TWENTY-EIGHTH EDITION, 2021

LIST OF LEAK DETECTION EVALUATIONS FOR STORAGE TANK SYSTEMS

WWW.NWGLDE.ORG

DISCLAIMER

GENERAL

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

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

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

SPECIFIC

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

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

National Work Group On
Leak Detection Evaluations

The National Work Group on Leak Detection Evaluations (NWGLDE) is pleased to publish our 28th Edition, 2021 of the "List of Leak Detection Evaluations for Storage Tank Systems." Please note, the NWGLDE has significantly changed the format of this List. All of our listings are kept current on our webpage: http://www.nwglde.org. As this webpage has the current listings and most users access our information through the much easier-to-navigate webpage, the NWGLDE will no longer be maintaining a full, printed List of all of the NWGLDE evaluations. Instead, the new "List" will simply be a list of the changes made to the evaluations and methods within the past year. Attached, please find only those listings that are new or updated since the previous publication (27th Edition, January 2020). Please use our webpage to access current information, listings, and methods.

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

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

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

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

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

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

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What's New Since The 27th Edition List, 2020
(01/29/2020)

MOST RECENT WEBSITE ADDITIONS/REVISIONS:

- **PMP Corporation**
  - PMP Tank Interstitial Sensors 63409, 63420, and 63460 as evaluated with the Veeder-Root TLS-350 (software version 11.02)

  Added to Interstitial Detector (Liquid-Phase) Method March 31, 2020

- **Integrated Control Systems**
  - SD1-SP and SD1-DP Safety Disconnect Liquid Sensors

  Added to Interstitial Detector (Liquid-Phase) Method April 6, 2020

- **ACCENT Environmental Services, Inc.**
  - SIRmadeSimple, version 1.0

  Added to Statistical Inventory Reconciliation Test Method (Quantitative) June 29, 2020

- **TRM Sensor LLC**
  - TRM Sensors TRM-DFS-3 Fuel Sensor with TRM-Easy5 Leak Monitoring Panel and optional Fuel Spill Remote Alarm

  Added to Out-of-Tank Product Detector (Liquid-Phase) Method July 1, 2020

- **Franklin Fueling Systems**
  - EVO600 AND EVO6000 (FMP-LL2 & FMP-LL3 Magnetostrictive Probe)

  Added to Automatic Tank Gauging Method August 6, 2020

- **Franklin Fueling Systems**
  - INCON T5 Series, TS-5, TS-550, TS-5000, TS-550evo and TS-5000evo, Colibri, EVO 200, EVO 400, EVO 600 and EVO 6000 consoles with SCALD 3 (INCON TSP-LL2 and FMP-LL3 Magnetostrictive Probe)

  Revised listing August 6, 2020

- **Franklin Fueling Systems**
  - EVO 600 and EVO 6000 Consoles with TSP-DDS BriteSensor, TSP-DTS BriteSensor, and TSP-MWS BriteSensor Groundwater Probe

  Added to Out-of-Tank Product Detector (Liquid-Phase) Method August 6, 2020

- **Franklin Fueling Systems**
  - EVO 600 and EVO 6000 Consoles with TSP-DIS BriteSensor and TSP-EIS Standard Sensor

— FUTURE EVENTS —
NWGLDE MEETING:
UPDATE! The NWGLDE Spring meeting, scheduled to be held April 1 - 3, 2020 in Arlington, Texas, at the Source North America Training Facility, HAS BEEN CANCELLED.

Contact Don Taylorr for more information.

Added to Interstital Detector (Liquid-Phase) Method
August 6, 2020

- **Franklin Fueling Systems**
  - **EVO 600 and EVO 6000 Consoles with TSP-DMS 12 and 24 Inch Discriminating Magnetostrictive Sensors**

Added to Interstital Detector (Liquid-Phase) Method
August 6, 2020

- **Franklin Fueling Systems**
  - **EVO 600 and EVO 6000 Consoles with TSP-HFS Horizontal Float, TSP-HLS Standard Sensor, TSP-ULS, and TSP-UHS Standard Sensors Switch**

Added to Interstital Detector (Liquid-Phase) Method
August 6, 2020

- **Franklin Fueling Systems**
  - **EVO 600 and EVO 6000 Consoles with TSP-HIS BriteSensor and TSP-HIS-XL Sensor**

Added to Interstital Detector (Liquid-Phase) Method
August 6, 2020

- **Leighton O'Brien Technologies, Ltd.**
  - **Qualitative Dry Line Test PM2 (for Rigid and Flexible Pipelines)**

Revised listing August 20, 2020

- **Franklin Fueling Systems**
  - **Incon TS-1001/2001, TS-5,TS-550, TS-5000, TS-550evo and TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-DDS Discriminating Dispenser Sump Sensor and FMP-DTS Discriminating Turbine Sump Sensor**

Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Franklin Fueling Systems EVO 400, EVO 200, EVO 600, and EVO 6000 Consoles with FMP-DDS-U Discriminating Dispenser Sump Sensor and FMP-DTS-U Discriminating Turbine Sump Sensor**

Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-DIS Discriminating Interstitial Sensor and FMP-EIS Electro-Optical Interstitial Sensor**

Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Franklin Fueling Systems EVO 400, EVO 200, EVO 600 and EVO 6000 Consoles with FMP-DIS-U Discriminating Interstitial Sensor and FMP-EIS-U Electro-Optical Interstitial Sensor**

Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, and TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-HFS Horizontal Float Switch, FMP-HFS2 Horizontal Float Switch, FMP-HLS High Level Float Switch, FMP-HIS Hydrostatic Interstitial Float Sensor, and FMP-HIS-XL Hydrostatic Interstitial Float Sensor**

Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Franklin Fueling Systems EVO 400, EVO 200, EVO 600 and EVO 6000 Consoles with FMP-HIS-U Hydrostatic Interstitial Float Sensor, and FMP-HIS-XL-U Hydrostatic Interstitial Float Sensor**

  Revised listing September 30, 2020

- **Franklin Fueling Systems**
  - **Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo, EVO 400, EVO 200, S940 Alarm Console, EVO 600, and EVO 6000 Consoles with FMP-ULS Universal Liquid Sensor, FMP-UHS Universal Hydrostatic Sensor, FMP-ULS-C Universal Liquid Sensor Chemical, FMP-ULS-PS Universal Liquid Sensor Position Sensitive sensors**

  Revised listing September 30, 2020

- **Core Engineered Solutions**
  - **SafeSite Vacuum Interstitial Monitoring System**

  Revised listing October 21, 2020

- **Pneumercator Company, Inc.**
  - **TMS4000 and TMS4000M (MP450 Series Magnetostrictive Probe)**

  Added to Automatic Tank Gauging Method December 16, 2020

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Issue Date: March 31, 2020

PMP Corporation

PMP Tank Interstitial Sensors 63409, 63420, and 63460 as evaluated with the Veeder-Root TLS-350 (software version 11.02)

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type:	qualitative
Sampling frequency:	continuous
Operating principle:	float switch

Test Results:

Fiberglass Tank Sensor 63409	diesel*	water	E10
Lower detection limit (in)	0.4	0.04	0.05
Precision (in)	0.02	0.02	0.01
Detection time (min)	<1	<1	<1
Steel tank Sensors 63420, 63460			
Lower detection limit (in)	1.3	1.2	1.3
Precision (in)	0.01	0.01	0.03
Detection time (min)	<1	<1	<1

*Evaluations determined these sensors' responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the lower detection limit is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:

These sensors were third party evaluated with a Veeder Root TLS-350 console (software version 11.02). PMP Corporation claims that these sensors will work with these other consoles: the TLS-450, TLS-4 series, TLS-350 series, TLS-300 series, TLS-PC, ILS-350, Simplicity, Gilbarco EMC series, EMC Basic series, EMC-PC, Red Jacket ProMax and ProPlus.

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Evaluator: Solutions Engineering Group
420 N Main Street
Montgomery, IL 60538-1367
Tel: (630) 701-7703
Date of Evaluations: 10/18/2019

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Issue Date: April 6, 2020

Integrated Control Systems

SD1-SP and SD1-DP Safety Disconnect Liquid Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: magnetic reed float switch

Test Results:

	unleaded gasoline	diesel*	waterl
SD1-SP and SD1-DP Sensors			
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Threshold Level (in)	1.450	1.395	1.231

*Evaluations determined these sensors' responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the lower detection limit is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses

Comments:

The SD1-SP and SD1-DP sensors are identical with one exception. The one exception is the SD1-SP has one relay module and one set of contacts and the SD1-DP has two relay modules and two sets of contacts.
These sensors use chemical resistant 304 stainless steel float switch housing.
An integrated reset switch allows the service technician to reset these sensors after correction of a fault condition. These sensors can also be reset by cycling power for a duration of 10 or more seconds.
If liquid rises above the threshold level of these sensors, power load to the pump or dispenser is disconnected and an alarm condition is generated.

Integrated Control Systems
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Cedar Hill, TX 75104
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Evaluator: Ken Wilcox Associates , Inc.
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Tel: (816) 443-2494
Dates of Evaluations: 03/08/19

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Issue Date: 6/29/20

SIRmadeSimple

Version 1.0 Monthly Monitoring (0.2 gal/hr leaks and 0.1 gal/hr leaks)

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification	Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.0%. Leak rate of 0.1 gph with PD = 99.0% and PFA = 0.01%.
Leak Threshold	0.1 gph for leak rate of 0.2 gph. 0.05 gph for leak rate of 0.1 gph. A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Applicability	Gasoline, diesel.
Tank Capacity	Maximum of 45,000 gallons.
Data Requirement	Minimum of 21 days of usable product level and flow through data are required.
Comments	This method is used as a monthly monitoring method. This method cannot be used as a tightness test. Evaluated for use on a manifolded tank system not to exceed 45,000 gallons that contains no more than 4 tanks in its system. Maximum throughput is 127,068.9 gallons. 70% of data sets evaluated were from manifolded tank systems. 73% of data sets evaluated used data collected by Automatic tank gauges. Of 100 data sets submitted for evaluation, all were analyzed with conclusive results.

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Date of Evaluation: 09/01/2014

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Issue Date: July 1, 2020

TRM Sensors LLC

TRM Sensors TRM-DFS-3 Fuel Sensor with TRM-Easy5 Leak Monitoring Panel and optional Fuel Spill Remote Alarm

OUT-OF-TANK PRODUCT DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: conductive polymers

Test Results:

	water	unleaded gasoline	diesell	E85	jet fuel
Detection time (sec)	none	8.8	9.0	8.7	<8.7
Fall time (min)	none	<15.0	<15.0	<15.0	<15.0
Threshold (in)	none	<0.0625	<0.0625	<0.0625	<0.0625

	water/E85 20%/80%		water/E85 40%/60%		water/E85 70%/30%	
	top layer	**bottom layer**	**top layer**	**bottom layer**	**top layer**	**bottom layer**
Detection time (sec)	8.2	44.4	8.6	none	8.6	none
Fall time (min)	<15.0	<15.0	<15.0	none	<15.0	none
Threshold (in)	<0.0625	<0.0625	<0.0625	n/a	<0.0625	n/a

Specificity Results (in addition to above):
Diesel, unleaded gasoline, jet fuel, E85

Comments:
Sensors respond to liquid hydrocarbons.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or for periodic testing. If the product sensitive strip is exposed to fuel, the sensor should be removed from the sensor body and submerged in lighter fluid for 15 seconds and then placed into a low heat oven (140 degrees) for 15 minutes. Alternatively, it is possible to replace the fuel exposed product sensitive strip with a new strip for immediate use if an alarm has been triggered. Simply unplug the old strip and plug in the new strip on the bottom of the sensor body

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Date of Evaluations: 02/24/20

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Issue Date: August 6, 2020

Franklin Fueling Systems

EVO600 AND EVO6000
(FMP-LL2 & FMP-LL3 Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification	Leak rate of 0.2 gph with PD = 96.6% and PFA = 3.35%. (FMP-LL2 Probe) Leak rate of 0.2 gph with PD = 97.64% and PFA = 2.36%. (FMP-LL3 Probe) Leak rate of 0.1 gph with PD = 96.4% and PFA = 3.64%. (FMP-LL2 Probe) Leak rate of 0.1 gph with PD = 95.6% and PFA = 4.36%. (FMP-LL3 Probe)
Leak Threshold	0.1 gph for leak rate of 0.2 gph. 0.05 gph for leak rate of 0.1 gph. A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, bio-diesel and ethanol blends compatible with probe floats.
Tank Capacity	Maximum of 30,000 gallons for leak rate of 0.2 gph. Maximum of 20,000 gallons for leak rate of 0.1 gph. Minimum product level is 14% tank capacity.
Waiting Time	Average of 6 hours between delivery and testing for leak rate of 0.2 gph. Average of 6 hours 4 minutes between delivery and testing for leak rate of 0.1 gph. None between dispensing and testing.
Test Period	Length of the test is determined automatically based on quality of test data. Average data collection time during evaluation was 7 hours 25 minutes for leak rate of 0.2 gph. Average data collection time during evaluation was 5 hours 19 minutes for leak rate of 0.1 gph. (FMP-LL2 Probe) Average data collection time during evaluation was 4 hours 17 minutes for leak rate of 0.1 gph. (FMP-LL3 Probe) There must be no dispensing or delivery during the test.
Temperature	Probe contains a minimum of 5 thermistors to monitor product temperature. At least one thermistor must be submerged in product during testing.
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 0.201 inch (FMP-LL2 Probe). Minimum detectable water level in the tank is 0.208 inch (FMP-LL3 Probe). Minimum detectable water level change is 0.011 inch (Both FMP-LL2 and FMP-LL3 Probes).
Calibration	Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems. Therefore, this certification is only applicable when there is a probe used in each tank and the siphon is broken during testing. Tests only portion of tank containing product. As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected. EPA leak detection regulations require testing of the portion of the tank system which routinely contains product.

Franklin Fueling Systems
3760 Marsh Road

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Dates of Evaluations: 11/06/18

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Issue Date: November 16, 2015
Revision Date: August 6, 2020

Franklin Fueling Systems

INCON T5 Series, TS-5, TS-550, TS-5000, TS-550evo and TS-5000evo, Colibri, EVO 200, EVO 400, EVO 600 and EVO 6000 consoles with SCALD 3 (INCON TSP-LL2 and FMP-LL3 Magnetostrictive Probe)

CONTINUOUS IN-TANK LEAK DETECTION METHOD
(Continuous Automatic Tank Gauging)

Certification	Leak rate of 0.2 gph with PD > 95% and PFA < 0.001%.
Leak Threshold	0.17 gph for single tanks at 95% PD. 0.155 gph for manifolded tank systems at 95% PD. 0.16 gph for single tanks at 99% PD. 0.135 gph for manifolded tank systems at 99% PD. A tank system should not be declared tight and a message printed for the operator, if the test results indicate a loss or gain that exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751.
Tank Capacity	Maximum of 32,891 gallons for single tanks and for all tanks manifolded together.
Throughput	Monthly maximum of 445,408 gallons.
Waiting Time	None. The algorithm tests the data for stability and discards those before the tank is stable.
Test Period	Data collection time ranges from 5 to 26 days. Data sampling frequency is at least once per minute. System collects data at naturally occurring product levels without interfering with normal tank operation, and discards data from unstable periods when system performs test.
Temperature	Average for product is determined by a minimum of 5 thermistors.
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 0.208 inch (0.44 inch using model TSP-IGF4P). Minimum detectable change in water level is 0.011 inch (0.013 inch using model TSP-IGF4P).
Calibration	Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	The user configuring the system can select between 99% and 95% PD modes. System reports a result of "pass" or "fail." Evaluated using both single and manifolded tank systems with probes in each tank. Constant and variable leaks were mathematically induced into tight tank test records which were collected by systems installed at various active tank sites. The database for evaluation of the system included sites with vapor recovery and blending dispensers. Tanks used in this evaluation contained gasoline and diesel. For very active tanks, a tank shut down may become necessary in order for the system to collect enough quiet-time data for a test. Tests only the portion of the tank containing product. System considers tank to be stable when net product volume change rate is less than 19.8 gph / 0.3302 gpm. System distinguishes large leak rates (between 1 gph and 10 gph) from dispensing activities and reports those as “fail”. As product level is lowered, the leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected. EPA leak detection regulations require testing of the portion of the tank system which routinely contains

product.
Data from periods when the tank volume is below 14% of maximum are not used for leak detection.

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Evaluator: Ken Wilcox Associates
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Dates of Evaluations: 09/14/15

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Issue Date: August 6, 2020

Franklin Fueling Systems

EVO 600 and EVO 6000 Consoles with TSP-DDS BriteSensor, TSP-DTS BriteSensor, and TSP-MWS BriteSensor Groundwater Probe

OUT-OF-TANK PRODUCT DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: magnetic switch and float (TSP-DDS, TSP-DTS BriteSensor), and hydrocarbon sensitive polymer (all)

Test Results:

	unleaded gasoline	diesel*	E85	water low level	water high level	water/E85 20/80% upper/lower	water/E85 30/70% upper/lower	water/E85 70/30% upper/lower	water/E85 80/20% lower
TSP-DDS BriteSensor									
Average detection time (mins)	6	54	6	<1	<1	6	6	7	15
Fall time (min)	<20	<60	<20	<1	<1	<20	<20	<20	<20
Product activation height (inches)	<1/8	<1/8	<1/8	1.2771	7.6943	<1/8	<1/8	<1/8	<1/8
TSP-DTS BriteSensor									
Average detection time (mins)	6	54	6	<1	<1	6	6	7	15
Fall time (min)	<20	<60	<20	<1	<1	<20	<20	<20	<20
Product activation height (inches)	<1/8	<1/8	<1/8	1.1698	10.9522	<1/8	<1/8	<1/8	<1/8

	unleaded gasoline	diesel*	water
TSP-MWS BriteSensor Groundwater Probe			
Detection time (mins.)	6	55	<1
Fall time (mins.)	34	>60	<1
Threshold level (inches)	<1/8	<1/8	2.2247

Specificity Results (additional for TSP-MWS BriteSensor Groundwater Probe):
Activated: As indicated above.

Comments:
*This evaluation determined the sensor's responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.
Sensors are reusable

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Dates of Evaluations: 12/17/18

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Issue Date: August 6, 2020

Franklin Fueling Systems

EVO 600 and EVO 6000 Consoles with TSP-DIS BriteSensor and TSP-EIS Standard Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type:	qualitative
Sampling Frequency:	continuous
Operating principle:	opto-electric

Test Results:

	unleaded gasoline	diesel*	water
TSP-DIS BriteSensor			
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Product activation height (in)	0.4947	0.4885	0.5100
TSP-EIS Standard Sensor			
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Product activation height (in)	0.4686	0.4634	0.4820

*This evaluation determined the sensor's responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:
TSP-DIS sensors are discriminating interstitial monitoring sensors that detect the presence of the liquids identified above in double wall tanks as well as in sumps in other locations. TSP-EIS sensors are electro-optic liquid sensors made of chemically resistant polysulfone plastic.
Sensors are reusable.

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URL: www.franklinfueling.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 12/17/18

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Issue Date: August 6, 2020

Franklin Fueling Systems

EVO 600 and EVO 6000 Consoles with TSP-DMS 12 and 24 Inch Discriminating Magnetostrictive Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: magnetostrictive probe with dual floats

Test Results:

TSP-DMS 12 Inch and 24 Inch Discriminating Sensor	unleaded gasoline	diesel*	water
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Average product activation height (in)	1.98	1.87	1.55

*This evaluation determined the sensor's responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA, as well as Carnegie Mellon Research Institute.
Sensors are reusable.

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Dates of Evaluations: 12/17/18

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Issue Date: August 6, 2020

Franklin Fueling Systems
(originally listed as INCON Intelligent Controls, Inc.)

EVO 600 and EVO 6000 Consoles with TSP-HFS Horizontal Float, TSP-HLS Standard Sensor, TSP-ULS, and TSP-UHS Standard Sensors Switch

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: magnetic switch

Test Results:

	unleaded gasoline	diesel*	E85	water
TSP-HFS Standard Sensor				
Detection time (min:sec)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Product activation height (in)	0.5146	0.4908	0.5046	0.4480
TSP-HLS Standard Sensor				
Detection time (min:sec)	10:09	09:55	<1	09:25
Fall time (min)	<1	<1	<1	<1
Product activation height (in)	2.0328	1.9408	2.0030	1.7658
TSP-ULS Standard Sensor				
Detection time (min:sec)	03:50	03:50	03:41	03:34
Fall time (min)	<1	<1	<1	<1
Product activation height (in)	1.1243	1.0726	1.0994	0.9529
TSP-UHS Standard Sensor				
Detection time (min:sec)	03:50	03:50	<1	03:34
Fall time (min)	<1	<1	<1	<1
Product activation height (in)	0.9628	0.8966	0.9125	0.7952

*This evaluation determined the sensor's responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles has been combined with previously evaluated sensor threshold data performed by KWA, as well as Carnegie Mellon Research Institute.
TSP-UHS is the same as the TSP-ULS sensor except that the float has been inverted so that it may be used to monitor the brine reservoir of containment sumps. An alarm condition will occur when the fluid level drops below the end of the sensor.
Sensors are reusable.

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Dates of Evaluations: 12/17/18

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Issue Date: August 06, 2020

Franklin Fueling Systems

EVO 600 and EVO 6000 Consoles with TSP-HIS BriteSensor and TSP-HIS-XL Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: magnetic switch

Test Results:

	brine	
TSP-HIS BriteSensor	high*	low*
Detection time (min)	<1	<1
Fall time (min)	<1	<1
Product activation height (in)	7.8099	1.0631

TSP-HIS-XL	high*	low*
Detection time (min)	<1	<1
Fall time (min)	<1	<1
Threshold Level	10.9546	1.00061

*The "high" and "low" refer to high- and low-level alarm points of hydrostatic sensors.

Comments:
TSP-HIS BriteSensor is intended to monitor level of either ethylene glycol or calcium chloride solutions in interstitial or annular space of a double-walled tank. Activates if any significant gain or loss of solution occurs.
Sensors are reusable.

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Dates of Evaluations: 12/17/2018

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Issue Date: November 23, 2010
Revision Date: August 20, 2020

Leighton O'Brien Technologies, Ltd.

Qualitative Dry Line Test PM2 (for Rigid and Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification
Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak rate of 0.025 gph with PD = 100% and PFA = 0%.

Leak Threshold
< 0.05 gph. Proprietary for dry test mode.
< 0.0125 gph for leak rate of 0.025 gph.

Applicability
Any dry pipeline.

Specification
System tests fiberglass, steel and flexible pipelines.
Dry Tests are conducted at 45 psi or 150% of operating pressure using the system as a digital manometer against the fluid and trapped vapor in the pipeline.
Mechanical line leak detector must be removed or manually isolated from pipeline for duration of test, or if testing is to be conducted with mechanical line leak detector in place, check valve in pump must be manually closed.

Pipeline Capacity

For leak rate of 0.1 gph
Maximum of 371.22 gallons in rigid piping.
Maximum of 109.8 gallons in flexible piping.
Maximum total of 481 gallons in combination rigid and flexible (the capacity of the flexible component cannot exceed 109.8 gallons).
Manifolded piping may be tested as long as the total length of piping is within the capacity and configuration limitations.

For leak rate of 0.025 gph
Maximum of 165 gallons in rigid piping.
Maximum of 110 gallons in flexible piping.
Maximum total of 275 gallons in combination rigid and flexible (the capacity of the flexible component cannot exceed 110 gallons).
Maximum pipe diameter is 6.00 inches.
Manifolded piping may be tested as long as the total length of piping is within the capacity and configuration limitations.

Waiting Time
None between delivery and testing.
None between dispensing and testing.

Test Period

For leak rate of 0.1 gph
Minimum of 3 minutes after installing in line.
Test data is collected continuously and recorded by computer.
Data is analyzed at the Leighton O'Brien analysis center with telemetry.

For leak rate of 0.025 gph
Minimum of 5 minutes after installing in line.
Test data is collected continuously and recorded by computer.
Data is analyzed at the Leighton O'Brien analysis center with telemetry.

Calibration
No temperature sensors used.
System must be calibrated yearly in accordance with manufacturer's instructions.

Comments
Groundwater is overcome with pressure on the top of the fluid test system apparatus during the dry test.

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Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/11/10, 06/21/2018

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Appearance on this list is not to be construed as an endorsement by any regulatory agency nor is it any guarantee of the performance of the method or equipment.
Equipment should be installed and operated in accordance with all applicable laws and regulations. For full details, please refer to our expanded "DISCLAIMER" page.

Issue Date: August 3, 2015
Revision Date: September 30, 2020

Franklin Fueling Systems

Incon TS-1001/2001, TS-5,TS-550, TS-5000, TS-550evo and TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-DDS Discriminating Dispenser Sump Sensor and FMP-DTS Discriminating Turbine Sump Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: float switch

Test Results:

	unleaded gasoline	diesel*	E85	water/E85 20%/80% upper layer	water/E85 20%/80% lower layer	water/E85 30%/70% upper layer	water/E85 70%/30% upper layer
FMP-DDS/DTS							
Detection time (min)	7.8	53.8	7.8	5.8	15.2	6.0	7.0
Fall time (min)	<20	<60	<20	<20	<20	<20	<20
Lower Detection Limit (in)	0.125	0.125	0.125	0.125	0.125	0.125	0.125
	water						
FMP-DDS							
Detection time (min)	<1						
Fall time (min)	<1						
Threshold Level							
Low level (in)	1.1090						
High level (in)	7.4687						
FMP-DTS							
Detection time (min)	<1						
Fall time (min)	<1						
Threshold Level							
Low level (in)	1.1698						
High level (in)	10.9522						

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined, but would be expected to be very similar to the diesel responses.

Comments:

Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA. Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested. The FMP-DDS and FMP-DTS sensors are identical in operation and communication to Franklin Fueling System's TSP-DDS and TSP-DTS sensors. The FMP-DDS and FMP-DTS sensors can connect to any INCON console with no software or setup changes. FMP-DDS and FMP-DTS sensors can be distinguished from TSP-DDS and TSP-DTS sensors by the part number on the label that begins with "FMP" instead of "TSP." The TSP-DDS, TSP-DTS, FMP-DDS, and FMP-DTS sensors appear as the same device from the automatic tank gauge.
The DDS and DTS sensors contain an identical product sensitive strip that triggers a product alarm when exposed to any type of fuel. The top and bottom floats of both types of sensors detect the presence of liquid and an alarm will be generated if the liquid rises above the threshold of either float. When the product sensitive strip was tested in each of the three mixtures of water/E85, the DDS and DTS sensors went into alarm when subjected to the top and lower layers of water/E85. For the upper layer containing hydrocarbon, the DDS sensor indicated a product alarm as designed for each of the 20%, 30% and 70% of the water/E85 mixture. For the lower layer of each of the 20%, 30% and 70% of the water/E85 mixtures, the 20% mixture indicated a product alarm after a short period of time, while the 30% and 70% mixtures indicated a water alarm when the threshold of the bottom float was exceeded but did not detect the presence of product after a period of 24 hours.

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Dates of Evaluations: 04/02/15, 11/08/18

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Issue Date: August 7, 2017
Revision Date: September 30, 2020

Franklin Fueling Systems

Franklin Fueling Systems EVO 400, EVO 200, EVO 600, and EVO 6000 Consoles with FMP-DDS-U Discriminating Dispenser Sump Sensor and FMP-DTS-U Discriminating Turbine Sump Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: float switch

Test Results:

	unleaded gasoline	diesel*	E85	water/E85 20%/80% upper/lower	water/E85 80%/20% upper/lower	water/E85 30%/70% upper/lower
FMP-DDS/DTS						
Detection time (min)	6.5	54.3	7.7	6.0	16.2	5.8
Fall time (min)	<20	<60	<20	<20	<20	<20
Lower Detection Limit (in)	0.125	0.125	0.125	0.125	0.125	0.125

	water
FMP-DDS	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	1.0759
High level (in)	7.4706
FMP-DTS	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level (in)	
Low level (in)	1.0678
High level (in)	10.9636

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined, but would be expected to be very similar to the diesel responses.

Comments:
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested. . The DDS and DTS sensors contain an identical product sensitive strip that triggers a product alarm when exposed to any type of fuel. The top and bottom floats of both types of sensors detect the presence of liquid and an alarm will be generated if the liquid rises above the threshold of either float. When the product sensitive strip was tested in each of the three mixtures of water/E85, the DDS and DTS sensors went into alarm when subjected to the top and lower layers of water/E85. For the upper layer containing hydrocarbon, the DDS sensor indicated a product alarm as designed for each of the 20%, 30% and 70% of the water/E85 mixture. For the lower layer of each of the 20%, 30% and 70% of the water/E85 mixtures, the 20% mixture indicated a product alarm after a short period of time, while the 30% and 70% mixtures indicated a water alarm when the threshold of the bottom float was exceeded but did not detect the presence of product after a period of 24 hours.

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Dates of Evaluations: 06/19/2017, 11/08/18

Issue Date: August 3, 2015
Revision Date: September 30, 2020

Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-DIS Discriminating Interstitial Sensor and FMP-EIS Electro-Optical Interstitial Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: conductivity, electro-optic

Test Results:

	unleaded gasoline	diesel*	waste oil	water	E85
FMP-DIS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.2996	0.3057	0.2934	0.3134	0.2886
FMP-EIS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.2718	0.2728	0.2534	0.2792	0.2700

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:

Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested.
The FMP-DIS and FMP-EIS sensors are identical in operation and communication to Franklin Fueling System's TSP-DIS and TSP-EIS sensors. The FMP-DIS and FMP-EIS sensors can connect to any INCON console with no software or setup changes. FMP-DIS and FMP-EIS sensors can be distinguished from TSP-DIS and FMP-EIS sensors by the part number on the label that begins with "FMP" instead of "TSP." The TSP-DIS, TSP-EIS, FMP-DIS and FMP-EIS sensors appear as the same device from the automatic tank gauge.
The FMP-DIS sensor uses two conductive pins to detect whether the liquid is water or fuel. When tested in three mixtures of water/E85 (i.e., 20%/80%; 30%/70%; and 70%/30%), the FMP-DIS sensor went into alarm when subjected to the upper and lower layers of water/E85. For the upper layer containing hydrocarbon, the DIS sensor indicated a product or alarm as designed. For the lower layer of liquid, the DIS sensor indicated a "water" alarm.

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Issue Date: August 7, 2017
Revision Date: September 30, 2020

Franklin Fueling Systems

Franklin Fueling Systems EVO 400, EVO 200, EVO 600 and EVO 6000 Consoles with FMP-DIS-U Discriminating Interstitial Sensor and FMP-EIS-U Electro-Optical Interstitial Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: conductivity, electro-optic

Test Results:

	unleaded gasoline	diesel*	waste oil	water	E85
FMP-DIS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.4293	0.4397	0.4208	0.4594	0.4240
FMP-EIS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.4478	0.4430	0.4317	0.4566	0.4507

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:

Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested.
The FMP-DIS sensor uses two conductive pins to detect whether the liquid is water or fuel. When tested in three mixtures of water/E85 (i.e., 20%/80%; 30%/70%; and 70%/30%), the FMP-DIS sensor went into alarm when subjected to the upper and lower layers of water/E85. For the upper layer containing hydrocarbon, the DIS sensor indicated a product or alarm as designed. For the lower layer of liquid, the DIS sensor indicated a "water" alarm.

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Issue Date: August 3, 2015
Revision Date: September 30, 2020

Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, and TS-5000evo, EVO 600 and EVO 6000 Consoles with FMP-HFS Horizontal Float Switch, FMP-HFS2 Horizontal Float Switch, FMP-HLS High Level Float Switch, FMP-HIS Hydrostatic Interstitial Float Sensor, and FMP-HIS-XL Hydrostatic Interstitial Float Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type:	qualitative
Sampling Frequency:	continuous
Operating principle:	float switch

Test Results:

	unleaded gasoline	diesel*	waste oil	water	E85
FMP-HFS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.3890	0.3759	0.3890	0.3091	0.3975
Threshold Level (in) **with EVO 600 and EVO 6000 Consoles**	0.5146	0.4908	--	0.4480	--
FMP-HFS2 Standard Sensor**					
Detection time (min:sec)	<1	<1	--	<1	
Fall time (min)	<1	<1	--	<1	
Product activation height (in)	0.3745	0.3505	--	0.2436	
FMP-HLS***					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	2.1369	2.0976	2.0882	2.0358	2.1350

	brine
FMP-HIS	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	1.0699
High level (in)	7.4890
FMP-HIS	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	1.0699
High level (in)	7.4890
FMP-HIS-XL	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	1.0061
High level (in)	10.9546

***FMP-HLS sensor not evaluated with the EVO 600 and EVO 6000 Consoles.

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:
**The FMP-HFS2 sensor was evaluated for all threshold responses with the S940, EVO 500, EVO 5000, EVO 600, and EVO 6000 consoles.
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested.
The FMP-HIS, FMP-HIS-XL, FMP-HLS, and FMP-HFS sensors are identical in operation and communication to Franklin Fueling System's TSP-HIS, TSP-HIS-XL, TSP-HLS, and TSP-HFS sensors. The FMP-HIS, FMP-HIS-XL, FMP-HLS, and FMP-HFS sensors can connect to any INCON console with no software or setup changes. FMP-HIS, FMP-HIS-XL, FMP-HLS, and FMP-HFS sensors can be distinguished from TSP-HIS, TSP-HIS-XL, TSP-HLS, and TSP-HFS sensors by the part number on the label that begins with "FMP" instead of "TSP." The TSP-HIS, TSP-HIS-XL, TSP-HLS, TSP-HFS, FMP-HIS, FMP-HIS-XL, FMP-HLS, and FMP-HFS sensors appear as the same device from the automatic tank gauge.

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Revision Date: September 30, 2020

Franklin Fueling Systems

Franklin Fueling Systems EVO 400, EVO 200, EVO 600 and EVO 6000 Consoles with FMP-HIS-U Hydrostatic Interstitial Float Sensor, and FMP-HIS-XL-U Hydrostatic Interstitial Float Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: float switch

Test Results:

	brine
FMP-HIS	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	1.0167
High level (in)	7.3218
FMP-HIS-XL	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level	
Low level (in)	0.9895
High level (in)	10.8398

Manufacturer and evaluator claim that sensors will respond to any liquid. Evaluations determined these sensors' responses to the liquids shown above. *Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.

Comments:
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensors can be removed, cleaned and reinstalled if an alarm is triggered or if the sensor is periodically tested.

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Dates of Evaluations: 06/19/2017, 11/08/18

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Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo, EVO 400, EVO 200, S940 Alarm Console, EVO 600, and EVO 6000 Consoles with FMP-ULS Universal Liquid Sensor, FMP-UHS Universal Hydrostatic Sensor, FMP-ULS-C Universal Liquid Sensor Chemical, FMP-ULS-PS Universal Liquid Sensor Position Sensitive sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output Type: qualitative

Sampling Frequency: continuous

Operating principle: float/reed switch

Test Results:

	unleaded gasoline	diesel*	biodiesel*	water	E85	brine
FMP-ULS						
Detection time (min)	<1	<1	<1	<1	<1	
Fall time (min)	<1	<1	<1	<1	<1	
Threshold Level (in)	1.0155	0.9944	0.9925	0.8775	1.0198	
FMP-UHS						
Detection time (min)	<1	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1	<1
Threshold Level (in)	0.9602	0.9144	0.9218	0.9397	0.9397	0.7561
FMP-ULS-PS						
Detection time (min)	<1	<1	<1	<1	<1	
Fall time (min)	<1	<1	<1	<1	<1	
Threshold Level (in)	1.4915	1.4882	1.4758	1.3770	1.4962	

	Lubrizol**	Afton**
FMP-ULS-C		
Detection time (min)	<1	<1
Fall time (min)	<1	<1
Threshold Level (in)	1.1707	1.1281
FMP-ULS-PS		
Detection time (min)	<1	<1
Fall time (min)	<1	<1
Threshold Level (in)	1.4959	1.4290

*Evaluations determined these sensors' responses to the liquids shown above. Biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce an alarm if the sensor threshold is exceeded. Responses to these fuels were not determined but would be expected to be very similar to the diesel responses.
** Manufacturer and evaluator claim that responses to Lubrizol 9888 and 9888C would be expected to be very similar to each other. Responses to Afton OTR 8332G. and OTR 8843G would be expected to be very similar to each other.

Comments:
Ken Wilcox Associates (KWA) has previously evaluated these sensors on one or more Franklin Fueling Systems ATG consoles. Results from the alarm functionality testing with the EVO600 and EVO6000 consoles have been combined with previously evaluated sensor threshold data performed by KWA.
Sensor TSP-UHS is the same as the TSP-ULS sensor except that the float has been inverted so that it may be used to monitor the brine reservoir of containment sumps. An alarm condition will occur when the fluid level drops below the end of the sensor. The FMP-ULS-PS is a position sensitive float switch that issues an alarm if not installed properly at the bottom of the intestinal or sump. Sensors are reusable.

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Core Engineered Solutions

SafeSite Vacuum Interstitial Monitoring System

CONTINUOUS INTERSTITIAL LINE MONITORING METHOD (PRESSURE/VACUUM) and CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Leak rate of 0.1 gph with PD=95.0% and PFA=<5.0% Evaluation Protocol for Vacuum-Wrapped Pressurized Portions of a Fuel Containment and Dispensing System. Revision 3A, Jairus D. Flora, Jr., Ph.D., December 15, 2006

Operating Principle:
System uses vacuum generated by a vacuum pump or submersible pump to continuously maintain a partial vacuum of a 7.5 psig, equivalent to 207.6" water column for a period of 60 minutes, and maintain vacuum for 30 seconds prior to testing. System is designed to activate a visual and acoustic alarm, and optional submersible pump shutdown before stored product can escape to the environment.
System was evaluated for detecting breaches within the interstitial space effective gap of 3/64" or greater of a double-walled tank or double-walled piping.

Alarm Condition:
System alarms when a liquid or air leak occurs which causes the interstitial vacuum to decrease (pressure to increase) and the system is unable to maintain a vacuum pressure of 1.0 psi per hour for three consecutive failures based upon the rate of vacuum decay. The system incorporates a minimum detectable pressure change of 0.028 psi.
System will also alarm if liquid is detected in the interstitial space, or if the vacuum level in the interstitial space decreases at a rate exceeding 0.1 gallons per minute in 15 minutes. Detection of liquid ingress occurs by system monitoring of vacuum decay and replenishment rates.

Applicability:
Double-walled piping or double-walled tank (underground or aboveground) with an interstitial space of 1/8" or greater, storing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, motor oil, water. Storage of biodiesel blends B6-B20 meeting ASTM D7467 and biodiesel B100 meeting ASTM D6751 would also produce a system alarm if the system threshold is exceeded. Responses to these fuels were not determined, but would be expected to be very similar to the system's response when storing diesel.

Manufacturerï¿½s Specifications:
Alarm will activate when interstitial vacuum decreases 1.0 psi for three consecutive tests. Default maximum vacuum level (pump-off pressure) is 7.5 psi vacuum (207.6" water column), Volume of monitored interstitial space must not exceed 270 gallons or 5,690 feet of piping.

Calibration:
The system must be programmed by a factory trained technician or under the direction of the manufacturer. Programmed parameters include: system type (pressure or vacuum), test target pressure or vacuum (PSI or in H2O), test duration, maximum allowable loss, number of failed tests required to activate leak alarm, and optional disabling of the fuel pump.

Comments:
The system described herein was tested with both open interstitial spaces of 1/8" or greater and with a restricted interstitial space with an effective interstitial gap of 3/64". This system may not be compatible with all secondarily contained tanks and/or piping. Always consult with the tank and/or piping manufacturer and the manufacturer's applicable recommended installation practices before installing this system, or damage may be caused to the tank or piping by its use.
The vacuum rate of replenishment is limited to a maximum of 85 liters per hour or a lesser rate specified by manufacturer.

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Pneumercator Company, Inc.

TMS4000 and TMS4000M
(MP450 Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification	Leak rate of 0.2 gph with PD = 97.13% and PFA = 2.87% for 2 hour test. (20,000 gallon tank) Leak rate of 0.2 gph with PD = 99.17% and PFA = 0.83% for 8 hour test. (30,000 gallon tank) Leak rate of 0.1 gph with PD = 95.25% and PFA = 4.75% for 8 hour test. (20,000 gallon tank)
Leak Threshold	0.05 gph for leak rate of 0.1 gph 0.1 gph for leak rate of 0.2 gph A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, bio-diesel and ethanol blends compatible with probe floats.
Tank Capacity	Maximum of 30,000 gallons for leak rate of 0.2 gph Maximum of 20,000 gallons for leak rate of 0.1 gph Tank must be between 20 and 90% full.
Waiting Time	Minimum of 8 hours between delivery and testing. Minimum of 5 minutes between dispensing and testing. There must be no delivery during waiting time.
Test Period	Minimum of 2 hours (0.2 gph leak rate / 20,000 gallon tank) Minimum of 8 hours (0.2 gph leak rate / 30,000 gallon tank) Minimum of 8 hours (0.1 gph leak rate / 20,000 gallon tank) Test data are acquired and recorded by system's computer. Leak rate is calculated from data determined to be valid by statistical analysis. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by probe which contains 5 thermistors. At least one thermistor must be submerged in product during test.
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 0.488 inch. Minimum detectable change in water level is 0.124 inch.
Calibration	Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems. Therefore, this certification is only applicable when there is a probe used in each tank and the siphon is broken during testing. Tests only portion of tank containing product. As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected. EPA leak detection regulations require testing of the portion of the tank system which routinely contains product.

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Equipment should be installed and operated in accordance with all applicable laws and regulations. For full details, please refer to our expanded "DISCLAIMER" page.