

Environmental & Regulatory Services Division  
Bureau of Petroleum Products and Tanks  
201 West Washington Avenue  
P.O. Box 7837  
Madison, WI 53707-7837

## Wisconsin COMM 10 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, 2012

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### **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 PC, TLS 450, ProMax and ProPlus consoles; TLS 300, TLS 300i, TLS 350, TLS 450 with Continuous Statistical Leak Detection (CSLD); TLS 300, TLS 350, TLS 450 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. Comm 10.510** and **Comm 10.515** 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 – Comm 10.

**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 <sup>1</sup> , TLS 300C <sup>2</sup>	TLS 2	TLS 350, 350 Plus, 350R, 350J, PC, ProMax	TLS 450
8463	TTT or ATG	X	(X)	X	X	X
8473	TTT or ATG	X	(X)	X	X	X
8463 with Manifolder Tanks and CSLD	Monthly Monitor	X	(X)		X	X
8473 with Manifolder 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
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
794380-20X	Sump <sup>1</sup>		X	X	X	X
794380-320	Discr.-Disp. Pan <sup>3,4</sup>				X	X
794380-322	Discr.-Disp. Pan <sup>3,4</sup>	X	X		X	X
794380-321	Dispenser Pan <sup>1</sup>				X	X
794380-323	Sump-Pos. Sensitive <sup>1,7,11</sup>	X	X	X	X	X
794380-30X	Hydrostatic (FRP) <sup>2</sup>		X		X	X
794380-344	Micro <sup>1,11</sup>				X	X
794380-343	Discriminating (FRP) <sup>3,4</sup>				X	X
794380-345	Interstitial (FRP- ethanol conc. 85% and lower)				X	X
794380-350	Discriminating-Sump <sup>3,4</sup>				X	X
794380-351	Sump <sup>1</sup>				X	X
794380-352	Discriminating-Sump <sup>3,4</sup>	X	X		X	X
794390-700	Vapor <sup>5</sup>			X	X	X
794380-62X	Groundwater <sup>3</sup>			X	X	X
794390-4X0	Steel Tank <sup>1,11</sup>		X	X	X	X
794390-40X	Fiberglass Tank <sup>1</sup>		X	X	X	X
794390-62X	Groundwater <sup>3</sup>			X	X	X
857080-XXX	Discriminating-Sump <sup>4,6,7,8,9</sup>				X	X
847990-00X	Stand-Alone Disp. Pan <sup>10</sup>					
<b>Double Wall Vacuum Monitoring</b>						
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 jet fuel.
- 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 on the internet 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 digital pressurized line leak detector **series 8590** was evaluated through comparison testing with the TLS 350 pressurized line leak detector consoles and series 8484 probe 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 1<sup>ST</sup> sheet of report)

<pre> MMM DD, YYYY HH:MM XM LEAK TEST REPORT T 1:REGULAR UNLEADED PROBE SERIAL NUM 105792  TEST STARTING TIME: MMM DD, YYYY HH:MM XM  TEST LENGTH = 4.3 HRS STRT VOLUME = 3725 GALS  LEAK TEST RESULTS 0.2 GAL/HR TEST PASS                 </pre>	<pre> MMM DD, YYYY HH:MM XM PRESSURE LINE LEAK TEST RESULTS  Q 1:UNLEADED REG LINE 3.0 GAL/HR RESULTS:  LAST TEST: MMM DD,YYYY HH:MM XM PASS  NUMBER OF TESTS PASSED PREV 24 HOURS : 123 SINCE MIDNIGHT : 81  0.20 GAL/HR RESULTS:  MMM DD,YYYY HH:MM XM PASS MMM DD,YYYY HH:MM XM PASS  0.10 GAL/HR RESULTS:  MMM DD,YYYY HH:MM XM PASS MMM DD,YYYY HH:MM XM PASS                 </pre>
<p><b>Tank Leak Report Example:</b> Last leak report for all active tanks.</p>	<p><b>Line Leak Report Examples:</b> Automatic, Monthly, and Annual.</p>

<pre> CSLD TEST RESULTS ----- DD-MM-YY HH:MM XM  T 2:SUPER UNLEADED PROBE SERIAL NUM 123002 0.2 GAL/HR TEST PER: DD-MM-YY PASS                 </pre>	<pre> SMART SENSOR STATUS ----- MMM DD,YYYY HH:MM XM  s1 : SUMP 1 SENSOR NORMAL                 </pre>	<pre> Station Name Street City, State Zip Telephone Number  SENSOR STATUS  SENSOR 2A NORMAL SENSOR 4A FUEL SENSOR 6A NORMAL SENSOR 8A NORMAL  EXTERNAL INP. STATUS OPEN                 </pre>
<p><b>Auto Leak Report Example:</b> Current status of 24-hour leak detection (CSLD) for all active tanks.</p>	<p><b>Smart Sensor SCVS Status Report Example:</b> For Secondary Containment Leak Detection System (SCLD)</p>	<p><b>Sensor Status Report Example</b></p>



TLS 450 Console:

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 1<sup>ST</sup> sheet of report)

<p>SIMSBURY LAB UNIT VEEDER-ROOT WORLD HEADQUARTERS</p> <p>TANK LEAK TEST HISTORY - PASSED TEST RESULTS</p> <p>T 1: 113 RUL NORTH</p> <table border="1"> <thead> <tr> <th>REPORT TYPE</th> <th>DATE/TIME</th> <th>METHOD</th> <th>HOURS</th> <th>AVERAGE VOLUME</th> <th>% VOLUME</th> </tr> </thead> <tbody> <tr> <td>LAST GROSS</td> <td>09/11/17 09:04</td> <td>SLD</td> <td></td> <td>3434</td> <td>14.8</td> </tr> <tr> <td>LAST PERIODIC</td> <td>09/11/17 05:51</td> <td>CSLD</td> <td>44</td> <td>3507</td> <td>15.1</td> </tr> </tbody> </table>	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	<p>NOV 17, 2009 9:44 AM</p> <p>SIMSBURY LAB UNIT VEEDER-ROOT WORLD HEADQUARTERS</p> <p>PRESSURE LINE LEAK REPORTS - PASSED TESTS HISTORY</p> <p>LN : 113 RUL NORTH</p> <table border="1"> <thead> <tr> <th>TEST TYPE</th> <th>DATE &amp; TIME</th> <th>TEST METHOD</th> <th>GROSS TEST PREV 24 HOURS</th> <th>GROSS TEST SINCE MIDNIGHT</th> </tr> </thead> <tbody> <tr> <td>GROSS</td> <td></td> <td>PLLD</td> <td>0</td> <td>0</td> </tr> <tr> <td>LAST GROSS</td> <td>NOV 3, 2009 12:47 PM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>LAST PERIODIC</td> <td>AUG 24, 2009 2:58 PM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>LAST ANNUAL</td> <td>APR 7, 2009 3:06 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>AUG 24, 2009 2:58 PM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>APR 5, 2009 5:22 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>MAR 2, 2009 2:57 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>FEB 4, 2009 3:40 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>JAN 1, 2009 9:03 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>DEC 2, 2008 3:40 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>NOV 20, 2008 4:10 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST PERIODIC</td> <td>SEP 10, 2008 4:22 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> <tr> <td>FIRST ANNUAL</td> <td>APR 7, 2009 3:06 AM</td> <td>PLLD</td> <td></td> <td></td> </tr> </tbody> </table>	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 3:40 AM	PLLD			FIRST PERIODIC	JAN 1, 2009 9:03 AM	PLLD			FIRST PERIODIC	DEC 2, 2008 3:40 AM	PLLD			FIRST PERIODIC	NOV 20, 2008 4:10 AM	PLLD			FIRST PERIODIC	SEP 10, 2008 4:22 AM	PLLD			FIRST ANNUAL	APR 7, 2009 3:06 AM	PLLD		
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## **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 **Comm 10.500(9)**.
- 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 3<sup>rd</sup> 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, TLS-PC, ProPlus and ProMax** consoles for annual 0.1 gph and monthly 0.2 gph testing: (Magnetostrictive probe)

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

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, ProPlus, and ProMax** consoles: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size <sup>1</sup>	<b>45,000 gallons</b> (Single Tank) <b>37,000 gallons</b> (Manifolded Tanks)
Software Version	<b>N/A</b>
Minimum Tank Level <sup>2</sup>	<b>5%</b>
Maximum Monthly Throughput	<b>227,559 gallons</b> (Single Tank) <b>226,848 gallons</b> (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 **Comm 5.88** 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	<b>3 in.</b>
Total maximum allowable volume of product in any <b>rigid</b> test pipeline	<b>119.4 gallons or less</b>

**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	<b>User selectable on console. For a list of currently approved piping, contact Veeder-Root.</b>
Total maximum allowable volume of product in any <b>flexible</b> test pipeline	<b>119.4 gallons or less</b>

**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	<b>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.</b>
Software version	<b>23 or higher</b>
Total maximum allowable volume of product in any <b>Hybrid</b> test pipeline	<b>212 gallons or less for 3.0 gph</b>

**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 3<sup>rd</sup> party certified for rigid piping only)

**Rigid Piping:** (3" Fiberglass or steel)

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

**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 <sup>1</sup>	<b>2114 gallons (8 m<sup>3</sup>)</b> (Tank) <b>2642 gallons (10 m<sup>3</sup>)</b> (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, 2012, 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: January 1, 2010

Reviewed by: \_\_\_\_\_  
Greg Bareta, P. E.  
Engineering Consultant  
Bureau of Petroleum Products and Tanks

Approved by: \_\_\_\_\_

Date: \_\_\_\_\_



Secondary Containment Volumes by Manufacturer

Manufacturer	Type	Volume	Type	Volume	Type	Volume
Amenon	Dusby 3000LX, 3" over 2" piping	0.2186 Gal / Ft	Modern Welding			
	Dusby 3000LX, 4" over 3" piping	0.2652 Gal / Ft	Steel welded tank w/ FRP exterior (Model 10):			
	Dusby 3000LX, 6" over 4" piping	0.6398 Gal / Ft	520 Gallon Tank, 4 ft dia	41 Gal / Tank		
	Dusby 3000LX, 2" piping	0.0133 Gal / Ft	1,000 Gallon Tank, 5 ft 4 in dia	64 Gal / Tank		
	Dusby 3000LX, 3" piping	0.0196 Gal / Ft	2,000 Gallon Tank, 5 ft 4 in dia	75 Gal / Tank		
	Dusby 3000LX, 4" piping	0.0252 Gal / Ft	3,000 Gallon Tank, 5 ft 4 in dia	82 Gal / Tank		
			4,000 Gallon Tank	120 Gal / Tank		
			5,000 Gallon Tank	120 Gal / Tank		
			6,000 Gallon Tank	140 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	294 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 welded composite tanks (Glassteel II, Model 13):			
			550 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		
			Mugli			
			2" over 1.5" piping (2.48" OD x 1.969" ID)	0.0546 Gal / Ft		
			3" over 2" piping (2.963" OD x 2.480" ID)	0.0518 Gal / Ft		
			4" over 3" piping (4.921" OD x 3.543" ID)	0.3299 Gal / Ft		
			4" over 2" piping (4.3" OD x 2.48" ID)	0.401 Gal / Ft		
			OPW			
			Double Wall Dispenser Sump, DST series	1.9 Gal / Ft		
			Tank Sump 42" Dia x 42" Ht, TRFSDW4248	0.8 Gal		
			Tank Sump 42" Dia x 60" Ht, TRFSDW4260	1 Gal		
			Tank Sump 42" Dia x 72" Ht, TRFSDW4272	1.3 Gal		
			Tank Sump 48" Dia x 42" Ht, TRFSDW4848	0.9 Gal		
			Tank Sump 48" Dia x 60" Ht, TRFSDW4860	1.2 Gal		
			Tank Sump 48" Dia x 72" Ht, TRFSDW4872	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		
			PHI-Tite			
			Double wall Tank Sump	0.974 Gal / Ft		
			48" Double wall Tank Sump	1.126 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		

Manufacturer	Type	Volume	Type	Volume	Type	Volume
UPP	93/75 piping	0.0762 Gal / Ft	96" Diameter 4,000 Gallon Capacity	76 Gal / Tank		
	50/160 piping	0.9824 Gal / Ft	96" Diameter 5,000 Gallon Capacity	95 Gal / Tank		
	Western Fiberglass		96" Diameter 6,000 Gallon Capacity	114 Gal / Tank		
	Coflex 1.5" piping	0.0077 Gal / Ft	96" Diameter 8,000 Gallon Capacity	152 Gal / Tank		
	Coflex 2" piping	0.0084 Gal / Ft	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		
			45" Double Wall Tank Sump	0.6631 Gal / Ft		

Manufacturer	Type	Volume	Type	Volume	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	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 20,000 Gallon Capacity	307.4 Gal / Tank				
	120" Diameter 22,000 Gallon Capacity	323.5 Gal / Tank				
	120" Diameter 25,000 Gallon Capacity	355.6 Gal / Tank				
	120" Diameter 28,000 Gallon Capacity	387.7 Gal / Tank				
	120" Diameter 30,000 Gallon Capacity	403.7 Gal / Tank				
	120" Diameter 34,000 Gallon Capacity	419.8 Gal / Tank				
	120" Diameter 38,000 Gallon Capacity	435.8 Gal / Tank				
	120" Diameter 40,000 Gallon Capacity	483.9 Gal / Tank				
	120" Diameter 45,000 Gallon Capacity	516.0 Gal / Tank				
	120" Diameter 50,000 Gallon Capacity	548.1 Gal / Tank				
	120" Diameter 55,000 Gallon Capacity	612.3 Gal / Tank				
	120" Diameter 60,000 Gallon Capacity	708.9 Gal / Tank				
	120" Diameter 70,000 Gallon Capacity	804.9 Gal / Tank				
	120" Diameter 80,000 Gallon Capacity	901.1 Gal / Tank				
	Double Wall Sumps					
	42" Double Wall Tank Sump	0.8216 Gal / Ft				
	45" Double Wall Tank Sump	0.9372 Gal / Ft				
	EFS Jacketed Tanks					
	500 Gallon Standard Eutron Tank	3 Gal / Tank				
	1,000 Gallon Standard Eutron Tank	4 Gal / Tank				
	2,000 Gallon Standard Eutron Tank	5 Gal / Tank				
	3,000 Gallon Standard Eutron Tank	6 Gal / Tank				
	4,000 Gallon Standard Eutron Tank	7 Gal / Tank				
	5,000 Gallon Standard Eutron Tank	8 Gal / Tank				
	6,000 Gallon Standard Eutron Tank	9 Gal / Tank				
	8,000 Gallon Standard Eutron Tank	10 Gal / Tank				
	10,000 Gallon Standard Eutron Tank	13 Gal / Tank				
	12,000 Gallon Standard Eutron Tank	15 Gal / Tank				
	15,000 Gallon Standard Eutron Tank	17 Gal / Tank				
	20,000 Gallon Standard Eutron Tank	22 Gal / Tank				
	Ewifron					
	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	6.5 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	6.5 Gal				
	Dispenser Sump FDS-4622-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				

Manufacturer	Type	Volume	Type	Volume	Type	Volume
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				
	45" 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					
	45" Diameter 550 Gallon Capacity	5.8 Gal / Tank				
	45" Diameter 600 Gallon Capacity	5.9 Gal / Tank				
	45" 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 4,500 Gallon Capacity	49.9 Gal / Tank				
	72" Diameter 5,000 Gallon Capacity	58.1 Gal / Tank				
	72" Diameter 6,000 Gallon Capacity	66.4 Gal / Tank				
	72" Diameter 7,000 Gallon Capacity	82.9 Gal / Tank				
	72" Diameter 8,000 Gallon Capacity	91.2 Gal / Tank				
	72" Diameter 9,000 Gallon Capacity	107.7 Gal / Tank				
	72" Diameter 10,000 Gallon Capacity	116.1 Gal / Tank				
	82" Diameter 4,000 Gallon Capacity	32.2 Gal / Tank				
	82" Diameter 5,000 Gallon Capacity	42.7 Gal / Tank				
	82" Diameter 6,000 Gallon Capacity	53.2 Gal / Tank				
	82" Diameter 7,000 Gallon Capacity	63.7 Gal / Tank				
	82" Diameter 8,000 Gallon Capacity	74.2 Gal / Tank				
	82" Diameter 10,000 Gallon Capacity	95.2 Gal / Tank				
	82" Diameter 11,000 Gallon Capacity	105.7 Gal / Tank				
	82" Diameter 12,000 Gallon Capacity	116.2 Gal / Tank				
	82" Diameter 13,000 Gallon Capacity	126.7 Gal / Tank				
	82" Diameter 14,000 Gallon Capacity	137.2 Gal / Tank				
	82" Diameter 15,000 Gallon Capacity	147.7 Gal / Tank				
	82" Diameter 16,000 Gallon Capacity	158.2 Gal / Tank				
	82" Diameter 17,000 Gallon Capacity	168.8 Gal / Tank				
	82" Diameter 18,000 Gallon Capacity	179.4 Gal / Tank				
	82" Diameter 20,000 Gallon Capacity	210.7 Gal / Tank				