.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

❑ Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

❑ Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.
15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

❑ Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

❑ Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

❑ Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

❑ Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

❑ Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

❑ Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	30	9- 325 A. Mag. Trip	HJ
	50	84- 546 A. Mag. Trip	
	100	180- 1040 A. Mag. Trip	
	150	348- 1690 A. Mag. Trip	
	250	684- 2500 A. Mag. Trip	JJ
	300- 400	Thermal Magnetic	LA
	400	500- 1000 A. Mag. Trip	
		750- 1600 A. Mag. Trip	
		1000- 2000 A. Mag. Trip	
		1125- 2250 A. Mag. Trip	
		1250- 2500 A. Mag. Trip	
		1500- 3000 A. Mag. Trip	
		1750- 3500 A. Mag. Trip	
		2000- 4000 A. Mag. Trip	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	
	1600- 2500	Electronic LSI	RJ
		Electronic LSIG	
	1600- 3000	Electronic LSI	NW
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers.*

Alt. Model	Amps	Trip Unit	Frame
4M 5M 7M	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

* P-frame breakers can be used with the Decision-Maker® 6000 Controller/DPS System or APM603 controller.
NW breakers are for use with the APM603 only.

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

Gen. Set kW	Alt. Model	Rating, Amperes	Type
350- 2250 kW	4M/ 5M/ 7M	3000	Load Bus

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

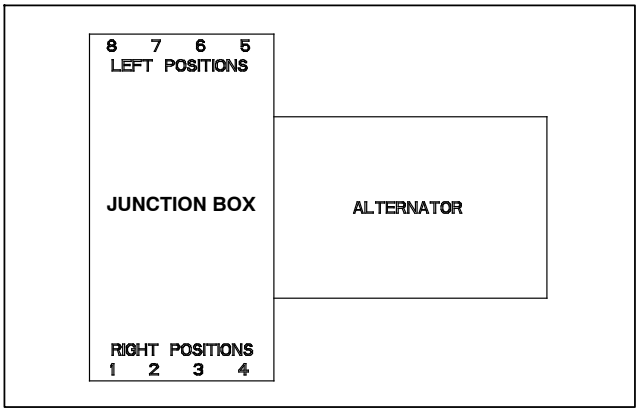
Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
NW	100	100	85
PG	65	35	18
PJ	100	65	25
PL	125	65	25
RJ	100	65	25

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
RJ	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600- 3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 kcmil

Breaker Positions



NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, HG, J, JG, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.

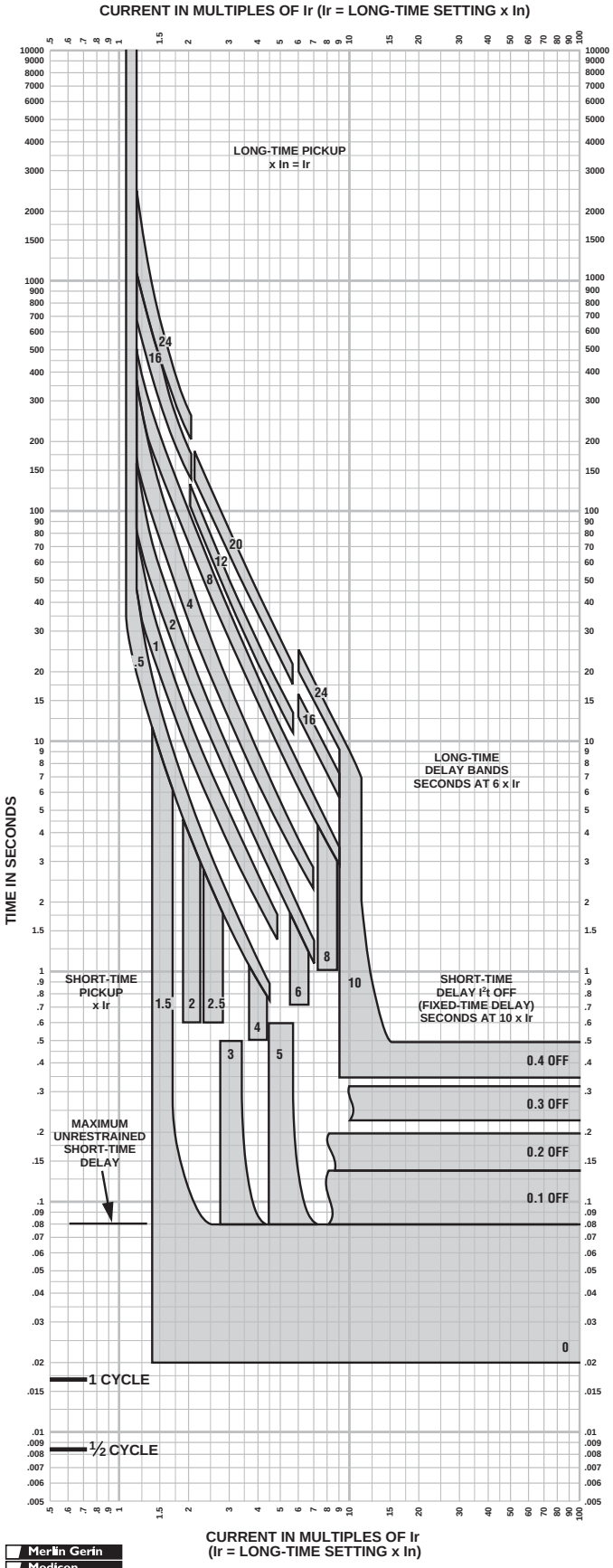
Multiple Circuit Breaker Combinations

Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	LA	LA	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG	LG	H/J	
	LG	LG	LA	
	LG	LG	LG	
	LG	H/J	H/J	H/J
	LG	LA	H/J	H/J
	LG	LA	LA	H/J
	LG	LA	LA	LA
	LG	LG	H/J	H/J
	LG	LG	LA	H/J
	LG	LG	LA	LA
	LG	LG	LG	H/J
	LG	LG	LG	LA
	LG	LG	LG	LG †
	M/P			
	M/P		H/J	
	M/P		LA	
	M/P		LG	
	M/P		M/P ‡	
	M/P		H/J	H/J
	M/P		LA	H/J
	M/P		LA	LA
	M/P		LG	H/J
	M/P		LG	LA
	M/P		LG	LG †
	R §			
	NW §			
	LOAD BUS KIT §			

† Frame size LG is not available in position 4 with 1219 mm (48 in.) junction box.

‡ Frame sizes M/P are not available in position 3 or 4 with 1219 mm (48 in.) junction box.

§ R breakers, NW breakers, and the load bus kit occupy all four positions on a side.



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

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Square D
Telemecanique
Federal Pioneer
Federal Pacific
Schneider Electric Brands

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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

POWERPACT Molded Case Circuit Breakers lead the industry with proven, reliable protection and innovative design. Providing unparalleled performance and control, this generation of P- and R-frame circuit breakers features exclusive MICROLOGIC® Trip Units, which allow for a range of sophisticated applications for metering and monitoring. In addition, units can be interchanged to allow for maximum flexibility and are field-installable for easy upgrades as needed.

The compact P- and R-frame circuit breakers permit smaller footprint and higher density installations using I-LINE® Panelboards and Switchboards. These circuit breakers are available in 100% rated construction up to 2500 A to meet a broad range of commercial and industrial application needs.

Full-Featured Performance

- P-frame – 1200 A available in both standard and 100% ratings with sensor sizes 250–1200 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- R-frame – 2500 A available in both standard and 100% ratings with sensor sizes 600–2500 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- Compact breaker size allows for smaller footprint installations using I-LINE Panelboards and Switchboards. 9" width on P-frame designs and 15" width on R-frame designs provide increased density installations
- Most field-installable accessories are common to all frame sizes for easier stocking and installation
- Selection of four interchangeable MICROLOGIC Trip Units with POWERLOGIC® power metering and monitoring capabilities available in advanced trip units
- Compatible with POWERLOGIC® systems and high amperage power circuit breakers
- Built-in MODBUS® protocol provides an open communications platform and eliminates the need to purchase additional, proprietary network solutions
- Connection options include bus, cable or I-Line for installation flexibility
- Additional options are available for 5-cycle closing, stored energy mechanisms and draw-out mounting of 1200 A breakers

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SQUARE D
Schneider Electric

POWERPACT® P- and R-Frame Molded Case Circuit Breakers
(Standard or 100% rated up to 2500 A)

Onboard Intelligence

For “smarter breakers,” a range of MICROLOGIC® Trip Units provides advanced functionality, such as a communications interface, and power metering and monitoring capabilities. With the appropriate MICROLOGIC Trip Unit, you can communicate with breakers, gather power information, monitor events and remotely control breakers based on predetermined conditions, leading to substantial savings in electrical system operating costs.

These interchangeable, microprocessor-controlled, plug-in devices provide the next generation of protection, measurement and control functions, delivering not only greater electrical system safety but also improved system integration and coordination.



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

- Basic circuit protection including long-time, instantaneous and optional short-time adjustments

MICROLOGIC 3.0A, 5.0A and 6.0A

- Long-time, instantaneous and optional short-time adjustments
- Integrated ammeter and phase loading bar graph
- LED trip indicator
- Zone selective interlocking with downstream and upstream breakers
- Optional ground-fault protection
- Optional MODBUS® communications interface

MICROLOGIC 5.0P and 6.0P

- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS communications interface compatibility with POWERLOGIC® installations
- Standard GF alarm on 5.0P. 6.0P has equipment ground-fault tripping protection

MICROLOGIC 5.0H and 6.0H

- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

Contact your Square D sales representative for additional information. Or, visit www.SquareD.com.

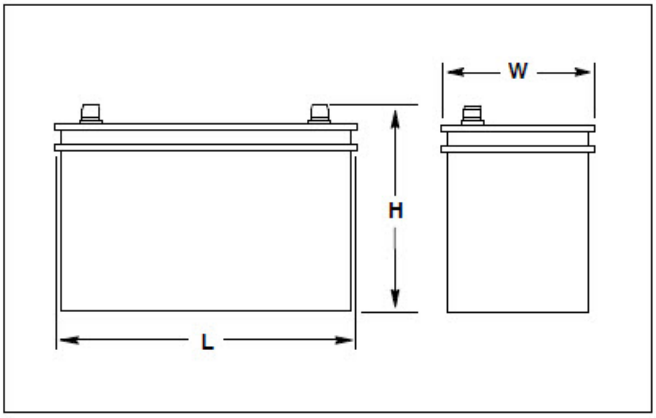
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Typical Overall Dimensions

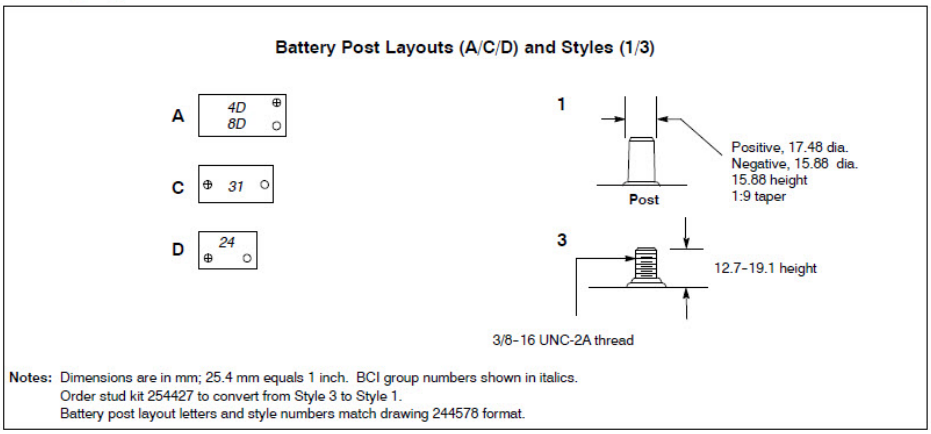


Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0 ° C (32 ° F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18°C (0°F) Min.	Reserve Capacity Minutes at 27° (80°F) Min.	Battery Post Layout and Style
				L	W	H			
Wet	324586	2	31	330.2 (13.0)	173.0 (6.8)	239.8 (9.4)	950	185	C/3

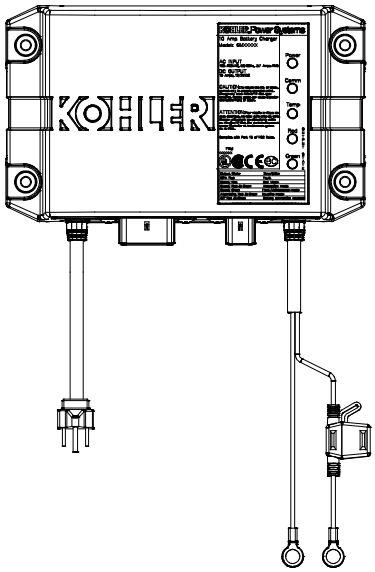
Battery Specifications



KOHLER

Industrial Generator Set Accessories

12/24 Volt, 10 Amp
Automatic Multi-Stage Battery Charger



The battery charger is a fully-automatic, high efficiency battery charger that charges batteries rapidly and safely. The battery charger is designed for an industrial environment.

The battery charger is designed for operation with an engine cranking battery.

The battery charger is universal voltage input capable, comes with a standard 120 V/60 Hz AC plug, and charges 12 VDC or 24 VDC battery systems.

Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

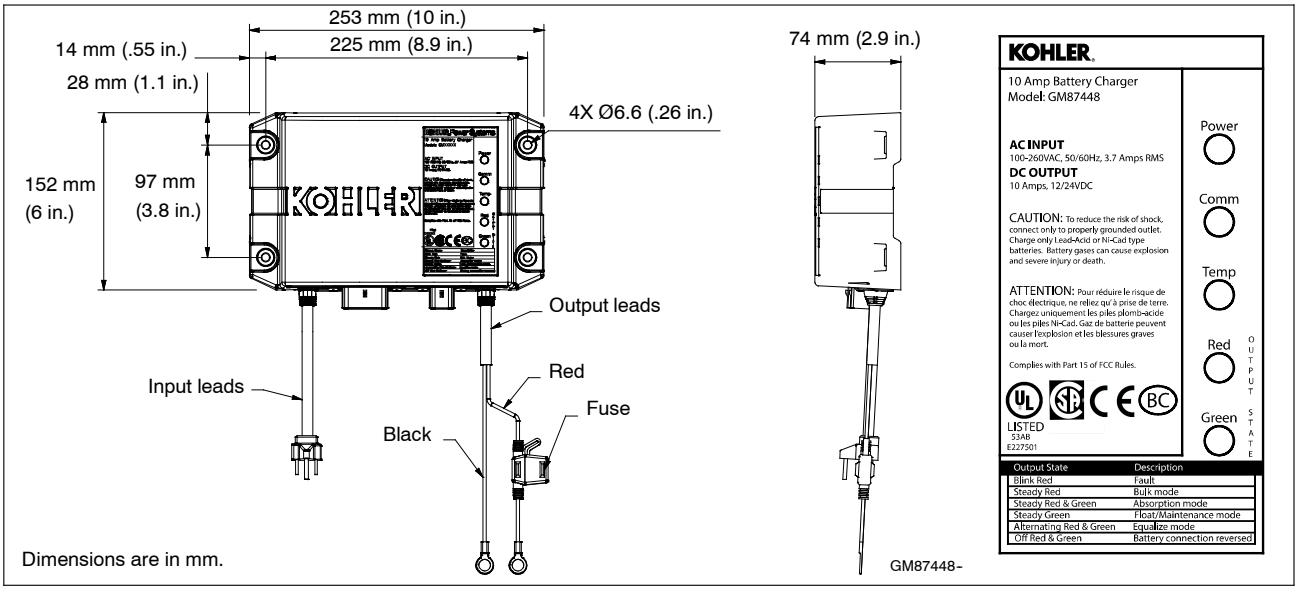
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

Standard Features

- 12 or 24 VDC output
  - Automatic voltage detection
- Automatic multi-stage charging modes
  - Recovery charge
  - Bulk charge
  - Absorption charge
  - Float charge
  - Equalize charge
- Charges the following type batteries:
  - Flooded lead acid (FLA)
  - AGM
  - Gel cell
  - High performance AGM
  - Nickel-cadmium (NiCad)
- 5 LED status indicators
- Durable potted assembly for waterproofing and vibration resistance
- Reverse-polarity protection
- Short-circuit protection
- Electronically limited output current
- Optional temperature compensation (FLA only)
- User adjustable parameters to support optimal manufacturer recommended charge curve.
- Code compliance:
  - UL 1236 Listed
  - NFPA 110, Level 1 compatible (when used with Kohler controller and connected to engine harness)
  - CSA - C22.2 No. 107.2-01
  - FCC - Title 47, Part 15 Class A
  - CE
  - IBC 2015
  - OSHPD

DC Output		AC Input			Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps	**Overall Dimensions** W x D x H	kgs	lbs
12/24	10	100-260	3.7	253 mm x 152 mm x 74 mm (10.0 in x 6.0 in x 2.9 in)	3.6	7.9

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel–Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ Red ○ Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

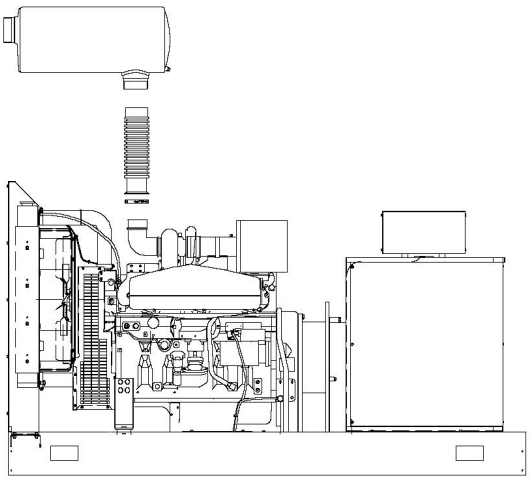
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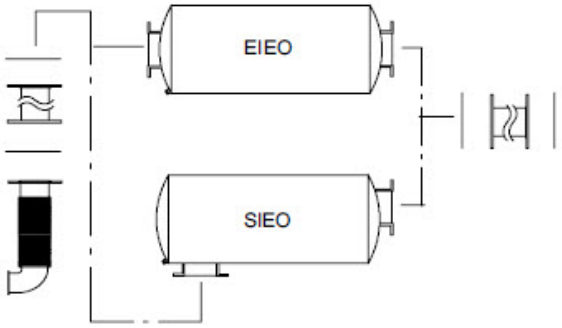


Kohler Co. offers silencers rated for hospital, critical, residential, and industrial applications and stainless steel flexible exhaust connectors for unhoused generator sets. The accessories described in this spec sheet apply to open units unless otherwise stated. These silencers withstand exhaust flow pressure and temperature without creating excessive engine backpressure.

Silencer Type	Noise Reduction dB(A)	Ambient Noise Level	Silencing Requirement
Hospital	32-42	Low	Very High

Backpressure Considerations

Consult the generator set spec sheet to determine the maximum allowable exhaust backpressure. Add the backpressure produced by the silencer and exhaust piping together to determine the total exhaust system backpressure. Contact an authorized distributor/dealer to calculate backpressure in exhaust piping. Do not exceed the maximum allowable backpressure.



Legend

Use the information below for identifying the exhaust system components shown in the illustrations on the following pages.

Side Inlet End Outlet (SIEO)



End Inlet End Outlet (EIEO)



Flex Exhaust



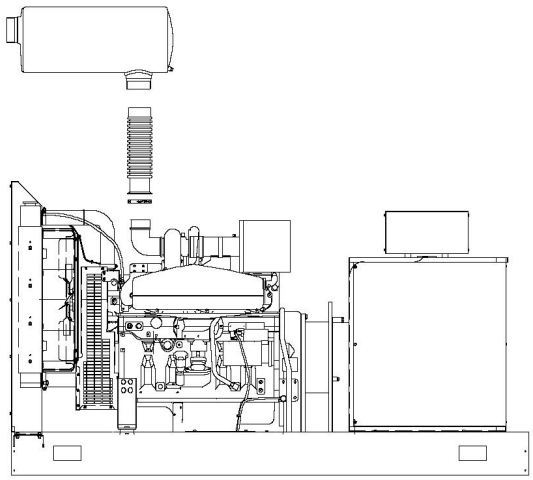
Flex Exhaust (wye)

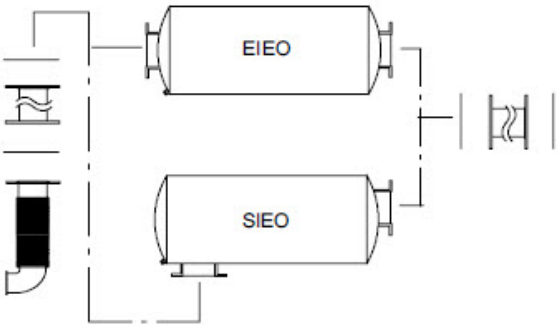


Exhaust System Kits	Qty. in Kit	Size, In/Out	Note
Hospital Silencer SIEO	1	10"	

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Use the illustrations on the following pages to select the available silencer type and exhaust system configuration best suited for your application. Refer to your authorized distributor/dealer for silencer and component kit numbers and for silencer dimensions.

Backpressure Considerations

Consult the generator set spec sheet to determine the maximum allowable exhaust backpressure. Add the backpressure produced by the silencer and exhaust piping together to determine the total exhaust system backpressure. Contact an authorized distributor/dealer to calculate backpressure in exhaust piping. Do not exceed the maximum allowable backpressure.

Legend

Use the information below for identifying the exhaust system components shown in the illustrations on the following pages.

Side Inlet End Outlet (SIEO)



End Inlet End Outlet (EIEO)



Flex Exhaust



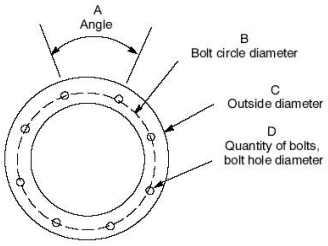
Flex Exhaust (wye)



Exhaust System Kits	Qty. in Kit	Size, In/Out	Note
Flex Exhaust 10"	1	-	Kit includes mounting hardware.

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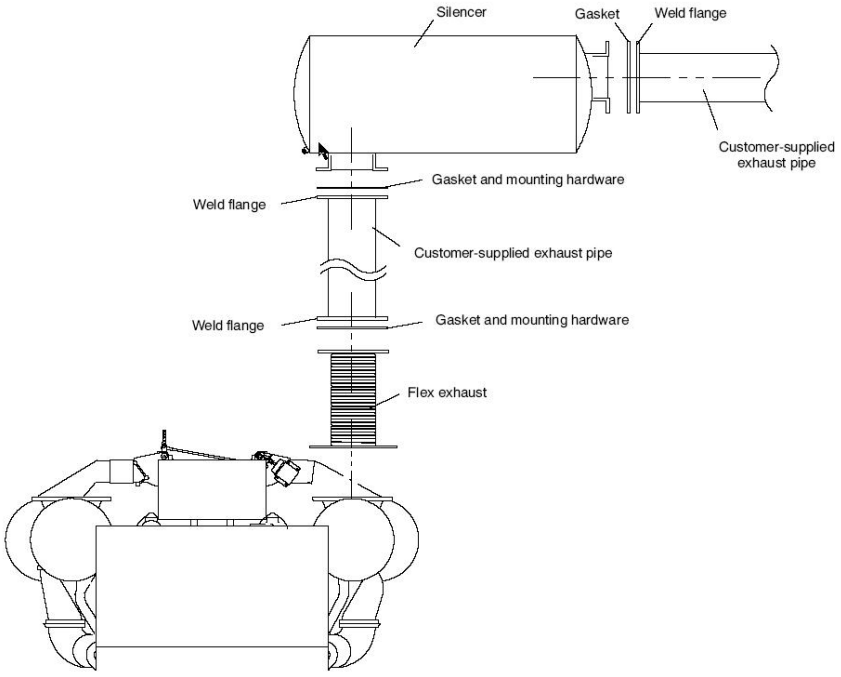


Weld Flange Dimensions

Weld Flange Kits

Use the weld flange kit to connect the exhaust silencer to customer-supplied exhaust pipe. One weld flange kit includes two exhaust flanges, two gaskets, and the mounting hardware.

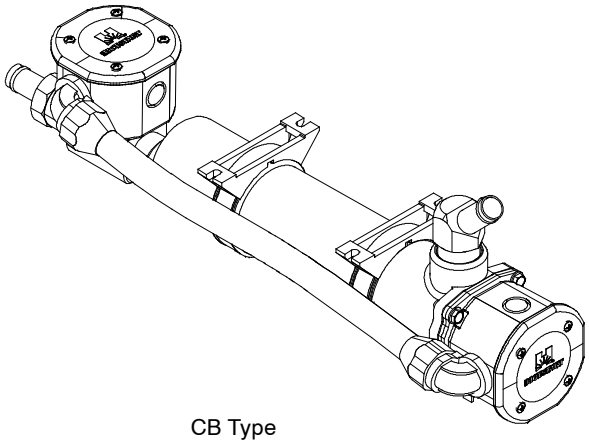
ANSI Class 150 Flange Dimensions				
Nominal Pipe Size, in.	A	B	C	D
	Deg.	mm (in.)	mm (in.)	Qty., mm (in.)
10"	30	361.95 (14.25)	406.4 (16.0)	12, 25.40 (1.00)



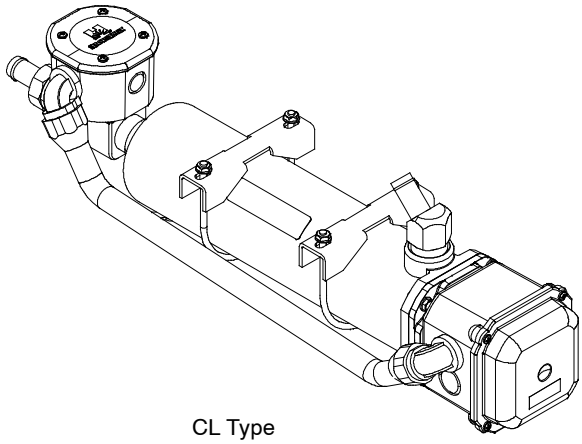
KOHLER®

Industrial Generator Set Accessories

Engine Block Heater Kits



CB Type



CL Type

Block Heater Kit, Typical

Applicable Models

- 180- 200RZXB
- 180- 200REZXB
- 230- 275REOZJE
- 300- 500REOZJ
- 350- 500REOZJB
- 350- 500REOZJC
- 350- 400REOZJD
- 500REOZVC
- 550- 600REOZVB

Standard Features

- UL- C/US listed
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

Description

The engine block heater kit heats the engine coolant in cold ambient, warming the cylinders, oil, and charge air circuit which all help to give a faster starting time. The engine block heater uses thermosiphon action to circulate warm coolant into the engine and supplies constant heating to the engine. The engine block heater helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 27°C (80°F) and turns OFF when the engine coolant temperature reaches 38°C (100°F).

The engine block heater kit is recommended for ambient temperatures below 10°C (50°F).

The engine block heater kits are available in 120 V, 208 V, 240 V, and 480 V versions.

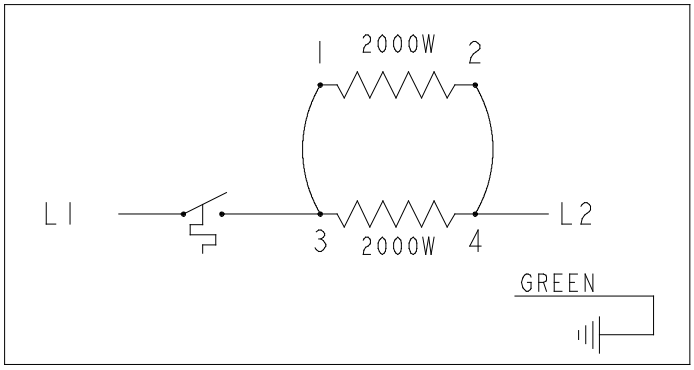
Block Heater Specifications

Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Thermostat Temperature Range	27°- 38°C (80°- 100°F)
Temperature High Limit	96°C (205°F)
Max. Pressure	125 psi (860 kPa)
Inlet/Outlet Plumbing	1 in. NPT
System Ingress	NEMA 4

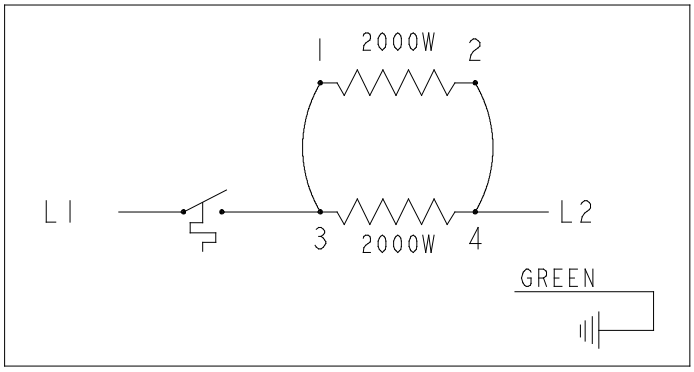
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase
GM75809- KA1	GM76113	2500	90- 120	1
GM75809- KA2	GM76114	2500	190- 208	1
GM75809- KA3	GM76115	2500	210- 240	1
GM75809- KA4	GM76116	2500	380- 480	1
GM76120- KA1	GM76113	2500	90- 120	1
GM76120- KA2	GM76114	2500	190- 208	1
GM76120- KA3	GM76115	2500	210- 240	1
GM76120- KA4	GM76116	2500	380- 480	1
GM79186- KA1	GM79182	4000	190- 208	1
GM79186- KA2	GM79183	4000	210- 240	1
GM79186- KA3	GM79184	4000	380- 480	1
GM79186- KP1	GM79182	4000	190- 208	1
GM79186- KP2	GM79183	4000	210- 240	1
GM79186- KP3	GM79184	4000	380- 480	1
GM79187- KA1	GM79182	4000	190- 208	1
GM79187- KA2	GM79183	4000	210- 240	1
GM79187- KA3	GM79184	4000	380- 480	1
GM79187- KP1	GM79182	4000	190- 208	1
GM79187- KP2	GM79183	4000	210- 240	1
GM79187- KP3	GM79184	4000	380- 480	1
GM84820- KA1	GM76113	2500	90- 120	1
GM84820- KA2	GM76114	2500	190- 208	1
GM84820- KA3	GM76115	2500	210- 240	1
GM84820- KA4	GM76116	2500	380- 480	1

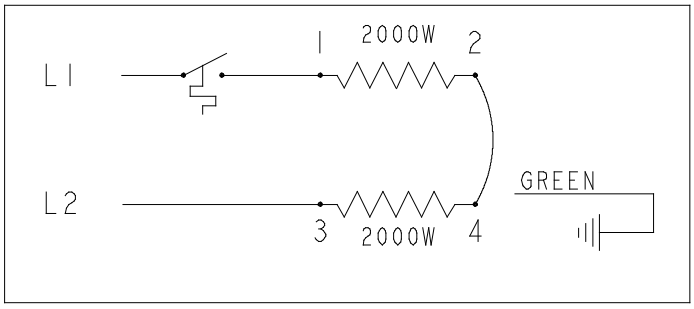
Wiring Diagram



208 VAC single phase- parallel



240 VAC single phase- parallel



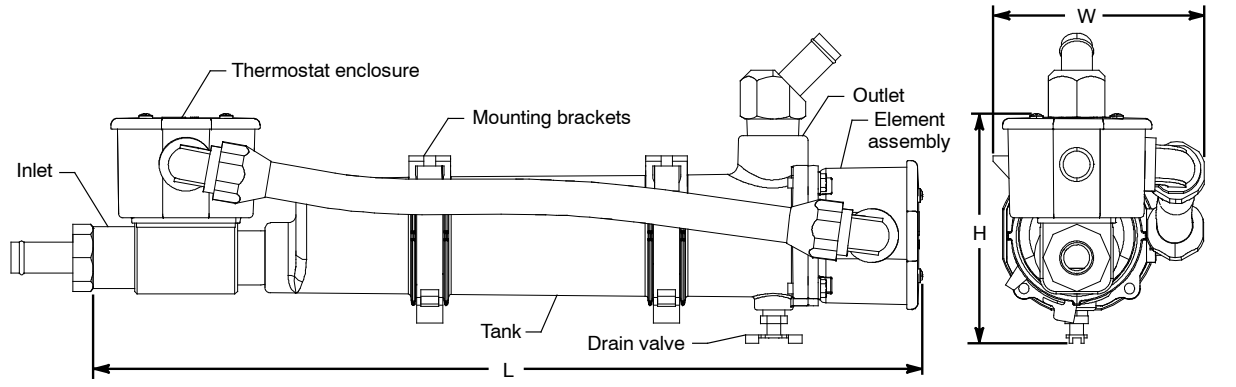
480 VAC single phase- parallel

GM79182

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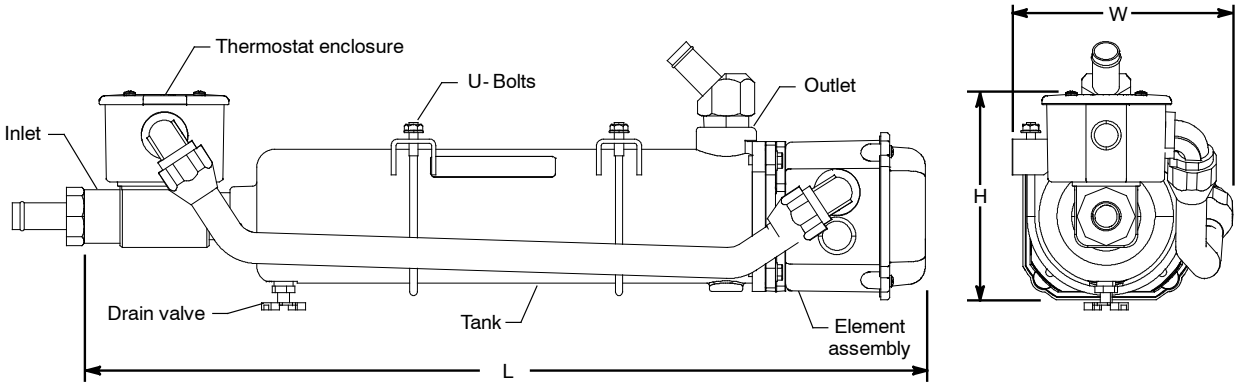
Dimensions and Weights

CB type block heater size, L x H x W, mm (in):	510 x 132 x 129 (20.1 x 5.2 x 5.1)
CL type block heater size, L x H x W, mm (in):	597 x 147 x 158 (23.5 x 5.8 x 6.2)
CB type block heater weight, kg (lb):	3 (6.9)
CL type block heater weight, kg (lb):	4.5 (10)



CB type

GM76113



CL type

GM79182

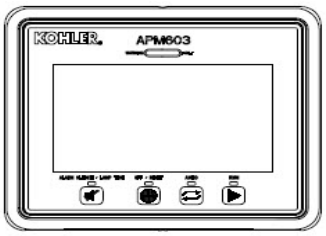
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KOHLER®

Integral Voltage Regulator with Kohler® APM603 Controllers and Menu-Driven Selections (80-4000 kW Generator Set Models)



APM603 Controller with Integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented high speed digital voltage regulator design providing ± 0.25% no-load to full-load regulation using root-mean-square (RMS) voltage sensing.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM603

Calibration	Range Settings	Default Selection
Voltage Adjustment	± 10% of System Voltage	System Voltage
Controller Gain	40 to 70 Hz	P: 1.3 I: 1.0 D: 0.25
Underfrequency Unload or Frequency Setpoint	40 to 70 Hz	0.5 Hz Below System Frequency (ECM)
Underfrequency Unload Scope	0-10% of System Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	-50% to 110%	0 kVAR
PF Adjust Control	-0.50 to 1.0 to 0.50	0.8 Lagging
VAR/PF Gain Adjustment	P: 0.3 to 3.00 I: 0.3 to 3.00 D: 0.3 to 3.00	P: 1.0 I: 1.0 D: 0.25

KOHLER®

Specification/Feature	Integral with APM603
Generator Set Availability	80-4000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40 ° C to 70 ° C (-40 ° F to 158 ° F)
Storage Temperature	-40 ° C to 85 ° C (-40 ° F to 185 ° F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-600 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5.0 ADC with GM88453 Activator Board
Maximum Output	7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	± 0.25%
Thermal Drift	<0.5% (-40 ° C to 70 ° C) [-40 ° F to 158 ° F] Range
Response Time	3-phase: 1 mS 1-phase: 5 mS
System Voltage Adjust.	± 10%
Voltage Adjustment	Controller Display
Remote Voltage Adjustment	Analog 0-5 VDC (± 10%) Input Optional
Paralleling Capability	Full Load Share and Control plus Reactive Droop

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can control Fast Response™ II, Fast Responset™X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

- Voltage Regulator Configuration
  - Under Frequency Unload Settings
  - Single and Three Phase Sensing
  - Voltage Target
  - Voltage Regulator Gains

Paralleling Settings, APM603

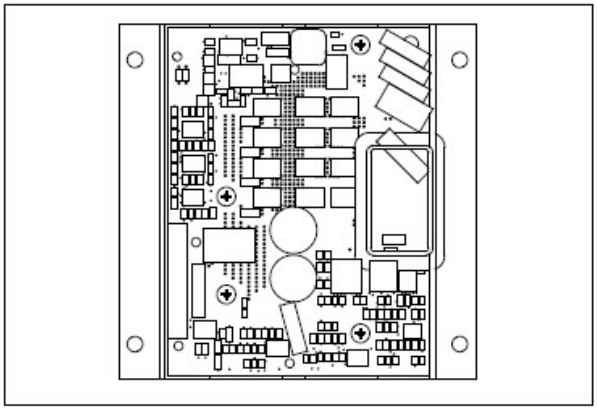
- Synchronizing parameters setup
  - Voltage matching
  - Frequency matching
  - Phase matching
  - Time delay
- Load sharing
  - kW sharing
  - kVAR sharing
  - Baseload settings
  - Droop

Paralleling Metering, APM603

- Paralleling State
- Paralleling Mode
- System Voltage
- System Frequency
- Connected Generators
- Sync Status
- Engine Speed

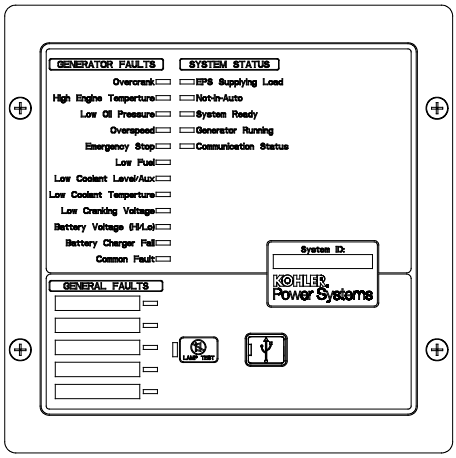
VAR/PF Control Input	VAR Control Mode, PF Control Mode, System VAR Control, System PF Control

Activator Board GM88453

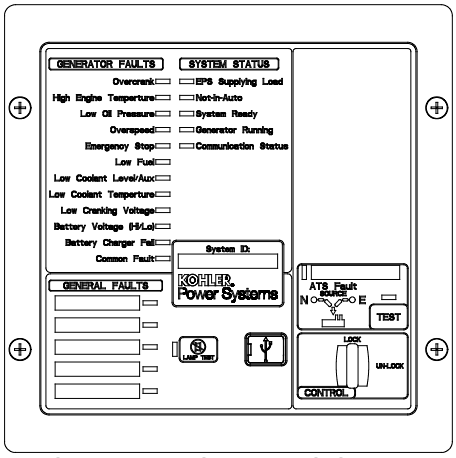


- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

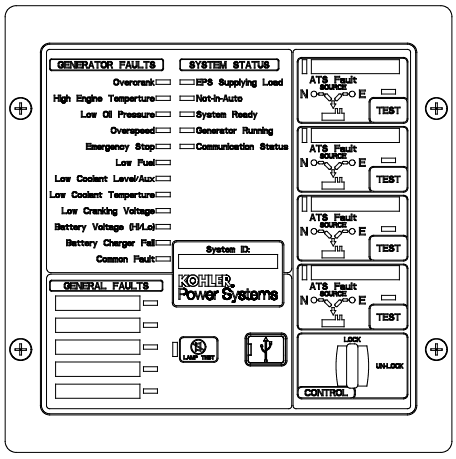
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RSA III



RSA III with a Single ATS Control



RSA III with Four ATS Controls

Remote Serial Annunciator III (RSA III) for Kohler® Controllers

- Monitors the generator set equipped with one of the following controllers:

APM402	Decision-Maker® 3000
APM603	Decision-Maker® 3500
APM802	Decision-Maker® 6000
Decision-Maker® 3+	Decision-Maker® 8000
Decision-Maker® 550	KPC 1000

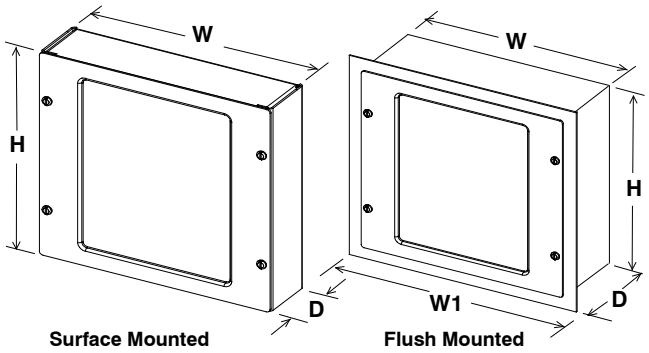
- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source for up to four ATS with any of the following controllers:
  - Decision-Maker® MPAC® 750, 1200, and 1500
  - MPAC® 1000 and 1500
- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:
  - RS-485 for serial bus network
  - USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
  - 12-/24-volt DC power supply
  - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

- Dimensions—W x H x D, mm (in.).
  - **Surface Mounted:**
    203 x 203 x 83 (8.0 x 8.0 x 3.3)
  - **Flush Mounted (Inside Wall):**
    203 x 203 x 76 (8.0 x 8.0 x 3.0)
    Flush mounting plate W1: 254 (10.0)

* SiteTech™ software is available to Kohler authorized distributors and dealers.

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Surface Mounted **Flush Mounted**

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
User Input #4 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #4 (Shutdown) (1)	Red	On	Green	Off	Green
User Input #5 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #5 (Shutdown) (1)	Red	On	Green	Off	Green
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA III with ATS Controls only)	Red	On	Red or Yellow	Green or Off	Green

Green LEDs appear as steady on when activated.
Yellow LEDs slow flash when activated except steady on with EPS supplying load and high battery voltage.
Red LEDs slow flash when activated except fast flash with loss of communication and not-in-auto.

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.
(2) Decision-Maker® 3+ controller only.
* May require optional kit or user-provided device to enable function and LED indication.
† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.
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ATS Controls (RSA III with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated lock/unlock switch for Test feature
- Test pushbutton

NFPA Requirements

- NFPA 110 compliant
- Engine functions:
  - High battery voltage warning *
  - High engine temperature shutdown
  - High engine temperature warning *
  - Low battery voltage warning *
  - Low coolant level/aux. shutdown
  - Low coolant temperature warning *
  - Low cranking voltage
  - Low fuel warning (level or pressure) *
  - Low oil pressure shutdown
  - Low oil pressure warning *
  - Overcrank shutdown
  - Overspeed shutdown
- General functions:
  - Audible alarm silence
  - Battery charger fault *
  - Lamp test
  - Master switch not-in-auto

Fault and Status LEDs and Lamp Test Switch

Alarm Horn. Horn sounds giving a minimum 90 dB at 0.1 m (0.3 ft.) audible alarm when a warning or shutdown fault condition exists except on high/low battery voltage or EPS supplying load.

Alarm Silenced. Red LED on lamp test switch lights when alarm horn is deactivated by alarm silence switch.

Alarm Silence Switch. Lamp test switch quiets the alarm during servicing. The horn will reactivate upon additional faults.

ATS Fault. Red LED lights when ATS fails to transfer.

Battery Charger Fail. LED lights if battery charger malfunctions. Requires battery charger with alarm contact.

Battery Voltage Hi/Lo. LED flashes if battery or charging voltage drops below preset level. LED lights steady if battery voltage exceeds preset level.

Common Fault. LED lights when a single or multiple common faults occur.

Communication Status. Green LED lights indicating annunciator communications functional. Red LED indicates communication fault.

EPS Supplying Load. LED lights when the Emergency Power System (EPS) generator set is supplying the load (APM402, APM603, APM802, and Decision-Maker® 550, 3000, 3500, 6000, and 8000 controllers) or when transfer switch is in the emergency position (Decision-Maker® 3+ controller).

Emergency Stop. LED lights and engine stops when emergency stop is made. May require a local emergency stop switch on some Decision-Maker® 3+ controllers.

Generator Running. LED lights when generator set is in operation.

High Engine Temperature. Red LED lights if engine has shut down because of high engine coolant temperature. Yellow LED lights if engine coolant temperature approaches shutdown range. Requires warning sender on some models.

Lamp Test (Switch). Switch tests all the annunciator indicator LEDs and horn.

Low Coolant Level/Aux. LED lights when engine coolant level is below acceptable range on radiator-mounted generator sets only. When used with a Decision-Maker® 3+ controller, the LED indicates low coolant level or an auxiliary fault shutdown. Requires user-supplied low coolant level switch on remote radiator models.

Low Coolant Temperature. LED lights if optional engine block heater malfunctions and/or engine coolant temperature is too low. Requires prealarm sender on some models.

Low Cranking Voltage. LED lights if battery voltage drops below preset level during engine cranking.

Low Fuel (Level or Pressure). LED lights if fuel level in tank approaches empty with diesel models or fuel pressure is low on gas models. Requires customer-supplied switch.

Low Oil Pressure. Red LED lights if generator set shuts down because of insufficient oil pressure. Yellow LED lights if engine oil pressure approaches shutdown range. Requires warning sender on some models.

Not In Auto. LED lights when the generator set controller is not set to automatic mode.

Overcrank. LED lights and cranking stops if engine does not start in either continuous cranking or cyclic cranking modes.

Overspeed. LED lights if generator set shuts down because of overspeed condition.

System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1-#5. Monitors five digital auxiliary inputs (can be configured as warnings or shutdowns). User-defined digital inputs are selected via the RSA III master for local or remote (generator set or ATS). The user-defined digital input can be assigned via PC using SiteTech™ setup software.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Accessories

- ❑ Power source adapter kit 120/208 VAC, 50/60 Hz.
- ❑ Modbus®/Ethernet converter GM41143-KP2 for serial to Ethernet communication.
- ❑ Communication module GM32644-KA1 or GM32644-KP1 is required with Decision-Maker® 3+ controllers.

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KOHLER®

Emissions Data

KOHLER®

600REOZVB

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TWD1643GE,TWD1644GE	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	674	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	PVPXL16.1ACW
Compression Ratio:	16.5:1	EPA Certificate:	PVPXL16.1ACW-011
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA (g/kWh):	**EPA D2 Cycle 5-mode weighted**	
	TWD1643GE	TWD1644GE
HC	0.11	0.11
NOx (Oxides of Nitrogen as NO_2)	5.63	5.59
CO (Carbon Monoxide)	0.41	0.39
PM (Particulate Matter)	0.076	0.04

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2023
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACW-011**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACW

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

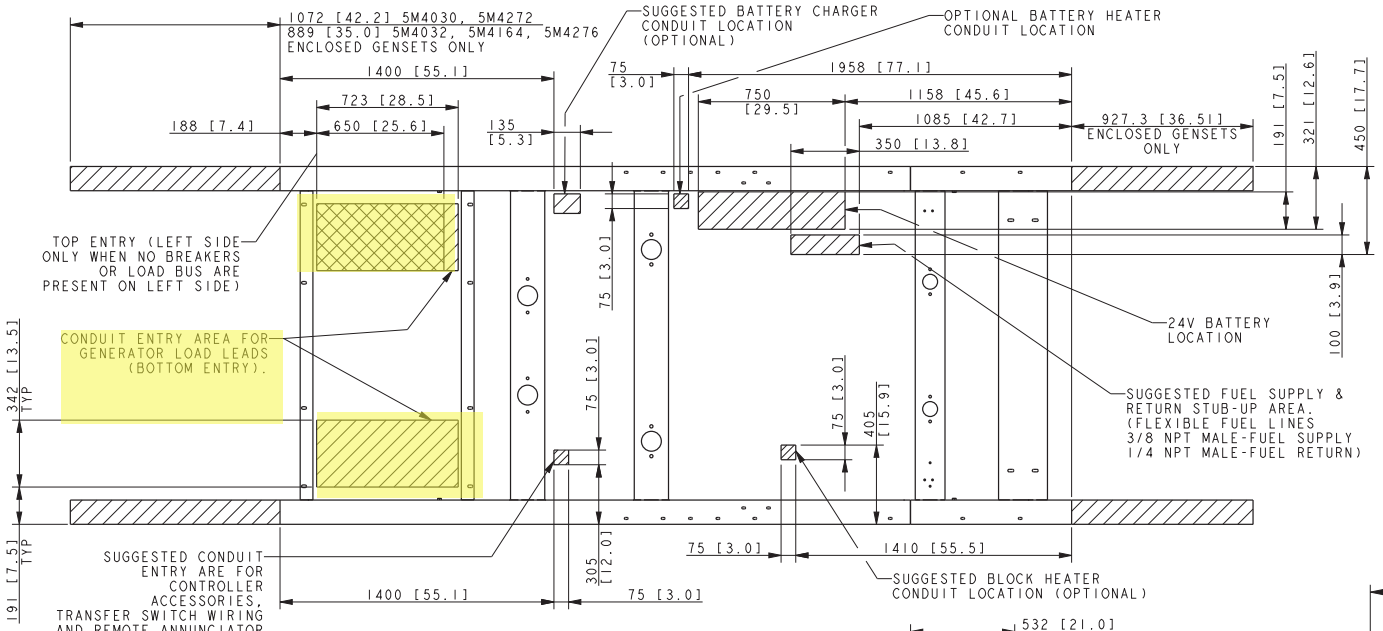
This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

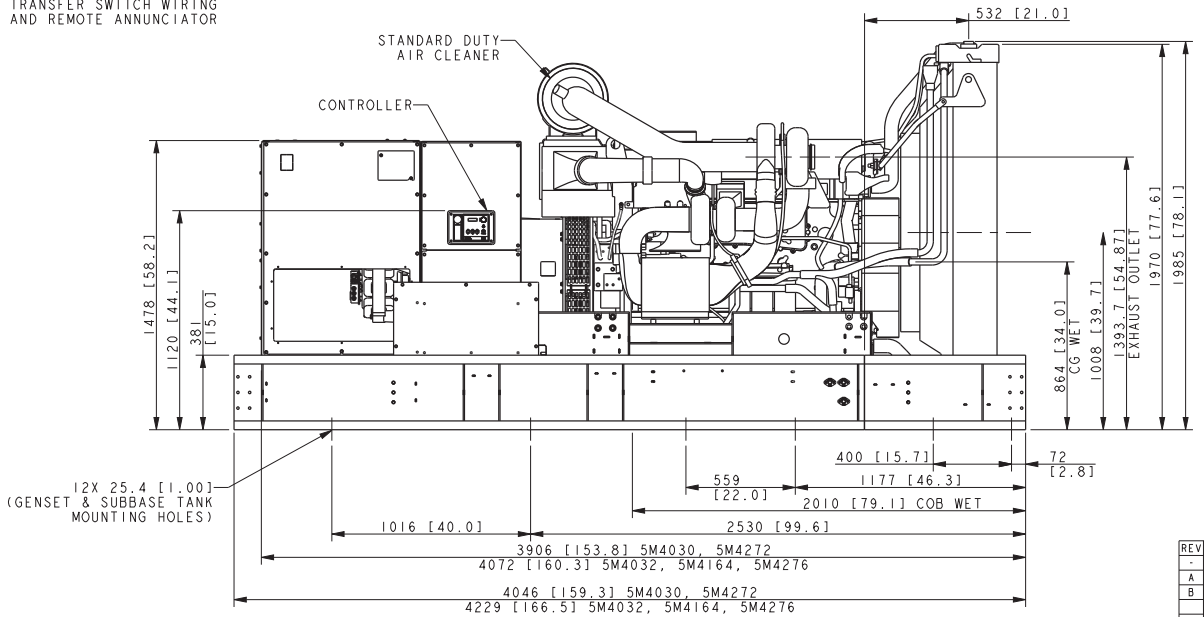
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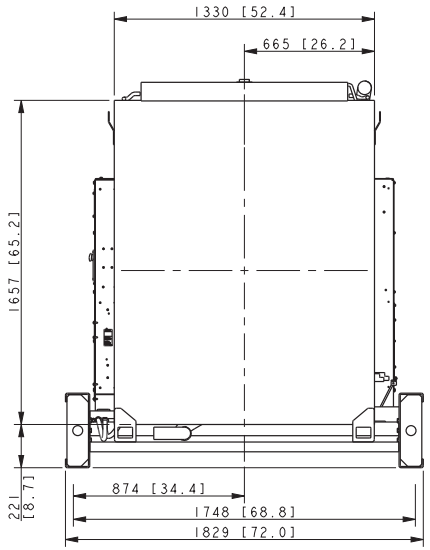
Dimensional Drawings



MODEL	ALTERNATOR FRAME	CONNECTION	GENSET WEIGHT (WET)
600 60 HZ	5M4030	10 LEAD	4627 KG [10,200 LBS]
	5M4032	10 LEAD	4785 KG [10,550 LBS]
	5M4164	4 LEAD	4785 KG [10,550 LBS]
	5M4272	4 LEAD	4627 KG [10,200 LBS]
	5M4276	4 LEAD	4885 KG [10,770 LBS]

INSTALLATION NOTE
IF SUBBASE FUEL TANK AND/OR ENCLOSURE IS USED, REFER TO SUBBASE FUEL TANK/ENCLOSURE ADV TO DETERMINE MOUNTING LOCATIONS.





NOTES:
1) DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

2) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT. REFER TO ENCLOSURE ADV.

3) IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

4) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

600 MODEL 60 HZ
5M4030, 5M4032, 5M4164, 5M4272, 5M4276
RECONN., 380V, 600V ALTERNATORS
VOLVO

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-16-14	NEW DRAWING [CT92986]	SAM
A	20AUG2021	(A,B-8) 1120[44.1] ADDED [CT214162]	RNN
B	13MAR2023	(A-1) PEP-RML-001 NOTE ADDED;	
		SEE SHEET 2 [CT226059]	PBG

UNLESS OTHERWISE SPECIFIED, 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: X ± X.X ± X.XX ± ANGLES ± SURFACE FINISH MAX. THIRD ANGLE PROJECTION

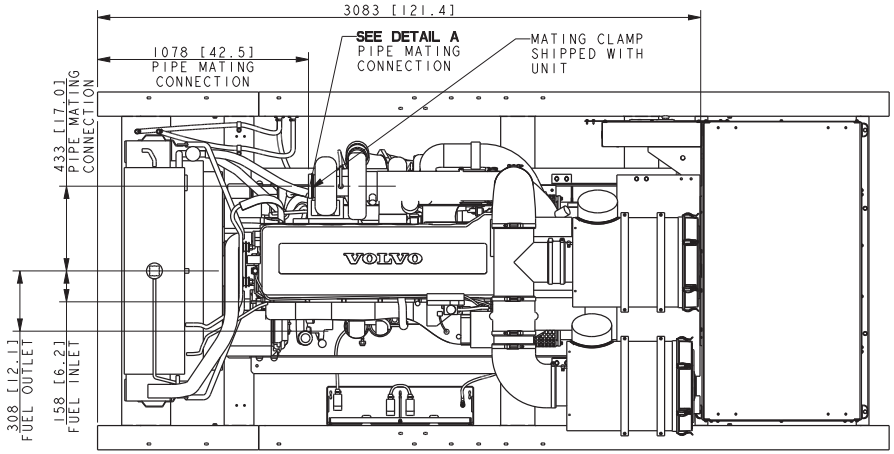
APPROVALS	DATE
DRAWN SAM	9-16-14
CHECKED SAM	9-16-14
APPROVED PBT	9-16-14

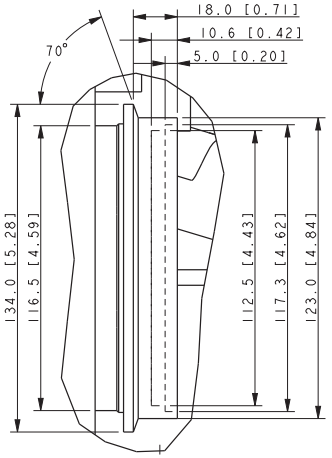
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

TITLE: DIMENSION PRINT, 600 KW VOLVO

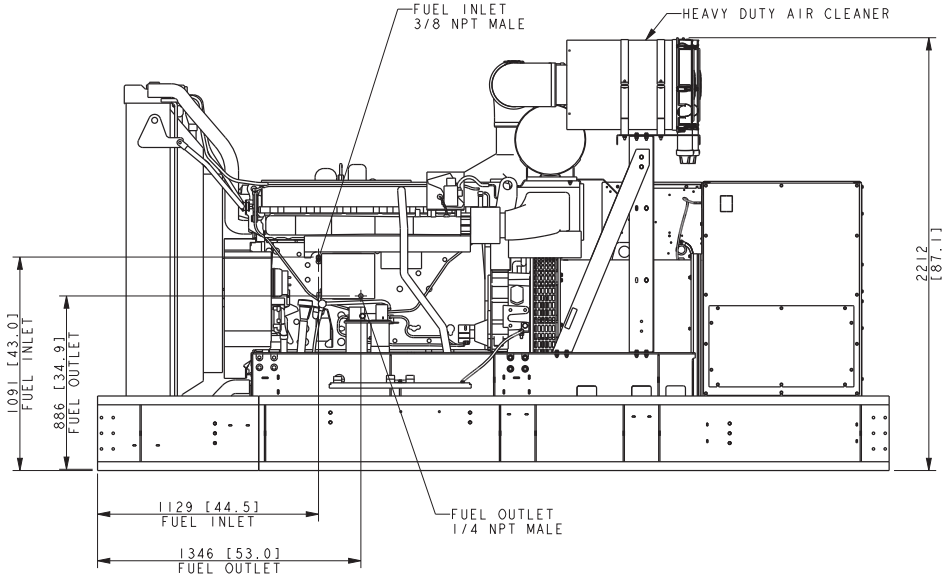
SCALE 0.08 | CAD NO. | SHEET 1 of 2

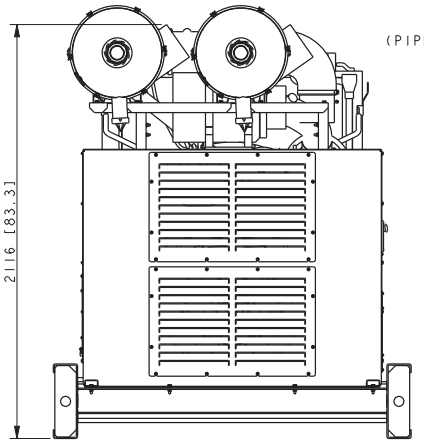
DWG NO. ADV-8743 | D





DETAIL A
(PIPE MATING CONNECTION)





NOTE:
DIMENSIONS IN [ ] ARE INCH EQUIVALENTS.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-16-14	NEW DRAWING [CT92986]	SAM
A	20AUG2021	SEE SHEET 1 [CT214162]	RNN
B	13MAR2023	(D-7,6,5) (C-2) PIPE MATING CONNECTION WAS	
		EXHAUST OUTLET; (B-4) 2212 [87.1] ADDED; SEE	
		SHEET 1 [CT226059]	PBG

600 MODEL 60 HZ
5M4030, 5M4032, 5M4164, 5M4272, 5M4276
RECONN., 380V, 600V ALTERNATORS
VOLVO

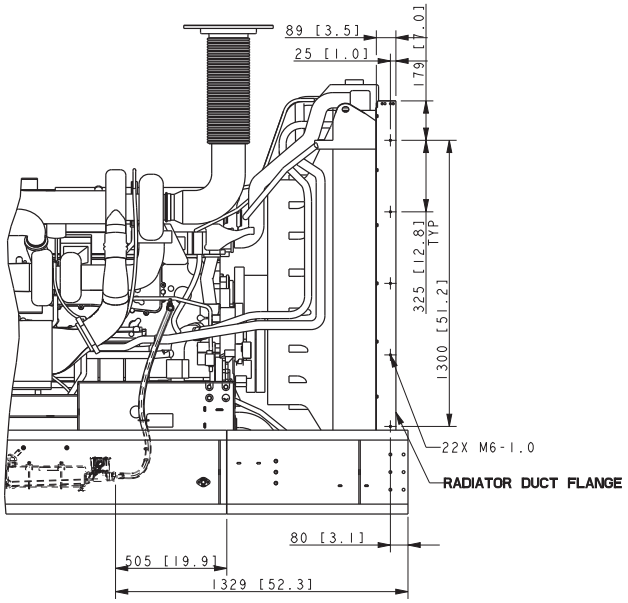
UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X. XX ±
X. XX ±
ANGLES ±
SURFACE FINISH
MAX.
THIRD ANGLE PROJECTION

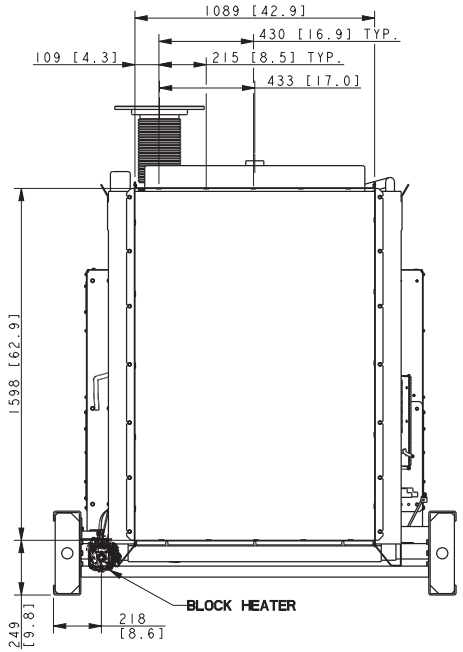
APPROVALS		DATE
DRAWN	SAM	9-16-14
CHECKED	SAM	9-16-14
APPROVED	PBT	9-16-14

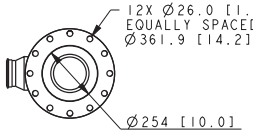
KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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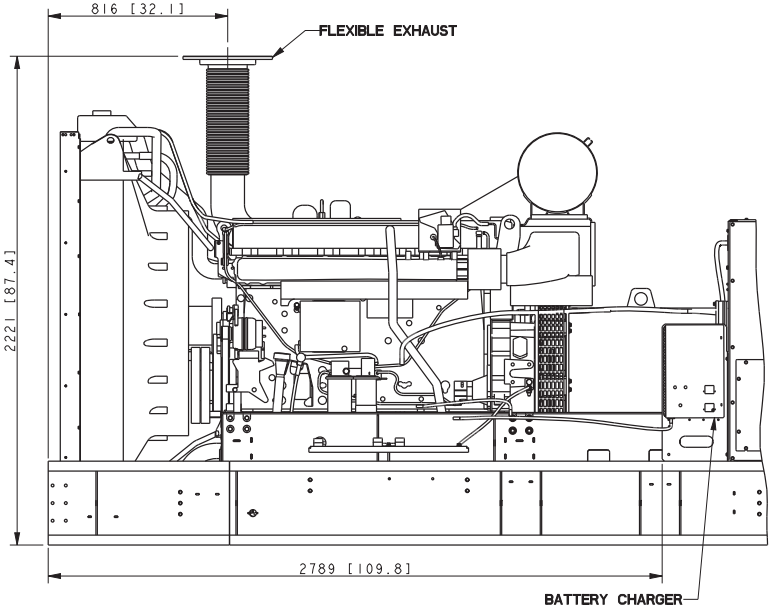
TITLE
DIMENSION PRINT, 600 KW VOLVO

SCALE 0.08 | CAD NO. | SHEET 2 of 2
DWG NO. **ADV-8743** | **D**









600 VOLVO MODEL
RECONNECTABLE
380V & 600V ALTERNATORS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-7-11	NEW DRAWING [91684-3]	DJV
A	1-10-12	VIEWS UPDATED [CT03561]	DJV
B	3-27-12	(B-4) 221 [87.4] ADDED [CT08774]	DJV
C	12-18-17	(C-6) 1598 [62.9] WAS 1511 [59.51]; (D-5) 1089 [42.9] WAS 1289 [59.7], 109 [4.3] WAS 107 [4.2]; (B-6) 249 [9.8] WAS 277 [10.9]; (C-7) 179 [7.01] WAS 106 [4.2] [CT182383]	MVT

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ±
X.X ±
X
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	DJV	6-7-11
CHECKED	DJV	6-7-11
APPROVED	JDZ	6-7-11

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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TITLE
DIMENSION PRINT, 600 VOLVO ACCESSORIES

SCALE 0.09 | CAD NO. | SHEET 1 of 1

DWG NO. ADV-8231 | D

KOHLER®

Wiring Schematics

SRC NO.	PART NO.	DESCRIPTION	OPTION	FIELD
1	XXXXXX	BATTERY CABLE POSITIVE	–	–
2	XXXXXX	BATTERY CABLE NEGATIVE	–	–
3	GM114916	HARNESS, APM603, PEDESTAL, VOLVO	–	–
4	GM110260	ENGINE HARNESS	–	–
5	GM105367	COMMON FAILURE RELAY	X	X
6	GM105366	15 RELAY DRY CONTACT	X	X
7	GM105663	RUN/OFF/AUTO KEYSWITCH	X	X
8	GM11501	CURRENT SENSE HARNESS	–	–
9	GM105377	VOLTAGE SENSE HARNESS	–	–
10	GM105845	4D ACTIVATOR/CURRENT/VOLT SENSE	–	–
11	GM105378	SHUNT TRIP RELAY HARNESS	X	X
12	GM105379	GROUND FAULT HARNESS	X	X
13	GM105380	LOCAL MOTORIZED BREAKER HARNESS	X	–
14	GM105382	REMOTE MOTORIZED BREAKER HARNESS	X	X
15	XXXXXX	FUEL LEVEL SENDER HARNESS	–	–
16	XXXXXX	FUEL LEAK ALARM HARNESS	–	–
17	GM114915	WIRING DIAGRAM	–	–

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
BTCS – BATTERY TEMP COMPENSATION SENSOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENDER
DIAG – DIAGNOSTIC LAMP
ECM – ENGINE CONTROL MODULE
ESS – EMERGENCY STOP SWITCH
FLA – FUEL LEAK ALARM
FLS – FUEL LEVEL SENDER
LCT – LOW COOLANT TEMPERATURE SWITCH
P(#) – PLUG
QCON(#) – QUICK CONNECT
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
SW(#) – SWITCH
TB(#) – TERMINAL BLOCK
W(#) – WIRE WELD

EBG – ENGINE BLOCK GROUND
GND – CONTROLLER BOX GROUND
PGND – PANEL GROUND

GENERATOR ALTERNATOR SHEET 5
ALTERNATOR
ACTIVATOR
4D
P1
CONNECT AS PER ADV-5875
CT
J26
P26
J2
P2
CURRENT SENSING
VOLTAGE SENSING
P1D
J1D

OPTIONAL MANUAL BREAKER
SHUNT TRIP OPTIONAL
BREAKER BOX
OPTIONAL MOTORIZED BREAKER
BREAKER BATTERY
CHARGER
L1
L2
L3
L0
USER POWER SHEET 7 OR 8
SHUNT TRIP RELAY
OPTIONAL
GFI
OPTIONAL
JG1
PG1
JX1
PX1

CONTROL BOX SHEET 2
SEE NOTE1
BREAKER MOTOR RELAY'S
TX1
PX1
JX1
PB1
JB1
TX5
OPTIONAL
LOCAL E-STOP
APM603
RDO CONNECTOR FACTORY USE ONLY
RDO CONNECTOR FACTORY USE ONLY
PX3
PX2
PX1
JX1
OPTIONAL SHEET 2
AUTO/OFF/MANUAL KEY SWITCH
HORN
FUEL LEVEL SENDER
FUEL LEAK SWITCH
SHEET 6
QCONS
RUN RELAY
OPTIONAL
COMMON FAILURE RELAY
15 RELAY BOARD
OPTIONAL
P1 J1
WAKEUP, RUN, GP RELAYS
P2
J2
DIAGNOSTIC PORT
CUSTOMER CONNECTION
TB12 (DIN RAIL)

VOLVO ENGINE SHEET 3
ECM
P4 (ON VOLVO HARNESS)
ENGINE SENSOR'S
BCA
FUSE
SS
SM
RED
BLK
BATTERY SHEET 3
BATTERY CHARGER
SHEET 3
ENGINE BLOCK GROUND

NOTES:
1: TX1 ONLY USED FOR REMOTE MOUNTED BREAKERS.

TB12 CONNECTION CHART

FUNCTION	POS	SIGNAL DESCRIPTION	
REMOTE E-STOP	1	REMOTE EMERGENCY STOP	
	2		
REMOTE START	3	REMOTE START SIGNAL	
	4		
CUSTOMER INTERFACE	5	FUSED BATTERY POWER	
	6	BATT VOLTS WHEN RUNNING	
	7	BATTERY NEGATIVE	
CUSTOMER INTERFACE	8	A (–)	ISOLATED RS-485 #2 (PGEN)
	9	B (+)	
	10	SHIELD	
LOW FUEL	11	LOW FUEL LEVEL SWITCH	
RES IN RETURN	12	LOW FUEL LEVEL SWITCH RETURN	
BAT CHRG FLT	13	BATTERY CHARGER FAULT	
RES IN RETURN	14	BATTERY CHARGER FAULT RETURN	
AUX WARNING	15	AUXILIARY WARNING	
RES IN RETURN	16	AUXILIARY WARNING RETURN	
AUX FAULT	17	AUXILIARY FAULT	
RES IN RETURN	18	AUXILIARY FAULT RETURN	
CUSTOMER INTERFACE	19	A (–)	ISOLATED RS-485 #3 (MODBUS/PGEN)
	20	B (+)	
	21	SHIELD	
CUSTOMER INTERFACE	22	A (–)	NON-ISOLATED RS-485 #4 (MODBUS RSA)
	23	B (+)	
	24	SHIELD	
RUN RELAY	25	COMMON CONTACT	
	26	NORMALLY OPEN CONTACT	
	27	NORMALLY CLOSED CONTACT	
SPEED BIAS	28	SPEED BIAS (+)	
	29	SPEED BIAS (–)	
VOLTAGE BIAS	30	SHIELD	
	31	VOLTAGE BIAS (+)	
	32	VOLTAGE BIAS (–)	
	33	SHIELD	
SPARE	34	SPARE	
SPARE	35	SPARE	
DROOP SELECT	36	SPARE	
ANALOG THROTTLE CONTROL	37	SPARE	
	38	SPARE	
	39	SPARE	
IDLE MODE	40	SPARE	
	41		
SPARE	42	SPARE	
SPARE	43	SPARE	
SPARE	44	SPARE	

* REMOVE RESISTORS IF PARALLELING

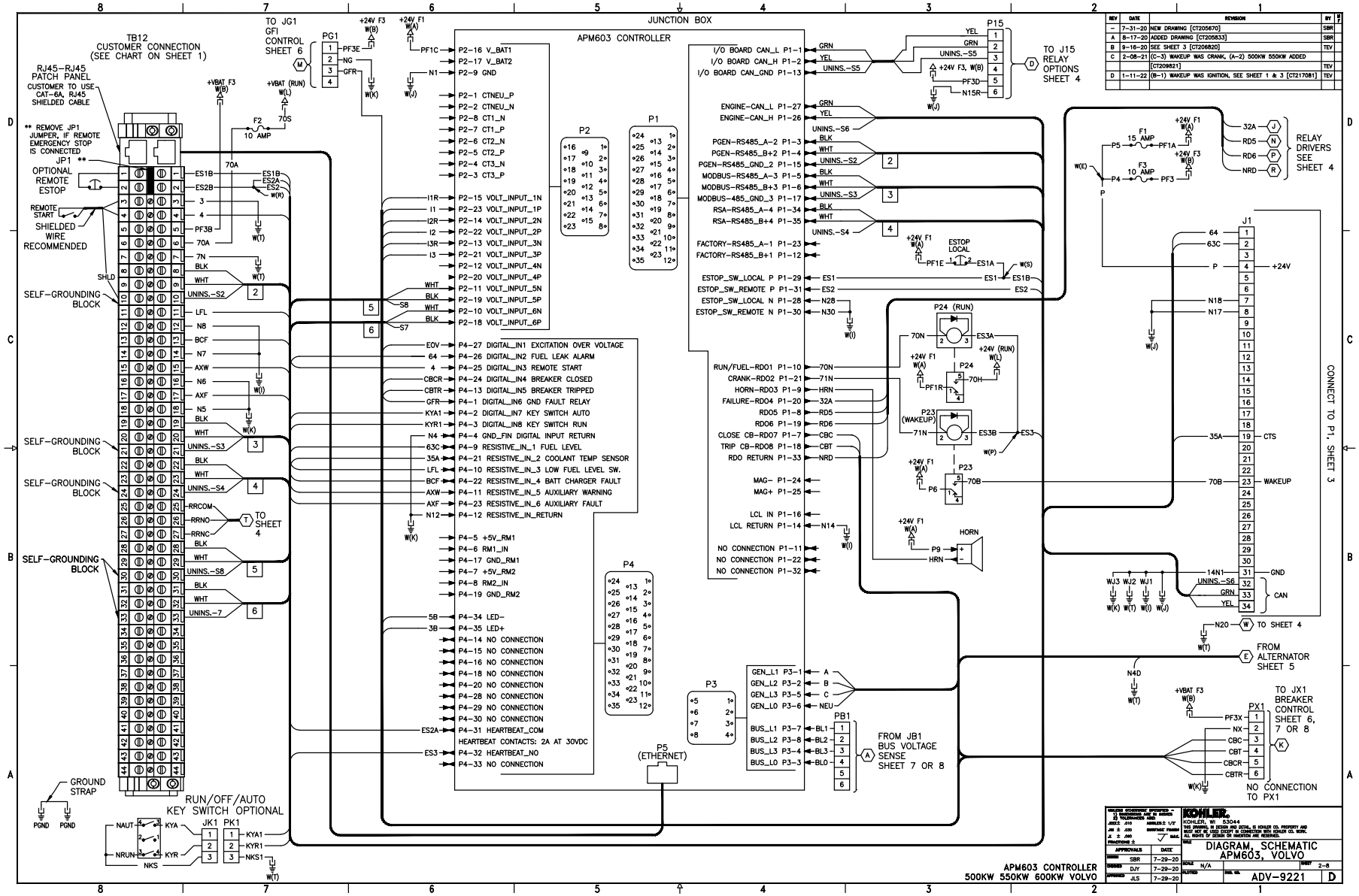
REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-5) WAKEUP WAS CRANK, (A-2) 500KW 550KW ADDED	
		[CT209821]	TEV
D	1-11-22	(B-7) ON VOLVO HARNESS WAS ON J.D. HARNESS,	
		SEE SHEETS 2 & 3 [CT217081]	TEV

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KOHLER, WI 53044
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APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

TITLE: DIAGRAM, SCHEMATIC APM603, VOLVO
SCALE: N/A
SHEET: 1-8
DRAWING NO.: ADV-9221
D

APM603 CONTROLLER
500KW, 550KW, 600KW VOLVO



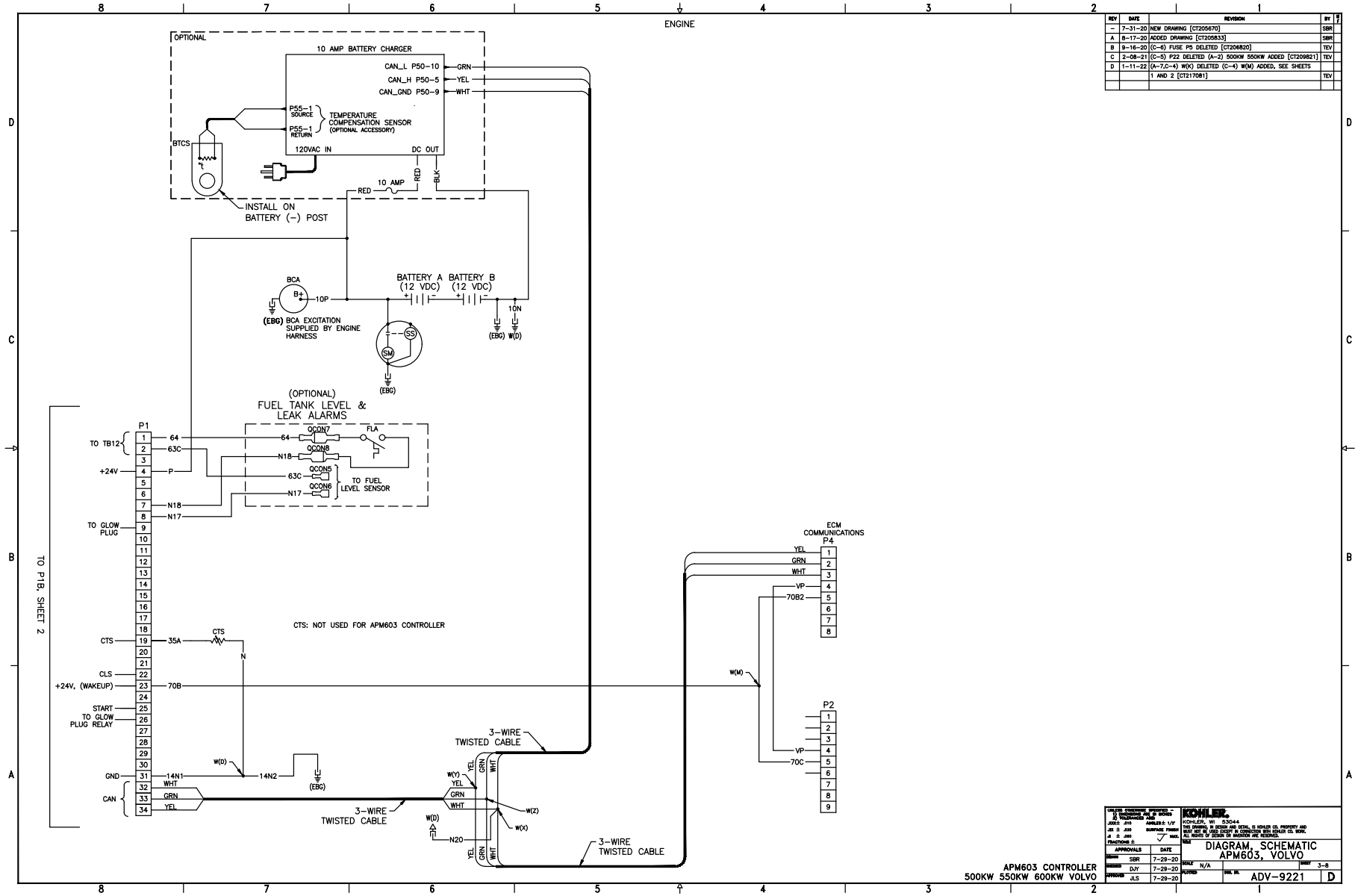
REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(C-3) WAKEUP WAS CRANK, (A-2) 500KW 550KW ADDED	
		[CT209821]	TEV
D	1-11-22	(B-1) WAKEUP WAS IGNITION, SEE SHEET 1 & 3 [CT217081]	TEV

APPROVALS	DATE
DRAWN SBR	7-29-20
CHECKED DJY	7-29-20
APPROVED JLS	7-29-20

KOHLER CO.
KOHLER, WI 53044

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A
SHEET 2-8
DWG NO. ADV-9221
REV D



REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	(C-6) FUSE P5 DELETED [CT206820]	TEV
C	2-08-21	(C-5) P22 DELETED (A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	(A-7,C-4) W(K) DELETED (C-4) W(M) ADDED. SEE SHEETS 1 AND 2 [CT217081]	TEV

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

KOHLER.
KOHLER, WI 53044

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APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A | SHEET 3-8

DWG. NO. ADV-9221 | D

REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV

JUNCTION BOX

J15
1 YEL
2 GRN
3 UNINS. (S5)
4
5 P15R
6 N15R

FROM P15 SHEET 2 (D)

(OPTIONAL)
15 RELAY DRY CONTACT KIT
W/ NO & NC CONTACTS

P15R
UNINS. (S5)
YEL
GRN
N15R

RELAYS K1–K14
12VDC, 10A, SPDT
RELAY K15
5VDC, 2A, DPDT

TB5
42A 42A 42A C NO (+) (–) 2 2 2
CAN
K15

DIGIN RETURNS
P35
TB6
DI1 DI2 DI3 DI4
(DIGITAL INPUT)

GND VNEVP2+5VSRD VN1 VP1 +5V
P36
(ANALOG INPUT)

K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13 K14

TB7 TB8 TB9 TB10 TB11 TB12 TB13

CUSTOMER CONNECTIONS

FROM SHEET 2
J 32A
N RD5
P RD6
R NRD

+24V F3
W(B)
PF3C
32A
W(K)

PR1 JR1
32A 1 1 32A
NR1 2 2 NR1
PF3C 3 3 PF3C
4 4

1 RELAY BOARD
C–294301
TB1 K1 2 42A
TB2 C NC NO

CUSTOMER CONNECTION

COMMON FAULT RELAY
(OPTIONAL)

+24V F3
W(B)
PF3F
RD5
NRD2

PR2
RD5 1
NRD2 2
PF3F 3
4

RDO PLUG
(FACTORY USE ONLY)

NRD
W(AE)
NRD3

+24V F3
W(B)
PF3G
RD6
NRD3

PR3
RD6 1
NRD3 2
PF3G 3
4

RDO PLUG
(FACTORY USE ONLY)

AUXILIARY RUN RELAY
291309=24VDC
248363=12VDC
RELAY

+24V (RUN)
W(L)

FROM TB12 SHEET 2 (T)
RRNC 1
RRNO 4
RRCOM 7

FROM SHEET 2 (W)
70K A
N20 B

1 2 3 4 5 6 7 8 9
A B

2 5 8 3 6 9

APM603 CONTROLLER
500KW 550KW 600KW VOLVO

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KOHLER, WI 53044
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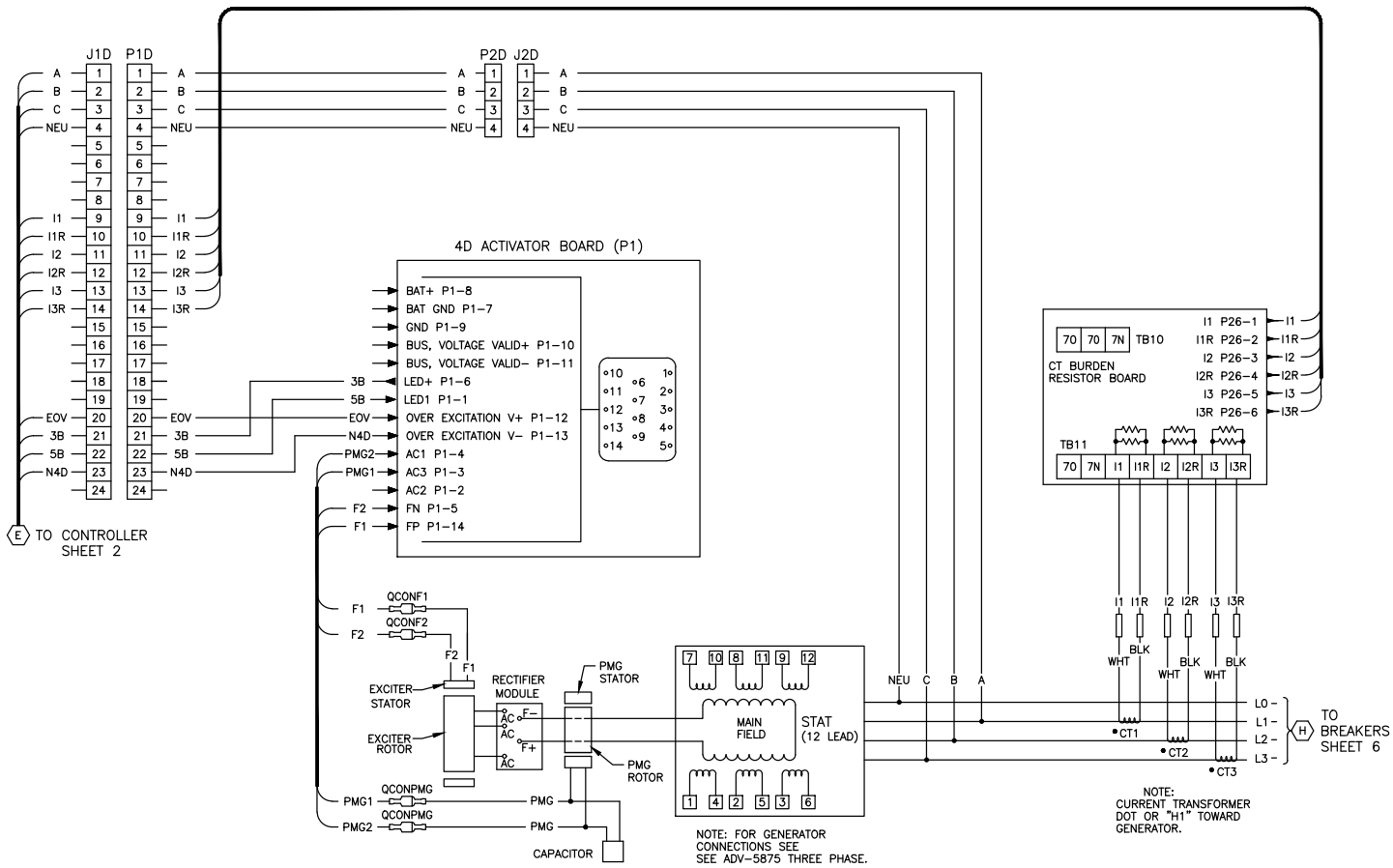
APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A
SHEET 4–8
DWG. NO. ADV-9221
REVISED D

ALTERNATOR

REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CT206820]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV



NOTE: FOR GENERATOR CONNECTIONS SEE SEE ADV-5875 THREE PHASE.

NOTE: CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.

ALTERNATOR SIDE
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

KOHLER CO.
KOHLER, WI 53044

APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

TITLE: DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE: N/A
SHEET: 5-8
DWG. NO.: ADV-9221
REV: D

REV	DATE	REVISION	BY	CHK
–	7-31-20	NEW DRAWING [CT205670]	SBR	
A	8-17-20	ADDED DRAWING [CT205833]	SBR	
B	9-16-20	SEE SHEET 3 [CT206820]	TEV	
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV	
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV	

JUNCTION BOX

SHUNT TRIP RELAY FOR CIRCUIT BREAKER
(OPTIONAL) (NOT AVAILABLE WITH EOB)

FROM PX1
BREAKER CONTROLS
SHEET 2

JX1
1 PF3X
2 NX
3
4 CBT
5
6

W(AA)
PF3X
PF2
PF1

1 RELAY BOARD
C-294301
TB1
K1
2
42A
TB2
C
NC
NO
CBT
NX2
PF1
PF2
ST2

NX2
NX
W(AB)
NX1
DX
ST1
ST2
W(AD)
ST

NX3
ST
T1
T2
S

FROM GENERATOR OUTPUT
SHEET 5
H

L1
L2
L3
L0

TO LOAD

W(AC)
JG1
1
2 NG2
14
15
M
FROM PG1
GFI CONTROL
SHEET 2

1
2
14
15
1 PWR
2 GND
14
15
16
GFA300
GFR
(OPTIONAL
GROUND FAULT
RELAY)
6
8

GENERATOR SYSTEM GROUND
TO GROUND BUS

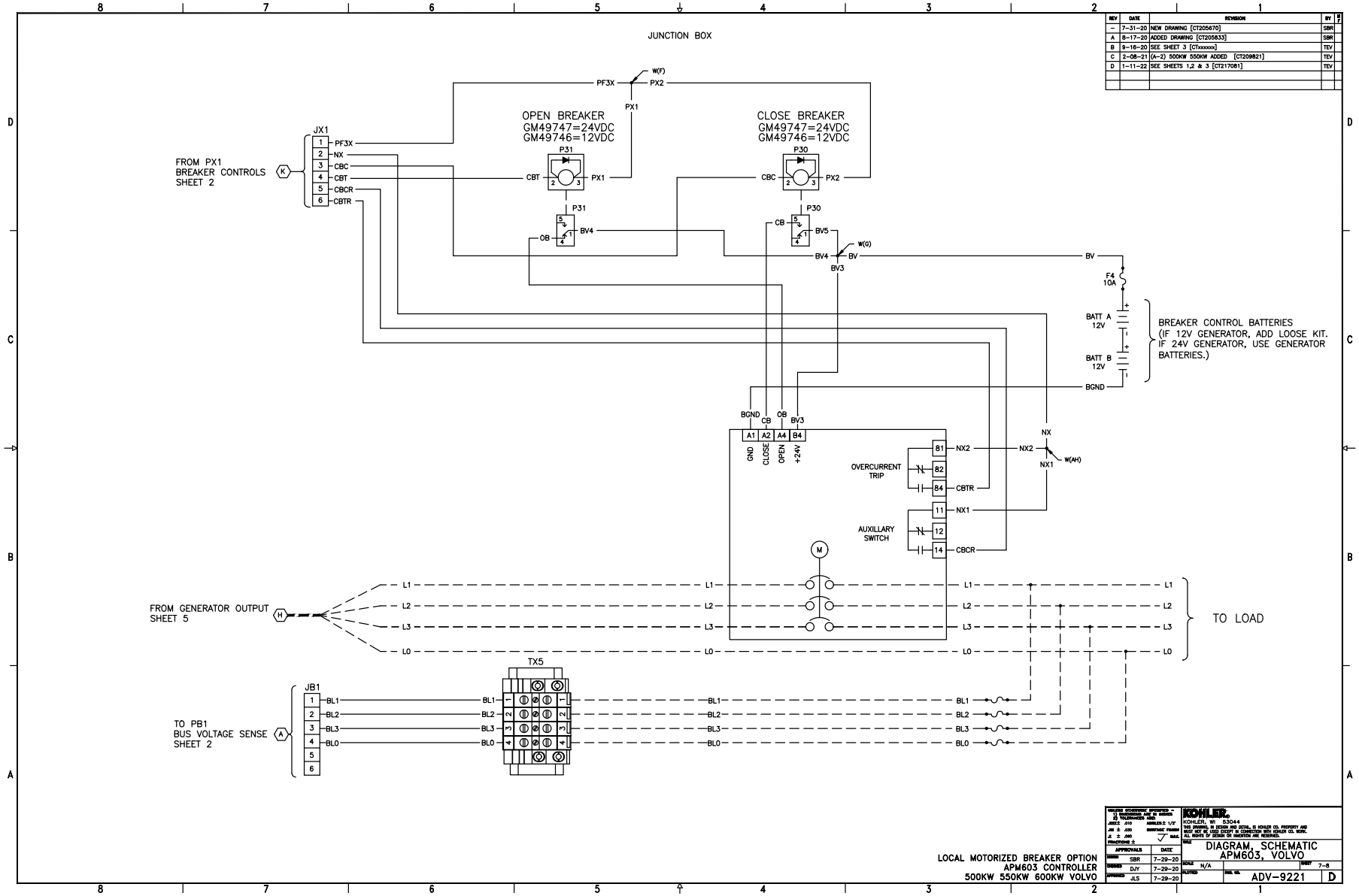
SHUNT TRIP OPTION
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

KOHLER CO.
KOHLER, WI 53044
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APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

TITLE: DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE: N/A
SHEET: 6-8
DWG. NO.: ADV-9221
REV: D



REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CTxxxxxx]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV

APPROVALS	DATE
SBR	7-29-20
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KOHLER CO.
KOHLER, WI 53044

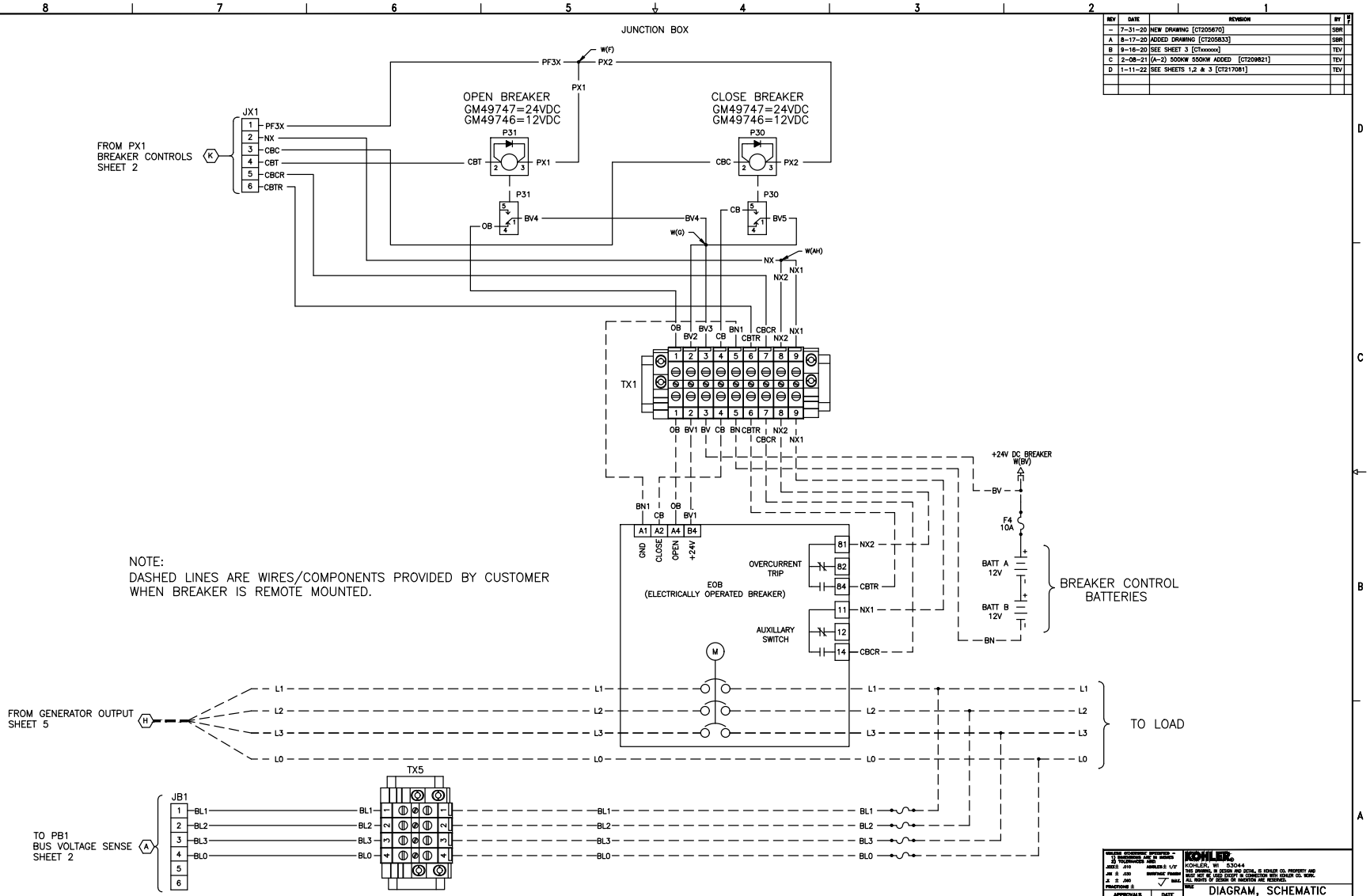
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TITLE: DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE: N/A
SHEET: 7-8
DWG. NO.: ADV-9221
REVISED: D

LOCAL MOTORIZED BREAKER OPTION
APM603 CONTROLLER
500KW 550KW 600KW VOLVO

REV	DATE	REVISION	BY
–	7-31-20	NEW DRAWING [CT205670]	SBR
A	8-17-20	ADDED DRAWING [CT205833]	SBR
B	9-16-20	SEE SHEET 3 [CTxxxxxx]	TEV
C	2-08-21	(A-2) 500KW 550KW ADDED [CT209821]	TEV
D	1-11-22	SEE SHEETS 1,2 & 3 [CT217081]	TEV



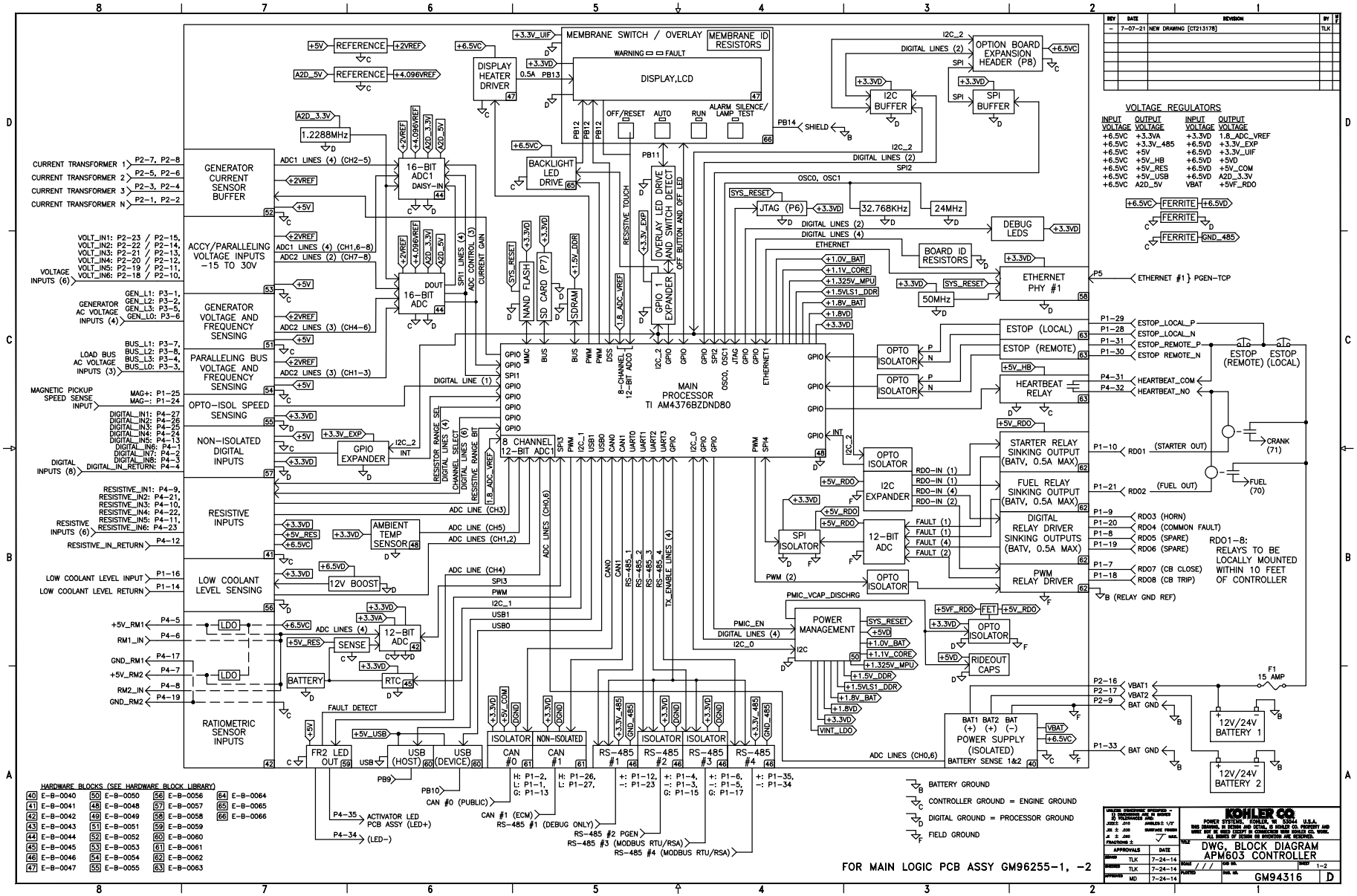
REMOTE MONITORISED BREAKER OPTION
APM603 CONTROLLER
500KW 550KW 600kW VOLVO

KOHLER CO.
KOHLER, WI 53044

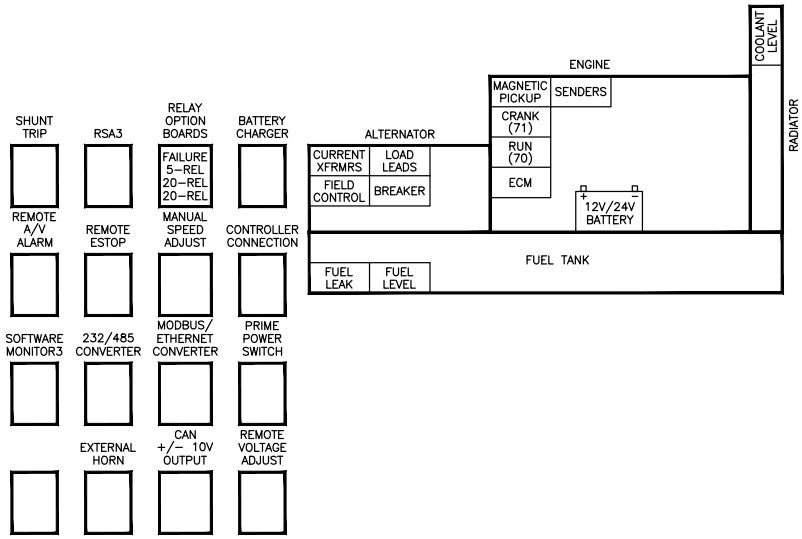
APPROVALS	DATE
SBR	7-29-20
DJY	7-29-20
JLS	7-29-20

DIAGRAM, SCHEMATIC
APM603, VOLVO

SCALE N/A
SHEET 8-8
DWG. NO. ADV-9221
D


MEMBRANE SWITCH / OVERLAY
MEMBRANE ID RESISTORS
DISPLAY,LCD
DISPLAY HEATER DRIVER
BACKLIGHT LED DRIVE
OPTION BOARD EXPANSION HEADER (P8)
I2C BUFFER
SPI BUFFER
MAIN PROCESSOR TI AM4376BZDND80
ETHERNET PHY #1
ESTOP (LOCAL)
ESTOP (REMOTE)
HEARTBEAT RELAY
STARTER RELAY SINKING OUTPUT (BATV, 0.5A MAX)
FUEL RELAY SINKING OUTPUT (BATV, 0.5A MAX)
DIGITAL RELAY DRIVER SINKING OUTPUTS (BATV, 0.5A MAX)
PWM RELAY DRIVER
RDO1-8: RELAYS TO BE LOCALLY MOUNTED WITHIN 10 FEET OF CONTROLLER
GENERATOR CURRENT SENSOR BUFFER
ACCY/PARALLELING VOLTAGE INPUTS -15 TO 30V
GENERATOR VOLTAGE AND FREQUENCY SENSING
PARALLELING BUS VOLTAGE AND FREQUENCY SENSING
OPTO-ISOL SPEED SENSING
NON-ISOLATED DIGITAL INPUTS
RESISTIVE INPUTS
LOW COOLANT LEVEL SENSING
RATIOMETRIC SENSOR INPUTS
POWER MANAGEMENT
RIDEOUT CAPS
BAT1 BAT2 BAT POWER SUPPLY (ISOLATED)
12V/24V BATTERY 1
12V/24V BATTERY 2
F1 15 AMP
VOLTAGE REGULATORS
BATTERY GROUND
CONTROLLER GROUND = ENGINE GROUND
DIGITAL GROUND = PROCESSOR GROUND
FIELD GROUND
HARDWARE BLOCKS (SEE HARDWARE BLOCK LIBRARY)
FOR MAIN LOGIC PCB ASSY GM96255-1, -2
KOHLER CO.
DWG, BLOCK DIAGRAM APM603 CONTROLLER
GM94316 D

Industrial	Industrial	Marine	Mobile	Ruggedized	Analog	Digital	Paralleling	APM403
Inputs, Level/Pressure/Temperature/Waukesha								
Leak, Fuel	X	X	X	X		X		
Level, Coolant PTC	X		X	X	X			
Level, Coolant Sw	X	X				X		
Level, Fuel	X		X	X	X			
Level, Fuel	X					X		
Level, Oil	X	X	X	X		X		
Pressure, Coolant		X			X			
Pressure, Low Fuel Shutdown (GM Only)	X					X		
Pressure, Oil #1	X	X	X	X	X			
Pressure, Oil #2		X			X			
Pressure, Sea Water		X				X		
Temperature, Coolant #1	X	X	X	X	X			
Temperature, Coolant #2		X			X			
Temperature, Exhaust		X				X		
Temperature, Oil	X	X			X			
Waukesha, AFM Shutdown	X					X		
Waukesha, Detonation Warning	X					X		
Waukesha, Detonation Shutdown	X					X		
Inputs, Control								
Air Damper	X					X		
Aux Shutdown	X	X	X	X		X		
Battery Charger Fault	X					X		
Breaker Status (Paralleling)	X	X	X	X		X	X	
Current Sense, AC (Generator)	X	X	X	X	X			
Emergency Stop	X	X	X	X		X		
Enable Sync (550 Paralleling)	X					X	X	
Excitation Over Voltage	X	X	X	X		X		
Idle Mode	X			X		X		
Remote Reset	X					X		
Remote Shutdown	X					X		
Remote Start	X	X	X	X		X		
RSA User Input 1	X					X		
RSA User Input 2	X					X		
RSA User Input 3	X					X		
Speed Sense (Mag Pickup)	X	X	X	X	X			
Speed Bias (Paralleling)		X	X	X	X		X	
Var PF Mode (550 Paralleling)	X					X	X	
Voltage Bias (Paralleling)		X	X	X	X		X	
Voltage Lower	X					X	X	
Voltage Raise	X					X	X	
Voltage Selector Switch #1			X	X				
Voltage Selector Switch #2			X	X				
Voltage Selector Switch #3			X	X				
Voltage Sense, AC (Bus) (Paralleling)	X	X	X	X	X		X	
Voltage Sense, AC (Generator)	X	X	X	X	X			
Inputs, Communication								
CAN 1 (ECM)	X	X	X	X				
CAN 2 (Accy)		X	X	X				
Ethernet	X	X	X	X				
RS485 1	X	X	X	X				
RS485 2		X	X	X				
Outputs								
Breaker Close (Paralleling)		X	X	X		X	X	
Breaker Open (Paralleling)		X	X	X		X	X	
Crank	X	X	X	X		X		
Glow Plugs	x	x	x	x		X		
LED, FR Activator	X	X	X	X	X			
Run	X	X	X	X		X		



REV	DATE	REVISION	BY	APP'D
–	7–24–14	NEW DRAWING [CT213178]	TLK	

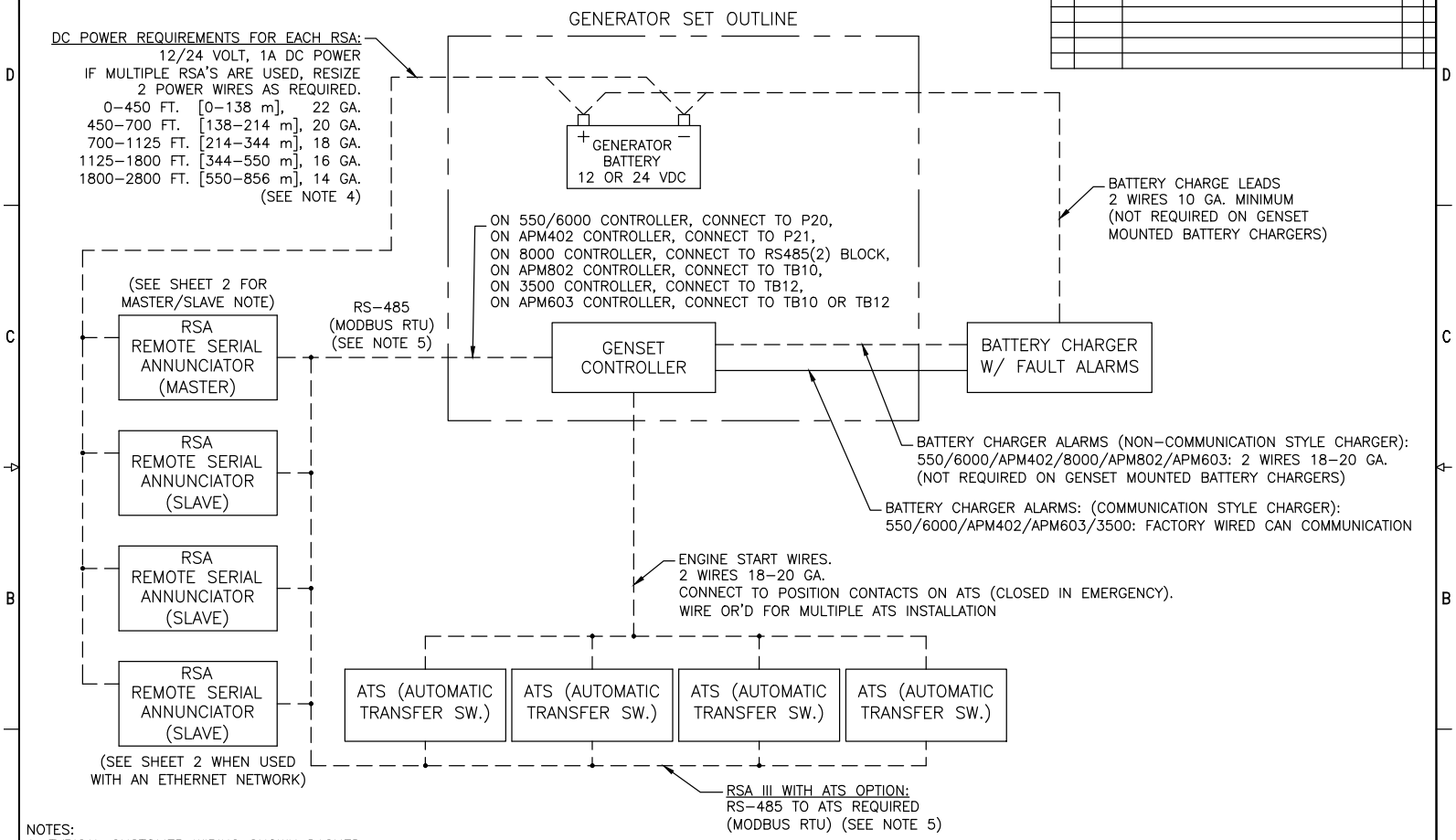
APPROVALS		DATE
DESIGN	TLK	7–24–14
DRAWING	TLK	7–24–14
APPROVED	MD	7–24–14

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TITLE: DWG, BLOCK DIAGRAM APM603 CONTROLLER
SCALE: / / / | SHEET: 2–2
DWG. NO.: GM94316 | D

RS-485 NETWORK CONNECTIONS

REV	DATE	REVISION	BY	M F
–	8-16-19	NEW DRAWING. REPLACES ADV-6990 [CT198499]	TLK	



NOTES:
1. TYPICAL CUSTOMER WIRING SHOWN DASHED.
2. CUSTOMER RESPONSIBLE FOR ADDITIONAL WIRING SHOWN IF COMPONENTS ARE SHIPPED LOOSE (BATTERY CHARGER, DRY-CONTACT BOX, ETC.)
3. IF BATTERY CHARGER IS SHIPPED LOOSE ADDITIONAL WIRES MAY BE REQUIRED FOR PROPER VOLTAGE SENSING. REFERENCE DRAWING ADV-5971 FOR INTERCONNECT.
4. DC VOLTAGE FOR EACH RSA REMOTE ANNUNCIATOR MAY ALSO BE SUPPLIED BY A LOCALLY MOUNTED 12 OR 24 VDC, 200 mA MIN., AC ADAPTER KIT (GM62466-KP1).
5. USE BELDEN #9841 OR EQUIVALENT. MAXIMUM DISTANCE = 4000 FT. [1219 m]

REFER TO WIRING DIAGRAM GM62554 (NETWORK COMMUNICATIONS) FOR CONNECTION DETAIL.

INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR

DIMENSIONS IN [ ] ARE METRIC EQUIVALENTS.

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES ± 1/2° .XX ± .030 SURFACE FINISH √ MAX. .X ± .060 FRACTIONS ±

APPROVALS	DATE
DRAWN TLK	8-16-19
CHECKED TLK	8-16-19
APPROVED MD	8-16-19

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TITLE: DIAGRAM, RSA INTERCONNECTION

SCALE: / / / SHEET 1-2

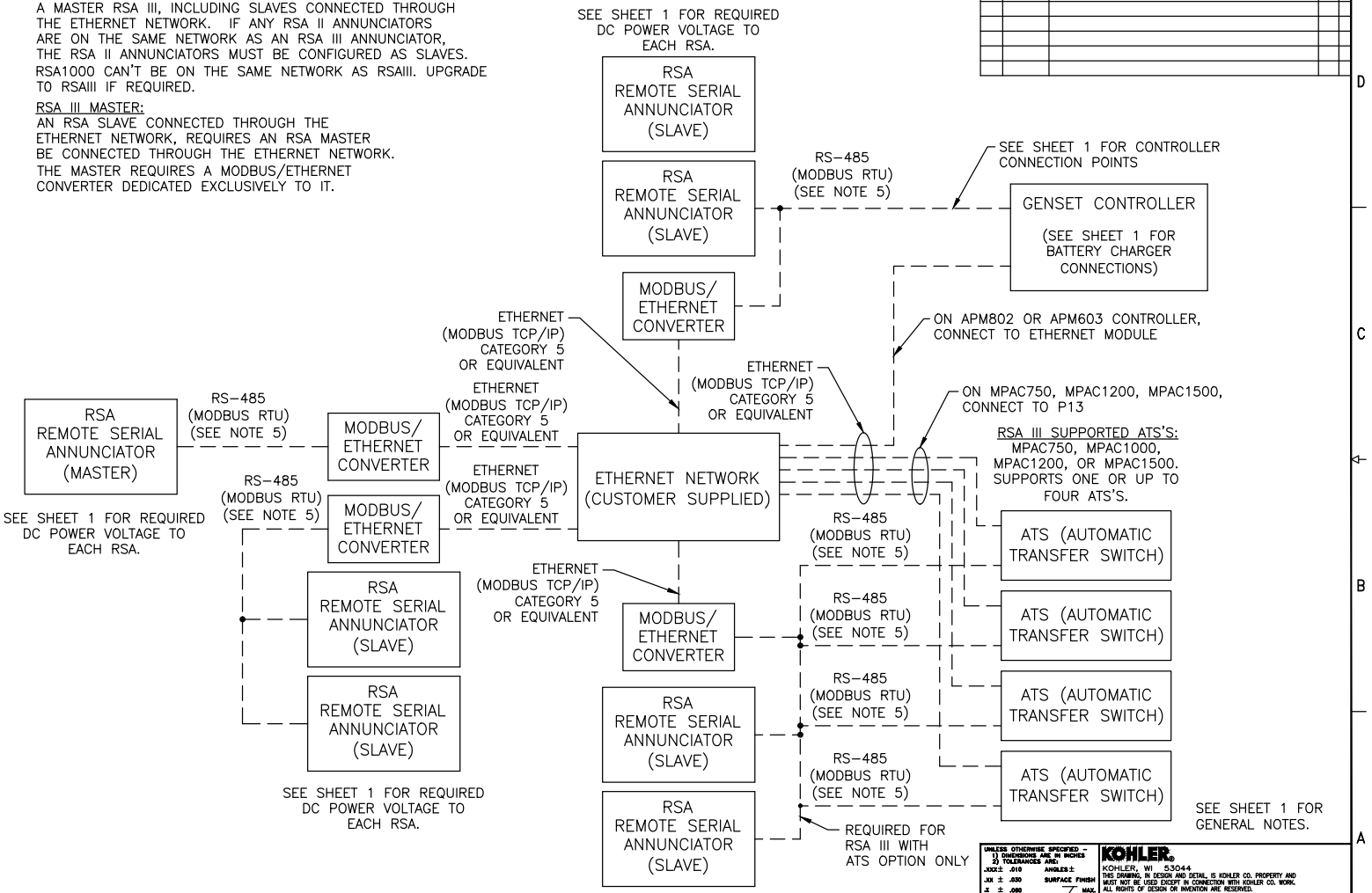
PLOTTED DWG. NO. ADV-9169 C

ETHERNET NETWORK CONNECTIONS

REV	DATE	REVISION	BY	M F
–	8–16–19	NEW DRAWING. REPLACES ADV–6990 [CT198499]	TLK	

RSA III:
A MAXIMUM OF 5 SLAVES CAN BE CONNECTED TO A MASTER RSA III, INCLUDING SLAVES CONNECTED THROUGH THE ETHERNET NETWORK. IF ANY RSA II ANNUNCIATORS ARE ON THE SAME NETWORK AS AN RSA III ANNUNCIATOR, THE RSA II ANNUNCIATORS MUST BE CONFIGURED AS SLAVES. RSA1000 CAN'T BE ON THE SAME NETWORK AS RSAIII. UPGRADE TO RSAIII IF REQUIRED.

RSA III MASTER:
AN RSA SLAVE CONNECTED THROUGH THE ETHERNET NETWORK, REQUIRES AN RSA MASTER BE CONNECTED THROUGH THE ETHERNET NETWORK. THE MASTER REQUIRES A MODBUS/ETHERNET CONVERTER DEDICATED EXCLUSIVELY TO IT.



INTERCONNECTION DIAGRAM CONTROLLER WITH RSA ANNUNCIATOR

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± .XX ± .030 SURFACE FINISH .X ± .080 MAX. FRACTIONS ±

APPROVALS		DATE
DRAWN	TLK	8–16–19
CHECKED	TLK	8–16–19
APPROVED	MD	8–16–19

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TITLE: DIAGRAM, RSA INTERCONNECTION

SCALE: / / / SHEET 2–2

PLOTTED DWG. NO. ADV–9169 C

Drawing Sheet Reference	
Sheet	Description
1	Networked Devices, General Notes, This Sheet
2	Converters, Ethernet Network, PC, Data Interface System
3	16-Light (DEC3+), 550 (DEC550), KPC 1000 Legacy Genset Controllers
4	DEC3000 / APM402 Genset Controller
5	DEC6000 Genset Controller
6	APM603 Genset Controller for non-KD series, Standard PGEN Network
7	This Sheet Reserved for Future Features
8	APM603 Genset Controller for KD Series, Standard PGEN Network
9	This Sheet Reserved for Future Features
10	APM802 Genset Controller
11	DEC8000 Genset Controller
12	DEC3500 Genset Controller, Towable 10 Position Customer Terminal Block
13	Series 1000 (MPAC1000), 340 (M340/M340+), Power Monitor Legacy ATS (Automatic Transfer Switch Controllers)
14	MPAC1500, MPAC-DM 750/1200/1500 ATS (Automatic Transfer Switch Controllers)
15	Legacy RSAII (Remote Serial Annunciator)
16	RSAIII (Remote Serial Annunciator)

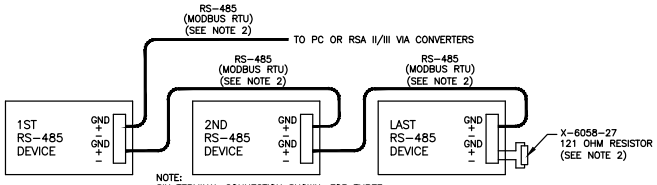
REV	DATE	REVISION	BY
N	5-30-19	THIS SHEET ADDED; COMPATIBILITY CHART, STANDARD NOTES,	
		AND NETWORKED DEVICES MOVED TO THIS SHEET; ISOLATED/	
		NON-ISOLATED RS-485 IDENTIFIED ON ALL SHEETS [CT197795]	TLK
P	6-24-20	(D-8) SHEET 6 NOTE: NON-KD SERIES WAS JOHN DEERE	
		80-500 KW, SHEET 12 NOTE: ADDED	
		TOWABLE 10 POSITION CUSTOMER TERMINAL BLOCK [CT204963]	TLK

Controller/Annunciator Compatibility Chart

	Monitor III	SiteTech	RSA2	RSA3
550 Genset	X	X	X	X
16-Light Genset	X		X	X
DEC 3000 / APM402 Genset	X	X	X	X
KPC 1000 Genset			X	X
6000 Genset	X	X	X	X
8000 Genset				4
APM802				X
APM603		X		X
DEC-3500 Genset		X		X
MPAC 1500	X		X	X
MPAC-DM 750, 1200, 1500		X	X	X
Series 1000 ATS	X		X	X
340 ATS	X			
340 Power Monitor	X			

"X" Designates supported devices. "4" Designates RS-485 Only.

DETAIL A (EXAMPLE OF)
NETWORKED RS-485 DEVICES



NOTE:
SIX TERMINAL CONNECTION SHOWN. FOR THREE TERMINAL CONNECTION, USE TWO WIRES PER TERMINAL STRIP SCREW.

NOTES:

1.) MAXIMUM CABLE LENGTH FOR RS-232 IS 50 FEET. USE RS-485 IF LONGER THAN 50 FEET IS REQ'D.

2.) CUSTOMER SUPPLIED WIRE. USE BELDEN #9841 OR EQUIVALENT CABLE. USE A MAXIMUM CABLE LENGTH OF 1219 METERS (4000 FT.) FROM THE RS-485 CONVERTER TO THE LAST RS-485 DEVICE IN THE NETWORK. THE "LAST DEVICE" IS THE DEVICE FURTHEST FROM THE CONTROLLER. CONNECT "+" TO "+", "-" TO "-". CONNECT THE CABLE SHIELD TO "GND" AT ONE END OF CABLE ONLY, LEAVE OTHER END DISCONNECTED. IF OPERATING OVER 19.2 K BAUD RATE AND WIRE LENGTH > 305 METERS (1000 FT.), CONNECT 121 OHM TERMINATING RESISTOR (X-6058-27) TO "+" AND "-" ON THE LAST DEVICE ON THE NETWORK. IF ONLY ONE DEVICE IS USED, IT IS THE LAST DEVICE. THE TERMINATING RESISTOR IS SELECTABLE INSIDE THE MODBUS/ETHERNET CONVERTER AND REMOTE SERIAL ANNUNCIATOR2 (RSA2) VIA P34. PLACE THE P34 JUMPER ON THE "IN" PINS IF THE MODBUS/ETHERNET CONVERTER, RSA2, OR RSA3 IS THE LAST DEVICE IN THE NETWORK. IF NOT THE LAST DEVICE, PLACE THE P34 JUMPER ON THE "OUT" PINS.

3.) THE 550 & 6000 CONTROLLER CAN BE USED AS A RS-232/RS-485 CONVERTER. CONNECT THE 9-PIN SERIAL PORT ON THE PC TO P18 ON THE 550 OR 6000 CONTROLLER AS SHOWN. THEN CONNECT P20 ON THE 550 OR 6000 CONTROLLER TO THE OTHER RS-485 DEVICES IN THE NETWORK.

4.) EACH MODBUS/ETHERNET CONVERTER CAN COMMUNICATE WITH UP TO 4 ETHERNET NETWORK DEVICES SIMULTANEOUSLY. IF A MODBUS/ETHERNET CONVERTER IS ATTACHED TO A SLAVE REMOTE SERIAL ANNUNCIATOR, A MODBUS/ETHERNET CONVERTER CONNECTED TO A MASTER REMOTE SERIAL ANNUNCIATOR IS REQUIRED. SEE NOTE 2 FOR P34 (TERMINATING RESISTOR) SETTING.

5.) ONLY ONE MASTER IS ALLOWED PER RS-485 NETWORK. ANY COMBINATION OF MASTERS IS ALLOWED IF COMMUNICATING VIA MODBUS/ETHERNET CONVERTERS.

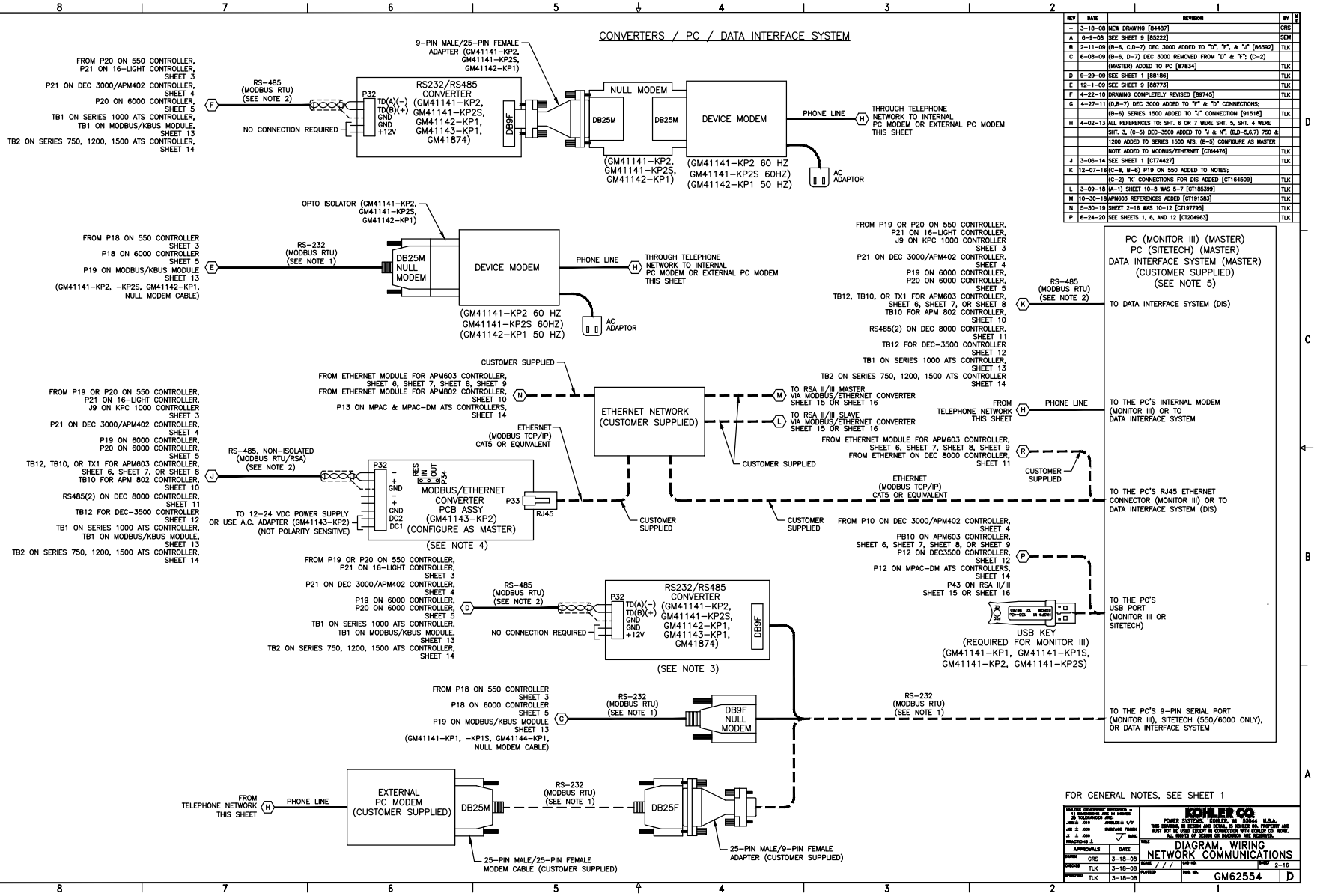
UNLESS OTHERWISE SPECIFIED -
DIMENSIONS ARE IN INCHES
TOLERANCES ARE
.XXX ± .010
.XX ± .020
∠ ± 1°
FRACTIONS ± 1/64
ANGLES ± 1/2°
SURFACE FINISH 125 MAX.

APPROVALS	DATE
DRAWN TLK	5-30-19
CHECKED TLK	5-30-19
APPROVED MD	5-30-19

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TITLE: DIAGRAM, WIRING
NETWORK COMMUNICATIONS

SCALE: / / / | SHEET: 1-16
DWG. NO.: GM62554 | REV: D



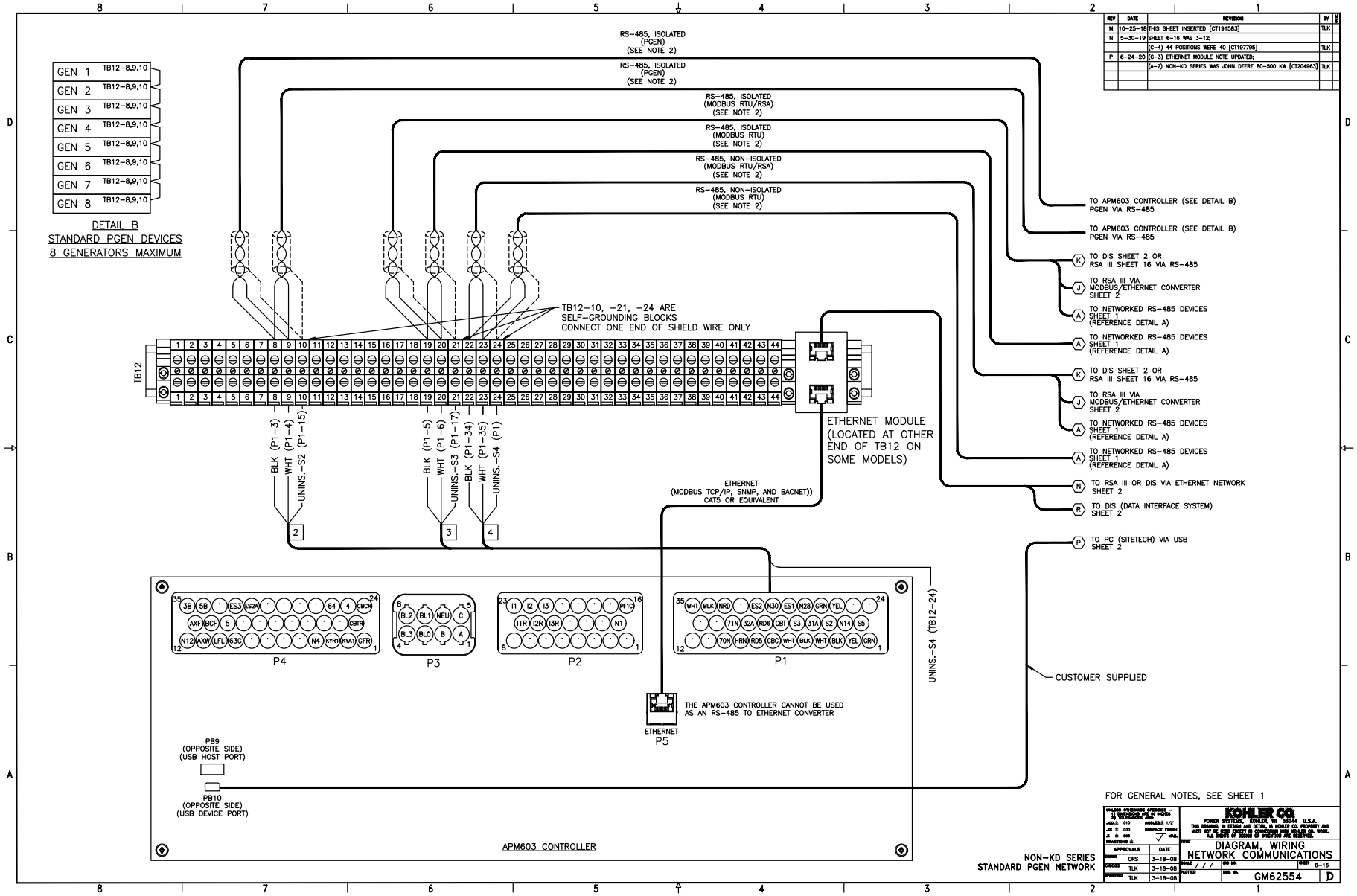
REV	DATE	REVISION	BY
–	3-18-08	NEW DRAWING [84487]	CRS
A	6-9-08	SEE SHEET 9 [85222]	SEM
B	2-11-09	(B-6, C,D-7) DEC 3000 ADDED TO "D", "F", & "J" [86392]	TLK
C	6-08-09	(B-6, D-7) DEC 3000 REMOVED FROM "D" & "F"; (C-2)	
		(MASTER) ADDED TO PC [87834]	TLK
D	9-29-09	SEE SHEET 1 [88186]	TLK
E	12-1-09	SEE SHEET 9 [88773]	TLK
F	4-22-10	DRAWING COMPLETELY REVISED [89745]	TLK
G	4-27-11	(C,D-7) DEC 3000 ADDED TO "F" & "D" CONNECTIONS;	
		(B-6) SERIES 1500 ADDED TO "J" CONNECTION [91518]	TLK
H	4-02-13	ALL REFERENCES TO: SHT. 6 OR 7 WERE SHT. 5, SHT. 4 WERE	
		SHT. 3, (C-5) DEC-3500 ADDED TO "J & N"; (B,D-5,6,7) 750 &	
		1200 ADDED TO SERIES 1500 ATS; (B-5) CONFIGURE AS MASTER	
		NOTE ADDED TO MODBUS/ETHERNET [C164476]	TLK
J	3-06-14	SEE SHEET 1 [C174427]	TLK
K	12-07-16	(C-8, B-6) P19 ON 550 ADDED TO NOTES;	
		(C-2) "K" CONNECTIONS FOR DIS ADDED [C164509]	TLK
L	3-09-18	(A-1) SHEET 10-8 WAS 5-7 [C185399]	TLK
M	10-30-18	APM603 REFERENCES ADDED [C191583]	TLK
N	5-30-19	SHEET 2-16 WAS 10-12 [C197795]	TLK
P	6-24-20	SEE SHEETS 1, 6, AND 12 [C204963]	TLK

FOR GENERAL NOTES, SEE SHEET 1

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APPROVALS	DATE
DRAWN CRS	3-18-08
CHECKED TLK	3-18-08
APPROVED TLK	3-18-08

TITLE: DIAGRAM, WIRING NETWORK COMMUNICATIONS
SCALE: NONE | DRW NO. GM62554 | SHEET 2-16 | REVISED | REVISION NO. D



REV	DATE	REVISION	BY
M	10-25-18	THIS SHEET INSERTED [CT191583]	TLK
N	5-30-19	SHEET 6-16 WAS 3-12;	
		(C-4) 44 POSITIONS WERE 40 [CT197795]	TLK
P	6-24-20	(C-3) ETHERNET MODULE NOTE UPDATED;	
		(A-2) NON-KD SERIES WAS JOHN DEERE 80-500 KW [CT204963]	TLK

FOR GENERAL NOTES, SEE SHEET 1

APPROVALS	DATE
ORS	3-18-08
TLK	3-18-08
TLK	3-18-08

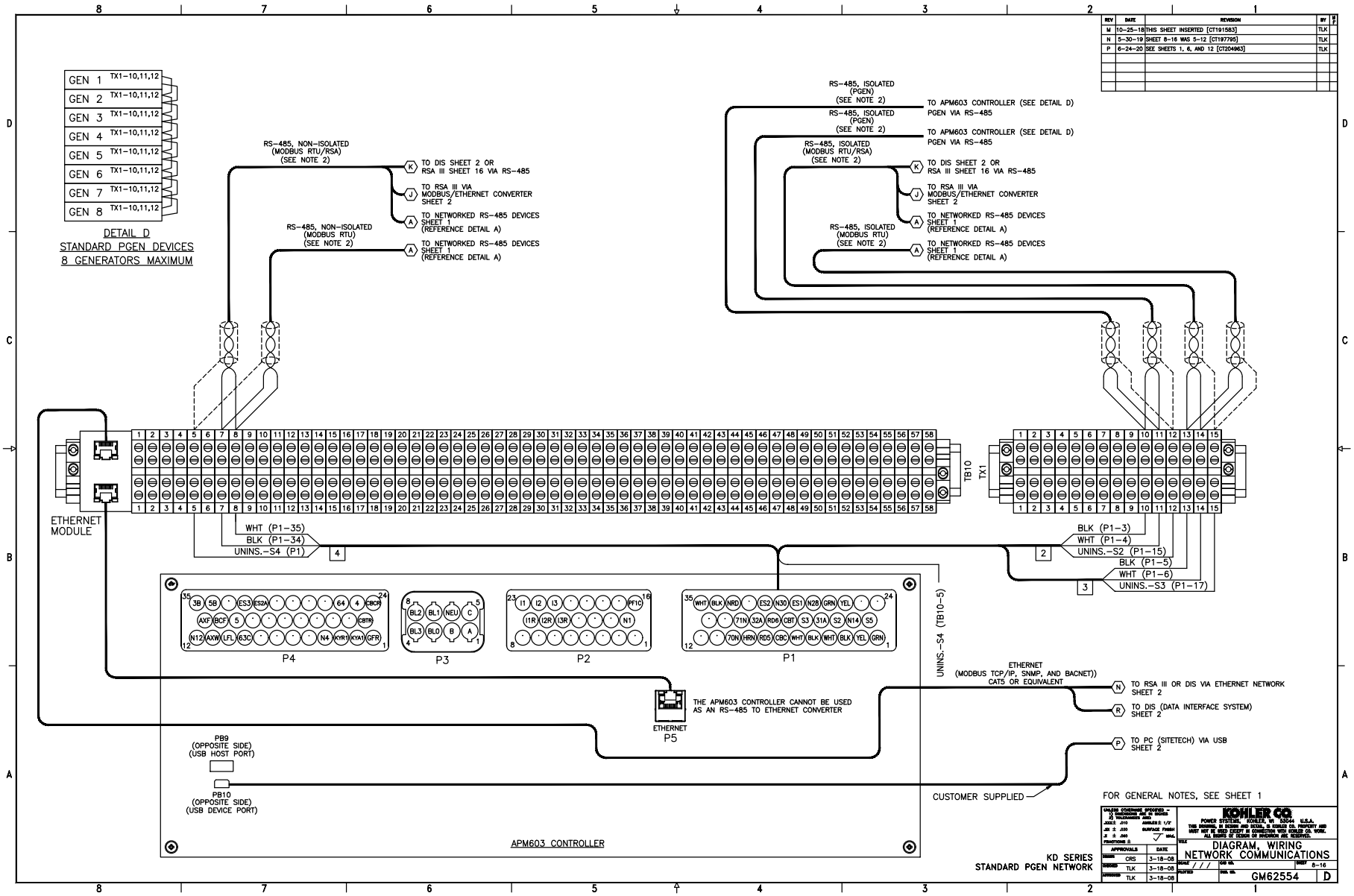
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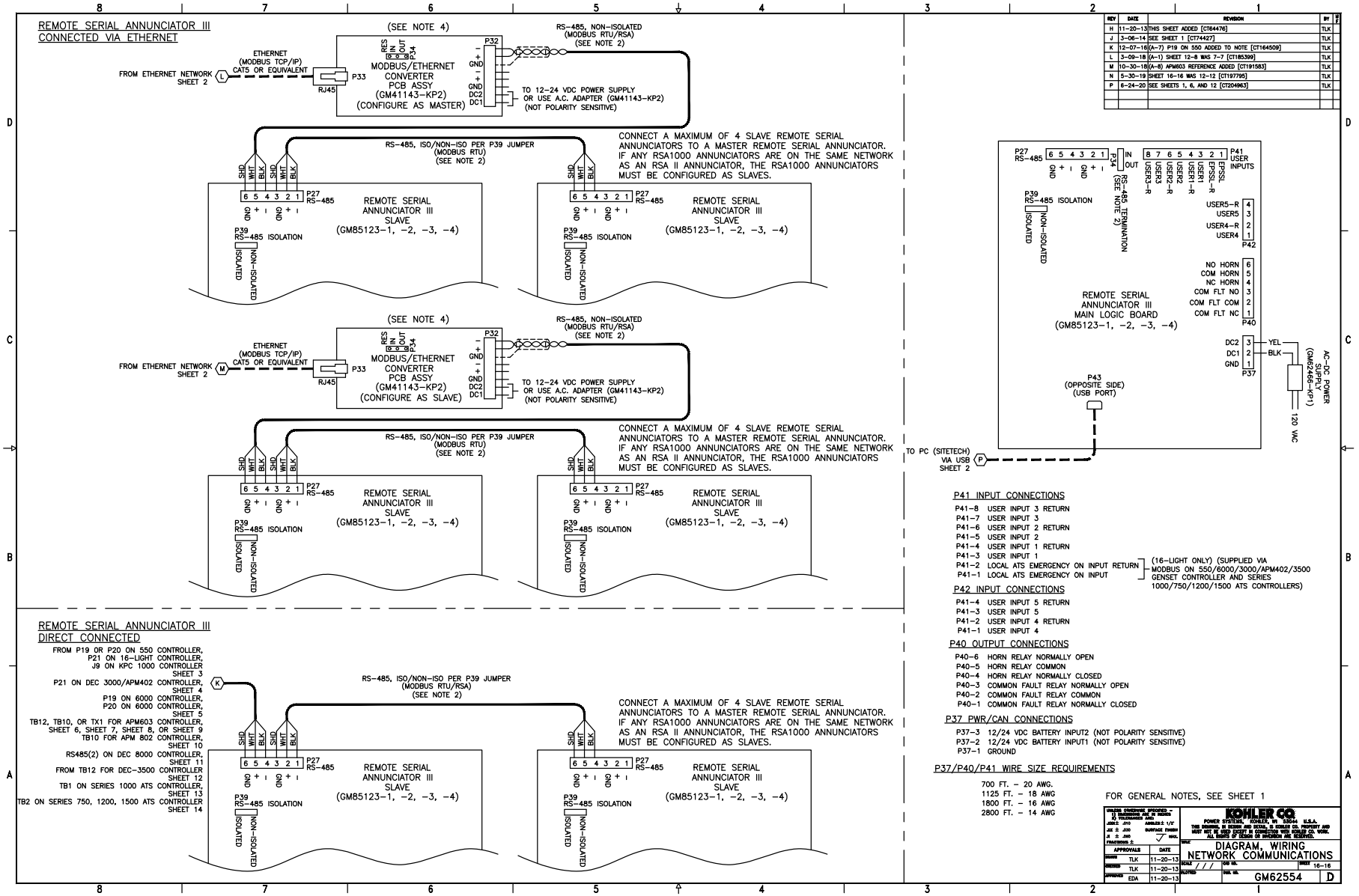
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TITLE: DIAGRAM, WIRING NETWORK COMMUNICATIONS

SCALE: NONE | DRG NO. GM62554 | SHEET 6-16 | SIZE D

NON-KD SERIES
STANDARD PGEN NETWORK


REV | DATE | REVISION | BY
M 10-25-18 THIS SHEET INSERTED [CT191583] TLK
N 5-30-19 SHEET 8-16 WAS 5-12 [CT197795] TLK
P 6-24-20 SEE SHEETS 1, 6, AND 12 [CT204963] TLK
GEN 1 TX1-10,11,12
GEN 2 TX1-10,11,12
GEN 3 TX1-10,11,12
GEN 4 TX1-10,11,12
GEN 5 TX1-10,11,12
GEN 6 TX1-10,11,12
GEN 7 TX1-10,11,12
GEN 8 TX1-10,11,12
DETAIL D
STANDARD PGEN DEVICES
8 GENERATORS MAXIMUM
RS-485, NON-ISOLATED (MODBUS RTU/RSA) (SEE NOTE 2)
K TO DIS SHEET 2 OR RSA III SHEET 16 VIA RS-485
J TO RSA III VIA MODBUS/ETHERNET CONVERTER SHEET 2
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, NON-ISOLATED (MODBUS RTU) (SEE NOTE 2)
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, ISOLATED (PGEN) (SEE NOTE 2)
TO APM603 CONTROLLER (SEE DETAIL D) PGEN VIA RS-485
RS-485, ISOLATED (PGEN) (SEE NOTE 2)
TO APM603 CONTROLLER (SEE DETAIL D) PGEN VIA RS-485
RS-485, ISOLATED (MODBUS RTU/RSA) (SEE NOTE 2)
K TO DIS SHEET 2 OR RSA III SHEET 16 VIA RS-485
J TO RSA III VIA MODBUS/ETHERNET CONVERTER SHEET 2
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
RS-485, ISOLATED (MODBUS RTU) (SEE NOTE 2)
A TO NETWORKED RS-485 DEVICES SHEET 1 (REFERENCE DETAIL A)
ETHERNET MODULE
TB10
TX1
WHT (P1-35)
BLK (P1-34)
UNINS.-S4 (P1)
4
BLK (P1-3)
WHT (P1-4)
UNINS.-S2 (P1-15)
2
BLK (P1-5)
WHT (P1-6)
UNINS.-S3 (P1-17)
3
P4
P3
P2
P1
UNINS.-S4 (TB10-5)
ETHERNET
P5
THE APM603 CONTROLLER CANNOT BE USED AS AN RS-485 TO ETHERNET CONVERTER
ETHERNET (MODBUS TCP/IP, SNMP, AND BACNET)) CAT5 OR EQUIVALENT
N TO RSA III OR DIS VIA ETHERNET NETWORK SHEET 2
R TO DIS (DATA INTERFACE SYSTEM) SHEET 2
P TO PC (SITETECH) VIA USB SHEET 2
PB9 (OPPOSITE SIDE) (USB HOST PORT)
PB10 (OPPOSITE SIDE) (USB DEVICE PORT)
CUSTOMER SUPPLIED
APM603 CONTROLLER
FOR GENERAL NOTES, SEE SHEET 1
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
APPROVALS DATE
DRAWN CRS 3-18-08
DESIGNED TLK 3-18-08
APPROVED TLK 3-18-08
TITLE DIAGRAM, WIRING NETWORK COMMUNICATIONS
SIZE D
DRAWING NO. GM62554
SHEET 8-16
KD SERIES
STANDARD PGEN NETWORK


REMOTE SERIAL ANNUNCIATOR III
CONNECTED VIA ETHERNET
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
L
RJ45
P33
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS MASTER)
RES
ON
OUT
J4
P32
GND
DC2
DC1
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
SHD
WHT
BLK
P27
RS-485
GND
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
REMOTE SERIAL
ANNUNCIATOR III
SLAVE
(GM85123-1, -2, -3, -4)
(SEE NOTE 4)
ETHERNET
(MODBUS TCP/IP)
CAT5 OR EQUIVALENT
FROM ETHERNET NETWORK
SHEET 2
M
RJ45
P33
MODBUS/ETHERNET
CONVERTER
PCB ASSY
(GM41143-KP2)
(CONFIGURE AS SLAVE)
RES
ON
OUT
J4
P32
GND
DC2
DC1
RS-485, NON-ISOLATED
(MODBUS RTU/RSA)
(SEE NOTE 2)
TO 12-24 VDC POWER SUPPLY
OR USE A.C. ADAPTER (GM41143-KP2)
(NOT POLARITY SENSITIVE)
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
REMOTE SERIAL ANNUNCIATOR III
DIRECT CONNECTED
FROM P19 OR P20 ON 550 CONTROLLER,
P21 ON 16-LIGHT CONTROLLER,
J9 ON KPC 1000 CONTROLLER
SHEET 3
P21 ON DEC 3000/APM402 CONTROLLER,
SHEET 4
P19 ON 6000 CONTROLLER,
P20 ON 6000 CONTROLLER,
SHEET 5
TB12, TB10, OR TX1 FOR APM603 CONTROLLER,
SHEET 6, SHEET 7, SHEET 8, OR SHEET 9
TB10 FOR APM 802 CONTROLLER,
SHEET 10
RS485(2) ON DEC 8000 CONTROLLER,
SHEET 11
FROM TB12 FOR DEC-3500 CONTROLLER
SHEET 12
TB1 ON SERIES 1000 ATS CONTROLLER,
SHEET 13
TB2 ON SERIES 750, 1200, 1500 ATS CONTROLLER
SHEET 14
K
RS-485, ISO/NON-ISO PER P39 JUMPER
(MODBUS RTU/RSA)
(SEE NOTE 2)
CONNECT A MAXIMUM OF 4 SLAVE REMOTE SERIAL
ANNUNCIATORS TO A MASTER REMOTE SERIAL ANNUNCIATOR.
IF ANY RSA1000 ANNUNCIATORS ARE ON THE SAME NETWORK
AS AN RSA II ANNUNCIATOR, THE RSA1000 ANNUNCIATORS
MUST BE CONFIGURED AS SLAVES.
P27
RS-485
P34
IN
OUT
RS-485 TERMINATION
(SEE NOTE 2)
P41
USER
INPUTS
USER3-R
USER3
USER2-R
USER2
USER1-R
USER1
EPSS1-R
EPSS1
P39
RS-485 ISOLATION
ISOLATED
NON-ISOLATED
USER5-R
USER5
USER4-R
USER4
P42
NO HORN
COM HORN
NC HORN
COM FLT NO
COM FLT COM
COM FLT NC
P40
REMOTE SERIAL
ANNUNCIATOR III
MAIN LOGIC BOARD
(GM85123-1, -2, -3, -4)
DC2
DC1
GND
P37
YEL
BLK
AC-DC POWER
SUPPLY
(GM62466-KP1)
120 VAC
P43
(OPPOSITE SIDE)
(USB PORT)
TO PC (SITETECH)
VIA USB
SHEET 2
P
P41 INPUT CONNECTIONS
P41-8 USER INPUT 3 RETURN
P41-7 USER INPUT 3
P41-6 USER INPUT 2 RETURN
P41-5 USER INPUT 2
P41-4 USER INPUT 1 RETURN
P41-3 USER INPUT 1
P41-2 LOCAL ATS EMERGENCY ON INPUT RETURN
P41-1 LOCAL ATS EMERGENCY ON INPUT
(16-LIGHT ONLY) (SUPPLIED VIA
MODBUS ON 550/6000/3000/APM402/3500
GENSET CONTROLLER AND SERIES
1000/750/1200/1500 ATS CONTROLLERS)
P42 INPUT CONNECTIONS
P41-4 USER INPUT 5 RETURN
P41-3 USER INPUT 5
P41-2 USER INPUT 4 RETURN
P41-1 USER INPUT 4
P40 OUTPUT CONNECTIONS
P40-6 HORN RELAY NORMALLY OPEN
P40-5 HORN RELAY COMMON
P40-4 HORN RELAY NORMALLY CLOSED
P40-3 COMMON FAULT RELAY NORMALLY OPEN
P40-2 COMMON FAULT RELAY COMMON
P40-1 COMMON FAULT RELAY NORMALLY CLOSED
P37 PWR/CAN CONNECTIONS
P37-3 12/24 VDC BATTERY INPUT2 (NOT POLARITY SENSITIVE)
P37-2 12/24 VDC BATTERY INPUT1 (NOT POLARITY SENSITIVE)
P37-1 GROUND
P37/P40/P41 WIRE SIZE REQUIREMENTS
700 FT. - 20 AWG.
1125 FT. - 18 AWG
1800 FT. - 16 AWG
2800 FT. - 14 AWG
FOR GENERAL NOTES, SEE SHEET 1
REV DATE REVISION BY
H 11-20-13 THIS SHEET ADDED [CT64476] TLK
J 3-06-14 SEE SHEET 1 [CT74427] TLK
K 12-07-16 (A-7) P19 ON 550 ADDED TO NOTE [CT164509] TLK
L 3-09-18 (A-1) SHEET 12-8 WAS 7-7 [CT185399] TLK
M 10-30-18 (A-8) APM603 REFERENCE ADDED [CT191583] TLK
N 5-30-19 SHEET 16-16 WAS 12-12 [CT197795] TLK
P 6-24-20 SEE SHEETS 1, 6, AND 12 [CT204963] TLK
UNLESS OTHERWISE SPECIFIED - DIMENSIONS ARE IN INCHES - TOLERANCES ARE: .XXX ± .010 .XX ± .020 .X ± .060 FRACTIONS ± ANGLES ± 1/2° SURFACE FINISH 125 MAX.
APPROVALS DATE
DRAWN TLK 11-20-13
CHECKED TLK 11-20-13
APPROVED EDA 11-20-13
KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
THIS DRAWING, IN WHOLE AND SEAL, IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.
TITLE DIAGRAM, WIRING
NETWORK COMMUNICATIONS
SCALE NONE DWG NO. 16-16
SHEET
SIZE GM62554 D

KOHLER®

Model: 150REOZJF

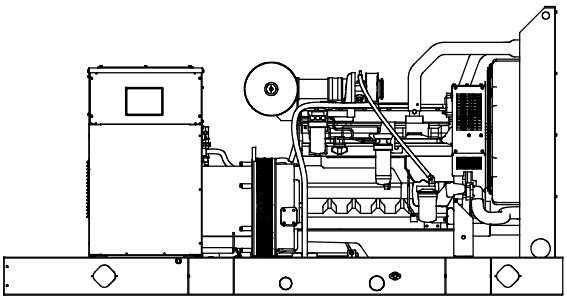
208- 600 V **Diesel**

ISO 9001 KOHLER® NATIONALLY REGISTERED

Tier 3 EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	106- 154
	kVA	106- 193
Prime:	**kW**	99- 140
	kVA	99- 175



Generator Set Ratings

				130°C Rise Standby Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4R13X	120/208	3	60	137/171	475	128/160	444
	127/220	3	60	143/179	469	132/165	433
	120/240	3	60	137/171	412	128/160	385
	120/240	1	60	107/107	446	99/99	413
	139/240	3	60	150/188	451	136/170	409
	220/380	3	60	124/155	235	116/145	220
	277/480	3	60	150/188	226	136/170	204
4S12X	120/208	3	60	154/193	534	140/175	486
	127/220	3	60	154/193	505	140/175	459
	120/240	3	60	154/193	463	140/175	421
	120/240	1	60	106/106	442	105/105	438
	139/240	3	60	154/193	463	140/175	421
	220/380	3	60	140/175	266	131/164	249
	277/480	3	60	154/193	232	140/175	210
	347/600	3	60	154/193	185	140/175	168
4S13X	120/208	3	60	154/193	534	140/175	486
	127/220	3	60	154/193	505	140/175	459
	120/240	3	60	154/193	463	140/175	421
	120/240	1	60	113/113	471	113/113	471
	139/240	3	60	154/193	463	140/175	421
	220/380	3	60	154/193	292	140/175	266
	277/480	3	60	154/193	232	140/175	210
	347/600	3	60	154/193	185	140/175	168
4T13X	120/240	1	60	144/144	600	133/133	554

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940 / ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- Mount up to three circuit breakers to allow circuit protection of selected priority loads.

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth, Permanent-Magnet
Leads: quantity, type	
4RX, 4SX	12, Reconnectable
4TX	4, 120/240 V
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Specifications		Alternator
Peak motor starting kVA:		(35% dip for voltages below)
480 V	4R13X (12 lead)	540
480 V	4S12X (12 lead)	480
480 V	4S13X (12 lead)	570
240 V	4T13X (4 lead)	440

Application Data

Engine

Engine Specifications	
Manufacturer	John Deere
Engine model	6068HF285K
Engine type	4-Cycle, Turbocharged, Charge Air-Cooled
Cylinder arrangement	6 Inline
Displacement, L (cu. in.)	6.8 (415)
Bore and stroke, mm (in.)	106 x 127 (4.19 x 5.00)
Compression ratio	17.0:1
Piston speed, m/min. (ft./min.)	457 (1500)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	177 (237)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Valve material:	
Intake	Chromium-Silicon Steel
Exhaust	Stainless Steel
Governor: type, make/model	JDEC Electronic L16 Denso HP3
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m^3/min. (cfm)	33.9 (1197)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	510 (950)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)
Exhaust outlet size at engine hookup, mm (in.)	98 (3.86)

Engine Electrical

Engine Electrical System (12/24 Volt*)	
Battery charging alternator:	12 Volt/24 Volt
Ground (negative/positive)	Negative
Volts (DC)	12/24
Ampere rating	65/45
Starter motor rated voltage (DC)	12/24
Battery, recommended cold cranking amps (CCA):	12 Volt/24 Volt
Quantity, CCA rating each	One, 640/Two, 570
Battery voltage (DC)	12

*12-volt or 24-volt engine electrical systems are available.

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	11.0 (0.44)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, fuel pump: type, m (ft.)	Electronic, 1.8 (6.0)
Max. fuel flow, Lph (gph)	96.9 (25.6)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter	
Primary	30 Microns
Secondary	2 Microns @ 98% Efficiency
Water Separator	Yes
Recommended fuel	#2 Diesel / HVO / RD

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.) §	27.0 (28.5)
Oil pan capacity with filter, L (qt.) §	27.9 (29.5)
Oil filter: quantity, type §	1, Cartridge
Oil cooler	Water-Cooled

§ Kohler recommends the use of Kohler Genuine oil and filters.

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F) *	50 (122)
Engine jacket water capacity, L (gal.)	11.3 (3.0)
Radiator system capacity, including engine, L (gal.)	25.7 (6.8)
Engine jacket water flow, Lpm (gpm)	174 (46)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	76.3 (4340)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	31.8 (1810)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	660 (26)
Fan, kWm (HP)	7.7 (10.3)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

* Enclosure with enclosed silencer reduces ambient temperature capability by 5°C (9°F).
Snow package enclosure with enclosed silencer reduces ambient temperature capability by 10°C (18°F).

Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm)‡	226.5 (8000)
Combustion air, m^3/min. (cfm)	13.6 (480)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	35.9 (2040)
Alternator, kW (Btu/min.)	12.3 (700)

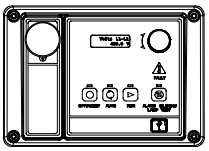
‡ Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption**

Diesel, Lph (gph) at % load	Standby Rating	
100%	44.3	(11.7)
75%	35.1	(9.3)
50%	26.3	(6.9)
25%	16.2	(4.3)
Diesel, Lph (gph) at % load	**Prime Rating**	
100%	40.6	(10.7)
75%	32.3	(8.5)
50%	24.0	(6.3)
25%	14.4	(3.8)

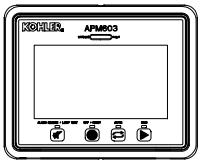
** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Controllers



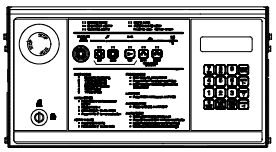
APM402 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.
- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-161 for additional controller features and accessories.



APM603 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.
- 7-inch graphic display with touch screen and menu control provides easy local data access
- Measurements are selectable in metric or English units
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other APM603 controllers only
- Generator management to turn paralleled generators off and on as required by load demand
- Load management to connect and disconnect loads as required
- Controller supports Modbus® RTU, Modbus® TCP, SNMP and BACnet®
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- UL-listed overcurrent protective device
- NFPA 110 Level 1 capability

Refer to G6-162 for additional controller features and accessories.



Decision-Maker® 6000 Paralleling Controller
Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities for paralleling multiple generator sets.
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other Decision-Maker® 6000 controllers only
- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-107 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

BACnet® is a registered trademark of ASHRAE.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Standard Features

- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker® 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Available Options

Circuit Breakers

Type

- ❑ Magnetic Trip
- ❑ Thermal Magnetic Trip
- ❑ Electronic Trip (LI)
- ❑ Electronic Trip with Short Time (LSI)
- ❑ Electronic Trip with Ground Fault (LSIG)

Rating

- ❑ 80%
- ❑ 100%

Operation

- ❑ Manual
- ❑ Electrically Operated (for paralleling)

Circuit Breaker Mounting

- ❑ Generator Mounted
- ❑ Remote Mounted
- ❑ Bus Bar (for remote mounted breakers)

Enclosures for Remote Mounted Circuit Breakers

- ❑ NEMA 1
- ❑ NEMA 3R

Approvals and Listings

- ❑ HCAI Pre- Approval
- ❑ CSA Certified
- ❑ IBC Seismic Certification
- ❑ UL 2200 Listing
- ❑ Hurricane Rated Enclosure

Enclosed Unit

- ❑ Snow Enclosure (sound enclosure with enclosed critical silencer, intake hood, and electrical package)
- ❑ Sound Enclosure (with enclosed critical silencer)
- ❑ Weather Enclosure (with enclosed critical silencer)

Open Unit

- ❑ Exhaust Silencer, Critical (kit: PA-354809)
- ❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Fuel Pressure Gauge
- ❑ Subbase Fuel Tanks

Controller

- ❑ Common Failure Relay (Decision-Maker® 6000 and APM603 controllers only)
- ❑ Decision-Maker® Paralleling System (DPS) (Decision-Maker® 6000 controller only)
- ❑ Dry Contact (isolated alarm) (Decision-Maker® 6000 controller only)
- ❑ Two Input/Five Output Module (APM402 controller only)
- ❑ Four Input/Fifteen Output Module (APM603 controller only)
- ❑ Lockable Emergency Stop Switch
- ❑ Remote Emergency Stop Switch
- ❑ Remote Serial Annunciator Panel
- ❑ Run Relay (standard with APM603, optional with others)
- ❑ Manual Key Switch (APM603 controller only)
- ❑ Manual Speed Adjust (APM402 controller only)

Cooling System

- ❑ Block Heater, 1800 W, 90- 120 V, 1 Ph
- ❑ Block Heater, 2000 W, 190- 240 V, 1 Ph Required for ambient temperature below 0°C (32°F)
- ❑ Radiator Duct Flange

Electrical System

- ❑ Generator Heater
- ❑ Battery
- ❑ Battery Charger, Equalize/Float Type
- ❑ Battery Heater

Miscellaneous

- ❑ Air Cleaner, Heavy Duty
- ❑ Air Cleaner Restriction Indicator
- ❑ Certified Test Report
- ❑ Crankcase Emissions Canister
- ❑ Engine Fluids Added
- ❑ Rated Power Factor Testing
- ❑ Rodent Guards

Literature

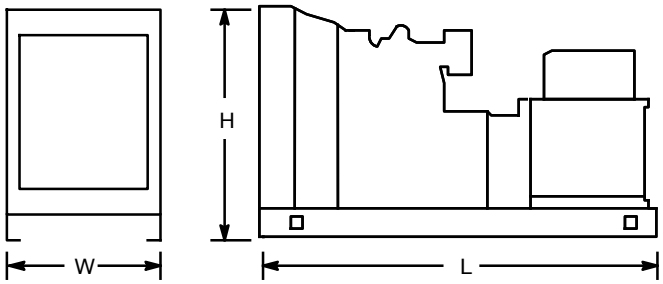
- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Warranty

- ❑ 2-Year Basic Limited Warranty
- ❑ 5-Year Basic Limited Warranty
- ❑ 5-Year Comprehensive Limited Warranty

Dimensions and Weights

Overall Size, L x W x H, mm (in.):	2950 x 1120 x 1524 (116.1 x 44.1 x 60.0)
Weight (radiator model), wet, kg (lb.):	1295- 1402 (2855- 3090)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

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KOHLER®

150REOZJF

60 HZ. DIESEL INDUSTRIAL GENERATOR SET
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	John Deere, 6068HF285K	Bore:	106mm (4.19 in.)
Nameplate BHP @ 1800 RPM:	237	Stroke:	127mm (5.0 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	6.8 L (415 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled		
Compression Ratio	17.0:1	EPA Family:	PJDXL06.8120
		EPA Certificate:	PJDXL06.8120-009

PERFORMANCE DATA:

	Table 1			
	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
Engine bkW @ Stated Load	44	89	133	177
Fuel Consumption (g/kWh)	250	244	222	214
Exhaust Gas Flow (m^3/min)				34
Exhaust Temperature (°C)				510

EXHAUST EMISSION DATA:

	Table 2
	EPA D2 Cycle 5-mode weighted
HC (Total Unburned Hydrocarbons)	0.12
NOx (Oxides of Nitrogen as NO2)	3.79
CO (Carbon Monoxide)	1.2
PM (Particulate Matter)	0.12

Values are in g/kWh unless otherwise noted

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Deere & Company**
(U.S. Manufacturer or Importer)

Certificate Number: **PJDXL06.8120-009**

Effective Date: 06/16/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/16/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PJDXL06.8120

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 130<=kW<225
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Smoke Puff Limiter, Engine Design Modification, Non-standard Non-After Treatment Device Installed

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

CONGLETON - HACKER CO.
Construction Managers / General Contractors

Submittal Review Cover Sheet

Project Name: UK Memorial Coliseum

UK job #: 2604.0

CHC Project #: 20-101

Submittal Description: Generator and ATS – Product Data

Subcontractor/Vendor: Nixon

Date Submittal Rec'd: 4/26/2023

CHC Review Stamp & Comments

Congleton-Hacker Company

Job # 20-101 Submittal: 263200-01
Date 4/26/23 By: Avery Gray .

The data contained hereon & here within is for inspection only
- Not for construction-
Unless stamped "Approved" by the architect and/or engineer.

Notes:

A/E Review Stamp & Comments

4/26/2023



NIXON POWER SERVICES

SUBMITTAL PACKAGE

UK Memorial Coliseum

CONTRACTOR / INSTALLER: UNIVERSITY OF KENTUCKY

Project Manager: Sara Russell
Mobile: 615-693-2030
Email: srussell@nixonpower.com

Project Engineer: Damian Garrett
Mobile: 615-202-2768
Email: dgarrett@nixonpower.com

Sales Specialist: Zachary Davis
Mobile: 502-612-1920
Email: zdavis@nixonpower.com

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TABLE OF CONTENTS

Section	Sub-Section	Literature
Quote		
Model 500REOZVC Spec Sheets		
Specification Sheet	Controller	G6-162
Specification Sheet	Circuit Breaker	G6-88
Specification Sheet	Circuit Breaker	Circuit Breaker Trip Curves
Specification Sheet	Circuit Breaker	P_R Frame Breaker
Specification Sheet	Battery Charger	G6-146
Specification Sheet	Silencer	Silencers
Specification Sheet	Weld Flange	Weld Flange
Specification Sheet	Engine Block Heater	G6-170
Specification Sheet	Voltage Regulator	Voltage Regulator
Specification Sheet	Remote Serial Annunciator	G6-139
Specification Sheet	Transfer Switch	Spec ATS Accessories
Specification Sheet	Transfer Switch Controls	G11-127
Alternator Data		
	Alternator Data Sheet	5M4028
Sound Data		
	Sound Data Sheet	Sound Data
Cooling Data		
	Cooling Systems Data Sheet	Cooling Data
Emissions Data		
	Emissions Data	Emissions Data
	EPA Certificate	EPA Certificate

KOHLER®

Certification

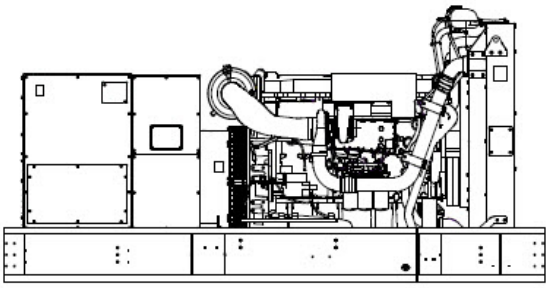
ISO9001 Certificate	G15-152
Prototype Test Summary	G18-489
Prototype Test Certificate	G18-56
ATS Test Program	G18-414

Pre-Startup Checklist

Pre-Startup Checklist	PreStartUpCheckList

Nixon Power Services
11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Generator





Kohler Model: 500REOZVC

This diesel generator set equipped with a 5M4028 alternator operating at 277/480 volts is rated for 510 kW/638 kVA. Output amperage: 767

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11910 Carrier Court
Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Standard Features:

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Other Features:

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Alternator Features:

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

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Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	500REOZVC Generator System
1	500REOZVC Generator Set

Includes the following:

Literature Languages	English
Approvals and Listings	UL2200 Listing
Engine	500REOZVC,24V,50/60Hz, EPA
Nameplate Rating	Standby 130C Rise
Voltage	60Hz, 277/480V, Wye, 3Ph, 4W
Alternator	5M4028
Cooling System	Unit Mounted Radiator, 50C
Skid and Mounting	Skid
Air Intake	Heavy Duty
Controller	APM603
Starting Aids, Installed	4000W,190-208V,1Ph,w/Valves
Cooling System Acc.,Installed	Radiator Duct Flange
Electrical Accy.,Installed	Battery, 2/12V, Wet
Electrical Accy.,Installed	Battery Charger, 10A
Electrical Accy.,Installed	Run Relay
Electrical Accy.,Installed	Generator Heater
Rating, LCB 1 Right	100% Rated
Amps, LCB 1 Right	600
Trip Type, LCB 1 Right	Electronic, LSI
LCB 1 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 1 Right	Shunt Trip
Frame, LCB 1 Right	PG
Position, LCB 1 Right	1
Rating, LCB 2 Right	100% Rated
Amps, LCB 2 Right	600
Trip Type, LCB 2 Right	Electronic, LSI
LCB 2 Right Interrupt Rating	35kA at 480V
Aux Trip, LCB 2 Right	Shunt Trip
Frame, LCB 2 Right	PG
Position, LCB 2 Right	2
LCB Accy. Installed	Breaker Separation Between LCB
LCB Accy. Installed	Shunt Trip Wiring
Fuel Lines, Installed	Flexible Fuel Lines
Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
Miscellaneous Accy,Installed	Coolant in Genset

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	Miscellaneous Accy,Installed	Oil in Genset
	Warranty	Standard
	Testing, Additional	Power Factor Test,0.8,3Ph Only
1	Silencer,Critical,10"Flange,SIEO	
1	Flexible Exhaust Connection 10" ANSI	
1	Weld-On Flange,10"ANSI	
1	NEC Remote, E-Stop	
1	Lit. Kit, General Maintenance, 500REOZVC	
1	RSA III, Annunciator only	
	660 Gallon Subbase Fuel Tank	
	Remote Fill Station Panel	
Qty 2	600A Wall Mount Quick Connect Panel	

Automatic Transfer Switch



Kohler Model: KSS-AMTA-0600S

3 Pole, 4 Wire, Solid Neutral, 600 amp, Kohler Specific Breaker rated Standard automatic transfer switch, Model KSS-AMTA-0600S, rated 480V, 60 Hz complete with all standard equipment and housed in a NEMA Type 1 enclosure.

Nixon Power Services
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Louisville, KY 40299
P: 502-267-0474
F: 502-267-9166

Qty	Description
	ATS KSSB Transfer Switch System
2	KSS-AMTA-0600S

Includes the following:

Literature Languages	English
Mechanism	Specific Breaker
Transition	Standard
Logic	1200
Voltage	480V / 60 Hz
Poles & Wires	3 Pole/4 Wire, Solid Neutral
Enclosure	Nema 1
Amps	600 Amps
Connection	Standard
IBC Seismic Certification	None
CSA Certification	None
Miscellaneous Acc.,Installed	Supervised Transfer Control
Miscellaneous Acc.,Installed	Lockable User Interface Cover
Warranty	1-YR STANDARD

Items shown in this diagram are examples only and are not true depictions of equipment ordered. Enclosures, colors, and styles may vary

NIXON POWER SERVICES

KOHLER GENERATOR
APM402 CONTROLLER





Emergency Stop



KOHLER REMOTE ANNUNCIATOR

AUTOMATIC TRANSFER SWITCH



AUTOMATIC TRANSFER SWITCH



MODBUS
Belden 9841

CONTROL WIRES
4ea. THHN 16ga.

REMOTE START
4ea. THHN 16ga.

E-STOP SWITCH
2ea. THHN 16ea.

COMMUNICATION DRAWING

AS BUILT DRAWINGS FOR EPSS COMMUNICATION SYSTEM

NIXON POWER
(800) 766-4966

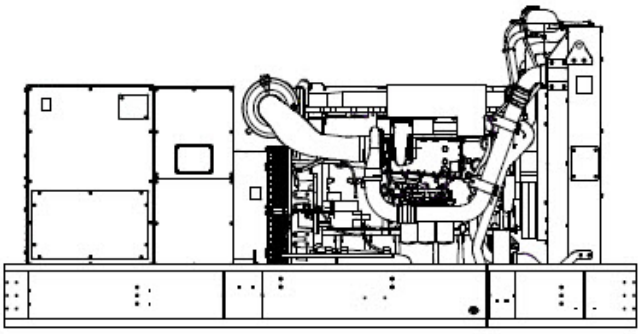
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Spec Sheets

KOHLER®

500REOZVC
Diesel



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Tier 2 EPA-certified for Stationary Emergency Applications
- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision Maker 6000 controller)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
- The brushless, rotating-field alternator has broad range reconnectability.

Other Features

- Kohler designed controllers for guaranteed system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- An electronic, isochronous governor delivers precise frequency regulation.
- Multiple circuit breaker configurations.

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	kW/kVA	Amps
5M4028	277/480	3	60	510/638	767

Alternator Specifications

Specifications	Alternator
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads, quantity	10/12, Reconnectable
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130 ° C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load (with <0.5% drift due to temp. variation)	3-Phase Sensing, +/-0.25%
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
• Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
• Sustained short-circuit current enabling down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Digital solid-state, volts-per-hertz voltage regulator with +/-0.25% no-load to full-load regulation.
• Brushless alternator with brushless pilot exciter for excellent load response.

Engine

Engine Specification

Engine Manufacturer	Volvo
Engine Model	TAD1642GE-B
Engine: type	4-Cycle, Turbocharged, Charge Air Cooled
Cylinder arrangement	6, Inline
Displacement, L (cu. in.)	16.12 (984)
Bore and stroke, mm (in.)	144 x 165 (5.67 x 6.50)
Compression ratio	17:01
Piston speed, m/min. (ft./min.)	594 (1949)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	565 (757)
Cylinder head material	Cast Iron
Piston: type, material	Steel
Crankshaft material	Forged Steel
Valve (exhaust) material Intake	Nimonic
Governor: type, make/model	EMS 2.4
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Field-Convertible
Air cleaner type, all models	Dry

Exhaust

Exhaust System

Exhaust flow at rated kW, m3/min. (cfm)	92.0 (3249)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	455 (851)
Maximum allowable back pressure, kPa (in. Hg)	10 (3.0)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24 V, 7kW
Battery charging alternator: Ampere rating	80
Starter motor rated voltage (DC)	24
Battery, recommended cold cranking amps (CCA): Qty., CCA rating each	Two, 925
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	8 (0.31)
Fuel return line, min. ID, mm (in.)	6 (0.25)
Max. fuel flow, Lph (gph)	204.4 (54)
Max. fuel pump restriction, kPa (in. Hg)	30 (8.9)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter: quantity, type	2, Primary, 10 Micron Secondary w/Water Separator, 3 Microns
Recommended fuel	#2 Diesel/HVO/RD

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	42.0 (44.4)
Oil pan capacity with filter, L (qt.)	48.1 (50.8)
Oil filter: quantity, type	3, Cartridge
Oil cooler	Water-Cooled

Cooling

Radiator System

Ambient temperature, ° C (° F)	50 (122)
Engine jacket water capacity, L (gal.)	39.7 (10.5)
Engine jacket water capacity, L (gal) (Non-IBC):	39.7 (10.5)
Radiator system capacity, including engine, L (gal.)	67 (17.7)
Engine jacket water flow, Lpm (gpm)	463.3 (122.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	231 (13137)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	147 (8360)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	890 (35)
Fan, kWm (HP)	19 (25.5)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	0.125 (0.5)

* Weather and sound enclosures with internal silencer and weather housing with external silencer reduce ambient temperature capability by 5 ° C (9 ° F).

Operation Requirements

Air Requirements

Radiator-cooled cooling air, m3/min. (scfm) *	598 (21120)
Combustion air, m3/min. (cfm)	46 (1617)
Heat rejected to ambient air: Engine, kW (Btu/min.)	24 (1365)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	29 (1660)

*Air density = 1.20 kg/m3 (0.075 lbm/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	139.3 Lph (36.8 gph)
Standby Fuel Consumption at 75% load	101.4 Lph (26.8 gph)
Standby Fuel Consumption at 50% load	68.1 Lph (18.0 gph)
Standby Fuel Consumption at 25% load	38.6 Lph (10.2 gph)
Prime Fuel Consumption at 100% load	121.9 Lph (32.0 gph)
Prime Fuel Consumption at 75% load	89.7 Lph (23.7 gph)
Prime Fuel Consumption at 50% load	60.6 Lph (16.0 gph)
Prime Fuel Consumption at 25% load	33.7 Lph (8.9 gph)
Continuous Fuel Consumption at 0% load	** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD

Dimensions and Weights

Dim Weight Spec	Dim Weight Value
Fuel	Diesel
Engine Manufacturer	Volvo
Overall Size, L x W x H, mm (in.):	4229 x 1829 x 1942 (166.5 x 72.0 x 76.5)
Weight (radiator model), wet, kg (lb.):	4082 (9000)

Industrial Generator Set Accessories

Generator Set Controller



The APM603 generator set controller provides advanced control, system monitoring, and system diagnostics for a single generator set or paralleling multiple generator sets. The APM603 interfaces the generator set to other power system equipment and network management systems using standard industry network communications. It uses a patented digital voltage regulator and unique software logic to manage alternator thermal overload protection as well as serves as an overcurrent protective relay, features normally requiring additional hardware. The APM603 controller meets NFPA 110, Level 1.

Display, Interface, and Accessibility

- A 7-inch color TFT touchscreen for easy local access to data.
  - Home screen can be customized to show critical data at a glance.
  - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial bus and Ethernet networks, and supports SNMP and BACnet® through Ethernet networks.

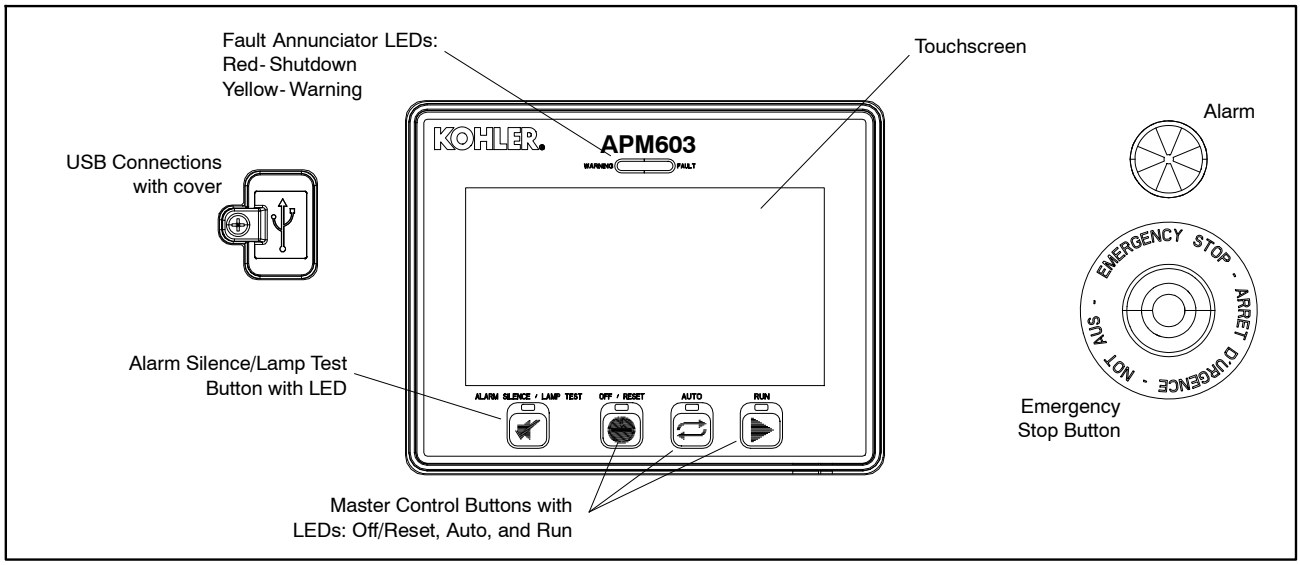
Global Support

- Sales, installation, and service support from more than 800 Kohler and SDMO service providers around the world.

On- board Diagnostics

- Immediate visibility of warnings and faults with text description and code display.
  - 15 seconds of critical data are captured around each warning and fault
  - Critical data can be viewed on the display and downloaded
- Store up to 10,000 events locally along with historical data logging of successful starts.
  - Accurate time stamp from real-time clock
  - Event log can be downloaded
- Data logging of customized parameter list for report generation and advanced troubleshooting.
  - Store to external USB drive for easy transfer to another device

Modbus® is a registered trademark of Schneider Electric.
BACnet® is a registered trademark of ASHRAE.



Controller Features

AC Output Voltage Regulator Adjustment	Maximum of ±10% of the system voltage
Alarm Horn	Indicates a generator set warning or shutdown condition
Alarm Silence	For NFPA-110 application or user convenience
Alternator Protection	Generator set overload and short circuit protection
Cyclic Cranking	Provides automatic restart after a failed start attempt with programmable on/off time and number of attempts
ECU Diagnostics	Displays engine ECU fault codes and descriptions for engine troubleshooting
Emergency Stop Button	Shuts down the generator set immediately, for emergency situations
Engine Start Aid	Control for an optional engine starting aid
Environmentally Sealed Membrane Keypad	Three master control buttons with LEDs: Off/Reset, Auto, and Run
Patented High-Speed RMS Digital Voltage Regulator	±0.25% no-load to full-load regulation with three-phase true RMS sensing
Lamp Test	Verifies functionality of the indicator LEDs
Real-time Clock	Includes battery back-up to retain date and time through controller power cycle
Remote Reset	Allows remote fault resets and restarting of the generator set
Remote Monitoring Panel	Compatible with the Kohler® Remote Serial Annunciator
Run Time Hourmeter	Displays generator set run time
Run Relay	Indicates that the generator set is running
Time Delay Engine Cooldown (TDEC)	Time delay before the generator set shuts down
Time Delay Engine Start (TDES)	Time delay before the generator set starts

Communication

USB Port	(1) Mini-USB port for PC connection (1) USB port for storage device
Serial (RS-485) Port	(1) Non-isolated for RSA III (1) Isolated for Modbus devices (1) Isolated for paralleling communication
Ethernet Port	(1) RJ45 for Modbus TCP, SNMP, and BACnet

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

- Isochronous control with real and reactive load sharing with other APM603 controller equipped generator sets
  - Supports paralleling up to 8 generators
- Random first-on logic to prevent two or more generator sets from closing to a dead bus and provides the fastest response for a single generator online
- Automatic synchronizer with dead bus closing
- Soft loading and unloading for generator management
- Protective relay functions:
  - Synch check (25C)
  - Over current (51)
  - Over frequency (81O)
  - Over power (32O)
  - Over voltage (59)
  - Reverse power (32R)
  - Reverse reactive power (32RQ)
  - Under frequency (81U)
  - Under voltage (27)
- Generator management to allow the start and stop of generators based on load demand or state of other generators
  - Fuel level
  - Run time
  - Manual order
  - Time of day
  - Efficiency
- Simplified paralleling system view from any generator controller in the system

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection
- Includes a maintenance mode for arc flash reduction per NEC 240.87

Load Management Features

- Programmable outputs included to command the connect and disconnect of loads based on generator or paralleling system state
  - Loads connected based on available capacity
  - Loads disconnected at system startup
  - Loads disconnected based on a maximum kW setting or underfrequency setting
- Supports up to 16 prioritized load steps per system
  - Can be used on a single generator system
  - Can be combined in a paralleling system for a total system load control capability
- Simplified load management system view from any generator controller in the system
- Requires input/output module option

Advanced Programmable I/O

- Configurable inputs and outputs can be programmed for customer specific use
- PLC-like capability for applying logic to customize generator system behavior

Troubleshooting Features

- 15 seconds of key data automatically captured around each warning and shutdown
  - Data can be exported for detailed analysis
  - Data can be viewed on controller for convenient on-site troubleshooting support
- Configurable data logger will allow you to select parameters to monitor
  - Data stored to USB device for flexibility on amount of data stored and ability to export for detailed analysis
  - Data capture controlled by user to allow capturing specific data required

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
  - Overcrank
  - Low coolant temperature warning
  - High coolant temperature warning
  - High coolant temperature shutdown
  - Low oil pressure shutdown
  - Low oil pressure warning
  - High engine speed
  - Low fuel (level or pressure) *
  - Low coolant level
  - EPS supplying load
  - High battery voltage
  - Low battery voltage
- General functions:
  - Master switch not in auto
  - Battery charger fault *
  - Lamp test
  - Contacts for local and remote common alarm
  - Audible alarm silence button
  - Remote emergency stop *

* Function requires optional input sensors or kits and is engine dependent, see Engine Data.

Standards

The generator set controller has been tested and verified for compliance with the following standards.

- NFPA 99
- NFPA 110, Level 1
- CSA 282-09
- UL 6200
- ASTM B117 (salt spray test)

Controller Functions

The controller displays warning, shutdown, and status messages. **All functions are available as relay outputs.**
Warning causes the yellow fault LED to show and sounds the alarm horn, signaling an impending problem.
Shutdown causes the red fault LED to show, sounds the alarm horn, and stops the generator set.

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here. This table highlights the items required for NFPA 110.

Event	Warning	Shutdown
Alternator Thermal Protection †		●
Battery Charger Fault *	▲	
CAN Option Board1 Comm Loss	▲	
Critically Low Fuel Level (diesel) *	▲	
ECU Diagnostic Event	▲	
ECU Mismatch Shutdown †		●
Fuel Leak Alarm (diesel) *	▲	
High Battery Voltage Warning	▲	
High Coolant Temperature Shutdown †		●
High Coolant Temperature Warning	▲	
High Fuel Level Warning (diesel) *	▲	
High Oil Temperature Shutdown †		●
High Oil Temperature Warning	▲	
Local Emergency Stop Shutdown †		●
Loss ECU Comms Shutdown †		●
Loss of Signal Low Coolant Level Voltage	▲	
Low Battery Voltage Warning	▲	
Low Coolant Level Shutdown †		●
Low Coolant Temperature Warning	▲	
Low Fuel Level Shutdown (diesel) * †		●
Low Fuel Level Warning (diesel) *	▲	
Low Fuel Pressure Warning (gas) *	▲	
Low Oil Pressure Shutdown †		●
Low Oil Pressure Warning	▲	
Low RTC (clock) Battery Voltage	▲	
Maintenance Reminder1	▲	
Maintenance Reminder2	▲	
Maintenance Reminder3	▲	
Maximum Power Shutdown †		●
Maximum Power Warning	▲	
Not In Auto Alarm	▲	
Over Crank Shutdown †		●
Over Current Shutdown (L1, L2, L3) †		●
Over Current Warning (L1, L2, L3)	▲	
Over Frequency Shutdown †		●
Over Frequency Warning	▲	
Over Power Shutdown †		●
Over Power Warning	▲	
Over Speed Shutdown †		●
Over Voltage Shutdown (L-L, L-N, each phase) †		●
Over Voltage Warning (L-L, L-N, each phase)	▲	

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		●
Reverse Power Shutdown †		●
Reverse VAR Shutdown †		●
Under Frequency Shutdown †		●
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		●
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1-8		
Run Button Pressed		

* Function requires optional input sensors or kits
† Items included with common fault shutdown 10

Mitsubishi Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Coolant Temperature, Degrees	Analog Input
Fuel Level %	
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Crank	
Horn	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	16 Dry Contact Digital
User Configurable Relay Outputs	8 NO/NC Relays
Note: Programmable I/O is configurable by a Kohler-authorized technician.	

Mitsubishi Engine Data

The following Mitsubishi engine data is displayed on the APM603 controller.

Parameter
Battery Voltage
Coolant Temperature
Engine Speed
Intercooler Temperature (NA on some engine sizes)
Oil Pressure
Total Run Time Hours

Volvo Engine-Powered Models
Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Tripped *	
Coolant Temperature	
Emergency Stop, Local	
Emergency Stop, Remote	
Excitation Over Voltage	
Fuel Leak Alarm	
Fuel Level	
Ground Fault Relay	
Key Switch Auto	
Key Switch Run	
Low Fuel Level Switch	
Remote Engine Start	Two-wire input
Speed Bias	Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias	

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Run	
Trip Breaker / Shunt Trip *	
* Only with remote- mounted electrically operated circuit breakers.	

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	2 Analog, 0- 5 VDC 4 Dry Contact Digital
User Configurable Relay Outputs	14 NO/NC Relays 1 Common Fault Relay
Note: Programmable I/O is configurable by a Kohler-authorized technician	

Volvo Engine Data

The following Volvo engine data is displayed on the APM603 controller.

Parameter
Air Intake Pressure
Air Intake Temperature
Ambient Temperature
Barometric Pressure
Coolant Temperature
ECU Battery Voltage
ECU Runtime Hours
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Intake Manifold Pressure
Intake Manifold Temperature
Intercooler Temperature
Mechanical Engine Load
Oil Pressure
Oil Temperature

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

APM603 Available Options

- ❑ **Common Failure Relay** provides a relay output to signal a generator set fault.
- ❑ **Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming capability.
- ❑ **Electrically Operated Circuit Breakers**
  - For paralleling systems
  - Available generator-mounted or remote-mounted
  - 24VDC
- ❑ **Ground Fault Relay** provides a relay output to signal a ground fault is detected.
- ❑ **Input/Output Module** for Kohler Diesel (KD) and Mitsubishi models provides:
  - 16 digital input connections with connection to ground
  - 8 relay output connections (Form C, rated 8A, 240 VAC or rated 0.5 A, 48 VDC)
- ❑ **Input/Output Module** for models other than KD or Mitsubishi provides:
  - 2 analog inputs (0- 5 VDC)
  - 4 digital input connections with connection to ground
  - 14 relay output connections (Form C, rated 10A, 120V)
  - 1 common fault relay output (NO, rated 2A, 24VDC)
- ❑ **Key Switch** to allow selection of RUN, OFF and AUTO modes. Lockable in the AUTO position by removing the key.
- ❑ **Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- ❑ **Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- ❑ **Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

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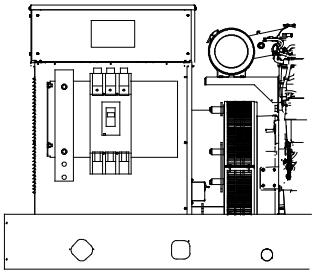
Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

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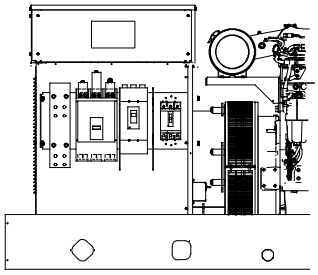
KOHLER

Industrial Generator Set Accessories

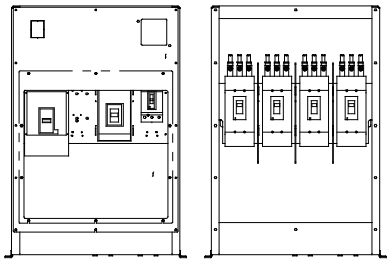
Line Circuit Breakers 15- 3250 kW



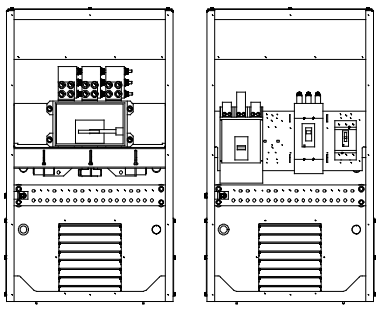
Single Circuit Breaker Kit with Neutral Bus Bar
15- 300 kW Model Shown



Multiple Circuit Breaker Kit with Neutral Bus Bar
180- 300 kW Model Shown



Multiple Circuit Breaker Kits with Neutral Bus Bar
350- 2250 kW Model Shown
(also applies to some 300 kW models)



Circuit Breaker Kits with Neutral Bus Bar
700- 2500 kW KD Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
  - Magnetic trip
  - Thermal magnetic trip
  - Electronic trip
  - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350- 2500 kW models and selected 80- 300 kW models).
- Up to four line circuit breakers can be used on 350- 2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
  - UL 489 Molded Case Circuit Breakers
  - UL 1077 Supplementary Protectors
  - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Magnetic Trip

The magnetic trip features an electromagnet in series with the load contacts and a moveable armature to activate the trip mechanism. When a sudden and excessive current such as a short circuit occurs, the electromagnet attracts the armature resulting in an instantaneous trip.

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory- calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

Electronic Trip

These line circuit breakers use electronic controls and miniature current transformers to monitor electrical currents and trip when preset limits are exceeded.

LI breakers are a combination of adjustable trip functions including long-time ampere rating, long-time delay, and instantaneous pickup. LSI breakers have all of the LI breaker features plus short-time pickup, short-time delay, and defeatable instantaneous pickup. LSIG breakers have all of the LSI breaker features plus ground-fault pickup and delay.

NOTE: MG-frame does not have a long-time delay when selected with LI breakers.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSIG in this document. Models with LSIG compare current flow in phase and neutral lines, and trip when current unbalance exists.

Ground fault trip units are an integral part of the circuit breaker and are not available as field-installable kits. The ground fault pickup switch sets the current level at which the circuit breaker will trip after the ground fault delay. Ground fault pickup values are based on circuit breaker sensor plug only and not on the rating plug multiplier. Changing the rating plug multiplier has no effect on the ground fault pickup values.

80% Rated Circuit Breaker

Most molded-case circuit breakers are 80% rated devices. An 80% rated circuit breaker can only be applied at 80% of its rating for continuous loads as defined by NFPA 70. Circuit conductors used with 80% rated circuit breakers are required to be rated for 100% of the circuit breaker's rating.

The 80% rated circuit breakers are typically at a lower cost than the 100% rated circuit breaker but load growth is limited.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

❑ Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

❑ Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

❑ Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

❑ Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.
15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.
350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

❑ Field Connection Barrier

Provides installer wiring isolation from factory connections.

❑ Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

❑ Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

❑ Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

❑ Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

❑ Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

❑ Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

❑ Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	30	9- 325 A. Mag. Trip	HJ
	50	84- 546 A. Mag. Trip	
	100	180- 1040 A. Mag. Trip	
	150	348- 1690 A. Mag. Trip	
	250	684- 2500 A. Mag. Trip	JJ
	300- 400	Thermal Magnetic	LA
	400	500- 1000 A. Mag. Trip	
		750- 1600 A. Mag. Trip	
		1000- 2000 A. Mag. Trip	
		1125- 2250 A. Mag. Trip	
		1250- 2500 A. Mag. Trip	
		1500- 3000 A. Mag. Trip	
		1750- 3500 A. Mag. Trip	
		2000- 4000 A. Mag. Trip	
	400- 600	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	800	Electronic LI	MG
	1000- 1200	Thermal Magnetic	PG
	800- 1200	Electronic LSI	
		Electronic LSIG	
	1200	Thermal Magnetic	PJ
		Electronic LSI	
		Electronic LSIG	
	1600- 2500	Thermal Magnetic	RJ
		Electronic LSI	
		Electronic LSIG	

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
4M 5M 7M	15- 150	Thermal Magnetic	HD
	60- 150	Electronic LI	HD
		Electronic LSI	
		Electronic LSIG	
	175- 250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
		Electronic LSIG	
	60- 150	Electronic LI	HG
		Electronic LSI	
		Electronic LSIG	
	250	Electronic LI	JG
		Electronic LSI	
		Electronic LSIG	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSIG	
	600- 1200	Electronic LSI	PG
		Electronic LSIG	
	1200	Electronic LSI	PJ
		Electronic LSIG	
	1600- 2500	Electronic LSI	RJ
		Electronic LSIG	
	1600- 3000	Electronic LSI	NW
		Electronic LSIG	

100% Rating Electrically Operated Breakers

For use as paralleling breakers.*

Alt. Model	Amps	Trip Unit	Frame
4M 5M 7M	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSIG	NW

* P-frame breakers can be used with the Decision-Maker® 6000 Controller/DPS System or APM603 controller.
NW breakers are for use with the APM603 only.

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

Gen. Set kW	Alt. Model	Rating, Amperes	Type
350- 2250 kW	4M/ 5M/ 7M	3000	Load Bus

300- 2250* kW Line Circuit Breaker Specifications

* Includes models 300REZXB and 300RZXB. For models 300REOZJ and 300REZXC, see the 15- 300 kW section. For KD model generator sets, see pages 8 and 9.

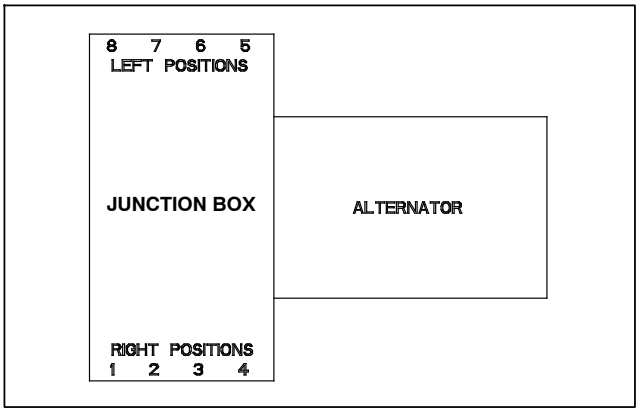
Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LA	42	30	22
LG	65	35	18
MG			
NW	100	100	85
PG	65	35	18
PJ	100	65	25
PL	125	65	25
RJ	100	65	25

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15- 150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200- 250	One 3/0 to 350 kcmil
LA	300- 400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400- 600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
RJ	1600- 2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600- 3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 kcmil

Breaker Positions



NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, HG, J, JG, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.

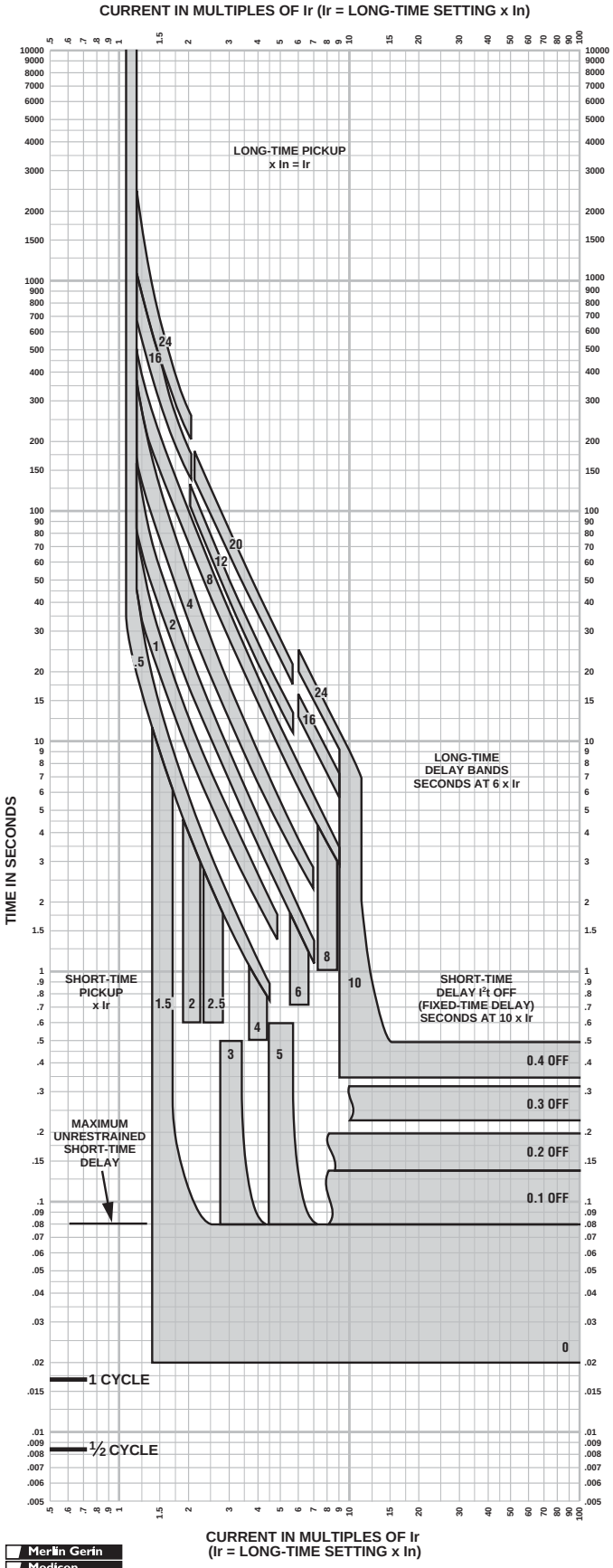
Multiple Circuit Breaker Combinations

Alternator Model	Positions 1 or 5	2 or 6	3 or 7	4 or 8
4M/ 5M/ 7M	H/J			
	H/J	H/J		
	H/J	H/J	H/J	
	H/J	H/J	H/J	H/J
	LA			
	LA	H/J		
	LA	LA		
	LA	H/J	H/J	
	LA	LA	H/J	
	LA	LA	LA	
	LA	H/J	H/J	H/J
	LA	LA	H/J	H/J
	LA	LA	LA	H/J
	LA	LA	LA	LA
	LG			
	LG	H/J		
	LG	LA		
	LG	LG		
	LG	H/J	H/J	
	LG	LA	H/J	
	LG	LA	LA	
	LG	LG	H/J	
	LG	LG	LA	
	LG	LG	LG	
	LG	H/J	H/J	H/J
	LG	LA	H/J	H/J
	LG	LA	LA	H/J
	LG	LA	LA	LA
	LG	LG	H/J	H/J
	LG	LG	LA	H/J
	LG	LG	LA	LA
	LG	LG	LG	H/J
	LG	LG	LG	LA
	LG	LG	LG	LG †
	M/P			
	M/P		H/J	
	M/P		LA	
	M/P		LG	
	M/P		M/P ‡	
	M/P		H/J	H/J
	M/P		LA	H/J
	M/P		LA	LA
	M/P		LG	H/J
	M/P		LG	LA
	M/P		LG	LG †
	R §			
	NW §			
	LOAD BUS KIT §			

† Frame size LG is not available in position 4 with 1219 mm (48 in.) junction box.

‡ Frame sizes M/P are not available in position 3 or 4 with 1219 mm (48 in.) junction box.

§ R breakers, NW breakers, and the load bus kit occupy all four positions on a side.



MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-4

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

Merlin Gerin
Modicon
Square D
Telemecanique
Federal Pioneer
Federal Pacific
Schneider Electric Brands

Schneider Electric

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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

POWERPACT Molded Case Circuit Breakers lead the industry with proven, reliable protection and innovative design. Providing unparalleled performance and control, this generation of P- and R-frame circuit breakers features exclusive MICROLOGIC® Trip Units, which allow for a range of sophisticated applications for metering and monitoring. In addition, units can be interchanged to allow for maximum flexibility and are field-installable for easy upgrades as needed.

The compact P- and R-frame circuit breakers permit smaller footprint and higher density installations using I-LINE® Panelboards and Switchboards. These circuit breakers are available in 100% rated construction up to 2500 A to meet a broad range of commercial and industrial application needs.

Full-Featured Performance

- P-frame – 1200 A available in both standard and 100% ratings with sensor sizes 250–1200 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- R-frame – 2500 A available in both standard and 100% ratings with sensor sizes 600–2500 A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- Compact breaker size allows for smaller footprint installations using I-LINE Panelboards and Switchboards. 9" width on P-frame designs and 15" width on R-frame designs provide increased density installations
- Most field-installable accessories are common to all frame sizes for easier stocking and installation
- Selection of four interchangeable MICROLOGIC Trip Units with POWERLOGIC® power metering and monitoring capabilities available in advanced trip units
- Compatible with POWERLOGIC® systems and high amperage power circuit breakers
- Built-in MODBUS® protocol provides an open communications platform and eliminates the need to purchase additional, proprietary network solutions
- Connection options include bus, cable or I-Line for installation flexibility
- Additional options are available for 5-cycle closing, stored energy mechanisms and draw-out mounting of 1200 A breakers

Merlin Gerin
Modicon
Square D
Telemecanique
Schneider Electric

SQUARE D
Schneider Electric

POWERPACT® P- and R-Frame Molded Case Circuit Breakers
(Standard or 100% rated up to 2500 A)

Onboard Intelligence

For “smarter breakers,” a range of MICROLOGIC® Trip Units provides advanced functionality, such as a communications interface, and power metering and monitoring capabilities. With the appropriate MICROLOGIC Trip Unit, you can communicate with breakers, gather power information, monitor events and remotely control breakers based on predetermined conditions, leading to substantial savings in electrical system operating costs.

These interchangeable, microprocessor-controlled, plug-in devices provide the next generation of protection, measurement and control functions, delivering not only greater electrical system safety but also improved system integration and coordination.



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

- Basic circuit protection including long-time, instantaneous and optional short-time adjustments

MICROLOGIC 3.0A, 5.0A and 6.0A

- Long-time, instantaneous and optional short-time adjustments
- Integrated ammeter and phase loading bar graph
- LED trip indicator
- Zone selective interlocking with downstream and upstream breakers
- Optional ground-fault protection
- Optional MODBUS® communications interface

MICROLOGIC 5.0P and 6.0P

- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS communications interface compatibility with POWERLOGIC® installations
- Standard GF alarm on 5.0P. 6.0P has equipment ground-fault tripping protection

MICROLOGIC 5.0H and 6.0H

- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

Contact your Square D sales representative for additional information. Or, visit www.SquareD.com.

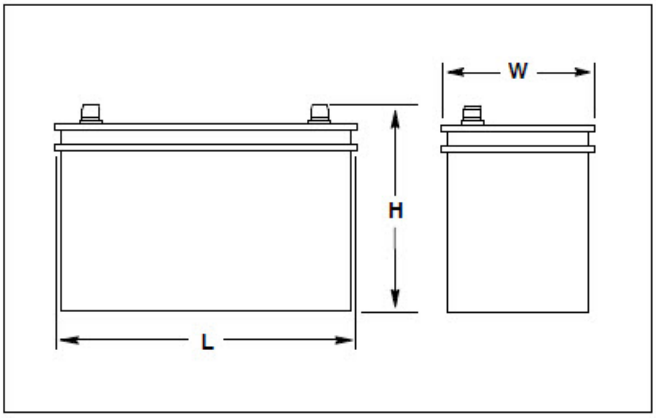
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Order Number 0612HO0201

SQUARE D
Schneider Electric

KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

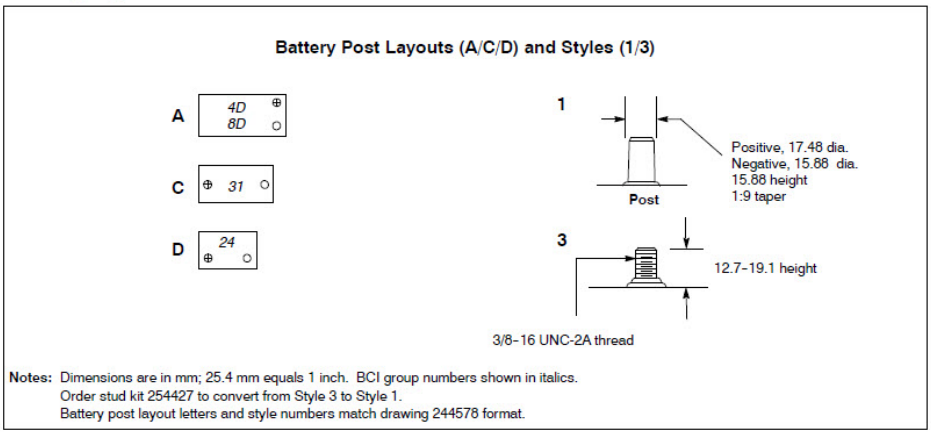


Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Batteries are rated according to SAE standard J-537.
- All batteries are 12-volts. Kits that contain two or four batteries are availabe for 24-volt systems and/or systems with redundant starters.
- Wet- and dry-charged batteries have lead-calcium or lead-antimony plates and use sulferic acide electrolyte. Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0 ° C (32 ° F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18°C (0°F) Min.	Reserve Capacity Minutes at 27° (80°F) Min.	Battery Post Layout and Style
				L	W	H			
Wet	324586	2	31	330.2 (13.0)	173.0 (6.8)	239.8 (9.4)	950	185	C/3

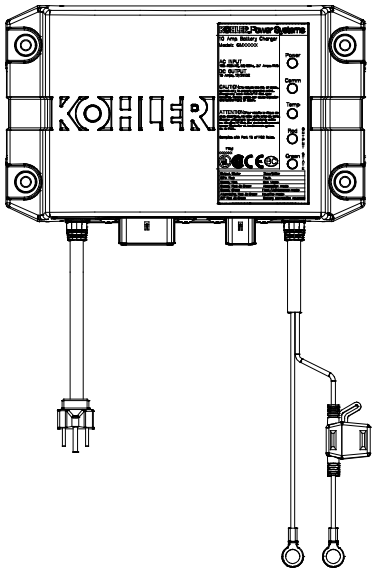
Battery Specifications



KOHLER

Industrial Generator Set Accessories

12/24 Volt, 10 Amp
Automatic Multi-Stage Battery Charger



The battery charger is a fully-automatic, high efficiency battery charger that charges batteries rapidly and safely. The battery charger is designed for an industrial environment.

The battery charger is designed for operation with an engine cranking battery.

The battery charger is universal voltage input capable, comes with a standard 120 V/60 Hz AC plug, and charges 12 VDC or 24 VDC battery systems.

Five LED lights indicate power, communication status, temperature compensation status, charge curve, and charger status.

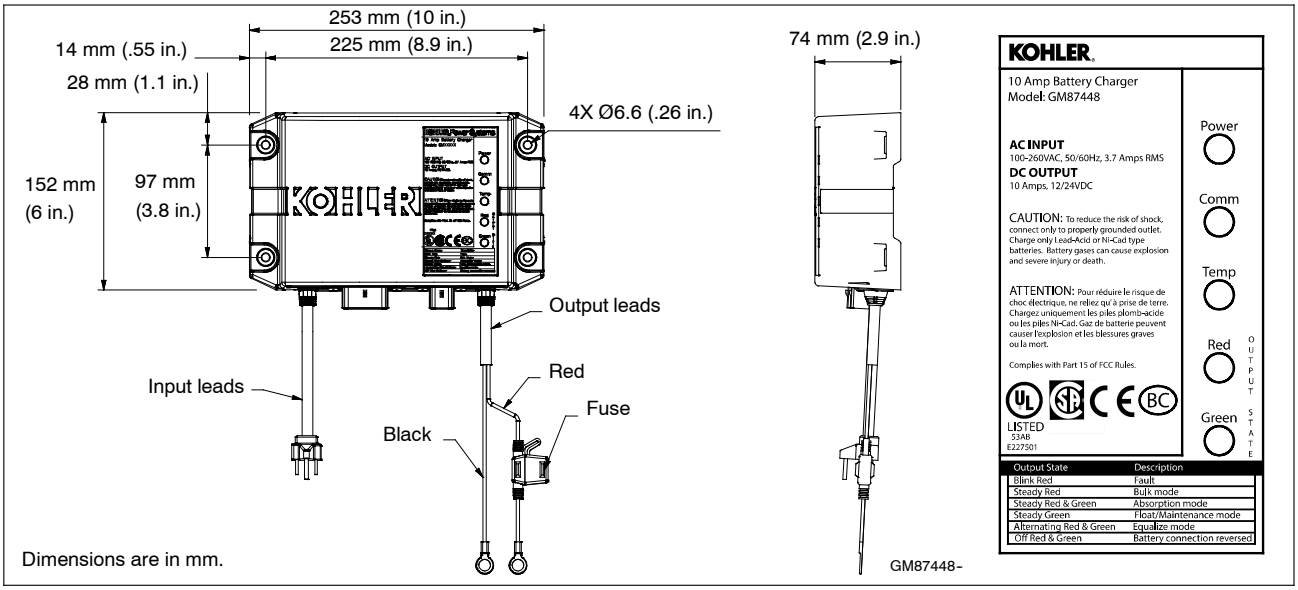
With the optional battery temperature sensor connected, the battery charger can adjust output voltages for optimal charging.

Standard Features

- 12 or 24 VDC output
  - Automatic voltage detection
- Automatic multi-stage charging modes
  - Recovery charge
  - Bulk charge
  - Absorption charge
  - Float charge
  - Equalize charge
- Charges the following type batteries:
  - Flooded lead acid (FLA)
  - AGM
  - Gel cell
  - High performance AGM
  - Nickel-cadmium (NiCad)
- 5 LED status indicators
- Durable potted assembly for waterproofing and vibration resistance
- Reverse-polarity protection
- Short-circuit protection
- Electronically limited output current
- Optional temperature compensation (FLA only)
- User adjustable parameters to support optimal manufacturer recommended charge curve.
- Code compliance:
  - UL 1236 Listed
  - NFPA 110, Level 1 compatible (when used with Kohler controller and connected to engine harness)
  - CSA - C22.2 No. 107.2-01
  - FCC - Title 47, Part 15 Class A
  - CE
  - IBC 2015
  - OSHPD

DC Output		AC Input			Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps	**Overall Dimensions** W x D x H	kgs	lbs
12/24	10	100-260	3.7	253 mm x 152 mm x 74 mm (10.0 in x 6.0 in x 2.9 in)	3.6	7.9

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com



Specifications

AC Input	100–260 VAC
Frequency Input	50/60 Hz
DC Output	10 Amps @ 12 VDC or 10 Amps @ 24 VDC (On battery voltage regulation ±1%; current is electronically limited
Fuse Protection	15 amps ATC
Battery Types	Flooded Lead Acid (FLA) AGM Gel Cell High Performance AGM Nickel–Cadmium (NiCad)
Monitoring	
LED Indications	Power Communication Temperature compensation Output charger curve and charger status: ○ Red ○ Green
Environmental	
Operating	-20° to 70°C (-4° to 158° F)
Storage	-40° to 85°C (-40° to 185° F)
Relative Humidity	5 to 95% (non-condensing)
Salt Spray Testing	ASTM B117
Corrosion Resistant	From battery gases

Enclosure	
Environmental Resistant	From rain, snow, dust, and dripping water
Battery Connections	
Lead Length	1.8 m (6 ft.) red and black leads
Battery Connections	9.5 mm (3/8 in.) ring terminals
AC Power Connections	
Lead Length	1.8 m (6 ft.)
Storage	Standard US style 3-prong AC plug
Available Options	
Temperature compensation	

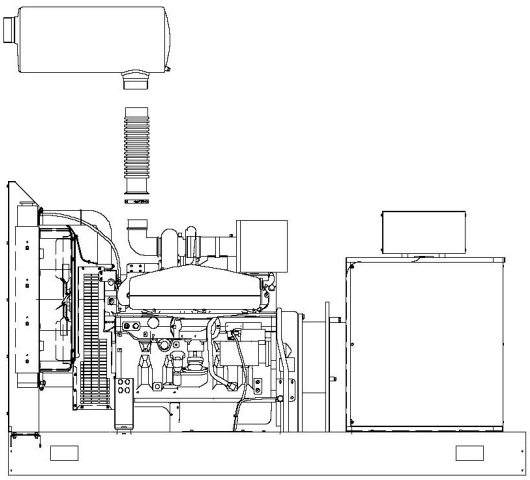
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KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

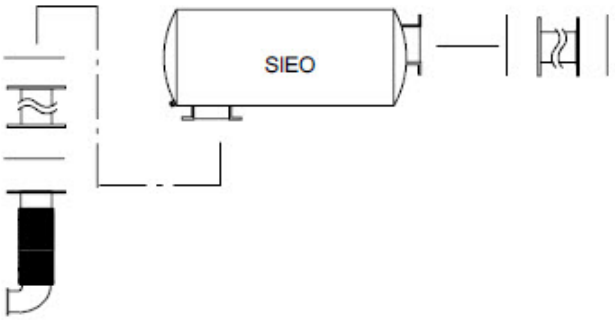


Kohler Co. offers silencers rated for hospital, critical, residential, and industrial applications and stainless steel flexible exhaust connectors for unhoused generator sets. The accessories described in this spec sheet apply to open units unless otherwise stated. These silencers withstand exhaust flow pressure and temperature without creating excessive engine backpressure.

Silencer Type	Noise Reduction dB(A)	Ambient Noise Level	Silencing Requirement
Critical	25-35	Low	High

Backpressure Considerations

Consult the generator set spec sheet to determine the maximum allowable exhaust backpressure. Add the backpressure produced by the silencer and exhaust piping together to determine the total exhaust system backpressure. Contact an authorized distributor/dealer to calculate backpressure in exhaust piping. Do not exceed the maximum allowable backpressure.



Legend

Use the information below for identifying the exhaust system components shown in the illustrations on the following pages.

Side Inlet End Outlet (SIEO)



End Inlet End Outlet (EIEO)



Flex Exhaust



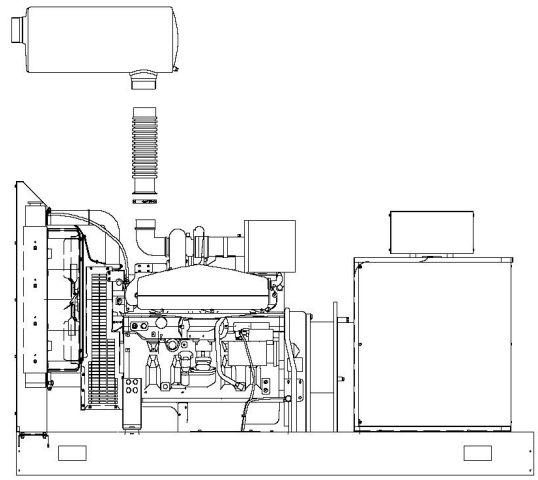
Flex Exhaust (wye)

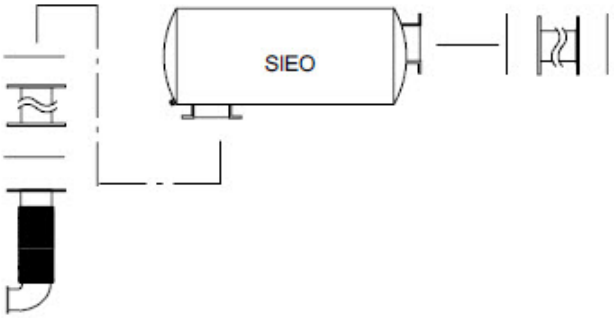


Exhaust System Kits	Qty. in Kit	Size, In/Out	Note
Critical Silencer SIEO	1	10"	

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Use the illustrations on the following pages to select the available silencer type and exhaust system configuration best suited for your application. Refer to your authorized distributor/dealer for silencer and component kit numbers and for silencer dimensions.

Backpressure Considerations

Consult the generator set spec sheet to determine the maximum allowable exhaust backpressure. Add the backpressure produced by the silencer and exhaust piping together to determine the total exhaust system backpressure. Contact an authorized distributor/dealer to calculate backpressure in exhaust piping. Do not exceed the maximum allowable backpressure.

Legend

Use the information below for identifying the exhaust system components shown in the illustrations on the following pages.

Side Inlet End Outlet (SIEO)



End Inlet End Outlet (EIEO)



Flex Exhaust



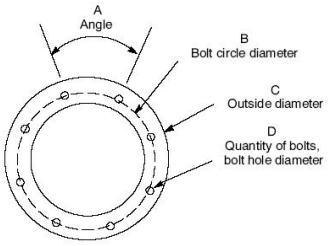
Flex Exhaust (wye)



Exhaust System Kits	Qty. in Kit	Size, In/Out	Note
Flex Exhaust 10"	1	-	Kit includes mounting hardware.

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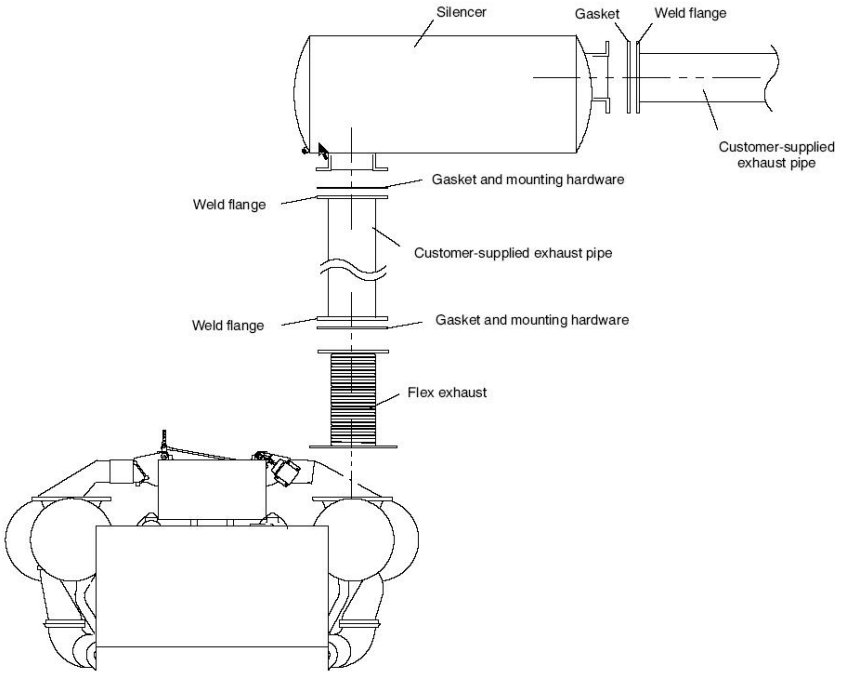


Weld Flange Dimensions

Weld Flange Kits

Use the weld flange kit to connect the exhaust silencer to customer-supplied exhaust pipe. One weld flange kit includes two exhaust flanges, two gaskets, and the mounting hardware.

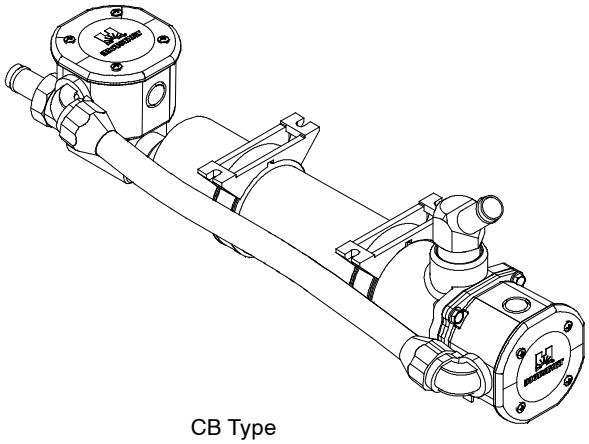
ANSI Class 150 Flange Dimensions				
Nominal Pipe Size, in.	A	B	C	D
	Deg.	mm (in.)	mm (in.)	Qty., mm (in.)
10"	30	361.95 (14.25)	406.4 (16.0)	12, 25.40 (1.00)



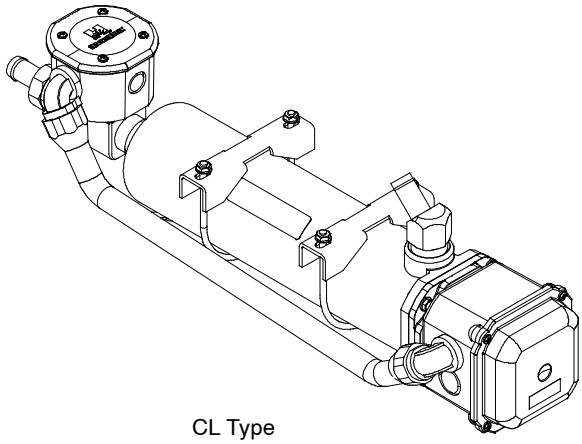
KOHLER®

Industrial Generator Set Accessories

Engine Block Heater Kits



CB Type



CL Type

Block Heater Kit, Typical

Applicable Models

- 180- 200RZXB
- 180- 200REZXB
- 230- 275REOZJE
- 300- 500REOZJ
- 350- 500REOZJB
- 350- 500REOZJC
- 350- 400REOZJD
- 500REOZVC
- 550- 600REOZVB

Standard Features

- UL- C/US listed
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

Description

The engine block heater kit heats the engine coolant in cold ambient, warming the cylinders, oil, and charge air circuit which all help to give a faster starting time. The engine block heater uses thermosiphon action to circulate warm coolant into the engine and supplies constant heating to the engine. The engine block heater helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 27°C (80°F) and turns OFF when the engine coolant temperature reaches 38°C (100°F).

The engine block heater kit is recommended for ambient temperatures below 10°C (50°F).

The engine block heater kits are available in 120 V, 208 V, 240 V, and 480 V versions.

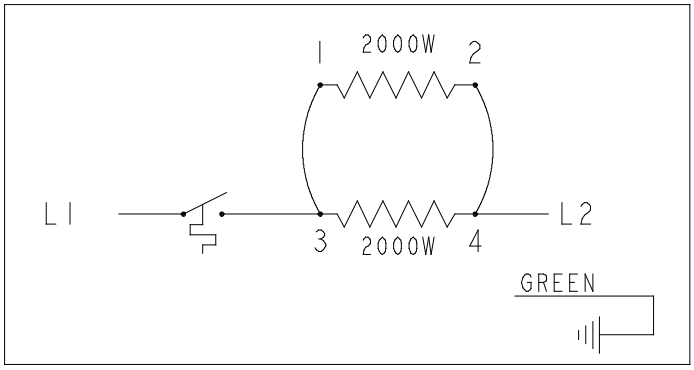
Block Heater Specifications

Heating Fluid	Water, Coolant Mix (50% Glycol/50% Water)
Thermostat Temperature Range	27°- 38°C (80°- 100°F)
Temperature High Limit	96°C (205°F)
Max. Pressure	125 psi (860 kPa)
Inlet/Outlet Plumbing	1 in. NPT
System Ingress	NEMA 4

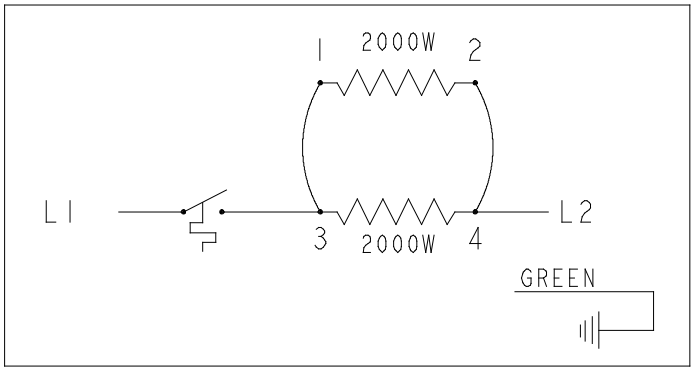
Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase
GM75809- KA1	GM76113	2500	90- 120	1
GM75809- KA2	GM76114	2500	190- 208	1
GM75809- KA3	GM76115	2500	210- 240	1
GM75809- KA4	GM76116	2500	380- 480	1
GM76120- KA1	GM76113	2500	90- 120	1
GM76120- KA2	GM76114	2500	190- 208	1
GM76120- KA3	GM76115	2500	210- 240	1
GM76120- KA4	GM76116	2500	380- 480	1
GM79186- KA1	GM79182	4000	190- 208	1
GM79186- KA2	GM79183	4000	210- 240	1
GM79186- KA3	GM79184	4000	380- 480	1
GM79186- KP1	GM79182	4000	190- 208	1
GM79186- KP2	GM79183	4000	210- 240	1
GM79186- KP3	GM79184	4000	380- 480	1
GM79187- KA1	GM79182	4000	190- 208	1
GM79187- KA2	GM79183	4000	210- 240	1
GM79187- KA3	GM79184	4000	380- 480	1
GM79187- KP1	GM79182	4000	190- 208	1
GM79187- KP2	GM79183	4000	210- 240	1
GM79187- KP3	GM79184	4000	380- 480	1
GM84820- KA1	GM76113	2500	90- 120	1
GM84820- KA2	GM76114	2500	190- 208	1
GM84820- KA3	GM76115	2500	210- 240	1
GM84820- KA4	GM76116	2500	380- 480	1

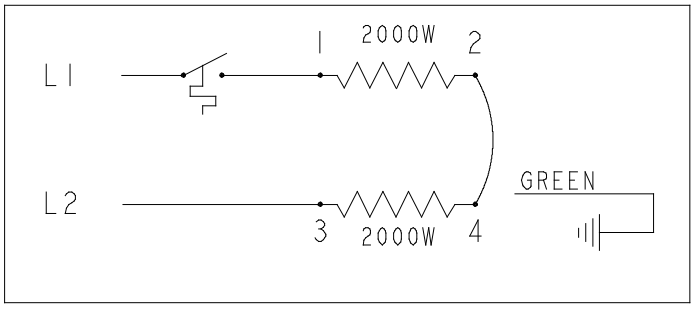
Wiring Diagram



208 VAC single phase- parallel



240 VAC single phase- parallel



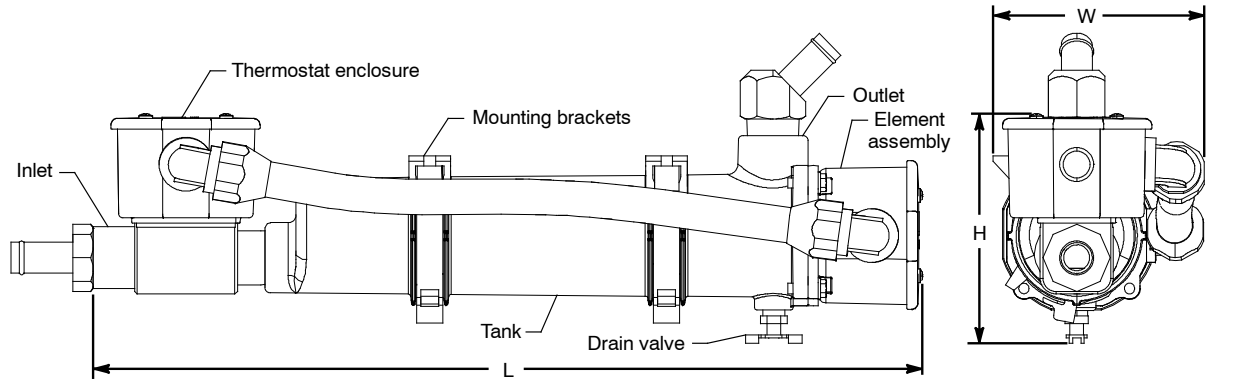
480 VAC single phase- parallel

GM79182

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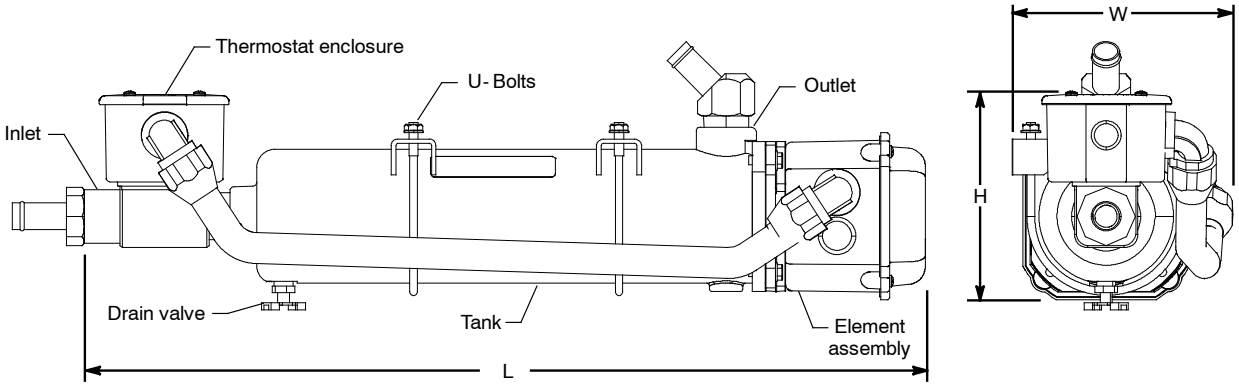
Dimensions and Weights

CB type block heater size, L x H x W, mm (in):	510 x 132 x 129 (20.1 x 5.2 x 5.1)
CL type block heater size, L x H x W, mm (in):	597 x 147 x 158 (23.5 x 5.8 x 6.2)
CB type block heater weight, kg (lb):	3 (6.9)
CL type block heater weight, kg (lb):	4.5 (10)



CB type

GM76113



CL type

GM79182

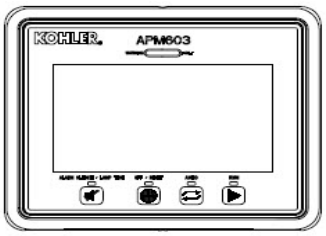
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KOHLER®

Integral Voltage Regulator with Kohler® APM603 Controllers and Menu-Driven Selections (80-4000 kW Generator Set Models)



APM603 Controller with Integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented high speed digital voltage regulator design providing ± 0.25% no-load to full-load regulation using root-mean-square (RMS) voltage sensing.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM603

Calibration	Range Settings	Default Selection
Voltage Adjustment	± 10% of System Voltage	System Voltage
Controller Gain	40 to 70 Hz	P: 1.3 I: 1.0 D: 0.25
Underfrequency Unload or Frequency Setpoint	40 to 70 Hz	0.5 Hz Below System Frequency (ECM)
Underfrequency Unload Scope	0-10% of System Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	-50% to 110%	0 kVAR
PF Adjust Control	-0.50 to 1.0 to 0.50	0.8 Lagging
VAR/PF Gain Adjustment	P: 0.3 to 3.00 I: 0.3 to 3.00 D: 0.3 to 3.00	P: 1.0 I: 1.0 D: 0.25

KOHLER®

Specification/Feature	Integral with APM603
Generator Set Availability	80-4000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40 ° C to 70 ° C (-40 ° F to 158 ° F)
Storage Temperature	-40 ° C to 85 ° C (-40 ° F to 185 ° F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-600 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5.0 ADC with GM88453 Activator Board
Maximum Output	7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	± 0.25%
Thermal Drift	<0.5% (-40 ° C to 70 ° C) [-40 ° F to 158 ° F] Range
Response Time	3-phase: 1 mS 1-phase: 5 mS
System Voltage Adjust.	± 10%
Voltage Adjustment	Controller Display
Remote Voltage Adjustment	Analog 0-5 VDC (± 10%) Input Optional
Paralleling Capability	Full Load Share and Control plus Reactive Droop

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can control Fast Response™ II, Fast Responset™X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

- Voltage Regulator Configuration
  - Under Frequency Unload Settings
  - Single and Three Phase Sensing
  - Voltage Target
  - Voltage Regulator Gains

Paralleling Settings, APM603

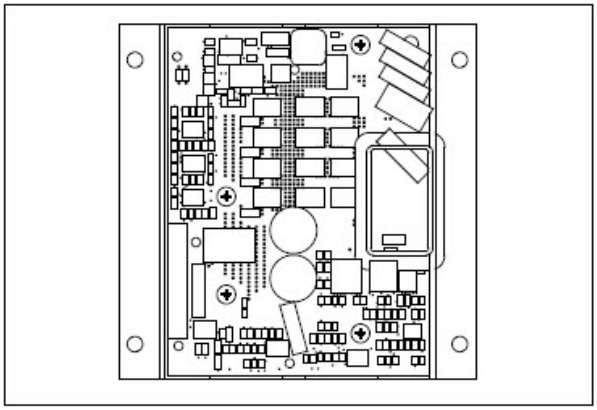
- Synchronizing parameters setup
  - Voltage matching
  - Frequency matching
  - Phase matching
  - Time delay
- Load sharing
  - kW sharing
  - kVAR sharing
  - Baseload settings
  - Droop

Paralleling Metering, APM603

- Paralleling State
- Paralleling Mode
- System Voltage
- System Frequency
- Connected Generators
- Sync Status
- Engine Speed

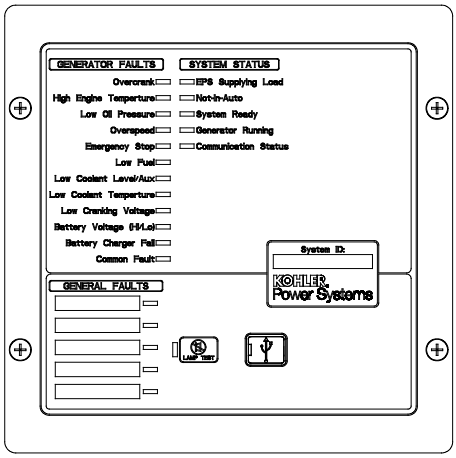
VAR/PF Control Input	VAR Control Mode, PF Control Mode, System VAR Control, System PF Control

Activator Board GM88453

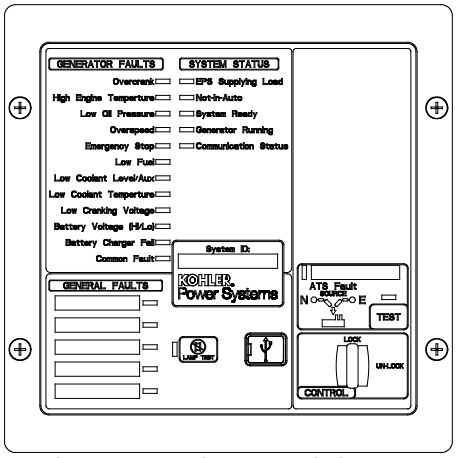


- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

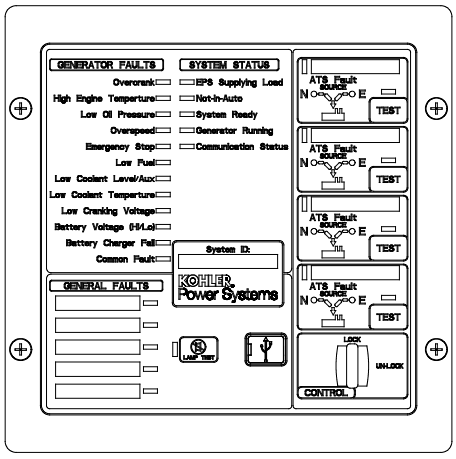
Modbus® is a registered trademark of Schneider Electric.



RSA III



RSA III with a Single ATS Control



RSA III with Four ATS Controls

Remote Serial Annunciator III (RSA III) for Kohler® Controllers

- Monitors the generator set equipped with one of the following controllers:

APM402	Decision-Maker® 3000
APM603	Decision-Maker® 3500
APM802	Decision-Maker® 6000
Decision-Maker® 3+	Decision-Maker® 8000
Decision-Maker® 550	KPC 1000

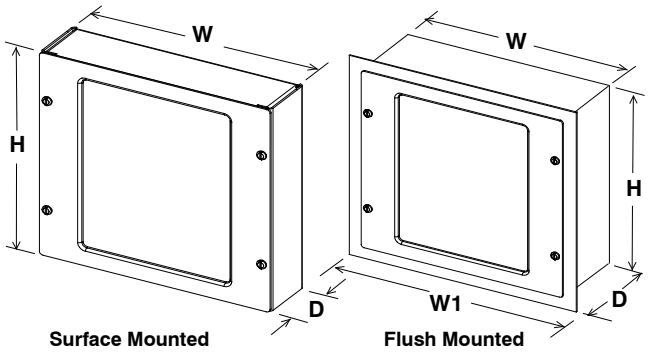
- Allows monitoring of the common alarm, remote testing of the automatic transfer switch, and monitoring of the normal/emergency source for up to four ATS with any of the following controllers:
  - Decision-Maker® MPAC® 750, 1200, and 1500
  - MPAC® 1000 and 1500
- Configuration via a personal computer (PC) software.
- Writable surfaces (white boxes in illustrations) for user-defined selections.
- Uses Modbus® RTU protocol.
- Controller connections:
  - RS-485 for serial bus network
  - USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
  - 12-/24-volt DC power supply
  - 120/208 VAC power supply (available accessory)
- Meets the National Fire Protection Association Standard NFPA 110, Level 1.

Dimensions

- Dimensions—W x H x D, mm (in.).
  - **Surface Mounted:**
    203 x 203 x 83 (8.0 x 8.0 x 3.3)
  - **Flush Mounted (Inside Wall):**
    203 x 203 x 76 (8.0 x 8.0 x 3.0)
    Flush mounting plate W1: 254 (10.0)

* SiteTech™ software is available to Kohler authorized distributors and dealers.

Modbus® is a registered trademark of Schneider Electric.



Surface Mounted **Flush Mounted**

Fault and Status Conditions	Fault LEDs	Fault Horn	System Ready LED	Generator Running LED	Communication Status LED
Overcrank Shutdown	Red	On	Red	Off	Green
High Engine Temperature Warning *	Yellow	On	Red	Green	Green
High Engine Temperature Shutdown	Red	On	Red	Off	Green
Low Oil Pressure Warning *	Yellow	On	Red	Green	Green
Low Oil Pressure Shutdown	Red	On	Red	Off	Green
Overspeed Shutdown	Red	On	Red	Off	Green
Emergency Stop *	Red	On	Red	Off	Green
Low Coolant Level/Aux. Shutdown	Red	On	Red	Off	Green
Low Coolant Temperature *	Yellow	On	Red	Off	Green
Low Cranking Voltage	Yellow	On	Red	Off	Green
Low Fuel—Level or Pressure *	Yellow	On	Red	Green or Off	Green
Not-In-Auto	Red	On	Red	Green or Off	Green
Common Fault	Red	On	Green	Green or Off	Green
Battery Charger Fault (1) *	Yellow	On	Red	Green or Off	Green
Battery Charger Fault (2) *	Yellow	On	Green	Green or Off	Green
High Battery Voltage *	Yellow	Off	Green	Green or Off	Green
Low Battery Voltage *	Yellow	Off	Green	Green or Off	Green
User Input #1 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #1 (Shutdown)	Red	On	Green	Off	Green
User Input #2 (Warning)	Yellow	Off	Green	Green or Off	Green
User Input #2 (Shutdown)	Red	On	Green	Off	Green
User Input #3 (Warning) (1) †	Yellow	Off	Green	Green or Off	Green
User Input #3 (Shutdown) (1) †	Red	On	Green	Off	Green
User Input #4 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #4 (Shutdown) (1)	Red	On	Green	Off	Green
User Input #5 (Warning) (1)	Yellow	Off	Green	Green or Off	Green
User Input #5 (Shutdown) (1)	Red	On	Green	Off	Green
EPS Supplying Load	Yellow	Off	Green	Green	Green
Communications Status (Fault mode)	—	Off	Green or Red	Green or Off	Red
ATS Fault (RSA III with ATS Controls only)	Red	On	Red or Yellow	Green or Off	Green

Green LEDs appear as steady on when activated.
Yellow LEDs slow flash when activated except steady on with EPS supplying load and high battery voltage.
Red LEDs slow flash when activated except fast flash with loss of communication and not-in-auto.

Specifications

- LED indicating lights for status, warning, and/or shutdown.
- Power source with circuit protection: 12- or 24-volt DC
- Power source with120/208 VAC, 50/60 Hz adapter (option)
- Power draw: 200 mA
- Humidity range: 0% to 95% noncondensing
- Operating temperature range: - 20°C to +70°C (- 4°F to +158°F)
- Storage temperature range: - 40°C to +85°C (- 40°F to +185°F)
- Standards:
  - NFPA 110, level 1
  - UL 508 recognized
  - CE directive
  - NFPA 99
  - ENS 61000- 4- 4
  - EN6II-4-4 fast transient immunity
- RS-485 Modbus® isolated port @ 9.6/19.2/38.4/57.6 kbps (default is 19.2 kbps)
- USB device port
- NEMA 1 enclosure

(1) All generator set controllers except Decision-Maker® 3+ controller.
(2) Decision-Maker® 3+ controller only.
* May require optional kit or user-provided device to enable function and LED indication.
† Digital input #3 is factory-set for high battery voltage on the Decision-Maker® 3+ controller.
Modbus® is a registered trademark of Schneider Electric.

ATS Controls (RSA III with ATS controls only)

- ATS position LED (normal or emergency)
- Power source indicator LED (normal or emergency)
- ATS fault LED
- Key-operated lock/unlock switch for Test feature
- Test pushbutton

NFPA Requirements

- NFPA 110 compliant
- Engine functions:
  - High battery voltage warning *
  - High engine temperature shutdown
  - High engine temperature warning *
  - Low battery voltage warning *
  - Low coolant level/aux. shutdown
  - Low coolant temperature warning *
  - Low cranking voltage
  - Low fuel warning (level or pressure) *
  - Low oil pressure shutdown
  - Low oil pressure warning *
  - Overcrank shutdown
  - Overspeed shutdown
- General functions:
  - Audible alarm silence
  - Battery charger fault *
  - Lamp test
  - Master switch not-in-auto

Fault and Status LEDs and Lamp Test Switch

Alarm Horn. Horn sounds giving a minimum 90 dB at 0.1 m (0.3 ft.) audible alarm when a warning or shutdown fault condition exists except on high/low battery voltage or EPS supplying load.

Alarm Silenced. Red LED on lamp test switch lights when alarm horn is deactivated by alarm silence switch.

Alarm Silence Switch. Lamp test switch quiets the alarm during servicing. The horn will reactivate upon additional faults.

ATS Fault. Red LED lights when ATS fails to transfer.

Battery Charger Fail. LED lights if battery charger malfunctions. Requires battery charger with alarm contact.

Battery Voltage Hi/Lo. LED flashes if battery or charging voltage drops below preset level. LED lights steady if battery voltage exceeds preset level.

Common Fault. LED lights when a single or multiple common faults occur.

Communication Status. Green LED lights indicating annunciator communications functional. Red LED indicates communication fault.

EPS Supplying Load. LED lights when the Emergency Power System (EPS) generator set is supplying the load (APM402, APM603, APM802, and Decision-Maker® 550, 3000, 3500, 6000, and 8000 controllers) or when transfer switch is in the emergency position (Decision-Maker® 3+ controller).

Emergency Stop. LED lights and engine stops when emergency stop is made. May require a local emergency stop switch on some Decision-Maker® 3+ controllers.

Generator Running. LED lights when generator set is in operation.

High Engine Temperature. Red LED lights if engine has shut down because of high engine coolant temperature. Yellow LED lights if engine coolant temperature approaches shutdown range. Requires warning sender on some models.

Lamp Test (Switch). Switch tests all the annunciator indicator LEDs and horn.

Low Coolant Level/Aux. LED lights when engine coolant level is below acceptable range on radiator-mounted generator sets only. When used with a Decision-Maker® 3+ controller, the LED indicates low coolant level or an auxiliary fault shutdown. Requires user-supplied low coolant level switch on remote radiator models.

Low Coolant Temperature. LED lights if optional engine block heater malfunctions and/or engine coolant temperature is too low. Requires prealarm sender on some models.

Low Cranking Voltage. LED lights if battery voltage drops below preset level during engine cranking.

Low Fuel (Level or Pressure). LED lights if fuel level in tank approaches empty with diesel models or fuel pressure is low on gas models. Requires customer-supplied switch.

Low Oil Pressure. Red LED lights if generator set shuts down because of insufficient oil pressure. Yellow LED lights if engine oil pressure approaches shutdown range. Requires warning sender on some models.

Not In Auto. LED lights when the generator set controller is not set to automatic mode.

Overcrank. LED lights and cranking stops if engine does not start in either continuous cranking or cyclic cranking modes.

Overspeed. LED lights if generator set shuts down because of overspeed condition.

System Ready. Green LED lights when generator set master switch is in AUTO position and the system senses no faults. Red LED indicates system fault.

User-Defined Digital Inputs #1-#5. Monitors five digital auxiliary inputs (can be configured as warnings or shutdowns). User-defined digital inputs are selected via the RSA III master for local or remote (generator set or ATS). The user-defined digital input can be assigned via PC using SiteTech™ setup software.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Accessories

- ❑ Power source adapter kit 120/208 VAC, 50/60 Hz.
- ❑ Modbus®/Ethernet converter GM41143-KP2 for serial to Ethernet communication.
- ❑ Communication module GM32644-KA1 or GM32644-KP1 is required with Decision-Maker® 3+ controllers.

Modbus® is a registered trademark of Schneider Electric.

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

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KOHLER®

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Transfer Switch Standard Features

- UL 1008 listed file #E58962 (automatic), #E86894 (non automatic)
- CSA certification available
- IBC seismic cerfiticaion available
- Available in 2, 3, or 4 pole configurations
- Electrically operated, mechanically held mechanism
- High withstand amd close-on ratings
- Design suitable for emergency and standby applications on all classes of load, 100% tungsten rated through 400 amps
- Silver alloy main contacts
- Gold-flashed engine start contacts rated 2 amps @ 30 VDC/250 VAC
- Front-accessible contacts for easy inspection
- Front-replaceable main and arcing contacts (800-1200 amps)
- Reliable, field-proven solenoid mechanism
- Switching mechanisms lubricated for the expected life of the transfer switch
- Internal manual operating handle
- Main shaft auxiliary position-indicating contacts rated 10 amps @ 32 VDC/250 VAC
- NEMA type 1, 12, 3R, 4 and 4X enclosures available
- Standard one-year limited warranty. Extended limited warranties are available.
- Standard-transition operation with either automatic or non-automatic control
- Standard-transition transfer time less than 100 milliseconds (6 cycles @ 60 Hz)
- Double-throw, mechanically interlocked design (break-before-make power contacts)
- Solid, switched, or overlapping (make-before-break) neutral

Decision-Maker® MPAC 1200 Controller



- LCD display, 4 lines x 20 characters, backlit
- Complete programming and viewing capability at the door using the keypad and LCD display
- LED indicators: Source available, transfer switch position, service required (fault), and "not in auto"
- Programmable voltage and frequency pickup and dropout settings
- Programmable time delays
- Programmable generator exerciser
- Time-based load control
- Two programmable inputs and two programmable outputs
- Up to four I/O extension modules available
- Modbus communication standard
- RS-485 communication standard
- Ethernet communication optional: For more information about Decision-Maker® MPAC 1200 features and functions, see specification sheet G11-127.

Environmental Specifications	
Operating Temperature	-20 ° C to 70 ° C (-4 ° F to 158 ° F)
Storage Temperature	-40 ° C to 85 ° C (-40 ° F to 185 ° F)
Humidity	5% to 95% noncondensing

Input and Output Connection Specifications	
Component	Wire Size Range
Main board I/O terminals	#12-24 AWG
I/O module terminals	#14-24 AWG

Auxiliary Position Indication Contacts (rated 10 Amps @ 32 VDC/250 VAC)	
Switch Rating, amps	Number of Contacts Indicating Normal, Emergency
600	8, 8

Weights and Dimensions

See ADV drawings for weights and dimensions. Allow 15% additional weight for packing materials.

UL-Listed Solderless Screw-Type Terminals for External Power Connections			
Range of Wire Sizes, Copper or Aluminum*			
Switch Rating, Amps	Normal, Emergency, and Load	Neutral	Ground
600	(2) #2 AWG to 600 KCMIL	(6) #2 AWG to 600 KCMIL	(3) #4 AWG to 600 KCMIL or (6) 1/0 to 250 KCMIL
* Use 75 degrees C minimum Cu/Al wire for power connections			

Withstand and Close-On Ratings (WCR)
Ratings Summary

The transfer switch is rated for use on a circuit capable of delivering not more than the RMS symmetrical amperes listed at the specified maximum voltage below, but no greater than the interrupt capacity of the selected circuit breaker or fuse. Circuit breakers and fuses are supplied by the customer.

	Withstand and Close-On Ratings (WCR) Standard, Programmed, and Closed-Transition Models									
	Current Limiting Fuses				Specific Coordinated Breaker			Time-Based Rating		
Switch Rating, Amps	Fuse Class	Max Amps	480 VAC	600 VAC	240 VAC	480 VAC	600 VAC	Time sec.	480 V Max.	600 V. Max
600	J	600	200000	200000	65000	50000	42000	0.05	22000	22000
600	L	800	200000	200000	65000	50000	42000	0.05	22000	22000

Ratings with Specific Manufacturer's Circuit Breaker

Withstand and close-on ratings (WCR) in RMS symmetrical amperes for specific manufacturers' circuit breakers.

Molded-Case Circuit Breakers					
Switch Rating, Amps	WCR, Amps, RMS	Voltage, Max.	Manufacturer	Type	Max. Size, Amps
600	65000	240	General Electric	THQMV	225
600	65000	240	General Electric	SGL1, SGL4, SGL6, SGP1, SGP4, SGP6	600
600	65000	240	Eaton/Cutler Hammer	LDC, CLDC, HLD, CHLD	600
600	65000	240	Siemens/ITE	HLD6, HLXD6	600
600	65000	240	Square D	QG, QJ	250
600	65000	240	Square D	LJ, LL, LR	600
600	50000	480	Eaton/Cutler Hammer	JGH, JGC, HFG, LFG	250
600	50000	480	Eaton/Cutler Hammer	HLD, CHLD, LDC, CLDC, LGH*, LGC*, LGU*, LGX*	600
600	50000	480	Eaton/Cutler Hammer	MDL, CMDL, HMDL, CHMDL, NGS, NGH, NGC, NGU, MDLB, CMDLB, NF	800
600	50000	480	General Electric	TBC6, TJL4V, TJL1S- 6S, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGN, FGH, FGL, FGP	600
600	50000	480	General Electric	TBC8, TKL4V, TKH8S- 12S, TKL8S- 12S, SKH8, SKL8, SKP8, TB8	800
600	50000	480	General Electric	SKL12, SK12P	1200
600	50000	480	Siemens/ITE	HLD6, HLXD6, SHLD6, HHLD6, HHLXD6, CLD6, SCLD6, HLG, LLG	600
600	50000	480	Siemens/ITE	LMD6, LMXD6, HLMD6, HLMXD6, MD6, MXD6, HMD6, HMXD6, SMD6, SHMD6, CMD6, SCMD6, HMG, LMG	800
600	50000	480	Siemens/ITE	HND6, HNXD6, SND6, SHND6, ND6, NXD6, HNG, LNG, CND6	1200
600	50000	480	Square D	LC, DJ, DL, LI, NSJ600	600
600	50000	480	Square D	CK800N, CK800NN, MJ	800
600	50000	480	Square D	MH, CK1200N, CK1200NN, CK1200H, CK1200HH, NT- H, NT- L1, NT- L, NT- LF, PK, PJ, PL	1200
600	50000	480	Square D	CM2000HH	2000
600	50000	480	Square D	CM2000HH	2500
600	42000	600	Eaton/Cutler Hammer	JGC	250

600	42000	600	Eaton/Cutler Hammer	TBC4	400
600	42000	600	Eaton/Cutler Hammer	LDC, CLDC	600
600	42000	600	General Electric	TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP	600
600	42000	600	General Electric	TBC8, TKL4V, TKL8S- 12S, SKL8, SKP8	800
600	42000	600	General Electric	SKL12, SKP12	1200
600	42000	600	Siemens/ITE	HHLD6, HHLXD6, CLD6, SCLD6	600
600	42000	600	Siemens/ITE	HLMD6, HLMXD6, HMXD6, SHMD6, HMD6, CMD6, SCMD6, LMG	800
600	42000	600	Siemens/ITE	HND6, HNXD6, HNG, LNG, SHND6	1200
600	42000	600	Square D	LI	600
600	42000	600	Square D	CK800H, CK800HH	800
600	42000	600	Square D	CK1000HL	1000
600	42000	600	Square D	CK1200H, CK1200HH, NT- H, NT- L, NT- LF, NT- L1, MasterPact STR, 28D, PK	1200

Codes and Standards

The ATS meets or exceeds the requirements of the following specifications:

- Underwriters Laboratories UL 1008, Standard for Automatic Transfer Switches for Use in Emergency Standby Systems file #E58962 (automatic), #E86894 (nonautomatic)
- CSA C22.2 No. 178 certification 208-600 VAC available, file #LR58301
- NFPA 70, National Electrical Code
- NFPA 99, Essential Electrical Systems for Health Care Facilities
- NFPA 110, Emergency and Standby Power Systems
- IEEE Standard 446, IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- NEMA Standards ICS 10-2005, Electromechanical AC Transfer Switch Equipment
- EN61000-4-4 Fast Transient Immunity Severity Level 4
- IEC 609047-6-1, Low Voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment
- EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- IEC Spedifications for EMI/EMC Immunity:
    - CISPR 11, Radiated Emissions
    - IEC 1000–4–2, Electrostatic Discharge
    - IEC 1000–4–3, Radiated Electromagnetic Fields
    - IEC 1000–4–4, Electrical Fast Transients (Bursts)
    - IEC 1000–4–5, Surge Voltage
    - IEC 1000–4–6, Conducted RF Disturbances
    - IEC 1000–4–8, Magnetic Fields
    - IEC 1000–4–11, Voltage Dips and Interruptions
- IEEE 472 (ANSI C37.90A) Ring Wave Test
- Seismic certification in accordance with the International Building Code is available. (Accessory kit is required for seismic certification)
    - IBC 2000, referencing ASCE 7-98 and ICC AC-156
    - IBC 2003, referencing ASCE 7-02 and ICC AC-156
    - IBC 2006, referencing ASCE 7-05 and ICC AC-156
    - IBC 2009, referencing ASCE 7-05 and ICC AC-156
    - IBC 2012, referencing ASCE 7-10 and ICC AC-156

Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

Padlockable User Interface Cover

- With or without window
- Cover without window standard on NEMA 3R enclosures

Accessory Modules

The mounting kit holds up to five optional modules. The maximumtotal current draw is 300 mA. If an External Battery Module isinstalled, there is no current restriction.

- Alarm Module
- External Battery Supply Module
- Standard I/O Module
- High Power I/O Module

Supervised Transfer Control Switch

- Auto, Manual, and Transfer positions
- Automatic and non–automatic modes
- Alarm module required

Warranty

Warranty-1-year standard

KOHLER®

Automatic Transfer Switch Controller

Decision-Maker® MPAC 1200





Model KCS with Decision-Maker® MPAC 1200 Controller

Applicable Models

Model	Description
KCS	Standard-Transition Any Breaker ATS ‡
KCP	Programmed-Transition Any Breaker ATS ‡
KCC	Closed-Transition Any Breaker ATS §
KSS	Standard-Transition Specific Breaker ATS ‡

‡ Available with automatic or non-automatic controller
§ Available with automatic controller only

Decision-Maker® MPAC 1200 Controller Standard Features

- Microprocessor-based controller
- Environmentally sealed user interface
- LCD display, 4 lines x 20 characters, backlit
- Dynamic function keypad with tactile feedback pushbuttons allows complete programming and viewing capability at the door
- LED indicators: Source available, transfer switch position, service required (fault), and not in auto
- Broadrange voltage sensing (208- 600 VAC) on all phases
- Phase-to-phase sensing and monitoring with 0.5% accuracy on both sources
- Line-to-neutral monitoring
- Frequency sensing with 0.5% accuracy on both sources
- Anti-single phasing protection
- Phase rotation sensing for three-phase systems
- Real-time clock with automatic adjust for daylight saving time and leap year
- Run time clock and operation counter
- Time-stamped event log
- Fail-safe transfer for loaded test and exercise functions
- DIP switches: password disable and maintenance
- Isolated RS-485 ports for Modbus connections (9.6, 19.2, and 57.6 kbps)
- Modbus® RTU protocol (Modbus register map available)
- USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
- Available in automatic and non-automatic versions; see supervised transfer control switch on page 5

Programmable Features

- Programming and monitoring methods:
  - Monitoring and password-protected programming at the door using the keypad and display
  - Program using a PC with Kohler® SiteTech™ software (available to Kohler-authorized distributors and dealers)
- Over/undervoltage for all phases of the normal and emergency sources
- Over/underfrequency for the emergency source
- Adjustable time delays
- Load/no load/auto-load test and load/no-load exercise functions
- Programmable inputs and outputs
- Load bank control for exercise or test
- Time-based load control, nine individual time delays for selected loads
- In-phase monitor (3-phase only)
- Password protection, three security levels
- See pages 2 and 3 for additional programmable features

* SiteTech software is available to Kohler-authorized distributors and dealers.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1200 Controller Features

User Interface LED Indicators

- Contactor position: source N and source E
- Source available: source N and source E
- Service required (fault indication)
- Not in automatic mode

LCD Display

- System status
- Line-to-line voltage
- Line-to-neutral voltage
- Active time delays
- Source frequency
- Preferred source selection
- System settings
- Common alarms
- Load current, each phase (current sensing kit required)
- Inputs and outputs
- Faults
- Time/date
- Address
- Event history
- Maintenance records
- Exerciser schedule
- Exerciser mode
- Time remaining on active exercise

Dynamic Function Tactile Keypad Operations

- Scroll up/down/forward/back
- Increase/decrease/save settings
- End time delay
- Start/end test or exercise
- Reset fault
- Lamp test

DIP Switches

- Maintenance mode
- Password disable

Event History

- View time and date-stamped events on the display or on a personal computer equipped with Kohler® SiteTech™ software. *****
- Download complete event history files using Kohler SiteTech software and a PC connected to the USB port. *****

Main Logic Board Inputs and Outputs

- Two (2) programmable inputs
- Two (2) programmable outputs

Communications

- Optional Ethernet communications with RJ45 connector for 10/100 Ethernet connection
- Isolated RS-485 ports for Modbus communications
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB Port. Use SiteTech software to upload or download files and adjust transfer switch settings *****
  - Application software
  - Event history files
  - Language files
  - Parameter settings
  - Usage reports
  - Feature configuration

Programmable Features

- System voltage, 208- 600 VAC †
- System frequency, 50/60 Hz †
- Single/three-phase operation †
- Standard/programmed/closed-transition operation †
- Preferred source selection allows the normal or emergency source to be used when both sources are available (alarm module required)
- Phase rotation: ABC/BAC/none selection with error detection
- Overvoltage and undervoltage pickup and dropout settings, both sources
- Overfrequency and underfrequency pickup and dropout settings, Emergency source
- Voltage unbalance, enable/disable
- In-phase monitor: enable/disable and phase angle
- Transfer commit/no commit
- Passwords, system and test
- Time, date, automatic daylight saving time enable/disable
- Time delays (see table)
- Exerciser: calendar mode, loaded/unloaded up to 21 events
- Test: loaded/unloaded/auto load (1- 60 minutes)
- Remote test: loaded/unloaded
- Automatic override on generator failure (loaded test and exercise)
- Peak shave delay enable/disable
- Current monitoring (current sensing kit required)
- Load control pre/post-transfer delays, 9 individual time delays for selected loads
- Resettable historical data

***** SiteTech software is available to Kohler-authorized distributors and dealers.

† System parameters are factory-set per order.

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Decision-Maker® MPAC 1200 Controller Features, Continued

Programmable Inputs

- Forced transfer to OFF (programmed-transition models only; requires load shed accessory)
- Inhibit transfer
- Low battery voltage (external battery supply module required)
- Peak shave/area protection input
- Remote common fault
- Remote test
- Remote end time delay
- Remotely monitored inputs, four (4) available

Programmable Outputs

- Alarm silenced
- Audible alarm
- Chicago alarm control
- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- Generator engine start, source E
- I/O module faults
- In-phase monitor synch
- Load bank control
- Load control active (pre/post transfer delay, up to 9 outputs)
- Loss of phase fault, source N and E
- Low battery fault (external battery supply module required)
- Maintenance mode
- Non-emergency transfer
- Not in automatic mode
- Over/undervoltage faults, source N and E
- Peak shave/area protection active
- Phase rotation error, source N and E
- Preferred source supplying load
- Software-controlled relay outputs (four maximum)
- Source available, preferred and standby
- Standby source supplying load
- Test active
- Transfer switch auxiliary contact fault
- Transfer switch auxiliary contact open
- Voltage unbalance, source N and E

Voltage and Frequency Sensing		
Parameter	**Default**	**Adjustment Range**
Undervoltage dropout	90% of pickup	75%- 98%
Undervoltage pickup	90% of nominal	85%- 100%
Overvoltage dropout *	115% of nominal*	106%- 135%
Overvoltage pickup	95% of dropout	95%- 100%
Unbalance enable	Disable	Enable/Disable
Unbalance dropout	20%	5%- 20%
Unbalance pickup	10%	3%- 18%
Voltage dropout time	0.5 sec.	0.1- 9.9 sec.
Underfrequency dropout †	99% of pickup	95%- 99%
Underfrequency pickup †	90% of nominal	80%- 95%
Overfrequency dropout †	101% of pickup	101%- 115%
Overfrequency pickup †	110% of nominal	105%- 120%
Frequency dropout time †	3 sec.	0.1- 15 sec.
* 690 volts, maximum. Default = 110% for 600 volt applications.		
† Emergency source only		

Adjustable Time Delays		
Time Delay	**Default**	**Adjustment Range**
Engine start	3 sec.	0- 6 sec. †
Engine cooldown	5 min.	0- 60 min.
Fail to acquire standby source	1 min.	
Transfer, preferred to standby	3 sec.	
Transfer, standby to preferred	15 min.	
Transfer, off to standby	1 sec.	1 sec. - 60 min.
Transfer, off to preferred	1 sec.	
Fail to synchronize	60 sec.	10 sec - 15 min.
Auto load test termination after transfer	1 sec.	1 sec.- 60 min.
Load Control Time Delays:		
Pretransfer to preferred	0 sec.	0- 60 min.
Post-transfer to preferred	0 sec.	
Pretransfer to standby	0 sec.	
Post-transfer to standby	0 sec.	
Note: Time delays are adjustable in 1 second increments, except as noted.		
† Engine start time delay can be extended to 60 minutes with an External Battery Supply Module Kit.		

Accessory Modules

The mounting kit holds up to five optional modules.

Module Current Draw Specifications, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100
Maximum Total Current *	300
* If an External Battery Module is installed, there is no current restriction.	

❑ Standard Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	6
Contact Type	Form C (SPDT)
Contact Voltage Rating	2 A @ 30 VDC 500 mA @ 125 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG

❑ High-Power Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Voltage Rating	12 A @ 24 VDC 12 A @ 250 VAC 10 A @ 277 VAC 2 A @ 480 VAC
Connection Type	Terminal Strip
Wire Size	#14- 24 AWG
Environmental Specifications	
Temperature	- 40°C to 85°C (- 40°F to 185°F)
Humidity	35% to 85% noncondensing

❑ Alarm Module

- 90 dB Audible alarm
- Any alarm function can be programmed to trigger the audible alarm
- Chicago alarm function
- Preferred source selection
- Supervised transfer control (supervised transfer control switch required)
- Connection for external alarm

External Alarm Connection Specifications	
Wire Size	#12- 22 AWG Cu
Contact Voltage Rating	500 mA @ 120 VAC
	250 mA @ 240 VAC

❑ External Battery Supply Module

- Energizes the ATS controls using an external battery when no source power is available
- Allows extended engine start time delays
- Allows the use of any combination of accessory modules (no current draw restriction, maximum of five modules total)
- Connects to one or two batteries, 12 VDC or 24 VDC system
- Current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC
- Provides low external battery voltage indication to the transfer switch controller
- Reverse-polarity protected

Other Controller Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

❑ Controller Disconnect Switch

- Disconnects power to the controller without disconnecting the load
- Mounts inside the enclosure

❑ Current Sensing Kit

- Monitor current on all phases with 1% accuracy

❑ Digital Meter

- Measure and display voltage, current, frequency, and power
- 35 programmable alarms
- LCD display, 67 x 62.5 mm (2.65 x 2.5 in.)
- Pushbutton operation
- Password- protected programming menus
- Two digital inputs
- Two digital outputs
- Two Form A relay outputs
- Serial port for optional network connections
- Data logging
- Factory- installed

❑ Ethernet Communications

- RJ-45 connector
- Supports Internet Protocol version 4 (IPv4)
- Supports Modbus TCP/IP protocol

❑ Load Shed Kit

- Forced transfer from Emergency to OFF for programmed-transition and closed-transition models
- Customer-supplied signal (contact closure) is required for the forced transfer to OFF function
- Factory-installed and loose kits available for models KCC and KCP
- Factory-installed only for other programmed-transition and closed-transition models

❑ Padlockable User Interface Cover

- Provides additional protection against unauthorized access
- Cover standard on NEMA 3R enclosures

❑ RSA III Remote Serial Annunciator

- Monitors the generator set
- Monitors ATS common alarm, Normal source, and Emergency source status and connection
- Allows remote testing of the ATS
- For more information about RSA III features and functions, see specification sheet G6- 139

❑ Supervised Transfer Control Switch

- Standard on models with non-automatic controls
- Optional for models with automatic controls
- Auto, manual, and transfer positions
- Automatic and non-automatic modes
- Alarm module required

Supervised Transfer Control Switch Operation for Automatic and Non-Automatic Transfer Switches

Switch Position	Automatic Switches	Non-Automatic Switches
AUTO	• Automatically transfers to the standby source, when available, if the preferred source is lost. • Transfers back to the preferred source when it becomes available.	
MANUAL	• Automatically transfers to an available source if the connected source is lost. • Test, peak shave, and loaded exercise commands will transfer to the standby source. • Does not automatically transfer back to preferred when both sources are available.	• Does not automatically transfer to an available source when the connected source is lost. • Test, peak shave, and loaded exercise commands are ignored. • Does not automatically transfer back to preferred when both sources are available. • Transfers only when the switch is manually moved to the TRANSFER position as described below.
TRANSFER (momentary switch position)	• Does not initiate an engine start sequence. Generator set engine must be signalled to start by an event such as a loss of utility, loaded test, loaded exercise, etc. • Allows transfer to the other source, if available. An event such as a loss of utility, loaded exercise, or loaded test must first initiate the transfer sequence. • Time delays will operate. Wait for time delays to expire, or press the End Time Delay button. • Operates pre- and post-transfer load control time delays if both sources are available. • MANUAL TRANSFER is displayed when the ATS is ready to transfer.	

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

Main Board I/O Specifications	
Output contact type	Isolated form C (SPDT)
Output contact rating	1 amp @ 30 VDC, 500 mA @120 VAC
I/O terminals wire size	#12-24 AWG

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® Power Systems distributor for availability.

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KOHLER®

Emissions Data

KOHLER®

500REOZVC

60 Hz. Diesel Generator Set
Tier 2 EPA Certified for Stationary Emergency Applications
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	TAD1641GE-B	Bore:	144mm (5.67 in.)
Nameplate kW @ 1800 RPM:	565	Stroke:	165mm (6.50 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	16.12 L (984 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled	EPA Family:	NVPXL16.1ACC
Compression Ratio:	16.5:1	EPA Certificate:	NVPXL16.1ACC-020
Emission Control Device:	Electronic Control		

EXHAUST EMISSION DATA:	**EPA D2 Cycle 5-mode weighted**	
HC	0.139	g/kWh
NOx (Oxides of Nitrogen as NO_2)	5.56	g/kWh
CO (Carbon Monoxide)	0.349	g/kWh
PM (Particulate Matter)	0.04	g/kWh

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

1/2022
rev. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **AB Volvo Penta**
(U.S. Manufacturer or Importer)

Certificate Number: **PVPXL16.1ACC-012**

Effective Date: 11/07/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 11/07/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PVPXL16.1ACC

Mobile/Stationary Indicator: Stationary
Emissions Power Category: kW>560
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

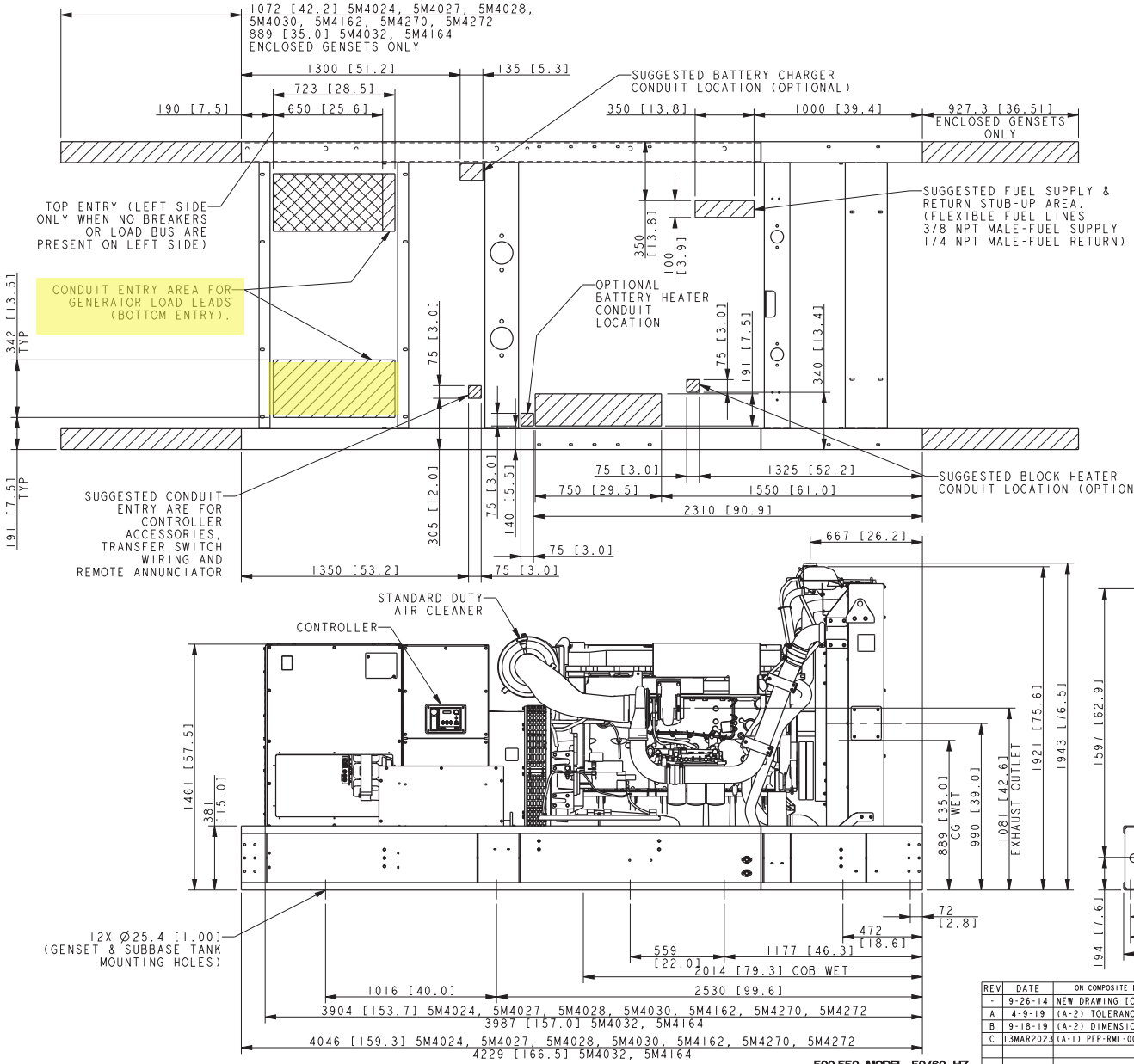
It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

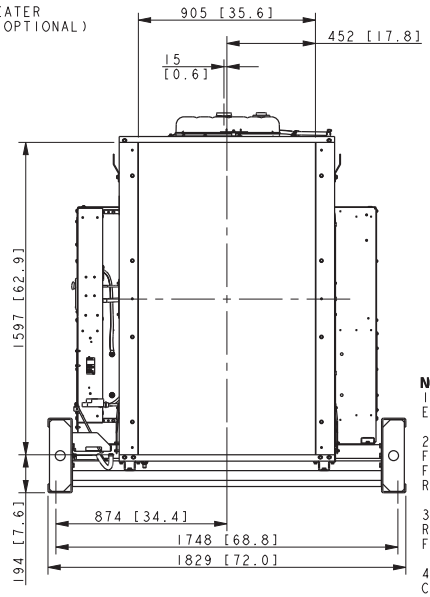
This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

KOHLER®

Dimensional Drawings

MODEL	ALTERNATOR FRAME	CONNECTION	GENSET WEIGHT (WET)
500 50/60 HZ	5M4024	10 LEAD	3778 KG [8330 LBS]
500 50/60 HZ	5M4027	12 LEAD	3828 KG [8440 LBS]
500 50/60 HZ	5M4028	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4030	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4032	10 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4162	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4164	4 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4270	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4272	4 LEAD	3924 KG [8650 LBS]





INSTALLATION NOTE
IF SUBBASE FUEL TANK AND/OR ENCLOSURE IS USED, REFER TO SUBBASE FUEL TANK/ENCLOSURE ADV TO DETERMINE MOUNTING LOCATIONS.

NOTES:
1) DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

2) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT. REFER TO ENCLOSURE ADV.

3) IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

4) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

500-550 MODEL 50/60 HZ
5M4024, 5M4027, 5M4028, 5M4030, 5M4032
5M4162, 5M4164, 5M4270, 5M4272
RECONN, 380V, 600V ALTERNATORS, VOLVO

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-26-14	NEW DRAWING [CT92986]	SAM
A	4-9-19	(A-2) TOLERANCES REMOVED [CT194818]	SUD
B	9-18-19	(A-2) DIMENSION 1829 [72.0] ADDED [CT198657]	HM
C	13MAR2023	(A-1) PEP-RML-001 NOTE ADDED; SEE SHEET 2 [CT226059]	PBG

UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' MAX. SURFACE FINISH. THIRD ANGLE PROJECTION

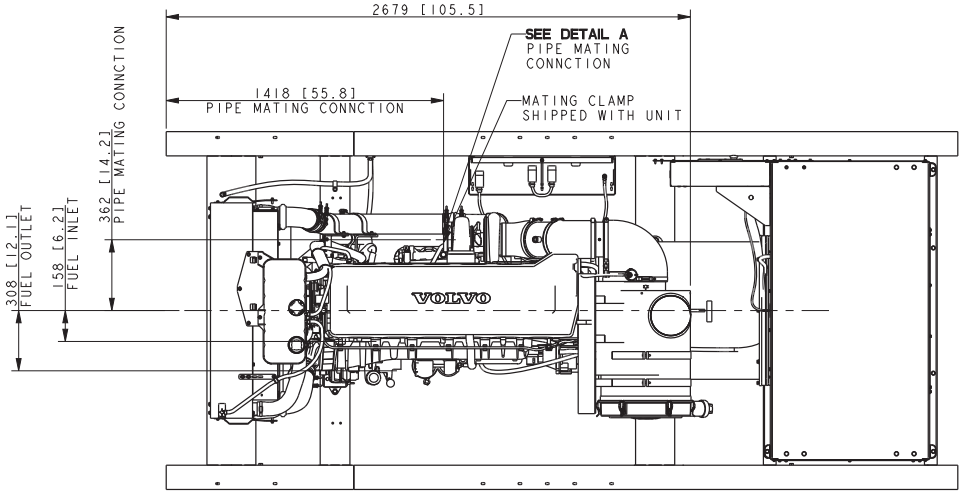
APPROVALS		DATE
DRAWN	SAM	9-26-14
CHECKED	SAM	9-26-14
APPROVED	PBT	9-26-14

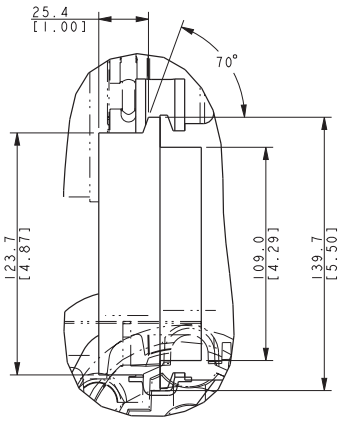
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
THIS DRAWING IN DESIGN AND DETAIL IS KOHLER CO. PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH KOHLER CO. WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

TITLE: DIMENSION PRINT, 500 KW VOLVO

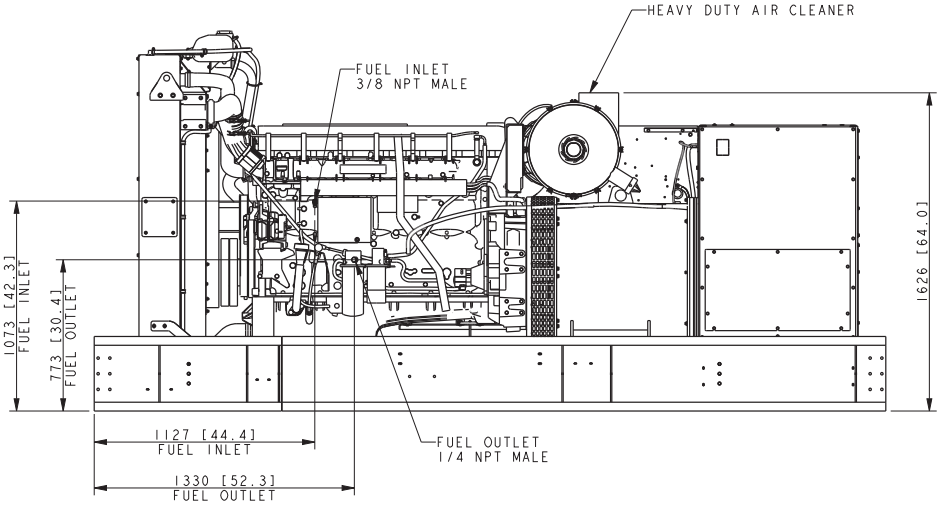
SCALE 0.08 | CAD NO. | SHEET 1 of 2

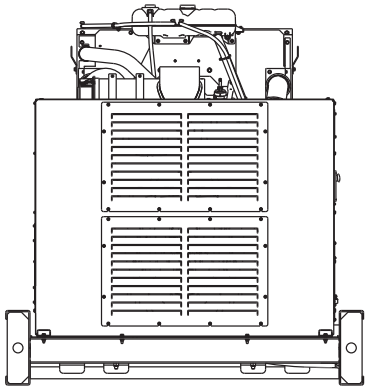
DWG NO. ADV-8745 | D





DETAIL A
(PIPE MATING CONNCTION)





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-26-14	NEW DRAWING [CT92986]	SAM
A	4-9-19	(A-2) TOLERANCES REMOVED [CT194818]	SUD
B	9-18-19	SEE SHEET 1 [CT198657]	HM
C	13MAR2023	(D-7,6,5) PIPE MATING CONNECTION WAS EXHAUST OUTLET;	
		(D-5) NOTE ADDED; (D-6) 2679 WAS 2782; (B-3) 1626 WAS 1754;	
		(C,D-2) DETAIL A UPDATED; SEE SHEET 1 [CT226059]	PBG

UNLESS OTHERWISE SPECIFIED:
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X .XX ± 0.25
X .X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-26-14
CHECKED	SAM	9-26-14
APPROVED	PBT	9-26-14

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POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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METRIC | PRO-E

TITLE
DIMENSION PRINT, 500 KW VOLVO

SCALE 0.08 | CAD NO. | SHEET 2 of 2

DWG NO. **ADV-8745** | **D**

CUSTOMER APPROVAL

Name: _____

Date: _____

Tank Paint Color: BLACK (Unless Otherwise Specified)

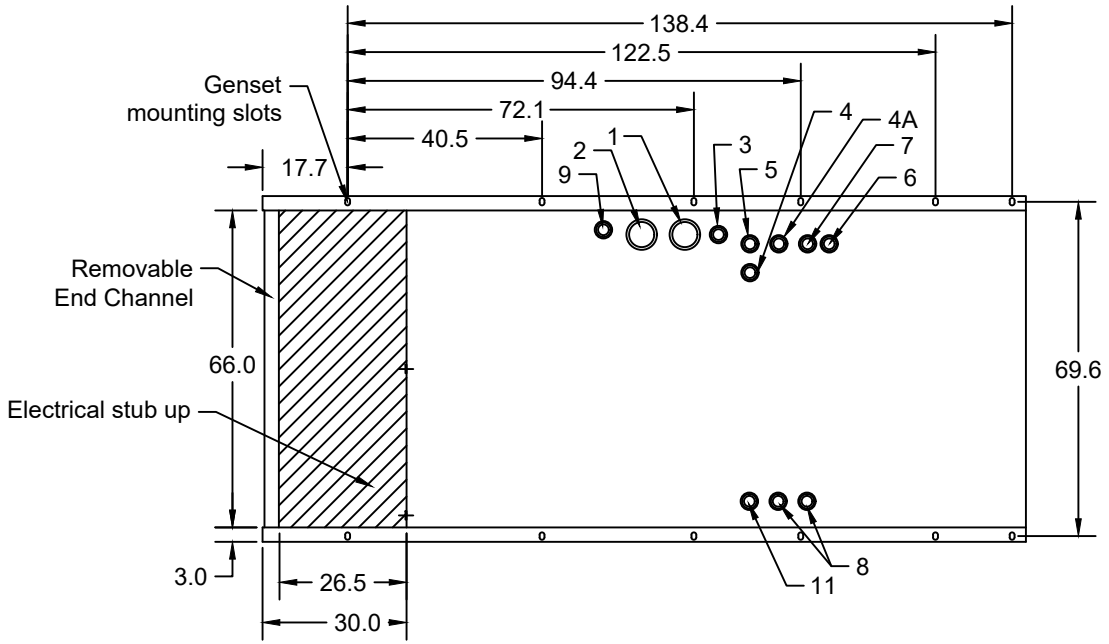
Encl Paint Color: Customer to Specify

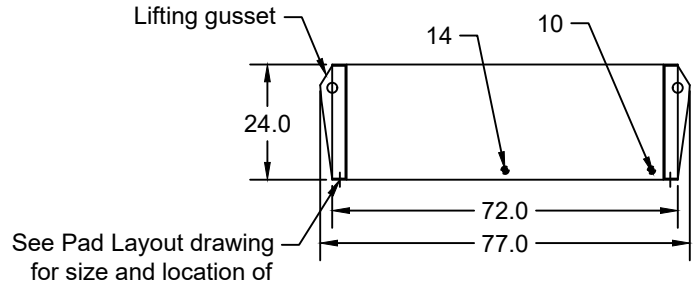
Important: By signing this drawing you are approving all pages AS IS. If changes are required, a new revision will be required.

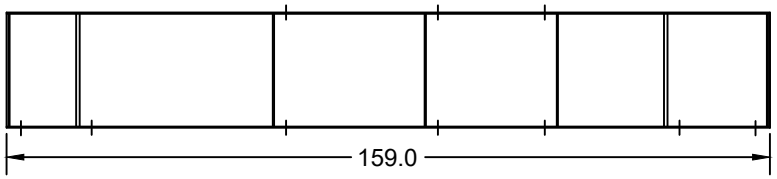
Genset Model	Kohler, 500REOZVC, open		
Genset Drawing#	ADV-8745	Rev	B
Silencer	None		
Isolator	None		
Quote #	SS23-0456		
Customer Ref.	UK Memorial		

Double wall secondary containment
Approximate Weight (Dry): 2,400 lbs.

Fittings:
1. 5" NPT, Emergency tank vent
2. 5" NPT, Rupture basin emergency vent
3. 2" NPT, Normal tank vent
4. 2" NPT, 2" NPT, Manual fill with riser
4A. 2"NPT required for remote fill provided by others, ship with plug
5. 2" NPT, Direct reading gauge
6. 2" NPT, Engine supply, 3/8" NPT full length dip tube
7. 2" NPT, Engine return, 3/8" NPT full length dip tube
8. (2) 2" NPT, Fuel level switch, 50% and 90%
9. 2" NPT, Visual inspection into basin, plugged
10. 1/2" NPT, Rupture basin switch
11. 2" NPT, Sender, 240-30 ohms, for customer use
14. 1/2" NPT, Basin drain, plugged







UL 142
File no.
MH17470

00	04/18/23	Start	XX
S. Rev	Date	Description	Name
Change Block			

TRAMONT

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Angle = +/- 1.5°
.X = +/- .250 in.
.XX = +/- .125 in.
.XXX = +/- .062 in.

DRAWN BY: XX	DATE: 04/18/23	DESCRIPTION: 660 Gallon sub base tank. Series 700	
CHK'D:	DATE:		
APPROVED:	DATE:	FOR: Submittal, Tank	SHEET 1of3
SCALE: NTS			DRAWING NO.: S8004688

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CUSTOMER APPROVAL

Name: _____

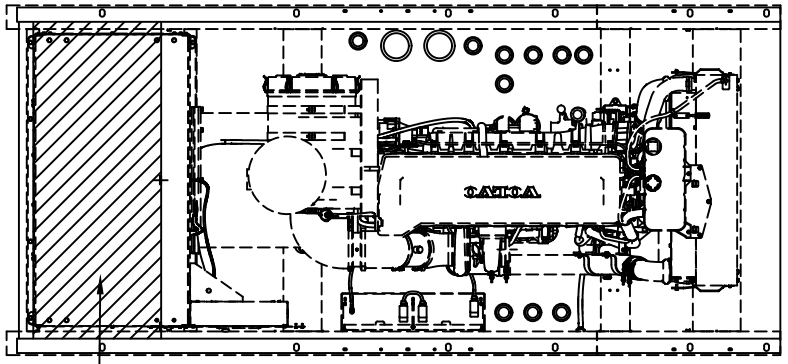
Date: _____

Tank Paint Color: BLACK (Unless Otherwise Specified)

Encl Paint Color: Customer to Specify

Important: By signing this drawing you are approving all pages AS IS. If changes are required, a new revision will be required.

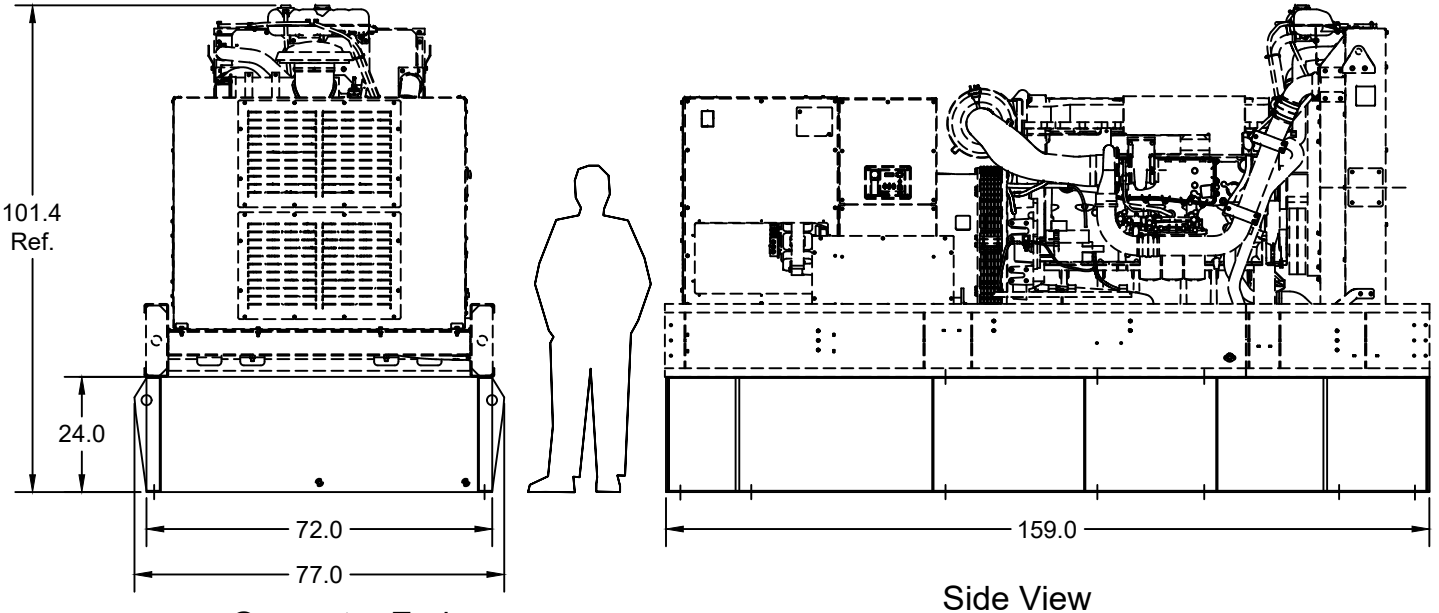
Genset Model	Kohler, 500REOZVC, open		
Genset Drawing#	ADV-8745	Rev	B
Silencer	None		
Isolator	None		
Quote #	SS23-0456		
Customer Ref.	UK Memorial		



Radiator View

Electrical stub up

Top View



Generator End

Side View

00	04/18/23	Start	XX
S. Rev	Date	Description	Name

Change Block

TRAMONT

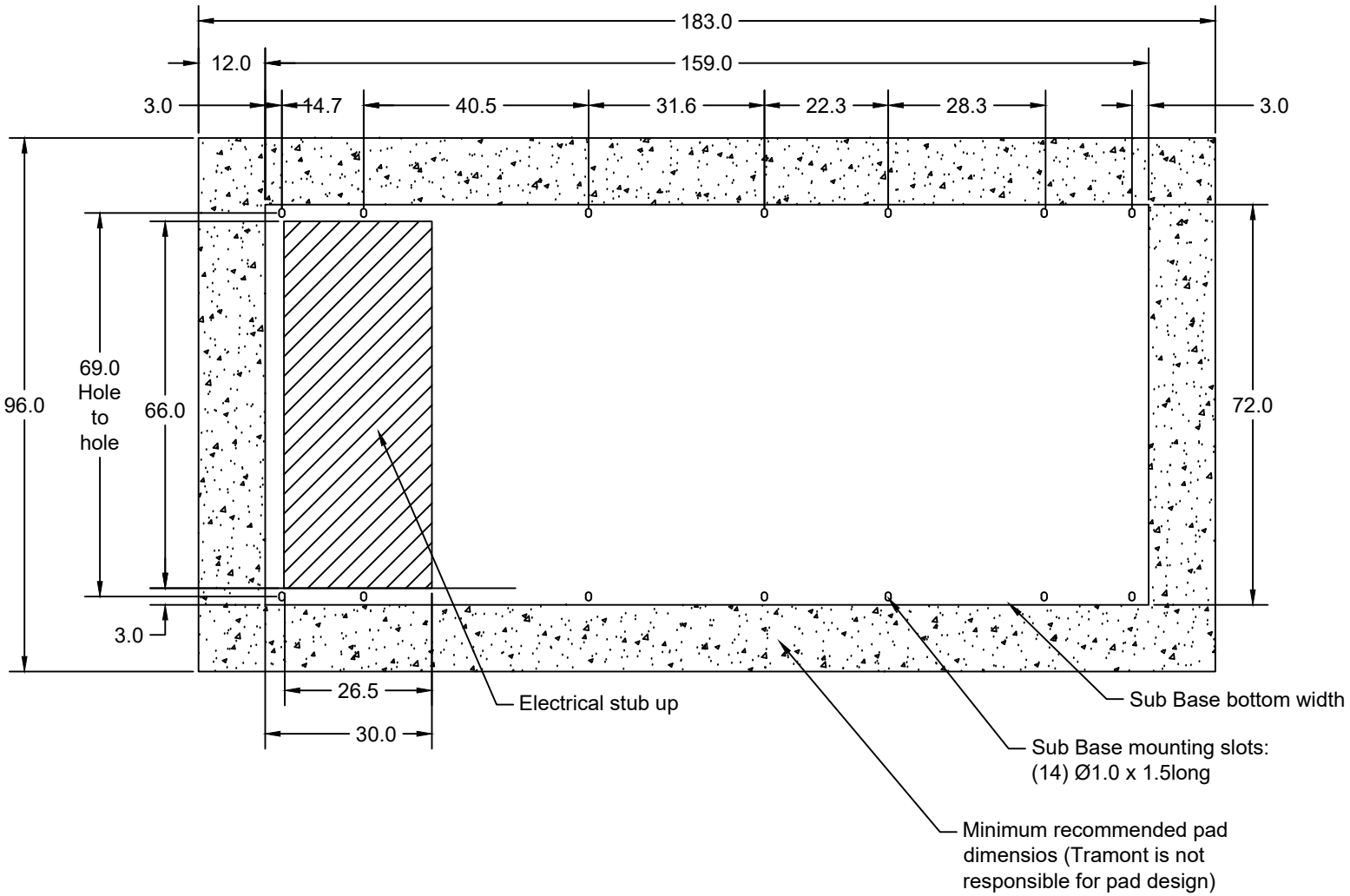
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Angle = +/- 1.5°
.X = +/- .250 in.
.XX = +/- .125 in.
.XXX = +/- .062 in.

DRAWN BY: XX	DATE: 04/18/23	DESCRIPTION: 660 Gallon sub base tank. Series 700
CHK'D:	DATE:	
APPROVED:	DATE:	FOR: Submittal, Main View
SCALE: NTS		SHEET: 2of3
		DRAWING NO.: S8004688

S:\ENG\DRAWINGS\S\S80046XX\S8004688\SALES\S8004688.DWG



00	04/18/23	Start	XX
S. Rev	Date	Description	Name
Change Block			

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Angle = +/- 1.5°
.X = +/- .250 in.
.XX = +/- .125 in.
.XXX = +/- .062 in.

DRAWN BY: XX	DATE: 04/18/23	
CHK'D:	DATE:	
APPROVED:	DATE:	
SCALE: NTS		

DESCRIPTION: 660 Gallon sub base tank. Series 700

FOR: Submittal, Pad Layout

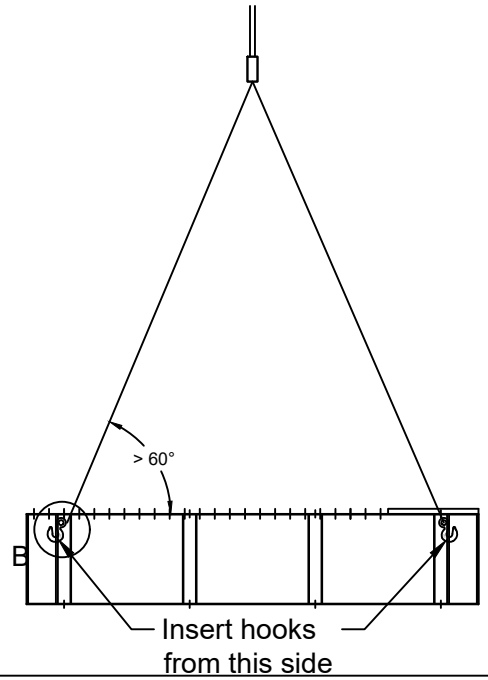
SHEET: 3of3

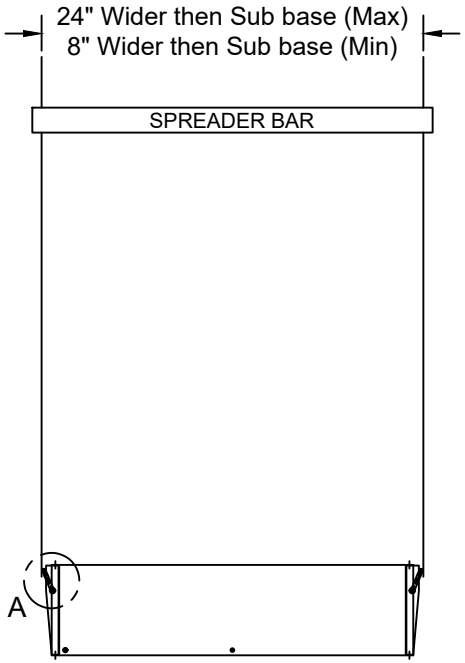
DRAWING NO.: S8004688

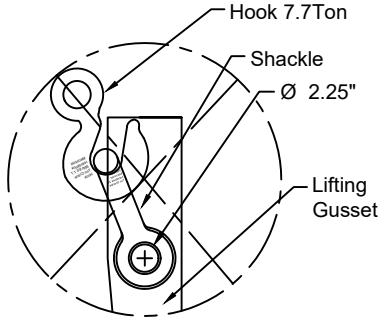
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CAUTION IMPORTANT SAFETY NOTES:

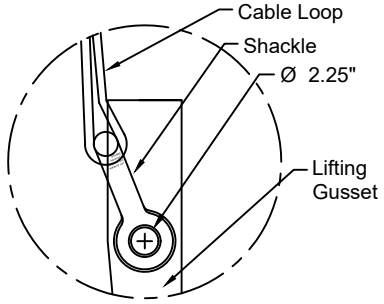
1. **Center of Gravity location may not be at the lifting midpoint. It is the rigger's responsibility to insure a level lift with proper use of spreader bars and fulcrum points**
2. Rigging is not supplied by Tramont Manufacturing. Rigging design, plan and execution is the sole responsibility of the crane/rigging contractor. Consult crane/rigging contractor for details.
3. Heavy equipment and machinery lifting should only be done by qualified personnel per adherence to local codes and Authority Having Jurisdiction (AHJ).
4. Generic sound enclosure shown. This drawing is for reference only and does not represent the specific project. Tramont provides this diagram as a typical example only.
5. Before moving the equipment, check the condition and capacity of all lifting and hoisting equipment.
6. Attach hooks to lifting gusset or lifting plate. Use all lifting gussets or plates provided.
7. Fuel tank must be emptied before the lift. Lifting calculations are based on EMPTY FUEL TANK ONLY.



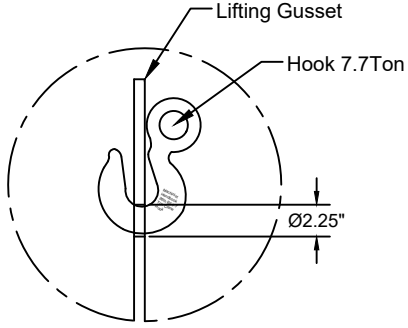




DO NOT USE HOOK AND SHACKLE



A - A



B - B

S. Rev	Date	Description	Name
L	09/09/21	Added #7 note	XX
K1	04/14/20	Updated drawing border	GBH
K	07/24/19	Added (6) point lifting diagram	XX
J	11/28/17	Revised drawing notes	XX
H	10/14/16	Added new flat plate lifting design	XX
G	02/15/13	Added note 7	CRT
F	01/21/13	Added sheets for tank only	CRT
E	06/27/12	Safety notes	XX
D	04/29/10	Updated sheet numbers	CRT
C	02/19/10	Updated per current format	CRT

Change Block

TRAMONT

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.X = +/- .250 in.
.XX = +/- .125 in.
.XXX = +/- .062 in.

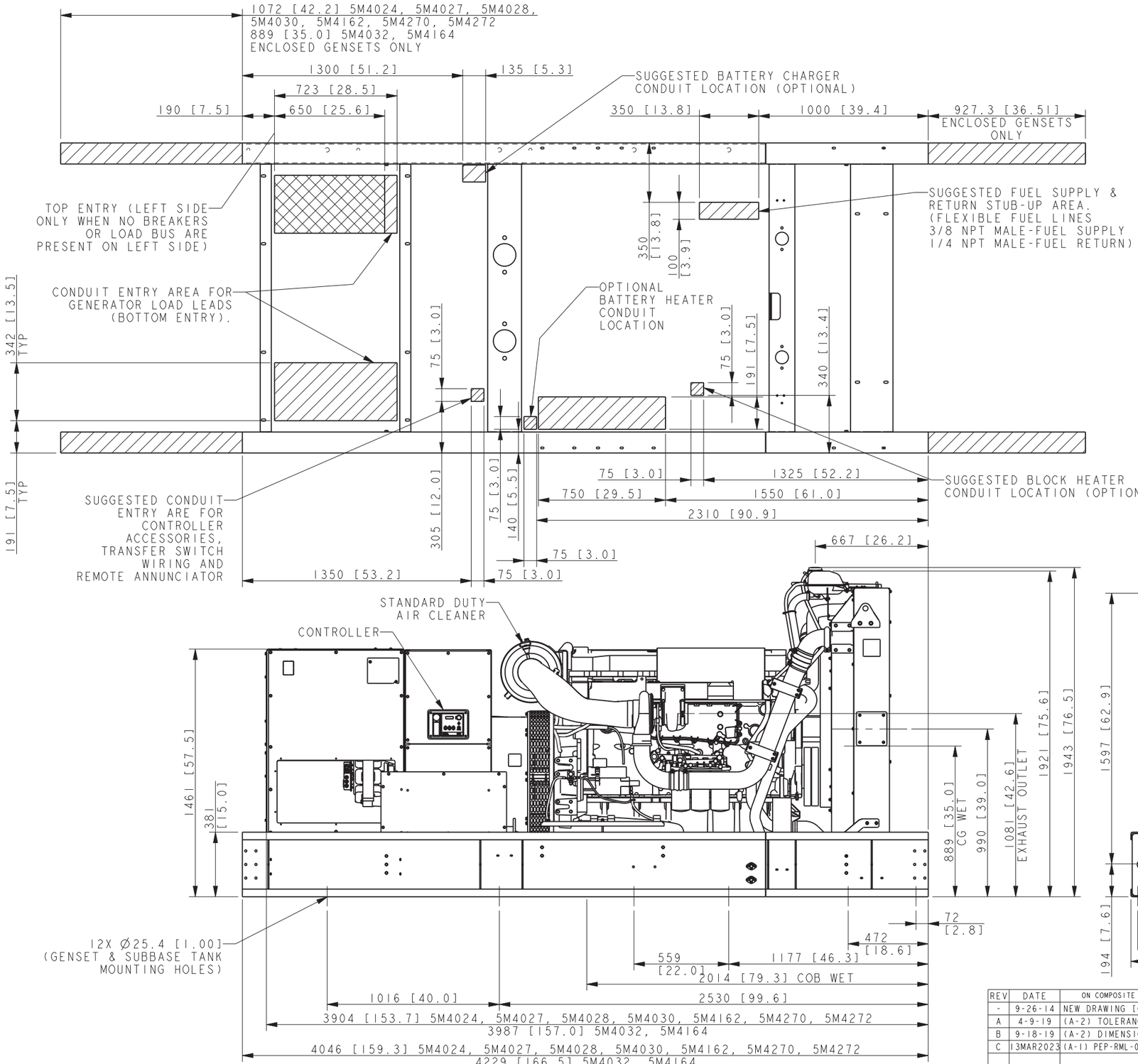
DRAWN BY: LMT	DATE: 01/11/07	DESCRIPTION: Reference Drawing
CHK'D:	DATE:	
APPROVED:	DATE:	
SCALE: NTS		FOR: Four point lifting

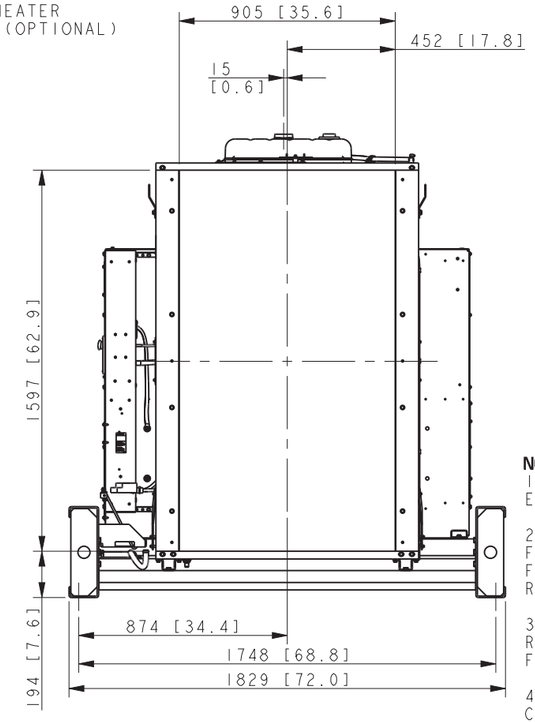
SHEET: 4pt

DRAWING NO.: 6000-13802

S:\ENG\DRAWINGS\6000-\6000-13XXX\6000-13802\6000-13802.DWG

MODEL	ALTERNATOR FRAME	CONNECTION	GENSET WEIGHT (WET)
500 50/60 HZ	5M4024	10 LEAD	3778 KG [8330 LBS]
500 50/60 HZ	5M4027	12 LEAD	3828 KG [8440 LBS]
500 50/60 HZ	5M4028	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4030	10 LEAD	3924 KG [8650 LBS]
500 50/60 HZ	5M4032	10 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4162	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4164	4 LEAD	4082 KG [9000 LBS]
500 60 HZ	5M4270	4 LEAD	3828 KG [8440 LBS]
500 60 HZ	5M4272	4 LEAD	3924 KG [8650 LBS]





INSTALLATION NOTE
IF SUBBASE FUEL TANK AND/OR ENCLOSURE IS USED, REFER TO SUBBASE FUEL TANK/ENCLOSURE ADV TO DETERMINE MOUNTING LOCATIONS.

NOTES:
1) DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.

2) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT. REFER TO ENCLOSURE ADV.

3) IF IBC CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.

4) THIS ASSEMBLY OR PART MUST COMPLY WITH PEP-RML-001

500-550 MODEL 50/60 HZ
5M4024, 5M4027, 5M4028, 5M4030, 5M4032
5M4162, 5M4164, 5M4270, 5M4272
RECONN., 380V, 600V ALTERNATORS, VOLVO

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-26-14	NEW DRAWING [CT92986]	SAM
A	4-9-19	(A-2) TOLERANCES REMOVED [CT194818]	SUD
B	9-18-19	(A-2) DIMENSION 1829 [72.0] ADDED [CT198657]	HM
C	13MAR2023	(A-1) PEP-RML-001 NOTE ADDED; SEE SHEET 2 [CT226059]	PBG

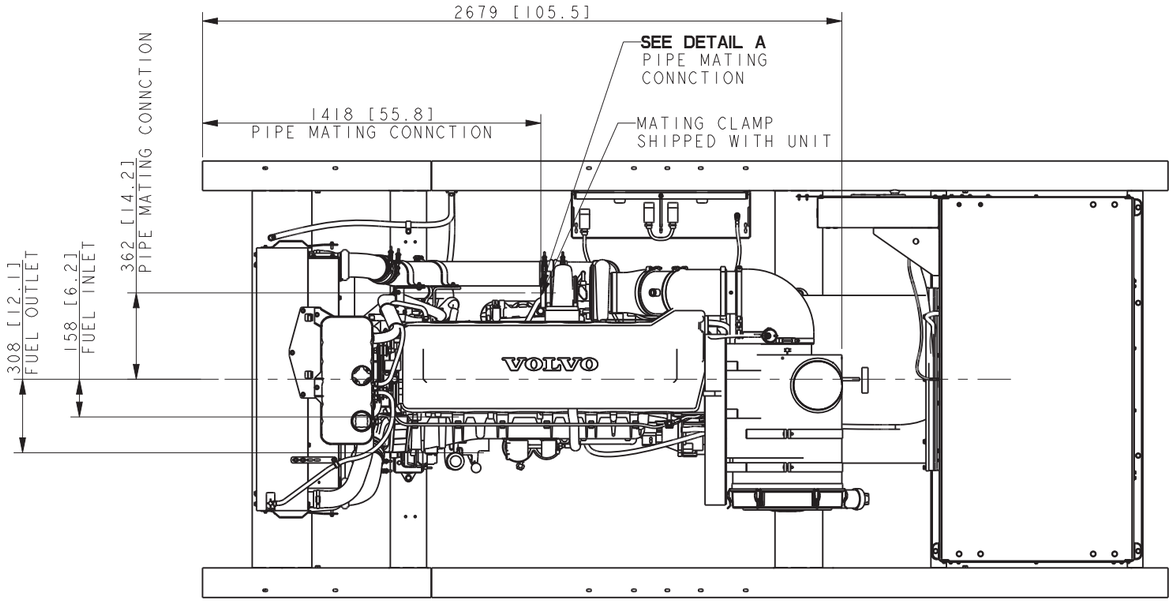
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX
THIRD ANGLE PROJECTION

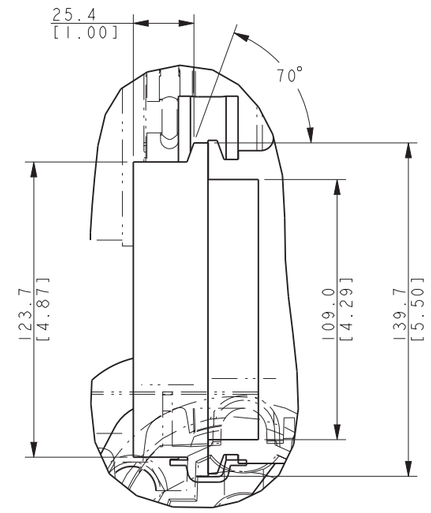
APPROVALS		DATE
DRAWN	SAM	9-26-14
CHECKED	SAM	9-26-14
APPROVED	PBT	9-26-14

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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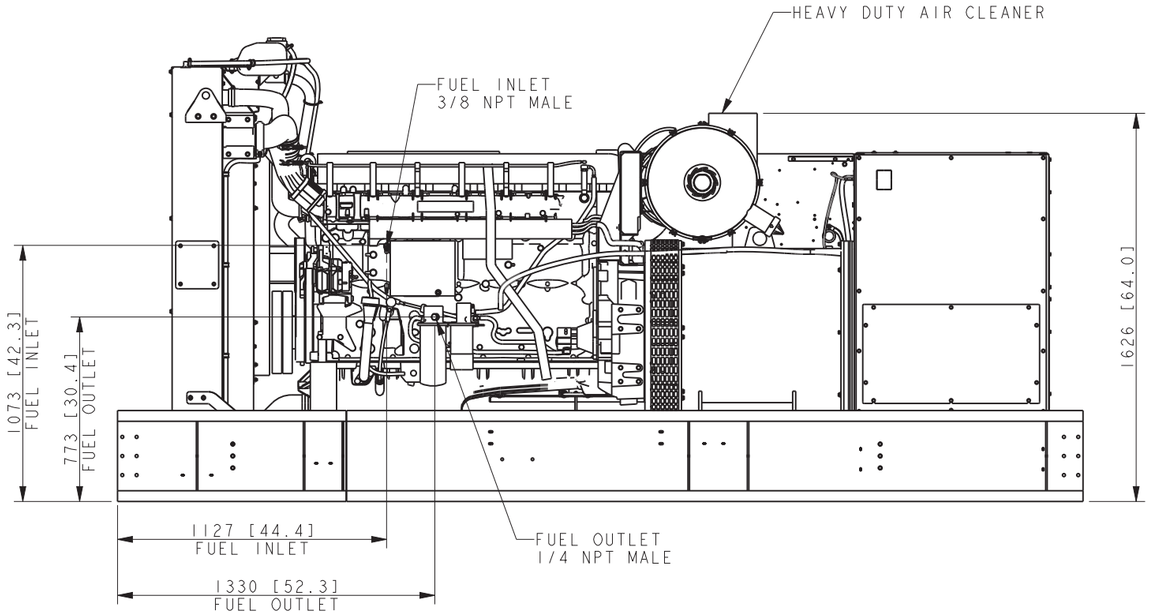
TITLE
DIMENSION PRINT, 500 KW VOLVO

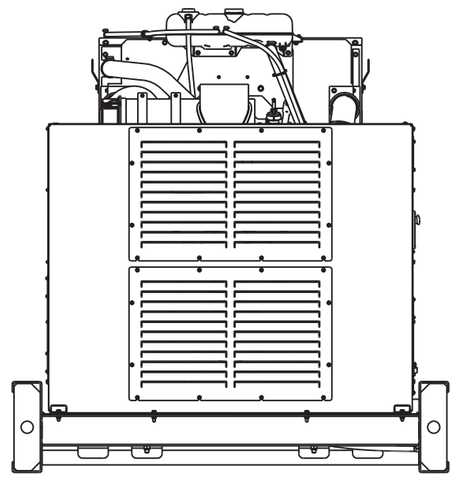
SCALE 0.08 | CAD NO. | SHEET 1 of 2
DWG NO. **ADV-8745** | **D**





DETAIL A
(PIPE MATING CONNCTION)





REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	9-26-14	NEW DRAWING [CT92986]	SAM
A	4-9-19	(A-2) TOLERANCES REMOVED [CTI94818]	SUD
B	9-18-19	SEE SHEET 1 [CTI98657]	HM
C	13MAR2023	(D-7,6,5) PIPE MATING CONNECTION WAS EXHAUST OUTLET;	
		(D-5) NOTE ADDED; (D-6) 2679 WAS 2782; (B-3) 1626 WAS 1754;	
		(C,D-2) DETAIL A UPDATED; SEE SHEET 1 [CT226059]	PBG

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	SAM	9-26-14
CHECKED	SAM	9-26-14
APPROVED	PBT	9-26-14

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POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

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TITLE
DIMENSION PRINT, 500 KW VOLVO

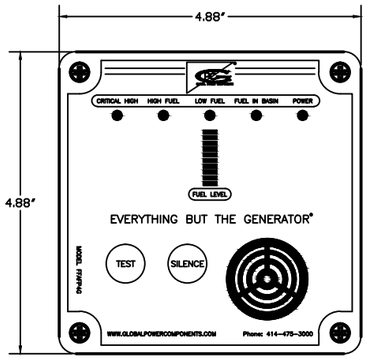
SCALE 0.08 | CAD NO. | SHEET 2 of 2

DWG NO. **ADV-8745** | **D**

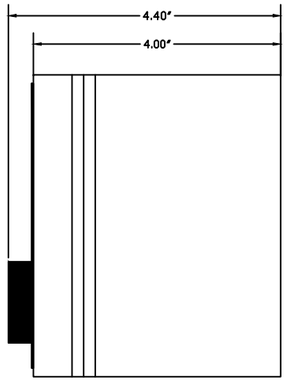
JOB #

—

PANEL LAYOUT



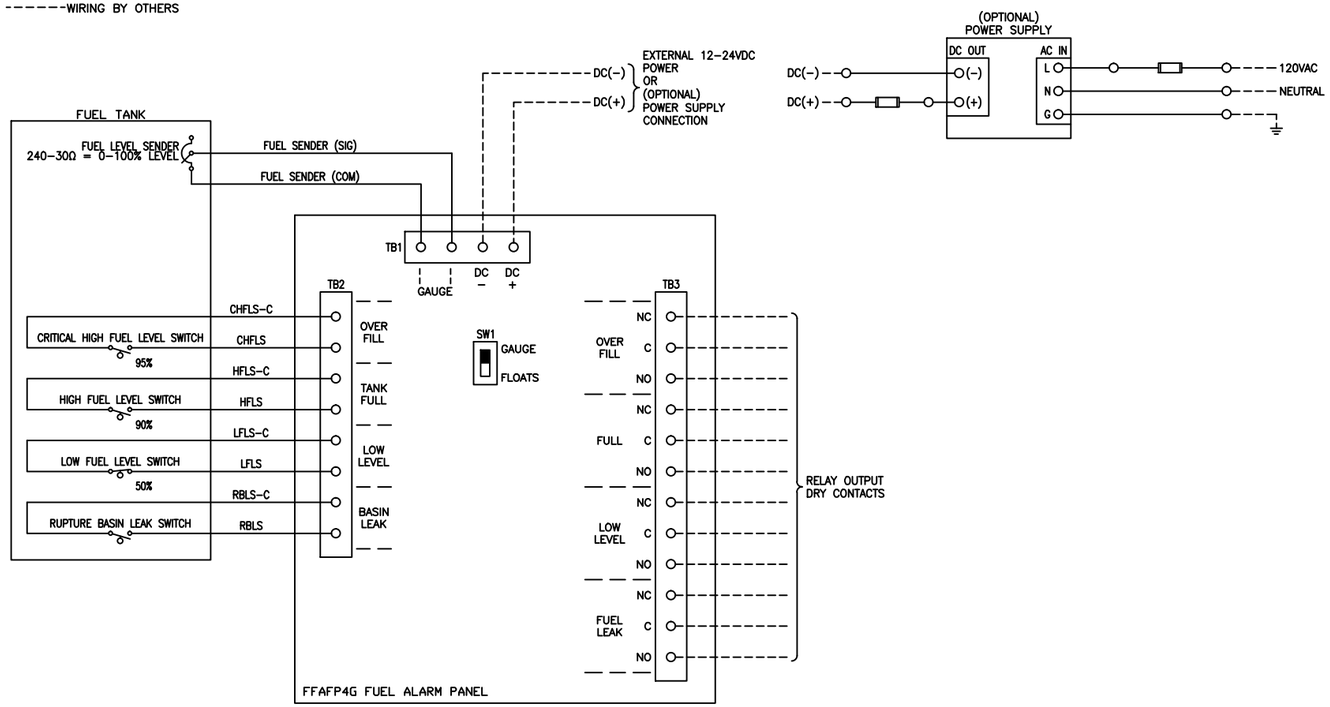
FFAFP4G ALARM PANEL
(FRONT VIEW)



FFAFP4G ALARM PANEL
(SIDE VIEW)

WIRING DIAGRAM

NOTES:
* – PROVIDED BY OTHERS
———GPC WIRING
------WIRING BY OTHERS



PROGRAMMING INSTRUCTIONS:

SELECT DESIRED OPERATION MODE BASED ON THE ALARM PANEL MODEL NUMBER:
MODEL# FFAFP4G → OPERATION MODE 1 (4 ALARM PANEL W/ OPTIONAL FUEL LEVEL GAUGE)
MODEL# AFP4 → OPERATION MODE 2 (4 ALARM PANEL)
MODEL# AFP2 → OPERATION MODE 3 (2 ALARM PANEL)

PROGRAM THE PANEL FOR THE DESIRED OPERATION MODE:
- VERIFY CONTROL POWER IS OFF
- HOLD DOWN THE "TEST" AND "SILENCE" PUSH BUTTONS SIMULTANEOUSLY WHILE TURNING CONTROL POWER ON
- THE "POWER" LED WILL BLINK ON AND OFF, SIGNIFYING THE PANEL IS IN PROGRAMMING MODE
- RELEASE THE "TEST" AND "SILENCE" PUSH BUTTONS, THE "POWER" LED SHOULD REMAIN BLINKING AND THE "CRITICAL HIGH" AND/OR "HIGH FUEL" LED'S WILL BE ILLUMINATED ACCORDING TO THE PANEL'S CURRENT OPERATION MODE (SEE CHART BELOW)

OPERATION MODE	"CRITICAL HIGH" LED	"HIGH FUEL" LED
1	OFF	ON
2	ON	OFF
3	ON	ON

- PRESS THE "SILENCE" PUSH BUTTON TO TOGGLE THROUGH THE OPERATION MODES
- WHEN THE "CRITICAL HIGH" AND "HIGH FUEL" LED STATUSES MATCH THE DESIRED OPERATION MODE, PRESS THE "TEST" PUSH BUTTON TO SAVE THE OPERATION MODE AND EXIT PROGRAMMING MODE

PROGRAM THE LOW FUEL LEVEL ALARM SETPOINT UTILIZING THE ANALOG SENDER INPUT (FOR MODEL# FFAFP4G ONLY):
- VERIFY THE ALARM PANEL IS PROGRAMMED FOR OPERATION MODE 1 (SEE INSTRUCTIONS ABOVE FOR PROGRAMMING THE PANEL'S OPERATION MODE)
- VERIFY THE CIRCUIT BOARD DIP SWITCH (SW1) IS SET TO "GAUGE"
- TURN OFF CONTROL POWER TO THE ALARM PANEL
- HOLD DOWN THE "TEST" PUSH BUTTON WHILE TURNING CONTROL POWER ON
- ONCE THE PANEL IS POWERED UP, RELEASE THE "TEST" PUSH BUTTON
- THE CURRENT LOW FUEL LEVEL ALARM SETPOINT LED WILL BE ILLUMINATED ON THE BAR LED FUEL LEVEL GAUGE
- PRESS THE "SILENCE" PUSH BUTTON TO TOGGLE THROUGH THE FUEL GAUGE LED'S, WHICH INDICATE THE AVAILABLE LOW FUEL LEVEL ALARM SETPOINTS (AVAILABLE LOW FUEL LEVEL ALARM SETPOINTS ARE 10%, 20%, 30%, 40%, 50%, OR 60%)
- WHEN THE ILLUMINATED FUEL GAUGE LED MATCHES THE DESIRED LOW FUEL LEVEL ALARM SETPOINT, PRESS THE "TEST" PUSH BUTTON TO SAVE THE LOW FUEL LEVEL ALARM SETPOINT AND EXIT PROGRAMMING MODE

OPERATION:

MODEL# FFAFP4G (FLOATS OR GAUGE CONTROL):
"FLOATS" CONTROL (SWITCH "SW1" IN "FLOATS" POSITION):
- ALL FUEL LEVEL SWITCH INPUTS ARE ACTIVE (OVER FILL, TANK FULL, LOW LEVEL, & BASIN LEAK)
- THE ANALOG SENDER INPUT AND BAR LED FUEL LEVEL GAUGE ARE INACTIVE
- RELAY OUTPUTS ACTIVATE BASED ON ACTIVATION OF THE CORRESPONDING FUEL LEVEL SWITCH INPUTS

"GAUGE" CONTROL (SWITCH "SW1" IN "GAUGE" POSITION):
- "OVER FILL" AND "BASIN LEAK" FUEL LEVEL SWITCH INPUTS REMAIN ACTIVE
- "TANK FULL" AND "LOW LEVEL" FUEL LEVEL SWITCH INPUTS ARE INACTIVE
- THE ANALOG SENDER INPUT AND BAR LED FUEL LEVEL GAUGE ARE ACTIVE
- "HIGH FUEL" LED AND "FULL" RELAY OUTPUT ACTIVATE AT 80% FUEL LEVEL (CONTROLLED BY ANALOG SENDER INPUT)
- "CRITICAL HIGH" LED AND "OVER FILL" RELAY OUTPUT ACTIVATE AT 90% FUEL LEVEL (CONTROLLED BY ANALOG SENDER INPUT)
- "CRITICAL HIGH" ALARM REACTIVATES AT 100% FUEL LEVEL IF THE ALARM WAS SILENCED AT 90% FUEL LEVEL
- "LOW FUEL" LED AND "LOW LEVEL" RELAY OUTPUT ACTIVATE AT THE PROGRAMMED LOW FUEL LEVEL ALARM SETPOINT (10%–60%) (SEE INSTRUCTIONS ABOVE FOR PROGRAMMING THE LOW FUEL LEVEL ALARM SETPOINT)
- "FUEL IN BASIN" LED AND "FUEL LEAK" RELAY OUTPUT ACTIVATE WHEN THE BASIN LEAK SWITCH CLOSES
- DURING NORMAL OPERATION, IF THE "POWER" LED IS BLINKING AND ALL OF THE BAR LED'S ON THE FUEL GAUGE ARE ARE ILLUMINATED, THEN THE ANALOG FUEL SENDER INPUT IS SHORTED
- DURING NORMAL OPERATION, IF THE "POWER" LED IS BLINKING AND ALL OF THE BAR LED'S ON THE FUEL GAUGE ARE ARE OFF, THEN THE ANALOG FUEL SENDER INPUT IS OPEN

MODEL# AFP4 (FLOATS CONTROL ONLY):
"FLOATS" CONTROL (SWITCH "SW1" IN "FLOATS" POSITION):
- ALL FUEL LEVEL SWITCH INPUTS ARE ACTIVE (OVER FILL, TANK FULL, LOW LEVEL, & BASIN LEAK)
- THE ANALOG SENDER INPUT AND BAR LED FUEL LEVEL GAUGE ARE INACTIVE
- RELAY OUTPUTS ACTIVATE BASED ON ACTIVATION OF THE CORRESPONDING FUEL LEVEL SWITCH INPUTS

MODEL# AFP2 (FLOATS CONTROL ONLY):
"FLOATS" CONTROL (SWITCH "SW1" IN "FLOATS" POSITION):
- "OVER FILL" AND "TANK FULL" FUEL LEVEL SWITCH INPUTS ARE ACTIVE
- "LOW LEVEL" AND "BASIN LEAK" FUEL LEVEL SWITCH INPUTS AND RELAY OUTPUTS ARE INACTIVE
- THE ANALOG SENDER INPUT AND BAR LED FUEL LEVEL GAUGE ARE INACTIVE
- "OVER FILL" AND "FULL" RELAY OUTPUTS ACTIVATE BASED ON ACTIVATION OF THE CORRESPONDING FUEL LEVEL SWITCH INPUTS

TEST PUSH BUTTON:
- MOMENTARILY PRESS THE "TEST" PUSH BUTTON TO ILLUMINATE ALL OF THE ALARM LED'S AND SOUND THE ALARM HORN

SILENCE PUSH BUTTON:
- WHEN AN ALARM ACTIVATES, THE ALARM HORN WILL SOUND UNTIL IT IS ACKNOWLEDGED. (EVEN IF THE ALARM CLEARS)
- TO ACKNOWLEDGE THE ALARM, PRESS THE "SILENCE" PUSH BUTTON, WHICH WILL SILENCE THE ALARM HORN

THIS AUTOCAD DRAWING IS THE PROPERTY OF GLOBAL POWER COMPONENTS AND MAY NOT BE USED IN ANY WAY DETRIMENTAL TO THE INTERESTS OF G.P.C. ANY MANUAL CHANGES WILL VOID THIS DRAWING. SPECIFICATIONS MAY CHANGE WITHOUT NOTICE.

WIRING

REVISIONS

REV	DATE:	CHANGE MADE	BY

REVISIONS

REV	DATE:	CHANGE MADE	BY

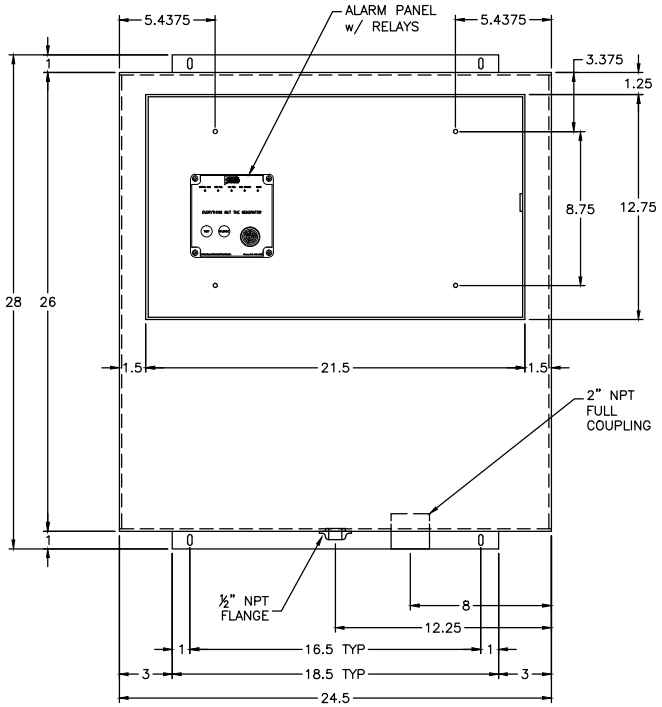
FFAFP4G FUEL ALARM PANEL

CUSTOMER/ID: X
JOB REF: X
DRAWING REF: X
DWG #: MODEL FFAFP4G
DATE: 5/7/14
DRAWN BY: CDP

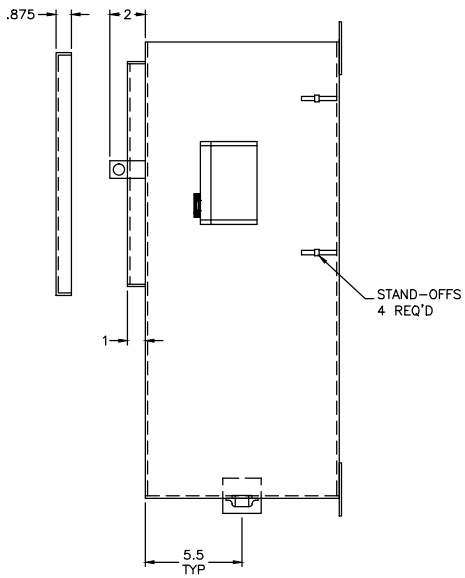
GLOBAL POWER COMPONENTS

JOB #	OPTION #
X	1055-AFP4R

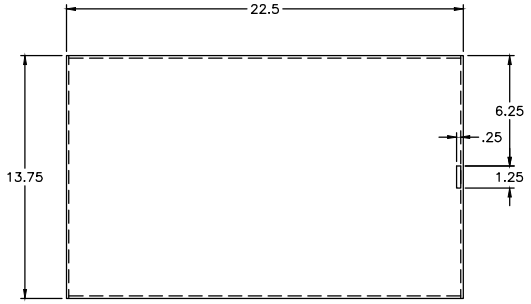
APPROVED BY: _____ DATE: _____



FRONT VIEW (DOOR REMOVED)



SIDE VIEW



FRONT VIEW OF DOOR

REMOTE ALARM FILL STATION
4 FUNCTION ALARM PANEL
WITH RELAYS
AND 14-GALLON SPILL
CONTAINMENT AREA

MATERIAL: 12GA STEEL

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1 – 1

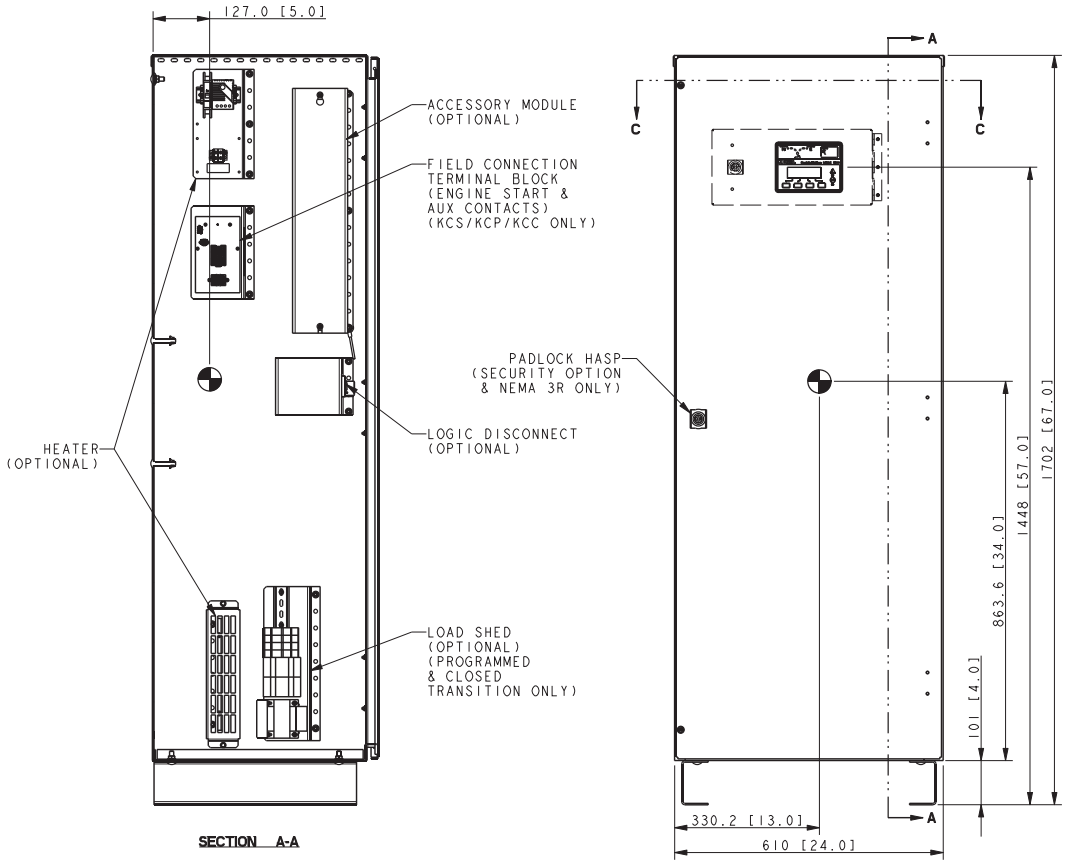
REVISIONS				REVISIONS			
REV	DATE:	CHANGE MADE	BY	REV	DATE:	CHANGE MADE	BY

REMOTE ALARM FILL STATION

CUSTOMER/ID: X
JOB REF: X
DRAWING REF: X
DWG #: 1055
DATE: x
DRAWN BY: MJ

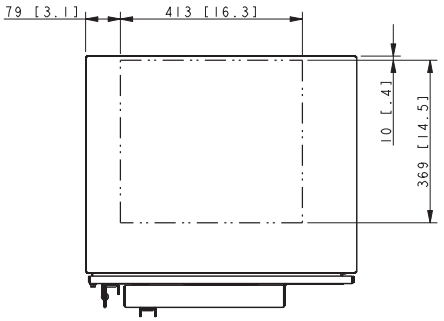
Underwriters Laboratories, Inc. File No. MH18481

GLOBAL POWER COMPONENTS

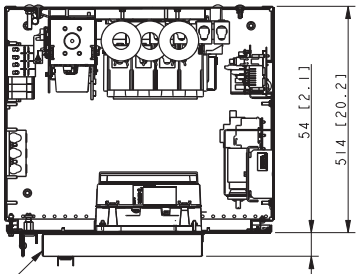


SECTION A-A

NOTE:
ALLOW FOR MINIMUM DOOR SWING CLEARANCE OF 610 [24.0] IN FRONT OF CABINET.



RECOMMENDED ENTRANCE AREA TOP & BOTTOM



SECTION C-C

SECURITY COVER (OPTIONAL ON NEMA 1, REQUIRED ON NEMA 3R)

NOTES:
DIMENSION IN [ ] ARE IN INCHES.

FINISH - ANSI 49 GRAY.

REFER TO OPERATORS MANUAL PRIOR TO INSTALLATION AND OPERATION OF SWITCH.

FOR UNITS WITH SEISMIC CERTIFICATION OPTION, REFER TO ADV-7456 AND INSTALLATION INSTRUCTIONS.

SEE ADV-8565 FOR FULL MODEL CODE DEFINITION

STYLE	MECHANISM	TRANSITION	MPAC LOGIC	VOLTS	POLES	NEUTRAL	ENCLOSURE	AMPS	CONNECTION
KCS	STANDARD	STANDARD	1200,1500	600	2,3,4	SOLID,SW,OVLP	1,3R	230	STANDARD
KCS	STANDARD	STANDARD	1200,1500	208-600	2,3,4	SOLID,SW,OVLP	1,3R	260,400,600	STANDARD
KCP	STANDARD	PROGRAMMED	1200,1500	208-600	2,3,4	SOLID,SW	1,3R	150,225,260,400,600	STANDARD
KCC	STANDARD	CLOSED	1200,1500	208-600	2,3,4	SOLID,SW	1,3R	150,260,400,600	STANDARD
KSS	SPECIFIC BREAKER	STANDARD	1200	600	2,3,4	SOLID,SW,OVLP	1,3R	230	STANDARD
KSS	SPECIFIC BREAKER	STANDARD	1200	208-600	2,3,4	SOLID,SW,OVLP	1,3R	260,400,600	STANDARD

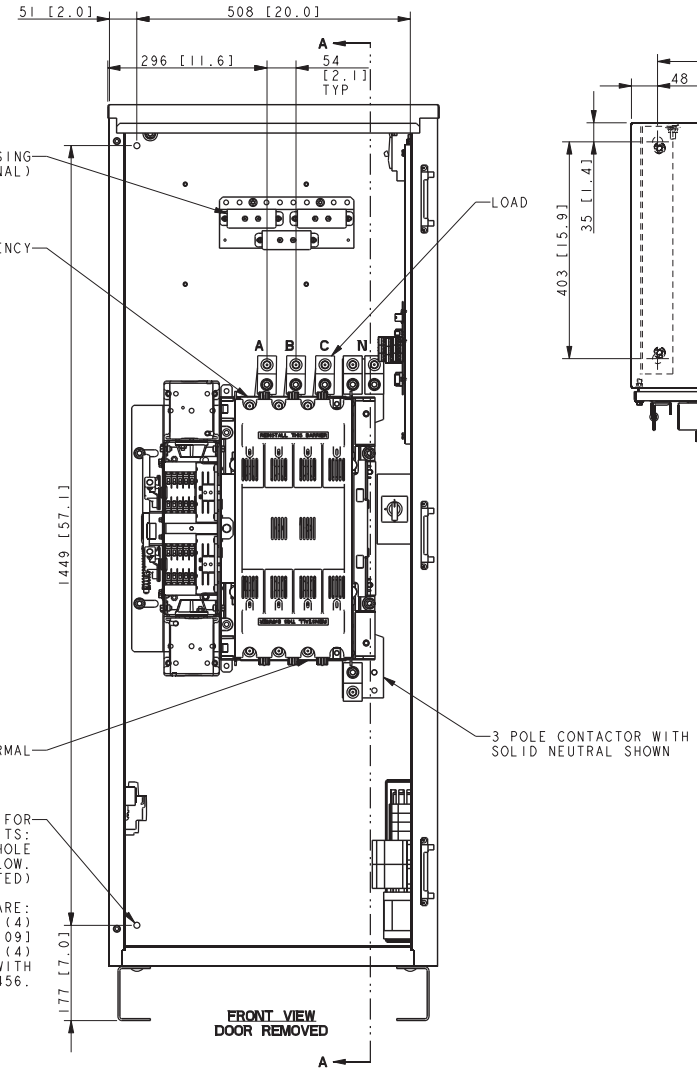
REV	DATE	REVISION	BY
-	8-15-13	NEW DRAWING [CT54441]	BTW
A	6-11-14	SEE SHEET 2 [CT83866]	BTW
B	8-19-16	(A-4-8) CHART AND INFORMATION UPDATED; [CTI56425]	BTW
C	12-14-20	(A-4,8) ADDED 2 ROWS KSS SPECIFIC	
		BREAKER; (B,C,-6) UPDATED NOTES: (C-5,7)	
		ADDED CG; [CT20803I]	ZHK
D	9-3-21	(A-5) REMOVED 225A FROM KCC CHART	
		[CT210709]	ZHK

UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: SURFACE FINISH MAX. THIRD ANGLE PROJECTION

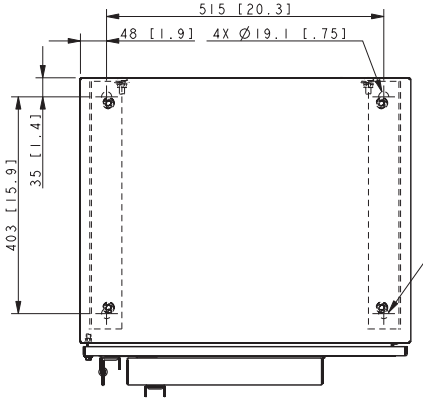
DRAWN BTW 8-15-13
CHECKED BTW 8-15-13
APPROVED MTL 8-15-13

KOHLER CO. METRIC | PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.
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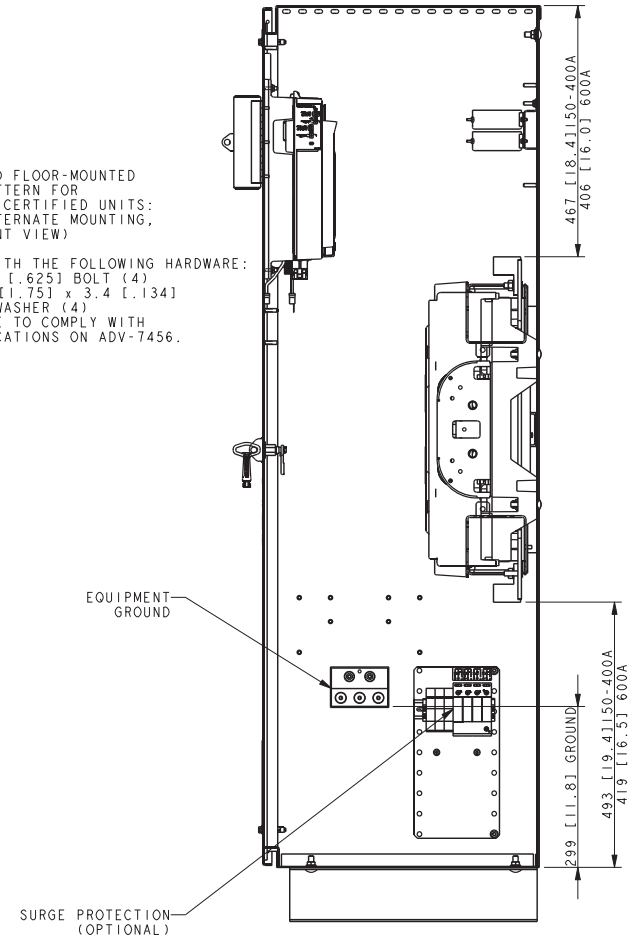
TITLE: DIMENSION PRINT
SCALE | CAD NO. | SHEET 1 of 2
DWG NO. ADV-8570 D



FRONT VIEW
DOOR REMOVED



TOP VIEW
MOUNTING HOLES SHOWN



SECTION A-A

SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTION

SWITCH RATING (AMPS)	RANGE OF AL-CU WIRE SIZES		
	CONTACTOR (PER PHASE)	NEUTRAL (SEE NOTE)	GROUND
150-400	(1) #4 TO 600 KCMIL OR (2) 1/0 TO 250 KCMIL	(3) #4 TO 600 KCMIL OR (6) 1/0 TO 250 KCMIL	(3) #4-600 KCMIL OR (6) 1/0-250 KCMIL
600	(2) #2 TO 600 KCMIL	(6) #2 TO 600 KCMIL	

WEIGHTS KG (LBS)		
2 POLE	3 POLE	4 POLE
179 (395)	183 (403)	188 (414)

REV	DATE	REVISION	BY
-	8-15-13	NEW DRAWING [CT54441]	BTW
A	6-11-14	(B-2) 387 [15.2] NEUTRAL WAS 412 [16.2] NEUTRAL; (D-1) 467 [18.4] 150-400A WAS 480 [18.9] 150-400A & 406 [16.0] 600A WAS 419 [16.5] 600A; [CT83866]	BTW
B	8-19-16	SEE SHEET 1 [CT156425]	BTW
C	12-14-20	(B-2) REMOVED NEUTRAL; (B-5) UPDATED	
		NEUTRAL; [CT20803]	ZHK
D	9-3-21	SEE SHEET 1 [CT210709]	ZHK

UNLESS OTHERWISE SPECIFIED: 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: SURFACE FINISH MAX. THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	BTW	8-15-13
CHECKED	WSD	8-15-13
APPROVED	MTL	8-15-13

KOHLER CO. METRIC | PRO-E

POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

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TITLE: **DIMENSION PRINT**

SCALE | CAD NO. | SHEET 2 of 2

DWG NO. **ADV-8570** | **D**

Cat® D500 GC
Diesel Generator Sets

UK - Parking Structure #8

Standby : 60 Hz



Image shown may not reflect actual configuration.

Engine Model	Cat® C15 In-line 6, 4-cycle diesel
Bore x Stroke	137 mm x 171 mm (5.4 in x 6.8 in)
Displacement	15.2 L (928 in³)
Compression Ratio	16.1:1
Aspiration	Turbocharged Air-to-Air Aftercooled
Fuel Injection System	MEUI
Governor	Electronic ADEM™ A4

Model	Standby	Emission Strategy
D500 GC	500 ekW, 625 kVA	EPA Certified for Stationary Emergency Application

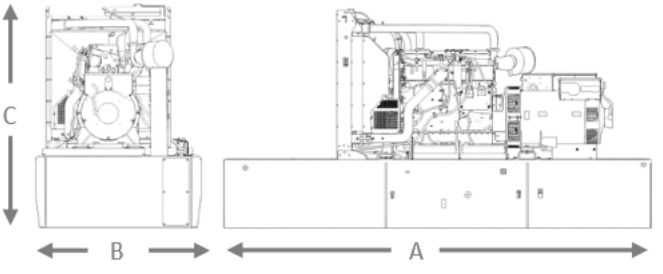
PACKAGE PERFORMANCE

Performance	Standby
Frequency	60 Hz
Genset Power Rating	625 kVA
Genset power rating with fan @ 0.8 power factor	500 ekW
Emissions	EPA TIER 2
Performance Number	DM8155
Fuel Consumption	
100% load with fan, L/hr (gal/hr)	135.2 (35.7)
75% load with fan, L/hr (gal/hr)	109.1 (28.8)
50% load with fan, L/hr (gal/hr)	70.4 (18.6)
25% load with fan, L/hr (gal/hr)	41.3 (10.9)
Cooling System[1]	
Radiator air flow restriction (system), kPa (in water)	0.12 (0.48)
Radiator air flow, m³/min (cfm)	720 (25426)
Engine coolant capacity, L (gal)	20.8 (5.5)
Radiator coolant capacity, L (gal)	54 (14)
Total coolant capacity, L (gal)	75 (20)
Inlet Air	
Combustion air inlet flow rate m³/min (cfm)	38.2 (1347.7)
Max. allowable combustion air inlet temp, °C (°F)	49 (120)
Exhaust System	
Exhaust stack gas temperature, °C (°F)	531.1 (988.0)
Exhaust gas flow rate, m³/min (cfm)	102.1 (3605.5)
Exhaust system backpressure (maximum allowable) kPa (in. water)	10.0 (40.0)
Heat Rejection	
Heat rejection to jacket water, kW (Btu/min)	182 (10375)
Heat rejection to exhaust (total), kW (Btu/min)	493 (28039)
Heat rejection to aftercooler, kW (Btu/min)	121 (6860)
Heat rejection to atmosphere from engine, kW (Btu/min)	91 (5182)
Heat rejection from alternator, kW (Btu/min)	29 (1655)
Emissions (Nominal)[2]	
NOx, mg/Nm³ (g/hp-hr)	2129.1 (4.6)
CO, mg/Nm³ (g/hp-hr)	301.5 (0.6)
HC, mg/Nm³ (g/hp-hr)	8.8 (0.03)
PM, mg/Nm³ (g/hp-hr)	9.5 (0.03)

D500 GC Diesel Generator Sets
Electric Power

Alternator[3]		
Voltages	480V	600V
Motor starting capability @ 30% Voltage Dip, skVA	1160	1350
Current Amps	751.8	601.4
Frame Size	M3154L41	M3136L41
Excitation	S.E	AREP
Temperature Rise, °C	105	130

WEIGHTS & DIMENSIONS – OPEN SET



FUEL TANK CAPACITY

Tank Design	Total Capacity L (gal)	Useable Capacity L (gal)
Integral	3671 (969.7)	3323 (877.8

Base	Length "A" mm (in)	Width "B" mm (in)	Height "C" mm (in)	Generator Set Weight kg (lb)
Skid (Wide Base)	4815 (189.6)	1630 (64.2)	2034 (80.1)	3756 (8280.6)
Integral Tank Base	4815 (189.6)	1630 (64.2)	2584 (101.7)	4693 (10346.3)

Note: General configuration not to be used for installation. See general dimension drawings for detail.

APPLICABLE CODES AND STANDARDS:

AS1359, CSA C22.2 No100-04, UL142, UL489, UL869, UL2200, NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.
Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

RATINGS: Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

FUEL RATES: Based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/litre (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details.
For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

DEFINITIONS AND CONDITIONS

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

[2] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 BTU/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

[3] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

LET'S DO THE WORK.™

LEHE2011-09 (09/22)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: PCPXL15.2NZS-011

Effective Date: 07/05/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 07/05/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PCPXL15.2NZS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

SUBMITTAL COVER SHEET – SS03 REVISION 1

SUBMITTAL STATUS: **SUBMITTED**

H&R Project: 23-111 - Bosworth Building Boiler Replacement **Submittal Date:** 7/28/2023

Submitted By: Chad Walter
Company: H&R Mechanical Contractors, Inc.
PO Box 797

Georgetown, KY 40324
cwalter2@hrmech.com | 502-863-4955

Submitted To: Jason Murphy
Company: University of Kentucky
Accounts Payable
PO Box 77-00056
Lexington, KY 40506
jtmup0@uky.edu | 859-257-9103

Submittal # SS03, Revision 1

HOT WATER BOILER AND PUMP

Spec Section	Type	Supplier	Manufacturer
23 25 16	Product Data	Stoermer Anderson, Inc	Camus

Attachment(s):

S03 R1 Revision_1 Submittal UK Bossworth Boilers 23 25 16 N3D.pdf

Notes:

1. Boiler supplier shall provide dedicated boiler pumps. 2. Provide boilers with gas regulators if pressure drop is exceeded during startup and gas system has to be increased above 14". 3. Provide blocked drain switch. 4. High and Low Gas Pressure Switches Required.

N3D GROUP

REVIEWED FOR GENERAL CONFORMANCE WITH CONSTRUCTION DOCUMENTS ONLY. NOTES AND MARKINGS SHALL NOT BE CONSTRUED AS RELIEVING THE CONTRACTOR FROM COMPLIANCE WITH CONSTRUCTION DOCUMENTS. THIS REVIEW DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS AND OMISSIONS IN DESIGNS WHICH THE CONTRACTOR IS RESPONSIBLE.

☐ NO EXCEPTIONS ☐ RESUBMIT
☒ NOTE MARKINGS ☐ REJECTED

BY: JAN DATE: 8/1/23

Previous submittal items have been addressed above in this letter.

Equipment Submittal

Project Name:	Bosworth Building Boiler Replacement CCK-2731-24	**Spec Section:**	23 52 16
Manufacturer:	Camus Hydronics & Armstrong Pumps	**Date Submitted:**	7/28/2023
Description:	Fire Tube Boilers & Pumps	**Original or Revision #:**	Revision #1

PROJECT INFO: University of Kentucky Bosworth Building
631 S Limestone
Lexington KY 40508

MECHANICAL ENGINEER: ND3 Group
1204 Winchester Rd. Suite 200
Lexington Ky 40506
John A Newman 859-303-5708

CONSTRUCTION MANAGER:

MECHANICAL CONTRACTOR: H & R Mechanical Contractors
106 Demand Ct.
Georgetown KY 40325
Rick Napier 502-863-4955

EQUIPMENT SUPPLIER: Stoermer-Anderson, Inc.
3818 Red Bank Road
Cincinnati, OH 45227

Area below reserved for approval stamps:

Date: 7/18/23
Job: UK Bosworth Boiler Replacement
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H&R Mechanical
End User: University of Kentucky
Prepared By: CET



VALIANT SERIES II

Condensing Boiler – Hydronic Heating

The Valiant-FT Series II is a condensing, commercial boiler, designed for use with a hydronic heating system at working pressures up to 160 PSI.

- ANSI Z21.13/CSA 4.9 Certified
- ASME Certified; “H” Stamp / National Board Listed
- Canadian Registration Number (CRN)
- CSD-1 Compliant
- AHRI Certified

Performance Overview:

- Capable of up to 99.4% Thermal Efficiency and up to 99.2% Combustion Efficiency.
- Available in a broad capacity range, with inputs from 400 to 850 KBtu/h.
- Fully condensing vertical cylindrical counter-flow firetube design heat exchanger, with stainless steel construction and all welded design allowing constant system return temperatures as low as 40F°.
- 10:1 gas input turn-down ratio with sustained combustion characteristics throughout the entire range.
- NOx < 9 ppm corrected to 3% oxygen (Pending Approval).
- Category II & IV venting.
- Fully factory fire-tested to obtain optimum combustion characteristics and to establish certified gas input rates.
- Safety and operating devices and controls fully configured, calibrated and factory tested.
- Complies with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard.
- Certified by CSA to the Requirements of ANSI Z21.13, And CSA 4.9.

H

Date: 7/20/23 Engineer: ND3 Group
Job: UK Bosworth Building Boiler Replace Contractor: H&R Mechanical Contractors
Model #: VA0850 End User: University of Kentucky
Representative: SAI Prepared By: CET

CAMUS Hydronics Ltd.

Heat Exchanger

- ASME Section IV Welded Stainless-Steel Heat Exchanger
- VA0400 to VA0850 – 160 PSI Operating Pressure
- 50°F to 208°F Supply Temperature Range
- Fully welded construction with stainless steel pressure vessel, tubes, tube sheets and combustion chamber
- ASME Relief Valve
- Drain valve

Combustion Features

- Direct Vent (Sealed Combustion)
- Standard Air Filter for combustion air
- Modulating Stainless Steel knitted metal fiber Premix Burner
- Venturi Air/Gas Ratio Combustion Control
- "Inherent O2 Trim" Via Air Density Response
- Low NOx (SCAQMD Pending)
- Natural Gas or Propane Fuel Operation (Field Convertible)
- Input gas pressure is 4"-14" W.C. for Natural Gas (5" W.C. min gas pressure for NG VA0500); and 8"-14" W.C. for Propane.
- 10:1 Turndown for NG (5:1 for LP)
- Category II Venting
- Category IV Venting (120' Flue & 120' Air Intake vent)
- Approved for Thermoplastic Venting (PVC, CPVC, PPE)
- Direct Ignition
- Flame Sensor
- Optional UV flame detection
- Flame view port for visual inspection of ignition and/or the boiler combustion during firing.

Standard Safeties

- Air Pressure Switch
- Blocked Flue Switch
- Water Flow Switch
- High & Low Air Pressure Switches (Blocked Air Intake & Blocked Flue Switch)
- Manual Reset High Temperature Limit
- ΔT heat exchanger protection algorithm

Standard Control Features

- Externally mounted 7" Touchscreen
- System Temperature Sensor
- Inlet & Outlet Temperature Sensors
- Flue Temperature Sensor
- Local/Remote switch for building management, remote modulation and set-point control
- Built-in audible alarm
- SOLA Controller featuring cascade controls lead lag up to 8 boilers
- Manual Reset Soft High Limit (through touchscreen)
- Outdoor Reset
- Alarm Contacts
- Pump Enable Contacts
- Air Inlet Damper (or Damper Contacts)
- PWM (pulse width modulation) signal output for modulating fan speeds.
- Native Modbus Communication
- Lead-Lag Staging
- Flame Signal Monitoring
- Error History w/ Cycle Stamp
- Manual Override of Boiler Modulation Rate

Optional Features

- CSD-1
- Motorized isolation valves
- Condensate neutralization kit
- BMS gateway – BACnet MSTP/IP, LonWorks or Metasys N2
- Outdoor installation kit (Consult Factory)
- Outdoor sensor
- Outdoor vent kit (Consult Factory)
- High & Low Gas Pressure Switch
- Optional Low Water Cut-Off w/manual reset
- Spring return air inlet damper with wire harness
- Vent adapter to Stainless Steel

Venting Options

- Category II and IV venting
- Direct venting
- Standard PVC/CPVC flue vent connection
- Room air
- Horizontal & vertical venting
- Outdoor venting (Consult Factory)

Venting Materials

- PVC
- CPVC
- PPE
- AL29-4C Stainless Steel

The following guideline shall be used to determine the suitability of vent material:

Vent Material	Maximum Flue Temperature (°F)
PVC	149
CPVC	194
Polypropylene	230
AL29-4C	300+, limited only by rating of seals
316L Stainless Steel	300+, limited only by rating of seals

Date: 7/20/23
Job: UK Bosworth Building Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.

Approx. Heat Exchanger Head Loss and Flow

		Model Size									
		400,000		500,000		600,000		725,000		850,000	
		GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd	GPM	ft-hd
Temperature Differential (ΔT)	20	39.00	3.50	49.00	4.80	59.00	4.40	71.00	4.90	83.00	5.70
	30	26.00	2.80	33.00	3.40	39.00	3.20	47.00	3.50	55.00	3.90
	40	20.00	2.50	24.00	2.90	29.00	2.80	35.00	3.00	41.00	3.30
	60	13.00	2.40	16.00	2.50	20.00	2.50	24.00	2.70	28.00	2.80
	80	10.00	2.30	12.00	2.40	15.00	2.30	18.00	2.60	21.00	2.60

Input / Output / High altitude

Model	Max Input Btu/hr (kw)	Max Output Btu/hr (kw)	Max Input > 2000 ft Btu/hr (kw)	Max Output > 2000 ft Btu/hr (kw)	Min input Btu/hr (kw) [NG]	Min Input > 2000 ft Btu/hr (kw) [NG]	Min input Btu/hr (kw) [LP]	Min Input > 2000 ft Btu/hr (kw) [LP]
VA0400	400,000 (117.2)	396,400 (116.2)	360,000 (105.5)	356,760 (104.5)	40000 (11.5)	35,676 (10.4)	80,000 (23.4)	72,000 (21.1)
VA0500	500,000 (146.5)	496,000 (145.3)	450,000 (131.9)	446,400 (130.8)	50000 (14.3)	44,640 (13.0)	100,000 (29.3)	90,000 (26.3)
VA0600	600,000 (175.8)	595,200 (174.4)	540,000 (158.2)	535,680 (157.0)	60000 (17.2)	53,568 (15.7)	120,000 (35.2)	108,000 (31.6)
VA0725	725,000 (212.4)	719,925 (211.0)	652,500 (191.2)	647,932 (189.9)	72500 (20.7)	64,793 (18.9)	145,000 (42.5)	130,500 (38.2)
VA0850	850,000 (249.1)	844,900 (247.6)	765,000 (224.1)	760,410 (222.8)	85000 (24.2)	76,041 (22.3)	170,000 (49.8)	153,000 (44.8)

Minimum Power Requirements

Model	Voltage Requirement	Maximum Over Protection
VA0400	115VAC, 60Hz, Single Phase	15
VA0500	115VAC, 60Hz, Single Phase	15
VA0600	115VAC, 60Hz, Single Phase	15
VA0725	115VAC, 60Hz, Single Phase	15
VA0850	115VAC, 60Hz, Single Phase	15

Model	Weight (lb)	Weight (kg)
VA0400	366	166.02
VA0500	387	175.54
VA0600	417	189.15
VA0725	492	223.17
VA0850	518	234.96

Minimum Service Clearance

Model	Top	Right	Left	Back	Front
VA0400	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0500	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0600	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0725	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)
VA0850	18” (46 cm)	2” (5 cm)	3” (8 cm)	1” (2.5 cm)	24” (70 cm)

*Minimum clearance of 10” recommended on right hand side of appliance for ease of filter replacement.

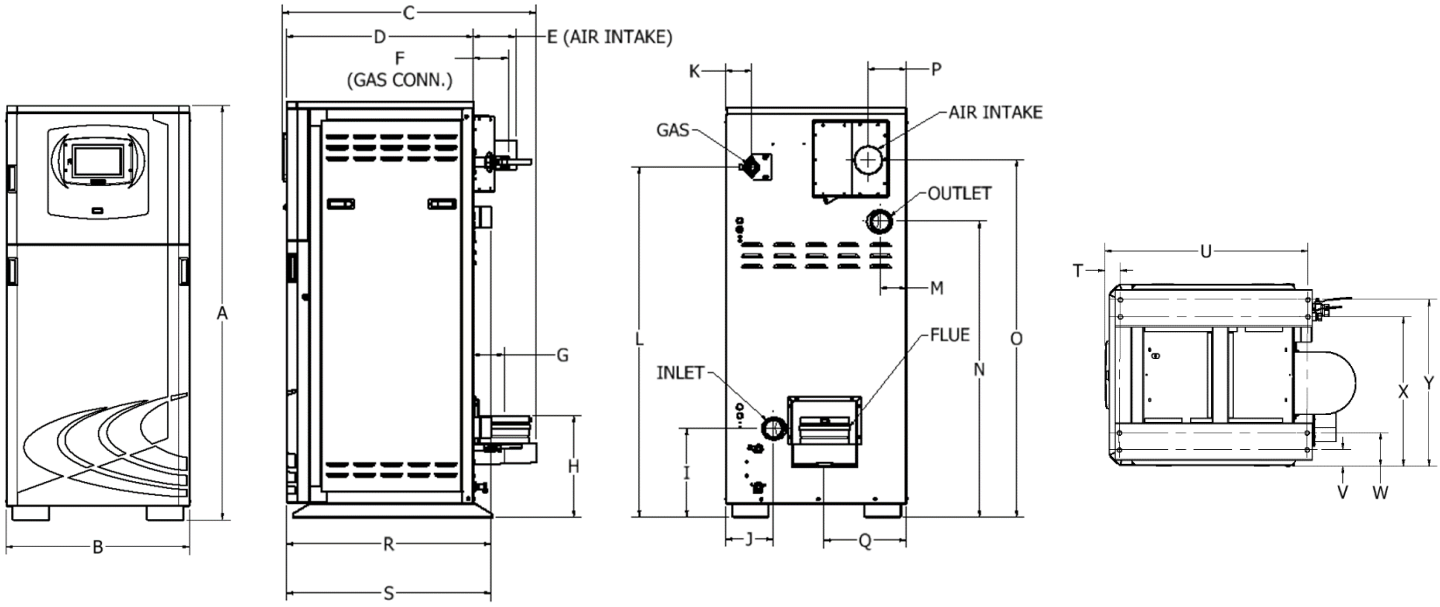
Clearance to Combustibles

Model	Top	Right	Left	Back	Flue Vent
All Models	1” (2.5 cm)	0” (0 cm)	0” (0 cm)	1” (2.5 cm)	1” (2.5 cm)

Date: 7/20/23
Job: UK Bosworth Boiler Replace
Model #: VA0850
Representative: SAI

Engineer: ND3 Group
Contractor: H & R Mechanical Contractors
End User: University of Kentucky
Prepared By: CET

CAMUS Hydronics Ltd.



	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Inches)	400	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	500	57 1/2	22 1/8	31 3/8	23 3/8	6	5 7/8	4 3/8	14	12 1/8	4 3/4	2 1/2	47 1/2
	600	57 1/2	25 1/4	31 3/8	23 3/8	6 5/8	5 3/8	4 3/8	14	12 1/8	7 5/8	2	48 1/2
	725	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8
	850	57 1/2	25 1/4	35	25 7/8	5 7/8	4 7/8	4 1/4	14	12 1/2	6 5/8	3 5/8	49 1/8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Inches)	400	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	500	2 7/8	41 1/2	49 7/8	5 1/2	10 5/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/8	4 1/2	17 5/8	20
	600	3 1/4	41 1/2	49 5/8	5 1/8	10 7/8	27 1/4	27 1/4	2 1/8	25 5/8	2 1/4	4 5/8	20 5/8	23
	~~725~~	~~3 5/8~~	~~41 1/2~~	~~50 1/8~~	~~5 3/8~~	~~11 1/2~~	~~28 7/8~~	~~28 7/8~~	~~2 1/8~~	~~28 1/4~~	~~2 1/4~~	~~4 5/8~~	~~20 7/8~~	~~23 1/4~~
	850	3 5/8	41 1/2	50 1/8	5 3/8	11 1/2	28 7/8	28 7/8	2 1/8	28 1/4	2 1/4	4 5/8	20 7/8	23 1/4

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Inches)	400	2	2	1	4	4
	500	2	2	1	4	4
	600	2	2	1	5	6
	~~725~~	~~2 1/2~~	~~2 1/2~~	~~1~~	~~5~~	~~6~~
	850	2 1/2	2 1/2	1	5	6

	Model	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Dimensions (Millimeters)	400	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	500	1460.5	562.0	796.9	593.7	152.4	149.2	111.1	355.6	308.0	120.7	63.5	1206.5
	600	1460.5	641.4	796.9	593.7	168.3	136.5	111.1	355.6	308.0	193.7	50.8	1231.9
	725	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8
	850	1460.5	641.4	889.0	657.2	149.2	123.8	108.0	355.6	317.5	168.3	92.1	1247.8

	Model	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	"U"	"V"	"W"	"X"	"Y"
Dimensions (Millimeters)	400	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	500	73.0	1054.1	1266.8	139.7	269.9	692.2	692.2	54.0	650.9	54.0	114.3	447.7	508.0
	600	82.6	1054.1	1260.5	130.2	276.2	692.2	692.2	54.0	650.9	57.2	117.5	523.9	584.2
	725	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6
	850	92.1	1054.1	1273.2	136.5	292.1	733.4	733.4	54.0	717.6	57.2	117.5	530.2	590.6

	Model	Water Inlet NPT	Water Outlet NPT	Gas Conn.	Air Intake Ø	Flue Vent Ø
Dimensions (Millimeters)	400	50.8	50.8	25.4	101.6	101.6
	500	50.8	50.8	25.4	101.6	101.6
	600	50.8	50.8	25.4	101.6	152.4
	725	63.5	63.5	25.4	127	152.4
	850	63.5	63.5	25.4	127	152.4

Submittal

Ref. #: SQFNR000569_1

E.2 series dry motor circulator

Model: Series E21.2 STD125

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag number:	BP-1 & BP-2	Pipe orientation:	Single
Service:	Boiler Pumps	Suction pressure:	0 ft
Location:		Fluid:	Non-Potable Fluid - Water
Quantity:	2	Operating temperature:	60˚F
Duty flow per pump:	60 USgpm	Viscosity:	31 SSU
Duty head:	15 ft	Specific gravity:	1.0000
Total dissolved solids:	0 ppm	Efficiency at Design:	N/A
NPSHR:	1 ft	Impeller diameter:	2.7 in

Materials of construction

Construction:	STD 125	Impeller:	Glass-filled Noryl
Rating:	ANSI-125	Bearings:	Permanently Lubricated SS
Connections:	Inlet:1.5 in, Outlet: 1.5 in		

Mechanical seal data

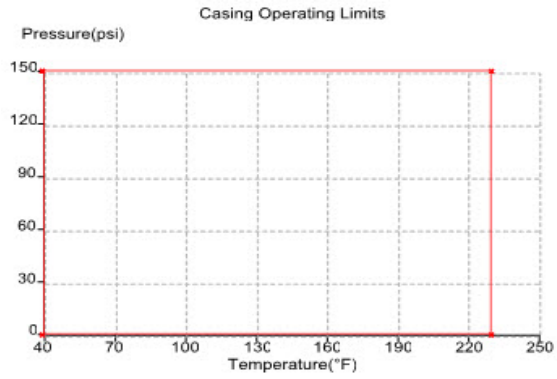
Manufacturer:	Armstrong	Seal:	Silicon Carbide
Seal type:	Bellows-style Silicon Carbide	Maximum Total Dissolved Solid (TDS)*:	2000 PPM

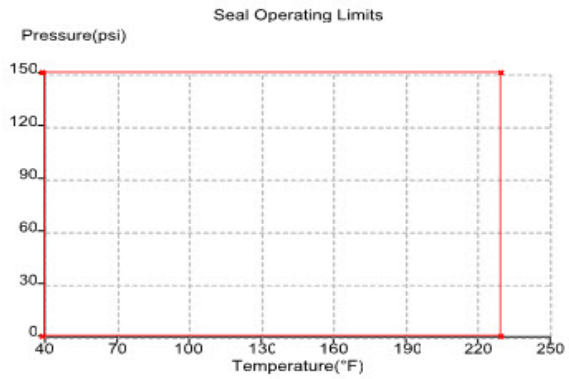
*Note: Please ensure proper seal is selected by inputting Total Dissolved Solids (TDS) in PPM in ADEPT if water quality is poor at site. Also select Flush Line Filter or Cyclone Separator if there are other contaminants in the fluid.

Motor electrical data

Supplier:	Factory Choice	Insulation class:	Class F Insulation
Size:	0.4 hp	Inverter motor type:	[none]
Frame size:	Not applicable	Efficiency:	Std
Enclosure:	ODP	Speed:	3350 rpm
Motor power supply:	115/1/60		

Operating limits (temperature - pressure)



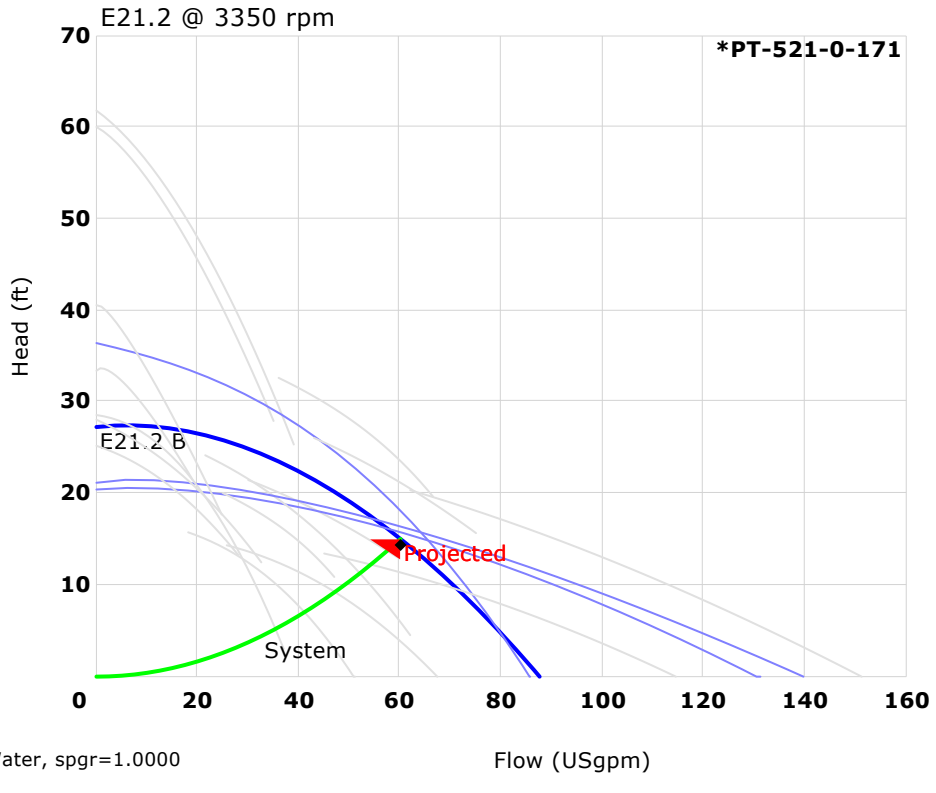


Maximum pressure: 150 psi

Maximum temperature: 230 ˚F

All Pump casings are hydrostatically tested to requirements of ANSI/HI 14.6 standard.

Performance curve



----Admin Data—-
Tag Num: BP-1 & BP-2
Service: Boiler Pumps
Locaion:

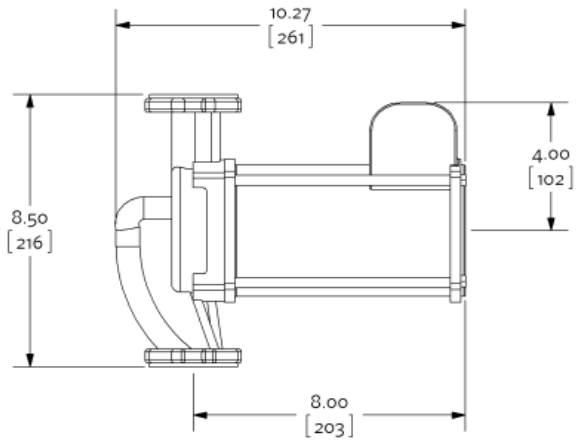
----Motor Data----
Motor Size: 0.4 hp
Motor Speed: 3350 rpm

----Design Duty Points---
Flow: 60 USgpm
Head: 15 ft

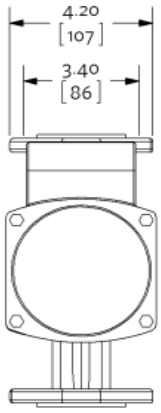
----Pump Data----
Pump Size: E21.2 STD125
Impeller: 2.7 in
Suction Head:0 ft
Projected Flow: 60.0991 USgpm
Projected Head: 15.0404 ft

Dimensional data (not for construction)

Side view



Top view



Weight: 26 lb [11.79 kg], Units of measure: inches [millimeters]

- Not to scale
- Tolerance of ± 0.125 inch (± 3 mm) should be used
- For certified dimensions, please contact your Armstrong representative

Connection details

Connection	Size	Rating	OD	Bolt quantity*	BCD	Bolt size
Inlet	1.5	ANSI-125	5.00	2	3.88	0.5
Outlet	1.5	ANSI-125	5.00	2	3.88	0.5

*Equally spaced straddling centreline

Submittal

Ref. #: SQFNR000569_1

Flo-trex valve

Model: FTV-2TS-Flo-Trex Valve-Straight

Project name:	UK Bosworth Building Boiler Replacement	**Representative:**	Christian Tipton
Location:		**Phone number:**	
Date submitted:	7/28/2023 3:46 AM	**e-mail:**	cet@stoermer-anderson.com
Engineer:	ND3	**Submitted by:**	Tipton, Christian

Application design data

Tag	Qty	Model	Size Inlet/Outlet	Config	Pipe Type	Design flowrate	Pressure Drop*	Associated pump
BP-1 & BP-2	2	FTV-2TS	2 in	Straight	NPT	60 USgpm	3.75 ft	N/A

*at design flow

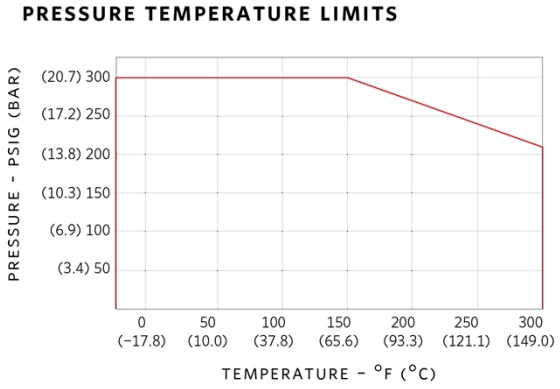
Materials of construction

FTV-2TS-Flo-Trex Valve-Straight

Body:	304 Stainless Steel	Spring:	304 Stainless Steel
Disc:	Brass	O rings:	EPDM
Seat:	Not Applicable	2 metering ports:	Brass Body with EPDM Check and Gasketed Cap
Stem:	Brass	2 drain tappings:	1/4in NPT with SS 304 Plug

Operating limits (temperature - pressure)

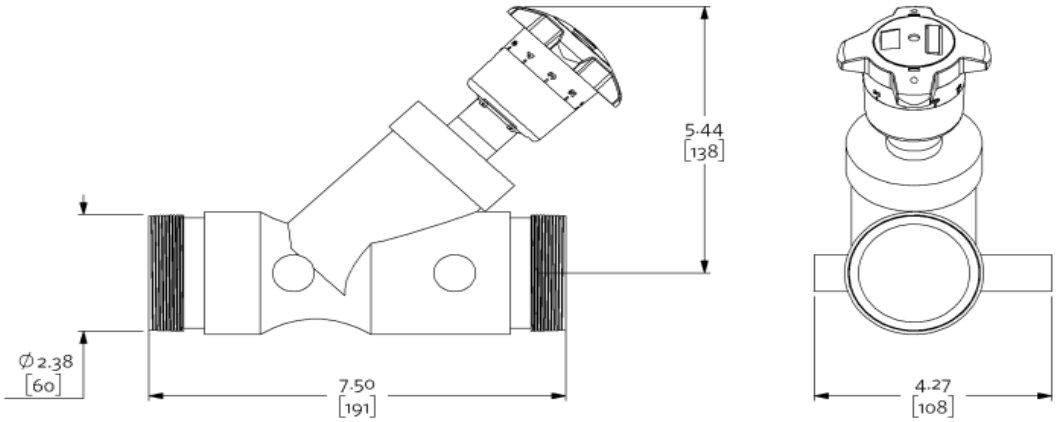
FTV-2TS-Flo-Trex Valve-Straight



Maximum pressure: 300 psi
Maximum temperature: 300 F

Dimensional data (not for construction)

Model: FTV-2TS-Flo-Trex Valve-Straight	Weight: 6 lb [2.72 kg]
Side view	Front view



Not to scale
Units of measure: inches [millimeters]
Tolerance of +/- 0.125 inch (+/- 3 mm) should be used
For certified dimensions, please contact your Armstrong representative

University of Kentucky
Facilites Management
® *Office of the Vice President*

July 27, 2023

Mr. Zack Bittner
Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: Application for the addition of a diesel-fired emergency generator located in the Pence Hall Building to permit V-18-052 R1
University of Kentucky, 21-067-00003, AI 1104

Dear Mr. Bittner:

The University of Kentucky is proposing to install a new 237 hp diesel-fired emergency generator for auxiliary power at the Pence Hall building #0041 located at 507 Library Dr. as part of a University modernization project. Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generator. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines. Construction of the generator does not add any additional regulations to the current V-18-052 R1 permit, and all existing conditions of the permit will be met after the addition. Therefore, we request the Division for Air Quality process the construction as a 502(b)(10) change in accordance with 401 KAR 52:020, Section 17.

We appreciate your timely review and consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Mary S. Vosevich
Vice President, Facilities Management
Chief Facilities Officer

Enclosure: DEP 7007 permit application forms; Air Emission Calculations; Construction Specifications
cc: Mike Duffy/Andrea Smith

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: July 27, 2023

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: 500 ft **Property Area:** 1500

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity:

☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____

☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☑ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* Late August 2023, order

Proposed Operation Start-Up Date: *(MM/YYYY)* July 2024

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☐ **No**

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [x] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Mary S Vosevich
Authorized Signature

7/27/23
Date

Mary S. Vosevich
Type or Printed Name of Signatory

VP for Facilities Management
Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

Other attachment is a complete list of pollutant emissions and calculations contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: July 27, 2023

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
92	237 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Kohler	150REOZJF	08/2023, ordered 07/2024 install	20300101	1000 gal	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
92				100	1.66	177 237	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	100		0.015

Section A.3: Notes, Comments, and Explanations
A complete list of pollutant emissions and calculations is contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: July 27, 2023

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
92	237 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.0117	CO	38.60	mfg cert	0.00%	0.00%	0.45	0.45	0.02	0.02
								NO2	122.00	mfg cert	0.00%	0.00%	1.43	1.43	0.07	0.07
								PM10	3.860	mfg cert	0.00%	0.00%	0.045	0.045	0.002	0.002
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.007	0.007	0.0003	0.0003
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.561	0.561	0.028	0.028
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00150	0.00150	0.00007	0.00007
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00066	0.00066	0.00003	0.00003
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00046	0.00046	0.00002	0.00002
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00189	0.00189	0.00009	0.00009
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00123	0.00123	0.00006	0.00006

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00015	0.00015	0.00001	0.00001
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00027	0.00027	0.00001	0.00001
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	263	263	13	13

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
92	92 01	0.33, est	30, est				1197	950	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 7/27/2023

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
92	Diesel Generator 237 HP (177 kW)	40CFR60, Subpart IIII (60.4202(a)(2) & 60.4205(b)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine is EPA emissions certified to the emission standards of 40 CFR 1039, Appendix I. Per 60.4211(g)(3), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII 60.4209(a) 60.4211(a)(1-2), (f), (g)(2)) 60.4214(b) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the time of operation of the engine and the reason the engine was in operation during that time. Monitor monthly fuel usage.	Per 60.4209(a), the unit must install a non-resettable hours meter since the engine emissions are not certified to the non-emergency emission standards of 60.4201(a) Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Per 60.4211(f), the engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4211(g), **IF** the engine and control device is not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions, or change are made to emission-related settings in a way that is not permitted by the manufacturer, **THEN** demonstrate compliance with 60.4211(g)(2), keep a maintenance plan and records of maintenance, and maintain/operate consistent with good air pollution control practice to minimize emissions. Conduct an initial performacne test within 1 year of startup or within 1 year after engine and control device is no longer installed, configured, operated, and maintained in accordance with the manufacturer's emission-related written instructions, or within 1 year after a change to emission-related settings in a way that is not permitted by the manufacturer. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII 60.4214(b) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the time of operation of the engine and the reason the engine was in operation during that time. Record monthly fuel usage.	Per 60.4214(b), initial notification of date construction is not required for an emergency engine. Per 06.4214(b), since the emergency engine does not meet the standards applicable to non-emergency engines, records must me kept of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. Record the time of operation of the engine and the reason the engine was in operation during that time. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
92	Diesel Generator 237 HP (177 kW)	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
92	Diesel Generator 237 HP (177 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4 or 40CFR60, Subpart IIII 60.4211(g)(2) is triggered .
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations
None

Emissions Associated with EU92 Sanders Brown Generator (Diesel)

92.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	237	hp
Total Engine Rating (kW):	177	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	1.659	MMBtu/hr
Maximum Annual Operating Hours:	100	hrs
Calculated Fuel Consumption in Mgal/hr:	0.0117	Mgal/hr

Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacturer certification. PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

NOx

Emission factor for NOx:	2.83 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	121.9 lb/Mgal	= (2.83 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

CO

Emission factor for CO:	0.90 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	38.6 lb/Mgal	= (0.90 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

PM

Emission factor for PM:	0.090 g/hp-hr	Mfg. Certification
PM emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM10

Emission factor for PM10:	0.090 g/hp-hr	Mfg. Certification
PM10 emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM2.5

Emission factor for PM2.5:	0.090 g/hp-hr	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	3.860 lb/Mgal	= (0.090 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

Emissions Associated with EU92 Sanders Brown Generator (Diesel)

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	7.67E-04	0.105
Acrolein	107-02-8	9.25E-05	0.013
Benzene	71-43-2	9.33E-04	0.128
Formaldehyde	50-00-0	1.18E-03	0.162
Toluene	108-88-3	4.09E-04	0.056
Xylene	1330-20-7	2.85E-04	0.039
Total HAPs			5.02E-01

GHG Emission Factors

CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**121.9**	Mfg. Certification	1.43	0.07
CO	**38.6**	Mfg. Certification	0.45	0.02
VOC	**47.95**	AP-42 Table 3.3-1	0.56	0.03
PM	**3.86**	Mfg. Certification	0.045	0.002
PM10	**3.86**	Mfg. Certification	0.045	0.002
PM2.5	**3.86**	Mfg. Certification	0.045	0.002
SO2	**39.7**	AP-42 Table 3.3-1	0.007	0.0003
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.006	0.0003
Formaldehyde	**0.162**	AP-42 Table 3.3-2	0.002	0.00009
CO2	**22,468**	AP-42 Table 3.3-1, 10/96	263	13
CH4	**0.91**	40 CFR 98, Subpart C, Table C-2	0.011	0.001
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.002	0.0001
GHGs as CO2e	**22,545**	40 CFR 98, Subpart A	264	13

KOHLER

Model: 150REOZJF

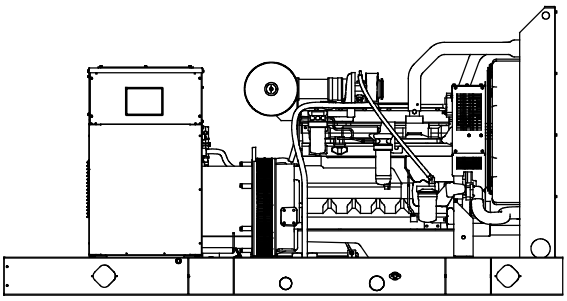
208- 600 V **Diesel**

ISO 9001 KOHLER NATIONALLY REGISTERED

Tier 3 EPA-Certified for Stationary Emergency Applications

Ratings Range

		60 Hz
Standby:	**kW**	106- 154
	kVA	106- 193
Prime:	**kW**	99- 140
	kVA	99- 175



Generator Set Ratings

				130°C Rise Standby Rating		105°C Rise Prime Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4R13X	120/208	3	60	137/171	475	128/160	444
	127/220	3	60	143/179	469	132/165	433
	120/240	3	60	137/171	412	128/160	385
	120/240	1	60	107/107	446	99/99	413
	139/240	3	60	150/188	451	136/170	409
	220/380	3	60	124/155	235	116/145	220
	277/480	3	60	150/188	226	136/170	204
4S12X	120/208	3	60	154/193	534	140/175	486
	127/220	3	60	154/193	505	140/175	459
	120/240	3	60	154/193	463	140/175	421
	120/240	1	60	106/106	442	105/105	438
	139/240	3	60	154/193	463	140/175	421
	220/380	3	60	140/175	266	131/164	249
	277/480	3	60	154/193	232	140/175	210
	347/600	3	60	154/193	185	140/175	168
4S13X	120/208	3	60	154/193	534	140/175	486
	127/220	3	60	154/193	505	140/175	459
	120/240	3	60	154/193	463	140/175	421
	120/240	1	60	113/113	471	113/113	471
	139/240	3	60	154/193	463	140/175	421
	220/380	3	60	154/193	292	140/175	266
	277/480	3	60	154/193	232	140/175	210
	347/600	3	60	154/193	185	140/175	168
4T13X	120/240	1	60	144/144	600	133/133	554

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940 / ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controllers for one-source system integration and remote communication. See Controllers on page 3.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
- Mount up to three circuit breakers to allow circuit protection of selected priority loads.

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth, Permanent-Magnet
Leads: quantity, type	
4RX, 4SX	12, Reconnectable
4TX	4, 120/240 V
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Windings are vacuum-impregnated with epoxy varnish for dependability and long life.
- Superior voltage waveform from a two-thirds pitch stator and skewed rotor.

Specifications		Alternator
Peak motor starting kVA:		(35% dip for voltages below)
480 V	4R13X (12 lead)	540
480 V	4S12X (12 lead)	480
480 V	4S13X (12 lead)	570
240 V	4T13X (4 lead)	440

Application Data

Engine

Engine Specifications	
Manufacturer	John Deere
Engine model	6068HF285K
Engine type	4-Cycle, Turbocharged, Charge Air-Cooled
Cylinder arrangement	6 Inline
Displacement, L (cu. in.)	6.8 (415)
Bore and stroke, mm (in.)	106 x 127 (4.19 x 5.00)
Compression ratio	17.0:1
Piston speed, m/min. (ft./min.)	457 (1500)
Main bearings: quantity, type	7, Replaceable Insert
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	177 (237)
Cylinder head material	Cast Iron
Crankshaft material	Forged Steel
Valve material:	
Intake	Chromium-Silicon Steel
Exhaust	Stainless Steel
Governor: type, make/model	JDEC Electronic L16 Denso HP3
Frequency regulation, no-load to full-load	Isochronous
Frequency regulation, steady state	±0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Exhaust

Exhaust System	
Exhaust manifold type	Dry
Exhaust flow at rated kW, m^3/min. (cfm)	33.9 (1197)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	510 (950)
Maximum allowable back pressure, kPa (in. Hg)	7.5 (2.2)
Exhaust outlet size at engine hookup, mm (in.)	98 (3.86)

Engine Electrical

Engine Electrical System (12/24 Volt*)	
Battery charging alternator:	12 Volt/24 Volt
Ground (negative/positive)	Negative
Volts (DC)	12/24
Ampere rating	65/45
Starter motor rated voltage (DC)	12/24
Battery, recommended cold cranking amps (CCA):	12 Volt/24 Volt
Quantity, CCA rating each	One, 640/Two, 570
Battery voltage (DC)	12

*12-volt or 24-volt engine electrical systems are available.

Fuel

Fuel System	
Fuel supply line, min. ID, mm (in.)	11.0 (0.44)
Fuel return line, min. ID, mm (in.)	6.0 (0.25)
Max. lift, fuel pump: type, m (ft.)	Electronic, 1.8 (6.0)
Max. fuel flow, Lph (gph)	96.9 (25.6)
Max. return line restriction, kPa (in. Hg)	20 (5.9)
Fuel prime pump	Manual
Fuel filter	
Primary	30 Microns
Secondary	2 Microns @ 98% Efficiency
Water Separator	Yes
Recommended fuel	#2 Diesel / HVO / RD

Lubrication

Lubricating System	
Type	Full Pressure
Oil pan capacity, L (qt.) §	27.0 (28.5)
Oil pan capacity with filter, L (qt.) §	27.9 (29.5)
Oil filter: quantity, type §	1, Cartridge
Oil cooler	Water-Cooled

§ Kohler recommends the use of Kohler Genuine oil and filters.

Application Data

Cooling

Radiator System	
Ambient temperature, °C (°F) *	50 (122)
Engine jacket water capacity, L (gal.)	11.3 (3.0)
Radiator system capacity, including engine, L (gal.)	25.7 (6.8)
Engine jacket water flow, Lpm (gpm)	174 (46)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	76.3 (4340)
Heat rejected to air charge cooler at rated kW, dry exhaust, kW (Btu/min.)	31.8 (1810)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	660 (26)
Fan, kWm (HP)	7.7 (10.3)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)

* Enclosure with enclosed silencer reduces ambient temperature capability by 5°C (9°F).
Snow package enclosure with enclosed silencer reduces ambient temperature capability by 10°C (18°F).

Operation Requirements

Air Requirements	
Radiator-cooled cooling air, m^3/min. (scfm)‡	226.5 (8000)
Combustion air, m^3/min. (cfm)	13.6 (480)
Heat rejected to ambient air:	
Engine, kW (Btu/min.)	35.9 (2040)
Alternator, kW (Btu/min.)	12.3 (700)

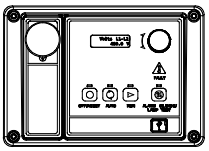
‡ Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption**

Diesel, Lph (gph) at % load	Standby Rating	
100%	44.3	(11.7)
75%	35.1	(9.3)
50%	26.3	(6.9)
25%	16.2	(4.3)
Diesel, Lph (gph) at % load	**Prime Rating**	
100%	40.6	(10.7)
75%	32.3	(8.5)
50%	24.0	(6.3)
25%	14.4	(3.8)

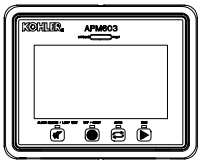
** Volumetric Fuel consumption is up to 4% higher when using HVO/RD than #2 ULSD.

Controllers



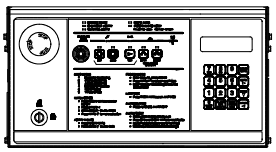
APM402 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.
- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-161 for additional controller features and accessories.



APM603 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.
- 7-inch graphic display with touch screen and menu control provides easy local data access
- Measurements are selectable in metric or English units
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other APM603 controllers only
- Generator management to turn paralleled generators off and on as required by load demand
- Load management to connect and disconnect loads as required
- Controller supports Modbus® RTU, Modbus® TCP, SNMP and BACnet®
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- UL-listed overcurrent protective device
- NFPA 110 Level 1 capability

Refer to G6-162 for additional controller features and accessories.



Decision-Maker® 6000 Paralleling Controller
Provides advanced control, system monitoring, and system diagnostics with remote monitoring capabilities for paralleling multiple generator sets.
- Paralleling capability to control up to 8 generators on an isolated bus with first-on logic, synchronizer, kW and kVAR load sharing, and protective relays
  Note: Parallel with other Decision-Maker® 6000 controllers only
- Digital display and keypad provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or modem configuration
- Controller supports Modbus® protocol
- Integrated voltage regulator with ±0.25% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-107 for additional controller features and accessories.

Modbus® is a registered trademark of Schneider Electric.

BACnet® is a registered trademark of ASHRAE.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Standard Features

- Alternator Protection
- Battery Rack and Cables
- Customer Connection (standard with Decision-Maker® 6000 controller only)
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Available Options

Circuit Breakers

Type

- ❑ Magnetic Trip
- ❑ Thermal Magnetic Trip
- ❑ Electronic Trip (LI)
- ❑ Electronic Trip with Short Time (LSI)
- ❑ Electronic Trip with Ground Fault (LSIG)

Rating

- ❑ 80%
- ❑ 100%

Operation

- ❑ Manual
- ❑ Electrically Operated (for paralleling)

Circuit Breaker Mounting

- ❑ Generator Mounted
- ❑ Remote Mounted
- ❑ Bus Bar (for remote mounted breakers)

Enclosures for Remote Mounted Circuit Breakers

- ❑ NEMA 1
- ❑ NEMA 3R

Approvals and Listings

- ❑ HCAI Pre- Approval
- ❑ CSA Certified
- ❑ IBC Seismic Certification
- ❑ UL 2200 Listing
- ❑ Hurricane Rated Enclosure

Enclosed Unit

- ❑ Snow Enclosure (sound enclosure with enclosed critical silencer, intake hood, and electrical package)
- ❑ Sound Enclosure (with enclosed critical silencer)
- ❑ Weather Enclosure (with enclosed critical silencer)

Open Unit

- ❑ Exhaust Silencer, Critical (kit: PA-354809)
- ❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

- ❑ Flexible Fuel Lines
- ❑ Fuel Pressure Gauge
- ❑ Subbase Fuel Tanks

Controller

- ❑ Common Failure Relay (Decision-Maker® 6000 and APM603 controllers only)
- ❑ Decision-Maker® Paralleling System (DPS) (Decision-Maker® 6000 controller only)
- ❑ Dry Contact (isolated alarm) (Decision-Maker® 6000 controller only)
- ❑ Two Input/Five Output Module (APM402 controller only)
- ❑ Four Input/Fifteen Output Module (APM603 controller only)
- ❑ Lockable Emergency Stop Switch
- ❑ Remote Emergency Stop Switch
- ❑ Remote Serial Annunciator Panel
- ❑ Run Relay (standard with APM603, optional with others)
- ❑ Manual Key Switch (APM603 controller only)
- ❑ Manual Speed Adjust (APM402 controller only)

Cooling System

- ❑ Block Heater, 1800 W, 90- 120 V, 1 Ph
- ❑ Block Heater, 2000 W, 190- 240 V, 1 Ph Required for ambient temperature below 0°C (32°F)
- ❑ Radiator Duct Flange

Electrical System

- ❑ Generator Heater
- ❑ Battery
- ❑ Battery Charger, Equalize/Float Type
- ❑ Battery Heater

Miscellaneous

- ❑ Air Cleaner, Heavy Duty
- ❑ Air Cleaner Restriction Indicator
- ❑ Certified Test Report
- ❑ Crankcase Emissions Canister
- ❑ Engine Fluids Added
- ❑ Rated Power Factor Testing
- ❑ Rodent Guards

Literature

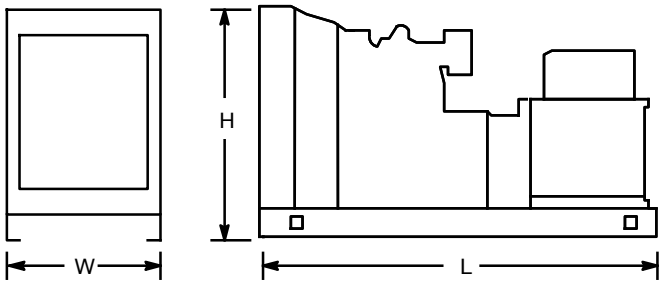
- ❑ General Maintenance
- ❑ NFPA 110
- ❑ Overhaul
- ❑ Production

Warranty

- ❑ 2-Year Basic Limited Warranty
- ❑ 5-Year Basic Limited Warranty
- ❑ 5-Year Comprehensive Limited Warranty

Dimensions and Weights

Overall Size, L x W x H, mm (in.):	2950 x 1120 x 1524 (116.1 x 44.1 x 60.0)
Weight (radiator model), wet, kg (lb.):	1295- 1402 (2855- 3090)



NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

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KOHLER®

150REOZJF

60 HZ. DIESEL INDUSTRIAL GENERATOR SET
EMISSION DATA SHEET

ENGINE INFORMATION

Model:	John Deere, 6068HF285K	Bore:	106mm (4.19 in.)
Nameplate BHP @ 1800 RPM:	237	Stroke:	127mm (5.0 in.)
Type:	4-Cycle, 6 Cylinder, Inline	Displacement:	6.8 L (415 cu. in.)
Aspiration:	Turbocharged, Charge Air-Cooled		
Compression Ratio	17.0:1	EPA Family:	PJDXL06.8120
		EPA Certificate:	PJDXL06.8120-009

PERFORMANCE DATA:

	Table 1			
	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
Engine bkW @ Stated Load	44	89	133	177
Fuel Consumption (g/kWh)	250	244	222	214
Exhaust Gas Flow (m^3/min)				34
Exhaust Temperature (°C)				510

EXHAUST EMISSION DATA:

	Table 2
	EPA D2 Cycle 5-mode weighted
HC (Total Unburned Hydrocarbons)	0.12
NOx (Oxides of Nitrogen as NO2)	3.79
CO (Carbon Monoxide)	1.2
PM (Particulate Matter)	0.12

Values are in g/kWh unless otherwise noted

TEST METHODS AND CONDITIONS

The emission data listed is measured from a laboratory test engine according to the test procedures of 40 CFR 89 or 40 CFR 1039, as applicable. The test engine is intended to represent nominal production hardware, and there is no guarantee that every production engine will have identical test results. The family parent data represents multiple ratings and this data may have been collected at a different engine speed and load. Emission results may vary due to engine manufacturing tolerances, engine operating conditions, fuels used, alternate test methods, or other conditions.

Data and specifications subject to change without notice.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Deere & Company**
(U.S. Manufacturer or Importer)

Certificate Number: **PJDXL06.8120-009**

Effective Date: 06/16/2022

Expiration Date: 12/31/2023

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/16/2022

Revision Date: N/A

Model Year: 2023
Manufacturer Type: Original Engine Manufacturer
Engine Family: PJDXL06.8120

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 130<=kW<225
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Smoke Puff Limiter, Engine Design Modification, Non-standard Non-After Treatment Device Installed

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

University of Kentucky
Facilites Management
Office of the Vice President

June 14, 2022

Mr. Zack Bittner
Division for Air Quality
300 Sower Blvd, 2nd Floor
Frankfort, KY 40601

Subject: University of Kentucky: Permit V-18-052R1, ID 21-067-00003, AI 1104
Addition of generator at the future distilling operations, EU88

Dear Mr. Bittner:

On January 21, 2021, the University of Kentucky submitted an off-permit change for a small-scale research and development distilling operation located on the main campus at the corner of Cooper Drive and Limestone. Since that time, we have determined the necessity of a 69 hp diesel-fired emergency generator on location. Our review determined regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) apply to the generator. Further, section 63.6590(c)(1) states compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*.

The combined emissions of the original equipment and the generator continue to quality as an off-permit change and we request the application process the construction per 401 KAR 52:020, Section 17.

We appreciate your timely review and consideration of the application and look forward to your approval. If you have any questions, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Mary S. Vosevich
Vice President for Facilities Management
Chief Facilities Officer

Enclosure: DEP7007 permit application forms
Air Quality Emission Calculation

c: Mike Duffy/Andrea Smith

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: **University of Kentucky**

KY EIS (AFS) #: **21- 067-00003**

Permit #: **V-18-052 R1**

Agency Interest (AI) ID: **1104**

Date: **6/14/2022**

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: *500 ft*

Property Area: **1500**

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity:

☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____

☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☑ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* 11/2022, est

Proposed Operation Start-Up Date: *(MM/YYYY)* 5/2023, est

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☑ **No**

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [ ] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Mary S. Vosevich
Authorized Signature

6/28/22
Date

Mary S. Vosevich
Type or Printed Name of Signatory

VP for Facilities Management
Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

Other attachment is a complete list of pollutant emissions and calculations contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: 21-067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: 14-Jun-22

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
88	69 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Catepillar	C25 D6	11/2022, est	20300101	1000 gal	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
88				100	0.49	25 69	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	8760		0.015

Section A.3: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 6/14/2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
88	69 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.00242	CO	34.13	mfg cert	0.00%	0.00%	0.0826	0.0826	0.3618	0.3618
								NO2	100.12	mfg cert	0.00%	0.00%	0.2423	0.2423	1.0612	1.0612
								PM10	6.6	mfg cert	0.00%	0.00%	0.0160	0.0160	0.0700	0.0700
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.0014	0.0014	0.0063	0.0063
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	0.1160	0.1160	0.5083	0.5083
								Benzene	0.1278	AP-42, 3.3-2	0.00%	0.00%	0.00031	0.00031	0.0014	0.0014
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00014	0.00014	0.0006	0.0006
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00009	0.00009	0.0004	0.0004
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00039	0.00039	0.0017	0.0017
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00025	0.00025	0.0011	0.0011

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00003	0.00003	0.0001	0.0001
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00006	0.00006	0.0002	0.0002
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	54.37	54.37	238.2	238.2

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
88	88 01	0.5	39.6				290 (cfm)	825	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V
Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: **University of Kentucky**
KY EIS (AFS) #: **21- 067-00003**
Permit #: **V-18-052 R1**
Agency Interest (AI) ID: **1104**
Date: **6/14/2022**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
88	Diesel Generator -69 HP (25 kW)	40CFR60, Subpart IIII (60.4205(b) & 4202(a)(2)) 40CFR1039, Appendix I	CO	3.5 g/KW-hr			Compliance demonstrated through recordkeeping of manufacturer testing.
		same	NOx + HC	4.0 g/KW-hr			Same
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
88	Diesel Generator -69 HP (25 kW)	CO	40CFR60, Subpart IIII (60.4209; 60.4211 (a)(1), (a)(2), (c), (f)); and 60.4214(b)	Monitor the hours of operation and reason for operation.	In accordance with 60.4209(a), the unit does not need to install a non-resettable hours meter. The engine will be operated and maintained by the manufacturer's instructions; change only those emission-related setting that are permitted by the manufacturer; and the engine has been certified to the emission standards. The engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 60.4214 (b) monitor the hours of operation and reason for operation.
		NOx + HC	same	Monitor the hours of operation and reason for operation.	same
		PM	same	Monitor the hours of operation and reason for operation.	same
		SO2	same	Diesel sulfur content	Maintain bill of lading.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
88	Diesel Generator -69 HP (25 kW)	CO	40CFR60, Subpart IIII (60.4214(b))	The hours of operation and reason for operation.	Initial notification is not required and the emergency engine and meets the non-emergency engine standards so a non-settable hour meter is not required. Record the time of operation of the engine and the reason the engine was in operation during that time, 40 CFR 60.4214(b). Bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.
		NOx + HC	same	The hours of operation and reason for operation.	same
		PM	same	The hours of operation and reason for operation.	same
		SO2	same	Diesel sulfur content	Maintain bill of lading.

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
88	Diesel Generator -69 HP (25kW)	CO	401 KAR 52:020, Section 22	Report fuel usage based on hours of operations for calendar year.	Submit necessary information to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same
					NOTE: Engine does not meet the requirements of 60.4211(f)(3)(i-iii) so the annual report in 60.4214(d), is not required.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
88	Diesel Generator -69 HP (25 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same

Section V.6: Notes, Comments, and Explanations

Emissions Associated with EU**88 Distillery** Generator (Diesel)

88.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	69	hp
Total Engine Rating (kW):	25	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	0.486	MMBtu/hr
Maximum Annual Operating Hours:	8760	hrs
Calculated Fuel Consumption in Mgal/hr:	0.00242	Mgal/hr

88.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01
SCC Units:	1000 Gallons Distillate Oil (Diesel)

88.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacture certification. emission factors in AP-42 Table 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition). PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are is based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

88.3.1 NOx

Emission factor for NOx:	0.242 lb/MMBtu	Mfg. Certification
NO_X emission factor in terms of SCC units:	100.12 lb/ Mgal	= (0.242 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.2 CO

Emission factor for CO:	0.083 lb/MMBtu	Mfg. Certification
CO emission factor in terms of SCC units:	34.13 lb/Mgal	= (0.083 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.3 VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.4 PM

Emission factor for PM:	0.016 lb/MMBtu	Mfg. Certification
PM emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.5 PM10

Emission factor for PM10:	0.016 lb/MMBtu	Mfg. Certification
PM10 emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.6 PM2.5

Emission factor for PM2.5:	0.016 lb/MMBtu	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	6.6 lb/Mgal	= (0.016 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

88.3.7 SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 1 MMBtu/hr / 0.00242 Mgal/hr)

Emissions Associated with EU**88 Distillery** Generator (Diesel)

88.3.8 HAP Emission Estimates

> Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	HAP?	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	Y	7.67E-04	0.105
Acrolein	107-02-8	Y	9.25E-05	0.013
Benzene	71-43-2	Y	9.33E-04	0.128
Formaldehyde	50-00-0	Y	1.18E-03	0.162
Toluene	108-88-3	Y	4.09E-04	0.056
Xylene	1330-20-7	Y	2.85E-04	0.039
Total HAPs				5.02E-01

88.3.9 GHG Emission Factors

> CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

88.4 Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**100.1**	Mfg. Certification	0.242	1.06
CO	**34.13**	Mfg. Certification	0.083	0.36
VOC	**47.95**	Mfg. Certification	0.116	0.10
PM	**6.60**	AP-42 Table 3.3-2	0.016	0.07
PM10	**6.60**	AP-42 Table 3.3-2	0.016	0.07
PM2.5	**6.60**	AP-42 Table 3.3-2	0.016	0.07
SO2	**0.60**	AP-42 Table 3.3-2	0.014	0.006
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.002	0.009
Fomaldehyde	**0.162**	AP-42 Table 3.3-2	0.0004	0.002
CO2	22,468	AP-42 Table 3.3-1, 10/96	180	45
CH4	0.91	40 CFR 98, Subpart C, Table C-2	0.007	0.002
N2O	0.18	40 CFR 98, Subpart C, Table C-2	0.001	0.000
GHGs as CO2e	22,545	40 CFR 98, Subpart A	181	45

UK Still & Maturation
Project263213
Generator4-29-22

SHOP DRAWING REVIEW

Marrillia Design and Construction has reviewed this information for general compliance with the contract documents. Sole responsibility for correctness of dimensions, details, quantities and safety during fabrication and installation shall remain the responsibility of the Subcontractor. Shop drawings and submittals by the Subcontractor do not supersede the contract documents. Adherence to the contract documents for all items provided herein shall remain the sole responsibility of the Subcontractor.

☑ Conforms to Design Concept

☐ Conforms to Design Concept as Noted

☐ Non-Conforming - Revised and Resubmit

By: Brian Gravitt, Project Manager

Date: See Date of E-mail for Electronic Transmittal

Arrow Electric Co., Inc.
2321 Maggard Drive
Lexington, Kentucky 40511

ARROW ELECTRIC CO., INC. PROJECT NO 22010003

SHOP DRAWING SUBMITTAL/REVIEW

Generator
SPECIFICATION SECTION- DIVISION 26000

Contractor Approval:

ARROW ELECTRIC CO., INC.
LEXINGTON CONSTRUCTION DEPT.

FOR SUBMITTAL DATE: 04/21/2022 BY MG
REVIEWED ☐
APPROVED AS NOTED ☐
DIASPPROVED, RESUBMIT ☐ **DATE:_____**
FOR CONSTRUCTION ☐ **DATE:_____**

Architect Approval:

Engineer Approval:

UK Still and Maturation Building
Arrow Electric

CUMMINS / C25D6 25
CUMMINS / OTEC 125 (2)

Cummins Sales and Service

CORPORATE OFFICE
111 Monument Circle
Indianapolis, IN 46204
(317) 243-7979 (P)
(317) 240-1925 (F)

CROSS LANES BRANCH
602 New Goff Mountain Road
Cross Lanes, WV 25313
(304) 769-1012 (P)
(304) 769-1022 (F)

EVANSVILLE BRANCH
7901 Highway 41 North
Evansville, IN 47725
(812) 867-4400 (P)
(812) 867-4411 (F)

FAIRMONT BRANCH
25 Gateway Drive
White Hall, WV 26554
(304) 367-0196 (P)
(304) 367-1077 (F)

FORT WAYNE BRANCH
3415 Coliseum Blvd. West
Fort Wayne, IN 46808
(260) 482-3691 (P)
(260) 484-8930 (F)

HAZARD BRANCH
1868 S KY Hwy 15
Hazard, KY 41702
(606) 436-5718 (P)
(606) 436-5048 (F)

INDIANAPOLIS BRANCH
3621 W. Morris Street
Indianapolis, IN 46242
317) 486-5287 (P)
317) 240-1215 (F)

LOUISVILLE BRANCH
9820 Bluegrass Parkway
Louisville, KY 40299
(502) 495-0677 (P)
(502) 499-7499 (F)

MISHAWAKA BRANCH
3025 North Home Street
Mishawaka, IN 46545
(574) 252-2154 (P)
(574) 252-2156 (F)

Cummins
Sales and Service

Power Systems
9820 Bluegrass Parkway
Louisville, KY 40299
(502) 495-0677
Fax: (502) 499-7499

UK Still and Maturation

Arrow Electric

For assistance, questions or concerns on any material contained within this submittal packet contact one of the following people:

Jason Schneider
Area Sales Manager
Cummins, Inc. dba Cummins Sales and Service
120 West Spring Street, Suite 401
New Albany, IN 47150

Phone (502) 495-0677
Cell (502) 648-8575
Fax (502) 499-7499

Andrew Renn
Inside Sales
Cummins, Inc. dba Cummins Sales and Service
120 West Spring Street, Suite 401
New Albany, IN 47150

Phone (502) 403-2107
Cell (317) 965-2222
Fax (502) 499-7499

NOTICE

A COPY OF THIS GENERATOR SET SUBMITTAL MUST BE RETURNED TO OUR OFFICE, APPROVED IN ITS ENTIRETY AND BEARING THE DATE OF APPROVAL, STAMP OR SIGNATURE AND TITLE OF THE APPROVING AUTHORITY, BEFORE ANY ITEM WILL BE RELEASED FOR MANUFACTURE OR SHIPMENT. WE ASSUME NO RESPONSIBILITY FOR DELAYS IN OUR FORECASTED SHIPPING SCHEDULES ON ANY ITEM ON WHICH SUBMITTAL APPROVAL IS BEYOND THIRTY (30) DAYS FROM THE SUBMISSION DATE ON THE COVER PAGE.

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY OF FROM OUR VENDORS. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS IS POSSIBLE. PLEASE REVIEW IT CAREFULLY AND THOROUGHLY.

Cummins
Sales and Service

Power Systems
9820 Bluegrass Parkway
Louisville, KY 40299
(502) 495-0677
Fax: (502) 499-7499

Power Generation

Table of Contents

UK Still and Maturation Building

	Page
Cover Letter	1
Contacts	2
Notice Letter	3
Table of Contents	4
Bill of Materials	5-6
Generator Specification Sheet	7-11
Generator Data Sheet	12-14
Generator PowerCommand Control - PCC 1.1	15-20
Generator Alternator Data Sheet	21-22
Prototype Test Certificate	23
Prototype Test Summary Report	24
Generator Open Unit Drawing.pdf	25-26
Generator Circuit Breaker Specification Sheet	27-30
Generator Circuit Breaker Drawing	31
Generator Accessories Option Drawing	32
Generator Enclosure Sound Data Sheet	33
Generator Fuel Tank Specification Sheet	34-36
Generator Enclosure Drawing	37
Generator Fuel Tank Drawing	38
Generator Fuel Tank Stub Area Drawing	39
Automatic Transfer Switch Specification Sheet	40-51
Automatic Transfer Switch Drawing - 125A	52
Generator Docking Station Submittal - 200A	53-59
Generator Annunciator Panel Specification Sheet	60-63
Generator Battery Charger Specification Sheet	64-65
CDUC ProtoAir Specification Sheet	66-135
Generator Emergency Stop Switch Data Sheet	136
Preventative Maintenance Literature	137
Generator - ATS - Accessories Wiring Diagram	138-140
Generator Warranty Statement - Base	141-142
Automatic Transfer Switch Warranty Statement - Base	143-144

Sales and Service

Bill of Materials

Feature Code	Description	Qty
C25 D6	**C25D6, Diesel Genset, 60Hz, 25kW**	1
US-Stat	U.S. EPA, Stationary Emergency Application	
C25 D6	C25D6, Diesel Genset, 60Hz, 25kW	
A331-2	Duty Rating-Standby Power (ESP)	
L169-2	Emission Certification, EPA, Tier 3, NSPS CI Stationary Emergency	
C301-2	Fuel Tank-Regional, Dual Wall, Sub Base, 24 Hour Minimum	
L090-2	Listing-UL 2200	
L193-2	NFPA 110 Type 10 Level 1 Capable	
C310-2	Low Fuel Level Switch, 40%	
C311-2	Tube-Fuel Tank, Fill Down, 6" from Bottom	
C312-2	Mechanical Fuel Gauge	
C314-2	5 Gallon Lockable Spill Containment Fuel Fill Box	
C318-2	Switch-Fuel Tank, Rupture Basin	
H608-2	Control Mounting-Right Facing	
H700-2	PowerCommand1.1 Controller	
H012-2	Gauge-Oil Pressure	
H536-2	Control Display Language-English	
KV04-2	Load Connections-Dual	
KV41-2	Circuit Breaker, Location A, 125A, 3P, 600 Volts AC, 80%, UL	
KV91-2	Circuit Breaker, Location B, 125A, 3P, 600 Volts AC, 80%, UL	
A366-2	Engine Governor-Electronic, Isochronous	
A422-2	Engine Starter-12 Volt DC Motor	
D041-2	Engine Air Cleaner-Normal Duty	
A333-2	Battery Charging Alternator	
BB89-2	Battery Charger-6 Amp, Regulated	
E125-2	Engine Cooling-Radiator, High Ambient Air Temperature, Ship Fitted	
E089-2	Extension-Coolant Drain	
H669-2	Engine Coolant-50% Antifreeze, 50% Water Mixture	
B979-2	Exciter/Regulator-Excitation Boost System (EBS)	
E153-2	Coolant Heater	
R098-2	Voltage-120/208, 3 Phase, Wye, 4 Wire	
H268-2	Extension-Oil Drain	
H706-2	Engine Oil	
L028-2	Genset Warranty-2 Years Base	
B946-2	Alternator-60Hz, 12L, 208/120V, 120C, 40C Ambient	
L050-2	Literature-English	
A322-2	Packing-Skid, Poly Bag	
F231-2	Aluminum Sound Attenuated Level 1 Enclosure, with Exhaust System	
P176-2	Enclosure Color-Green, Aluminum	
F252-2	Enclosure-Wind Load 180 MPH, ASCE7-10	
F253-2	Larger Battery Rack	
F179-2	Skidbase-Housing Ready	
OTECA	**OTECA, OTEC Transfer Switch-Electronic Control: 125A**	2
OTEC125	OTEC125, Transfer Switch-Electronic Control, 125 Amp	
M032-7	Relay-Elevator Signal	
A046-7	Listing-UL 1008/CSA Certification	
A035-7	Application-Utility to Genset	
G004-7	Transfer Switch Warranty-2 Year Comprehensive	
B001-7	Cabinet-Type 1	
A029-7	Poles-4 (Switched Neutral)	
A044-7	Frequency-60 Hz	
A042-7	System-3 Phase, 3 or 4 Wire	
R021-7	Voltage-208 Volts AC	
M033-7	Genset Starting Battery-12V DC	
C110-7	PC40 Control	

Docking Station	**Generator connection panel 100 amp**	2
SU-5000	**Service - start up & testing**	1
BL-5000	**Service - building load test 1 hour**	1
E-Stop	**Remote E-stop**	1
PM Agreement	**Preventive maintenance agreement 1 year with quarterly exercising**	
A045J201	**Annunciator**	1
CDUC	**ProtoAir - BacNet**	1

Specification sheet

Diesel generator set

25 kW - 40 kW

EPA emissions

stationary Standby



Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

Cummins heavy-duty engine - Rugged 4-cycle, liquid-cooled, industrial diesel engine delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard cooling package provides reliable running at up to 50 °C (122 °F) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminum material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7-10. The intelligent design has removable panels and service doors to provide easy access for service and maintenance.

Fuel tanks - Two dual wall sub-base fuel tank series are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby rating 60 Hz		Prime rating 60 Hz		Data sheets 60 Hz
Model	kW	kVA	kW	kVA	
C25 D6	25	31.3	22.7	28.4	NAD-5860
C30 D6	30	37.5	27	33.8	NAD-5861
C35 D6	35	43.8	32	40	NAD-5862
C40 D6	40	50	36	45	NAD-5863

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Generator set specifications

Governor regulation class	ISO8528 Part 1 Class G2
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 0.5% - 3 Phase only
Frequency regulation	Isochronous
Random frequency variation	± 0.5%
Radio frequency emissions compliance	FCC code Title 47 Part 15 Class B

Engine specifications

Bore	95.0 mm (3.74 in.)
Stroke	115.1 mm (4.53 in.)
Displacement	3.3 litres (199 in^3)
Configuration	Cast iron, in-line, 4 cylinder
Battery capacity	550 amps at ambient temperature of 0 °F to 32 °F (-18 °C to 0 °C)
Battery charging alternator	40 amps
Starting voltage	12 volt, negative ground
Fuel system	Indirect injection, number 2 diesel fuel, fuel filter, electric fuel shut off
Fuel filter	Single element, 10 micron filtration, spin-on fuel filter with water separator
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Spin-on, full flow
Standard cooling system	50 °C (122 °F) ambient cooling system

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 ºC (248 °F) Standby
Exciter type	Torque match (shunt) with PMG/EBS as option
Alternator cooling	Direct drive centrifugal blower
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	0.03

Available voltages

Single phase	3 phase			
• 120/240	• 120/208	• 120/240 delta	• 277/480	• 347/600

Note: Consult factory for other voltages.

Generator set options

Fuel system

- Basic fuel tanks
- Regional fuel tanks

Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain

Alternator

- 120 °C (248 °F) temperature rise alternator
- 105 °C (221 °F) temperature rise alternator
- Excitation Boost System (EBS) or PMG
- Alternator heater, 120 V

Control

- AC output analog meters (bargraph)
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- Single circuit breaker
- Dual circuit breakers
- 80% rated circuit breakers
- 100% rated circuit breakers

Enclosure

- Aluminum enclosure sound level 1 or level 2, with muffler installed, sandstone or green color
- Open set

Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Cold weather option for operating at <4 °C (40 °F)

Exhaust system

- Exhaust connector - NPT
- Open set with muffler mounted

Generator set application

- Battery rack, larger battery
- Radiator outlet duct adapter

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Generator set options (continued)

Warranty

- Base warranty – 2 year, 1000 hour, Standby
- Standby, 3 year, 1500 hour, parts
- Standby, 5 year, 2500 hour, parts
- Standby, 3 year, 1500 hour, parts and labor
- Standby, 5 year, 2500 hour, parts and labor
- Standby, 3 year, 1500 hour, parts, labor and travel
- Standby, 5 year, 2500 hour, parts, labor and travel

Generator set accessories

- Coolant heater kit
- Battery rack, larger battery
- Battery heater kit
- HMI211RS in-home display, including pre-configured 12” harness
- HMI211 remote display, including pre-configured 12” harness
- HMI220 remote display
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Remote monitoring device – PowerCommand 500
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Enclosure paint touch up kit
- Mufflers – industrial, residential or critical
- Alternator Excitation Boost System (EBS) or PMG
- Alternator heater
- Maintenance and service kit
- Engine lift kit
- Various fuel tanks and accessories

Control system PowerCommand 1.1





PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown

Alternator data

- Line-to-Line and Line-to-Neutral AC volts
- 3-phase AC current
- Frequency
- Total kVa

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

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Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic Transfer Switch (ATS) control
- Generator set exercise, field adjustable

Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)
- Digital governing
- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):

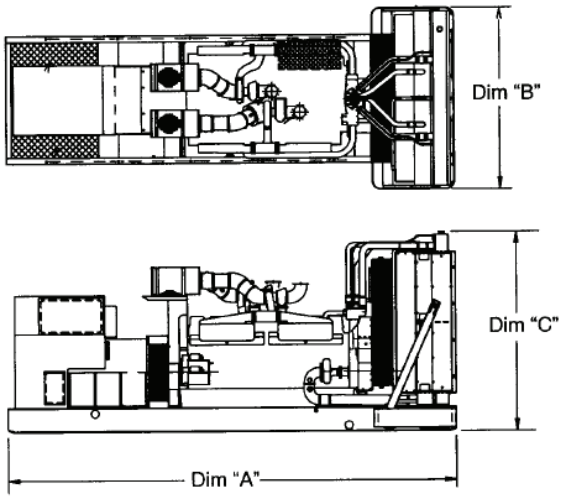
Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

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Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set weight* dry kg (lbs)	Set weight* wet kg (lbs)
Open set					
C25 D6	2224 (87.5)	864 (34)	1121 (44.13)	504 (1115)	525 (1161)
C30 D6	2224 (87.5)	864 (34)	1121 (44.13)	533 (1178)	553 (1224)
C35 D6	2224 (87.5)	864 (34)	1121 (44.13)	552 (1221)	573 (1267)
C40 D6	2224 (87.5)	864 (34)	1121 (44.13)	566 (1252)	587 (1298)
Sound attenuated enclosure Level 1					
C25 D6	2384 (93.8)	864 (34)	1156 (45.5)	551 (1219)	572 (1265)
C30 D6	2384 (93.8)	864 (34)	1156 (45.5)	580 (1282)	600 (1328)
C35 D6	2384 (93.8)	864 (34)	1156 (45.5)	599 (1325)	620 (1371)
C40 D6	2384 (93.8)	864 (34)	1156 (45.5)	613 (1356)	634 (1402)
Sound attenuated enclosure Level 2					
C25 D6	2629 (103.5)	864 (34)	1156 (45.5)	570 (1261)	591 (1307)
C30 D6	2629 (103.5)	864 (34)	1156 (45.5)	599 (1324)	619 (1370)
C35 D6	2629 (103.5)	864 (34)	1156 (45.5)	618 (1367)	639 (1413)
C40 D6	2629 (103.5)	864 (34)	1156 (45.5)	632 (1398)	653 (1444)

* Weights represent a set with standard features. See outline drawings for weights of other configurations.

see below drawings for overall shipping weight and dimensions

Codes and standard

Codes or standards compli… all model configurations – consult factory for availability.

ISO 9001	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.	UL	The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
PTS	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.
CSA	All low voltage models are CSA certified to product class 4215-01.	**International Building Code**	The generator set is certified for seismic application in accordance with International Building Code (IBC) 2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

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Generator set data sheet

Model:	**C25 D6**
Frequency:	**60 Hz**
Fuel type:	**Diesel**
kW rating:	**25 Standby** **22.7 Prime**
Emissions level:	**EPA Emission Stationary Standby**

Exhaust emission data sheet:	**EDS-1182**
Exhaust emission compliance sheet:	**EPA-1251**
Sound performance data sheet:	**MSP-1180**
Cooling performance data sheet:	**MCP-262**
Prototype test summary data sheet:	**PTS-322**

Fuel consumption

	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	25 (31.25)				22.7 (28.325)			
Load	**1/4**	**1/2**	**3/4**	**Full**	**1/4**	**1/2**	**3/4**	**Full**
US gph	0.94	1.42	1.91	2.42	0.85	1.29	1.74	2.20
L/hr	3.56	5.37	7.23	9.16	3.22	4.88	6.59	8.33

Engine

	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	4BT3.3-G5	
Configuration	Cast iron, in-line, 4 cylinder	
Aspiration	Turbocharged	
Gross engine power output, kWm (bhp)	51 (69)	45 (60)
BMEP at set rated load, kPa (psi)	634.31 (92.0)	576.40 (83.6)
Bore, mm (in.)	95 (3.74)	
Stroke, mm (in.)	115 (4.53)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	6.9 (1359)	
Compression ratio	20.8:1	
Lube oil capacity, L (qt)	7.9 (8.35)	
Overspeed limit, rpm	2250	

Fuel flow

Maximum fuel flow, L/hr (US gph)	49.5 (13.1)
Maximum fuel inlet restriction with clean filter, mm Hg (in Hg)	58.42 (2.3)
Maximum return restriction, mm Hg (in Hg)	375.92 (14.8)

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Air

	Standby rating	Prime rating
Combustion air, m^3/min (scfm)	3.42 (121)	3.34 (118)
Maximum air cleaner restriction with clean filter, kPa (in H_2O)	1.25 (5)	
Alternator cooling air, m^3/min (cfm)	11.41 (403)	

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	8.21 (290)	7.90 (279)
Exhaust temperature, °C (°F)	440.5 (825)	427 (801)
Maximum back pressure, kPa (in H_2O)	10.22 (41)	10.22 (41)
Actual exhaust back pressure with CPG fitted muffler, kPa (in H_2O)	3.51 (14.1)	3.26 (13.1)

Standard set-mounted radiator cooling[1]

Ambient design, °C (°F)	50 (122)	
Fan load, kW_m (HP)	2.79 (3.8)	
Coolant capacity (with radiator), L (US gal)	14.8 (3.9)	
Cooling system air flow, m^3/min (scfm)	93.2 (3290)	
Total heat rejection, MJ/min (Btu/min)	1.54 (1456.25)	1.435 (1359.38)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)	

Weights[2]

Unit dry weight kgs (lbs)	554 (1219)
Unit wet weight kgs (lbs)	574 (1265)

see below drawings for overall shipping weight and dimensions

Notes:

[1] For non-standard remote installations contact your local Cummins representative.

[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available up to 3050 m (10,000 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 3% per 300 m (985 ft) and 6% per 10 °C (18 °F).
Prime	Engine power available up to 3050 m (10,000 ft) and ambient temperatures up to 50 °C (122 °F). Above these conditions, derate at 3% per 300 m (985 ft) and 6% per 10 °C (18 °F).

Ratings definitions

Emergency Standby Power (ESP):	Limited-Time Running Power (LTP):	Prime Power (PRP):	Base Load (Continuous) Power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited-Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

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Alternator data

Standard alternators		Single phase table	Three phase table			
Maximum temperature rise above 40 °C ambient		120 °C	120 °C	120 °C	120 °C	120 °C
Feature code		B949-2	B946-2	B986-2	B943-2	B952-2
Alternator data sheet number		ADS-571	ADS-571	ADS-571	ADS-571	ADS-571
Voltage ranges		120/240	120/208	120/240	277/480	347/600
Voltage feature code		R104-2	R098-2	R106-2	R002-2	R114-2
Surge kW		38.86	39.31	39.31	39.31	39.31
Motor starting kVA (at 90% sustained voltage)	Shunt	48	59	59	59	59
	EBS	78	94	94	94	94
Full load current amps at Standby rating		104	86.8	75.2	37.6	30

Optional alternators for improved motor-starting capability		Single phase table	Three phase table			
Maximum temperature rise above 40 °C ambient		105 °C	105 °C	105 °C	105 °C	105 °C
Feature code		BB96-2	BB93-2	BB94-2	BB95-2	BB92-2
Alternator data sheet number		ADS-576	ADS-574	ADS-574	ADS-574	ADS-574
Voltage ranges		120/240	120/208	120/240	277/480	347/600
Voltage feature code		R104-2	R098-2	R106-2	R002-2	R114-2
Surge kW		39.04	39.49	39.49	39.49	39.49
Motor starting kVA (at 90% sustained voltage)	Shunt	57	71	71	71	71
	EBS	93	113	113	113	113
Full load current amps at Standby rating		104	86.8	75.2	37.6	30

Notes:

[1] Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor. Also see Note 3 below.

[2] The broad range alternators can supply single phase output up to 2/3 set rated 3-phase kW at 1.0 power factor.

[3] The extended stack (full single phase output) and 4 lead alternators can supply single phase output up to full set rated 3-phase kW at 1.0 power factor.

Formulas for calculating full load currents:

Three phase output

$$\frac{\text{kW} \times 1000}{\text{Voltage} \times 1.73 \times 0.8}$$

Single phase output

$$\frac{\text{kW} \times \text{SinglePhaseFactor} \times 1000}{\text{Voltage}}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

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Dual wall sub-base diesel fuel tanks -

10-200 kW generator sets



Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5	QSB7-G5
Generator set model names	C10D6	C20D6	C25D6	C50D6	C50D6C	C125D6D
	C15D6		C30D6	C60D6	C60D6C	C150D6D
			C35D6		C80D6C	C175D6D
			C40D6		C100D6C	C200D6D
					C125D6C	

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Regional fuel tanks

Standard features:

UL 142 and ULC-S601 listed - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

UL 142 & ULC-S601 listed - Minimum 125% secondary containment capacity.

NFPA & IFC - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

Emergency pressure relief vents - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

Normal atmospheric vent - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

Raised fuel fill - Includes lockable sealed fuel cap.

Lifting eyes - Allow lifting of fuel tank with generator set installed.

Optional features:

Secondary containment basin switch (rupture switch) - Activates a warning in the event of a primary tank leak. Side Mounted.

Low fuel level switch - Activates a warning when 40% of the fuel is left in the tank.

Fuel level gauge - Provides direct reading of fuel level. Top mounted.

Electric fuel level sender with gauge - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

Tank to foundation clearance - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

Spill containment box for fuel fill - 5 gallon capacity with integral drain (to tank). Lockable lid.

Overfill prevention valve - Shuts off fuel flow during filling at approximately 95% full*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

High fuel switch - Activates at 90% of full fuel level. Flying leads for customer connection.

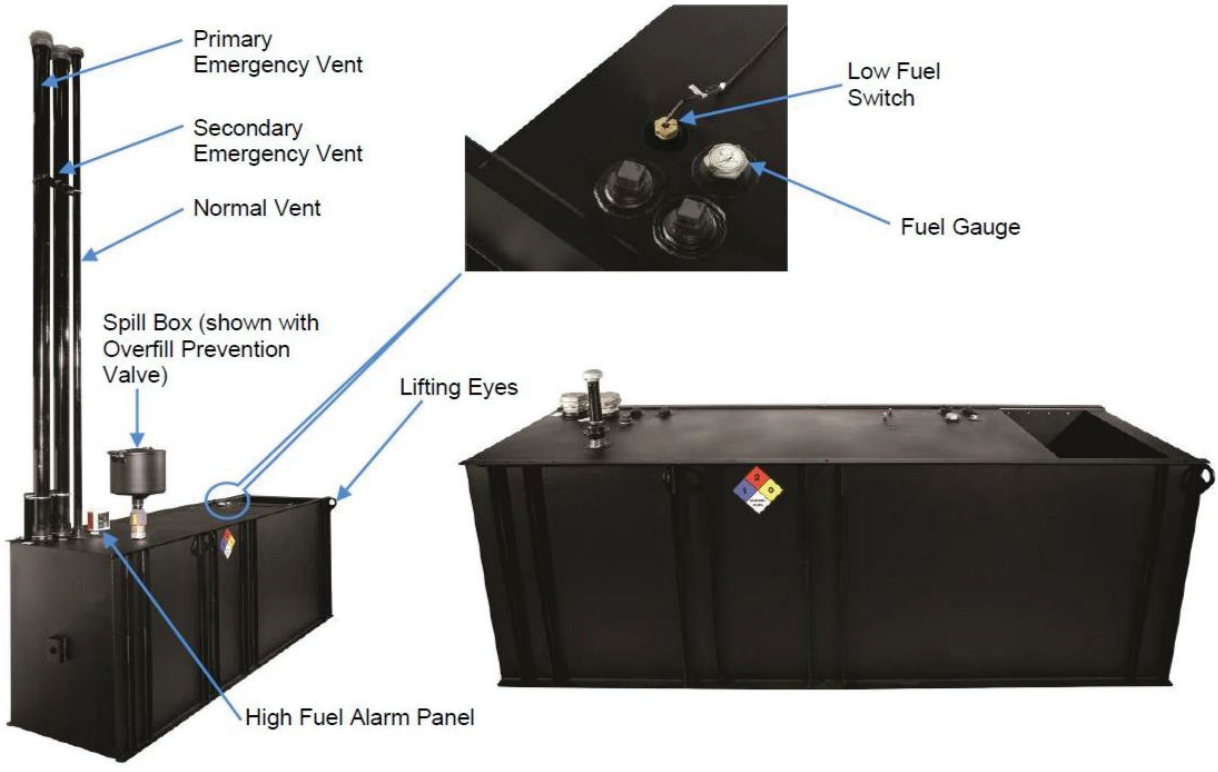
High fuel alarm panel - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

Fill drop tube - Terminates fuel fill location within 6" of the bottom of the fuel tank.

Vent extensions - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

Seismic vent extensions - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



*Picture is for reference only. See outline drawing for tank specific information by model.

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Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	118	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	41	39
				C303-2	48	154 x 40 x 32	1657	425	70	66
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

see below drawings for overall shipping weight and dimensions

* All weights are approximate.

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Exhaust emission data sheet
C25 D6
60 Hz Diesel generator set
EPA emission

Engine information:

Model:	Cummins 4BT3.3-G5	Bore:	3.74 in. (95 mm)
Type:	4 cycle, in-line, 4 cylinder diesel	Stroke:	4.53 in. (115 mm)
Aspiration:	Turbocharged	Displacement:	199 cu. in. (3.3 liters)
Compression ratio:	20.8:1		
Emission control device:			

Performance data	1/4 Standby	1/2 Standby	3/4 Standby	Full Standby
BHP @ 1800 RPM (60 Hz)	10.5	21	31.4	41.9
Fuel consumption (gal/Hr)	1.3	1.9	2.1	2.4
Exhaust gas flow (CFM)	129.8	177.4	216.6	262.1
Exhaust gas temperature (°F)	357.7	484.9	618.4	753.3
Exhaust emission data				
HC (Total unburned hydrocarbons)	2.93	2.38	1.19	0.1
NOx (Oxides of nitrogen as NO2)	4.67	3.28	2.77	2.7
CO (Carbon monoxide)	4.04	2.25	1.34	0.89
PM (Particular Matter)	0.36	0.17	0.12	0.09
SO2 (Sulfur dioxide)	0.25	0.21	0.18	0.17
Smoke (Bosch)	0.15	0.25	0.35	0.45

All values are Grams per HP - Hour

Test conditions

Data is representative of steady-state engine speed (± 25 RPM) at designated genset loads. Pressures, temperatures, and emission rates were stabilized.

Fuel specification:	ASTM D975 No. 2-D diesel fuel with 0.03-0.05% sulfur content (by weight), and 40-48 cetane number.
Fuel temperature:	99 ± 9 °F (at fuel pump inlet)
Intake air temperature:	77 ± 9 °F
Barometric pressure:	29.6 ± 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H2O/lb dry air
Reference standard:	ISO 8178

The NOx, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may results in elevated emission levels.

2022 EPA Tier 3 Exhaust Emission Compliance Statement
C25 D6
Stationary Emergency
60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	NCEXL03.3BAA-036
Effective Date:	08/09/2021
Date Issued:	08/09/2021
EPA Engine Family (Cummins Emissions Family):	NCEXL03.3BAA

Engine Information:

Model:	4BT3.3-G5	Bore:	3.74 in. (95 mm)
Engine Nameplate HP:	69	Stroke:	4.53 in. (115 mm)
Type:	4 Cycle, In-line, 4 Cylinder Diesel	Displacement:	199 cu. in. (3.3 liters)
Aspiration:	Turbocharged	Compression ratio:	20.8:1
Emission Control Device:		Exhaust stack diameter:	3 in. (76 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NO_X + NMHC	CO	PM	NO_X + NMHC	CO	PM
Test Results	3.3	1.5	0.22	4.4	2.0	0.29
EPA Emissions Limit	3.5	3.7	0.30	4.7	5.0	0.40

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50, Reference: ASTM D975 No. 2-D, 7-15 ppm Sulphur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit..

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

University of Kentucky
Facilites Management
® *Office of the Vice President*

October 12, 2022

Mr. Zack Bittner
Division for Air Quality
300 Sower Blvd, 2st Floor
Frankfort, KY 40601

Subject: Application for the addition of UK-Samaritan Hospital diesel-fired & Reynold's Bldg #1 natural gas-fired emergency generators to permit V-18-052 R1
University of Kentucky, 21-067-00003, AI 1104

Dear Mr. Bittner:

The University of Kentucky is proposing to install two new emergency generators. A 1114 hp diesel-fired generator to be located at UK-Samaritan will connect in parallel with the two existing hospital generators to upgrade the emergency power system and support load requirements. A 729 hp natural gas-fired generator to be located at Reynold's Building #1 is part of a modernization project that includes providing auxiliary power to the building. Regulation 40 CFR 63, subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, sections 63.6585(c) and 63.6590(a)(iii) applies to the generators. Section 63.6590(c)(1) states that compliance with the regulation is met through the requirements of 40 CFR 60, subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* for diesel engines and 40 CFR 60, subpart JJJJ, *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines* for natural gas engines. Construction of the generators does not add any additional regulations to the current V-18-052 R1 permit and all existing conditions of the permit will be met after the additions. Therefore, we request the Division for Air Quality process the constructions as a 502(b)(10) change in accordance with 401 KAR 52:020, Section 17.

We appreciate your timely review and consideration of this request, and we look forward to your approval. Should you have questions or require additional information, please do not hesitate to contact Ms. Andrea Smith, Air Quality Compliance Manager. She can be reached at Andrea.Smith@uky.edu or 859-218-6265.

Sincerely,

Mary S. Vosevich
Vice President, Facilities Management
Chief Facilities Officer

Enclosure: DEP 7007 permit application forms; Air Emission Calculations; Construction Specifications
cc: Mike Duffy/Andrea Smith

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information

___ Section AI.2: Applicant Information

___ Section AI.3: Owner Information

___ Section AI.4: Type of Application

___ Section AI.5: Other Required Information

___ Section AI.6: Signature Block

___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: University of Kentucky

KY EIS (AFS) #: 21- 067-00003

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: October 12, 2022

Section AI.1: Source Information

Physical Location Address:	**Street:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**County:**	Fayette	**Zip Code:**	40506
Mailing Address:	**Street or P.O. Box:**	225 Frank D Peterson Service Bldg.				
	City:	Lexington	**State:**	Kentucky	**Zip Code:**	40506

Standard Coordinates for Source Physical Location

Longitude: 38.03895 (decimal degrees) **Latitude:** -84.50496 (decimal degrees)

Primary (NAICS) Category: Colleges, Universities, and Profession Schools **Primary NAICS #:** 61131

Classification (SIC) Category: Colleges and Universities **Primary SIC #:** 8221

Briefly discuss the type of business conducted at this site: Land Grant State University.

Description of Area Surrounding Source: ☐ Rural Area ☐ Industrial Park ☐ Residential Area ☑ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☑ No

Number of Employees: 850

Approximate distance to nearest residence or commercial property: *500 ft*

Property Area: 1500

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☑ Currently Hold	☐ Need	☐ N/A
UST:	☑ Currently Hold	☐ Need	☐ N/A

Type of Regulated Waste Activity:

☑ Mixed Waste Generator ☑ Generator ☐ Recycler ☐ Other: _____

☐ U.S. Importer of Hazardous Waste ☐ Transporter ☑ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: University of Kentucky

Title: (if individual)

Mailing Address:
Street or P.O. Box: 225 Frank D Peterson Service Bldg
City: Lexington **State:** KY **Zip Code:** 40506

Email: (if individual)

Phone:

Technical Contact

Name: Andrea Smith

Title: Air Quality Compliance Manager

Mailing Address:
Street or P.O. Box: 355 Cooper Dr
City: Lexington **State:** KY **Zip Code:** 40506

Email: andrea.smith@uky.edu

Phone: 859-218-6265

Air Permit Contact for Source

Name: Same as technical contact

Title:

Mailing Address:
Street or P.O. Box:
City: **State:** **Zip Code:**

Email:

Phone:

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☐ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☑ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☐ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* 03/2023

Proposed Operation Start-Up Date: *(MM/YYYY)* 07/2023

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)*

Proposed Operation Start-Up Date: *(MM/YYYY)*

Applicant is seeking coverage under a permit shield. ☐ **Yes** ☑ **No**

Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- [x] DEP7007A Indirect Heat Exchangers and Turbines
- [ ] DEP7007B Manufacturing or Processing Operations
- [ ] DEP7007C Incinerators and Waste Burners
- [ ] DEP7007F Episode Standby Plan
- [ ] DEP7007J Volatile Liquid Storage
- [ ] DEP7007K Surface Coating or Printing Operations
- [ ] DEP7007L Mineral Processes
- [ ] DEP7007M Metal Cleaning Degreasers
- [x] DEP7007N Source Emissions Profile
- [ ] DEP7007P Perchloroethylene Dry Cleaning Systems
- [ ] DEP7007R Emission Offset Credit
- [ ] DEP7007S Service Stations
- [ ] DEP7007T Metal Plating and Surface Treatment Operations
- [x] DEP7007V Applicable Requirements and Compliance Activities
- [ ] DEP7007Y Good Engineering Practice and Stack Height Determination
- [ ] DEP7007AA Compliance Schedule for Non-complying Emission Units
- [ ] DEP7007BB Certified Progress Report
- [ ] DEP7007CC Compliance Certification
- [ ] DEP7007DD Insignificant Activities
- [ ] DEP7007EE Internal Combustion Engines
- [ ] DEP7007FF Secondary Aluminum Processing
- [ ] DEP7007GG Control Equipment
- [ ] DEP7007HH Haul Roads
- [ ] Confidentiality Claim
- [ ] Ownership Change Form
- [ ] Secretary of State Certificate
- [ ] Flowcharts or diagrams depicting process
- [ ] Digital Line Graphs (DLG) files of buldings, roads, etc.
- [ ] Site Map
- [ ] Map or drawing depicting location of facility
- [ ] Safety Data Sheet (SDS)
- [ ] Emergency Response Plan
- [x] Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Mary A. Vosevich
Authorized Signature

10/18/22
Date

Mary S. Vosevich
Type or Printed Name of Signatory

VP for Facilities Management
Title of Signatory

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

Other attachment is a complete list of pollutant emissions and calculations contained in the Air Emissions Calculation attachment.

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007A

Indirect Heat Exchangers and Turbines

___ Section A.1: General Information

___ Section A.2: Operating and Fuel Information

___ Section A.3: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

____ Manufacturer's specifications

Source Name: University of Kentucky

KY EIS (AFS) #: **21-067-00003**

Permit #: V-18-052 R1

Agency Interest (AI) ID: 1104

Date: October 12, 2022

Section A.1: General Information

Emission Unit #	Emission Unit Name	Process ID	Process Name	Identify General Type: Indirect Heat Exchanger, Gas Turbine, or Combustion Turbine	Indirect Heat Exchanger Configuration	Manufacturer	Model No./ Serial No.	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	SCC Code	SCC Units	Control Device ID	Stack ID
89	1114 Hp Diesel Generator	1	Diesel Fuel	Emergency Generator		Catepillar	C27	3/2023, est	20300101	1000 gal	None	1
90	729 Hp Natural Gas Generator	1	Natural Gas	Emergency Generator		Generac	SG500	3/2023, est	20300201	MM ft^3	None	1

Section A.2: Operating and Fuel Information

Emission Unit #	If multipurpose unit, identify the percentage of use by purpose				Rated Capacity Heat Input *(MMBTU/hr)*	Rated Capacity Power Output		Describe Operating Scenario (only if this unit will be used in different configurations)	Classify Fuel as Primary or Secondary	Identify Fuel Type: Coal, Natural Gas, Wood, Biomass, Landfill/Digester Gas, Fuel Oil # (specify 1-6), or Other	Heat Content (HHV)		Maximum Operating Hours	Ash Content *(%)*	Sulfur Content *(%)*
	Space Heat	Process Heat	Power	Emergency			*(Specify units: hp, MW, or lb steam/hr)*					*(Specify units: Btu/lb, Btu/gal, or Btu/scf)*			
89				100	7.04	750 1114	kW hp		Primary	Fuel Oil #2	137,000	Btu/gal	500		0.015
90				100	5.75	500 729	kW hp		Primary	Natural Gas	1020	Btu/ft^3	500		

Section A.3: Notes, Comments, and Explanations
A complete list of pollutant emissions and calculations is contained in the Air Emissions Calculation attachment.

Division for Air Quality

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DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 12, 2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
89	1114 Hp Diesel Generator	1	Diesel Usage	NA	NA	1	0.0536	CO	10.78	mfg cert	0.00%	0.00%	0.5778	0.5778	0.1445	0.1445
								NO2	226.32	mfg cert	0.00%	0.00%	12.1308	12.1308	3.0327	3.0327
								PM10	0.862	mfg cert	0.00%	0.00%	0.0462	0.0462	0.0116	0.0116
								SO2	39.73	AP-42, 3.3-1	0.00%	0.00%	0.0319	0.0319	0.0080	0.0080
								VOC	47.95	AP-42, 3.3-1	0.00%	0.00%	2.5701	2.5701	0.6425	0.6425
								Benzene	0.128	AP-42, 3.3-2	0.00%	0.00%	0.00686	0.00686	0.0017	0.0017
								Toluene	0.056	AP-42, 3.3-2	0.00%	0.00%	0.00300	0.00300	0.0008	0.0008
								Xylene	0.039	AP-42, 3.3-2	0.00%	0.00%	0.00209	0.00209	0.0005	0.0005
								Formaldehyde	0.1617	AP-42, 3.3-2	0.00%	0.00%	0.00867	0.00867	0.0022	0.0022
								Acetaldehyde	0.1051	AP-42, 3.3-2	0.00%	0.00%	0.00563	0.00563	0.0014	0.0014

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	0.0127	AP-42, 3.3-2	0.00%	0.00%	0.00068	0.00068	0.0002	0.0002
								PAH	0.023	AP-42, 3.3-2	0.00%	0.00%	0.00123	0.00123	0.0003	0.0003
								CO2	22468	AP-42, 3.3-1	0.00%	0.00%	1204.28	1204.28	301.1	301.1

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: October 12, 2022

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
90	729 Hp Nat. Gas Generator	1	Nat. Gas Usage	NA	NA	1	0.005862	CO	192.57	mfg cert	0.00%	0.00%	1.1288	1.1288	0.2822	0.2822
								NO2	9.63	mfg cert	0.00%	0.00%	0.0565	0.0565	0.0141	0.0141
								PM10	10.110	AP-42, 3.2-2	0.00%	0.00%	0.0593	0.0593	0.0148	0.0148
								SO2	0.6	AP-42, 3.2-2	0.00%	0.00%	0.0035	0.0035	0.0009	8.79E-04
								VOC	51.35	mfg cert (as worst case THC value)	0.00%	0.00%	0.3010	0.3010	0.0753	0.0753
								Benzene	0.45	AP-42, 3.2-2	0.00%	0.00%	0.00264	0.00264	0.0007	0.0007
								Toluene	0.42	AP-42, 3.2-2	0.00%	0.00%	0.00246	0.00246	0.0006	0.0006
								Xylene	0.19	AP-42, 3.2-2	0.00%	0.00%	0.00111	0.00111	0.0003	0.0003
								Formaldehyde	53.86	AP-42, 3.2-2	0.00%	0.00%	0.31573	0.31573	0.0789	0.0789
								Acetaldehyde	8.53	AP-42, 3.2-2	0.00%	0.00%	0.05000	0.05000	0.0125	0.0125

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
								Acrolein	5.24	AP-42, 3.2-2	0.00%	0.00%	0.03072	0.03072	0.0077	0.0077
								CO2	112200	AP-42, 3.2-2	0.00%	0.00%	657.71640	657.71640	164.4291	164.4291

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
89	89 01	1.0, est	30, est				5612	949	
90	90 01	1.0, est	30, est				3188	1380	

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*
NA								

Section N.4: Notes, Comments, and Explanations
None

Division for Air Quality

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Frankfort, KY 40601
(502) 564-3999

DEP7007V
Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: University of Kentucky
KY EIS (AFS) #: 21- 067-00003
Permit #: V-18-052 R1
Agency Interest (AI) ID: 1104
Date: 10/12/2022

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
89	Diesel Generator 1114 HP (750 kW)	40CFR60, Subpart IIII (60.4205(b) & 4202(a)(2)) 40CFR1039, Appendix I 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	3.5 g/KW-hr			Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. Record the hours of operation and fuel usage monthly.
		same	NOx + HC	6.4 g/KW-hr			Same

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
		same	PM	0.2 g/KW-hr			Same
		40CFR60, Subpart IIII (60.4207(b))	SO2			≤15 ppm	Purchase diesel with ≤ 15 ppm
90	Nat. Gas Generator 729 HP (500 kW)	40CFR60, Subpart JJJJ (60.4243(d)(1-3) & 60.4233(d) Table 1 401KAR52:020, Section 10 401 KAR 52:020, Section 22	CO	4.0 g/hp-hr			Per 60.4243(b)(1), engine emission are certified to the non-emergency emission standards of 60.4233(d). Record the hours of operation and fuel usage monthly.
		same	NOx + HC	2.0 g/hp-hr			Same
		same	VOC	1.0 g/hp-hr			Same

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
89	Diesel Generator 1114 HP (750 kW)	CO	40CFR60, Subpart IIII 60.4211(a)(1-2), (c), (f)) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the hours of operation and fuel usage monthly.	Since the engine emission are certified to the non-emergency emission standards (60.4214(c)), the unit does not need to install a non-resettable hours meter per 60.4209(a). Per 60.4211(a)(1-2), the engine will be operated and maintained by the manufacturer's instructions and change only those emission-related setting that are permitted by the manufacturer. The engine qualifies as emergency in accordance with 60.4211(f)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note f(2)(ii) and f(2)(iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in f(2)(i). Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Monitor the hours of operation and fuel usage monthly.	same
		PM	same	Monitor the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are monitored for all diesel purchases from the supplier for the sulfur content standard.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4243(d)(1-3); 60.4245(a)(2) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Monitor the hours of operation and fuel usage monthly.	Per 60.4245(a)(2), maintain maintenance records. Since the engine emission are certified to the non-emergency emission standards, the unit does not need to install a non-resettable hours meter per 60.4237(a) and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required (60.4245(b)). The engine will be operated and maintained by the manufacturer's instructions; change only those emission-related setting that are permitted by the manufacturer; and the engine has been certified to the emission standards. The engine qualifies as emergency in accordance with 60.4243(d)(1-3) in that there is no time limit on the use of the engine in emergency situations; the engine will not operate for more than 100 hours per calendar year for maintenance checks/readiness testing (note d(2)(ii-iii) has been vacated); and the engine will not run more than 50 hours per calendar year in a non-emergency situation and these hours are counted as part of the 100 hours in d(3). Per 401 KAR 52:020,Section 10, monitor the hours of operation on a monthly basis. Monitor monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Monitor the hours of operation and fuel usage monthly.	same
		VOC	same	Monitor the hours of operation and fuel usage monthly.	same

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
89	Diesel Generator 1114 HP (750 kW)	CO	401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the hours of operation and fuel usage monthly.	Per 60.4214(b), initial notification and a installation of a non-settable hour meters is not required since the engine emissions are certified to non-emergency standard. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis. Since the engine emissions are certified to non-emergency standards, 60.4214(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Record the hours of operation and fuel usage monthly.	same
		PM	same	Record the hours of operation and fuel usage monthly.	same
		SO2	Same plus 40CFR60, Subpart IIII 60.4207(b)	Same plus keep diesel sulfur content	Same plus per 60.4247(b), bill of lading are kept for all diesel purchases from the supplier for the sulfur content standard.

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4245(a)(1-3) 401KAR52:020, Section 10 401 KAR 52:020, Section 22	Record the hours of operation and fuel usage monthly.	Per 60.4245(a)(1-3), maintain records of all notifications; maintenance records; and emissions certification. Per 401 KAR 52:020,Section 10, record the hours of operation on a monthly basis and the manufacturer's certified emissions certificate. Since the engine emissions are certified to non-emergency standards, 60.4245(b) is not applicable and recording the hours of operation by a non-resettable hour meter and documenting the reason for operation is not required. Record monthly fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	Record the hours of operation and fuel usage monthly.	same
		VOC	same	Record the hours of operation and fuel usage monthly.	same

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
89	Diesel Generator 1114 HP (750 kW)	CO	40CFR60, Subpart IIII (60.4214(b, d)) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4214(b), not required. If engine becomes contractually obligated obligated to be available for more than 15 hours per year, report information of 60.4214(d). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		PM	same	same	same
		SO2	same	same	same
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ (60.4245) 401 KAR 52:020, Section 22	Report annual fuel usage.	Engine certified, therefore initial notification of 60.4245(c), not required. If performance tests listed V.5 are performed, submit the results per 60.4245(d). If engine becomes contractually obligated obligated to be available for more than 15 hours per year, report information of 60.4245(e). Submit annual fuel usage to determine annual emissions within 30 day after the date the KyEIS emissions survey is mailed (52:020(22)).
		NOx + HC	same	same	same
		VOC	same	same	same

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
89	Diesel Generator 1114 HP (750 kW)	CO	NA	NA	No testing is required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	NA	NA	same
		PM	NA	NA	same
		SO2	NA	NA	same
90	Nat. Gas Generator 729 HP (500 kW)	CO	40CFR60, Subpart JJJJ 60.4243(e)	NA	Generator emission standards not certified to propane so if propane is used for more than 100 hours per year, a performance test required to demonstrate compliance with the emission standards. No other testing required unless requested by the Cabinet per 401 KAR 59:005 Section 2(2) and 401 KAR 50:045, Section 4.
		NOx + HC	same	same	same
		VOC	same	same	same

Section V.6: Notes, Comments, and Explanations
None

Emissions Associated with EU89 Samaritan Generator #3 (Diesel)

89.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	1114	hp
Total Engine Rating (kW):	750	kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000	Btu/hp-hr
Diesel Heating Value in Btu/gal:	137,000	Btu/gal
Calculated Fuel Input in MMBtu/hr:	7.800	MMBtu/hr
Maximum Annual Operating Hours:	500	hrs
Calculated Fuel Consumption in Mgal/hr:	0.0536	Mgal/hr

89.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300101
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Distillate Oil (Diesel) (2-03-001), Reciprocating (2-03-001-01)
SCC Units:	1000 Gallons Distillate Oil (Diesel)

89.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and PM10 are based on manufacturer certification. PM and PM2.5 are assumed to equal PM10. SO2 and VOC emission factors are based on AP-42 able 3.3-1 for Gasoline And Diesel Industrial Engines (10/96 edition).

NOx

Emission factor for NOx:	5.25 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	226.3 lb/Mgal	= (5.25 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

CO

Emission factor for CO:	0.25 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	10.8 lb/Mgal	= (0.25 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

VOC

Emission factor for VOC:	0.350 lb/MMBtu	AP-42 Table 3.3-1, 10/96
VOC emission factor in terms of SCC units:	47.95 lb/Mgal	= (0.35 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

PM

Emission factor for PM:	0.02 lb/MMBtu	Mfg. Certification
PM emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM10

Emission factor for PM10:	0.02 lb/MMBtu	Mfg. Certification
PM10 emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

PM2.5

Emission factor for PM2.5:	0.02 lb/MMBtu	Mfg. Certification
PM2.5 emission factor in terms of SCC units:	0.862 lb/Mgal	= (0.02 g/hp-hr * 137000 Btu/gal * 1000 gal/Mgal / 454 lb/g / 7000 Btu/hp-hr)

SO2

Emission factor for SO2:	0.29 lb/MMBtu	AP-42, Table 3.3-1, 10/96 (0.015% sulfur content)
SO2 emission factor in terms of SCC units:	39.73 lb/Mgal	= (0.29 lb/MMBtu * 137000 Btu/gal *1000 gal/Mgal / 1MMBtu/10^6Btu)

Emissions Associated with EU89 Samaritan Generator #3 (Diesel)

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.3-2 (10/96 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/Mgal)
Acetaldehyde	75-07-0	7.67E-04	0.105
Acrolein	107-02-8	9.25E-05	0.013
Benzene	71-43-2	9.33E-04	0.128
Formaldehyde	50-00-0	1.18E-03	0.162
Toluene	108-88-3	4.09E-04	0.056
Xylene	1330-20-7	2.85E-04	0.039
Total HAPs			5.02E-01

GHG Emission Factors

CO2, CH4 and N2O emissions for diesel combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.3-1 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

CH4 Emission Factor	3.0E-03	kg CH4/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)
N2O Emission Factor	6.0E-04	kg N2O/MMBtu	40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/Mgal)	Emission Factor Basis
CO2		164.00	22,468	AP-42 Table 3.3-1, 10/96
CH4	3.00E-03		0.91	40 CFR 98, Subpart C, Table C-2
N2O	6.00E-04		0.18	40 CFR 98, Subpart C, Table C-2
CO2e			22,545	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/Mgal)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**226.3**	Mfg. Certification	12.1	3.03
CO	**10.8**	Mfg. Certification	0.58	0.15
VOC	**47.95**	AP-42 Table 3.3-1	2.57	0.64
PM	**0.86**	Mfg. Certification	0.046	0.01
PM10	**0.86**	Mfg. Certification	0.046	0.01
PM2.5	**0.86**	Mfg. Certification	0.046	0.01
SO2	**0.29**	AP-42 Table 3.3-1	0.032	0.008
Total HAPs	**0.502**	AP-42 Table 3.3-2	0.027	0.007
Fomaldehyde	**0.162**	AP-42 Table 3.3-2	0.009	0.002
CO2	**22,468**	AP-42 Table 3.3-1, 10/96	1204	301
CH4	**0.91**	40 CFR 98, Subpart C, Table C-2	0.049	0.01
N2O	**0.18**	40 CFR 98, Subpart C, Table C-2	0.010	0.002
GHGs as CO2e	**22,545**	40 CFR 98, Subpart A	1208	302

Emissions Associated with EU90 Reynolds Bldg #1 Natural Gas Emergency Generator

90.1 Generator Power and Fuel Consumption Data

Total Engine Rating (hp):	729 hp
Total Engine Rating (kW):	500 kW
Brake Specific Fuel Consumption rate in Btu/Bhp-hr:	7,000 Btu/hp-hr
Natural Gas Heating Value in Btu/gal:	1,020 Btu/gal
Calculated Fuel Input in MMBtu/hr:	5.750 MMBtu/hr
Maximum Annual Operating Hours:	500 hrs
Calculated Fuel Consumption in MMft3/hr:	0.005862 MMft3l/hr

90.2 Source Classification Code

> Emissions are tied to the SCC code for diesel generators listed below.

SCC:	20300201
SCC Description:	Internal Combustion Engines, Commercial/Institutional (2-03), Natural Gas (2-03-002), Reciprocating (2-03-002-01)
SCC Units:	Million Cubic Feet Natural Gas Burned

90.3 Emission Calculation Methodology and Emission Factors

> Emission factors for NOx, CO, and VOC (as worst case THC = VOC) are based on manufacturer certification. SO2 and PM emission factors are based on AP-42 Table 3.2-2 for Natural gas-fired Reciprocating Engines (07/00 edition). PM and PM2.5 are assumed to equal PM10.

NOx

Emission factor for NOx:	0.03 g/hp-hr	Mfg. Certification
NOx emission factor in terms of SCC units:	9.63 lb/MMft3	= (0.03 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

CO

Emission factor for CO:	0.60 g/hp-hr	Mfg. Certification
CO emission factor in terms of SCC units:	192.6 lb/MMft3	= (0.60 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

VOC

Emission factor for VOC:	0.16 g/hp-hr	Mfg. Certification (as worse case THC = VOC)
VOC emission factor in terms of SCC units:	51.35 lb/MMft3	= (0.16 g/hp-hr * 1020 Btu/ft3 / 454 lb/g / 7000 Btu/hp-hr / 10^{-6} MMft3)

PM / PM10 / PM2.5

Emission factor for PM:	0.00991 lb/MMBtu	AP-42, Table 3.2-2, 07/00
PM emission factor in terms of SCC units:	10.11 lb/MMft3	= (0.00991 lb/MMBtu * 1020 Btu/ft3)(10^{-6} MMBtu/Btu / $ft^3/10^{-6}$ MMft3)

SO2

Emission factor for SO2:	0.000588 lb/MMBtu	AP-42, Table 3.2-2, 07/00
SO2 emission factor in terms of SCC units:	0.6 lb/MM/ft3	= (0.000588 lb/MMBtu * 1020 Btu/ft3)(10^{-6} MMBtu/Btu / $ft^3/10^{-6}$ MMft3)

Emissions Associated with EU90 Reynolds Bldg #1 Natural Gas Emergency Generator

HAP Emission Estimates

Emission factors for organic HAP compounds expected to be emitted are based on emission factors in AP-42 Table 3.2-2 (07/00 Edition).

	CAS #	Emission Factor (lb/MMBtu)	Emission Factor (lb/MMft^3)
Acetaldehyde	75-07-0	8.36E-03	8.53
Acrolein	107-02-8	5.14E-03	5.24
Benzene	71-43-2	4.40E-04	0.45
Formaldehyde	50-00-0	5.28E-02	53.9
n-Hexane	100-54-3	1.11E-03	1.13
Methanol	67-56-1	2.50E-03	2.55
Toluene	108-88-3	4.08E-04	0.42
Xylene	1330-20-7	1.84E-04	0.19
Total HAPs			73.6

GHG Emission Factors

CO2, CH4 and N2O emissions for natural gas combustion are estimated using the diesel emission factors published in 40 CFR 98, Subpart C, Table C-2, and AP-42 Table 3.2-2 and the global warming potentials from 40 CFR 98, Subpart A, Table A-1.

Global Warming Potentials of GHGs per 40 CFR 98 Subpart A, Table A-1.

CO2	1
CH4	25
N2O	298

N2O Emission Factor 1.0E-04 kg N2O/MMBtu 40 CFR 98, Subpart C, Table C-2; Petroleum (All fuel types in Table C-1)

Pollutant	Emission Factor (kg/MMBtu)	Emission Factor (lb/MMBtu)	Equivalent Factor (lb/MMft^3)	Emission Factor Basis
CO2		110.00	112,200	AP-42 Table 3.2-1, 07/00
CH4		1.25	1,275	AP-42 Table 3.2-1, 07/00
N2O	1.00E-04		0.22	40 CFR 98, Subpart C, Table C-2
CO2e			144,142	40 CFR 98, Subpart A

Summary of Generator Potential Emissions

Pollutant	Emission Factor (lb/MMft3)	Basis	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
NOx	**9.63**	Mfg. Certification	0.056	0.014
CO	**192.57**	Mfg. Certification	1.13	0.28
VOC	**51.35**	Mfg. Certification(as worse case THC = VOC)	0.30	0.075
PM	**10.11**	AP-42 Table 3.2-2	0.059	0.015
PM10	**10.11**	AP-42 Table 3.2-2	0.059	0.015
PM2.5	**10.11**	AP-42 Table 3.2-2	0.059	0.015
SO2	**0.60**	AP-42 Table 3.2-2	0.004	0.0009
Total HAPs	**73.61**	AP-42 Table 3.2-2	0.43	0.108
Fomaldehyde	**53.86**	AP-42 Table 3.2-2	0.316	0.079
CO2	**112200**	AP-42 Table 3.2-1	658	164
CH4	**1275**	40 CFR 98, Subpart C, Table C-2	7.47	1.87
N2O	**0.22**	40 CFR 98, Subpart C, Table C-2	0.0013	0.00033
GHGs as CO2e	**144,142**	40 CFR 98, Subpart A	845	211

Cat® C27
Diesel Generator Sets



Bore – mm (in)	137.2 (5.4)
Stroke – mm (in)	152.4 (6.0)
Displacement – L (in^3)	27.03 (1649.47)
Compression Ratio	16.5:1
Aspiration	TA
Fuel System	MEUI
Governor Type	ADEM™ A4

Image shown may not reflect actual configuration

Standby 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Standby 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Emissions Performance
750 (937)	680 (850)	800 (1000)	725 (906)	U.S. EPA Emergency Stationary Use Only (Tier 2)

Standard Features

Cat® Diesel Engine
- Meets U.S. EPA Emergency Stationary Use Only (Tier 2) emission standards
- Reliable performance proven in thousands of applications worldwide

Generator Set Package
- Accepts 100% block load in one step and meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators
- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System
- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

EMCP 4 Control Panels
- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements

Warranty
- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Financing
- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Optional Equipment

Engine

Air Cleaner
- ❑ Single element
- ❑ Dual element
- ❑ Heavy duty

Muffler
- ❑ Residential grade (25 dB)

Starting
- ❑ Standard batteries
- ❑ Oversized batteries
- ❑ Standard electric starter(s)
- ❑ Jacket water

Alternator

Output voltage
- ❑ 208V
- ❑ 240V
- ❑ 480V
- ❑ 600V

Temperature Rise (over 40°C ambient)
- ❑ 150°C
- ❑ 125°C
- ❑ 105°C
- ❑ 80°C

Winding type
- ❑ Random wound

Excitation
- ❑ Internal excitation (IE)

Attachments
- ❑ Anti-condensation heater
- ❑ Stator and bearing temperature monitoring and protection

Power Termination

Type
- ❑ Bus bar
- ❑ Circuit breaker
- ❑ 400A ❑ 800A
- ❑ 1200A ❑ 1600A
- ❑ 2000A ❑ 2500A
- ❑ 3000A
- ❑ UL ❑ IEC
- ❑ 3-pole ❑ 4-pole
- ❑ Manually operated
- ❑ Electrically operated

Trip Unit
- ❑ LSI ❑ LSI-G
- ❑ LSIG-P

Factory Enclosure

- ❑ Sound attenuated

Attachments
- ❑ Cold weather bundle
- ❑ DC lighting package
- ❑ Motorized louvers

Fuel Tank

- ❑ 1000 gal (3785 L)
- ❑ 2000 gal (7571 L)
- ❑ 3600 gal (13627 L)

Control System

Controller
- ❑ EMCP 4.2B
- ❑ EMCP 4.3
- ❑ EMCP 4.4

Attachments
- ❑ Local annunciator module
- ❑ Remote annunciator module
- ❑ Expansion I/O module
- ❑ Remote monitoring software

Charging

- ❑ Battery charger – 10A
- ❑ Battery charger – 20A
- ❑ Battery charger – 30A

Vibration Isolators

- ❑ Rubber
- ❑ Spring
- ❑ Seismic rated

Cat Connect

Connectivity
- ❑ Ethernet
- ❑ Cellular
- ❑ Satellite

Extended Service Options

Terms
- ❑ 2 year (prime)
- ❑ 3 year
- ❑ 5 year
- ❑ 10 year

Coverage
- ❑ Silver
- ❑ Gold
- ❑ Platinum
- ❑ Platinum Plus

Ancillary Equipment

- ❑ Automatic transfer switch (ATS)
- ❑ Uninterruptible power supply (UPS)
- ❑ Paralleling switchgear
- ❑ Paralleling controls

Certifications

- ❑ UL 2200 Listed
- ❑ CSA
- ❑ IBC seismic certification
- ❑ OSHPD pre-approval

Note: *Some options may not be available on all models. Certifications may not be available with all model configurations. Consult factory for availability.*

Package Performance

Performance	Standby		Prime		Standby		Prime	
Frequency	60 Hz		60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	750 ekW		680 ekW		800 ekW		725 ekW	
Gen set power rating with fan @ 0.8 power factor	937 kVA		850 kVA		1000 kVA		906 kVA	
Emissions	EPA ESE (Tier 2)		EPA ESE (Tier 2)		EPA ESE (Tier 2)		EPA ESE (Tier 2)	
Performance number	DM9071-03		DM9073-02		DM7696-02		DM9069-02	
Fuel Consumption								
100% load with fan – L/hr (gal/hr)	202.9	(53.6)	187.4	(49.5)	216.9	(57.3)	199.6	(52.7)
75% load with fan – L/hr (gal/hr)	162.4	(42.9)	149.6	(39.5)	171.7	(45.4)	157.8	(41.7)
50% load with fan – L/hr (gal/hr)	116.2	(30.7)	107.0	(28.3)	122.3	(32.3)	112.5	(29.7)
25% load with fan – L/hr (gal/hr)	70.6	(18.7)	66.0	(17.4)	73.9	(19.5)	69.0	(18.2)
Cooling System								
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m^3/min (cfm)	1200	(42377)	1200	(42377)	1200	(42377)	1200	(42377)
Engine coolant capacity – L (gal)	55.0	(14.5)	55.0	(14.5)	55.0	(14.5)	55.0	(14.5)
Radiator coolant capacity – L (gal)	41.0	(10.0)	41.0	(10.0)	41.0	(10.0)	41.0	(10.0)
Total coolant capacity – L (gal)	96.0	(24.5)	96.0	(24.5)	96.0	(24.5)	96.0	(24.5)
Inlet Air								
Combustion air inlet flow rate – m^3/min (cfm)	58.7	(2073.6)	56.0	(1977.7)	62.8	(2216.4)	60.3	(2129.4)
Exhaust System								
Exhaust stack gas temperature – °C (°F)	509.3	(948.7)	502.5	(936.5)	511.4	(952.5)	500.6	(933.0)
Exhaust gas flow rate – m^3/min (cfm)	158.9	(5610.2)	149.7	(5285.5)	170.3	(6011.7)	160.7	(5674.4)
Exhaust system backpressure (maximum allowable) – kPa (in. water)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)
Heat Rejection								
Heat rejection to jacket water – kW (Btu/min)	324	(18441)	307	(17433)	330	(18785)	320	(18191)
Heat rejection to exhaust (total) – kW (Btu/min)	738	(41994)	693	(39387)	796	(45257)	741	(42135)
Heat rejection to aftercooler – kW (Btu/min)	139	(7898)	123	(6970)	162	(9235)	146	(8320)
Heat rejection to atmosphere from engine – kW (Btu/min)	110	(6249)	92	(5238)	110	(6240)	89	(5074)
Heat rejection from alternator – kW (Btu/min)	53	(3014)	47	(2644)	40	(2292)	37	(2081)
Emissions* (Nominal)								
NOx mg/Nm^3 (g/hp-h)	2637.1	(5.25)	2330.9	(4.68)	2580.0	(5.18)	2283.7	(4.61)
CO mg/Nm^3 (g/hp-h)	123.9	(0.25)	147.4	(0.29)	115.1	(0.23)	135.6	(0.27)
HC mg/Nm^3 (g/hp-h)	11.2	(0.03)	10.9	(0.02)	12.5	(0.03)	12.2	(0.03)
PM mg/Nm^3 (g/hp-h)	8.8	(0.02)	8.8	(0.02)	9.7	(0.02)	9.0	(0.02)

**mg/Nm^3 levels are corrected to 5% O_2. Contact your local Cat dealer for further information.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2022 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Caterpillar Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: NCPXL27.0NZS-005

Effective Date: 06/01/2021

Expiration Date: 12/31/2022

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 06/01/2021

Revision Date: N/A

Model Year: 2022
Manufacturer Type: Original Engine Manufacturer
Engine Family: NCPXL27.0NZS

Mobile/Stationary Indicator: Stationary
Emissions Power Category: 560<kW<=2237
Fuel Type: Diesel
After Treatment Devices: No After Treatment Devices Installed
Non-after Treatment Devices: Electronic Control, Engine Design Modification

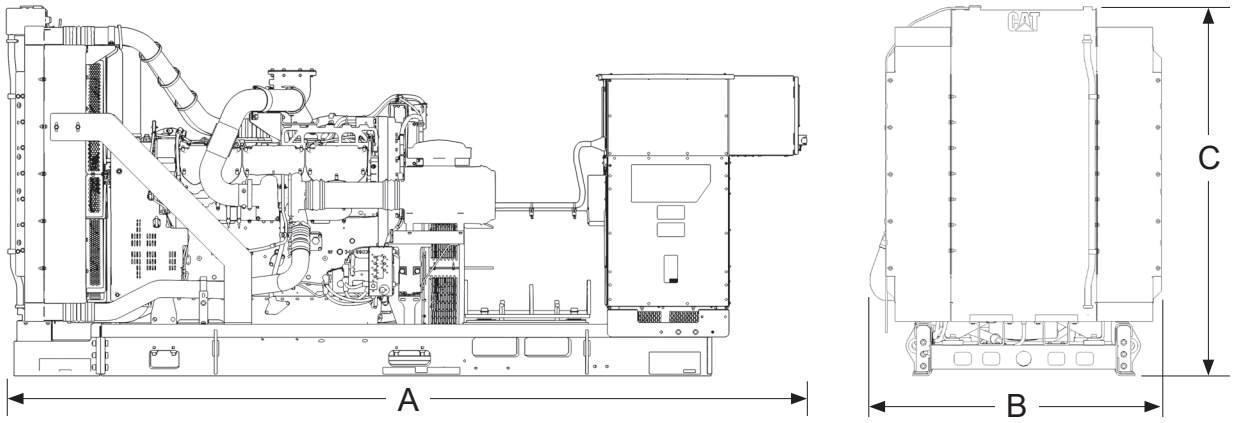
Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
4674 (184.0)	1723 (67.8)	2162 (85.1)	6622 (14,600)

Note: *For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.*

Due to custom order diminsions are estimated only

Ratings Definitions

Standby
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime
Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Applicable Codes and Standards
AS 1359, CSA C22.2 No. 100-04, UL 142, UL 489, UL 869, UL 2200, NFPA 37, NFPA 70, NFPA 99, NFPA 110, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU.

Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications
- ISO 8528-1 Data Center Power (DCP) compliant per DCP application of Cat diesel generator set prime power rating.
- All ratings Tier III/Tier IV compliant per Uptime Institute requirements.
- All ratings ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates
Fuel rates are based on fuel oil of 35º API [16°C (60ºF)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 29ºC (85ºF) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.)

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Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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C27 PGBG
LEHE1213-04 (10/19)

SG500 | 25.8L | 500 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

GENERAC | INDUSTRIAL POWER

DEMAND RESPONSE READY

Standby Power Rating
500 kW, 625 kVA, 60 Hz

Demand Response Rating
500 kW, 625 kVA, 60 Hz

Prime Power Rating
450 kW, 563 kVA, 60 Hz

ISO 9001:2008

USA ENGINEERED & BUILT* *Assembled in the USA using domestic and foreign parts

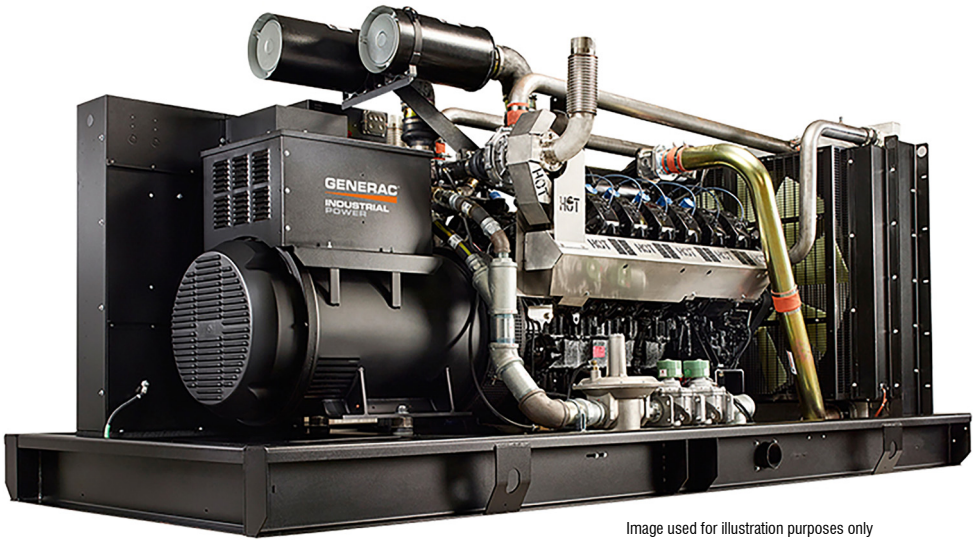


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

- UL2200, UL6200, UL1236, UL489
- CSA C22.2, B149
- BS5514 and DIN 6271
- SAE J1349
- NFPA 37, 70, 99, 110
- NEC700, 701, 702, 708
- ISO 3046, 7637, 8528, 9001
- NEMA ICS10, MG1, 250, ICS6, AB1
- ANSI C62.41
- IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

Generac ensures superior quality by designing and manufacturing most of its generator components, such as alternators, enclosures, control systems and communications software. Generac also makes its own spark-ignited engines, and you'll find them on every Generac gaseous-fueled generator. We engineer and manufacture them from the block up — all at our facilities throughout Wisconsin. Applying natural gas and LP-fueled engines to generators requires advanced engineering expertise to ensure reliability, durability and necessary performance. By designing specifically for these dry, hotter-burning fuels, the engines last longer and require less maintenance. Building our own engines also means we control every step of the supply chain and delivery process, so you benefit from single-source responsibility.

Plus, Generac Industrial Power's distribution network provides all parts and service so you don't have to deal with third-party suppliers. It all leads to a positive owner experience and higher confidence level. Generac spark-ignited engines give you more options in commercial and industrial generator applications as well as extended run time from utility-supplied natural gas.

SG500 | 25.8L | 500 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

GENERAC | INDUSTRIAL POWER

STANDARD FEATURES

DEMAND RESPONSE READY

ENGINE SYSTEM

- Oil Drain Extension
- Heavy Duty Air Cleaner
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)
- Shipped Loose Catalyst Silencer (Open Set Only)
- Oil Temperature Indication and Alarm

Fuel System

- NPT Fuel Line Connection
- Primary and Secondary Fuel Shutoff

Cooling System

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- Radiator Drain Extension

Electrical System

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Amortisseur Winding
- Full Load Capacity Alternator

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby and Demand Response Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)
- Silencer Mounted in the Discharge Hood (Enclosed Unit Only)

ENCLOSURE (If Selected)

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material (Sound Attenuated Enclosures)
- Gasketed Doors
- Upward Facing Discharge Hoods (Radiator and Exhaust)
- Stainless Steel Lift Off Door Hinges
- Stainless Steel Lockable Handles
- RhinoCoat™ - Textured Polyester Powder Coat Paint

CONTROL SYSTEM



Power Zone® Pro Sync Controller

Program Functions

- NFPA 110 Level 1 Compliant
- Engine Protective Functions
- Alternator Protective Functions
- Digital Engine Governor Control
- Digital Voltage Regulator
- Multiple Programmable Inputs and Outputs
- Remote Display Capability
- Remote Communication via Modbus® RTU, Modbus TCP/IP, and Ethernet 10/100
- Alarm and Event Logging with Real Time Stamping
- Expandable Analog and Digital Inputs and Outputs
- Remote Wireless Software Update Capable
- Wi-Fi, Bluetooth, BMS and Remote Telemetry
- Built-In Programmable Logic Eliminates the Need for External Controllers Under Most Conditions
- Ethernet Based Communications Between Generators
- Programmable I/O Channel Properties
- Built-In Diagnostics

Protections

- Low Oil Pressure
- Low Coolant Level
- High/Low Coolant Temperature
- Sensor Failure
- Oil Temperature
- Over/Under Speed
- Over/Under Voltage
- Over/Under Frequency
- Over/Under Current
- Over Load
- High/Low Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I^2T Algorithm)

7 Inch Color Touch Screen Display

- Resistive Color Touch Screen
- Sunlight Readable (1400 NITS)
- Easily Identifiable Icons
- Multi-Lingual
- On Screen Editable Parameters
- Key Function Monitoring
- Three Phase Voltage, Amperage, kW, kVA, and kVAr
- Selectable Line to Line or Line to Neutral Measurements
- Frequency
- Engine Speed
- Engine Coolant Temperature
- Engine Oil Pressure
- Engine Oil Temperature
- Battery Voltage
- Hourmeter
- Warning and Alarm Indication
- Diagnostics
- Maintenance Events/Information

SG500 | 25.8L | 500 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

GENERAC® | INDUSTRIAL POWER

CONFIGURABLE OPTIONS

DEMAND RESPONSE READY

ENGINE SYSTEM

- ○ Baseframe Cover/Rodent Guard
- ○ Oil Heater
- ○ Air Filter Restriction Indicator
- ○ Radiator Stone Guard (Open Set Only)
- ○ Level 1 Fan and Belt Guards (Enclosed Units Only)
- ○ Engine Coolant Heater
- ○ Shipped Loose Catalyst Silencer (Open Set Only)

FUEL SYSTEM

- ○ NPT Flexible Fuel Line

ELECTRICAL SYSTEM

- ○ 10A UL Listed Battery Charger
- ○ Battery Warmer

ALTERNATOR SYSTEM

- ○ Alternator Upsizing
- ○ Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS

- ○ Main Line Circuit Breaker
- ○ 2nd Main Line Circuit Breaker
- ○ Shunt Trip and Auxiliary Contact
- ○ Electronic Trip Breakers

GENERATOR SET

- ○ Demand Response Rating
- ○ Extended Factory Testing (3-Phase Only)
- ○ 12 Position Load Center

ENCLOSURE

- ○ Weather Protected Enclosure
- ○ Level 1 Sound Attenuated
- ○ Level 2 Sound Attenuated
- ○ Level 2 Sound Attenuated with Motorized Dampers
- ○ Level 3 Sound Attenuated (Steel Only)
- ○ Steel Enclosure
- ○ Aluminum Enclosure
- ○ Damper Alarm (Motorized Dampers Only)
- ○ Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- ○ AC/DC Enclosure Lighting Kit
- ○ Enclosure Heaters
- ○ Door Open Alarm Switch

CONTROL SYSTEM

- ○ NFPA 110 Compliant 21-Light Remote Annunciator
- ○ Remote Relay Assembly (8 or 16)
- ○ Remote E-Stop (Break Glass-Type, Surface Mount)
- ○ Remote E-Stop (Red Mushroom-Type, Surface Mount)
- ○ Remote E-Stop (Red Mushroom-Type, Flush Mount)
- ○ 10A Engine Run Relay
- ○ Ground Fault Annunciator
- ○ 100 dB Alarm Horn
- ○ 120V GFCI and 240V Outlets

WARRANTY (Standby Gensets Only)

- ○ 2 Year Extended Limited Warranty
- ○ 5 Year Limited Warranty
- ○ 5 Year Extended Limited Warranty
- ○ 7 Year Extended Limited Warranty
- ○ 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM

- ○ Coolant Heater Ball Valves
- ○ Fluid Containment Pan

CONTROL SYSTEM

- ○ Battery Disconnect Switch

GENERATOR SET

- ○ Special Testing
- ○ Battery Box

CIRCUIT BREAKER OPTIONS

- ○ 3rd Main Line Circuit Breaker
- ○ 4th Main Line Circuit Breaker

SG500 | 25.8L | 500 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

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APPLICATION AND ENGINEERING DATA

DEMAND RESPONSE READY

ENGINE SPECIFICATIONS

General

Make	Generac
Cylinder #	12
Type	V12
Displacement - in^3 (L)	1,574.4 (25.8)
Bore - in (mm)	5.19 (132)
Stroke - in (mm)	6.30 (160)
Compression Ratio	10.0:1
Intake Air Method	Turbocharged/Aftercooled
Number of Main Bearings	7
Connecting Rods	Steel Alloy
Cylinder Head	Cast Iron
Cylinder Liners	Cast Steel Alloy
Ignition	Electronic
Piston Type	Cast Aluminum Alloy
Crankshaft Type	Forged Steel Alloy
Lifter Type	Solid
Intake Valve Material	High Temp Steel Alloy
Exhaust Valve Material	High Temp Steel Alloy
Hardened Valve Seats	High Temp Steel Alloy

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full-Flow Cartridge
Crankcase Capacity - qt (L)	95 (90)

Cooling System

Cooling System Type	Pressurized Closed Recovery
Fan Type	Pusher
Fan Speed - RPM	1,640
Fan Diameter - in (mm)	44 (1,118)

Fuel System

Fuel Type	Natural Gas
Carburetor	Down Draft
Secondary Fuel Regulator	Standard
Fuel Shut Off Solenoid	Standard
Operating Fuel Pressure - in H_2O (kPa)	11 - 14 (2.7 - 3.5)
Optional Operating Fuel Pressure - in H_2O (kPa)	7 - 11 (1.7 - 2.7)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	60 A
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(2) - 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K0500124Y23
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5% (3-Phase)
Telephone Interference Factor (TIF)	<52

Standard Excitation	Permanent Magnet
Bearings	Sealed Ball
Coupling	Direct via Flexible Disc
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Full Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

SG500 | 25.8L | 500 kW

INDUSTRIAL SPARK-IGNITED GENERATOR SET

EPA Certified Stationary Emergency and Non-Emergency

OPERATING DATA

DEMAND RESPONSE READY

POWER RATINGS - NATURAL GAS

	Standby/Demand Response		Prime	
Three-Phase 120/208 VAC @0.8pf	500 kW/625 kVA	Amps: 1,737	450 kW/563 kVA	Amps: 1,563
Three-Phase 120/240 VAC @0.8pf	500 kW/625 kVA	Amps: 1,505	450 kW/563 kVA	Amps: 1,355
Three-Phase 277/480 VAC @0.8pf	500 kW/625 kVA	Amps: 753	450 kW/563 kVA	Amps: 677
Three-Phase 346/600 VAC @0.8pf	500 kW/625 kVA	Amps: 602	450 kW/563 kVA	Amps: 542

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip

277/480 VAC	30%	208/240 VAC	30%
K0500124Y23	1,020	K0600124Y23	1,120
K0600124Y23	1,560	G0546124N23	1,760
K0832124Y23	2,800	K0792124Y23	2,130
		K0832124Y23	2,090

FUEL CONSUMPTION RATES*

Natural Gas – scfh (m^3/hr)

Percent Load	Standby/Demand Response	Prime
25%	2,550 (72)	2,431 (69)
50%	3,624 (103)	3,409 (97)
75%	4,770 (135)	4,426 (125)
100%	5,862 (166)	5,425 (154)

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby/Demand Response	Prime
Air Flow (Fan Air Flow Across Radiator)	scfm (m^3/min)	31,400 (889)	31,400 (889)
Coolant Flow	gpm (Lpm)	225 (852)	225 (852)
Coolant System Capacity	gal (L)	25 (93)	25 (93)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)		See Bulletin No. 0199270SSD	
Maximum Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby/Demand Response	Prime
Flow at Rated Power - scfm (m^3/min)	935 (26.5)	865 (24.5)

ENGINE

		Standby/Demand Response	Prime
Rated Engine Speed	RPM	1,800	1,800
Horsepower at Rated kW**	hp	729	656
Piston Speed	ft/min (m/min)	1,890 (576)	1,890 (576)
BMEP	psi (kPa)	204 (1,404)	183 (1,263)

EXHAUST

		Standby/Demand Response	Prime
Exhaust Flow (Rated Output)	scfm (m^3/min)	3,186 (90.2)	2,907 (82.3)
Max. Backpressure (Post Silencer)	inHg (kPa)	0.75 (2.54)	0.75 (2.54)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C)	1,380 (749)	1,355 (735)

** Refer to “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528, and DIN6271 standards.
Standby - See Bulletin 0187500SSB
Demand Response - See Bulletin 10000018250
Prime - See Bulletin 0187510SSB

SG500 | 25.8L | 500 kW

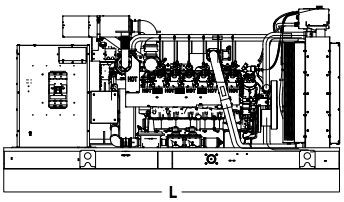
INDUSTRIAL SPARK-IGNITED GENERATOR SET

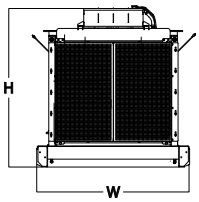
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DIMENSIONS AND WEIGHTS*

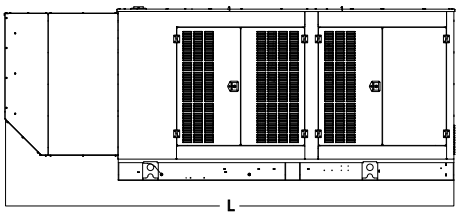
DEMAND RESPONSE READY

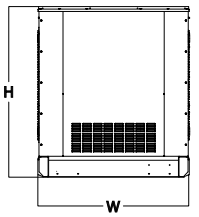




OPEN SET (Includes Exhaust Flex)

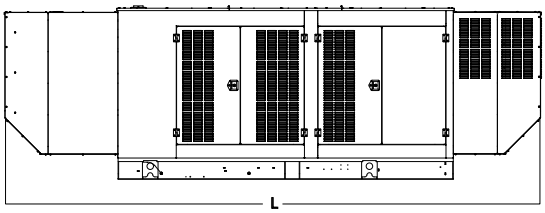
L x W x H - in (mm)	154.4 (3,922) x 70.5 (1,791) x 74.9 (1,902)
Weight - lbs (kg)	9,386 - 9,739 (4,257 - 4,417)

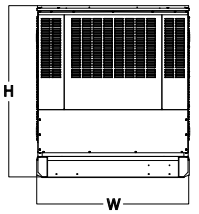




WEATHER PROTECTED ENCLOSURE

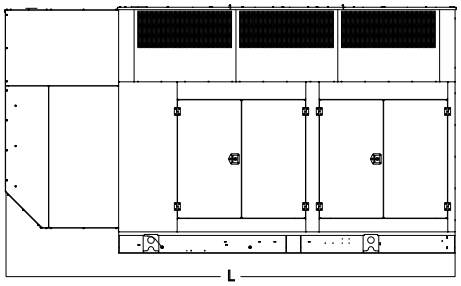
L x W x H - in (mm)	207.4 (5,268) x 70.9 (1,801) x 80.0 (2,032)
Weight - lbs (kg)	Steel: 11,576 - 11,929 (5,250 - 5,410) Aluminum: 10,489 - 10,841 (4,757 - 4,917)

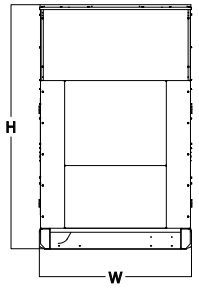




LEVEL 1 SOUND ATTENUATED ENCLOSURE

L x W x H - in (mm)	247.5 (6,287) x 70.9 (1,801) x 80.0 (2,032)
Weight - lbs (kg)	Steel: 12,583 - 12,936 (5,707 - 5,867) Aluminum: 10,921 - 11,274 (4,953 - 5,113)





LEVEL 2 SOUND ATTENUATED ENCLOSURE

L x W x H - in (mm)	207.4 (5,268) x 70.9 (1,801) x 114.1 (2,898)
Weight - lbs (kg)	Steel: 12,921 - 13,658 (5,860 - 6,194) Aluminum: 11,066 - 11,565 (5,019 - 5,245)

LEVEL 3 SOUND ATTENUATED ENCLOSURE

L x W x H - in (mm)	232.0 (5,893) x 76.9 (1,953) x 129.2 (3,282)
Weight - lbs (kg)	15,950 - 16,303 (7,234 - 7,394)

* All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

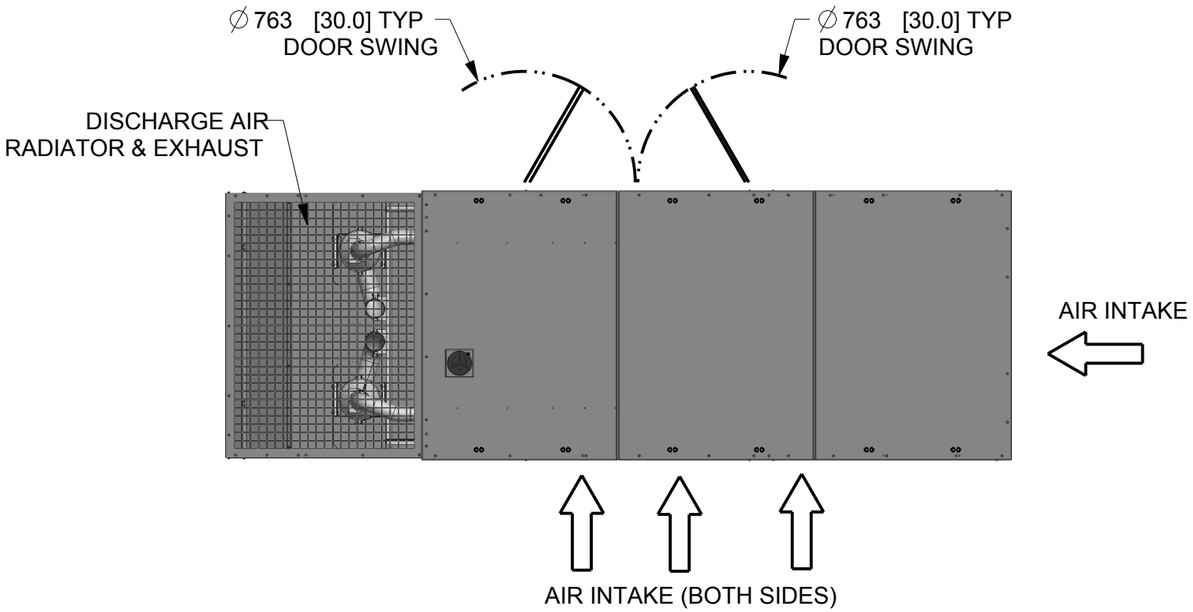
SPEC SHEET

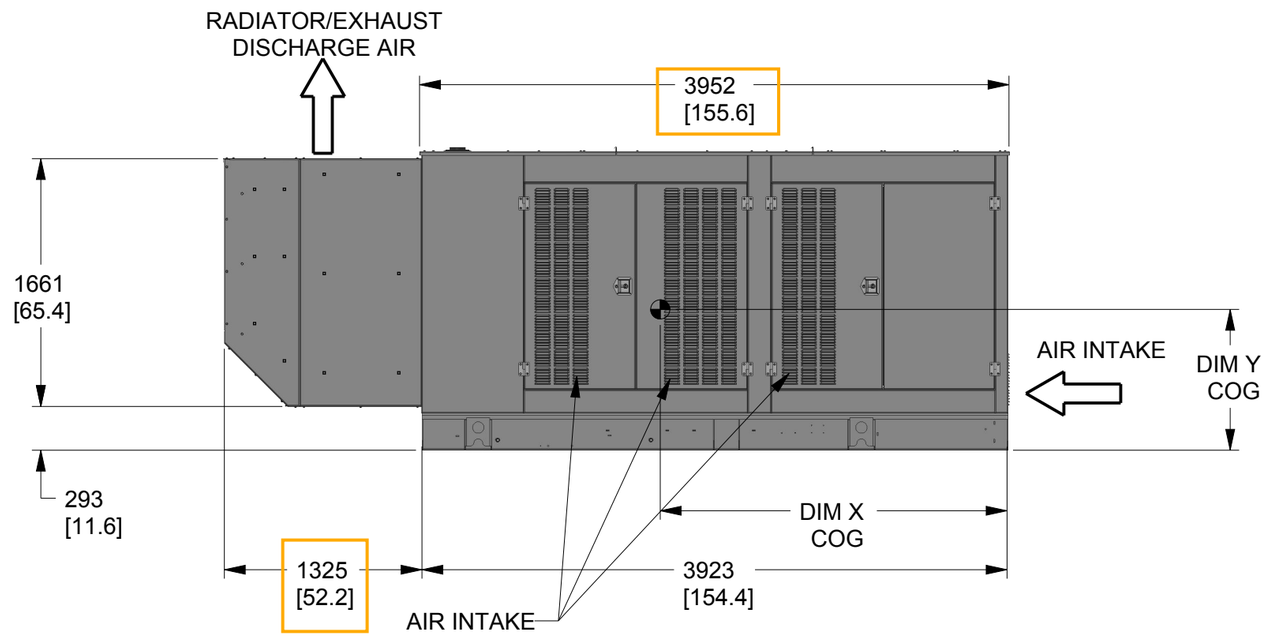
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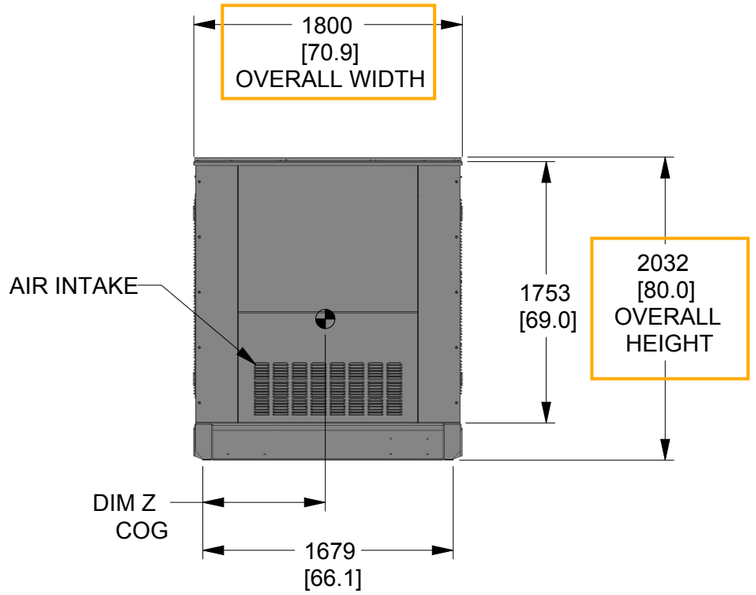
Part No. 10000038081
Rev. B 10/02/19

SH	REV	WINDCHILL VERSION
1/1	A	A.1

FOR ALL STUB-UP, WEIGHT, AND COG DETAILS, SEE CORRESPONDING OPEN SET DRAWING PER UNIT CONFIGURATION.







DRAWING CREATED FROM PRO/ENGINEER 3D FILE. ECO MODIFICATION TO BE APPLIED TO SOLID MODEL ONLY.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

INSTALLATION DRAWING

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

TITLE
STANDARD ENCLOSURE
G25.8L, 60HZ: SG/MG 500, PG450
50HZ: SG/MG 400, PG360

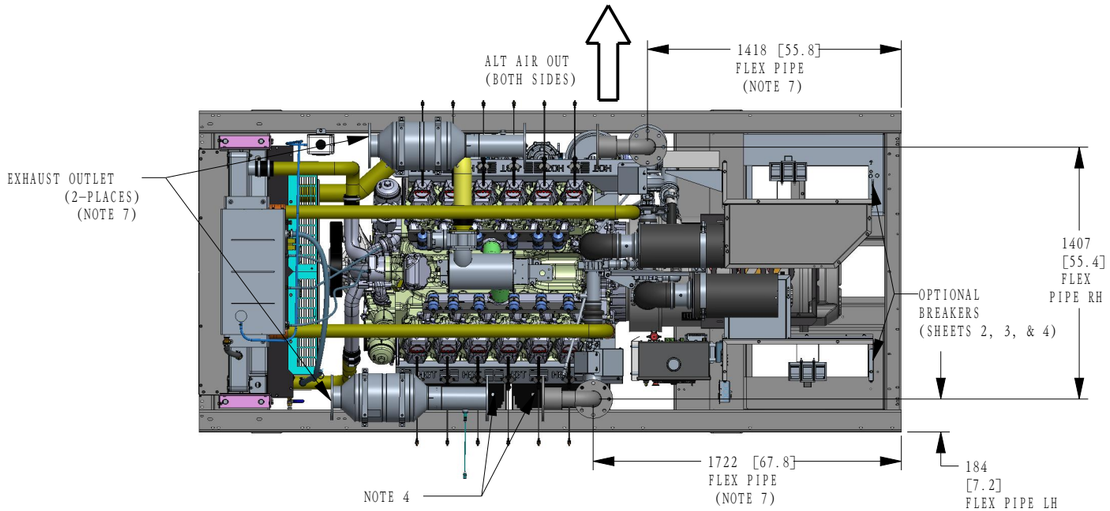
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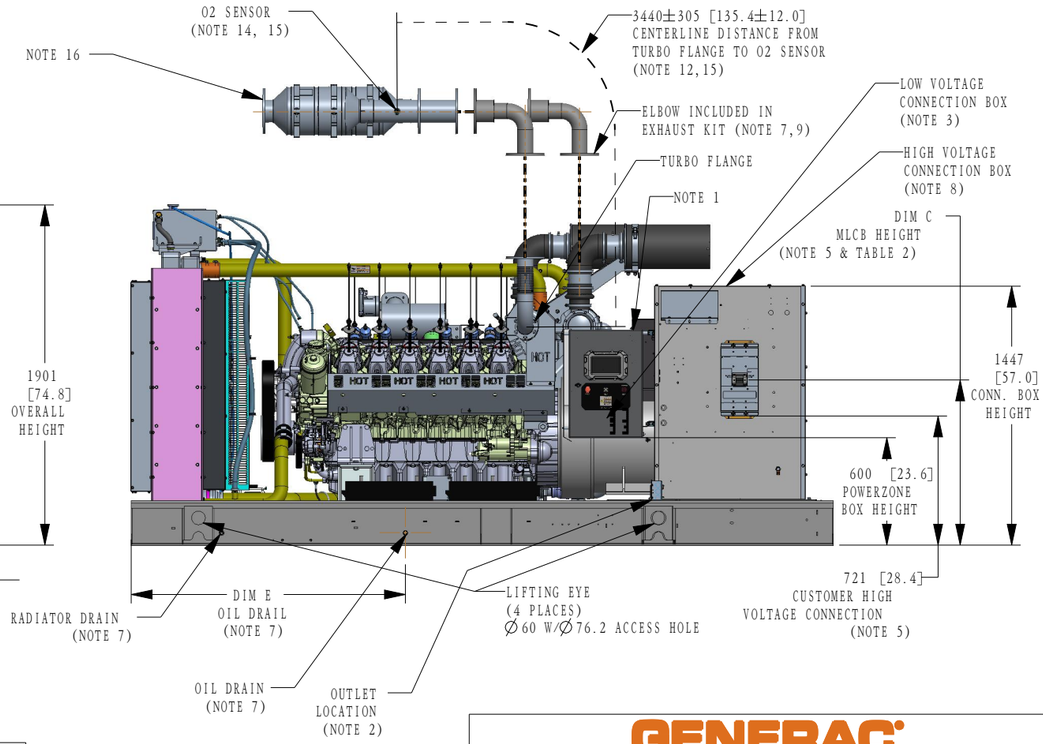
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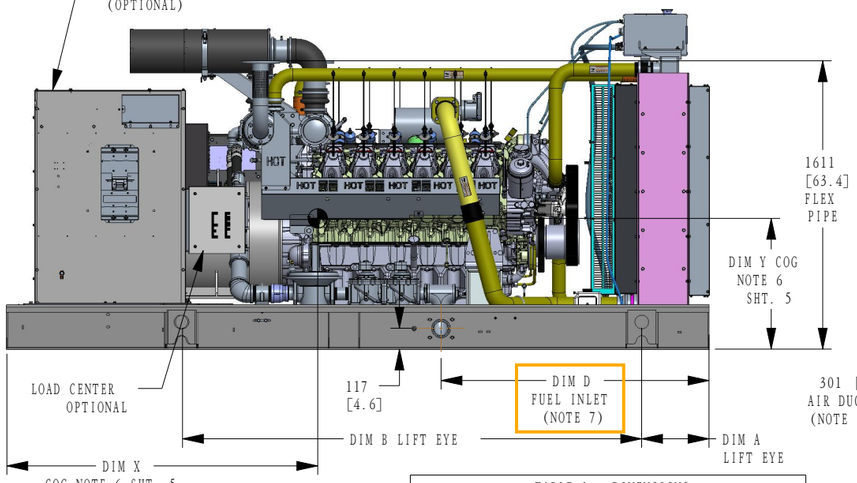
SCALE 0.025 | WT-KG | SHEET 1 of 1

NOTES:
1. CONTROL PANEL, (OPTIONAL BATTERY CHARGER INSIDE).
2. 120V, 20A GFCI & 250V, 15A OUTLET (OPTIONAL).
3. CONNECTION POINTS FOR CONTROL WIRES PROVIDED IN THE LOW VOLTAGE CONNECTION BOX (USE LOW VOLTAGE STUB-UP AREA).
4. BATTERY (24 VOLT NEGATIVE GROUND SYSTEM).
5. MAIN LINE CIRCUIT BREAKER (MLCB), AC LOAD LEADS. (DIMENSIONS MAY VARY DUE TO UNIT CONFIGURATION)
6. CENTER OF GRAVITY AND WEIGHT MAY CHANGE DUE TO UNIT OPTIONS.
7. ENGINE SERVICE CONNECTIONS:
   INLET NATURA GAS = 2" NPT FEMALE COUPLING (STANDARD OPT), 3" NPT FEMALE COUPLING (LOW FUEL PRESSURE OPT)
   INLET DIESEL = N/A
   RETURN DIESEL = N/A
   OIL DRAIN = 1/2" NPT FEMALE COUPLING
   RADIATOR DRAIN = 1/2" NPT FEMALE COUPLING
   EXHAUST FLEX PIPE OUTLET = 3.5" I.D. SAE FLANGE
   CATALYST INLET/OUTLET = 5" I.D. SAE FLANGE
   ELBOW INLET = 3.5" ANSI CLASS 125#/150#
   ELBOW OUTLET = 5" ANSI CLASS 125#/150#
***** SEE GENERATOR SIZING GUIDE FOR FUEL PIPE SIZING TO SUIT APPLICATION *****
8. AUXILARY AC CONNECTION FOR UNIT OPTIONS ARE LOCATED IN HIGH VOLTAGE CONNECTION BOX, UNLESS AN OPTIONAL LOAD CENTER IS INSTALLED.
9. EXHAUST PIPES MAY BE ROTATED TO ALLOW MUFFLER TO POINT OUT TO THE RIGHT OR LEFT SIDE OF GENERATOR. (MAY NOT APPLY TO ALL UNITS)
10. GENERATOR SET MUST BE INSTALLED SUCH THAT FRESH COOLING AIR IS AVAILABLE AND DISCHARGE AIR FROM THE RADIATOR IS NOT RECIRCULATED.
11. BOTTOM OF GENERATOR SET MUST BE ENCLOSED TO PREVENT PEST INTRUSION AND RECIRCULATION OF DISCHARGE AIR AND/OR IMPROPER COOLING AIR FLOW.
12. IF USED, INSTALL EXHAUST BLANKETS (SUPPLIED BY OTHERS) ALONG THIS LINE. O2 SENSOR TO BE PLACED THIS DISTANCE FROM TURBO FLANGE.
    BLANKETS MUST HAVE MINIMUM CONTINUOUS OPERATING TEMPERATURE OF 1500°F [816°C].
13. CONNECT THE OPEN SET EXHAUST PER NFPA 37
14. BLANKETS SHOULD NOT COVER OXYGEN SENSOR.
15. OXYGEN SENSOR MUST BE MOUNTED BETWEEN ENGINE OUTLET AND CATALYST INLET AS SHOWN. IF ELBOWS ARE REQUIRED, ONLY TWO ELBOWS PER EXHAUST LINE MAY BE USED. OXYGEN SENSOR MUST BE LOCATED AT LEAST 508MM [20IN] DOWNSTREAM OF ANY ELBOW. PIPES WITH SMALLER DIAMETERS THAN THOSE OF THE PIPES PROVIDED MAY NOT BE USED.
16. CATALIZED SILENCER (FOR EPA UNITS) MUST BE MOUNTED IN DESCRIBED POSITION.
FAILING TO FOLLOW THESE INSTRUCTIONS WHEN INSTALLING A CERTIFIED ENGINE IN A PIECE OF STATIONARY EQUIPMENT VIOLATES FEDERAL LAW 40 CFR 1068. 105(B), SUBJECT TO FINES OR PENALTIES AS DESCRIBED IN THE CLEAN AIR ACT.
17. BOLTS OR STUDS USED TO MOUNT UNIT TO PAD, OR BASE TANK, SHALL BE 5/8"-11 GRADE 5. USE STANDARD SAE TORQUE SPECS.
(FOR INSTALLATION OF FUEL TANK TO PAD REFER TO INSTALL DRAWING OF THE BASE TANK)

ADDITIONAL NOTES:
FOR WEIGHT AND CENTER OF GRAVITY DATA SEE NOTE 6, AND SHEET 5.







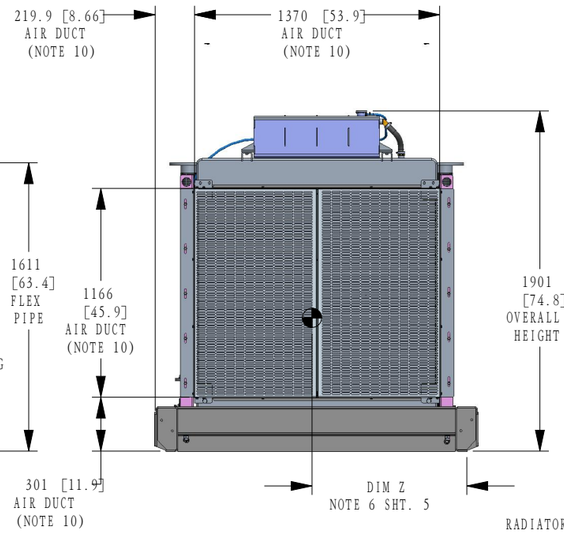


TABLE 1 – DIMENSIONS		
DIM	OPEN SET & STD, L1A & L2A ENCLOSURE	LEVEL L3A ENCLOSURE
A	376 [14.8]	681 [26.8]
B	2565 [101.0]	2573 [101.3]
D	1497 [58.9]	1802 [70.9]
E	1532 [60.3]	1837 [72.3]
NOTE: OPEN SET FRAME LEVEL 0, 1 & 2 SHOWN		

TABLE 2 – MLCB HEIGHTS			
DIM	STANDARD (SG)	MULTIPLE (SG)	MPS (MG)
C	923 [36.31]	923 [36.3]	1210 [47.6]
NOTES: 1) TWO OPTIONAL BREAKERS SHOWN 2) MLCB HEIGHT MAY VARY BASED ON AMPERAGE SIZE.			

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DIMENSIONS ARE IN MILLIMETERS [INCHES]

INSTALLATION DRAWING

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

TITLE
OPEN SET W/POWERZONE
G25.8L, 60HZ: SG500, PG450
50HZ: SG400, PG360

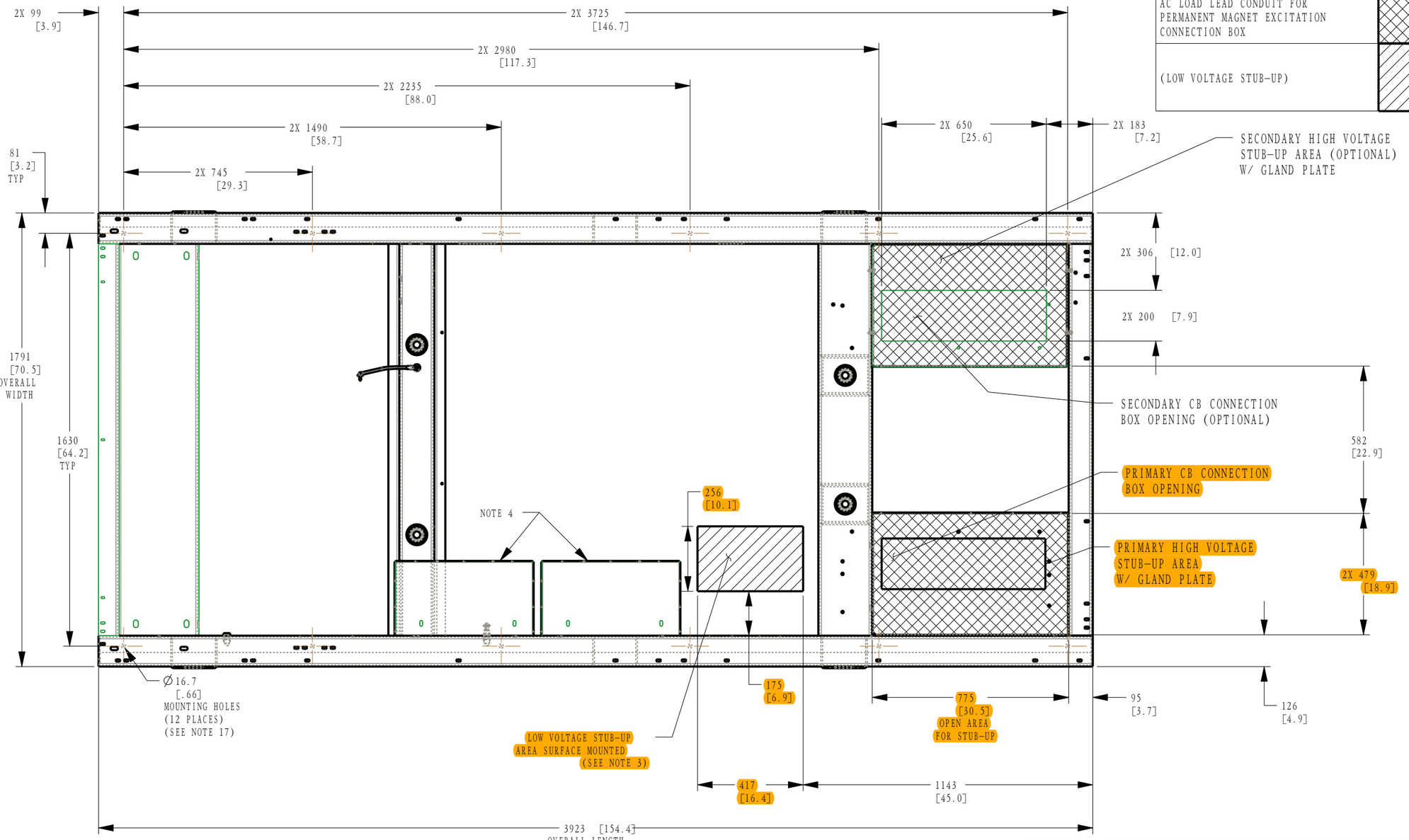
ISSUE DATE:

SIZE	CAGE NO	DWG NO	REV
B	N/A	10000038218	E
SCALE 0.030	WT-KG N/A	SHEET 1 of 5	

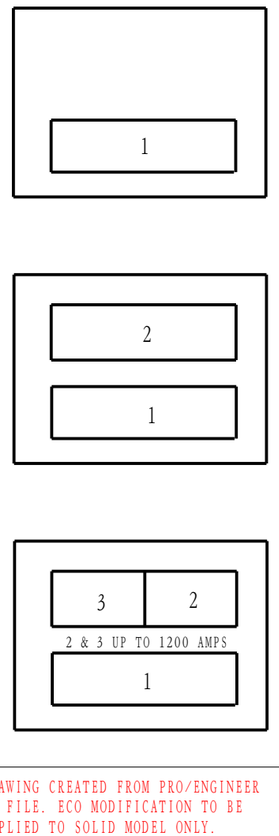
RECOMMENDED ELECTRICAL STUB-UP

(HIGH VOLTAGE STUB-UP)
AC LOAD LEAD CONDUIT FOR
PERMANENT MAGNET EXCITATION
CONNECTION BOX

(LOW VOLTAGE STUB-UP)



OPTIONAL BREAKER CONFIGURATIONS



DRAWING CREATED FROM PRO/ENGINEER 3D FILE. ECO MODIFICATION TO BE APPLIED TO SOLID MODEL ONLY.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

INSTALLATION DRAWING

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

TITLE
STUB-UP VIEW FRAME: STD, L1A & L2A
G25.8L, 60HZ: SG500, PG450
50HZ: SG400, PG360

ISSUE DATE:

SIZE	CAGE NO	DWG NO	REV
B	N/A	10000038218	E
SCALE 0.030	WT-KG N/A	SHEET 2 of 5	

OPEN SET

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	4257 kg [9386 lbs]	1957 [77.0]	687 [27.0]	837 [33.0]
SG/MG 500, PG 450	208V,240V,400V,480V & 600V UPSIZED ALT	4417 kg [9739 lbs]	1915 [75.3]	662 [26.0]	837 [33.0]

NOTE:
CENTER OF GRAVITY AND WEIGHT MAY CHANGE DUE TO UNIT OPTIONS.

STD ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	5250 kg [11,576 lbs]	2173 [85.5]	795 [31.3]	838 [33.0]
SG/MG 500, PG 450	208V,240V,400V,480V & 600V UPSIZED ALT	5410 kg [11,929 lbs]	2141 [84.3]	788 [31.0]	838 [33.0]

STD ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM "X"	CENTER OF GRAVITY DIM "Y"	CENTER OF GRAVITY DIM "Z"
4757kg [10,489 lbs]	2098 [82.6]	748 [29.4]	838 [33.0]
4917kg [10,841 lbs]	2065 [81.3]	743 [29.2]	838 [33.0]

L1A ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	5707 kg [12,583 lbs]	2021 [79.5]	822 [32.3]	841 [33.1]
SG/MG 500, PG 450	208V,240V,400V,480V & 600V UPSIZED ALT	5867 kg [12,936 lbs]	1996 [78.5]	815 [32.0]	841 [33.1]

L1A ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM "X"	CENTER OF GRAVITY DIM "Y"	CENTER OF GRAVITY DIM "Z"
4953kg [10,921 lbs]	2024 [79.6]	764 [30.0]	839 [33.0]
5113kg [11,274 lbs]	1995 [78.5]	758 [29.8]	839 [33.0]

L2A ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	5860 kg [12,921 lbs]	2205 [86.8]	975 [38.3]	837 [33.0]
SG/MG 500, PG 450	208V,240V,400V,480V & 600V UPSIZED ALT	6020 kg [13,274 lbs]	2175 [85.6]	963 [37.9]	837 [33.0]

L2A ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM "X"	CENTER OF GRAVITY DIM "Y"	CENTER OF GRAVITY DIM "Z"
5019kg [11,066 lbs]	2119 [83.4]	843 [33.1]	837 [33.0]
5179kg [11,419 lbs]	2087 [82.1]	835 [32.8]	837 [33.0]

L2A MOTORIZED DAMPER ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	6034 kg [13,304 lbs]	2205 [86.8]	975 [38.3]	837 [33.0]
SG/MG 500, PG 450	208V,240V,400V,480V & 600V UPSIZED ALT	6195 kg [13,658 lbs]	2175 [85.6]	963 [37.9]	837 [33.0]

L2A MOTORIZED DAMPER ENCLOSURE, ALUMINUM

WEIGHT	CENTER OF GRAVITY DIM "X"	CENTER OF GRAVITY DIM "Y"	CENTER OF GRAVITY DIM "Z"
5086kg [11,213 lbs]	2119 [83.4]	843 [33.1]	837 [33.0]
5246kg [11,565 lbs]	2087 [82.1]	835 [32.8]	837 [33.0]

L3A ENCLOSURE, STEEL

MODEL	VOLTAGE	WEIGHT	CENTER OF GRAVITY DIM X	CENTER OF GRAVITY DIM Y	CENTER OF GRAVITY DIM Z
SG/MG 500, PG 450	208V,240V,400V,480V & 600V	7233kg [15,950 lbs]	2235 [88.0]	972 [38.0]	914 [36.0]

DRAWING CREATED FROM PRO/ENGINEER
3D FILE. ECO MODIFICATION TO BE
APPLIED TO SOLID MODEL ONLY.

INSTALLATION DRAWING

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ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

TITLE
WEIGHT & CENTER OF GRAVITY
G25.8L, 60HZ: SG500, PG450
50HZ: SG400, PG360

ISSUE DATE:

SIZE	CAGE NO	DWG NO	REV
B	N/A	10000038218	E

SCALE 0.030 | WT-KG N/A | SHEET 5 of 5

Certification of Quality

Generac Power Systems certifies that the products we manufacture have been built and tested in accordance with strict internal and external standards for quality. Our quality management system has been registered with the internationally recognized ISO 9001:2008 standard and our products comply with external standards that include, but are not limited to, CSA, NEMA, EGSA, ISO, and UL.

The Generac Quality Management System (GQMS) ensures the highest standards of quality at every level of production, from raw materials to the finished product. This includes receiving inspection, in-process checks, product and process audits, testing, final inspections, and shipping standards.

Tests of our products are performed in accordance with our internal procedures and controlled through the GQMS to ensure accuracy and effectiveness. The testing process and product designs comply with external standards which may include, but are not limited to: ISO 8528-5, ISO 3046, NFPA 99, NFPA 110, BS 5514, SAE J1349, and DIN 6271.

Generac Power Systems has over one million square feet of manufacturing space and over 2000 employees dedicated to designing and manufacturing power generation equipment in our multiple State of Wisconsin, USA factories. All of our installed and mobile generators are built with pride by our skilled American workforce to ensure our customers receive the quality that they expect from Generac.

We are committed to producing quality products for both our internal and external customers. We will continuously improve our processes and diligently measure all aspects of our business.

Daniel Waschow

Vice President of Quality
Generac Power Systems, Inc.
Waukesha, Wisconsin USA

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Part No. 0184520SSD
Rev. B 03/01/12

CERTIFICATE

This is to certify that

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

with the organizational units/sites as listed in the annex

has implemented and maintains a **Quality Management System**.

Scope:
Design, Manufacture, and Distribution of Power Products and Solutions.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2015

Certificate registration no.	10012920 QM15
Date of original certification	2013-12-09
Date of revision	2021-06-25
Date of certification	2021-07-16
Valid until	2024-07-15

DQS Inc.

Brad McGuire
Managing Director

Annex to certificate
Registration No. 10012920 QM15

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

Location	Scope
10012920 **Generac Power Systems, Inc.** **S45 W29290 Hwy. 59** **Waukesha, WI 53189** **United States of America**	Design and Support of Power Products and Solutions.
10012922 **Generac Power Systems, Inc.** **211 Murphy Dr.** **Eagle, WI 53119** **United States of America**	Manufacture and Distribution of Power Products and Solutions.
10012923 **Generac Power Systems, Inc.** **757 N. Newcomb St.** **Whitewater, WI 53190** **United States of America**	Manufacture and Distribution of Power Products and Solutions.
10012924 **Generac Power Systems, Inc.** **900 N. Parkway** **Jefferson, WI 53549** **United States of America**	Manufacture of Power Products and Solutions.
10013528 **Generac Power Systems** **3815 Oregon St.** **Oshkosh, WI 54902** **United States of America**	Manufacture and Distribution of Power Products.
10017103 **Generac Mobile** **215 Power Drive** **Berlin, WI 54923** **United States of America**	Manufacture and Distribution of Power Products.

Annex to certificate
Registration No. 10012920 QM15

Generac Power Systems, Inc.

S45 W29290 Hwy. 59
Waukesha, WI 53189
United States of America

Remote Location	Scope
10014175 **Generac Power Systems, Inc.** **351 Collins Road** **Jefferson, WI 53549** **United States of America**	The remote location at Jefferson, WI performs the following primary functions: Parts and Components Receiving, Inventory, Return and Reconditioning of Product, and Distribution to Generac Locations.
10017439 **Generac Mobile** **745 E. Knopf St.** **Berlin, WI 54923** **United States of America**	The remote location at Berlin, WI performs the following primary functions: Warehousing and Shipping.
10018422 **Generac Power Systems, Inc.** **303 Venture Court** **Janesville, WI 53546** **United States of America**	The remote location at Janesville, WI performs the following primary functions: Parts and Components Receiving, Kitting, Warehousing, Inventory, and Distribution to Generac locations.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2022 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Generac Power Systems, Inc.**
(U.S. Manufacturer or Importer)

Certificate Number: NGNXB25.82C1-023

Effective Date: 10/13/2021

Expiration Date: 12/31/2022

Byron J. Bunker, Division Director
Compliance Division

Issue Date: 10/13/2021

Revision Date: N/A

Manufacturer: Generac Power Systems, Inc.
Engine Family: NGNXB25.82C1
Mobile/Stationary Certification Type: Stationary
Fuel : Natural Gas (CNG/LNG)
Emission Standards :
Part 60 Subpart JJJJ Table 1
NOx (g/Hp-hr) : 2.0
CO (g/Hp-hr) : 4.0
VOC (g/Hp-hr) : 1.0
Emergency Use Only : Y

Pursuant to Section 213 of the Clean Air Act (42 U.S.C. section 7547) and 40 CFR Part 60, 1065, 1068, and 60 (stationary only and combined stationary and mobile) and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new nonroad spark-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60. This certificate of conformity does not cover nonroad engines imported prior to the effective date of the certificate.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068.20 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover large nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

STATEMENT OF EXHAUST EMISSIONS
2022 Spark-Ignited Generators
Industrial Series - NON-SCAQMD Certified, Stationary Emergency

	Model	Engine (L)	EPA Engine Family	Fuel	Catalyst Required	Combination Catalyst or Separate Catalyst	EPA Certification #	Grams/bhp-hr. THC	NMHC	NOx	CO	Rated RPM	BHP	Fuel Flow (lb/hr)
Small Spark Ignited Engine (SSIE) Small Off-Road Engines (SORE)	QTA25	2.4	NGNXB02.42NN	NG	No	Not Required	NGNXB02.42NN-059	1.60	1.56	1.77	70.06	1,800	38	16.52
	QTA25	2.4	NGNXB02.42NL	LPG			NGNXB02.42NL-060	1.43	N/A	4.38	86.18	1,800	43	17.59
	SG035, 40, 45, 50NA	4.5	NGNXB04.52NN	NG			NGNXB04.52NN-009	0.64	0.10	4.48	35.10	1,800	75	25.89
	SG035, 40, 45, 50NA	4.5	NGNXB04.52NL	LPG			NGNXB02.42NL-060	0.84	N/A	5.27	64.25	1,800	76	29.51
	SG050T, 60, 70, 80	4.5	NGNXB04.52NN	NG			NGNXB04.52NN-009	0.49	0.12	3.36	42.88	1,800	129	45.22
	SG050T, 60, 70, 80	4.5	NGNXB04.52NL	LPG			NGNXB02.42NL-060	0.47	N/A	3.27	59.64	1,800	129	48.96
	SG080	9.0	NGNXB08.92U1	NG			NGNXB08.92U1-011	0.60	0.06	1.07	93.19	1,800	125	62.37
	SG080 (DF)	9.0	NGNXB08.92U1	NG/LPV			NGNXB08.92U1-011	0.42	0.05	1.89	52.04	1,800	125	57.18
	SG080 (DF)	9.0	NGNXB08.92U1	NG/LPL			NGNXB08.92U1-011	0.68	0.11	1.61	82.22	1,800	128	55.82
	SG080	9.0	NGNXB08.92U2	LPV			NGNXB08.92U2-012	0.71	N/A	1.54	124.79	1,800	128	61.52
	SG080	9.0	NGNXB08.92U2	LPL			NGNXB08.92U2-012	0.75	N/A	1.33	127.68	1,800	128	60.23
Large Spark Ignited Engines (LSIE)	SG080, 100	9.0	NGNXB08.92O1	NG	Yes	Catalyst Muffler	NGNXB08.92O1-017	0.18	0.00	0.01	0.25	1,800	153	53.10
	SG080, 100 (LPF)	9.0	NGNXB08.92O1	NG			NGNXB08.92O1-017	0.11	0.00	0.12	0.03	1,800	153	53.24
	SG080, 100	9.0	NGNXB08.92O2	LPV			NGNXB08.92O2-018	0.01	N/A	0.21	0.22	1,800	142	54.36
	SG080, 100	9.0	NGNXB08.92O2	LPL			NGNXB08.92O2-018	0.03	N/A	0.00	0.36	1,800	142	55.27
	SG080, 100 (DF)	9.0	NGNXB08.92O1	NG/LPV			NGNXB08.92O1-017	0.14	0.00	0.00	0.17	1,800	148	53.20
	SG080, 100 (DF)	9.0	NGNXB08.92O1	NG/LPL			NGNXB08.92O1-017	0.17	0.00	0.01	1.03	1,800	151	51.86
	SG080, 100 (DF, LPF)	9.0	NGNXB08.92O1	NG/LPV			NGNXB08.92O1-017	0.11	0.00	0.00	0.18	1,800	152	46.90
	SG080, 100 (DF, LPF)	9.0	NGNXB08.92O1	NG/LPL			NGNXB08.92O1-017	0.08	0.00	0.00	0.09	1,800	151	51.58
	SG/MG130, 150	9.0	NGNXB08.92O3	NG			NGNXB08.92O3-019	0.14	0.00	0.10	0.74	1,800	228	86.37
	SG/MG130, 150 (DF)	9.0	NGNXB08.92O3	NG/LPV			NGNXB08.92O3-019	0.18	0.00	0.08	0.56	1,800	229	88.01
	SG/MG130, 150 (DF)	9.0	NGNXB08.92O3	NG/LPL			NGNXB08.92O3-019	0.06	0.00	0.09	0.19	1,800	228	84.82
	SG/MG130, 150	9.0	NGNXB08.92O4	LPV			NGNXB08.92O4-024	0.02	N/A	0.03	0.09	1,800	230	85.37
	SG/MG130, 150	9.0	NGNXB08.92O4	LPL			NGNXB08.92O4-024	0.01	N/A	0.28	0.20	1,800	230	86.38
	SG175	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.24	0.00	0.12	0.21	1,800	304	101.16
	SG/MG150, 200	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.24	0.00	0.12	0.21	1,800	304	101.16
	SG230	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.15	0.00	0.35	0.41	1,800	374	141.71
	SG/MG250	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.15	0.00	0.35	0.41	1,800	374	141.71
	SG275, 300	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.03	0.00	0.04	0.32	1,800	460	140.33
	MG300	14.2	NGNXB14.22C1	NG			NGNXB14.22C1-020	0.03	0.00	0.04	0.32	1,800	460	140.33
	SG350	21.9	NGNXB21.92C1	NG			NGNXB21.92C1-021	0.07	0.00	0.26	0.21	1,800	636	175.68
	SG350 (LPF)	21.9	NGNXB21.92C1	NG			NGNXB21.92C1-021	0.30	0.00	0.06	0.12	1,800	636	213.96
	SG/MG450	21.9	NGNXB21.92C3	NG			NGNXB21.92C3-022	0.08	0.00	0.06	0.10	1,800	673	208.97
	SG/MG450 (LPF)	21.9	NGNXB21.92C3	NG			NGNXB21.92C3-022	0.19	0.00	0.05	0.17	1,800	673	224.29
	SG/MG500	25.8	NGNXB25.82C1	NG			NGNXB25.82C1-023	0.16	0.00	0.03	0.60	1,800	777	280.37
	SG/MG500 (LPF)	25.8	NGNXB25.82C1	NG			NGNXB25.82C1-023	0.19	0.00	0.06	0.57	1,800	777	279.64
	SG/MG625	33.9	NGNXB33.92C1	NG			NGNXB33.92C1-026	0.13	0.00	0.01	0.22	1,800	908	324.88
	SG/MG750	33.9	NGNXB33.92C1	NG			NGNXB33.92C1-026	0.18	0.00	0.15	0.92	1,800	1,077	416.90
	SG/MG1000	49.0	NGNXB49.02C1	NG			NGNXB49.02C1-027	0.12	0	0.03	0.65	1,800	1,475	426.67

NG: Natural Gas
LPV: Liquid Propane Vapor
LPL: Liquid Propane Liquid

DF: Dual Fuel
LPG: Liquid Propane Vapor or Liquid Propane Liquid
LPF: Units with Option Low Pressure Fuel System

N/A: Not Applicable
Refer to Page 2 for Definitions and Advisory Notes.

Part No. A0002156018
Rev. A 1/14/2022

STATEMENT OF EXHAUST EMISSIONS
2022 Spark-Ignited Generators
Industrial Series - NON-SCAQMD Certified, Stationary Emergency

2020 EPA SPARK-IGNITED EXHAUST EMISSIONS DATA

Effective since 2009, the EPA has implemented exhaust emissions regulations on stationary spark-ignited (gaseous) engine generators for emergency applications. All Generac spark-ignited gensets, including SG, MG, QTA, QT and RG series gensets that are built with engines manufactured in 2009 and later meet the requirements of 40CFR part 60 subpart JJJJ and are EPA certified. These generator sets are labeled as EPA Certified with decals affixed to the engines' valve covers.

The attached documents summarize the general information relevant to EPA certification on these generator sets. This information can be used for submittal data and for permitting purposes, if required. These documents include the following information:

EPA Engine Family

The EPA Engine Family is assigned by the Manufacturer under EPA guidelines for certification purposes and appears on the EPA certificate.

Catalyst Required
Indicates whether a three-way catalyst (TWC) and Air/Fuel Ratio control system are required on the generator set to meet EPA certification requirements. Generally, units rated 80kW and smaller do not require a TWC to meet EPA certification requirements. Please note that some units that do not require a TWC to meet EPA requirements do need one if the California SCAQMD option is selected. Please see "California SCAQMD" below for additional information on this option.

Combination Catalyst or Separate Catalyst
SG and MG series generator sets typically utilize a single combination catalyst/silencer as part of meeting EPA certification requirements. Many QT and RG series generator sets use the same engines as SG series units, but have different exhaust configurations that require the use of conventional silencers with additional separate catalysts installed.

EPA Certificate Number
Upon certification by the EPA, a Certificate Number is assigned by the EPA.

Emissions Actuals - Grams/bhp-hr
Actual exhaust emission data for Total Hydrocarbons (THC), Nitrogen Oxides (NOx) and Carbon Monoxide (CO) that were submitted to EPA and are official data of record for certification. This data can be used for permitting if necessary. Values are expressed in grams per brake horsepower-hour; to convert to grams/kW-hr, multiply by 1.341. Please see advisory notes below for further information.

California Units, SCAQMD CEP Number
A separate low-emissions option is available on many Generac gaseous-fueled generator sets to comply with the more stringent South Coast Air Quality Management District requirements that are recognized in certain areas in California. Gensets that include this option are also EPA Certified.

General Advisory Note to Dealers
The information provided here is proprietary to Generac and its' authorized dealers. This information may only be disseminated upon request, to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Generac Power Systems, Inc.

Advisory Notes on Emissions Actuals

- The stated values are actual exhaust emission test measurements obtained from units representative of the generator types and engines described.
- Values are official data of record as submitted to the EPA and SCAQMD for certification purposes. Testing was conducted in accordance with prevailing EPA protocols, which are typically accepted by SCAQMD and other regional authorities.
- No emission values provided are to be construed as guarantees of emissions levels for any given Generac generator unit.
- Generac Power Systems, Inc. reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emissions performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and must be consulted by the permit applicant/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems, Inc. cannot be construed as a guarantee of installability of the generator set.
- The emission values provided are the result of multi-mode, weighted scale testing in accordance with EPA testing regulations, and may not be representative of any specific load point.
- The emission values provided are not to be construed as emission limits.

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Part No. A0002156018
Rev. A 1/14/2022

Generac Power Systems 5 Year (5C) Extended Limited Warranty for Industrial Standby Generators

For the period of warranty noted below, which begins upon the successful start-up and/or on-line activation of the unit, Generac Power Systems, Inc. “Generac” warrants that its Generator will be free from defects in material and workmanship for the items and period set forth below. Generac will, at its discretion, repair or replace any part(s) which, upon evaluation, inspection and testing by Generac or an Independent Authorized Service Dealer, is found to be defective. Any equipment that the purchaser/owner claims to be defective must be evaluated by the nearest Independent Authorized Service Dealer. Emissions components are excluded from coverage under this extended warranty. Emissions warranty coverage is detailed in a separate emissions warranty.

Warranty Coverage: Warranty coverage period is for Five (5) years or two-thousand (2,000) hours, whichever occurs first.

Warranty Coverage in Year(s) 1-5
Parts, Labor and Limited Travel

Limited Gearbox Coverage:

Year(s): 1-5 Coverage	Year(s): 6-10 Coverage
Limited Parts and Labor	Limited Parts Only

Guidelines:

1. Unit must be registered and proof of purchase available.
2. Any and all warranty repairs and/or concerns must be performed and/or addressed by an Independent Authorized Service Dealer, or branch thereof. Repairs or diagnostics performed by individuals other than Independent Authorized Service Dealers not authorized in writing by Generac will not be covered.
3. This Warranty is transferable between ownership of original install site.
4. Generac supplied engine coolant heaters (block-heaters), heater controls and circulating pumps are only covered during the first year of the warranty provision.
5. Generac may choose to repair, replace or refund a piece of equipment in its sole discretion.
6. Enclosures are warranted against rust for the first year of ownership only. Damage caused after receipt of generator is the responsibility of the owner and is not covered by this warranty. Nicks, scrapes, dents or scratches to the painted enclosure should be repaired promptly by the owner.
7. Warranty only applies to permanently wired and mounted units.
8. Damage to any covered components or consequential damages caused by the use of a non-OEM part will not be covered by the warranty.
9. Proof of performance of all required maintenance must be available.
10. Travel allowance is limited to 300 miles maximum and seven and one half (7.5) hours maximum (per occurrence, whichever is less) round trip from the nearest Independent Authorized Service Dealer. Any additional travel required will not be covered.
11. Engines, driven components and fuel tanks used in Generac’s standby power products system can carry a separate manufacturer’s (OEM) warranty (the “OEM Warranties”), unless otherwise expressly stated. OEM Warranties are in addition to this Warranty. All warranty claims for defects in material and/or workmanship on Generac product OEM components, may be directed through the OEM distributor/dealer network. OEM Warranties may vary and are subject to change. Generac shall have no liability under OEM warranties.

The following will NOT be covered by this warranty:

1. Costs of normal maintenance (i.e. tune-ups, associated part(s), adjustments, loose/leaking clamps, installation and start-up).
2. Damage/failures to the generator caused by accidents, shipping, handling, or improper storage.
3. Damage/failures caused by operation with improper fuels, speeds, loads or installations other than what’s recommended or specified by Generac Power Systems.
4. Damage to the generator due to the use of non-Generac parts and/or equipment, contaminated fuels, oils, coolants/antifreeze or lack of proper fuels, oil or coolants/antifreeze.
5. Failures due to normal wear and tear, accident, misuse, abuse, neglect, improper installation, improper sizing, or rodent, reptile, and/or insect infestation.
6. Rental equipment used while warranty repairs are being performed and/or any extraordinary equipment used for removal and/or reinstallation of generator (i.e. cranes, hoists, lifts, et. al.).
7. Planes, ferries, railroad, buses, helicopters, snowmobiles, snow-cats, off-road vehicles or any other mode of transport deemed not standard by Generac.
8. Products that are modified or altered in a manner not authorized by Generac in writing.
9. Starting batteries, fuses, light bulbs, engine fluids and any related labor.
10. Steel enclosures that rust as a result of improper installation, location in a harsh or salt water environment, or are scratched where the integrity of applied paint is compromised.
11. Units sold, rated or used for "Prime Power", "Trailer Mounted" or "Rental Unit" applications as defined by Generac. Contact an Independent Authorized Service Dealer for definitions.
12. Shipping costs associated with expedited shipping.
13. Additional costs for overtime, holiday or emergency labor costs for repairs outside of normal business hours.
14. Any incidental, consequential or indirect damages caused by defects in materials or workmanship, or any delay in repair or replacement of the defective part(s).
15. Failures caused by any act of God or external cause including without limitation, fire, theft, freezing, war, lightning, earthquake, windstorm, hail, water, tornado, hurricane, or any other matters which are reasonably beyond the manufacturer’s control.

THIS WARRANTY SUPERSEDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. SPECIFICALLY, GENERAC MAKES NO OTHER WARRANTIES AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTIES WHICH ARE ALLOWED BY LAW, SHALL BE LIMITED IN DURATION TO THE TERMS OF THE EXPRESS WARRANTY PROVIDED HEREIN. SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. GENERAC'S ONLY LIABILITY SHALL BE THE REPAIR OR REPLACEMENT OF PART(S) AS STATED ABOVE. IN NO EVENT SHALL GENERAC BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH DAMAGES ARE A DIRECT RESULT OF GENERAC’S NEGLIGENCE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU ALSO HAVE OTHER RIGHTS UNDER APPLICABLE LAW.

FOR AUSTRALIA ONLY: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.
FOR NEW ZEALAND ONLY: Nothing in this warranty statement excludes, restricts or modifies any condition, warranty right or remedy which pursuant to the New Zealand Legislation (Commonwealth or State) including the Fair Trading Practices Act of 1986 or the Consumer Guarantees Act 1993 (“CGA”) applies to this limited warranty and may not be so excluded, restricted or modified. Nothing in this statement is intended to have the effect of contracting out of the provisions of the CGA, except to the extent permitted by that Act, and these terms are to be modified to the extent necessary to give effect to that intention. If you acquire goods from Generac Power Systems or any of its authorized resellers and distributors for the purposes of a business, then pursuant to section 43(2) of the CGA, it is agreed that the provisions of the CGA do not apply.

GENERAC POWER SYSTEMS, INC. • P.O. BOX 8 • Waukesha, WI, USA 53187
Ph: (888) GENERAC (436-3722) • Fax: (262) 544-4851

To locate the nearest Independent Authorized Service Dealer and to download schematics, exploded views and parts lists
visit our website: www.generac.com

Part No. 0J4301 Revision M (2/16)

Generac Power Systems 5 Year (5C) Limited Warranty Extension for Industrial Transfer Switch Systems

Generac and purchaser hereby amend ("Amendment") the term of the original warranty for the transfer switch ("Original Warranty") from the term originally stated in the Original Warranty to a term of five (5) years ("Term Extension"). If purchaser's Original Warranty had already expired, this Amendment revives the Original Warranty and replaces its term with the Term Extension. This Amendment also amends warranty coverage in the Original Warranty to the coverage listed below from years 1-5 ("Coverage Extension"). The Coverage Extension shall not retroactively apply to cover any warranty work performed before the date of the Amendment. For clarity purposes only, the amended warranty is stated below in full.

For the period of warranty noted below, which begins (or began, whichever applicable) upon the successful start-up and/or on-line activation/registration of the unit, Generac Power Systems, Inc. (Generac) warrants that its transfer switch will be free from defects in material and workmanship for the items and period set forth below. Generac will, at its discretion, repair or replace any part(s) which, upon evaluation, inspection and testing by Generac or an Independent Authorized Service Dealer, is found to be defective. Any equipment that the purchaser/owner claims to be defective must be evaluated by the nearest Independent Authorized Service Dealer.

Warranty Coverage in Year(s) 1-5
Parts, Labor and Limited Travel

Guidelines:

1. Unit must be registered and proof of purchase available.
2. Any and all warranty repairs and/or concerns must be performed and/or addressed by an Independent Authorized Service Dealer, or branch thereof. Repairs or diagnostics performed by individuals other than Independent Authorized Service Dealers not authorized in writing by Generac will not be covered.
3. Warranty is transferable between ownership of original installation site.
4. Generac may choose to repair, replace or refund a piece of equipment in its sole discretion.
5. Warranty only applies to permanently wired and mounted units.
6. Enclosures are warranted for the first year of ownership only. Damage caused after receipt of transfer switch is the responsibility of the owner and is not covered by this warranty. Nicks, scrapes, dents or scratches to the painted enclosure should be repaired promptly by the owner.
7. Proof of performance of all required maintenance must be available.
8. Travel allowance is limited to 300 miles maximum or seven and one half (7.5) hours maximum (per occurrence, whichever is less) round trip from the nearest Independent Authorized Service Dealer. Any additional travel required will not be covered.

The following will NOT be covered by this warranty:

1. Costs of normal maintenance (i.e. associated part(s), adjustments, installation or start-up).
2. Damage to the transfer switch system caused by accidents, shipping, handling or improper storage.
3. Damage/failures caused by operation with loads or installations other than what's recommended or specified by Generac. Unauthorized modification/misapplication will not be warranted unless authorized by Generac in writing.
4. Rental equipment used while warranty repairs are being performed and/or any extraordinary equipment used for removal and/or reinstallation of transfer switch (i.e. cranes, hoists, lifts, etc.).
5. Planes, ferries, railroad, buses, helicopters, snowmobiles, snow-cats, off-road vehicles or any other mode of transport deemed not standard by Generac.
6. Failures due to normal wear and tear, accident, misuse, abuse, neglect, improper installation, or improper sizing.
7. Damage to any covered components or consequential damages caused by the use of a non-OEM part will not be covered by this warranty.
8. Damage related to rodent, reptile, and/or insect infestation.
9. Repairs or diagnostics performed by individuals other than Independent Authorized Service Dealers not authorized in writing by Generac.
10. Steel enclosures that rust as a result of improper installation, location in a harsh or salt water environment, or are scratched where the integrity of applied paint is compromised.
11. Fuses, light bulbs and any related labor.
12. Units sold, rated or used for "Prime Power," "Trailer Mounted" or "Rental Unit" applications as defined by Generac. Contact an Independent Authorized Service Dealer for definitions.
13. Failures caused by any act of God or external cause including without limitation, fire, theft, freezing, war, lightning, earthquake, windstorm, hail, water, tornado, hurricane, or any other matters which are reasonably beyond the manufacturer's control.
14. Shipping costs associated with expedited shipping.
15. Any incidental, consequential or indirect damages caused by defects in materials or workmanship, or any delay in repair or replacement of the defective part(s).
16. Any unit built/manufactured prior to 2014 models.
17. Overtime, holiday or emergency labor.
18. Living or travel expenses of person(s) performing service, except as specifically included within the terms of a specific unit warranty period.

THIS WARRANTY SUPERSEDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. SPECIFICALLY, GENERAC MAKES NO OTHER WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTIES WHICH ARE ALLOWED BY LAW, SHALL BE LIMITED IN DURATION TO THE TERMS OF THE EXPRESS LIMITED WARRANTY PROVIDED HEREIN. SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND GENERAC'S ONLY LIABILITY SHALL BE THE REPAIR OR REPLACEMENT OF PART(S) AS STATED ABOVE. IN NO EVENT SHALL GENERAC BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH DAMAGES ARE A DIRECT RESULT OF GENERAC'S NEGLIGENCE. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU COULD ALSO HAVE OTHER RIGHTS FROM STATE TO STATE.

FOR AUSTRALIA ONLY: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.
FOR NEW ZEALAND ONLY: Nothing in this warranty statement excludes, restricts or modifies any condition, warranty right or remedy which pursuant to the New Zealand Legislation (Commonwealth or State) including the Fair Trading Practices Act of 1986 or the Consumer Guarantees Act 1993 ("CGA") applies to this limited warranty and may not be so excluded, restricted or modified. Nothing in this statement is intended to have the effect of contracting out of the provisions of the CGA, except to the extent permitted by that Act, and these terms are to be modified to the extent necessary to give effect to that intention. If you acquire goods from Generac Power Systems or any of its authorized resellers and distributors for the purposes of a business, then pursuant to section 43(2) of the CGA, it is agreed that the provisions of the CGA do not apply.

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Part No. 0J4305 Revision H (4/21)

United States Environmental Protection Agency Warranty Statement (Stationary Emergency Spark-Ignited Generators)

Warranty Rights, Obligations and Coverage

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac) are pleased to explain the Emission Control System Warranty on your new stationary emergency engine. If during the warranty period, any emission control system or component on your engine is found defective in materials or workmanship, Generac will repair your engine at no cost to you for diagnosis, replacement parts and labor provided it be done by a Generac Authorized Warranty Service Facility. Your emission control system may include parts such as the fuel metering, ignition, and exhaust systems and other related emission related components listed below. Generac will warrant the emissions control systems on your 2009 and later model year engines provided there has been no abuse, neglect, unapproved modification, or improper maintenance of your engine. For engines less than 130 HP the warranty period is two years from the date of sale to the ultimate purchaser. For engines greater than or equal to 130 HP the warranty period is three years or 2500 hours of operation, whichever comes first, from the date of the engine being placed into service. For high-cost warranted components, the Emission Control System warranty is valid for 5 years or 3500 hours of operation, whichever comes first.

Purchaser's/Owner's Warranty Responsibilities

As the engine purchaser/owner you are responsible for the following: 1) The engine must be installed and configured in accordance to Generac's installation specifications. 2) The completion of all maintenance requirements listed in your Owner's Manual. 3) Any engine setting adjustment must be done in accordance and consistent with the instructions in the Owner's Manual. 4) Any emission control system or component must be maintained and operated appropriately in order to ensure proper operation of the engine and control system to minimize emissions at all times.

Generac may deny any/or all Emission Control System Warranty coverage or responsibility of the engine, or an emission control system or component on your engine thereof, if it has failed due to abuse, neglect, unapproved modification or improper maintenance, or the use of counterfeit and/or “gray market” parts not made, supplied or approved by Generac. Warranty service can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. The purchaser/owner shall be responsible for any expenses or other charges incurred for service calls and/or transportation of the product to/from the inspection or repair facilities. The purchaser/owner shall be responsible for any and/or all damages or losses incurred while the engine is being transported/shipped for inspection or warranty repairs. Contact Generac Power Systems Inc. for additional Emission Control System Warranty related information, Generac Power Systems, Inc., PO. Box 8, Waukesha, WI 53187, or call 1-800-333-1322 or www.generac.com.

Important Note

This warranty statement explains your rights and obligations under the Emission Control System Warranty, which is provided to you by Generac pursuant to federal law. Note that this warranty shall not apply to any incidental, consequential, or indirect damages caused by defects in materials or workmanship or any delay in repair or replacement of the defective part(s). This warranty is in place of all other warranties, expressed or implied. Specifically, Generac makes no other warranties as to the merchantability or fitness for a particular purpose. Any implied warranties which are allowed by law, shall be limited in duration to the terms of the express warranty provided herein. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Emission Related Parts Include the Following (if so equipped)

1) Fuel Metering System

1.1) Gasoline Carburetor Assembly and Internal Components
A) Fuel Filter, B) Carburetor, C) Fuel Pump

1.2) Carburetion Assembly and Its Components
A) Fuel Controller, B) Carburetor and Its Gaskets, C) Mixer and Its Gaskets, D) Primary Gas Regulator, E) Liquid Vaporizer

1.3) Fuel Regulator

2) Air Induction System Including A) Intake Pipe/Manifold, B) Air Cleaner

3) Ignition System Including A) Spark Plug, B) Ignition Module, C) Ignition Coil, D) Spark Plug Wires

4) Exhaust System
A) Catalyst Assembly*, B) Exhaust Manifold, C) Muffler, D) Exhaust Pipe, E) Muffler Gasket

5) Crankcase Breather Assembly Including
A) Breather Connection Tube, B) PCV Valve

6) Oxygen Sensor

7) Diagnostic Emission-Control System

*High-Cost Warranted Component

United States Environmental Protection Agency Compliance Requirements (Stationary Emergency Spark-Ignited Generators)

Purchaser's/Owner's Record Keeping Responsibilities

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac) are pleased to explain your record keeping requirements for compliance with Subpart JJJJ- Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60. As the engine purchaser/owner who operates and maintains their certified emergency stationary engine and emission control system according to applicable emission related guidelines as specified in this Owner's Manual, you are required to meet the following notification and record keeping requirements to demonstrate compliance: 1) Maintain documentation that the engine is certified to meet emission standards. 2) Record keeping of maintenance conducted. 3) Record keeping of the provision allowing natural gas engines to operate using propane for a maximum of 100 hours per year as an alternate fuel solely during emergency operations provided the engine is not certified to operate on propane. 4) Meet all compliance notifications submitted to the purchaser/owner and maintain all supporting documentation. 5) Record keeping of hours of operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. For emergency engines greater than or equal to 130 HP, record keeping of hours of operation begins January 1, 2011. For emergency engines less than 130 HP, record keeping of hours of operation begins January 1, 2009; engines are equipped with non-resettable hour meters to facilitate record keeping.

Specific Air Quality Management or Air Pollution Control Districts may have different and additional record keeping/reporting requirements. Your permit to construct and/or operate the engine may be contingent upon compliance with those requirements. Check with your local Air Quality Management or Air Pollution Control District for specific requirements.

Emergency stationary internal combustion engines (ICE) may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, Generac, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The purchaser/owner may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing.

The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For purchaser/owner of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in this section is prohibited.

If you operate and maintain your certified emergency stationary SI internal combustion engine and emissions control systems in accordance to the specifications and guidelines in this Owner’s Manual, EPA will not require engine performance testing. If not, your engine will be considered non-certified and you must demonstrate compliance according to Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60.

Emission-Related Installation Instructions

Your certified emergency stationary engine has pre-set emission control systems or components that require no adjustment. Inspection and replacement of an emissions related component is required to be done so in accordance with the requirements cited in the United States Environmental Protection Agency Warranty Statement or can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. Failing to follow these instructions when installing a certified engine in a piece of non-road equipment violates federal law 40 CFR 1068.105 (b), subject to fines or penalties as described in the Clean Air Act.