STATE OF WISCONSIN
Department of Agriculture,
Trade and Consumer Protection

Approval # 20190005
(Replaces #20130002)

Bureau of Weights and Measures
Storage Tank Regulation
P.O. Box 7837
Madison, WI 53707-7837

Wisconsin ATCP 93 Material Approval

Equipment: Automatic Tank Gauging, Volumetric Tank Tightness Testing, Line Leak Detection, Liquid and Vapor Monitoring, and Secondary Containment Leak Detection Systems

Manufacturer: Veeder-Root Company
125 Powder Forest Drive
P.O. Box 2003
Simsbury, CT 06070

Expiration of Approval: December 31, 2022

SCOPE OF EVALUATION

The sensing probes used with the Veeder-Root TLS 2, TLS 300, TLS 300C, TLS 300i, TLS 350, TLS 350J, TLS 350R, TLS 350Plus, TLS PC, TLS 450, TLS 450Plus (8600), TLS 4 (8601), TLS 4i, TLS 4c, ProMax and ProPlus consoles; TLS 300, TLS 300i, TLS 350, TLS 450, TLS 450Plus (8600), TLS 4, TLS 4i, TLS 4c (8601) with Continuous Statistical Leak Detection (CSLD); TLS 300, TLS 350, TLS 450, TLS 450Plus (8600), TLS 4, TLS 4i, TLS 4c (8601) with Manifold Tanks CSLD; Wireless Pressurized Line Leak Detector (WPLLD); Pressurized Line Leak Detector (PLLD); Digital Pressurized Line Leak Detector (DPLLD); dispenser pan/sump sensors, and the Secondary Containment Leak Detection System manufactured by Veeder-Root have been evaluated for use as leak detection equipment conforming to specified portions of **ss. ATCP 93.510** and **ATCP 93.515** of the current edition of the Wisconsin Flammable and

Combustible Liquids Code.

This evaluation summary is condensed to provide the specific installation, application and operation parameters necessary to maintain the subject systems in compliance with the Wisconsin Administrative Code – ATCP 93.

DESCRIPTION AND USE

All versions of the Automatic Tank Gauges (ATG), Tank Tightness Testing (TTT), and line leak detection systems may be used with gasoline, diesel fuel, aviation fuel, solvents, and used oil: has to be pure oil-not mixtures of oils, gasoline or solvents, etc.

Alternative Fuel Note: Veeder-Root has to test and approve all biodiesel blends, including B100, before any of the ATG probes can be used to meet Wisconsin leak detection requirements. This is not a material compatibility test, rather a functionality test due to possible variations in product specific gravity which may affect float operation. PLLD and sensor performance and compatibility are not affected by any biodiesel blend.

Ethanol based blends greater than 15% must use the Alternative Fuel Probes and compatible sensors. The ATG water float will detect level of pure water, not all ethanol/water mixtures. PLLD performance and compatibility are not affected by any ethanol blend.

Tank Leak Detection

Probe-Console Application Chart (Tanks)

Probe No.	Application	TLS 300, PC, ProPlus	TLS 300i[1], TLS 300C[2]	TLS 2	TLS 350, 350 Plus, 350R, 350J, PC, ProMax	TLS 450, 450 Plus 8600	TLS 4, TLS 4i, TLS 4c 8601
8463	TTT or ATG	X	(X)	X	X	X	X
8473	TTT or ATG	X	(X)	X	X	X	
8463 with Manifolded Tanks and CSLD	Monthly Monitor	X	(X)		X	X	X
8473 with Manifolded Tanks and CSLD	Monthly Monitor	X	(X)		X	X	

1: (X) indicates optional equipment for TLS 300i with in-tank leak detection. 2: The TLS 300C has a two-tank limitation.

The **8463** and **8473** probes measure changes in product volume by detecting changes in the level of a float using the magnetostrictive principle. These probes, when used with the appropriate consoles, have a preset leak detection threshold that cannot be changed by the operator, installer or technician. Results are reported as “Passed” or “Failed”.

The **CSLD** option operates in a long term sampling mode using statistical analysis to evaluate product and temperature levels collected by the probes every few seconds. The system identifies periods during product dispensing, stabilization periods after product delivery and

periods of temperature instability and ignores data from those periods. The system prints a leak test report daily or on demand. The report indicates a pass, fail or inconclusive result using data from up to, but no more than, the preceding 28-day period.

Line Leak Detection

PLLD-Console Application Chart (Line)

PLLD No.	Application	TLS 300 PC, ProPlus	TLS 350, 350 Plus, 350R, 350J, PC, ProMax	TLS 450, TLS 450 Plus 8600
8484	3.0, 0.2, 0.1 gph		X	
8494	3.0, 0.2, 0.1 gph		X	
8590	3.0, 0.2, 0.1 gph			X

TLS Pressurized Line Leak Detectors

The Pressurized Line Leak Detector (PLLD) for both rigid and flexible piping, **8484 series**; Digital Pressurized Line Leak Detector (DPLLD) for both rigid and flexible piping, **8590 series** and the Wireless Pressurized Line Leak Detector for rigid piping, **8494 series**, operate during idle periods by independently pressurizing the pipeline system, then isolating the system from the pump and monitoring the pressure drop. The pressure drop is measured for several pressurization cycles, which are determined by the equipment. When the leak detection system determines that thermal effects have been sufficiently reduced, it compares the final pressure drop with a preset limit. If the pressure drop exceeds that limit, a leak is declared.

Liquid Sensors

The following chart shows the appropriate consoles to be used with sensing probes, and the typical application/capability for each sensor.

Sensor-Console Application Chart

Sensor No.	Application	TLS 300 ProPlus	TLS 300i, 300C	ILS 350	TLS 350, 350 Plus, 350R, 350J, ProMax	TLS 450, 450 Plus 8600	TLS4, 4i, 4c 8601
794380-20X	Sump[1]		X	X	X	X	X
794380-320	Discr.-Disp. Pan[3,4]				X	X	X
794380-322	Discr.-Disp. Pan[3,4]	X	X		X	X	X
794380-321	Dispenser Pan[1]				X	X	X
794380-323	Sump-Pos. Sensitive[1,7,11]	X	X	X	X	X	X
794380-30X	Hydrostatic (FRP)[2]		X		X	X	X
794380-344	Micro[1,11]				X	X	X
794380-343	Discriminating (FRP)[3,4]				X	X	X
794380-345	Interstitial (FRP- ethanol conc. 85% and lower)				X	X	X
794380-350	Discriminating-Sump[3,4]				X	X	X
794380-351	Sump[1]				X	X	X
794380-352	Discriminating-Sump[3,4]	X	X		X	X	X
794390-700	Vapor[5]			X	X	X	X
794380-62X	Groundwater[3]			X	X	X	X
794390-4X0	Steel Tank[1,11]		X	X	X	X	X
794390-40X	Fiberglass Tank[1]		X	X	X	X	X
794390-62X	Groundwater[3]			X	X	X	X
857080-XXX	Discriminating-Sump[4,6,7,8,9]				X	X	X
847990-00X	Stand-Alone Disp. Pan[10]						
Double Wall Vacuum Monitoring							
857280-100	Vacuum Sensor for Pipe & Sumps 1 pipe or 1 sump				X		
857280-200	Vacuum Sensor for 1 steel tank				X		
857280-301	Vacuum Sensor for 4' Dia Fiberglass tanks				X		
857280-302	Vacuum Sensor for 6' Dia Fiberglass tanks				X		
857280-303	Vacuum Sensor for 8' Dia Fiberglass tanks				X		
857280-304	Vacuum Sensor for 10' Dia Fiberglass tanks				X		

1: Capable of detecting any liquid that exceeds the threshold level.
2: Monitors the level of ethylene glycol or calcium chloride solution in the interstitial of a fiberglass double wall tank.
3: May be used for gasoline, synthetic fuel, diesel fuel, fuel oil, aviation fuel, and solvents.
4: Capable of detecting water.
5: Gasoline or JP-4 jetfuel.
6: Gasoline or diesel fuel

7: Sensor will alarm if raised from bottom of containment sump.
8: Correct positioning of the magnetostrictive probe is essential; vertical positioning shall not cause binding of the rod and float, and mounting of probe must be secure and stable.
9: This probe can be used for sump integrity testing.
10: The Stand-alone dispenser pan sensor immediately shuts down AC power to the dispenser when 1.5 inches of fluid, as measured from the bottom of the sensor, is detected in the pan. There is not a separate reporting or alarm console associated with this equipment.
11: Approved for high alcohol fuels

Secondary Containment Leak Detection System- SCLD (Tank, Lines, Sumps)

The Veeder-Root Secondary Containment Leak Detection (SCLD) system is designed to prevent product leakage to the environment from underground storage tanks and associated piping. This is accomplished by maintaining a constant partial vacuum on the system relative to ambient, so that any breach in the primary or secondary containment will result in a pressure change that is detected by the SCLD system. The SCLD system is a component of Veeder-Root's existing TLS-350, TLS-350Plus, TLS-350R w/BIR consoles. This system may be used as a means of monthly monitoring for underground double wall tank, double wall piping and double wall sump interstitial spaces storing gasoline, diesel, heating oil, kerosene, aviation fuel, motor oil, water. The SCLD system is marketed as the Secondary Containment Vacuum Sensing (SCVS) System (857280-xxx).

The SCLD system maintains a constant partial vacuum on the interstitial space being monitored, including double-walled piping, double-walled tanks, and double-walled sumps. The STP siphon port is used to provide a vacuum source, and is controlled by the TLS-350 console. The normal operating level of vacuum varies depending upon the system being monitored ranging from –9 psid to –3 psid. This vacuum is normally maintained by opening the line to the STP siphon during normal dispensing as required. If the frequency of dispensing is not sufficient to maintain the vacuum, the system will automatically energize the STP to restore it to the normal level. The system generates an alarm if the vacuum level decreases to within 1.7 psi of ambient atmospheric pressure. A warning is generated if the flow rate of replenishment of the containment volume exceeds 100 liters per hour. In addition, the system includes a liquid sensor that generates an alarm when a small amount of liquid is collected. All alarms and warnings produce an audible and visual indication, and may be programmed to disable the STP.

The SCLD is an optional, add-on card in the main console. As part of the system, the SCLD card is "scanned" every eight seconds when the main console takes readings from it. In a UST system with a large interstice and slow vacuum decay due to a leak, this 8-second update time will allow close tracking of the vacuum decay resulting from a leak. The system will respond comparatively quickly with regards to vacuum level when a pump or alarm threshold is passed.

The SCLD system shuts the submersible turbine pump off after an Alarm On threshold is reached. Manual intervention, using console switches or signals sent on the serial communications port, is required to diagnose the problem, clear the alarm and restart the turbine pump.

Periodic calibration of the system is not required.

Manifolded tanks require that the interstice of the tanks be manifolded to a common vacuum source.

An example of the principles of system operation can be found online at http://www.veeder.com/dynamic/flashfiles/SCVS/index.htm .

TESTS AND RESULTS

Tank Tightness Testing Systems

The performance of the series **8463** and **8473** probes were determined in accordance with the EPA Protocol for volumetric tank testing methods. The probes were found to be capable of detecting a leak of 0.10 gallon per hour leak within a probability of detection (P_D) of 95 percent and probability of false alarm (P_{FA}) of less than 5 percent.

Automatic Tank Gauging Systems

The performance of the series **8463** and **8473** probes were determined in accordance with the EPA protocol for ATG systems.

The series **8463** and **8473** probes were certified to within the 95-5 ranges required by the EPA protocols for detecting a leak of 0.20 gallon per hour.

CSLD Monthly Monitoring

The Veeder-Root **consoles with CSLD option** and **series 8463** or **8473** probe were evaluated using an alternative test procedure and were certified to within the 95-5 ranges required by the EPA protocols for detecting a leak of 0.20 gallon per hour.

Pressurized Line Leak Detectors

The Veeder-Root TLS series pressurized line leak detector consoles and probes, **series 8484,** and **8494** were evaluated using the Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Methods. The TLS 450 (8600) digital pressurized line leak detector **series 8590** was evaluated through comparison testing with the TLS 350 pressurized line leak detector consoles and series 8484 line leak detector combination by Ken Wilcox Associates.

When used as an automatic line leak detector with rigid and flexible piping, the PLLD and DPLLD systems are certified capable of detecting a 3 gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a monthly monitoring leak detector with rigid and flexible piping, the PLLD and DPLLD systems are certified capable of detecting a 0.2 per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a line tightness test with rigid and flexible piping, the PLLD and DPLLD systems are certified capable of detecting a 0.1-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as an automatic line leak detector with rigid piping, the WPLLD system is certified capable of detecting a 3 gallon per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a monthly monitoring leak detector with rigid piping, the WPLLD system is certified capable of detecting a 0.2 per hour leak within the 95-5 ranges required by the EPA protocols.

When used as a line tightness test with rigid piping, the WPLLD system is certified capable of detecting a 0.1-gallon per hour leak within the 95-5 ranges required by the EPA protocols.

Liquid Sensors

Testing of the liquid sensors was conducted in accordance with a modified version of the EPA Standard "Liquid-Phase Product Detectors" protocol.

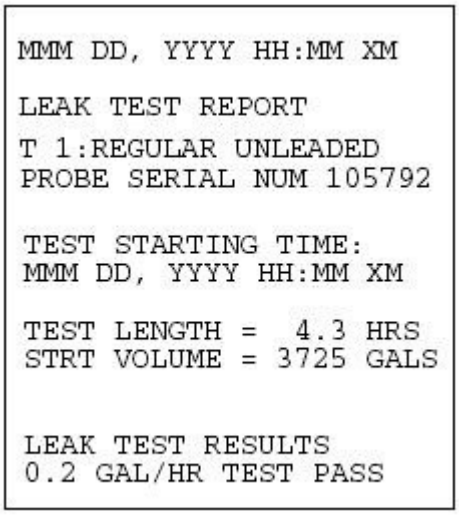
Secondary Containment Leak Detection System- SCLD (Tank, Lines, Sumps)

The Veeder-Root Secondary Containment Leak Detection System (SCLD) was evaluated according to the “European Standard EN 13160-2, “Leak Detection Systems – Part 2: Pressure and vacuum system”, May 2003. The system as designed meets all of the protocol requirements.

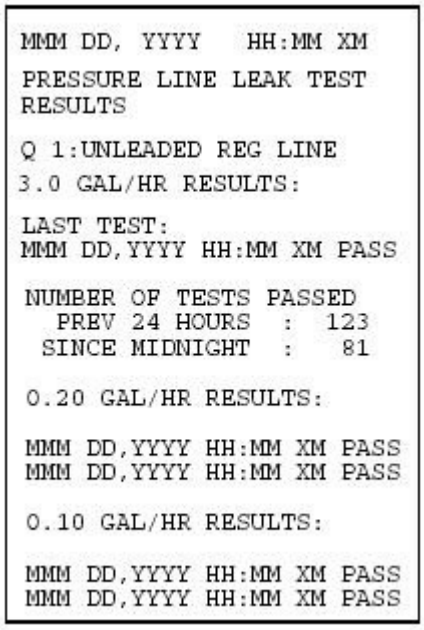
MONITORING SYSTEM OUTPUT

TLS 300 and 350 Consoles:

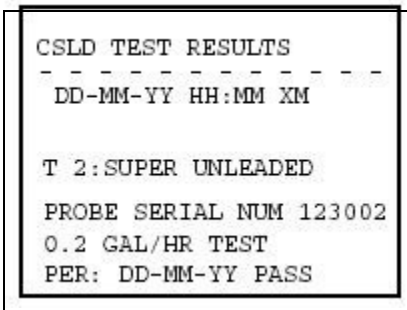
Detailed here are examples of the typical Tank Leak Report, Line Leak Test Report, Continuous Statistical Leak Report (CSLD), and Sensor Status Report. (Site Name/Address is printed on 1ST sheet of report)



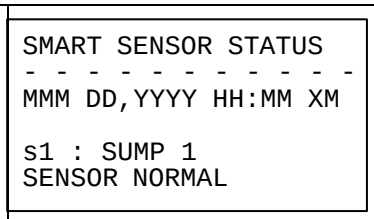
Tank Leak Report Example: Last leak report for all active tanks.



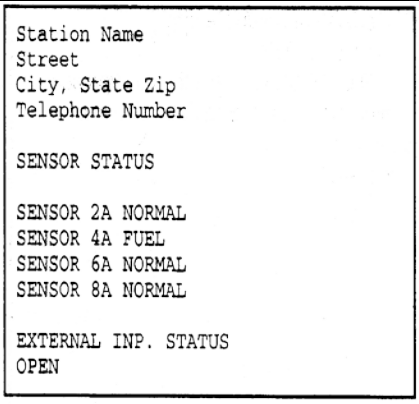
Line Leak Report Examples: Automatic, Monthly, and Annual.



Auto Leak Report Example: Current status of 24-hour leak detection (CSLD) for all active tanks.



Smart Sensor SCVS Status Report Example: For Secondary Containment Leak Detection System (SCLD)



Sensor Status Report Example

TLS 450 (8600) series and TLS 4 (8601) series Consoles:

Detailed here are examples of the typical Tank Leak Test History Report, Line Leak Passed Test History Report, and Sensor Status Report. (Site Name/Address is printed on 1ST sheet of report)

SIMSBURY LAB UNIT
VEEDER-ROOT
WORLD HEADQUARTERS

TANK LEAK TEST HISTORY - PASSED TEST RESULTS

T 1: 113 RUL NORTH

REPORT TYPE	DATE/TIME	METHOD	HOURS	AVERAGE VOLUME	% VOLUME
LAST GROSS	09/11/17 09:04	SLD		3434	14.8
LAST PERIODIC	09/11/17 05:51	CSLD	44	3507	15.1

Tank Leak Test History Example: Last leak report for all active tanks.

NOV 17, 2009 9:44 AM

SIMSBURY LAB UNIT
VEEDER-ROOT
WORLD HEADQUARTERS

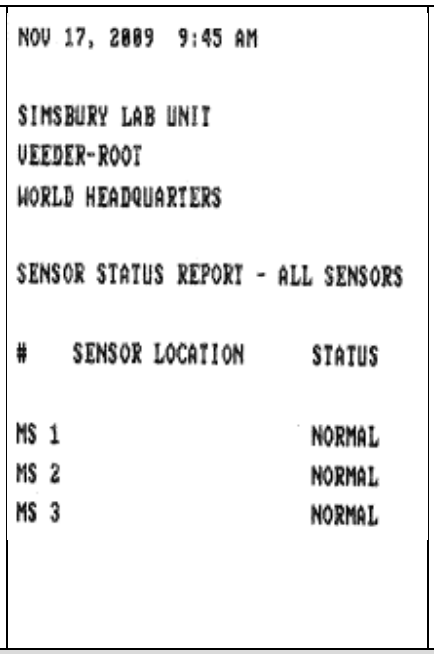
PRESSURE LINE LEAK REPORTS - PASSED TESTS HISTORY

LN :: 113 RUL NORTH

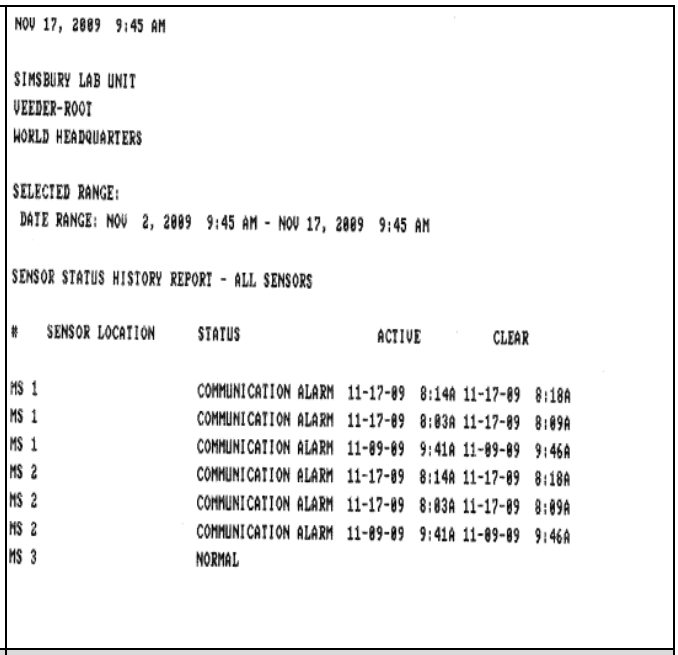
TEST TYPE	DATE & TIME	TEST METHOD	GROSS TEST PREV 24 HOURS	GROSS TEST SINCE MIDNIGHT
GROSS		PLLD	0	0
LAST GROSS	NOV 3, 2009 12:47 PM	PLLD		
LAST PERIODIC	AUG 24, 2009 2:58 PM	PLLD		
LAST ANNUAL	APR 7, 2009 3:06 AM	PLLD		
FIRST PERIODIC	AUG 24, 2009 2:58 PM	PLLD		
FIRST PERIODIC	APR 5, 2009 5:22 AM	PLLD		
FIRST PERIODIC	MAR 2, 2009 2:57 AM	PLLD		
FIRST PERIODIC	FEB 4, 2009 3:48 AM	PLLD		
FIRST PERIODIC	JAN 1, 2009 9:03 AM	PLLD		
FIRST PERIODIC	DEC 2, 2008 3:48 AM	PLLD		
FIRST PERIODIC	NOV 28, 2008 4:18 AM	PLLD		
FIRST PERIODIC	SEP 18, 2008 4:22 AM	PLLD		
FIRST ANNUAL	APR 7, 2009 3:06 AM	PLLD		

Line Leak Report Example: Automatic, Monthly, and Annual.

TLS 450 (8600) series and TLS 4 (8601) series Consoles, continued:



Sensor Status Report Example



Sensor Status History Report Example

LIMITATIONS / CONDITIONS OF APPROVAL

General

- All monitoring equipment shall be installed, calibrated, operated, and maintained in accordance with the manufacturer instructions, and verified every 12 months for operability, proper operating condition, and proper calibration by a certified service technician. Records of sampling, testing, or monitoring shall be maintained in accordance with **ATCP 93.230**.

- The manufacturer shall submit for a revision to this Wisconsin Material Approval application if any of the functional performance capabilities of this equipment are revised. This would include, but not be limited to changes in software, hardware, or methodology.

- While 3rd party testing does determine a required minimum tank level, EPA leak detection regulations require testing of the portion of the tank system which routinely contains product. Consistent testing at low levels could allow a leak to remain undetected.

  During leak testing, a minimum level of product in tank shall be maintained so as to ensure testing of the portion of the tank and/or piping that routinely contains product, regardless of testing system capability. For instance, if product levels are routinely maintained at 60%, but the leak detection system is capable of testing at 15% product level, then testing shall be performed at 60% levels.

- If performing a tank tightness test, minimum tank level shall be 95%, regardless of leak detection system minimum capability.

Tank Monitoring ATG's and Tightness Testing (static monitoring)

- Critical performance parameters for the series **8463** and **8473** probes with the **TLS-300 series, TLS-350 series, TLS-450 (8600) series, TLS-PC, ProPlus and ProMax** consoles for annual 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size[1]	**Up to 15,000 gallons**
Software Version	**N/A**
Minimum Tank Level (0.2 gph testing only- 0.1 gph testing must be performed at 95%)	Minimum product level is based on tank diameter as follows:

Probe Working Length (Tank ID in inches)	**Minimum Level (in)[2]**
24 thru 26	9
27 thru 36	12
37 thru 47	15
48 thru 58	18
59 thru 69	21
70 thru 79	24
80 thru 90	27
91 thru 101	30
102 thru 111	33
112 thru 122	36
123 thru 133	39
134 thru 143	42
144 thru 154	45
155 thru 165	48
166 thru 175	51
176 thru 177	54

Waiting time between filling tank and test start[3] (Stabilization Time)	**8 hours minimum** (monthly -0.2 gph) **8 hrs. 15 min. minimum** (annual- 0.1 gph)
Waiting time between dispensing and test start	**30 minutes minimum**
Minimum Test Period[4]	**2 hours** (0.2 gph test) **3 hours** (annual- 0.1 gph)

1: Monthly and annual testing can only be performed on one tank at a time. If two or more tanks are manifolded together, an isolation valve (siphon break) will have to be installed so as to separate the tanks individually.
2: Minimum level from probe bottom is same as product level in tank, assuming the typical configuration where the probe touches the bottom of the tank.
3: There must be no delivery during waiting time.
4: There must be no delivery or dispensing during testing.

- Critical performance parameters for the **Series 8463** and **8473** probe with the **TLS-300 series, TLS-350 series, TLS-450 (8600) series, TLS-PC, TLS-2, ProPlus and ProMax** consoles for annual 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size[1]	**Up to 20,000 gallons** (0.1 gph) **Up to 30,000 gallons** (0.2 gph)
Software Version	**N/A**
Minimum Tank Level (0.2 gph testing only- 0.1 gph testing must be performed at 95%)	Minimum product level is based on tank diameter as follows: **Probe Working Length** (Tank ID in inches) / **Minimum Level (in)[2]** 24 thru 26 — 9 27 thru 36 — 12 37 thru 47 — 15 48 thru 58 — 18 59 thru 69 — 21 70 thru 79 — 24 80 thru 90 — 27 91 thru 101 — 30 102 thru 111 — 33 112 thru 122 — 36 123 thru 133 — 39 134 thru 143 — 42 144 thru 154 — 45 155 thru 165 — 48 166 thru 175 — 51 176 thru 177 — 54
Waiting time between filling tank and test start[3] (Stabilization Time)	**8 hours minimum** (0.2 gph test) For 0.1 gph testing the following times are to be matched with the corresponding test times below **Scenario: A: 8 hours minimum** **B: 9 hours minimum** **C: 10 hours minimum** **D: 11 hours minimum**
Waiting time between dispensing and test start	**30 minutes minimum**
Minimum Test Period[4]	**2 hours** (0.2 gph test) For 0.1 gph match with scenario above **Scenario: A: 5 hours minimum** **B: 4 hours minimum** **C: 3 hours minimum** **D: 2 hours minimum**

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.

2: Minimum level from probe bottom is same as product level in tank, assuming the typical

configuration where the probe touches the bottom of the tank.
3: There must be no delivery during waiting time.
4: There must be no delivery or dispensing during testing.

Critical performance parameters for the **Series 8463** probe with the **TLS-4 (8601) series** consoles for monthly 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size[1]	**Up to 20,000 gallons** (0.1 gph) **Up to 30,000 gallons** (0.2 gph)
Software Version	**N/A**
Minimum Tank Level	**50%**
Waiting time between filling tank and test start[3] (Stabilization Time)	**8 hours minimum**
Waiting time between dispensing and test start	**30 minutes minimum**
Minimum Test Period[4]	**3 hours**

1: Monthly and annual testing can only be performed on one tank at a time. If several tanks are manifolded together, an isolation valve will have to be installed so as to separate the tanks individually.
2: Minimum level from probe bottom is same as product level in tank, assuming the typical configuration where the probe touches the bottom of the tank.
3: There must be no delivery during waiting time.
4: There must be no delivery or dispensing during testing.

Tank Monitoring ATG's w/CSLD (24-hour, 0.2 gph monthly monitoring)

- Critical performance parameters for the **series 8463** and **8473** probe with the **TLS-300 series, TLS-350 series, TLS-450 (8600) series, ProPlus, and ProMax** consoles: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size[1]	**45,000 gallons** (Single Tank) **37,000 gallons** (Manifolded Tanks)
Software Version	**N/A**
Minimum Tank Level[2]	**5%**
Maximum Monthly Throughput	**227,559 gallons** (Single Tank) **226,848 gallons** (Manifolded Tanks)

1: Manifolded tank capacity is an aggregate capacity of all tanks.
2: The CSLD system will automatically check the tank level, and not perform a test if the tank level is below the minimum.

- Critical performance parameters for the **series 8463** probe with the **TLS-4 (8601) series** console: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size[1]	**43,722 gallons** (Single Tank or up to 3 Manifolded Tanks)
Software Version	**N/A**
Minimum Tank Level[2]	**15%**
Maximum Monthly Throughput	**235,000 gallons** (Single Tank or up to 3 Manifolded Tanks)

1: Manifolded tank capacity is an aggregate capacity of all tanks.
2: The CSLD system will automatically check the tank level, and not perform a test if the tank level is below the minimum.

Electronic Line Leak Detectors

- The Veeder-Root Electronic Line Leak Detectors are approved for use on pipeline systems for underground storage tank facilities that contain petroleum or other chemical products. It is approved for use on rigid piping and flexible piping.

- An annual test of the operation of the leak detector shall be conducted in accordance with the manufacturer procedures for testing by inducing a physical line leak calibrated to a 3.0 gph @ 10 psi equivalent leak rate. The individual performing the test must be qualified by the equipment manufacturer or an individual meeting the requirements of **SPS 305.88** for pipe testing.

- **Mechanical line leak detectors shall be removed from the pipeline before testing.**

- This test cannot be used if trapped vapor is present in the system.

Pressurized

- Critical performance parameters for the **series 8484** Line Leak Detector with the **TLS and ProMax** consoles:

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Maximum Test Line Size	**3 in.**
Total maximum allowable volume of product in any **rigid** test pipeline	**119.4 gallons or less**

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	**User selectable on console. For a list of currently approved piping, contact Veeder-Root.**
Total maximum allowable volume of product in any **flexible** test pipeline	**119.4 gallons or less**

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Hybrid Piping (Flexible and Rigid) 3.0 gph testing only:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	**User selectable on console. A measurement of bulk modulus must be made at the owner's facility so that the software can be programmed to deal with the specific characteristics of the piping system at the facility. Contact Veeder Root for the procedure.**
Software version	**23 or higher**
Total maximum allowable volume of product in any **Hybrid** test pipeline	**212 gallons or less for 3.0 gph**

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

- Critical performance parameters for the Series **8494** Line Leak Detector with the **TLS, TLSPC, EMC Series except Basic Series, ProMax, and LLD 300** consoles: (Note: This Line Leak Detector is 3rd party certified for rigid piping only)

Rigid Piping: (3" Fiberglass or steel)

Parameter	Value
Maximum Test Line Size	**3 in.**
Total maximum allowable volume of product in any **rigid** test pipeline	**100 gallons or less**

Note: All other critical parameters, such as test line pressure; minimum test times; minimum wait times between product dispensing and start of test are pre-programmed into the software and are not accessible for viewing.

Liquid Sensors

- The Liquid Sensors shall be placed such that a release from any portion of the tank or piping will be detected.

- Reference the Sensor-Console Application Chart under the Description and Use section of this material approval for application of appropriate sensor for the product.

Secondary Containment Leak Detection System- SCLD (Tank, Lines, Sumps)

- Critical performance parameters for the Secondary Containment Leak Detection System- SCLD:

Parameter	Value
Maximum Allowable Interstitial Volume[1]	**2114 gallons (8 m^3)** (Tank) **2642 gallons (10 m^3)** (Piping)

1: See attached table for typical secondary tank, pipe, and sump volumes. Due to the small volume of the double wall sump interstice, there is no maximum allowable volume limit on sump volume.

Installation Notes:

- An external siphon check valve (Veeder-Root/Red Jacket p/n 188-241-5) must be used when making a vacuum source connection between the SCLD system sensors and the siphon port cartridge for all STPs including the Red Jacket, Red Jacket Standard, Red Jacket Quantum and FE pumps.
- Only Veeder-Root supplied Vacuum Hose (Veeder-Root p/n 332310-001,-002,-003) is approved for use with the SCLD system.
- When monitoring double-wall tanks, a liquid sensor must be located at the lowest point of interstitial space.
- Manifolded tanks require that the interstice of the tanks be manifolded to a common vacuum pump.
- The interstitial space shall be rated for the operating vacuum of the leak detector, in consideration of temperature and groundwater fluctuations. Refer to Veeder-Root installation and Operation Guides for assistance.
- This system may not be compatible with all secondary contained tanks and/or piping. 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.

This approval will be valid through December 31, 2022, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Material Approval Number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The Department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement unless specified in this document.

Effective Date: March 27, 2019

Reviewed by: Signature on File Date: 3/27/2019
Erik Otterson
Environmental Engineering Specialist

Approved by: Signature on File Date: 3/27/2019
Greg Bareta, P. E.
Section Chief
Storage Tank Regulation
Bureau of Weights and Measures

Secondary Containment Volumes by Manufacturer

Type	Volume
Ameron	
Dualoy 3000/L 3" over 2" piping	0.2186 Gal / Ft
Dualoy 3000/L 4" over 3" piping	0.2652 Gal / Ft
Dulaoy 3000/L 6" over 4" piping	0.8398 Gal / Ft
Dualoy 3000/LCX 2" piping	0.0133 Gal / Ft
Dualoy 3000/LCX 3" piping	0.0196 Gal / Ft
Dualoy 3000/LCX 4" piping	0.0252 Gal / Ft
APT	
0.5" Double Wall Pipe	0.0031 Gal / Ft
0.75" Double Wall Pipe	0.0042 Gal / Ft
1.00" Double Wall Pipe	0.0119 Gal / Ft
1.5" Double Wall Pipe	0.0052 Gal / Ft
1.75" Double Wall Pipe	0.0182 Gal / Ft
2" Double Wall Pipe	0.0218 Gal / Ft
2.5" Double Wall Pipe	0.0104 Gal / Ft
Bravo	
Small Foot Print Double Wall UDC	1.25 Gal / Sump
Large Foot Print Double Wall UDC	2 Gal / Sump
42" Double Wall Tank Sump	1.1429 Gal / Ft
48" Double Wall Tank Sump	1.3061 Gal / Ft
Small Vent Box	1.25 Gal/Sump
Large Vent Box	2.00 Gal/Sump
Containment Solutions	
Double Wall Tanks	
48" Diameter 550 Gallon Capacity	5.8 Gal / Tank
48" Diameter 600 Gallon Capacity	5.9 Gal / Tank
48" Diameter 1,000 Gallon Capacity	6.1 Gal / Tank
72" Diameter 2,000 Gallon Capacity	25.1 Gal / Tank
72" Diameter 2,500 Gallon Capacity	33.4 Gal / Tank
72" Diameter 3,000 Gallon Capacity	41.7 Gal / Tank
72" Diameter 3,500 Gallon Capacity	45.8 Gal / Tank
72" Diameter 4,000 Gallon Capacity	49.9 Gal / Tank
72" Diameter 4,500 Gallon Capacity	58.1 Gal / Tank
72" Diameter 5,000 Gallon Capacity	66.4 Gal / Tank
72" Diameter 6,000 Gallon Capacity	82.9 Gal / Tank
72" Diameter 7,000 Gallon Capacity	91.2 Gal / Tank
72" Diameter 8,000 Gallon Capacity	107.7 Gal / Tank
72" Diameter 9,000 Gallon Capacity	116.1 Gal / Tank
72" Diameter 10,000 Gallon Capacity	132.4 Gal / Tank
92" Diameter 4,000 Gallon Capacity	32.2 Gal / Tank
92" Diameter 5,000 Gallon Capacity	42.7 Gal / Tank
92" Diameter 6,000 Gallon Capacity	53.2 Gal / Tank
92" Diameter 7,000 Gallon Capacity	63.7 Gal / Tank
92" Diameter 8,000 Gallon Capacity	74.2 Gal / Tank
92" Diameter 10,000 Gallon Capacity	95.2 Gal / Tank
92" Diameter 11,000 Gallon Capacity	105.7 Gal / Tank
92" Diameter 12,000 Gallon Capacity	116.2 Gal / Tank
92" Diameter 13,000 Gallon Capacity	126.7 Gal / Tank
92" Diameter 14,000 Gallon Capacity	137.2 Gal / Tank
92" Diameter 15,000 Gallon Capacity	147.7 Gal / Tank
92" Diameter 16,000 Gallon Capacity	158.2 Gal / Tank
92" Diameter 17,000 Gallon Capacity	168.8 Gal / Tank
92" Diameter 18,000 Gallon Capacity	179.4 Gal / Tank
92" Diameter 20,000 Gallon Capacity	210.7 Gal / Tank

Type	Volume
Containment Solutions	
Double Wall Tanks - continued	
120" Diameter 10,000 Gallon Capacity	131 Gal / Tank
120" Diameter 12,000 Gallon Capacity	163.1 Gal / Tank
120" Diameter 15,000 Gallon Capacity	227.2 Gal / Tank
120" Diameter 16,000 Gallon Capacity	243.3 Gal / Tank
120" Diameter 17,000 Gallon Capacity	259.3 Gal / Tank
120" Diameter 18,000 Gallon Capacity	291.4 Gal / Tank
120" Diameter 19,000 Gallon Capacity	307.4 Gal / Tank
120" Diameter 20,000 Gallon Capacity	323.5 Gal / Tank
120" Diameter 21,000 Gallon Capacity	339.5 Gal / Tank
120" Diameter 22,000 Gallon Capacity	355.6 Gal / Tank
120" Diameter 23,000 Gallon Capacity	387.7 Gal / Tank
120" Diameter 24,000 Gallon Capacity	403.7 Gal / Tank
120" Diameter 25,000 Gallon Capacity	419.8 Gal / Tank
120" Diameter 26,000 Gallon Capacity	435.8 Gal / Tank
120" Diameter 28,000 Gallon Capacity	483.9 Gal / Tank
120" Diameter 30,000 Gallon Capacity	516.0 Gal / Tank
120" Diameter 31,000 Gallon Capacity	532.1 Gal / Tank
120" Diameter 32,000 Gallon Capacity	548.1 Gal / Tank
120" Diameter 35,000 Gallon Capacity	612.3 Gal / Tank
120" Diameter 40,000 Gallon Capacity	708.6 Gal / Tank
120" Diameter 45,000 Gallon Capacity	804.9 Gal / Tank
120" Diameter 50,000 Gallon Capacity	901.1 Gal / Tank
Double Wall Sumps	
42" Double Walled Tank Sump	0.8216 Gal / Ft
48" Double Walled Tank Sump	0.9372 Gal / Ft
EFS Jacketed Tanks	
500 Gallon Standard Elutron Tank	3 Gal / Tank
1,000 Gallon Standard Elutron Tank	4 Gal / Tank
2,000 Gallon Standard Elutron Tank	5 Gal / Tank
3,000 Gallon Standard Elutron Tank	6 Gal / Tank
4,000 Gallon Standard Elutron Tank	7 Gal / Tank
5,000 Gallon Standard Elutron Tank	8 Gal / Tank
6,000 Gallon Standard Elutron Tank	9 Gal / Tank
8,000 Gallon Standard Elutron Tank	10 Gal / Tank
10,000 Gallon Standard Elutron Tank	13 Gal / Tank
12,000 Gallon Standard Elutron Tank	15 Gal / Tank
15,000 Gallon Standard Elutron Tank	17 Gal / Tank
20,000 Gallon Standard Elutron Tank	22 Gal / Tank
Environ	
GeoFlex Piping	
GeoFlex Piping .75" Dia. (GFP-2075)	0.0028 Gal / Ft
GeoFlex Piping 1.0" Dia. (GFP-2100)	0.0039 Gal / Ft
GeoFlex Piping 1.5" Dia. (GFP-2150)	0.0094 Gal / Ft
GeoFlex Piping 2.0" Dia. (GFP-2200)	0.0094 Gal / Ft
GeoFlex Piping 3.0" Dia. (GFP-2300)	0.0164 Gal / Ft
Dispenser Sump	
Dispenser Sump FDS-2014-DW	5 Gal
Dispenser Sump FDS-2414-DW	6.5 Gal
Dispenser Sump FDS-2716-DW	8.5 Gal
Dispenser Sump FDS-2922-DW	10 Gal
Dispenser Sump FDS-3215-DW	7 Gal
Dispenser Sump FDS-3621-DW	8 Gal
Dispenser Sump FDS-4021-DW	10 Gal
Dispenser Sump FDS-4319-DW	8.5 Gal
Dispenser Sump FDS-4422-DW	10.5 Gal
Dispenser Sump FDS-4614-DW	8 Gal
Dispenser Sump FDS-4714-DW	8 Gal
Dispenser Sump FDS-4715-DW	8 Gal
Dispenser Sump FDS-4721-DW	9 Gal

Type	Volume
Modern Welding	
Steel walled tank w/ FRP exterior (Model 16):	
520 Gallon Tank, 4 ft dia	41 Gal / Tank
1,000 Gallon Tank, 5 ft 4 in dia	64 Gal / Tank
2,000 Gallon Tank, 5 ft 4 in dia	75 Gal / Tank
3,000 Gallon Tank, 5 ft 4 in dia	82 Gal / Tank
4,000 Gallon Tank	120 Gal / Tank
5,000 gallon tank	142 Gal / Tank
6,000 gallon tank	150 Gal / Tank
8,000 Gallon Tank	157 Gal / Tank
10,000 Gallon Tank	172 Gal / Tank
12,000 Gallon Tank	183 Gal / Tank
15,000 Gallon Tank	239 Gal / Tank
20,000 Gallon Tank	254 Gal / Tank
25,000 Gallon Tank	284 Gal / Tank
30,000 Gallon Tank	307 Gal / Tank
35,000 gallon tank	389 Gal / Tank
40,000 Gallon Tank	426 Gal / Tank
45,000 gallon tank	471 Gal / Tank
50,000 Gallon Tank	501 Gal / Tank
Steel walled composite tanks (Glasteel II, Model 13):	
560 Gallon Tank	3 Gal / Tank
1,000 Gallon Tank	4 Gal / Tank
2,000 Gallon Tank	5 Gal / Tank
3,000 Gallon Tank	6 Gal / Tank
4,000 Gallon Tank	7 Gal / Tank
6,000 Gallon Tank	9 Gal / Tank
8,000 Gallon Tank	10 Gal / Tank
10,000 Gallon Tank	13 Gal / Tank
12,000 Gallon Tank	15 Gal / Tank
15,000 Gallon Tank	17 Gal / Tank
20,000 Gallon Tank	22 Gal / Tank
Nupi	
2" over 1.5" piping (2.48" OD x 1.969" OD)	0.0546 Gal / Ft
3" over 2" piping (2.953" OD x 2.480" OD)	0.0518 Gal / Ft
4" over 3" piping (4.921" OD x 3.543" OD)	0.3299 Gal / Ft
4" over 2" piping (4.3" OD x 2.48" OD)	0.401 Gal / Ft
OPW	
Double Wall Dispenser Sump, DST series	1.9 Gal / Ft
Tank Sump 42" Dia x 42" Ht, TRFSDW-4248	0.8 Gal
Tank Sump 42" Dia x 60" Ht, TRFSDW-4260	1 Gal
Tank Sump 42" Dia x 72" Ht, TRFSDW-4272	1.3 Gal
Tank Sump 48" Dia x 42" Ht, TRFSDW-4848	0.9 Gal
Tank Sump 48" Dia x 60" Ht, TRFSDW-4860	1.2 Gal
Tank Sump 48" Dia x 72" Ht, TRFSDW-4872	1.4 Gal
Double Wall Vent Stack Sump, TST-4536	1.9 Gal
CD15DW, 1-1/2" Double Wall Pipe	0.0089 Gal / Ft
CD15RB, 1-1/2" Ribbed Double Wall Pipe	0.006 Gal / Ft
CP20RB, 2" Ribbed Double Wall Pipe	0.0086 Gal / Ft
Phil-Tite	
42" Double wall Tank Sump	0.974 Gal / Ft
48" Double wall Tank Sump	1.1126 Gal / Ft
Double wall UDC	3.3896 Gal / Sump
Smith	
3" over 2" Fiberglass piping	0.23 Gal / Ft
4" over 3" Fiberglass piping	0.276 Gal / Ft
6" over 4" Fiberglass piping	0.823 Gal / Ft
Total Containment	
OmniFlex 1.5" (CP1503)	0.0052 Gal / Ft
OmniFlex 2.5" (CP2503)	0.0079 Gal / Ft

Type	Volume
UPP	
63/75 piping	0.0762 Gal / Ft
90/160 piping	0.9824 Gal / Ft
Western Fiberglass	
CoFlex 1.5" piping	0.0077 Gal / Ft
CoFlex 2" piping	0.0094 Gal / Ft
42" Double Walled FRP Tank Sump	2.50 Gal / Ft
48" Double Walled FRP Tank Sump	2.75 Gal / Ft
Double Walled Dispenser Sump DS1840	10.5 Gal
Double Walled Dispenser Sump DS1836	10 Gal
Double Walled Dispenser Sump DS1642	9 Gal
Double Walled Dispenser Sump DS1640	9 Gal
Double Walled Dispenser Sump DS1630	8 Gal
Double Walled Dispenser Sump DS1142	8 Gal
Double Walled Dispenser Sump DS1323	7 Gal
Double Walled Dispenser Sump DS1320	7 Gal
Double Walled Dispenser Sump DS1130	7 Gal
Double Walled Dispenser Sump DS1129	7 Gal
Double Walled Dispenser Sump DS1125	7 Gal
Double Walled Dispenser Sump DS1123	7 Gal
Double Walled Dispenser Sump DS1122	7 Gal
Double Walled Dispenser Sump DS1121	7 Gal
Double Walled Dispenser Sump DS1120	7 Gal
Double Walled Dispenser Sump DS1118	5 Gal
Double Walled Dispenser Sump DS1117	5 Gal
Double Walled Dispenser Sump DS1115	5 Gal
Double Walled Dispenser Sump DS1114	5 Gal
Double Walled Dispenser Sump DS1112	5 Gal
Double Walled Dispenser Sump DS0711	3 Gal
Small Vent Box (24x30x30)	3.5 Gal
Large Vent Box (24x42x29)	5.5 Gal
Xerxes	
Double Wall Tanks	
48" Diameter 600 Gallon Capacity	8 Gal / Tank
48" Diameter 1,000 Gallon Capacity	10 Gal / Tank
72" Diameter 2,500 Gallon Capacity	48 Gal / Tank
72" Diameter 3,000 Gallon Capacity	59 Gal / Tank
72" Diameter 4,000 Gallon Capacity	76 Gal / Tank
72" Diameter 5,000 Gallon Capacity	93 Gal / Tank
72" Diameter 6,000 Gallon Capacity	110 Gal / Tank
Xerxes	
Double Wall Tanks - continued	
96" Diameter 4,000 Gallon Capacity	76 Gal / Tank
96" Diameter 5,000 Gallon Capacity	95 Gal / Tank
96" Diameter 6,000 Gallon Capacity	114 Gal / Tank
96" Diameter 8,000 Gallon Capacity	152 Gal / Tank
96" Diameter 10,000 Gallon Capacity	189 Gal / Tank
96" Diameter 12,000 Gallon Capacity	227 Gal / Tank
96" Diameter 15,000 Gallon Capacity	284 Gal / Tank
120" Diameter 10,000 Gallon Capacity	144 Gal / Tank
120" Diameter 12,000 Gallon Capacity	167 Gal / Tank
120" Diameter 15,000 Gallon Capacity	213 Gal / Tank
120" Diameter 20,000 Gallon Capacity	280 Gal / Tank
120" Diameter 25,000 Gallon Capacity	325 Gal / Tank
120" Diameter 30,000 Gallon Capacity	375 Gal / Tank
120" Diameter 35,000 Gallon Capacity	498 Gal / Tank
120" Diameter 40,000 Gallon Capacity	579 Gal / Tank
Double Wall Sumps	
42" Double Wall Tank Sump	0.5714 Gal / Ft
48" Double Wall Tank Sump	0.6531 Gal / Ft