Kentucky Department for Environmental Protection
Division of Waste Management
Underground Storage Tank Branch
300 Sower Boulevard, Second Floor – Frankfort KY 40601
(502) 564-5981

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DO NOT WRITE IN THIS SPACE

UST Automatic Line Leak Detector Operational Test

1. UST Facility Information

Agency Interest Number (AI)			
UST Facility Name			
UST Facility Physical Address	Street Address:		
	City:	County:	Zip Code: -

2. UST System Information & Testing Requirements

(Attach additional pages as necessary)

Test Date	/ /				
Reason for Test *(mark all that apply)*	☐ Required Periodic Test ☐ New Installation ☐ DEP Directed *(specify):*				
	☐ Suspected Release ☐ Repair ☐ Other *(specify):*				
Piping Material	☐ Steel ☐ Fiberglass Reinforced Plastic ☐ Flexible Thermoplastic ☐ Other *(specify)*:				
Pipe Dimensions	Diameter *(in):* Length *(ft):*				
Line Number / Product Type					
Manufacturer					
Model Number					
Manifolded System	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
STP Cycles On/Off	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

3. Mechanical Test Data

Full Pump Pressure *(psi)*					
Holding Pressure *(psi)*					
Resiliency *(ml)*					
Metering Pressure *(psi)*					
Opening Time *(seconds)*					
Leak Test Pressure *(psi)*					
Leak Test Volume *(ml)*					
Test Leak Rate *(gph)*					

4. Electronic Test Data

Set-up Parameters Correct?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Simulated Leak Alarm Type	☐ Audible ☐ Visible	☐ Audible ☐ Visible	☐ Audible ☐ Visible	☐ Audible ☐ Visible	☐ Audible ☐ Visible
Simulated Leak Causes Pump Shutdown	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Number of test cycles before alarm or pump shutdown					
Test Results	☐ Pass ☐ Fail	☐ Pass ☐ Fail	☐ Pass ☐ Fail	☐ Pass ☐ Fail	☐ Pass ☐ Fail
New ALLD Installed	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

AI _____

Comments	

5. Certification

I certify that all the information provided on this document is true, accurate, and complete.

Tester Certification	*Printed*		**Date**	/ /
	Signature			
License	Number:	Expiration Date: / /		
Certification Type *(mark all that apply)*	☐ Test Equipment Manufacturer	☐ Recognized Practice	☐ Other *(specify):* _____	
Contact Information	Phone: ( ) -	Email:		
Company Name				

If you have questions on how to fill out this form please contact the cabinet at (502) 564-5981 or visit our web site at http://waste.ky.gov/ust. For copies of UST facility records please visit http://eec.ky.gov/pages/openrecords.aspx or email EEC.KORA@ky.gov.

GENERAL INSTRUCTIONS
UST Automatic Line Leak Detector Operational Test

Instructions provided are for the DWM 4221, UST Automatic Line Leak Detector Operational Test form. For any questions regarding any section of this form, please call the Division of Waste Management's Underground Storage Tank (UST) Branch. This form must be completed either by typing or by printing legibly with black ink.

Submit DWM 4221 form via mail, fax, or electronically:

Kentucky Department for Environmental Protection
Division of Waste Management
Underground Storage Tank Branch
300 Sower Boulevard, Second Floor
Frankfort, KY 40601
Phone: (502) 564-5981
Fax: (502) 564-0094
http://waste.ky.gov/UST

Procedure for Testing Automatic Line Leak Detectors

I. Mechanical Automatic Line Leak Detectors

A. **Test Setup**

1. Shut off power to the pump and perform lockout/tag out procedures on the circuit breakers.
2. Bleed line pressure to zero by activating the dispenser and opening the nozzle, allowing product to drain into an approved container. After all line pressure has been bled off, hang up the nozzle and close the shear valve.
3. Connect the test apparatus to the shear valve test port at the highest dispenser. If there is no elevation change, connect the test apparatus at the furthest dispenser. If the piping has master/satellite dispensers, the test apparatus must be connected to the furthest satellite dispenser.
4. Reestablish power to the pump. Open the shear valve and pressurize the line by activating the pump. Confirm there are no leaks in the test apparatus or the connection to the shear valve test port.
5. Dispense product from the dispenser nozzle to remove all air from the line.

B. **Determine Operational Parameters of the Mechanical Line Leak Detector**

6. Close the dispenser nozzle and allow the line to fully pressurize. Record this as the full pump pressure on the form.
7. Shut off the pump, close the shear valve and allow line pressure to decay until it stabilizes. Record this as the holding pressure on the form. If the line pressure does not stabilize, this may indicate that the check valve/functional element are defective or the packer O-ring in the pump head is leaking.
8. Bleed line pressure to zero by opening the test apparatus leak orifice and allowing product to drain into a graduated cylinder. The volume of product recovered is the resiliency and should be recorded in milliliters (ml) on the form.
9. After waiting for 2 – 5 minutes, fully close the test apparatus leak orifice, turn pump back on and observe pressure gauge. Pressure should rise quickly and pause for approximately 2 – 5 seconds before building to full pump pressure. If the line pressure goes to full pump pressure without pausing, this indicates that the leak detector did not "trip" (move to the leak search position). If the leak detector did not move to the leak search position, repeat Step 8.
10. Observe the line pressure when it pauses and record this as the metering pressure on the form.
11. Measure with a stopwatch the length of time it takes from pausing at the metering pressure until full pump pressure is achieved. Record this as the opening time on the form. If the opening time is greater than 2 – 5 seconds, this may indicate that there is air trapped in the line, the piping has high resiliency or a leak smaller than the leak detector is capable of detecting may exist in the piping. WARNING: pay very close attention to the pressure gauge while measuring the opening time as this happens rather quickly.

C. **Calibrate Test Apparatus Leak Orifice**

12. Without the use of a pressure regulator:
    a) Referencing the full pump pressure recorded in Step 6, determine from Table 1 the volume of product that must be discharged in 60 seconds at full pump pressure to simulate a leak equivalent to 3 gph (gallons per hour) at 10 pounds per square inch (psi).
    b) Turn the pump on and confirm that full pump pressure is indicated. Slowly open the test apparatus leak orifice and adjust until the flow rate determined in Step 12a has been achieved. To do this, direct the product flow into a graduated cylinder while timing for 60 seconds. Continue to adjust the size of the test apparatus leak orifice until the desired flow rate is achieved. To expedite calibration, you may find it useful to initially make coarse adjustments by measuring the volume of product that corresponds to the 15 second time interval indicated in Table 1. However, the final calibration of the test apparatus leak orifice must be conducted by measuring the appropriate volume of product over the full 60 second time frame.

13. With the use of a pressure regulator:
    a) Turn the pump on and confirm that full pump pressure is indicated. Slowly open the test apparatus leak orifice and direct the product flow into an approved container.
    b) Adjust the line pressure to 10 psi with the pressure regulator. Direct the product flow into a graduated cylinder and time for 60 seconds. Adjust the size of the test apparatus leak orifice until the desired flow rate of 189 ml/minutes (min) is achieved while maintaining a line pressure of 10 psi. It may be necessary to readjust the pressure regulator and/or the test apparatus leak orifice several times in order to correctly set the leak rate at 189 ml/minute at a line pressure of 10 psi. To expedite calibration, you may find it useful to initially make coarse adjustments by measuring the volume of product that corresponds to 15 seconds (1/4 of 189 ml = 47 ml). However, the final calibration of the test apparatus leak orifice must be conducted by measuring 189 ml of product over the full 60 second time frame.

D. **Determine if the Leak Detector Sees a Leak Equivalent to 3 gph at 10 psi**

14. Turn the pump off and allow the line pressure to bleed off completely (0 psi) through the test apparatus leak orifice. This should cause the leak detector to "trip" (move into the leak sensing position). Do not change the size of the test apparatus leak orifice after it has been properly calibrated in Step 12b or 13b.
15. Turn the pump on and allow the simulated leak to occur through the calibrated test apparatus leak orifice. If using a pressure regulator in the test apparatus, the pressure regulator must be completely bypassed or fully opened while conducting Steps 15 and 16.
16. Observe that the line pressure rises to the metering pressure (determined in Step 10) and remains there indefinitely with the pump running and the simulated leak occurring through the calibrated test apparatus leak orifice. The test must be conducted for a minimum of 60 seconds. If the line pressure rises to the full pump pressure at any time during the test, this indicates that the leak detector has fully opened and fails the test.
17. Confirm that the leak detector is operating correctly by recording the line pressure observed in Step 16 as the leak test pressure. The leak test pressure should be equivalent to the metering pressure.
18. Measure the volume of product discharged from the test apparatus leak orifice while the leak detector is being tested in Step 16 by directing the flow into the graduated cylinder while timing for 60 seconds. Record this as the leak test volume on the form. The leak test volume should be equal to the volume of product that corresponds to the line pressure in Table 1.
19. Refer to Table 2 to determine the leak rate (expressed as gph) that corresponds to the leak volume observed in Step 18. Record this as the test leak rate on the form.

E. **Restore the System to Operational Condition**

20. Cut the pump power off, allow line pressure to bleed off to zero and close the shear valve. Perform lockout/tag out procedure on the circuit breakers.
21. Remove the test apparatus from the shear valve body and properly reinstall the plug into the shear valve test port.
22. Reestablish power to the pump on and confirm that there are no leaks in the system.
23. Dispense product into an approved container to remove any air from the line and confirm that the leak detector is operating properly by observing that full product flow is achieved.

F. **Pass/Fail Criteria**

Pass – The line pressure does not increase above the metering pressure for the duration of the test with the simulated leak occurring.

Fail – The line pressure increases to full pump pressure while the simulated leak is occurring or the leak detector does not reset (trip) when the line pressure is bled off to zero.

Note: If the leak detector initially fails the test, repeat the test procedure before declaring the test result as "fail".

II. Electronic Automatic Line Leak Detectors

A. **Determine Operational Parameters of the Electronic Line Leak Detector**

1. From the control panel, verify that the system setup parameters are correct (e.g. pipe diameter, pipe length, pipe material of construction, etc.).
2. If any of the setup parameters are not correct, a qualified service technician should make any changes that may be necessary to bring the system settings to within specifications.

B. **Test Setup**

3. Shut off power to pump and perform lockout/tag out procedures on the circuit breakers.
4. Bleed line pressure to zero by activating the dispenser and opening the nozzle, allowing product to drain into an approved container. After all line pressure has been bled off, hang up the nozzle and close the shear valve.
5. Connect test apparatus to shear valve test port at the highest dispenser. If there is no elevation change, connect the test apparatus at the furthest dispenser, or as recommended by the manufacturer. If the piping has master/satellite dispensers, the test apparatus must be connected to the furthest satellite dispenser.

6. Reestablish power to the pump. Open the shear valve and pressurize the line by activating the pump. Confirm there are no leaks in the test apparatus or the connection to the shear valve test port.
7. Dispense product from the dispenser nozzle to remove all air from the line.
8. Close the dispenser nozzle and allow the line to fully pressurize. Confirm that the line pressure observed is the full pump pressure.

C. **Calibrate Test Apparatus Leak Orifice**

9. Without the use of a pressure regulator:
   a) Referencing the full pump pressure observed in Step 8, determine from Table 1 the volume of product that must be discharged in 60 seconds at full pump pressure to simulate a leak equivalent to 3 gph at 10 psi.
   b) With the pump running and the line at full pump pressure, slowly open the test apparatus leak orifice and adjust until the flow rate determined in Step 9a has been achieved. To do this, direct the product flow into a graduated cylinder while timing for 60 seconds. Continue to adjust the size of the test apparatus leak orifice until the desired volume is achieved. To expedite calibration, you may find it useful to initially make coarse adjustments by measuring the volume of product that corresponds to the 15 second time interval indicated in Table 1. However, the final calibration of the test apparatus leak orifice must be conducted by measuring the appropriate volume of product over the full 60 second time frame.
10. With the use of a pressure regulator:
   a) With the pump running and the line at full pump pressure, slowly open the leak test apparatus orifice and direct product into an approved container.
   b) With the pressure regulator, adjust the line pressure to 10 psi. Direct the product flow into a graduated cylinder and time for 60 seconds. Adjust the size of the test apparatus leak orifice until the desired leak rate of 189 ml/min is achieved while maintaining a line pressure of 10 psi. It may be necessary to readjust the pressure regulator and/or the test apparatus leak orifice several times in order to correctly set the leak rate at 189 ml/minute at a line pressure of 10 psi. To expedite calibration, you may find it useful to initially make coarse adjustments by measuring the volume of product that corresponds to 15 seconds (47 ml). However, the final calibration of the test apparatus leak orifice must be conducted by measuring a product volume of 189 ml over the full 60 second time frame.

D. **Determine if leak detector sees a leak equivalent to 3 gph at 10 psi**

11. Without adjusting the test apparatus leak orifice after it has been properly calibrated in Step 9b or 10b, hang up the dispenser nozzle, allowing the pump to turn off.
12. While directing the product flow from the leak test apparatus into an approved container, observe that the electronic line leak detector turns the pump on and pressurizes the line.
13. Confirm that the simulated leak condition causes the electronic line leak detector to alarm and/or shut down the pump. The electronic line leak detector may cycle the pump on/off several times before alarming or shutting down the pump. Record the number of test cycles observed before alarm/shut down occurs on the form.

E. **Restore the System to Operational Condition**

14. Cut the pump power off, allow line pressure to bleed off to zero and close the shear valve. Perform lockout/tag out procedure on the circuit breakers.
15. Remove the test apparatus from the shear valve body and properly reinstall the plug into the shear valve test port.
16. Reestablish power to the pump on and confirm that there are no leaks in the system.
17. Dispense product into an approved container to remove any air from the line and confirm that full product flow is achieved.

F. **Pass/Fail Criteria**

Pass – The electronic line leak detector alarms and/or causes the pump to shut down while the simulated leak is occurring.

Fail – The electronic line leak detector does not alarm or shut down the pump while the simulated leak is occurring.

Note: If the leak detector initially fails the test, repeat the test procedure before declaring the test result as “fail”.

Table 1 – Volume that must be discharged within indicated time frame to be equivalent to a leak rate of 3 gph at 10 psi:

Line Pressure	15 seconds	60 seconds	Line Pressure	15 seconds	60 seconds
5 psi	33 ml	134 ml	**30 psi**	82 ml	328 ml
6 psi	37 ml	147 ml	**31 psi**	83 ml	333 ml
7 psi	40 ml	158 ml	**32 psi**	85 ml	338 ml
8 psi	42 ml	169 ml	**33 psi**	86 ml	344 ml
9 psi	45 ml	179 ml	**34 psi**	87 ml	349 ml
10 psi	47 ml	189 ml	**35 psi**	89 ml	354 ml
11 psi	50 ml	198 ml	**36 psi**	90 ml	359 ml
12 psi	52 ml	207 ml	**37 psi**	91 ml	364 ml
13 psi	54 ml	216 ml	**38 psi**	92 ml	369 ml
14 psi	56 ml	224 ml	**39 psi**	94 ml	374 ml
15 psi	58 ml	232 ml	**40 psi**	95 ml	378 ml
16 psi	60 ml	239 ml	**41 psi**	96 ml	383 ml
17 psi	62 ml	247 ml	**42 psi**	97 ml	388 ml
18 psi	64 ml	254 ml	**43 psi**	98 ml	392 ml
19 psi	65 ml	261 ml	**44 psi**	99 ml	397 ml
20 psi	67 ml	268 ml	**45 psi**	100 ml	401 ml
21 psi	69 ml	274 ml	**46 psi**	102 ml	406 ml
22 psi	70 ml	281 ml	**47 psi**	103 ml	410 ml
23 psi	72 ml	287 ml	**48 psi**	104 ml	415 ml
24 psi	73 ml	293 ml	**49 psi**	105 ml	419 ml
25 psi	75 ml	299 ml	**50 psi**	106 ml	423 ml
26 psi	76 ml	305 ml	**51 psi**	107 ml	427 ml
27 psi	78 ml	311 ml	**52 psi**	108 ml	431 ml
28 psi	79 ml	317 ml	**53 psi**	109 ml	436 ml
29 psi	81 ml	322 ml	**54 psi**	110 ml	440 ml

Adjust size of test apparatus leak orifice until the indicated flow rate is achieved.

Table 2 – Leak Rate Conversion Chart

ml/min	gph	ml/min	gph	ml/min	gph
134	2.1	281	4.5	374	5.9
147	2.3	287	4.6	378	6.0
158	2.5	293	4.7	383	6.1
169	2.7	299	4.7	388	6.2
179	2.8	305	4.8	392	6.2
189	3.0	311	4.9	397	6.3
198	3.1	317	5.0	401	6.4
207	3.3	322	5.1	406	6.4
216	3.4	328	5.2	410	6.5
224	3.5	333	5.3	415	6.6
232	3.7	338	5.4	419	6.6
239	3.8	344	5.5	423	6.7
247	3.9	349	5.5	427	6.8
254	4.0	354	5.6	431	6.8
261	4.1	359	5.7	436	6.9
268	4.2	364	5.8	440	7.0
274	4.3	369	5.9		

1 gallon per hour (gph) = 63.06 milliliters per minute (ml/min)