MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL AUTOMATIC LINE LEAK DETECTOR TESTING

- This form may be utilized to document functionality testing of automatic line leak detectors (ALLD's).
- All ALLDs (both mechanical and electronic) must be tested at installation and once every 12 months.
- Manufacturer's certification may be required to test ALLD's (consult with manufacturer to determine).

Date Test Conducted:

UST Facility			Person Conducting Testing	
Facility Name	MDEQ Facility ID #		Tester's Name	
Physical Address			Company	
City	County	State **MS**	MDEQ Certification #	Expiration Date
UST Owner			Tester's Signature	Date

System Information & Testing Requirements		
Type of Pipe (Steel, FRP, Thermoplastic)	Pipe Diameter	Approx. Length of Pipe

Reason for Test: ☐ Annual ☐ New Installation ☐ Troubleshooting ☐ Leak Investigation ☐ Other

Name of Testing Device: | Date of Device Calibration (if required):

All testing must follow the attached "MDEQ Procedure for Testing Automatic Line Leak Detectors"

Description	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product
Line Number / Product						
ALLD Manufacturer						
ALLD Model						
ALLD Serial Number						
ALLD is new	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO
STP cycles on/off properly	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO
Mechanical ALLD Test Data						
Full Pump Pressure (psi)						
Holding Pressure (psi)						
Resiliency/Bleedback (ml)						
Metering Pressure (psi)						
Opening Time (seconds)						
Leak Test Pressure (psi)						
Leak Test Volume (ml)						
Test Leak Rate (gph)						
Electronic ALLD Test Data						
Set-up parameters correct	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO
Simulated 3 gph leak causes audible or visual alarm	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO	☐ Yes ☐ NO
Simulated 3 gph leak causes pump shutdown (yes/no or NA)						
Number of test cycles before alarm or pump shutdown occurs						
Test Results						
Pass / Fail						

Comments:

MDEQ Procedure for Testing Automatic Line Leak Detectors

Mechanical Automatic Line Leak Detectors

Test Set-up

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 fuel 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. Note: If the piping has master/satellite dispensers, the test apparatus must be connected to the furthest satellite dispenser.

4. Re-establish power to the pump. Open the shear valve and pressurize the line by activating the pump. Confirm that 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.

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.

7. Shut off the pump, close the shear valve and allow line pressure to decay until it stabilizes. Record this as the holding pressure. Note: 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 fluid to drain into a graduated cylinder. The volume of fluid recovered is the resiliency and should be recorded in milliliters (ml).

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. Note: 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.

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. Note: 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: You must pay very close attention to the pressure gauge while measuring the opening time as this happens rather quickly.

Calibrate Test Apparatus Leak Orifice

I. Without the use of a pressure regulator

12. Referencing the full pump pressure recorded in Step 6, determine from Table 1 the volume of fluid that must be discharged in 60 seconds at full pump pressure to simulate a leak equivalent to 3 gph @ 10 psi.

13. 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 12 has been achieved. Note: To do this, direct the fluid 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 fluid 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 fluid over the full 60 second time frame.

II. With the use of a pressure regulator

12. Turn the pump on and confirm that full pump pressure is indicated. Slowly open the test apparatus leak orifice and direct the fuel flow into an approved container.

13. Adjust the line pressure to 10 psi with the pressure regulator. Direct the fluid 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/min is achieved while maintaining a line pressure of 10 psi. Note: 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 fluid 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 fluid over the full 60 second time frame.

Determine if the Leak Detector Sees a Leak Equivalent to 3 gph @ 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). Note: Do not change the size of the test apparatus leak orifice after it has been properly calibrated in Step 13.

15. Turn the pump on and allow the simulated leak to occur through the calibrated test apparatus leak orifice. Note: 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. Note: The test must be conducted for a minimum of 60 seconds. If the line pressure rises to the full pump pressure at anytime 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 fluid 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. Note: The leak test volume should be equal to the volume of fluid that corresponds to the line pressure in Table 1.

19. Refer to Table 2 to determine the leak rate (expressed as gallons per hour) that corresponds to the leak volume observed in Step 18. Record this as the test leak rate.

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. Re-establish power to the pump on and confirm that there are no leaks in the system.

23. Dispenser 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.

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".

Table 1 - Volume that must be discharged within indicated time frame to be equivalent to a leak rate of 3 gph @ 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 – Conversion of leak rate from milliliters per minute (ml/min) to gallons per hour (gph)							
Leak Rate (ml/min)	Leak Rate (gph)		Leak Rate (ml/min)	Leak Rate (gph)		Leak Rate (ml/min)	Leak Rate (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		445	7.1
Note: 1 gallon per hour = 63.06 milliliters per minute							

Electronic Automatic Line Leak Detectors

Determine Operational Parameters of the Electronic Line Leak Detector

1. From the control panel, verify that the system set-up parameters are correct (e.g. pipe diameter, pipe length, pipe material of construction, etc…).

2. If any of the set-up parameters are not correct, make any changes that may be necessary to bring the system settings to within specifications.

Test Set-up

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 fuel 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. Note: If the piping has master/satellite dispensers, the test apparatus must be connected to the furthest satellite dispenser.

6. Re-establish power to the pump. Open the shear valve and pressurize the line by activating the pump. Confirm that 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.

Calibrate Test Apparatus Leak Orifice

I. Without the use of a pressure regulator

9. Referencing the full pump pressure observed in Step 8, determine from Table 1 the volume of fluid that must be discharged in 60 seconds at full pump pressure to simulate a leak equivalent to 3 gph @ 10 psi.

10. 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 9 has been achieved. Note: To do this, direct the fluid 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 fluid that corresponds to the 15second 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 fluid over the full 60 second time frame.

II. With the use of a pressure regulator

8. With the pump running and the line at full pump pressure, slowly open the leak test apparatus orifice and direct fluid into an approved container.

9. With the pressure regulator, adjust the line pressure to 10 psi. Direct the fluid 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. Note: 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 fluid that corresponds to 15 seconds (47 ml). However, the final calibration of the test apparatus leak orifice must be conducted by measuring a fluid volume of 189 ml over the full 60 second time frame.

Determine if leak detector sees a leak equivalent to 3 gph @ 10 psi

10. Without adjusting the test apparatus leak orifice after it has been properly calibrated in Step 9, hang-up the dispenser nozzle, allowing the pump to turn off.

11. While directing the fluid 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.

12. Confirm that the simulated leak condition causes the electronic line leak detector to alarm and/or shut-down the pump. Note: 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.

Restore the System to Operational Condition

13. 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.

14. Remove the test apparatus from the shear valve body and properly reinstall the plug into the shear valve test port.

15. Re-establish power to the pump on and confirm that there are no leaks in the system.

16. Dispenser product into an approved container to remove any air from the line and confirm that full product flow is achieved.

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".