THIRTY-THIRD EDITION, 2026

LIST OF LEAK DETECTION EVALUATIONS FOR STORAGE TANK SYSTEMS

https://neiwpcc.org/nwglde/

DISCLAIMER

GENERAL

Appearance on this list is not to be construed as an endorsement by any regulatory agency nor is it any guarantee of the performance of the method or equipment. Equipment should be installed and operated in accordance with all applicable laws and regulations.

This list of Leak Detection Evaluations was prepared by a work group consisting of State and EPA members and is limited to evaluations of leak detection equipment and procedures or systems, conducted by an "independent third-party evaluator" (see Appendix "Glossary of Terms") and reviewed by the work group. This list includes evaluations conducted in accordance with either EPA Standard Test Procedures for Evaluating Leak Detection Methods (EPA/530/UST-90/004 through 010) or other test procedures accepted by the NWGLDE as equivalent to the EPA standard test procedures (see Part III "Acceptable Test Protocols").

The National Work Group on Leak Detection Evaluations (NWGLDE) does not guarantee the performance of any leak detection method or equipment appearing on this List, nor does it warrant the results obtained through the use of such methods or equipment.

SPECIFIC

- The NWGLDE does not evaluate methods or equipment and appearance on this List does not mean they are automatically acceptable for use in any particular state or local jurisdiction.
- The NWGLDE List is not an EPA List, nor does appearance on this list constitute endorsement or approval by the NWGLDE or EPA. Anyone claiming that a device or method is "EPA approved" because it appears on this list is making a false claim.
- The NWGLDE makes no representations concerning the safe operation of any method or equipment. Users of any method or equipment appearing on this List assume full responsibility for the proper and safe operation of said equipment and assume any and all risks associated with its use.
- On each data sheet, this List reports parameters and data values for methods, equipment, and software that are specific to the most current third-party evaluation submitted to the NWGLDE. Subsequent modifications or changes to the method, equipment, or software may produce parameters and data values that are significantly different than the listed third-party evaluation parameters and data values. It is the responsibility of the local implementing agency to accept or reject those modifications or changes.
- NWGLDE Listings apply to leak detection functionality only and not material compatibility. Since long term material compatibility with the product stored is not addressed in test procedures and evaluations, the NWGLDE makes no representations as to the compatibility of leak detection equipment with the product stored.
- Unless specifically indicated on the individual data sheets, performance with alternative fuels has not been demonstrated **with the following exception:**

  Biodiesel B6 through B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 may be used with all equipment listed for diesel whether or not these alternative fuels are included on individual data sheets. This exception DOES NOT APPLY to leak detection test methods using Out-Of Tank Product Detection (Vapor Phase) for B6-B20, and Out-Of Tank Product Detection (Liquid and Vapor Phase) and any tracer-based test methods for B100. For these methods, individual data sheets will have to be referenced to determine applicability.
- Measurements derived for minimum detectable water level and minimum water level change for automatic tank gauge method, continuous automatic tank gauge method, and certain non-volumetric tank tightness test method listings were calculated in 100% hydrocarbon fuels, unless otherwise noted.
- NWGLDE listed leak detection equipment may be applicable for use with additional liquids after consultation with the manufacturer and/or third party evaluator and subject to approval by the implementing agency.

National Work Group On
Leak Detection Evaluations

The National Work Group on Leak Detection Evaluations (NWGLDE) is pleased to publish our 33rd Edition, 2026 of the ”List of Leak Detection Evaluations for Storage Tank Systems". Please note, the NWGLDE has significantly changed the format of this List. All of our listings are kept current on our webpage: https://neiwpcc.org/nwglde/. As this webpage has the current listings and most users access our information through the much easier-to-navigate webpage, the NWGLDE will no longer be maintaining a full, printed List of all of the NWGLDE evaluations. Instead, the new “List” will simply be a list of the changes made to the evaluations and methods within the past year. Attached, please find only those listings that are new or updated since the previous publication (32nd Edition, January 2025). Please use our webpage to access current information, listings, and methods.

For help with accessing anything on our web site, please contact our webmaster, David Wilson, at djwilson@utah.gov, or give him a call at (385) 251-0893.

If you need to contact members of the work group, information for contacting them may be found on our webpage (https://neiwpcc.org/nwglde/group-members/). The work group team and team leaders are also listed on our webpage to help you determine the appropriate contacts (https://neiwpcc.org/nwglde/team-members/).

Vendors should send new third-party evaluations, which were performed by an “independent third-party evaluator” (see Glossary of Terms on webpage), to be reviewed by the work group to the team leader and all of the members of the team. Please follow all requirements and policies for submittals and include all documentation for a more prompt review (available on our webpage).

Please note, all reviews and listings are conducted and prepared by the NWGLDE, an independent work group consisting of state and EPA members. It is not a work group specifically affiliated with EPA or any specific state. The NWGLDE does not “approve” leak detection equipment or procedures. The “List” includes leak detection equipment/procedures that the work group has reviewed. The review confirms that the leak detection equipment/procedures were third-party evaluated in accordance with an acceptable protocol and in accordance with the EPA performance standards under appropriate test conditions. Implementing agencies must approve leak detection equipment and procedures, ensure appropriate installation, and determine compliance with UST regulations.

Thank you and we look forward to working with you soon.

Don Taylor, Chair
National Work Group on Leak Detection Evaluations (NWGLDE)

What’s New Since the 32nd Edition List, 2025 (02/03/2025)

Most Recent Website Additions/Revisions:

Preferred Utilities

- TG-VLM-P-2 AND TG-VLM-P-4 Continuous Vacuum Leak Monitoring System

Added to Continuous Interstitial Line Monitoring Method (Pressure/Vacuum), July 2, 2025

- TG-VLM-P-2 AND TG-VLM-P-4 Continuous Vacuum Leak Monitoring System

Added to Continuous Interstitial Tank Monitoring Method (Pressure/Vacuum), July 2, 2025

Franklin Fueling Systems

- FMP-LS500 RS-485 and 4-20mA ELLD sensors with EVOTM 400 and 600/6000 consoles (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

Added to Automatic Electronic Line Leak Detector, May 27, 2025

- FMP-LSU500-U Sensors for use with EVOTM 400 and 600/6000 consoles (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

Added to Automatic Electronic Line Leak Detector, May 27, 2025

- TS-LS500, TS-LS500E, FMP-LS500, FMP-LS500-U Series with ST and LT SLLD (for Rigid and/or Flexible Pipelines)

Revised Listing May 28,2025

Triangle Manufacturing, Inc.

- TEI System 5000, Version 1.0, Version 1.0W

Revised Listing March 27,2025

Purpora Engineering, Inc.

- Petro Title Large Volume Line Tightness Test for Annual Testing on Pressurized Pipeline Systems

Added to Line Testing Method November 21, 2025

Veedar-Root

- 8601 Series/TLS4 Series Consoles (Model 8463 Magnetostrictive Probe)

Revised Listing December 15, 2025

- 8600 Series / TLS-450 & 8601 Series/TLS4 Series Consoles (Model 8508 Series Wireless System with Magnetostrictive Probe)

Added to Automatic Tank Gauging Method December 15, 2025

Issue Date: July 2, 2025

Preferred Utilities

TG-VLM-P-2 AND TG-VLM-P-4 Continuous Vacuum Leak Monitoring System

CONTINUOUS INTERSTITIAL LINE MONITORING METHOD (PRESSURE/VACUUM)

Certification:

Leak rate of 0.1 gph with PD=100.0% and PFA=0% "Test Procedures for Tightness Testing Using A Vacuum Monitor On A Double- Walled Tank Interstice with or without The Addition Of A Liquid Sensor" - Standard Test Procedures for Evaluating Release Detection Monitoring Methods: Volumetric and Non-volumetric Tank Tightness Testing - USEPA May 2019 section 4.5.3.

Operating Principle:

System uses vacuum generated by a vacuum pump to continuously maintain and monitor up to 2 zones (TG-VLM-P-2) OR 4 zones (TG-VLM-P-4). The console has a learn function that is used during setup to determine the "commission" time to establish 7 inch HG vacuum on the interstice. The "commission" time to establish the vacuum during the learn process is stored by the console and is used to determine if there is an equivalent 0.1 gph leak when the vacuum needs to be re-established. Replenishment of vacuum begins once vacuum reaches 4 inch HG. System has a float valve that is designed to detect the presence of liquid between the interstice and the vacuum pump.

Alarm Condition:

System alarms when the loss of vacuum to 4 inch HG in the interstice cannot be replenished to 7 inch HG within 200% of the initial "commission" time. The time to alarm is determined based on the size of the interstice and drop time (time required for vacuum to reach 4 inch HG from 7 inch HG). The float valve located between the interstice and the vacuum pump shuts the flow of air from the vacuum pump to the interstice in the presence of liquid, therefore causing an alarm due to the system not being able to replenish the vacuum within 200% of "commission" time.

Applicability:

Double-walled piping or double-walled tank with an interstice up to 2,400 gallons (max volume to declare a tight test within 30 days), storing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, motor oil, water. Storage of biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce a system alarm if the system threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the system's response when storing diesel.

Interstitial Volume	**Time To Alarm with a 0.1 gal/hr leak**	**Time to Declare a Tight Test with no vacuum loss**
(Gallons)	(hours)	(hours/minutes)
5	19m	1h 30m
10	*38m	3h
20	*1h 16m	6h
50	*3h 10m	15h
100	*6h 20m	30h
200	*12h 40m	60h
500	*31h 40m	150h
1000	*63h 20m	300h
2000	*126h 40m	600h
2400**	*152h	720h (30 days)

*The time to alarm are estimates based on the evaluation utilizing a 5 – gallon interstice with a drop time of 14 minutes and a learned commission time of 2 minutes 31 seconds.

**maximum volume allowed in order to allow for a passing test within 30 days

Manufacturer's Specifications:

Alarm will activate when interstitial vacuum decreases from 7 inch HG to 4 inch HG and the system is unable to replenish

the vacuum within 200% of the “commission” time.
Volume of monitored interstitial space must not exceed 2,400 gallons to satisfy 30-day release detection requirement.

Calibration:
The system must be programmed by a factory trained technician or under the direction of the manufacturer. Maintenance schedule – Biannually - check solenoid, transmitter, and pump operation, test the alarm horn and strobe, inspect tubing, fittings, and any connections, check tubing for condensate, drain any liquid that is in the liquid stop valve.

Change the filter on the suction side of the vacuum pump that is in the control panel annually.

Comments:
The system described herein was tested with a 5-gallon vessel to simulate an interstice.

Float valve was tested with water, gasoline, and diesel. Valve activated with 2.6 inches water and at 2.7 inches for diesel and gasoline.

Vacuum line for the interstitial should be located at the lowest point (s) of the zone.

A difference in elevation of 8 foot or greater between the float valve and the low point (s) of the interstitial space may prevent the float valve from activating if the pressure from the column of liquid from intrusion is able to exceed or offset the 7 inch HG established by the vacuum pump.

This system may not be compatible with all secondarily contained tanks and/or piping. Always consult with the tank and/or piping manufacturer and the manufacturer's applicable recommended installation practices before installing this system, or damage may be caused to the tank or piping by its use.

Preferred Utilities
31-35 South Street
Danbury, CT 06810

Evaluator: Ken Wilcox Associates, Inc.
1125 Valley Ridge Drive
Grain Valley, MO 64029
Tel: (816)–443-2494
cwilcox@kwaleak.com
Date of Evaluation: June 9, 2025

Issue Date: July 2, 2025

Preferred Utilities

TG-VLM-P-2 AND TG-VLM-P-4 Continuous Vacuum Leak Monitoring System

CONTINUOUS INTERSTITIAL TANK MONITORING METHOD (PRESSURE/VACUUM)

Certification:

Leak rate of 0.1 gph with PD=100.0% and PFA=0% "Test Procedures for Tightness Testing Using A Vacuum Monitor On A Double- Walled Tank Interstice with or without The Addition Of A Liquid Sensor" - Standard Test Procedures for Evaluating Release Detection Monitoring Methods: Volumetric and Non-volumetric Tank Tightness Testing - USEPA May 2019 section 4.5.3.

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Date of Evaluation: June 9, 2025

Issue Date: May 27, 2025

Franklin Fueling Systems

FMP-LS500 RS-485 and 4-20mA ELLD sensors with EVO™ 400 and 600/6000 consoles (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification

Leak rate of 3.0 gph at 10 psi* with PD = 100% and PFA = 0%.
Leak rate of 0.2 gph at operating pressure with PD = 100% and PFA = 0%.
Leak rate of 0.1 gph at 1.5 times operating pressure* with PD = 100% and PFA = 0%.
*Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.

Leak Threshold

1.5 gph for leak rate of 3.0 gph.
0.1 gph for leak rate of 0.2 gph.
0.05 gph for leak rate of 0.1 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability

Gasoline, diesel, aviation fuels, fuel oil #4, waste oil, kerosene, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751.

Specification

On pressurized rigid, flexible, or combination rigid and flexible pipelines, system can perform 3.0 gph, 0.2 gph, and 0.1 gph tests.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity

Maximum line capacity for **Hourly** testing using bulk modulus limits:

Example Pipeline	Evaluated Volume (gallons)	Evaluated Bulk Modulus (PSI)	Example Bulk Modulus (PSI)	Multiplier to Convert Evaluated Volume to Equivalent Example Pipeline Volume (multiplier)	Pressure Drop per ML on Evaluated Line (PSI)	Line Volume Equivalent to Evaluated Line Volume Based on Bulk Modulus (gallons)	Maximum Pipeline Volume Allowed for Specific Bulk Modulus (gallons)
Evaluated Pipeline	601.01	19288	-	1.000	0.0085	-	1202.02
1	-	-	5000	0.259	-	155.80	311.60
2 (APT pipeline)	-	-	5025.24	0.261	-	156.59	313.17
3	-	-	7500	0.389	-	233.70	467.40
4 (UPP pipeline)	-	-	10000	0.518	-	311.60	623.20
5	-	-	12500	0.648	-	389.50	778.99
6	-	-	15000	0.778	-	467.40	934.79
7	-	-	17500	0.907	-	545.30	1090.59
8	-	-	20000	1.000	-	601.01	1202.02*
9	-	-	25000	1.000	-	601.01	1202.02*
10	-	-	30000	1.000	-	601.01	1202.02*
11	-	-	35000	1.000	-	601.01	1202.02*
12	-	-	40000	1.000	-	601.01	1202.02*
13	-	-	50000	1.000	-	601.01	1202.02*
14	-	-	60000	1.000	-	601.01	1202.02*
15	-	-	70000	1.000	-	601.01	1202.02*
16	-	-	80000	1.000	-	601.01	1202.02*

Maximum line capacity for **Monthly and Annual** testing using bulk modulus limits:

Example Pipeline	Evaluated Volume (gallons)	Evaluated Bulk Modulus (PSI)	Example Bulk Modulus (PSI)	Multiplier to Convert Evaluated Volume to Equivalent Example Pipeline Volume (multiplier)	Pressure Drop per ML on Evaluated Line (PSI)	Line Volume Equivalent to Evaluated Line Volume Based on Bulk Modulus (gallons)	Maximum Pipeline Volume Allowed for Specific Bulk Modulus (gallons)
Evaluated Pipeline	279.51	34601	-	1.000	0.0237	-	559.02
1	-	-	5000	0.145	-	40.39	80.78
2 (APT pipeline)	-	-	5025.24	0.145	-	40.59	81.19
3	-	-	7500	0.217	-	60.59	121.17
4 (UPP pipeline)	-	-	10000	0.289	-	80.78	161.56
5	-	-	12500	0.361	-	100.98	201.95
6	-	-	15000	0.434	-	121.17	242.34
7	-	-	17500	0.506	-	141.37	282.73
8	-	-	20000	0.578	-	161.56	323.12
9	-	-	25000	0.723	-	201.95	403.90
10	-	-	30000	0.867	-	242.34	484.69
11	-	-	35000	1.000	-	279.51	559.02*
12	-	-	40000	1.000	-	279.51	559.02*
13	-	-	50000	1.000	-	279.51	559.02*
14	-	-	60000	1.000	-	279.51	559.02*
15	-	-	70000	1.000	-	279.51	559.02*
16	-	-	80000	1.000	-	279.51	559.02*

Waiting Time

None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Depending on temperature stability, 1½ to 10 hours between dispensing and testing for leak rates of 0.2 gph and 0.1 gph.
Test times include thermal stability wait periods.

Test Period

Response time is 12 to 19 minutes for leak rate of 3.0 gph.
Minimum of 75 minutes for leak rate of 0.2 gph.
Minimum of 605 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

System Features

Permanent installation on pipeline.
Automatic testing of pipeline for a leak rate of 3.0 gph every dispenser cycle or 45 minutes.
Automatic testing of pipeline for a leak rate of 0.2 gph following a passing 3.0 gph test.
Automatic testing of pipeline for a leak rate of 0.1 gph following a passing 0.2 gph test.
Automatic pressure up, catch pressure, and other additional checks.
Indicator light and alarm activation if a leak is detected for any test. Automatic pump shutdown for 3.0 gph tests. Optional pump shutdown for 0.2 gph and 0.1 gph tests.
Uses AUTO-LEARN® technology to automatically learn line characteristics.

Calibration

System must be checked for functionality annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Franklin Fueling Systems
3760 Marsh Road
Madison, WI 53718
Tel: (800) 225-9787
E-mail: info@franklinfueling.com
URL: www.franklinfueling.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 09/23/2024

Issue Date: May 27, 2025

Franklin Fueling Systems

FMP-LSU500-U Sensors for use with EVO™ 400 and 600/6000 consoles (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification

Leak rate of 3.0 gph at 10 psi* with PD = 100% and PFA = 0%.
Leak rate of 0.2 gph at operating pressure with PD = 100% and PFA = 0%.
Leak rate of 0.1 gph at 1.5 times operating pressure* with PD = 100% and PFA = 0%.
*Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.

Leak Threshold

1.5 gph for leak rate of 3.0 gph.
0.1 gph for leak rate of 0.2 gph.
0.05 gph for leak rate of 0.1 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability

Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6, solvent, waste oil, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7647, biodiesel B100 meeting ASTM D6751, other liquids with known coefficients of expansion and density may be tested after consultation with the manufacturer.

Specification

On pressurized rigid, flexible, or combination rigid and flexible pipelines, system can perform 3.0 gph, 0.2 gph, and 0.1 gph tests.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity

Maximum line capacity for **Hourly** testing using bulk modulus limits:

Example Pipeline	Evaluated Volume (gallons)	Evaluated Bulk Modulus (PSI)	Example Bulk Modulus (PSI)	Multiplier to Convert Evaluated Volume to Equivalent Example Pipeline Volume (multiplier)	Pressure Drop per ML on Evaluated Line (PSI)	Line Volume Equivalent to Evaluated Line Volume Based on Bulk Modulus (gallons)	Maximum Pipeline Volume Allowed for Specific Bulk Modulus (gallons)
Evaluated Pipeline	601.01	19288	-	1.000	0.0085	-	1202.02
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4 (UPP pipeline)	-	-	10000	0.518	-	311.60	623.20
5	-	-	12500	0.648	-	389.50	778.99
6	-	-	15000	0.778	-	467.40	934.79
7	-	-	17500	0.907	-	545.30	1090.59
8	-	-	20000	1.000	-	601.01	1202.02*
9	-	-	25000	1.000	-	601.01	1202.02*
10	-	-	30000	1.000	-	601.01	1202.02*
11	-	-	35000	1.000	-	601.01	1202.02*
12	-	-	40000	1.000	-	601.01	1202.02*
13	-	-	50000	1.000	-	601.01	1202.02*
14	-	-	60000	1.000	-	601.01	1202.02*
15	-	-	70000	1.000	-	601.01	1202.02*
16	-	-	80000	1.000	-	601.01	1202.02*

Maximum line capacity for **Monthly and Annual** testing using bulk modulus limits:

Example Pipeline	Evaluated Volume (gallons)	Evaluated Bulk Modulus (PSI)	Example Bulk Modulus (PSI)	Multiplier to Convert Evaluated Volume to Equivalent Example Pipeline Volume (multiplier)	Pressure Drop per ML on Evaluated Line (PSI)	Line Volume Equivalent to Evaluated Line Volume Based on Bulk Modulus (gallons)	Maximum Pipeline Volume Allowed for Specific Bulk Modulus (gallons)
Evaluated Pipeline	279.51	34601	-	1.000	0.0237	-	559.02
1	-	-	5000	0.145	-	40.39	80.78
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5	-	-	12500	0.361	-	100.98	201.95
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13	-	-	50000	1.000	-	279.51	559.02*
14	-	-	60000	1.000	-	279.51	559.02*
15	-	-	70000	1.000	-	279.51	559.02*
16	-	-	80000	1.000	-	279.51	559.02*

Waiting Time

None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Depending on temperature stability, 1½ to 10 hours between dispensing and testing for leak rates of 0.2 gph and 0.1 gph.
Test times include thermal stability wait periods.

Test Period

For hourly testing, response time is 14-16 minutes, with an average of 15 minutes, for a leak rate of 3.0 gph.
Without a leak present, response time is 1 minute.
For monthly testing, response time is 725-818 minutes, with an average of 369 minutes, for a leak rate of 0.2 gph.
Without a leak present, response time is 291-674 minutes.
For annual testing, response time is 761-812 minutes, with an average of 791 minutes, for a leak rate of 0.1 gph.
Without a leak present, response time is 503-687 minutes.
Test data are acquired and recorded by a microprocessor.

System Features

Permanent installation on pipeline.
Automatic testing of pipeline for a leak rate of 3.0 gph every dispenser cycle or 45 minutes.
Automatic testing of pipeline for a leak rate of 0.2 gph following a passing 3.0 gph test.
Automatic testing of pipeline for a leak rate of 0.1 gph following a passing 0.2 gph test.
Automatic pressure up, catch pressure, and other additional checks.
Indicator light and alarm activation if a leak is detected for any test. Automatic pump shutdown for 3.0 gph tests.
Optional pump shutdown for 0.2 gph and 0.1 gph tests.
Uses AUTO-LEARN® technology to automatically learn line characteristics.

Calibration

System must be checked for functionality annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Franklin Fueling Systems
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URL: www.franklinfueling.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations:
Hourly Testing: 4/18/2025
Monthly Testing: 4/10/2025
Annual Testing: 4/15/2025

Issue Date: September 29, 2010
Revision Date(s): April 11, 2016
May 28, 2025

Franklin Fueling Systems

TS-LS500, TS-LS500E, FMP-LS500, FMP-LS500-U Series with ST and LT SLLD (for Rigid and/or Flexible Pipelines)

CONTINUOUS PRESSURIZED PIPING LEAK DETECTION METHOD

Certification	Leak rate of 0.2 gph at operating pressure with PD = 99.9% and PFA = <0.1%. *Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.
Leak Threshold	0.08 gph for leak rate of 0.2 gph. Although the system reports a quantitative leak rate internally, it only reports a pass or fail to the tank system operator.
Applicability	Gasoline, diesel, aviation fuel, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751.
Specification	System tests pressurized rigid, flexible, or combination rigid and flexible pipelines. Tests are conducted at operating pressure by statistically adding increments of stable testing until a test has enough data to be completed.
Pipeline Capacity	Maximum of 312.2 gallons for steel and fiberglass pipelines (examples: 480 feet of 4 inch line; 671 feet of 3 3/8 inch line). Maximum of 95.4 gallons for flexible pipelines (examples: 260 feet of 3 inch line; 1040 feet of 1 1/2 inch line). Maximum of 415.8 gallons for combination rigid and flexible pipelines (the capacity of the flexible component cannot exceed 95.4 gallons). Maximum of 176 gallons for Franklin Fueling Systems UPP semi-rigid pipeline. (example: 513 feet of 3 inch line; 1892 feet of 1 1/2 inch line).
Throughput	Monthly maximum of 391,250 gallons.
Waiting Time	Less than 3 hours to begin data collection.
Test Period	Test data records may cover 10 days for ST (short term) CPPLDS to 30 days for LT (long term) CPPLDS dependent on dispensing, with an average of 16.22 days. The ST array continuously contains 10 days of data, and the LT array continuously contains 30 days of data that are rolled over as additional data is acquired. **Precedence is given to the ALLD test, if present. If not present, it defaults to SLLD and prints the ST result.** It will only print the LT report if there is no ST test available for the month. Test data are acquired and recorded by a microprocessor.

System Features

Permanent installation of leak detector on pipeline and software upgrade to the monitor.

The SLLD (Statistical Line Leak Detection) is an added capability for the TS-LS500, TS-LS500E, FMP-LS500 and FMP-LS500-U Automatic Line Leak Detector (ALLD). The ALLD still performs the 3.0 gph tests, and with enough quiet time, the 0.2 gph and 0.1 gph tests; the SLLD is only used for 0.2 gph leak detection if the ALLD did not have enough quiet time to perform that test.

Pump shutdown, indicator light and alarm activation if leak is declared for 3.0 gph and 0.2 gph tests.

The TS-LS500E series is an explosion proof version of the original TS-LS500 series.

Calibration

System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

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Tel: (816) 443-2494
Date of Evaluation: 05/10/10, 01/20/16, Letter 04/21/25.

Issue Date: November 22, 1995
Revision Date: January 12, 2015
Revision Date: March 27, 2025

Triangle Manufacturing, Inc.

TEI System 5000, Version 1.0, Version 1.0W

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

Certification

Leak rate of 0.1 gph with PD = 100% and PFA = 0%.

Leak Threshold

A tank system should not be declared tight when the acoustic noise level of the tank under vacuum is greater than the calibrated background acoustic noise level (prior to evacuation).
A tank system should not be declared tight if any water ingress is detected.

Applicability

Gasoline, diesel, aviation fuel, fuel oil #4, waste oil.

Tank Capacity

Maximum of 20,000 gallons.
Tank must be minimum 14% full.
Microphone should be located within 24 feet of all points within the tank.

Waiting Time

None between delivery and testing.

Test Period

Minimum of 1 minute when groundwater is below bottom of tank.
When groundwater is above bottom of tank, Version 1.0W (includes either Triangle TEI System 5000 Water Sensor, Triangle Manufacturing Conductivity Water Sensor Version 1, or Estabrook EZ-3 Conductivity Water Sensor) must be used and test period extended to ensure water ingress detection during test.
For Triangle TEI System 5000 Water Sensor:
Minimum of 10 minutes when using (time begins after sensor is set up and calibrated).
For Triangle Manufacturing Conductivity Water Sensor Version 1:
Minimum test time must be calculated using Triangle Manufacturing operations manual. Calculation is based on tank size, groundwater elevation, and product elevation.
For Estabrook EZ-3 Conductivity Water Sensor:
Minimum test time must be calculated using Estabrook EZ-3 operations manual, but cannot be less than 1 hour. Calculation is based on tank size, groundwater elevation, and product elevation.
There must be no dispensing or delivery during test.

Test Pressure

Vacuum as directed in operating instructions.
If vacuum cannot be maintained, see manufacturer's instructions.

Temperature

Acoustic signal is independent of product temperature.

Water Sensors

Version 1.0W (includes either Triangle TEI System 5000 Water Sensor, Triangle Manufacturing Conductivity Water Sensor Version 1 or Estabrook EZ-3 Conductivity Water Sensor) must be used to detect water ingress.
For Triangle TEI System 5000 Water Sensor:
Minimum detectable water level is 0.0532 inch.
Minimum detectable change in water level is 0.00013 inch.
Minimum water level in tank must be adjusted to at least 0.0532 inch at the sensor before starting the test.
For Triangle Manufacturing Conductivity Water Sensor Version 1:
Minimum detectable water level is 0.0258 inch.
Minimum detectable change in water level is 0.0043 inch.
Minimum water level in tank must be adjusted to at least 0.0258 inch at the sensor before starting the test. For testing tanks without water the placement of the water sensor must be at the low end of the tank and tank bottom water samples should be collected both before and after testing is completed for visual indication of phase separated fuel if the tank is storing ethanol blended gasoline.
For Estabrook EZ-3 Conductivity Water Sensor:

Minimum detectable water level is 0.014 inch.
Minimum detectable change in water level is 0.0095 inch.
Minimum water level in tank must be adjusted to at least 0.014 inch at the sensor before starting the test.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
Version 1.0 can only be used when groundwater is below bottom of tank.
Version 1.0W must be used when groundwater is above bottom of tank.

Calibration Acoustic sensor must be calibrated before each test in accordance with manufacturer's instructions.
When using Version 1.0W, Triangle TEI System 5000 Water Sensor, Triangle Manufacturing Conductivity Water Sensor Version 1, or Estabrook EZ-3 Conductivity Water Sensor must be calibrated before each test in accordance with manufacturer's instructions.

Comments Manifolded tank systems must be isolated prior to test.
Evaluated using unleaded gasoline.
Microphone was 24 feet away from the leak source during evaluation.
Headphones are used during test to listen for air ingress signal. Noise signals are tape recorded rather that recording the noise levels in decibels.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be detected by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

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Evaluator: United States Testing Company
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Date of Evaluation: 02/04/93
Evaluator: Ken Wilcox Associates
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Date of Evaluation: 01/20/98; 01/16/2025

Issue Date: 11/21/2025

Purpora Engineering, Inc.

Petro Tite Large Volume Line Tightness Test for Annual Testing on Pressurized Pipeline Systems

LINE TIGHTNESS TEST METHOD

Certification

Leak rate of 0.1 gph with PD = 99.9167% and PFA = 0.00837%.

Leak Threshold

0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability

Gasoline (compatible with all blends of ethanol), diesel, biodiesel blends B6-B100, aviation fuel, fuel oil #4.

Specification

System tests steel, fiberglass and flexible plastic pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detectors shall be removed or manually isolated from the pipeline for duration of test or check valve in pump must be manually closed if testing is to be conducted with mechanical line leak detector in place.

Pipeline Capacity

Bulk Modulus (psi) of pipeline to be tested	Maximum Pipeline Volume Allowed for Specific Bulk Modulus (gallons)
1000	51.86
2000	103.72
3000	155.58
4000	207.44
5000	259.30
6000	311.16
7000	363.02
8000	414.88
9000	466.74
10000	518.60
11000	570.46
12000	622.32
13000	674.18
14000	726.04
15000	777.90
16000	829.76
16032	831.42
20000	831.42
25000	831.42
30000	831.42
35000	831.42
40000	831.42
50000	831.42
55000	831.42
60000	831.42
65000	831.42
70000	831.42
75000	831.42
80000 and greater	831.42

Maximum combined volume for flexible and rigid pipeline of 831.44 gallons with a minimum bulk modulus of 16,032 PSI.

Waiting Time

None between delivery and testing.
None between dispensing and testing.

Pre-test Bulk Modulus Determination

Prior to performing the leak test, the bulk modulus must be determined for the line being tested in accordance with Purpora Engineering Bulletin 25. An explanation of bulk modulus and a spreadsheet to assist in the calculation can be acquired by contacting Purpora Engineering or going to the following website: https://purporaengineering.com/trusted-line-and-tank-testing/reference/

Test Period

Minimum of four (4) consecutive readings at 15-minute intervals are required for a valid test. The final 4 leak rates must have an accumulated leak rate of less than 0.0500 gph to pass.

For a line that indicates a leak rate less than 0.05 gph:

- The minimum test time is one hour (four 15-minute intervals).
- Pressure and volume readings less than 0.05 gph which eventually diminish to zero indicate temperature and piping stabilization, and no additional readings are required.
- In the case where there are four **intervals** that total less than 0.05 gph, with the leak rate **increasing** between any of the four intervals, that indicates possible thermal expansion that is masking a leak. Over time, the fuel expansion will stabilize, therefore revealing an accurate leak rate. In this case, the test needs to continue for additional **intervals** until there are four consecutive identical leak rates, or, until the observed leak exceeds 0.05 gph. If the observed leak rate continues to increase and the rate **exceeds** 0.05 gph, a leak can be declared.

For a line that indicates a leak rate greater than or equal to 0.05 gph:

- The minimum test time is 1 hour and 15 minutes (75 minutes total - five 15-minute intervals).
- Volume loss exceeding 0.05 gph which gradually diminishes to zero may indicate temperature change or piping expansion/contraction. This requires the test time to be extended.

Calibration

This method utilizes a digital pressure gauge with a resolution of 0.01 PSI to improve the resolution for larger lines. Consult with the manufacturer and/or the Authority having Jurisdiction (AHJ) to determine frequency of calibration of the digital pressure gauge.

Comments

The manufacturer does not support test results if the technician does not hold a current Petro-Tite certification when the test is performed. Re-certification is required by the manufacturer every 2 years. Third party evaluation was not conducted utilizing a test manifold. Multiple lines can be tested using the Petro Tite 3 way manifold if the total volume being tested is within the maximum volume as determined by the bulk modulus of the combined multiple lines. Test data are acquired and recorded manually. Test time for larger volume lines with simulated leaks during the evaluation ranged from 60 to 270 minutes.

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Tel: (816) 443-2494
Dates of Evaluations: October 3, 2024

Issue Date: February 6, 2015
Revision Date: December 15, 2025

Veeder-Root

8601 Series/TLS4 Series Consoles
(Model 8463 Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification	Leak rate of 0.2 gph with PD = 97.1% and PFA = 0.1%. Leak rate of 0.1 gph with PD = 95% and PFA = 0.4%.
Leak Threshold	0.126 gph for leak rate of 0.2 gph. 0.063 gph for leak rate of 0.1gph. A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751.
Tank Capacity	Maximum of 30,000 gallons for leak rate of 0.2 gph. Maximum of 20,000 gallons for leak rate of 0.1 gph. Minimum product level required is based on tank diameter as follows: 48" dia/min 18"; 64" dia/min 21"; 72" dia/min 24"; 96" dia/min 30"; 120” dia/min 39"; 126" dia/min 39"; 132" dia/min 39".
Waiting Time	Minimum of 8 hours between delivery and testing. Minimum of 30 minutes between dispensing and testing. There must be no dispensing or delivery during test.
Test Period	Minimum of 3 hours Test data are acquired and recorded by system’s computer (microprocessor). Leak rate is calculated from the difference between the first and last data collected. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by a probe which contains 5 thermistors. At least two thermistors must be submerged in product during test.
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 0.5 inch. Minimum detectable change in water level in tank is 0.023 inch.
Calibration	Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems. Therefore, for manifolded tank systems, this certification is only applicable when there is a probe used in each tank and the siphon is broken during testing. Tests only portion of tank containing product. As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected. EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

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Dates of Evaluation: 01/15/14 (30,000 gallon tank), 04/09/14 (20,000 gallon tank)

Issue Date: December 15, 2025

Veeder-Root

8600 Series / TLS-450 & 8601 Series/TLS4 Series Consoles
(Model 8508 Series Wireless System with Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification	Leak rate of 0.2 gph with PD = 96.82% and PFA = 0.0715%. (8600 Series) Leak rate of 0.2 gph with PD = 96.64% and PFA = 0.0820%. (8601 Series)
Leak Threshold	0.13 gph for leak rate of 0.2 gph. A tank system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel and ethanol blends compatible with probe floats.
Tank Capacity	Maximum of 30,000 gallons for leak rate of 0.2 gph. Minimum product level required is based on tank diameter as follows: 48" dia/min 18"; 64" dia/min 21"; 72" dia/min 24"; 96" dia/min 30"; 120” dia/min 39"; 126" dia/min 39"; 132" dia/min 39".
Waiting Time	Minimum of 8 hours between delivery and testing. There must be no dispensing or delivery during test.
Test Period	Minimum of 5 hours Test data are acquired and recorded by system’s computer (microprocessor). Leak rate is calculated from the difference between the first and last data collected.
Temperature	Average for product is determined by a probe which contains 5 thermistors. At least two thermistors must be submerged in product during test.
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 0.9979 inch. (2 inch floats) Minimum detectable water level in the tank is 0.6982 inch. (4 inch floats) Minimum detectable change in water level in tank is 0.0194 inch. (2 inch floats) Minimum detectable change in water level in tank is 0.0116 inch. (4 inch floats)
Calibration	Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems. Therefore, for manifolded tank systems, this certification is only applicable when there is a probe used in each tank and the siphon is broken during testing. Tests only portion of tank containing product. As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected.

EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

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Dates of Evaluation: 02/22/2025