

# Line Leak Detection Systems, UST Leak Detection Equipment, Mag Sump Sensor, and Other Sensors

## Operability Testing Guide



# Notice

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Contact TLS Systems Technical Support for additional troubleshooting information at 800-323-1799.

## **DAMAGE CLAIMS / LOST EQUIPMENT**

Thoroughly examine all components and units as soon as they are received. If any cartons are damaged or missing, write a complete and detailed description of the damage or shortage on the face of the freight bill. The carrier's agent must verify the inspection and sign the description. Refuse only the damaged product, not the entire shipment.

Veeder-Root must be notified of any damages and/or shortages within 30 days of receipt of the shipment, as stated in our Terms and Conditions.

## **VEEDER-ROOT'S PREFERRED CARRIER**

1. Contact Veeder-Root Customer Service at 800-873-3313 with the specific part numbers and quantities that were missing or received damaged.
2. Fax signed Bill of Lading (BOL) to Veeder-Root Customer Service at 800-234-5350.
3. Veeder-Root will file the claim with the carrier and replace the damaged/missing product at no charge to the customer. Customer Service will work with production facility to have the replacement product shipped as soon as possible.

## **CUSTOMER'S PREFERRED CARRIER**

1. It is the customer's responsibility to file a claim with their carrier.
2. Customer may submit a replacement purchase order. Customer is responsible for all charges and freight associated with replacement order. Customer Service will work with production facility to have the replacement product shipped as soon as possible.
3. If "lost" equipment is delivered at a later date and is not needed, Veeder-Root will allow a Return to Stock without a restocking fee.
4. Veeder-Root will NOT be responsible for any compensation when a customer chooses their own carrier.

## **RETURN SHIPPING**

For the parts return procedure, please follow the appropriate instructions in the "General Returned Goods Policy" pages in the "Policies and Literature" section of the Veeder-Root **North American Environmental Products** price list. Veeder-Root will not accept any return product without a Return Goods Authorization (RGA) number clearly printed on the outside of the package.

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## Introduction

This manual contains instructions to comply with the US EPA CFR (Code of Federal Regulation) found in Title 40, Chapter I, Subchapter I, Subpart D – Release Detection, Part 280.40 (a) (3) (current as of 7/15/2015).

This regulation lists the requirement for tank system owners/operators to confirm the proper operation of their electronic and mechanical devices that supply release detection, at least annually, in accordance with manufacturer's instructions. You will find details herein on methods to test, report and repair any technical issues with the Veeder-Root ATG systems while conducting the required annual certification. Included in this manual are testing/inspection procedures for evaluating the TLS consoles, the liquid-level probes, standard and Mag Sump Sensors, WPLLD and PLLD Line Leak Sensors and other sensors of the Veeder Root product line which are in use for providing Release Detection compliance at tank & piping system facilities which are subject to applicable Release Detection requirements found within CFR40 Part 280.

The regulation at 280.40 (a) (3) specifies that a test of the proper operation must be performed at least annually and, at a minimum, as applicable to the facility, cover the following components and criteria:

- **Automatic tank gauge and other controllers**

- ✓ Test the alarm
- ✓ Verify the system
- ✓ Test the battery backup

- **Probes and sensors**

- ✓ Inspect for residual buildup
- ✓ Ensure any floats move freely
- ✓ Ensure any shafts are not damaged
- ✓ Ensure the cables are free of kinks and breaks
- ✓ Test the alarm operability and communication with the controller

- **Automatic line leak detector**

- ✓ The CFR requirement listed at 280.45 (b) (1) stipulates that Owners and operators must maintain records of release detection equipment testing for at least **(3) three years**. The record must include each component tested, whether each component passed the test or needed to have action taken, and any action taken to correct an issue.

**NOTICE** **Veeder-Root environmental monitoring systems installed in accordance with installation manual requirements are designed to detect and report conditions that inhibit proper operation. Veeder-Root systems self-diagnose essential components, and if a component failure is detected, will not complete and report tank and line tests. The system will issue an audible and visual alarm when a failed or disconnected sensor is detected.**



## General Testing Requirements

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A certified Veeder-Root Technicians must be available (on site) to assist in these types of testing.

**Service Technician Certification (Previously known as Level 2/3):** Contractors holding valid Technician Certifications are approved to perform installation checkout, startup, programming and operations training, system tests, troubleshooting and servicing for all Veeder-Root Series Tank Monitoring Systems, including Line Leak Detection.

**TLS-3xx Technician Certification:** Contractors holding valid TLS-350 Technician Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root TLS-300 or TLS-350 Series Tank Monitoring Systems, including Line Leak Detection and associated accessories.

**TLS-4xx Technician Certification:** Contractors holding valid TLS-450 Technician Certifications are approved to perform installation checkout, startup, programming and operations training, troubleshooting and servicing for all Veeder-Root TLS-450 Series Tank Monitoring Systems, including Line Leak Detection and associated accessories.

**In-Station Diagnostics (ISD-PMC) Technician Certification:** ISD PMC Contractors holding a valid ISD/PMC Certification are approved to perform (ISD/PMC) installation checkout, startup, programming, and operations training. This training also includes troubleshooting and service techniques for the Veeder-Root In-Station Diagnostics system. A current Veeder-Root Technician Certification is a prerequisite for the ISD/PMC course.

All service personal on site must comply with all recommended safety practices identified by OSHA and your employer.

Review and comply with all the safety warnings in the manuals listed in this document above and any other Federal, State or Local requirements.

## Reference Documents

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The following reference documents may be helpful when performing the operability tests outlined in this manual.

### UST Leak Detection Equipment










- [Veeder-Root TLS-450PLUS/TLS4 Operator's Manual \(577014-110\)](#)
- [Veeder-Root TLS-3XX Operators Manual \(576013-610\)](#)
- [Veeder-Root W/PLLD Troubleshooting Guide \(577013-344\)](#)
- [Veeder-Root Performance Results Certification Reports \(576013-308\)](#)
- [Veeder-Root Line Leak Application Guide \(577013-465\)](#)
- [Sensor Products Application Guide \(577013-750 Rev AD or Higher\)](#)
- [Veeder-Root TLS-3XX Setup Manual \(576013-623\)](#)


### Red Jacket Mechanical Leak Detector

- [Red Jacket Engineering Report Testing Mechanical Leak Detectors with the FX Tester \(C051-272\)](#)







## Safety Precautions

The following safety symbols may be used throughout this manual to alert you to important safety hazards and precautions

 <p><b>EXPLOSIVE</b> Fuels and their vapors are extremely explosive if ignited.</p>	 <p><b>FLAMMABLE</b> Fuels and their vapors are extremely flammable.</p>
 <p><b>ELECTRICITY</b> High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p><b>TURN POWER OFF</b> Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>
 <p><b>APPROVED CONTAINERS</b> Use non-breakable, clearly marked containers, suitable for collecting and transporting hazardous fuels during service.</p>	 <p><b>READ ALL RELATED MANUALS</b> Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does.</p>
 <p><b>USE SAFETY BARRICADES</b> Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>	 <p><b>WARNING</b> WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>
 <p><b>NOTICE</b> NOTICE is used to address practices not related to physical injury.</p>	



# WARNING

       	<p><b>This product is installed in systems operating on lethal voltages, near locations where highly combustible fuels or vapors may be present.</b></p> <p><b>FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</b></p> <p><b>SWITCHING ON THE PUMP WHILE FITTING TEST EQUIPMENT TO DISPENSER SHEAR VALVES OR MAKING WIRING CHANGES FOR TESTING CAN CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</b></p> <p><b>Product spillage could create serious environmental and safety hazards.</b></p> <ol style="list-style-type: none"> <li><b>1. Read and follow all instructions in this manual, including all safety warnings.</b></li> <li><b>2. Turn off, tag, and lockout power to pumps before removing dispenser shear valve fittings and when disconnecting pump wiring.</b></li> <li><b>3. Dispose of drained fuel properly. Use an approved container suitable for moving fuel. Dispose of fuel soaked materials properly and not into trash barrels that may be used by customers.</b></li> <li><b>4. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.</b></li> </ol>
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# Operability Verification of the Automatic Tank Gauge (ATG) Systems

## Scope:

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These procedures can be used at field sites to determine the operability of Veeder-Root TLS-3xx and TLS-4xx systems. Testing the ATG monitoring system in accordance with these procedures will verify the equipment's operability for basic operation including alarms and reporting. Further testing of individual devices will be covered later in this document.



## Before You Begin:

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- Verify that the TLS Console is programmed to adequately satisfy the Release Detection requirements of the tank & piping systems installed as well as any customer-specific business practices (BIR, etc.).
- Identify all breakers for disconnecting power to the Automatic Tank Gauge console, PLLD/WPLLD line leak detection systems and Submersible Turbine Pump (STP) systems when instructed. This will prepare you to perform lock-out/Tag-out of these systems to create a safe condition for some of the testing that will be conducted.



- Identify and lock all dispenser nozzle handles which could interrupt the testing. It is recommended that the entire station be shut down during this procedure to prevent a test from being interrupted.



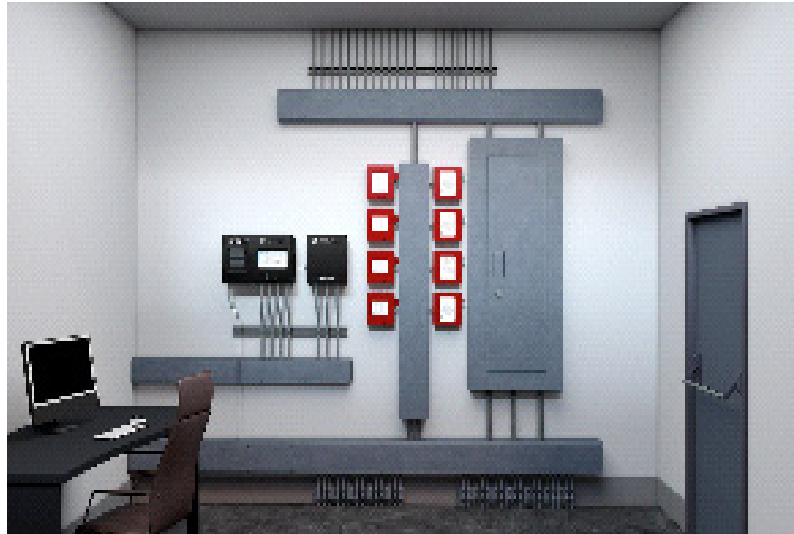
- Cordon off the Four Court area with Safety apparatus and vehicle to ensure safety for service providers conducting the operability verification testing. (For further details on Safety you can reference American Petroleum Institute's Work Safe Publications.)
- As it will likely require accessing containment sumps to retrieve some of the equipment to be tested, and that by definition these spaces could be deemed Confined Spaces, GVR reminds the contractor of the existence of OSHA regulations found within CFR 29 1910.146 which establish the criteria for safe contractor access/entry of those sumps/spaces.
- We have provided an example of an 'Annual Automatic Tank Gauge Inspection and Certification Form' in Appendix B of this document as a reference for recording the results of the inspection and testing. Use of this form is suggested, but not required, in lieu of a form created/issued by the testing contractor.

**NOTICE** The user of this manual is responsible to make use of any state or local UST agency report forms that are required for reporting the results of the Inspection and Certification. Also, it is recommended that all printouts from the TLS console be saved with the report forms for recording purposes.

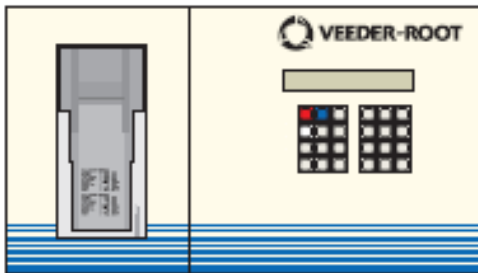
**NOTICE** It is required to remove power from the console before disconnecting any Sensors or Probes during these inspections to meet UL requirements.



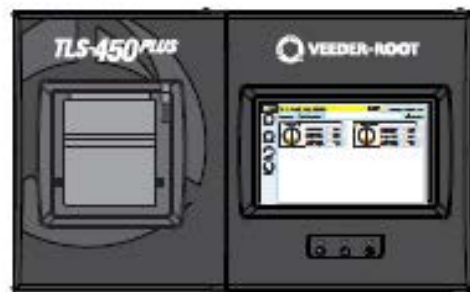
## ATG Inspection and Audible / Visual Test Requirements



1. Verify no items are obstructing the display and keypad area of the ATG system.
2. It is recommended to verify that all electrical connections to the system meet installation requirements - Refer to the installation manual that pertains to the ATG being inspected: <https://www.veeder.com/us/technical-document-library>.



[TLS-3XX Installation Guide 576013-879](#)



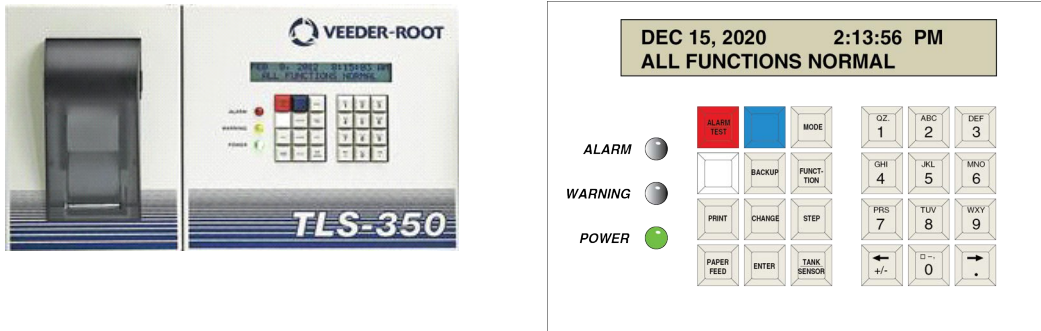
[TLS-450PLUS Installation Guide 577014-073](#)

3. If the ATG is equipped with an optional printer, verify that the paper is installed properly to ensure testing results are recorded during the inspection.

**NOTICE** Do not tear off printout. Leave printout intact during the inspection certification test to ensure records are preserved.

**NOTICE** Please use the Annual Automatic Tank Gauge Inspection and Certification Form that is provided in Appendix B of this document to record the results of the inspection and test.

## TLS-3xx Audible and Visual Test Procedure



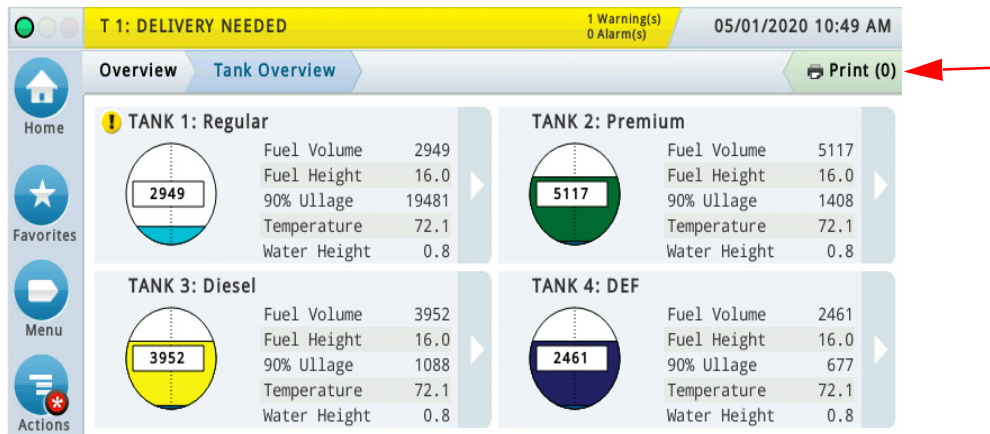
1. Press and Hold Alarm Test button for a minimum 3 seconds.
2. Verify Green Power, Yellow Warning and Red Alarm LED indicators are lit and audible alarm sounds.
3. The printer will automatically print a System Status report.

## TLS-4XX Audible and Visual Test Procedure

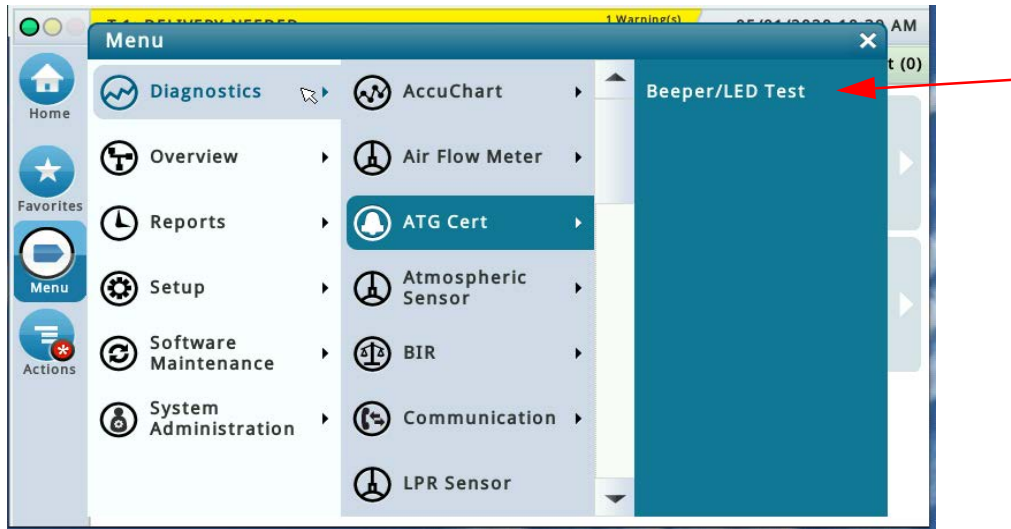


1. Touch the print button from the home screen (Upper Right) to verify the printer is operational.

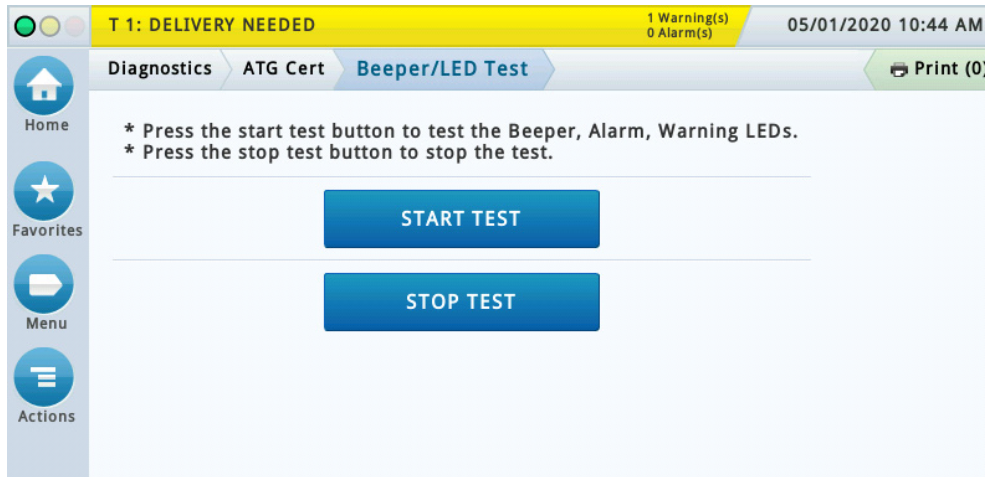
**NOTICE** If system is programmed to print on an external network printer verify with operator to ensure reports for inspection can be printed and obtained.



2. Touch **Menu/Diagnostics/ATG Cert/Beeper/LED Test** to display the Beeper/LED Test screen.



3. On Beeper/LED Test screen, touch-the **Start Test** Button observe LED's and that the audible sounds. Once verified, touch the **Stop Test** Button.



**NOTICE** Results of the Audible and Visual Test for either TLS-3xx or TLS-4xx systems should generate a audible and visual alarm. If any LED or Beeper failures occur during the inspection, they are an indication that the system does not meet the inspection requirements. Please repair immediately.

**NOTICE** Veeder-Root has provided an Inspection Form for your convince if needed to record the inspection results in Appendix B.

## Testing Battery Back-up Function

TLS-3xx systems are equipped with a battery backup system for system setup and report retention in the event of a power loss.

The TLS-4xx consoles do not require a battery verification test since system setup and report data is retained using a Secure Digital (SD) card.

### Testing and Replacing the Battery - TLS-350

Veeder-Root recommends conducting the following procedure prior to any Annual Certification or Operability test. This procedure will help assist in identifying the operational status of the backup battery before removing power to the ATG system. During this procedure the TLS power should remain on at all times unless specified.

1. Print out the System Setup.
2. Refer to the TLS-3XX System Setup manual, Section 28 Archiving Utility, and perform the Archiving Setup Data procedure.
3. Again print out System Setup and verify that the Archived Setup matches the setup printed in Step 1.
4. For easier access to the ECPU and Battery, you may want to remove the printer door group.
5. Carefully remove printer ribbon cable between the printer and ECPU. Do NOT shut the Battery Switch off (Down Position).
6. Using a Volt Meter, verify battery voltage for the applicable console by putting the positive lead on Resistor 151 (shown in Figure 1) and the negative lead on any exposed metal of the console's chassis. Use the battery test pads for voltage measurement, if available.

**NOTICE** TLS-350/350R ECPU boards manufactured after January 19th 2011 have Battery Test points located below the dip switch area. The figure below shows the location of both the battery test pads and R151.

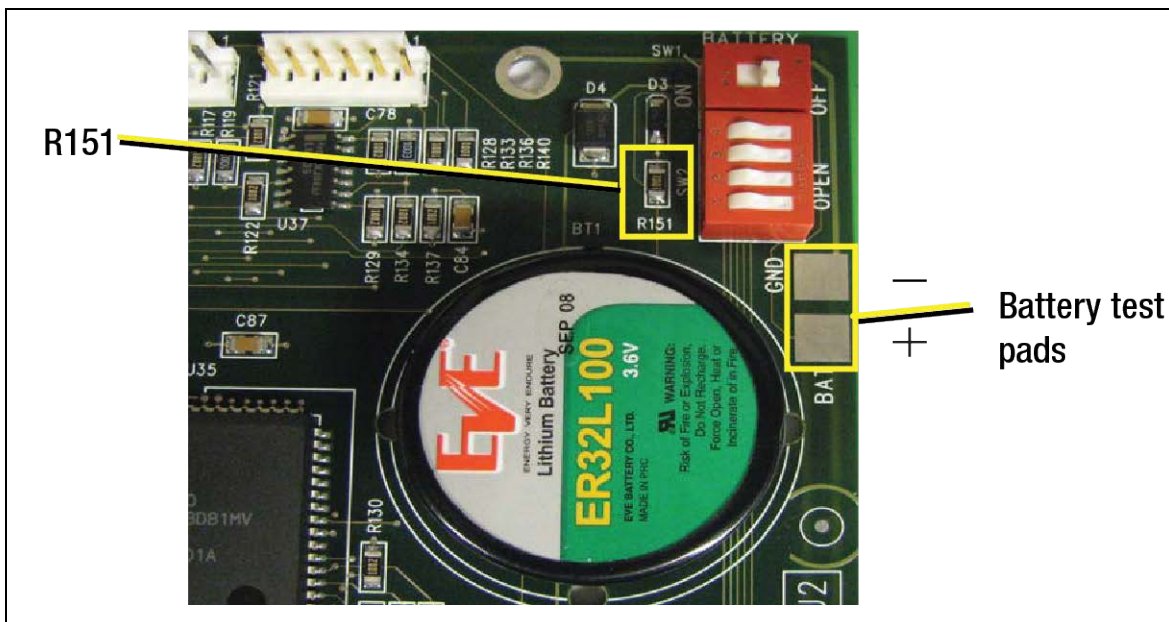
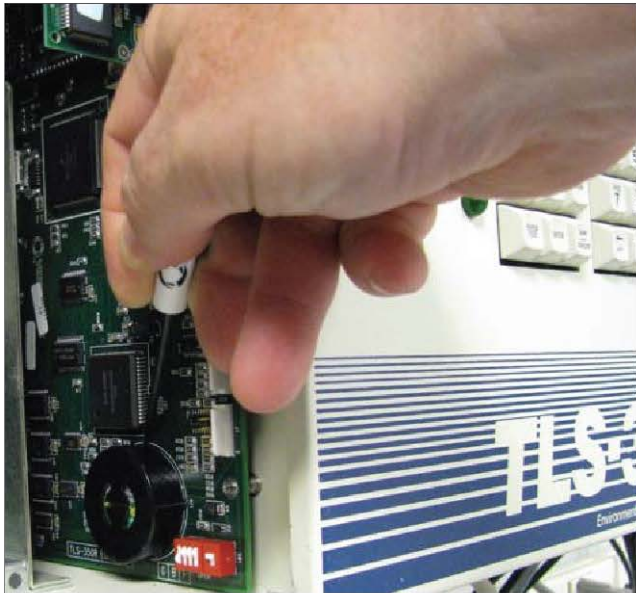


Figure 1. Battery Voltage Test Locations On ECPU Board

7. Does the volt meter read 3.4 to 3.6 Vdc? If Yes, Do not remove Battery. Battery is not defective do not remove it, go to Step 14. If No, go to Step 8.
8. Using an insulated screw driver, push down and pull away on the battery cover that is attached to the ECPU board. You may want to use your finger tips to help remove the battery cover. Please be careful you don't touch any other circuits on the board (see Figure 2, A). After the top of the battery cover has dislodged, you can pull the cover off with you finger tips (see Figure 2, B).



A. Dislodging Battery Cover



B. Battery Cover Dislodged

Figure 2. Removing Battery Cover

9. When removing battery, please ensure that you do not disconnect the ECPU board from the mother board (Back Plane).
10. Check new battery before installing on ECPU board. Confirm it reads 3.4 to 3.6 Vdc.
11. Install new battery (see Figure 2-15).

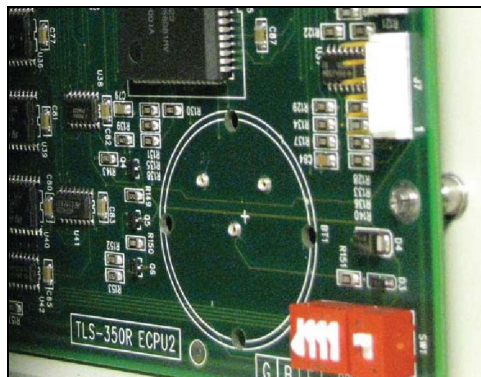


Figure 3. Install New Battery

12. Verify Voltage using the procedure in Step 6.
13. Re-install battery cover and printer door group.

**NOTICE** Do not reconnect the printer ribbon cable until you remove power from the TLS system. Doing so before power is removed, may cause damage to the ECPU or Printer.

14. If an annual ATG certification is being performed at this time, you can safely remove power to the TLS via the assigned dedicated circuit breaker so the fail safe procedure or annual certification procedure can be completed.
15. If the TLS produces an H8 or "UNRECOVERABLE DATA ERROR" while performing Step 14, please contact Technical Support for further assistance.

## Testing and Replacing the Battery - TLS-300

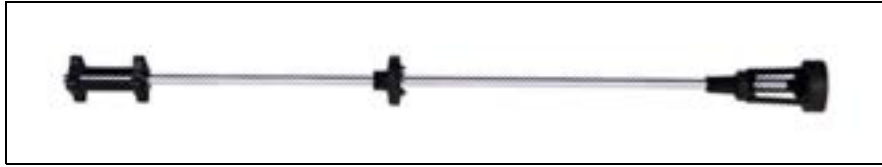
**NOTICE** Veeder-Root recommends conducting the following procedure prior to any Annual Certification or Operability test. This procedure will help assist in identifying the operational status of the backup battery before removing power to the ATG system. During this procedure the TLS power should remain on at all times unless specified.

1. Print out the System Setup.
2. For easier access to the CPU and Battery, you may want to remove the printer door group.
3. Carefully remove printer ribbon cable between the printer and CPU. Do NOT shut the Battery Switch off.
4. Using a Volt Meter, verify battery voltage for the applicable console by putting the positive lead on Resistor 98 shown in Figure 2-8) and the negative lead on any exposed metal of the console's chassis.
5. Does the volt meter read 3.4 to 3.6 Vdc? If Yes, Do not remove Battery. Battery is not defective do not remove it, go to Step 12. If No, go to Step 6.
6. Using an insulated screw driver, push down and pull away on the battery cover that is attached to the CPU board. You may want to use your finger tips to help remove the battery cover. Please be careful you don't touch any other circuits on the board (see Figure 2-14, A). After the top of the battery cover has dislodged, you can pull the cover off with you finger tips (see Figure 2-14, B).
7. When removing battery, please ensure that you do not disconnect the CPU board from the mother board (Back Plane).
8. Check new battery before installing on CPU board. Confirm it reads 3.4 to 3.6 Vdc.
9. Install new battery (see Figure 2-15).
10. Verify Voltage using the procedure in Step 4.
11. Re-install battery cover and printer door group.

**NOTICE** Do not reconnect the printer ribbon cable until you remove power from the TLS system. Doing so before power is removed, may cause damage to the CPU or Printer.

12. If an annual ATG certification is being performed at this time, you can safely remove power to the TLS via the assigned dedicated circuit breaker so the fail safe procedure or annual certification procedure can be completed.

## Verifying Operability of ATG In-Tank Probe



### Scope:

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These procedures can be used at field sites to determine the operability of Veeder-Root In-Tank Inventory and leak detection Magnetostrictive probes that are being used to provide 0.2 GPH periodic release detection for underground tanks or overfill prevention when used in conjunction with an external overfill horn. Testing of the In-Tank probe equipment with the following procedures will verify the equipment's proper operation for Inventory measurement, Water level measurement, Overfill measurement and optional leak detection at 0.2 and 0.1 GPH (gallons per hour) capabilities.



### Before You Begin:

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- Verify that the TLS Console is programmed in accordance with customers' needs and specified application.
- Identify all breakers for disconnecting power to the pumps (STPs) when instructed.
- Identify and lock all dispenser nozzle handles which could interrupt these test procedures. It is recommended that the entire station be shut down during this procedure to prevent a test from being interrupted.
- Locations that utilize In-Tank Probes for SIR, Tank Testing, or for primary overfill prevention with an external overfill horn, must remove the In-Tank probe for testing purposes to meet agencies requirements as outlined by PEI/RP-1200 Section 8.2.1.
- In-tank probes utilized for Inventory only purposes are not required to be removed from tank for testing/inspection unless specified by the AHJ.



### Service And Repair:

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If at any time during these test procedures you have identified an equipment failure, please reference the following manuals for further details on troubleshooting and repairing the failure if you are the designated service provider for the customer location. Keep in mind that proper operation of the device must be restored within 30 days of the original failure. The procedures of this manual should be used to verify proper function of any new Veeder-Root component that is installed to correct a fault/failure.

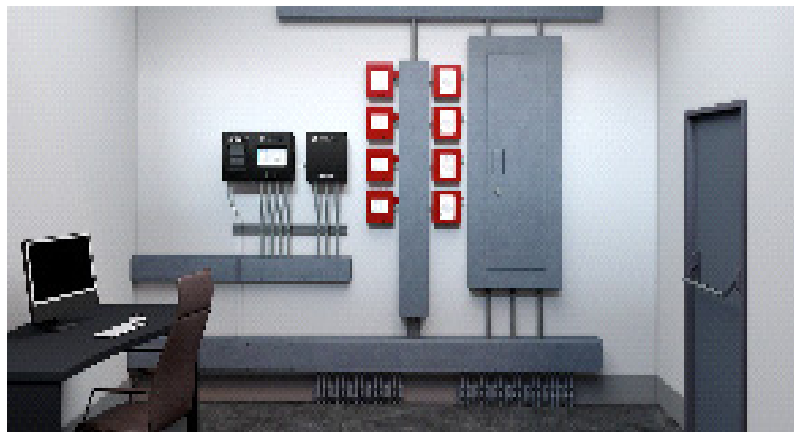
**NOTICE** A certification may be required by the State or the local AHJ to permit a Veeder-Root certified individual to perform repairs to a facility's tank monitoring system. It is the responsibility of the individual performing the repairs to be cognizant of these requirements and abide by them.

## Reference Documents



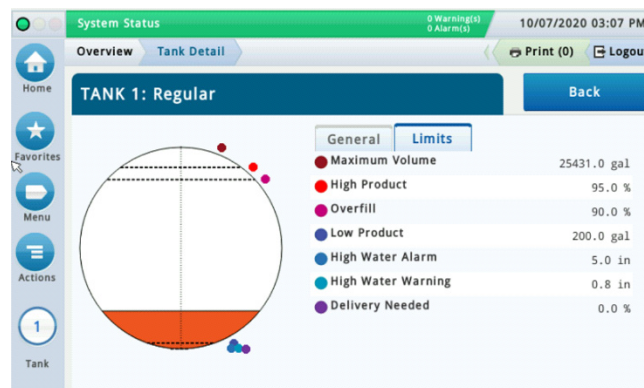
- Veeder-Root TLS-450PLUS/TLS4 Operator's Manual (577014-110)
- Veeder-Root TLS-3XX Operators Manual (576013-610)
- Veeder-Root Performance Results Certification Reports (576013-308)
- Veeder-Root TLS-3XX Setup Manual (576013-623)

## ATG In-Tank Probe Inspection & In-Tank (Probe) Alarm Verification



### Indoor / C-Store Activity (ATG)

1. Verify all TLS system alarm thresholds are programmed in accordance with customer business practices and local regulatory requirements.
2. Verify Overfill, High Product, Maximum, Delivery Needed, Low Product, Water, warnings and alarms are enabled and programmed to conduct alarm verification test.





3. Generate Inventory report before performing any inspection or testing of the Magnetostrictive In-Tank Probe.

**TLS-350**

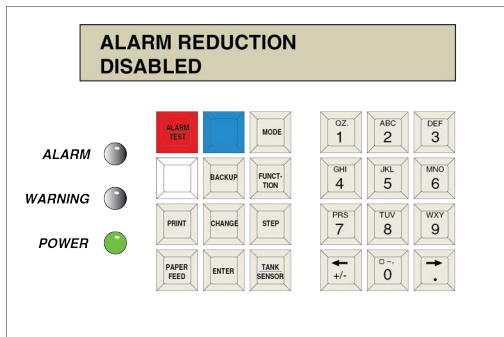
STATION NAME	
STATION ADDRESS	
TOWN, STATE, ZIP	
PHONE NUMBER	
JAN 1, 2021	9:30 AM
T 1: REGULAR	
VOLUME =	2311 GALS
ULLAGE =	3705 GALS
TC VOLUME =	2303 GALS
HEIGHT =	39.21 INCHES
WATER VOL =	0 GALS
WATER =	0.00 INCHES
TEMP =	65.2 DEG F
T 2: REGULAR SLAVE	
VOLUME =	3276 GALS
ULLAGE =	5774 GALS
TC VOLUME =	3266 GALS
HEIGHT =	41.07 INCHES
WATER VOL =	0 GALS
WATER =	0.00 INCHES
TEMP =	64.1 DEG F
T 3: MIDGRADE	
VOLUME =	4378 GALS
ULLAGE =	2149 GALS
TC VOLUME =	4365 GALS
HEIGHT =	42.81 INCHES
WATER VOL =	0 GALS
WATER =	0.00 INCHES
TEMP =	64.4 DEG F

**TLS-450PLUS**

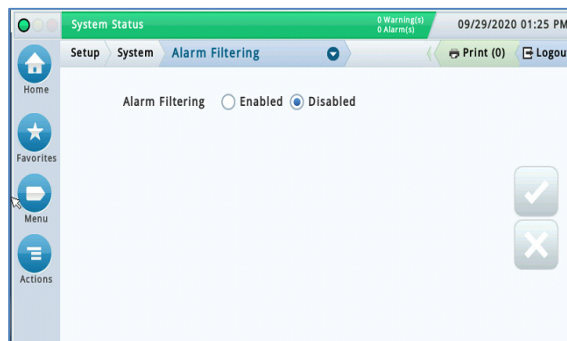
Fuel Vol.	Fuel TC Vol.	100% Ullage	Fuel Height	Water Height	Water Vol.	Fuel Temp
2806	2782	5794	17.4	0.0	0	72.4

4. Verify Alarm filtering is **disabled** during the alarm verification tests.

**TLS-350**



**TLS-450PLUS**



**NOTICE** Recommend printing or recording in-tank setup alarm limits to ensure warning or alarms are generated at preprogrammed levels.



**Forecourt Activity**



- Cordon off Forecourt area with safety apparatus and vehicle to ensure safety for service providers conducting the operability verification tests.
- Before performing the following, ensure power is removed from ATG before disconnecting any In-tank probes for inspection and testing purposes.
- Loosen the cable cord grip in the probe riser cap enough so the riser cap can be removed from the riser.
- Raise the probe out of the tank far enough to be able to unscrew the probe cable connector from the top of the probe canister.
- Completely remove probe from tank and lay on clean surface on or near sump, then reconnect cable to probe to perform Inspection and Alarm verification tests.

**Probe Inspection (Record Results on Inspection form – Appendix B**

1. Verify condition of the probe shaft, boot and boot attachment: Excellent, Good, Poor, Requires Attention
2. Verify product float condition: Excellent, Good, Poor, Requires Attention

3. Verify water float condition: Excellent, Good, Poor, Requires Attention
4. Verify riser cap, probe canister insulating sleeves/spacers condition: Excellent, Good, Poor, Requires Attention



### In-Tank Probe Alarm Verification Tests

**NOTICE** The TLS should post each of the alarm verification tests within a minute or less on average after float movement.

1. The following test(s) should be conducted in sequential order to ensure proper alarm and alarm clearing conditions occur and are recorded properly.

**NOTICE** When conducting verification tests it is suggested having a 2nd technician or store operator to ensure alarm conditions are occurring as well as clearing on the TLS before proceeding to next verification.

#### Example 10,000 Gallon Tank

Alarm/Warning	Limit
Probe Out	-----
Delivery Needed Warning	20% or 2000 gallons
Low Level Product Alarm	500 Gallons or 5 inches
Overfill Delivery Alarm	90% or 9,000 gallons
High Product Alarm	95% or 9,500 gallons
Max /Vol Label Product Alarm	100% or 10,000 gallons
Water Warning	1.0 inches
High Water Alarm	3.0 Inches

VEEDER-ROOT TLS4 V.M.233.21.r0 Veeder-Root Mark 9/29/20 10:27 AM mark | Log Out | Help

Main Menu Home Setup ▶ Tank ▶ Limits Print

Tank: Tank 1: Unleaded ▼

Max. Volume (Label Vol.) [gal]:	8600
High Product (% of max. vol.):	95.0000
Delivery Overfill (% of max. vol.):	90.0000
Delivery Limit (% of Full Vol.):	20.0000
Low Product [gal]:	250
High Water Warning [in]:	1.00
High Water Alarm [in]:	3.00
Water Alarm Filter Level:	Medium ▼
Water Alarm Filter Delay:	180 SEC ▼
Leak Alarm Limit [gal]:	99
Sudden Loss Limit [gal]:	100
Fuel Temperature Low Limit [°F]:	-58.0
Fuel Temperature High Limit [°F]:	140.0

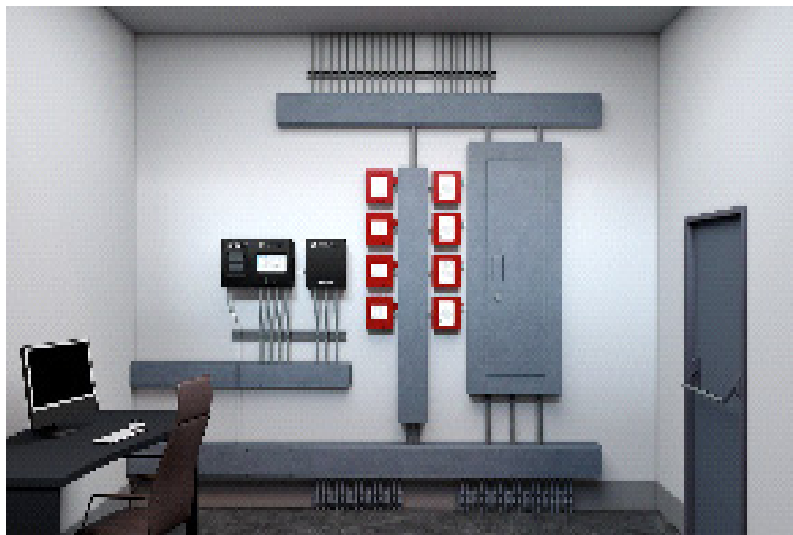
Reset Save

Figure 4. Example TLS-450PLUS ATG Limits

PRODUCT LABELS	Unleaded
PRODUCT CODE	1
COEFFICIENT OF THERMAL EXPANSION	000.00070
TANK DIAMETER	96"
TANK PROFILE	1PT
FULL VOL	9728
FLOAT SIZE	4.0, 3.0" or 2"
WATER WARNING	1.0
HIGH WATER LIMIT	3.0
MAX OR LABEL VOL	9728
OVERFILL LIMIT	90%
HIGH PRODUCT	95%
DELIVERY LIMIT	20%
LOW PRODUCT	1500
LEAK ALARM LIMIT	99
SUDDEN LOSS LIMIT	99

Figure 5. Example TLS-3xx Series ATG Limits

- Before you begin the probe alarm verification tests below, ensure the probe is resting on a level surface, product float is in the center of the probe (Ex: 96" probe = 48") and the water float is positioned at its lowest point on the probe shaft.



- Locate dedicated circuit breaker for ATG and turn breaker to the on position and apply power to TLS.
- Verify TLS system rebooted and verify that all probes being tested are showing inventory level at approximate level where product float is positioned Ex: 96" probe = 48"), and water level is at 0 inch.

**Simulate Probe Out Condition**

1. Disconnect probe cable from the top of the probe.
2. Wait for up to 2 minutes for a 'Probe Out' alarm.
3. Re-connect the probe and confirm that the console alarm has cleared.

```

I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY
    
```

ID	CATEGORY	DESCRIPTION	ALARM TYPE	STATE	DATE	TIME
T 2	TANK	SUPER	PROBE OUT	CLEAR	5-19-20	11:23AM
T 2	TANK	SUPER	PROBE OUT	ALARM	5-19-20	11:20AM

**Alternate Procedure for Probe Out Condition**

1. Remove power from the TLS console.
2. Open the right console door to access the modules and disconnect one of the probe wires from the appropriate module.
3. Restore power to the TLS console.
4. Wait for up to 2 minutes for a 'Probe Out' alarm.
5. Remove power to the TLS console.
6. Open console door and re-connect the probe wire. Close the console door(s).
7. Restore power to the console and confirm that the alarm has cleared.
8. Once you have verified proceed with the next alarm required for verification.

**Simulate Delivery Needed Condition**

1. Move product float at or below the programmed level for a delivery needed condition- (Example 20%-2,000 Gallons or 19”).
2. Verify TLS generated the Delivery Needed Warning.
3. Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarm and Alarm History, proceed with the next alarm required for verification

**TLS-350**

STATION NAME  
STATION ADDRESS  
TOWN, STATE, ZIP  
PHONE NUMBER

JAN 1, 2021 9:30 AM

T 4:REGULAR GASOLINE  
INVENTORY INCREASE

INCREASE START  
JUL 16, 2019 11:11 AM

VOLUME = 5:46 GALS  
WATER = 0.00 INCHES  
TEMP = 46.8 DEG F

INCREASE END  
JUL 16, 2021 11:35 AM

VOLUME = 8:04 GALS  
WATER = 0.00 INCHES  
TEMP = 47.2 DEG F

GROSS INCREASE= 2958  
TC NET INCREASE= 2983

**TLS-450PLUS**

TLS4 V.M.233.21.r0 Veeder-Root Markt
9/29/20 10:42 AM
mark | Log Out | Help

Main Menu Home
Reports > Delivery > Last Delivery
Print

Tank: Tank 1: Unleaded

	Start/End Date & Time	Fuel Volume	Fuel TC Volume	Water Height	Fuel Temp	Fuel Height
<b>Tank 1: Unleaded</b>						
Start	9/24/20 8:43 AM	290	287	0.0	72.2	3.6
End	9/24/20 8:44 AM	2838	2813	0.0	72.4	17.5
Amount		2548	2526			

### **Simulate Low Product Alarm Condition**

1. Move product float below the programmed level for a Low Product condition- (Example 500 Gallons or 8”).
2. Verify TLS has generated alarm condition.
3. Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed with the next alarm required for verification.

```

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Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY

```

ID	CATEGORY	DESCRIPTION	ALARM TYPE	STATE	DATE	TIME
T 2	TANK	SUPER	LOW PRODUCT ALARM	CLEAR	8-12-20	8:26PM
T 2	TANK	SUPER	LOW PRODUCT ALARM	ALARM	8-12-20	7:24PM

### **Simulate Overfill Delivery Alarm condition**

**NOTICE** As outlined by PEI/RP-1200-19 Section 8.2.1 this test must be completed if the VR probe is used with an external overfill horn as the tank’s primary Overfill prevention device.

1. Verify the position of the water float is at the bottom of the probe.
2. Ensure the product float is below 25% of the total length of the probe before proceeding.
3. Simulate a delivery by moving the product float towards the top of the probe at a rate of 1-2” per second.
4. Continue moving the product float at a moderate speed (1”- 2” per second or typically 30 to 50 seconds overall) to ensure the product float reaches above 90% (Example 96” tank= 86.4”) of the probe’s total length.

**NOTICE** Do not slam the float against the head of the probe, this can damage the float.

5. Moving the product float at the designated rate simulates a typical delivery rate, which should trigger a delivery flag

**NOTICE** If you move the float too quickly the system may not register the delivery flag.

6. Once the float reaches the Overfill level, the Overfill Alarm will sound If equipped with an external overfill alarm;
  - Acknowledge the alarm on the external device.
  - Silence alarm on the TLS.

- Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed to the next alarm required for verification.

**TLS-3xx**

```
ALARM HISTORY REPORT
---- IN-TANK ALARM ----
T 1:UNLEADED GASOLINE
OVERFILL ALARM
JUL 23. 1994 11:24 AM
JUN 22. 1994 2:44 PM
JUN 5. 1994 7:15 PM
DELIVERY NEEDED
JUL 11. 1994 8:02 AM
JUN 6. 1994 7:14 AM
```

**TLS-450PLUS**

#	Label	Alarm Description	Active Time	Clear Time
T 1	Unleaded	INVALID FUEL LEVEL	9/24/20 8:41 AM	9/24/20 8:44 AM
T 1	Unleaded	DELIVERY NEEDED	9/24/20 8:41 AM	9/24/20 8:44 AM
T 2	Premium	HIGH PRODUCT ALARM	9/24/20 8:30 AM	
T 1	Unleaded	SETUP DATA WARNING	9/24/20 8:29 AM	9/24/20 8:30 AM
T 2	Premium	SETUP DATA WARNING	9/24/20 8:29 AM	9/24/20 8:44 AM
T 2	Premium	MAX PRODUCT ALARM	9/24/20 8:28 AM	

```
I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY

ID  CATEGORY  DESCRIPTION  ALARM TYPE  STATE  DATE  TIME
T 2  TANK       SUPER       OVERFILL ALARM  CLEAR  8-12-20  7:35AM
T 2  TANK       SUPER       OVERFILL ALARM  ALARM  8-12-20  7:31AM
```

**Simulate High Product Alarm condition**

- Continue to move the product float at or above the programmed level for a High Product Alarm- (Example 95%-9,500 Gallons or 91”).
- Verify TLS has generated High Product Alarm.
- Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed to the next alarm required for verification.

```
I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY

ID  CATEGORY  DESCRIPTION  ALARM TYPE  STATE  DATE  TIME
T 2  TANK       SUPER       HIGH PRODUCT ALARM  CLEAR  8-12-20  2:35PM
T 2  TANK       SUPER       HIGH PRODUCT ALARM  ALARM  8-12-20  7:36AM
```

**Simulate Maximum/Label Vol Product Alarm condition**

1. Continue to move the product float at the top of the probe shaft to generate a Maximum/Label Vol Product Alarm - (Example 100%-10,000 Gallons or 96”).
2. Verify TLS has generated High Product Alarm.
3. Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed to the next alarm required for verification.

The screenshot shows the Veeder-Root web interface. At the top, it displays 'VEEDER-ROOT' and 'TLS4 V.M.233.21.r0 Veeder-Root Markt'. The current time is '10/1/20 9:52 AM'. The user is logged in as 'markt'. The main navigation menu includes 'Main Menu', 'Home', and 'Reports > Alarm'. The left sidebar has 'Diagnostics' and 'Reports' sections, with 'Alarm' selected. The main content area shows '1 total' alarm with a 'View 25 items per page' dropdown. The alarm details are: 'Alarms: Priority', 'Acknowledge Alarm', 'From: 9/16/20 12:00 AM', 'To: 10/1/20 9:52 AM', and a 'Filter' button. Below this is a table with one row:

#	Label	Alarm Description	Active Time	Clear Time
T 2	Premium	MAX PRODUCT ALARM ?	9/24/20 8:28 AM	

```

I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY

ID  CATEGORY  DESCRIPTION          ALARM TYPE          STATE  DATE      TIME
T 2  TANK       SUPER                MAX/LABEL VOL ALARM CLEAR  8-12-20  1:50PM
T 2  TANK       SUPER                MAX/LABEL VOL ALARM ALARM  8-12-20  7:40AM
    
```

**Simulate Water Warning condition**

**NOTICE** When performing this test, if possible use a container with water that the probe can be inserted into to verify the water float rises for the condition.

1. Verify that tank to be tested has a probe that provides water detection.
2. Move product float to center of the probe length to ensure all high-level alarms clear.
3. Move Water float above the programmed level for a Water Warning condition- (Example 1.0”) but below the Water Alarm level.
4. Verify TLS has generated a Water Warning.



- Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed to the next alarm required for verification.

```

I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY
    
```

ID	CATEGORY	DESCRIPTION	ALARM TYPE	STATE	DATE	TIME
T 2	TANK	SUPER	HIGH WATER WARN	CLEAR	5-19-20	10:17AM
T 2	TANK	SUPER	HIGH WATER WARN	ALARM	5-19-20	10:15AM

### **Simulate Water Alarm Condition**

**NOTICE** As outlined by PEI/RP-1200-19 Section 8.2.1 this test must be completed if the VR probe is used as the primary leak detection method.

- Verify that tank to be tested has a probe that provides water detection.
- Move product float to center of the probe length to ensure all high-level alarms clear.
- Move Water float above the programmed level for a Water Warning condition (Example 3.0”).
- Verify TLS has generated a Water Alarm.
- Once you have validated the alarm condition has been posted on TLS and has been recorded in Active Alarms and Alarm History, proceed to the next alarm required for verification.

```

I11100
OCT 5, 2020 1:57 PM

Veeder-Root Company
125 Powder Forest Drive
Simsbury, CT 06070
860-651-2700

PRIORITY ALARM HISTORY
    
```

ID	CATEGORY	DESCRIPTION	ALARM TYPE	STATE	DATE	TIME
T 2	TANK	SUPER	HIGH WATER ALARM	CLEAR	5-19-20	11:22AM
T 2	TANK	SUPER	HIGH WATER ALARM	ALARM	5-19-20	10:19AM

### **In-Tank Probe Alarm Verification Test Completion**

Once you have completed the in-Tank Probe Alarm Verification Test procedures, please record test results on the certification form in Appendix B. Also attach printouts, if applicable, of the alarm history reports to the certification form.

# Pressurized Line Leak Detection Operability Testing

## Scope

---

These procedures can be used at field sites to determine the operability of Veeder-Root line leak detection systems. Testing line leak detection equipment in accordance with this procedure will verify the equipment's operability for leak detection at 3 gph (gallons per hour), 0.2 gph (if equipped and programmed for this capability), and 0.1 gph (if equipped and programmed for this capability).



## Before You Begin

---

- Verify that the TLS Console is programmed correctly for the Site and the application.
- Identify all breakers for disconnecting power to the pumps (STP) when instructed.
- Identify and lock all dispenser nozzle handles which could interrupt this test. It is recommended that the entire station be shut down during this procedure to prevent a test from being interrupted.



## Service And Repair:

---

If at any time during these test procedures you have identified an equipment fault, please reference the following manuals for further details on troubleshooting and repairing the fault if you are the designated service provider for the customer location. Keep in mind that a Repair and Replace must be completed within 30 day of identifying the issue.



## Reference Documents

---

- [Veeder-Root TLS-450PLUS/TLS4 Operator's Manual \(577014-110\)](#)
- [Veeder-Root TLS-3XX Operators Manual \(576013-610\)](#)
- [Veeder-Root W/PLLD Troubleshooting Guide \(577013-344\)](#)
- [Veeder-Root Performance Results Certification Reports \(576013-308\)](#)
- [Veeder-Root Line Leak Application Guide \(577013-465\)](#)
- [Sensor Products Application Guide \(577013-750 Rev AD or Higher\)](#)
- [Veeder-Root TLS-3XX Setup Manual \(576013-623\)](#)
- [Red Jacket Engineering Report Testing Mechanical Leak Detectors with the FX Tester \(C051-272\)](#)

### 3 GPH testing utilizing the Red Jacket FX tester

Line leak detectors must be able to detect a leak in a product line that is equivalent to 3 gph at 10 psig. The line leak detector testing device that is used to conduct this test must accurately simulate a leak that is equivalent to 3 gph at 10 psig. There are various line leak detector test devices that are used to test line leak detectors, including a Field Test Apparatus (FTA) that can be assembled with readily available components. The description of components needed for a line leak detector FTA are described in PEI's RP-1200 "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities"; Section 9.1.4 and 9.2.4. Red Jacket reference document RJ-20 "Engineering Report Test Procedures for Mechanical Leak Detectors" also includes an FTA component list on page 8. Test equipment includes:

- Test apparatus that includes a pressure gauge with a minimum range of 0-60 psig
- Pressure regulator and an adjustable orifice that can simulate a leak rate equivalent to 3 gph at 10 psig
- Stopwatch or other time-measurement device capable of measuring a 1-second increment
- Graduated cylinder for measuring leak rate
- 5-gallon metal gas test can

Below are reference test procedures for line leak detector testing devices including:

- Red Jacket FTA
- Red Jacket FX Tester
- KWA LS 2003

#### HARDWARE NECESSARY:

Reference Red Jacket 051-272, page 9

#### TESTING PROCEDURE:



**Shut off, lock out, and tag the circuit breakers that provide pump power to the STP for the product line being tested.**

1. Disconnect the electrical power yoke at the STP for the product being tested.
2. Install the Red Jacket FX Tester leak simulating apparatus in the impact valve following the procedures defined in the C051-272 document (page 6-7, Section II - J, steps 1 - 4).
3. Re-connect the STP yoke, turn on the circuit breaker, and authorize the fueling position. Verify that no product is leaking (except into the test can). Dispense approximately 5 gallons from the dispenser into a suitable test container to ensure the line is purged of air.
4. Calibrate the leak rate corresponding to 3.0 gph at 10 psi per Table 1 below.

**Table 1**

Pump Operating Pressure (psi)	Flow rate to set at Pump Pressure	
	(gph)	(ml/minute)
20	4.2	265
22	4.5	281
24	4.7	273
26	4.8	305

Table 1

Pump Operating Pressure (psi)	Flow rate to set at Pump Pressure	
	(gph)	(ml/minute)
28	5.0	317
30	5.2	328
32	5.4	337
34	5.5	347
36	5.7	360
38	5.8	367
40	6.0	379

5. Set the FX Tester to the leak test position per Section II - B (page 3, step 2a-c) of the C051-272 document.
6. When a steady stream of product is observed flowing from the hose, hang up the nozzle (this will initiate a 3.0 gph leak test).
7. If you are at a TLS-350 console go to step 7a. If you are at a TLS-450PLUS console go to Step 7b.
  - a. Enter the TLS-350 DIAGNOSTIC mode and monitor the front panel display. When the test is complete, the front panel display will read "Test Complete Handle Off", the system will alarm, and will shut down the line. Press the "Alarm/Test" key on the TLS-350 to silence the alarm.

**NOTICE** During the 3 gph test, the STP will turn On and Off intermittently. Do NOT assume the test has completed until the TLS Console has alarmed.

If the test does NOT fail, the leak rate needs to be confirmed. Confirm the leak rate at pump pressure by referring to Table 1 in Step 4. (note that 3.0 gph at 10 psi with a pump-on pressure of 28 psi = 317 ml/minute). If the leak rate is correct, refer to the W/PLLD Troubleshooting Guide for instructions. Proceed to Step 8.

- b. At the TLS-450PLUS, go to **Menu>Diagnostics>PLLD>PLLD Manual Test** to display the Manual Test Screen. When the test is complete, the Manual Test Status column will read "Test Complete", the system will alarm, and will shut down the line. Touch the "Alarm" button once to view the Active Alarm report and a second time to silence the alarm.

**NOTICE** During the 3 gph test, the STP will turn On and Off intermittently. Do NOT assume the test has completed until the TLS Console has alarmed.

If the test does NOT fail, the leak rate needs to be confirmed. Confirm the leak rate at pump pressure by referring to Table 1 in Step 4. (note that 3.0 gph at 10 psi with a pump-on pressure of 28 psi = 317 ml/minute). If the leak rate is correct, refer to the W/PLLD Troubleshooting Guide for instructions. Proceed to Step 8.

8. Close the ball valve to stop the leak.



Shut off, lock out, and tag the circuit breakers that provide pump power to the STP for the product line being tested.

9. Disconnect the electrical power yoke at that STP.

10. Remove the leak testing hardware and replace the plug on the shear valve using the appropriate sealant on the threads and torque per the manufacturer's specification NOTE: Over tightening the shear valve plug may result in damage to the shear valve.
11. Print the leak test history report for your records.
12. Re-connect the STP yoke and turn on the circuit breaker.
13. If you are at a TLS-350 console go to step 13a. If you are at a TLS-450PLUS console go to Step 13b.
  - a. At the front panel of the TLS-350 press Function until you see 'Start Line Pressure Test, Press <Step> To Continue'. Select the line, select 3.0 test and at the prompt 'Start Line Leak Test Press <Enter>', press 'Enter' to start the test.
  - b. At the TLS-450PLUS Manual Test screen, touch Actions button and then select 'Start 3.0 Test' to begin the test.
14. Visually verify that product is not leaking from the shear valve port during the test, and confirm that the line now passes the 3 gph leak test.
15. Print out the applicable line leak setup and line leak test history for your records.

### 3 GPH testing utilizing the KWA LS 2003 Leak Detector Tester

All fuel accumulated during the testing should be collected in an approved container and returned to the tank at the conclusion of the testing.

**WARNING**



**Shut off, lock out, and tag the circuit breakers that provide pump power to the STP for the product line being tested.**

1. Install the quick-connect fittings in the shear valves for the tested pipeline beneath the dispensers or other convenient location.
2. Turn On the power to the turbines.
3. Authorize a dispenser to pressurize the line. Dispense approximately 5 gallons into a suitable container to ensure that the line is purged of air.
4. Connect the blue hose to the quick connect in the shear valve on one end and the KWA (Ken Wilcox Associates) LS 2003 on the other end. The selector should be in the "Off" position when connecting the hose.
5. Turn the selector valve to the "Calibrate" position.
6. Set the outlet pressure on the LS 2003 to 10 psi on the pressure gauge using the built-in regulator provided with the system.
7. Set the leak rate to 3.0 gph, (189±10 ml/min) at 10 psi using a stopwatch and the 500 ml graduated cylinder. The position of the float on the flow meter may vary slightly from site to site.
8. Switch the selector valve to the "Test" position on the LS 2003.
9. Hang up the nozzle to shut Off the dispenser. The leak detector should automatically perform a 3 gph leak test.



**WARNING**



**Shut off, lock out, and tag the circuit breakers that provide power to the turbines and the pump controllers.**

10. Remove the quick-connect fittings from the shear valves beneath the dispensers. Check to make sure the safety valve on the shear valve has not been accidentally tripped.
11. Print the leak test history report for your records.
12. Re-connect the STP yoke and turn on the circuit breaker.
13. If you are at a TLS-350 console go to step 13a. If you are at a TLS-450PLUS console go to Step 13b.
  - a. At the front panel of the TLS-350 press Function until you see 'Start Line Pressure Test, Press <Step> To Continue'. Select the line, select 3.0 test and at the prompt 'Start Line Leak Test Press <Enter>', press 'Enter' to start the test.
  - b. At the TLS-450PLUS Manual Test screen, touch Actions button and then select 'Start 3.0 Test' to begin the test.

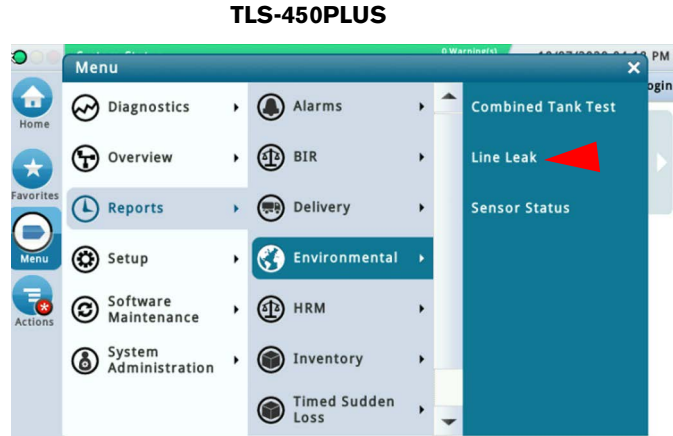
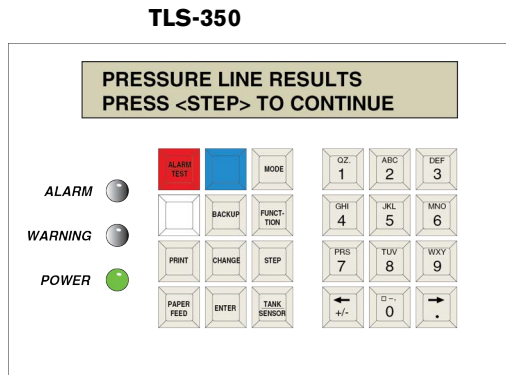
Visually verify that product is not leaking from the shear valve port during the test, and confirm that the line now passes the 3 gph leak test.

## Verification of 0.2 and 0.1 GPH Performance (if present)

This procedure verifies that the system is performing 0.2 and 0.1 gph testing, if desired, and if the system is programmed to perform these tests.

**NOTICE** Since the hardware and system set-up parameters used for 0.2 and 0.1 gph testing are the same as those used for 3 gph testing, this test procedure can be used to verify system operability for all levels of line leak detection.

1. If you are at a TLS-350 console go to step 1a. If you are at a TLS-450PLUS console go to Step 1b.
  - a. Press the <Function> key on the TLS -350 until the display reads "Pressure Line Results". Then press <Step> to obtain the most recent line leak test results. Pressing <Step> once provides the 3 gph results; pressing it again provides 0.2 gph results, and pressing it a third time provides 0.1 gph results. If a printout is desired and a printer is present, pressing the <Print> button will print out the test results.
  - b. Go to **Menu>Reports>Environmental>Line Leak** to view the line leak test results.



# Verifying Operability of UST Leak Detection Equipment

## Scope:

---

These procedures can be used at field sites to determine the operability of Veeder-Root's underground storage tank leak detection systems. Testing underground tank leak detection equipment in accordance with this procedure will verify the equipment's operability for leak detection at 0.2 gph static, 0.1 gph static, and Continuous Statistical Leak Detection (CSLD).

## Compliance Inspection Recommendations:

---

Veeder-Root TLS systems self-diagnose essential components, and will not complete and report passing tank tests in the event of failure of components used in the test. Completed tank tests, whether 0.2 gph static, 0.1 gph static, or using CSLD, are evidence that the system was powered as needed for the duration of the test, and that its components are in working order.

The unit provides audible and visual alarms on tank test failures. This feature is standard and not programmable.

In-tank probes do not require periodic calibration.

Completed compliance tests are evidence that, during the test,

- The system was properly powered for the data collection periods.
- All necessary tank probes were connected.
- All tank probes were operating within specification.
- All internal components were operating within specification.

Veeder-Root recommends that TLS tank testing systems be inspected periodically to determine that compliance tests, which can be 0.2 gph static tests, 0.1 gph static tests, or CSLD are being completed in accordance with local regulations. Since the leak detection system is required to compensate for changes in product level due to temperature changes in the tank in order to pass a leak test, a review of completed and successful periodic tank tests provides sufficient verification of system operability and should satisfy local agency requirements.



## Reference Documents:

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- Veeder-Root TLS-3XX Operators Manual (576013-610)
- Veeder-Root TLS-450PLUS/TLS4 Operator's Manual (577014-110)

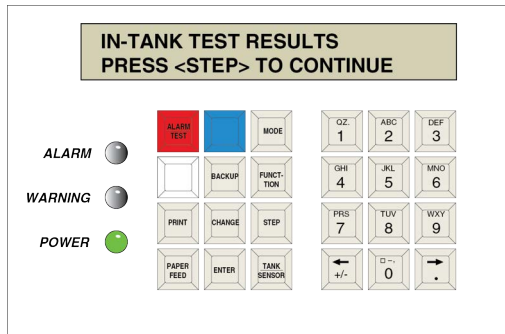
## Test Results

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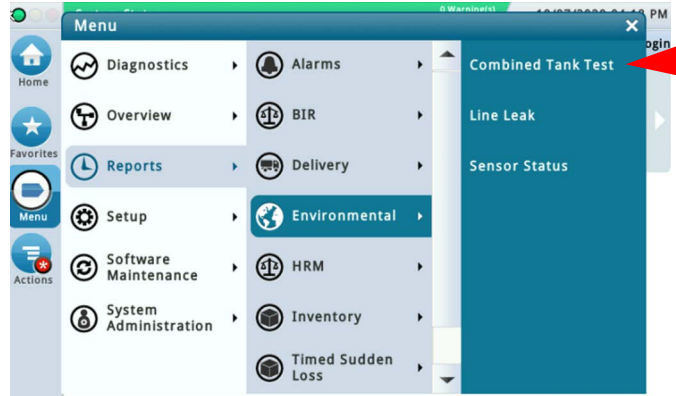
1. If you are at a TLS-350 console go to step 1a. If you are at a TLS-450PLUS console go to Step 1b.
  - a. Press the <Function> key on the TLS 350 until the display reads "In-Tank Test Results". Then press <Step> to obtain the latest test result. Pressing the <Tank/Sensor> button will scroll through the results for each tank. If a printout is desired and the console is equipped with a printer, pressing the <Print> button will print out the results.
  - b. Go to **Menu>Reports>Environmental>Combined Tank Test** to view the test results for each tank.



TLS-350



TLS-450PLUS



## Testing of 'Probe Out' and 'Sensor Out' Condition

1. Disconnect probe or sensor cable from the top of the probe or sensor.
2. Wait for up to 2 minutes for a 'Probe Out' or 'Sensor Out' alarm.
3. Re-connect the probe or sensor and confirm that the console alarm has cleared.

### Alternate Procedure



1. Remove power from the TLS console.
2. Open the right console door to access the modules and disconnect one of the probe or sensor wires from the appropriate module.
3. Close the console door and restore power to the console.
4. Wait for up to 2 minutes for a 'Probe Out' or 'Sensor Out' alarm.
5. Remove power to the TLS console.
6. Open console door and re-connect the probe or sensor wire. Close the console door.
7. Restore power to the console and confirm that the alarm has cleared.

# Verifying Operability of Mag Sump Sensor

## Scope:

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This procedure shall be used to determine the operability of the Mag Sump sensor, Form number 875080-1xx.



## Reference Documents:

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- Veeder-Root TLS-3XX Operators Manual (576013-610)
- Veeder-Root TLS-3XX Setup Manual (576013-623)
- Veeder-Root TLS-450PLUS/TLS4 Operator's Manual (577014-110)



## Before You Begin:

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**This testing (which is not required by Veeder-Root) can be dangerous. Any safety precautions required by your organization, customer's requirements and all state/local safety mandates, should be followed.**

Review and comply with all the safety warnings in the manuals listed above and any other federal, state, or local requirements.

Verify that the TLS Console is programmed correctly for the site and the application. Document any programming changes you have made from the original configuration.

If the site console is a TLS-350 console in Simplicity mode, it must be switched out of this mode for this test.



## Service And Repair:

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If at any time during these test procedures you have identified an equipment fault, please reference the following manuals for further details on troubleshooting and repairing the fault if you are the designated service provider for the customer location. Keep in mind that a Repair and Replace must be completed within 30 day of identifying the issue.

## Required Hardware:

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Safety equipment to perform this testing as required by your organization, customer's requirements, and all state/local safety mandates.



## Testing Procedure:

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1. Remove the Mag sensor carefully from its containment area. This should produce an 'Installation Alarm' on the TLS console. Visually inspect the sensor for any damage as defined by in the Periodic Maintenance Checklist in the console Operator's manual, such as damage to the cable or to the sensor housing.

2. If you are at a TLS-350 console go to step 2a. If you are at a TLS-450PLUS console go to Step 2b.
  - a. In Setup mode, press Function until you see Smart Sensor Setup Press <Step> To Continue. Select the Mag sensor your are testing and press Print to print out its water warning and height settings.
  - b. Go to Menu>Setup>Devices screen, touch the Device button to display the Device matrix then touch Mag Sensor to display the Mag Sensor setup screen. Scroll down the page to view the Mag Sensor setup and record the water warning and alarm height settings.
3. Fill one of the test containers with water to just above the recorded Mag Sensor's Water Warning Height setting to test the 'Water Warning' alarm.
4. While holding the sensor vertically, place the sensor into the container until it is resting on the bottom; this should clear the Installation Alarm. Test only one sensor per test container (multiple test containers may be used). Wait up to 1 minute for the console to alarm. If it does not alarm after 1 minute, the sensor has failed the test. Document the alarm and proceed to the next step.
5. Remove the sensor from the test vessel after observing a response. Allow the water to drain out of the sensor to clear the alarm.
6. Fill the test container with water to just above the recorded Mag Sensor's Water Alarm Height setting to test the 'Water Alarm' alarm. Then repeat steps 5 and 6.
7. Fill a second test container with a minimum of 2 inches of product (fuel). Then insert the sensor being tested in the second container and wait for up to 1 minute for the console to alarm. If it does not alarm after 1 minute, the sensor has failed the test.
8. Remove the sensor from the test container after observing a response and allow the test fuel to completely dry off the unit. Document the alarm and proceed to the next step.
9. Press the Alarm/Test key on the TLS-350 or touch the Alarm Status Bar on the TLS-450PLUS twice to clear the alarm before moving on to the next sensor (see Figure 6).

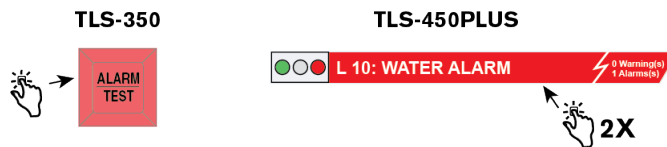


Figure 6. Clearing Alarm

10. Reinstall the sensor(s) upon verification of proper operation.
11. Print the test history and console status for your records. This completes the test procedure. Report any performance concerns to Veeder-Root while on site.

## Verifying Operability of Other Sensors

Table 2 lists Veeder-Root sensors by part number and operability test procedure.

**Table 2**

<b>Part No.</b>	<b>Sensor</b>	<b>Test Procedure</b>
794380-320	Solid State Discriminating Pan Sensor	Ref Procedure A
794380-350	Solid State Discriminating Sump Sensor	Ref Procedure A
794380-322	Discriminating Pan Sensor	Ref Procedure A
794380-352	Discriminating Sump Sensor	Ref Procedure A
794380-36X series	Fiber Trench Sensor	Ref Procedure A
794380-341, -343	Discriminating Interstitial Sensor	Ref Procedure B or D
794380-208, -209	Piping Sump Sensor	Ref. Procedure C
794380-321	Solid State Pan Sensor	Ref. Procedure C
794380-351	Solid State Sump Sensor	Ref. Procedure C
794390-420, -460	Interstitial Liquid Sensor for Steel Tanks	Ref. Procedure C
794380-341, -343	Discriminating Interstitial Sensor (Used in the non-discriminating mode)	Ref. Procedure D
794380-345	Interstitial Sensor for High-Alcohol	Ref. Procedure D
794380-340, -344	MicroSensor	Ref. Procedure D
794390-40X series	Interstitial Sensor for Fiberglass Tanks	Ref. Procedure E
794380-301, -302, -303, -304	Hydrostatic Sensor	Ref. Procedure F
794380-62X	Groundwater Sensor	Ref. Procedure G
794390-700	Vapor Sensor	Ref. Procedure H
847990-001, -002	Standalone Dispenser Pan Sensor with Dispenser Control Interface	Ref. Procedure I
794380-323	Position Sensitive Sensor	Ref. Procedure J
857280-100, -200, -30X	Vacuum Sensor	Ref. Procedure K
794380-333	Position Sensitive Interstitial Liquid Sensor for Steel Tanks	Ref. Procedure L



### Reference Documents:

- TLS-3XX Operators Manual (576013-610)
- TLS-3XX Setup Manual (576013-623)
- TLS-450PLUS/TLS4 Operator's Manual (577014-110)

## Before You Begin:

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- Verify that the TLS Console is programmed correctly for the site and the application. Document any programming changes you have made from the original configuration.
- If the site console is a TLS-350 console in Simplicity mode, it must be switched out of this mode for these tests.

## Required Hardware:

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- Safety equipment to perform this testing as required by your Organization, Customer's requirements, and all state and local safety mandates.
- Two Test containers that are suitable to be used for fuel. Containers used in Procedure A must be able to support a liquid depth of 30 inches and should be marked to indicate the liquid heights specified in the test procedures. Containers used in Procedure B for testing the 794380-341 sensor must be non-metallic containers which are approved for use with gasoline and must be properly grounded when filling them with gasoline. Containers used in Procedures H and I must be able to support a liquid depth of 4 inches and should be marked to indicate this liquid height. Procedures C, E, and J require a vessel which can support a liquid depth of 2 inches and have a mark to indicate this liquid height. Procedures D and F require a depth that will cover the sensor.

## Alarm Filtering

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Veeder-Root has worked with many customers in an effort to reduce false and nuisance alarms which cause unneeded service calls and expense. In TLS-350 Software Version 32, Veeder-Root added filters to reduce nuisance alarms and to consolidate multiple alarms into a single alarm.

The following alarms were selected for filtering: The DIM Communication alarm, Tank Probe Out alarm, MAG Sensor Alarms, and various other Sensor Alarms. These filters do not alter the ATGs ability to respond to potential fuel loss events.

Keep in mind that when performing annual testing, maintenance, or troubleshooting, the alarm filter will increase the time needed to post and clear the above alarms. However if your TLS-350 system has version 32C or later software. or if your TLS-450PLUS system has version V5B or later software, you can enable/disable this feature. (Default is Enabled.)

**NOTICE** In the TLS-350 consoles this feature is called **Alarm Reduction** and the path to it is as follows: press the **MODE** key, then press the **FUNCTION** key until you see the **SYSTEM SETUP** Function, then press the **STEP** key until you see the **ALARM REDUCTION** Step.

**In TLS-450PLUS Consoles this feature is called Alarm Filtering and the path to it is Menu>Setup>System>Alarm Filtering and then touching the Enable button.**

Refer to Appendix A for a list of the alarms that will be filtered and their resulting delay times.

## Testing Procedure A:

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### Discriminating Pan/Sump Sensors 794380-320, 794380-350, 794380-322, 794380-352; Fiber trench Sensors 794380-360, 794380-361, 794380-362

1. Fill one of the test containers to obtain the level of water specified in Table 3 below in order to test the Low Liquid alarm:

Table 3

Sensor	Water Level (Inches)
794380-320	2
794380-350	2
794380-360	23
794380-361	13
794380-362	3
794380-322	2
794380-352	2

2. Remove the sensor carefully from tank or containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
3. While holding the sensor vertically, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). Wait up to 5 minutes for the console to alarm. If it does not alarm after 5 minutes, the sensor has failed the test.
4. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
5. In order to test the High Level Alarm, add Water to the test container until the top of the sensor is submerged. Then repeat steps 4 and 5.
6. **Conduct this step only if required by Local and State regulations.** Fill the second test container with a minimum of one inch of product (fuel). Then insert the sensor being tested in the second container and wait for up to 20 minutes for gasoline and 60 minutes for diesel fuel for the console to alarm (in most cases, the sensor will alarm more quickly). If it does not alarm after the wait time, the sensor has failed the test.

#### Optional procedure for faster recovery times (applicable to testing in gasoline only):

Instead of keeping the sensor immersed in the product until it registers a Fuel alarm, remove it after 3 - 4 minutes of exposure. If it does not alarm after 8 minutes from the start of the immersion, the sensor will need to be immersed again until it alarms.

**NOTICE** If it is required by National, State, or Local requirements to test the sensor in fuels other than gasoline, the sensor response time may be significantly longer than 20 minutes. Also, it will be necessary to soak the sensor in Coleman Fuel for half an hour after testing before beginning the recovery period.

7. Remove the sensor from the test container after observing a response and allow the test fuel to completely dry off the unit. Document the alarm and proceed to the next step. Due to the time sensors take to recover when immersed in fuel, it may take up to one hour after testing in Gasoline (in most cases the sensor should recover within 30 minutes) and up to three hours after testing in Diesel or Kerosene for the sensor to return to a Normal state

8. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm Status bar twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
9. Reinstall the sensor(s) upon verification of proper operation.
10. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure B:

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### Discriminating Interstitial Sensors 794380-341, 794380-343

1. Print out system status, sensor configurations and alarm history
2. Fill one of the test containers with enough Water to completely cover the sensor.
3. Remove sensor carefully from tank or containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
4. While holding the sensor vertically, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). Test times may run as long as 10 minutes depending upon console type and configuration. If it does not alarm after 10 minutes, the sensor has failed the test.

**NOTICE** The 794380-343 sensor must be tested in a dark container. If there is too much ambient light, this may prevent the sensor from going into alarm.

5. Remove the sensor from the test container after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step. For the 794380-341 sensor, it is important that the sensor be tilted at an angle after removal because the sensor may trigger a false fuel alarm if small amounts of water are trapped in the window of the sensor.
6. Fill the test container with enough Fuel to completely cover the sensor.
7. Insert sensor to be tested in the container and wait up to 10 minutes for the console to alarm. Ensure that the sensor is completely submerged for the duration of the test. If it does not alarm after 10 minutes, the sensor has failed the test.

When testing, the sensor must be completely submerged. Also, the P/N 794380-341 sensor must be tilted at an angle after removal from the test container so that liquid does not become trapped in the window of the sensor.

8. Remove the sensor from the test container after observing a response. For the P/N 794380-343 sensor, dip the sensor into a small container of alcohol and briefly swirl it around to rinse off the unit.
9. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm Status bar twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
10. Reinstall the sensor (s) upon verification of proper operation.
11. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure C:

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### **Piping Sump Sensors 794380-208, 794380-209, Interstitial Sensors 794390-420, 794380-430, 794390-460, Solid-State Pan Sensor 794380-321, and Solid State Sump Sensor 794380-351**

1. Fill one of the test containers with a minimum of 2 inches of water.
2. Remove sensor carefully from tank or containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
3. While holding the sensor vertically, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not issue a "Fuel" alarm after 5 minutes, the sensor has failed the test.
4. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Reinstall the sensor(s) upon verification of proper operation.
7. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure D:

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### **MicroSensor 794380-340, -344; Interstitial Sensor for High-Alcohol 794380-345, Discriminating Interstitial Sensors 794380-341, 794380-343 used in the Non-discriminating mode**

1. Remove sensor carefully from the interstice containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
2. Fill the test container with enough fuel to completely cover the sensor.
3. Insert sensor to be tested in the container and wait up to 10 minutes for the console to alarm. Ensure that the sensor is completely submerged for the duration of the test. If it does not alarm after 10 minutes, the sensor has failed the test.

**NOTICE** When testing, the sensor must be completely submerged.

**The 794380-344 and 794380-343 sensors must be tested in a dark container. If there is too much ambient light, this may prevent the sensor from going into alarm.**

4. Remove the sensor from the test container after observing a response. For the P/N 794380-343 sensor, dip the sensor into a small container of alcohol and briefly swirl it around to rinse off the unit.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Reinstall the sensor(s) upon verification of proper operation.
7. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.



## Testing Procedure E:

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### Interstitial Sensors for Fiberglass tanks 794380-401, -404, -407, and -409

1. Print out system status, sensor configurations, and alarm histories and save for your records.
2. Fill one of the test containers with a minimum of 2 inches of water.
3. Remove sensor carefully from the interstice containment area. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
4. While holding the sensor flat and with the side with the Red dot facing upwards, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not issue a "Fuel" alarm after 5 minutes, the sensor has failed the test.
5. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
6. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
7. Reinstall the sensor(s) upon verification of proper operation.
8. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure F:

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### Hydrostatic Sensors 794380-301, 794380-302, 794380-303, 794380-304

1. Remove sensor carefully from tank reservoir. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or to the sensor housing.
2. For Hydrostatic sensors, removal of the sensor from the tank reservoir represents the "Low Liquid" Alarm condition for a Dual Point sensor and a "Fuel" Alarm condition for a Single Point sensor. Time to alarm may run as long as 5 minutes depending upon console type and configuration. If the sensor does not alarm after 5 minutes, the sensor has failed the test.
3. For Dual Point Hydrostatic sensors, a second alarm condition representing a "High Liquid" alarm is present. To test this alarm, completely submerge the sensor in water. Time to alarm may run as long as 5 minutes depending upon console type and configuration. If the sensor does not alarm after 5 minutes, the sensor has failed the test.
4. In order to clear the alarm, re-install the sensor in the reservoir. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure G:

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### Groundwater Sensor 794380-621, 794380-622, 794380-624

1. Print out system status, sensor configurations, and alarm histories and save for your records.
2. Remove sensor carefully from monitoring well. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable.
3. For Groundwater sensors, removal of the sensor from the monitoring well represents the "Water Out" Alarm condition. Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not alarm after 5 minutes, the sensor has failed the test.
4. In order to clear the alarm, re-install the sensor in the monitoring well. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure H:

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### Vapor Sensor 794390-700

1. Fill one of the test containers with a minimum of 4 inches of water.
2. Remove sensor carefully from monitoring well. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable.
3. Submerge the sensor in the water to produce a "Water Alarm" condition. Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not alarm after 5 minutes, the sensor has failed the test.
4. In order to clear the alarm, remove the sensor from the container. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure I:

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### Standalone Dispenser Pan Sensor with Dispenser Control Interface 847990-001, 847990-002

1. Fill one of the test containers with a minimum of 4 inches of Water.
2. Remove sensor carefully from dispenser pan. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or the sensor housing.
3. While holding the sensor vertically, place the sensor into the container until it is submerged. Test only one sensor per test container (multiple test containers may be used). The Alarm state is indicated by the dispenser power being turned off (i.e., there is no other visible or audible alarm).
4. Remove the sensor from the test vessel after observing a response and allow the sensor to completely dry off. Document the alarm and proceed to the next step.
5. Reinstall the sensor(s) upon verification of proper operation.
6. Turn Off power to the dispenser for at least 5 seconds in order to re-enable dispensing.
7. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.



## Testing Procedure J:

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### Position Sensitive Sensor 794380-323

1. Fill one of the test containers with a minimum of 2 inches of Water.
2. Remove sensor carefully from the pan or containment area - this should result in a "Sensor Out" alarm. Visually inspect the sensor for any damage as defined by sensor category in the Periodic Maintenance Checklist in the console's Operators manual, such as damage to the cable or the sensor housing.
3. While holding the sensor vertically, place the sensor into the container until it is resting securely on the bottom of the container (this should clear the "Sensor Out" alarm). Test only one sensor per test container (multiple test containers may be used). Test times may run as long as 5 minutes depending upon console type and configuration. If the sensor does not issue a "Fuel" alarm after 5 minutes, the sensor has failed the test.
4. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
5. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
6. Reinstall the sensor(s) upon verification of proper operation.
7. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure K:

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### Vacuum Sensors 857280-100, -200, -30x

1. Vacuum leak test: rotate the manual shut-off valve (which should be connected to the containment space being monitored) from the 'normal' position to the 'test' position. This should vent the vacuum sensor to atmosphere while maintaining vacuum in the test space.
2. Wait at least 1 minute at the console for the system to produce a 'No Vacuum Alarm'. Press the Alarm/Test key to silence the beeper and acknowledge the alarm on the TLS-350 console or touch the Alarm button twice on the TLS-450PLUS console (see Figure 6).
3. Rotate the manual shut-off valve back to the 'normal' position. If sufficient vacuum remains in the interstice, the alarm may clear at this time, however continue with the manual test (Step 4).
4. TLS-350 consoles: at the console go to DIAG MODE ↵, VAC SENSOR DIAG ↵, VAC SENSOR MANUAL TEST ↵, START MANUAL TEST to initiate a manual test that will clear the 'NO VACUUM ALARM' (refer to the TLS-3XX Operator's manual P/N 576013-610 for instructions).

TLS-450PLUS consoles: Go to **Menu>Diagnostics>Vac Sensor>Status** screen to initiate a manual test that will clear the 'NO VACUUM ALARM' (refer to the Vacuum Sensor Installation Guide P/N 577013-836 for instructions).

5. Vac Float Liquid Sensor (in sump) test: This test is performed using water, gasoline, or other appropriate test liquid for systems with the float housing in the sump. Rotate the manual shut-off valve from the 'normal' to the 'test' position.

**NOTICE** This will produce a 'NO VACUUM ALARM'

Remove the lower float bowl and fill it with the test liquid. Upon re-installation, a Liquid Alarm will be generated. At the console press the Alarm/Test key to silence the beeper and acknowledge the alarm on the TLS-350 console or touch the Alarm button twice on the TLS-450PLUS console.

**NOTICE** In some instances, it may be impossible to fill the float bowl enough to produce an alarm. If this occurs, follow this alternate procedure.

- a. Loosen the nut on the side of the liquid sensor housing that connects to the 3-way ball valve and remove the barbed fitting.
  - b. Connect a 1 - 2 foot (30 - 60 cm) piece of tubing to another 1/4" barbed fitting and insert this barbed fitting into the liquid sensor housing. Insert a funnel into the other end of the piece of tubing.
  - c. Completely loosen the nut on the opposite side of the liquid sensor and remove the hose and bushing together.
  - d. Pour 22 - 25 ml of water, gasoline, or other appropriate test liquid into the funnel. A liquid alarm should be produced. At the console press the Alarm/Test key to silence the beeper and acknowledge the alarm on the TLS-350 console or touch the Alarm Status bar twice on the TLS-450PLUS console.
  - e. Remove the short piece of tubing/funnel and re-install the original barbed fitting (with tubing connected to 3-way valve) and tighten the nut. Replace the hose and bushing in the other side of the liquid sensor and tighten the nut.
6. To remove the test liquid and clear the alarm, remove the lower float bowl of the liquid sensor, and ensure that all liquid is removed.
  7. Replace the lower float bowl and rotate the manual shut off valve back to the 'normal' position.
  8. Repeat Step 4 above to establish vacuum and clear any active 'NO VACUUM ALARM'.

9. For double-walled tanks, the interstitial sensor must be removed from the tank to perform a functional test. Follow "Testing Procedure C:" (Interstitial Sensor for Steel Tanks) or "Testing Procedure E:" (Interstitial Sensor for Fiberglass Tanks) as applicable.

**NOTICE** First you must vent the vacuum in the interstice. Restore the vacuum per Step 4 above to clear the 'NO VACUUM ALARM'.

10. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

## Testing Procedure L:

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### Position Sensitive Interstitial Sensor for Steel Tanks 794380-333

1. Fill one of the test containers with a minimum of 2 inches of water.
2. Remove sensor from tank and visually inspect the sensor for any damage as defined in the sensor category in the Periodic Maintenance Checklist in the consoles Operator manual, such as damage to the cable or to the sensor housing.
3. While holding the sensor vertically over the test container, suspend the sensor so it rests above the bottom of the test container a minimum of 2 inches.
4. Verify on the TLS system that the sensor is in a "FUEL ALARM". When the sensor is not positioned properly (Resting on the bottom of tank) it will generate a fuel alarm.
5. After verifying the sensor alarmed properly, holding the sensor vertically to the container lower the sensor until it's submerged. Test only one sensor at a time. Test time may take up to 5 minutes. The sensor should go into a "Fuel Alarm".
6. Remove the sensor from the test vessel after observing a response. Allow the sensor to completely dry off in order to clear the alarm. Document the alarm and proceed to the next step.
7. Press the Alarm/Test key on TLS-350 consoles, or touch the Alarm button twice on TLS-450PLUS consoles to clear the alarm before moving on to the next sensor (see Figure 6).
8. Reinstall the sensor(s) upon verification of proper operation.
9. Print the test history and console status for your records. This completes this test procedure. Report any performance concerns to Veeder-Root while on site.

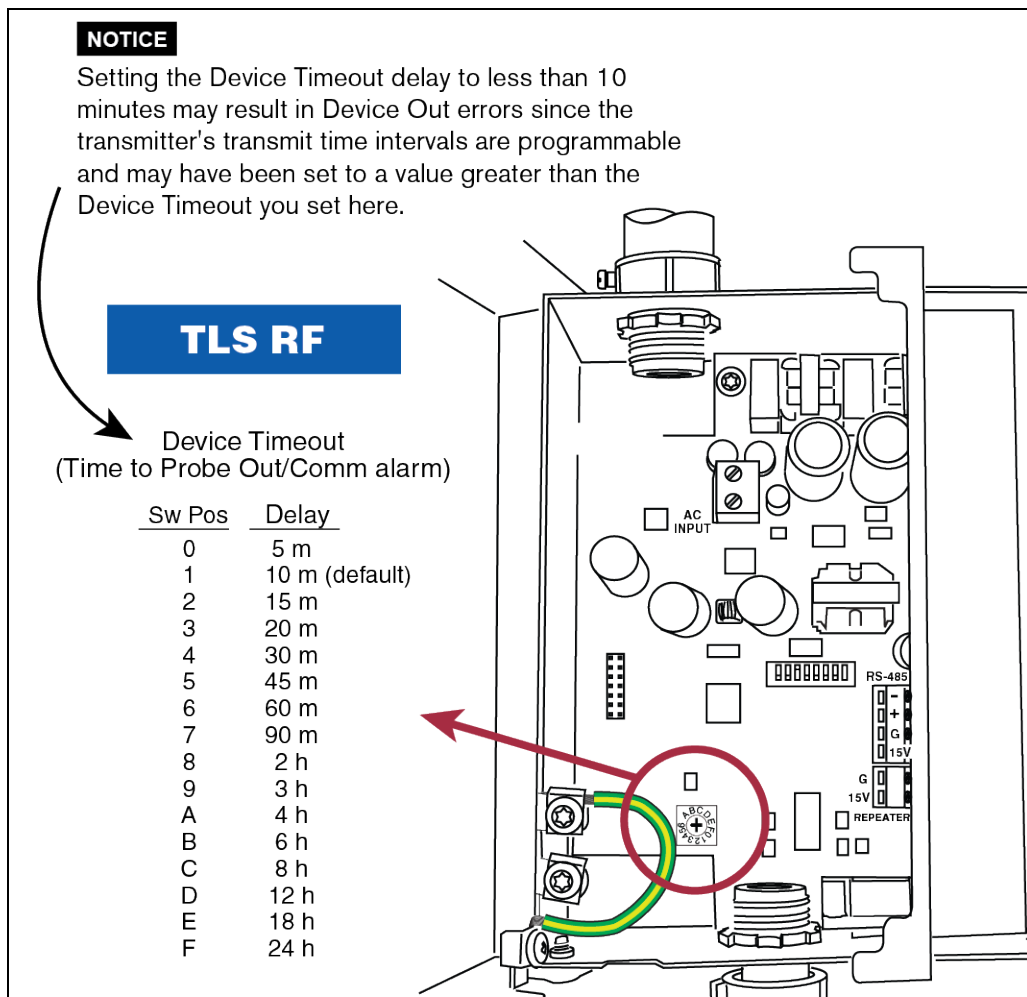
## TLS-RF Wireless 2 (W2) Testing Procedure

### Testing Sensor Out Alarm

1. Disconnect sensor wiring from top of sensor.
2. Wait for up to 2 minutes for "Sensor Out" alarm.
3. Re-connect sensor wiring and confirm that console alarm has cleared.

### Testing Communication Alarm

1. Visually determine Device Timeout delay via Dip Switch setting inside TLS RF (see illustration below).
2. Disconnect battery cable from wireless transmitter.
3. Wait the Device Timeout delay time for a "Communication Alarm".
4. Re-connect battery cable to wireless transmitter and confirm that console alarm has cleared.



## Appendix A - Filtered Alarms

Alarm	Detection Response Time	Clear Response Time
DIM Communication Alarm	6-minute delay	10-minute delay
Probe Out Alarm	2-minute delay	3-minute delay
Liquid <ul style="list-style-type: none"> <li>• Fuel</li> <li>• Water</li> <li>• Water Out</li> <li>• High Liquid</li> <li>• Low Liquid</li> <li>• Liquid Warning</li> </ul>	Immediate	3-minute delay
Liquid <ul style="list-style-type: none"> <li>• Open</li> </ul>	2-minute delay	3-minute delay
Liquid <p>* when caused by open circuit and no open alarms within the last 24-hours</p>	Immediate	3-minute delay
Liquid <ul style="list-style-type: none"> <li>• Short</li> </ul>	2-minute delay	15-minute delay
Vapor <ul style="list-style-type: none"> <li>• Fuel</li> <li>• Water Out</li> </ul>	Immediate	3-minute delay
Vapor <ul style="list-style-type: none"> <li>• Open</li> </ul>	2-minute delay	3-minute delay
Vapor <p>* when caused by open circuit and no open alarms within the last 24-hours</p>	Immediate	3-minute delay
Vapor <ul style="list-style-type: none"> <li>• Short</li> </ul>	2-minute delay	15-minute delay
Ground Water <ul style="list-style-type: none"> <li>• Fuel</li> <li>• Water Out</li> <li>• Liquid Warning</li> </ul>	Immediate	3-minute delay

**Appendix A - Filtered Alarms**

<b>Alarm</b>	<b>Detection Response Time</b>	<b>Clear Response Time</b>
Ground Water • Open	2-minute delay	3-minute delay
Ground Water * when caused by open circuit and no open alarms within the last 24-hours	Immediate	3-minute delay
Ground Water • Short	2-minute delay	15-minute delay
2-wire current loop • Fuel • Water Out • Liquid Warning	Immediate	3-minute delay
2-wire current loop • Open	2-minute delay	3-minute delay
2-wire current loop * when caused by open circuit and no open alarms within the last 24-hours	Immediate	3-minute delay
2-wire current loop • Short	2-minute delay	15-minute delay
3-wire current loop • Fuel • High Liquid • Liquid Warning	Immediate	3-minute delay
3-wire current loop • Open– caused by noise • Open – open circuit	2-minute delay	3-minute delay
3-wire current loop * when caused by open circuit and no open alarms within the last 24-hours	Immediate	3-minute delay
3-wire current loop • Open – open circuit *one or more open alarms within the last 24-hours	2-minute delay	3-minute delay
3-wire current loop • Short	2-minute delay	15-minute delay
Mag Sump Sensor • Fault • Communication	2-minute delay	15-minute delay



# Appendix B: ATG Inspection Checklists

## ATG Annual Inspection Check List

### Facility Information

<b>Facility ID #:</b>	<b>Facility Name:</b>			
<b>Facility Address:</b>	<b>City/State/ZIP:</b>			
<b>Facility Phone Number:</b>	<b>Form Completed by:</b>			<b>Date:</b>

### Tank Information

ATG Tank # (change #s ONLY if add 'l' pages are required)	1	2	3	4	5
<b>Facility Tank # or ID (designation used by facility)</b>					
<b>Compartmental Tanks</b>					
<b>Compartmental Tank Assignment (Enter Tank # 's)</b>					
<b>Tank Capacity</b>					
<b>Product Name (describe in comments if not listed)</b>					
<b>Siphon Manifoldd Tank</b>					
<b>Tank Status*</b>					
<i>If Tank Status = TC Enter Date of Closure</i>					
<i>If Tank Status = TC is tank Emptied to 1" or less?</i>					
<b>Tank Release Detection Method*</b>					
<b>Tank Corrosion Protection*</b>					
<b>Tank Wall Type*</b>					
<b>Tank receives &gt; 25 gallons at a time?</b>					
<b>Spill Bucket? (required where UST receives &gt; 25 gallons at a time)</b>					
<i>Spill Bucket Size</i>					
<i>Spill Bucket Wall Type*</i>					
<b>Overfill Protection? (required where UST receives &gt; 25 gals at a time)</b>					
<i>Overfill Protection Type*</i>					

### Piping Information

<b>Piping Wall Type</b>					
<b>Piping Delivery System</b>					
<b>Line Leak Detector Type (required for PR system)</b>					
<b>Piping Release Detection Method</b>					

### Containment Monitoring Information

<b>STP (Turbine Pump) Containment Sump?</b>					
<i>STP Containment Sump Wall Type*</i>					
<b>UDC (Under-dispenser) Containment Sump?</b>					
<i>UDC Containment Sump Wall Type*</i>					
<b>Piping Transition Sumps?</b>					
<i>Transition Sump Wall Type</i>					

### Corrosion Protection Information

<b>Piping Corrosion Protection</b>					
<b>Tank Corrosion Protection</b>					
<b>Flexible Connection - Dispenser</b>					
<b>Flexible Connection - Tank</b>					
<b>Flexible Connection - Dispenser</b>					

**Comments:**

## Annual Automatic Tank Gauge Inspection and Certification Form

### Facility Information

<b>Facility ID #:</b>		<b>Facility Name:</b>					
<b>Facility Address:</b>		<b>City:</b>		<b>STATE:</b>		<b>Zip:</b>	
<b>Facility Phone Number:</b>			<b>Form Completed by:</b>			<b>Date:</b>	
<b>Veeder-Root ATG Type</b>	TLS-450PLUS	<b>ATG Serial Number</b>	2133444-4-4-4-4-4-4	<b>ATG Form/Part Number</b>	847390-122		
<b># of Fill Sumps Monitored by ATG</b>	4	<b># of Tanks Monitored by ATG</b>	4	<b># of STP Sumps Monitored by ATG</b>	4	<b># of UDC Monitored by ATG</b>	
<b>ATG Powered</b>	YES	<b>Have All ATG leak alarms been addressed?</b>	YES	<b>Is the TLS Programmed per the site configuration requirements</b>	YES		
<b>Remote Communication</b>		IP Address					

### ATG Audible and Visual Test

<b>Console Alarm Test</b>	Beeper Sounds	YES	Green LED On	YES	Yellow LED On	YES	Red LED On	YES
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### In-Tank Probe Inspection

(Before performing the following ensure power is removed from ATG before disconnecting probe cable)

ATG Tank # (change # s ONLY if add 'l pages are required)	1	2	3	4	5
<b>Product Name</b>					
<b>Removed Probe and inspected probe shaft and floats</b>					
<b>Probe Shaft Condition</b>					
<b>Product Float Condition</b>					
<b>Water Float Condition</b>					
<b>Comments:</b>					

## In Tank (Probe) Alarm Verification Test

Energize Power to ATG for the following

Note: Verify Alarm Filtering is Disabled during Alarm Verification Test (3xx V31^ / 4xx V5A^)

ATG Tank # (change # s ONLY if add'l pages are required)	1	2	3	4	5
<b>Product Name</b>	Reg UL	Reg UL	Reg UL	Reg UL	Reg UL
<b>Is the TLS system programmed at 90% for Overfill Alarm</b>	YES				
<b>Simulate Overfill Condition- TLS generate overfill Alarm?</b>	YES				
<b>Overfill Alarm Clear after delivery was recognized by TLS system</b>	YES				
<b>Does TLS alarm when product float is lowered to bottom of probe</b>	NO				
<b>Raise product float 50%- Does TLS clear Low Level Alarm</b>	YES				
<b>Raise the Water Float float approximately 2" from the bottom of the probe. Did TLS Generate a Water Warning/Alarm?</b>	YES				
<b>Lower Water Float to bottom of probe. Did Water Warning/Alarm Clear?</b>	NO				
<b>Comments:</b>					
De-Energize Power to ATG for the following					
<b>Disconnect Probe Cable: Yes/No</b>					
Energize Power to ATG for the following					
<b>Did TLS generate a Probe Out Alarm: Yes/No</b>					
<b>Comments:</b>					
De-Energize Power to ATG for the following					
<b>Reconnect Probe Cable: Yes /No</b>					
Energize Power to ATG for the following					
<b>TLS Probe Out Alarm Cleared</b>					
<b>Comments:</b>					

**Containment / Interstitial Sensor Inspection & Alarm Test**

**Energize Power to ATG for the following**

**Note: Verify Alarm Filtering is Disabled during Alarm Verification Test (3xx V31^ / 4xx V5A^)**

**STP Containment Sump Inspection & Alarm Test**

[\(Reference Manual: Annual Automatic Tank Gauge Certification Operability Testing Guide 577014-xxx\)](#)

ATG Sensor Type	Piping Sump 794380-208				
Sensor Location	STP				
Product Label	Unld STP				
Sensor ID #	L1				
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS	Yes				
Comments:					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					

## UDC Inspection & Alarm Test

(Reference Manual: Annual Automatic Tank Gauge Certification Operability Testing Guide 577014-xxx)

ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
Comments:					

## Interstitial Sensor Inspection & Alarm Test

[\(Reference Manual: Annual Automatic Tank Gauge Certification Operability Testing Guide 577014-xxx\)](#)

ATG Sensor Type	794380-322/352 Discriminating				
Sensor Location	STP Sump				
Product Label	Reg UL				
Sensor ID #	1				
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS	YES				
<b>Comments:</b>					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
<b>Comments:</b>					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
<b>Comments:</b>					
ATG Sensor Type					
Sensor Location					
Product Label					
Sensor ID #					
Sensor Liquid Test - Simulate Test per Operability Test instructions per sensor type; Did Sensor Alarm and Report on TLS					
<b>Comments:</b>					

## Electronic Line Leak Detection Inspection & Alarm Test

[\(Reference Manual: Annual Automatic Tank Gauge Certification Operability Testing Guide 577014-xxx\)](#)

ATG Sensor Type	450PLUS DPLLD			
Sensor Location	STP Sump			
Product Label	Reg UL			
Sensor ID #	1			
STP Type	The Red Jacket			
STP HP	2 hp			
Line Leak Verification Test - Simulate 3.0 GPH Test per Operability Test instructions; Did TLS create 3.0 GPH Shutdown Alarm ?	YES			
Comments:				
ATG Sensor Type				
Sensor Location				
Product Label				
Sensor ID #				
STP Type				
STP HP				
Line Leak Verification Test - Simulate 3.0 GPH Test per Operability Test instructions; Did TLS create 3.0 GPH Shutdown Alarm ?				
Comments:				
ATG Sensor Type				
Sensor Location				
Product Label				
Sensor ID #				
STP Type				
STP HP				
Line Leak Verification Test - Simulate 3.0 GPH Test per Operability Test instructions; Did TLS create 3.0 GPH Shutdown Alarm ?				
Comments:				
ATG Sensor Type				
Sensor Location				
Product Label				
Sensor ID #				
STP Type				
STP HP				
Line Leak Verification Test - Simulate 3.0 GPH Test per Operability Test instructions; Did TLS create 3.0 GPH Shutdown Alarm ?				
Comments:				



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[veeder.com](http://veeder.com)