TWENTY-FOURTH EDITION, 2017

LIST OF LEAK DETECTION EVALUATIONS FOR STORAGE TANK SYSTEMS

January 3, 2017

NWG LDE

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.

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
dnr.mo.gov

TO: Vendors of Leak Detection Equipment/Systems, Regulators, and Other Interested Parties

FROM: Heather Peters, NWGLDE Chair

RE: ***National Work Group on Leak Detection Evaluation's (NWGLDE)***
List of Leak Detection Evaluations for Storage Tank Systems

The National Work Group on Leak Detection Evaluations is proud to make available our **24th Edition, 2017 of the "List of Leak Detection Evaluations for Storage Tank Systems"**. Each year the NWGLDE publishes a new edition of the "List" that can be downloaded from our web site. This and all previous editions of the "List" are available from our web site on the "Downloads" page in both Adobe ® Portable Document Format (PDF) and Microsoft ® Word format (DOC). There is also a web site version of the "List" that is kept up-to-date with new and revised listings on a monthly basis throughout the year. Changes made to the web site "List" since the issue date of the most recent edition of the "List" are noted on our web site under "News and Events". We invite you to visit our web site at the following address:

http://www.nwglde.org/

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 (801) 536-4138.

If you need to contact members of the work group, information is included for contacting them after this memo. Also, the work group team and team leaders are listed on the page following the member "List" to help you determine whom you may need to contact. However, this information is more likely to be current on our web site and can be found under "Group Members" and "Team Leaders".

Vendors should send new third-party evaluations, which were performed by an "independent third-party evaluator" (see Glossary of Terms), to be reviewed by the work group to **the team leader and all the members of the team**. To enable the work group to properly review the evaluations, **one (1) copy** of all applicable information indicated in the enclosed "Leak Detection Equipment Review - Document List" must be sent to the team leader and each team member.

In the interest of expediting third-party evaluation reviews, maintaining consistency among evaluations, and adhering to the accepted evaluation protocols, the NWGLDE has adopted the following policies:

1. **In order for an evaluation to be listed, third-party evaluation reports must clearly state which protocol was used to conduct the evaluation. The Work Group will not review any evaluations that do not follow either:**
   a. **A Standard EPA protocol, or**

b. **An alternative protocol, e.g., a national voluntary consensus standard or other accepted test procedures developed by an independent third-party.** ***Currently, the mechanism to obtain approval of alternative protocols is to first submit them to a peer review committee. Once the peer review committee determines that the protocol conforms with the minimum requirements as described in the "Foreword" to each of the EPA protocols, they will forward the protocol to the appropriate Work Group Team Leader and recommend that the Work Group add the protocol to the "List". The Work GroupTeam will then review the protocol to confirm the peer review committee determination.***
c. **An existing protocol that has been amended for a specific evaluation.** ***Currently, the mechanism to obtain approval of amended protocols is to have the evaluator submit the amendment to the appropriate Work Group Team Leader prior to conducting the evaluation. The Team will review the amendment and either approve it or suggest modifications.***

2. **Changes to a listed protocol need to be discussed with the Work Group before testing, or before continuing testing if the evaluator identifies concerns during testing. Regular communication with Work Group members can expedite an evaluation's review.**
3. **If a problem is discovered with a third-party test after a system data sheet has been added to the "List", or if a listed system is modified by the vendor in such a way that the changes affect how it detects and/or quantifies a leak, the vendor shall be given a reasonable time period to provide the necessary information to clarify or modify the listing. The data sheet listing may be removed from the "List" if:**
   a. **The vendor must re-evaluate the system,**
   b. **The vendor fails to meet the time frame set by the Work Group,**
   c. **The vendor fails to respond to take the appropriate actions.**

   The system data sheet may be reinstated on the "List" after all third-party test concerns are resolved. If concerns cannot be resolved or if there is no response from the vendor, the system will no longer appear on the "List".

Since the first draft "List" was sent out back in January of 1995, the "List" has sometimes been referred to as the "EPA work group list of approved leak detection equipment". The work group and EPA are concerned that similar statements may appear in sales literature distributed by vendors. We request that no one refer to the "List" in this way for the following reasons:

1. **This is not an EPA or EPA work group list.** This "List" was prepared by an **independent** work group consisting of state and EPA members.

2. **Neither EPA nor the work group approves leak detection equipment or procedures.** The "List" does not include "approved" leak detection equipment/procedures. It includes leak detection equipment/procedures that the work group has reviewed. This review has confirmed that the leak detection equipment/procedures were third-party tested in accordance with either an EPA or other acceptable test protocol. The review also confirmed that the equipment/procedures met EPA performance standards under test conditions. Approval or acceptance of leak detection equipment and procedures is the responsibility of the implementing agency, which in most cases is the state environmental agency. Please read the work group "Disclaimer" on page ii.

Attachments: Work Group Members, Work Group Teams, Leak Detection Equipment Review Document List, Latest Edition of List of Leak Detection Evaluations for UST Systems

NWGLDE LEAK DETECTION EQUIPMENT/METHOD EVALUATION REVIEW - DOCUMENT LIST
(Revised October 12, 2011)

The following is a checklist of the documentation required by the NWGLDE for review of third-party evaluations of storage tank system leak detection equipment/methods. As much as possible, please send the information electronically.

☐ 1. Documentation establishing intellectual property ownership of the leak detection method.

2. A complete third-party evaluation report, including:
☐ a. Details of the evaluation procedure if the EPA standard procedure was not used for the evaluation. If the EPA evaluation procedure was used, list any deviations or modifications to the procedure.
☐ b. Version of equipment software, if equipment uses software.
☐ c. A complete set of all the EPA required attachment sheets.
☐ d. Individual test logs and/or field notes.
☐ e. Statistical calculations and any applicable graphs or charts generated during the evaluation.
☐ f. A statement from the evaluator confirming that all equipment at the test site was properly maintained and calibrated to the level of accuracy necessary for a valid evaluation.

☐ 3. An outline of the manufacturer's operating procedures for the equipment/system. The summary procedure must be dated and include a revision number, if applicable. A copy of the summary procedure must be provided to the third-party evaluator for enclosure in the report. Also required is a statement from the manufacturer confirming the use of the submitted procedure during the evaluation.

☐ 4. A complete installation/operations manual for the equipment/system.

☐ 5. A sample of the test report (including field work-sheets) which will be submitted to the owner/local implementing agency.

☐ 6. An outline of the test procedures in high groundwater areas. These procedures should be reviewed for adequacy by the third-party evaluator and a statement to that effect should be included with the report.

☐ 7. An outline of the test procedures for manifolded tank systems. These procedures should be reviewed for adequacy by the third-party evaluator and a statement to that effect should be included with the report.

☐ 8. An affidavit from the manufacturer confirming that there are no mutual financial interests between the equipment manufacturer and the third-party evaluator.

☐ 9. A resume, including all applicable formal training and experience, from personnel who conducted the evaluation.

☐ 10. Equipment calibration procedures and manufacturer recommended schedule of calibration.

☐ 11. Digital picture(s), or link(s) to picture(s) of the leak detection equipment (300 dpi or greater are best) are requested, but not required. If provided, the Work Group will include the picture(s) on the web site listing.

☐ 12. The name, address, e-mail address, and phone number of the <u>technical personnel</u> serving as the manufacturer's representative for the response to the regulatory agency questions on the equipment/system. Also, the URL for the manufacturer's web site, if applicable.

☐ 13. Correspondence letters from state agencies who have reviewed the equipment/system.

14. The following documentation for all permanently-installed leak detection equipment:
☐ a. An outline of the maintenance procedure (including a list of the parts or functions of the system to be checked, calibrated, or programmed) for the annual functional test by authorized service personnel.
☐ b. An outline (1-2 pages) "Equipment Check Guidelines for Inspectors" prepared by the manufacturer. This summary should guide local agency inspectors on proper field procedures to follow when inspecting equipment for proper operation, for attempting to access the stored history (for alarms or failed tests) to determine compliance with state requirements.
☐ c. A sample of the reports generated and/or printed by the equipment (for all equipment models), and an explanation of the items in the report, if not self-explanatory.
☐ d. Information on how the control panel modules connected to the various probes are labeled. The information on the panel should be directly comparable to the equipment name, model/part/probe number which will be included in the committee's list. If necessary, a permanent label containing that information should be affixed to the panel.

15. The following documentation for the systems using tracer analysis:
☐ a. The name and certification of the laboratory analyzing vapor samples.
☐ b. Quality Assurance Manual of the laboratory.
☐ c. The method and amount of tracer injection.
☐ d. The vapor sample collection method and chain of custody records.
☐ e. The third-party certification for capability of the system to detect leaks from the ullage portion of the tank.

16. The following documentation for the mechanical and electronic line leak detectors:
☐ a. The maximum vertical rise of pipeline allowed above the transducer, controller or leak detector.

WORK GROUP MEMBERS **Revised 10/14/16**

MEMBER	ADDRESS	PHONE/FAX/E-MAIL
Heather Peters Chair	Missouri Department of Natural Resources 1730 East Elm Street Jefferson, MO 65101	(573) 751-7877 Fax (573) 526-5268 heather.peters@dnr.mo.gov
Peter Rollo Vice Chair	DNREC – Tank Management Section 391 Lukens Drive New Castle, DE 19720	(302) 395-2500 Fax (302) 395-2555 peter.rollo@state.de.us
Greg Bareta	Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) Bureau of Weights & Measures Storage tank Regulation 2811 Agriculture Drive Madison, WI 53708	(608) 224-5150 Fax (608) 221-6592 greg.bareta@wisconsin.gov
Jason Cocke	Washington State Department of Ecology Toxics Clean-up Program Underground Storage Tank Unit 4601 North Monroe Street Spokane, WA 99205	(509) 329-3405 FAX (509) 329-3572 Jcoc461@ecy.wa.gov www.ecy.wa.gov/programs/tcp/ust-lust/tanks.html
Michael Juranty	New Hampshire Department of Environmental Services Waste Management Division Oil Compliance Section PO Box 95 29 Hazen Drive Concord, NH 03302-0095	(603) 271-6058 Fax (603) 271-2181 michael.juranty@des.nh.gov
Shaheer Muhanna	Georgia DNR - EPD 4244 International Parkway, Suite 104 Atlanta, GA 30354	(404) 362-2579 Fax (404) 362-2654 SHAHEER_MUHANNA@dnr.state.ga.us
Marcia Poxson	Michigan Department of Environmental Quality Remediation Division Storage Tank and Contract Unit 525 West Allegan Street PO Box 30246 Lansing, MI 48909-7741	(517) 373-3290 Fax (517) 335-2245 poxsonm@michigan.gov
Helen Robbins	Connecticut Department of Environmental Protection 79 Elm Street Hartford, CT 06106	(860) 424-3291 Fax (860) 424-4061 helen.robbins@ct.gov
Tim Smith	Office of Underground Storage Tanks US Environmental Protedtion Agency (Mail Address): 1200 Pennsylvania Avenue, NW, Mail Code 5401R, Washington, DC 20460 (Fed Ex Address): Ronald Reagan Building (RRB), 1300 Pennsylvania Avenue, NW 7th Floor, Washington, DC 20004	(202) 564-0643 smith.timr@epamail.epa.gov
Don Taylor	Tennessee Department of Environment and Conservation Division of Underground Storage Tanks 2305 Silverdale Drive Johnson City, TN 37601	(423) 854-5391 Fax (423) 854-5401 Don.Taylor@tn.gov www.tn.gov/environment/section/ust-underground-storage-tanks
David J. Wilson	Utah Department of Environmental Quality, Division of Environmental Response and Remediation (Mail Address): PO Box 144840, Salt Lake City, Utah 84114-4840 (Fed Ex Address): 195 North 1950 West, Salt Lake City, Utah 84116	(801) 536-4138 Fax (801) 359-8853 djwilson@utah.gov

WORK GROUP TEAMS **Revised 5/2/16**

TEAM	LEADER	MEMBERS
Automatic Tank Gauging (ATG) and Volumetric Tank Tightness Test (VTTT) Methods	Mike Juranty	Marcia Poxson Don Taylor
Continuous In-Tank Leak Detection Methods	Shaheer Muhanna	Helen Robbins
Non-Volumetric Tank Tightness Test Methods	Helen Robbins	Mike Juranty
Line Leak Detection Methods	Greg Bareta	David Wilson Don Taylor
Statistical Inventory Reconciliation (SIR) Methods	Shaheer Muhanna	Helen Robbins
Interstitial Monitoring and Out-of-Tank Detector Methods	Tim Smith	Peter Rollo Marcia Poxson Don Taylor
Aboveground and Bulk Storage Tank Methods	Peter Rollo	Greg Bareta Marcia Poxson
Secondary and Spill Containment Test Methods	Marcia Poxson	Mike Juranty Tim Smith David Wilson
List Administration and Surveys	Heather Peters	David Wilson

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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. Please refer to complete "DISCLAIMER" on page ii of this list.

PART I

LEAK DETECTION TEST METHODS AND EQUIPMENT/SYSTEMS

ALPHABETICAL BY TEST METHOD,

THEN BY VENDOR,

NEXT BY EQUIPMENT/SYSTEM MODEL,

FINALLY BY LEAK RATE OR OPERATING PRINCIPLE

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. Please refer to complete “DISCLAIMER” on page ii of this list.

ABOVEGROUND STORAGE TANK LEAK DETECTION METHOD

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Leak Detection Technologies	MDLeak Enhanced Leak Detection Method	Adjustable sensitivity to 0.005 gph/A tank should not be declared tight when chemical marker is detected outside of the tank/Not limited by capacity.
Mass Technology Corp.	Precision Mass Measurement Systems SIM-1000 & CBU-1000	1.717 gph and 0.859 gph/A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold./Surface area 30,172 sq. ft. and diameter 196 feet.
Praxair Services, Inc.	Tracer Tight for Large Aboveground Storage Tanks Systems	0.1 gph and 0.005 gph/A tank system should not be declared tight when tracer chemical greater than the background level is detected outside of the tank system./Not limited by capacity.

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AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPLINE CAPACITY
Campo/Miller, Inc.	LS300, LS300 N/C, LS300-120, LS300-120 XLC, LS300-120 PLUS, LS300-120 PLUS A/S	3.0 gph/2.36 gph/35.36 gallons
EBW, Inc. (originally listed as Campo/Miller)	AS-LS300 Series (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/1.5 gph/396.6 gallons (rigid), 95.5 gallons (flexible), 407.6 gallons (hybrid combination of rigid & flexible) 0.2 gph/0.1 gph/163 gallons (rigid), 39.5 gallons (flexible) 0.1 gph/0.05 gph/163 gallons (rigid), 39.5 gallons (flexible)
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	TS-LLD Line Leak Detector	3.0 gph/1.5 gph/163 gallons 0.2 gph/0.1 gph/163 gallons 0.1 gph/0.05 gph/163 gallons
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	TS-LLD Line Leak Detector (for Flexible Pipelines)	3.0 gph/1.5 gph/49.6 gallons 0.2 gph/0.1 gph/49.6 gallons 0.1 gph/0.05 gph/49.6 gallons
Franklin Fueling Systems(originally listed as Campo/Miller)	TS-LS300 Series (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/1.5 gph/396.6 gallons (rigid), 95.5 gallons (flexible), 407.6 gallons (hybrid combination of rigid & flexible) 0.2 gph/0.1 gph/163 gallons (rigid), 39.5 gallons (flexible) 0.1 gph/0.05 gph/163 gallons (rigid), 39.5 gallons (flexible)
Franklin Fueling Systems	TS-LS500, TS-LS500E Series (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/1.5 gph/ 0.2 gph/0.1 gph/ 0.1 gph/0.05 gph/ 312.2 gallons (rigid), 95.4 gallons (flexible), 415.8 gallons (hybrid combination of rigid & flexible), 176 gallons (Franklin Fueling Systems UPP semi-rigid pipeline)
OMNTEC Mfg., Inc. (originally listed as Campo/Miller)	OMNTEC PLLD, (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/1.5 gph/396.6 gallons (rigid), 95.5 gallons (flexible), 407.6 gallons (hybrid combination of rigid & flexible) 0.2 gph/0.1 gph/163 gallons (rigid), 39.5 gallons (flexible) 0.1 gph/0.05 gph/163 gallons (rigid), 39.5 gallons (flexible)
OPW Fuel Management Systems	Model 327 VLLD Line Leak Detector	3.0 gph/1.5 gph/425.8 gallons (rigid), 109.8 gallons (flexible), 535.7 gallons (hybrid combination of rigid & flexible) 0.2 gph/0.1 gph/425.8 gallons (rigid), 109.8 gallons (flexible), 535.7 gallons (hybrid combination of rigid & flexible) 0.1 gph/0.05 gph/425.8 gallons (rigid), 109.8 gallons (flexible), 535.7 gallons (hybrid combination of rigid & flexible)
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System LLD (Q0011)	3.0 gph/2.0 gph/67.4 gallons 0.2 gph/0.1293 gph/67.4 gallons 0.1 gph/0.0793 gph/67.4 gallons

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AUTOMATIC ELECTRONIC LINE LEAK DETECTOR - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System LLD (for Flexible Pipelines)	3.0 gph/2.0 gph/49.6 gallons 0.1 gph/0.0793 gph/49.6 gallons
OPW Fuel Management Systems (originally listed as Hasstech and later as Petro Vend, Inc.)	LineTite Pipeline Leak Monitor	3.0 gph/2.0 gph/341 gallons 0.1 gph/0.062 gph/341 gallons
OPW Fuel Management Systems (originally listed as Hasstech and later as Petro Vend, Inc.)	LineTite Pipeline Leak Monitor (for Flexible Pipelines)	3.0 gph/2.0 gph/49.6 gallons 0.1 gph/0.062 gph/49.6 gallons
OPW Fuel Management Systems (originally listed as Hasstech and later as Petro Vend, Inc.)	LineTight Pipeline Leak Monitor Model 2001J	3.0 gph/2.5 gph/172 gallons 0.1 gph/0.05 gph/172 gallons
OPW Fuel Management Systems (originally listed as Hasstech and later as Petro Vend, Inc.)	LineTight Pipeline Leak Monitor Model 2001J (for Flexible Pipelines)	3.0 gph/2.5 gph/39.5 gallons 0.1 gph/0.05 gph/39.5 gallons
Ronan Engineering Co.	Ronan X-76 Automatic Line Leak Detector with Version X-76 DM-4 Microprocessor and JT-H2 Line Pressure Sensor	3.0 gph/0.831 gph/45 gallons 0.1 gph/0.066 gph/45 gallons
Tidel Engineering, Inc.	LIPSPC-301-0730-001, LIP-301-0729-001 Line Integrity Probe and Submersible Pump Controller	3.0 gph/2.0 gph/129 gallons 0.1 gph/0.06 gph/129 gallons
Vaporless Manufacturing	Vaporless LD-2100 or PLC-5000 with 98LD-2000PLC (for Rigid and Flexible Pipelines)	3.0 gph/2.5 gph/172 gallons (rigid), 39.5 gallons (flexible) 0.2 gph/0.136 gph/172 gallons (rigid), 39.5 gallons (flexible) 0.1 gph/0.068 gph/172 gallons (rigid), 39.5 gallons (flexible)
Veeder-Root (originally listed as Control Engineers)	Line Leak Detector, Model LLP2	3.0 gph/1.88 gph/89 gallons 0.1 gph/0.05 gph/89 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket PPM 4000, RLM 9000	3.0 gph/2.0 gph/55.1 gallons 0.2 gph/0.1 gph/55.1 gallons 0.1 gph/0.047 gph/55.1 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket PPM 4000, RLM 9000, ST 1401L, ST1801L (for Flexible Pipelines)	0.2 gph/0.1 gph/27.6 gallons 0.1 gph/0.05 gph/27.6 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket ST 1401L, ST1801L, CPT, ProLink	3.0 gph/1.5 gph/172 gallons 0.2 gph/0.1 gph/163 gallons 0.1 gph0.047gph/163 gallon
Veeder-Root	Series 8590 DPLLD with 8600 Series System (for Rigid and/or Flexible Pipelines)	3.0 gph/1.5 gph/109.84 gallons (flexible), 425.84 gallons (rigid), 535.68 gallons (hybrid combination of rigid & flexible) 0.2 gph/0.1 gph/109.84 gallons (flexible), 165.08 gallons (rigid), 267.84 gallons (hybrid combination of rigid & flexible) 0.1 gph/0.05 gph/109.84 gallons (flexible), 165.08 gallons (rigid), 267.84 gallons (hybrid combination of rigid & flexible)

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AUTOMATIC ELECTRONIC LINE LEAK DETECTOR - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
Veeder-Root	TLS-350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Line Leak Detector, Series 8475 VLLD	3.0 gph/1.5 gph/158 gallons 0.2 gph/0.1 gph/158 gallons 0.1 gph/0.079 gph/158 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console with Line Leak Detector Series PA02630000501	3.0 gph/1.5 gph/158 gallons 0.2 gph/0.1 gph/158 gallons 0.1 gph/0.079 gph/158 gallons
Veeder-Root	TLS-350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Line Leak Detector, Series 8475 VLLD (for Flexible Pipelines)	3.0 gph/1.5 gph/49.6 gallons 0.2 gph/0.1 gph/49.6 gallons 0.1 gph/0.079 gph/49.6 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console with Line Leak Detector Series PA02630000501 (for Flexible Pipelines)	3.0 gph/1.5 gph/49.6 gallons 0.2 gph/0.1 gph/49.6 gallons 0.1 gph/0.079 gph/49.6 gallons
Veeder-Root	TLS 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Line Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD	3.0 gph/1.88 gph/98.4 gallons 0.2 gph/0.17 gph/98.4 gallons 0.1 gph/0.05 gph/98.4 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console with Line Leak Detector Series PA0263000060X	3.0 gph/1.88 gph/98.4 gallons 0.2 gph/0.17 gph/98.4 gallons 0.1 gph/0.05 gph/98.4 gallons
Veeder-Root	TLS 350, 350PC, 350R, 350RPC, 350Plus, LLD-300, Red Jacket ProMax Line Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD (for Flexible Pipelines)	3.0 gph/1.5 gph/40.8 gallons 0.2 gph/0.17 gph/40.8 gallons 0.1 gph/0.05 gph/40.8 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console with Line Leak Detector Series PA0263000060X (for Flexible Pipelines)	3.0 gph/1.5 gph/40.8 gallons 0.2 gph/0.17 gph/40.8 gallons 0.1 gph/0.05 gph/40.8 gallons
Veeder-Root	TLS 350, 350PC, 350R, 350RPC, 350Plus, 350J, Red Jacket ProMax Line Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD, Software Version X19 or Higher (for Rigid and/or Flexible Pipelines)	3.0 gph/2.0 gph/212 gallons
Veeder-Root	TLS 350, 350PC, 350R, 350RPC, 350Plus, LLD-300, Red Jacket ProMax Line Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD, Software Version X19 or Higher (for Rigid and/or Flexible Pipelines)	3.0 gph/2.0 gph/119.4 gallons 0.2 gph/0.17gph/119.4 gallons 0.1gph/0.05 gph/119.4 gallons
Veeder-Root	TLS 350, 350PC, 350R, 350RPC, 350Plus, LLD-300, Red Jacket ProMax Line Leak Detector, Series 8494, Wireless Pressurized Line Leak Detector (WPLLD)	3.0 gph/2.5 gph/100 gallons 0.2 gph/0.17 gph/100 gallons 0.1 gph/0.09 gph/100 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC, EMC-PC, EMC Enhanced, EMC-PC Enhanced, LMS Environmental Management Consoles with Line Leak Detector Series PA0263000100X, PA0277000060X	3.0 gph/2.5 gph/100 gallons 0.2 gph/0.17 gph/100 gallons 0.1 gph/0.09 gph/100 gallons

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AUTOMATIC MECHANICAL LINE LEAK DETECTOR

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
Franklin Fueling Systems	FE PETRO STP-MLD+G, STP-MLD+AG, STP-MLD+D and STP-MLD+BD Pipeline Leak Detector (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/3.0 gph/165.1 gallons (rigid), 109.8 gallons (flexible), 274.9 gallons (hybrid combination of rigid & flexible)
Franklin Fueling Systems (originally listed as FE Petro, Inc.)	STP-MLD Pipeline Leak Detector (for Rigid and/or Flexible Pipelines)	3.0 gph/2.0 gph/129.14 gallons (rigid), 101.6 gallons (flexible)
Franklin Fueling Systems (originally listed as FE Petro, Inc.)	STP-MLD-D Pipeline Leak Detector	3.0 gph/2.0 gph/341 gallons
Franklin Fueling Systems (originally listed as FE Petro, Inc.)	STP-MLD-E Flexline Line Leak Detector (for Flexible Pipelines)	3.0 gph/2.0 gph/49.6 gallons
Franklin Fueling Systems (originally listed as FE Petro, Inc.)	STP-MLD-HC and STP-MLD-HCD Pipeline Leak Detectors (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/2.0 gph/396.6 gallons (rigid), 95.5 gallons (flexible), 492.1 gallons (hybrid combination of rigid & flexible)
Tokheim Corp.	Tokheim Pressure Monitor, Models PM 101, 585A-PM	3.0 gph/2.25 gph/78 gallons
Vaporless Manufacturing	Vaporless LD-2000, LD-2000S	3.0 gph/1.7 gph/129 gallons
Vaporless Manufacturing	Vaporless LD-2000E, LD-2000E-S (for Flexible Pipelines)	3.0 gph/2.0 gph/59.6 gallons
Vaporless Manufacturing	Vaporless LD-2000T, LD-2000T-S	3.0 gph/2.5 gph/129 gallons
Vaporless Manufacturing	Vaporless 98LD-2000, 99LD-2000, 99LD-2200, LD-2200 Scout (for Rigid and Flexible Pipelines)	3.0 gph/2.5 gph/172 gallons (rigid), 39.5 gallons (flexible)
Vaporless Manufacturing	Vaporless 99 LD-3000, LD-3000, 99 LD-3000S LD-3000S (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)	3.0 gph/2.0 gph/404 gallons (rigid), 96 gallons (flexible), 500 gallons (hybrid combination of rigid & flexible)
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket DLD, XLD	3.0 gph/2.0 gph/129 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket FX1,FX2	3.0 gph/2.0 gph/316 gallons (FX1), 3.0 gph/2.0 gph/362 gallons (FX2)
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket FX1,FX2 Flexline (for Flexible Pipelines)	3.0 gph/2.0 gph/49 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket FX1D,FX2D, FX1DV, FX2DV Installed in the Big-Flow	3.0 gph/2.0 gph/362 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket FX1DV, FX2DV Installed in the Big-Flow (for Flexible Pipelines)	3.0 gph/2.0 gph/39.4 gallons
Veeder-Root	Red Jacket FX1V, FX2V in Big Flow or Packer Manifold (for Rigid and Flexible Pipelines)	3.0 gph/1.5 gph/416.7 gallons (rigid) 95.4 gallons (flexible)
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket XLP	3.0 gph/2.0 gph/129 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket XLP (for Flexible Pipelines)	3.0 gph/2.0 gph/48.9 gallons

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AUTOMATIC TANK GAUGING METHOD

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Advanced Telemetrics, Ltd.	Model 1100LD Version 1.07	0.2 gph/0.1 gph/30,000 gallons
AMETEK Automation & Process Technologies (originally listed as MagneTek, then Patriot Sensors and Controls Corp.)	7021 Digital Tank Gauge (7030 Series Magnetostrictive Probe) **As of 2005, the 7021 product line became obsolete.**	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
AMETEK Automation & Process Technologies (originally listed as MagneTek, then Patriot Sensors and Controls Corp.)	7021 Digital Tank Gauge (7100 Series Magnetostrictive Probe) **As of 2005, the 7021 product line became obsolete.**	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Andover Controls Corp.	Andover Infinity, Versions CX9900, CX9400, CX9200, CX9000,CMX240 (Magnetostrictive Probe)	0.2 gph/0.1 gph/30,000 gallons
Andover Controls Corp.	Andover Infinity, Versions CX9000, CX9200, CMX240 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Andover Controls Corp.	Versions AC8+, AC256+ (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Barton Instrument Systems, LLC	Barton 3500 ATG	0.2 gph/0.1 gph/75,000 gallons
Dresser Wayne Europe	TIG 5000 0.2 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Dresser Wayne Europe	TIG 1000 (Model 924, 2 inch dia Floats, Magnetostrictive Probe)	0.2 gph/0.1 gph/20,000 gallons
Dresser Wayne Europe	TIG 1000 (Model 924, 4 inch dia Floats, Magnetostrictive Probe)	0.2 gph/0.1 gph/20,000 gallons
Egemin Naamloze Vennootschap	E'SPI III (Mass Buoyancy Probe)	0.2 gph/0.075 gph/15,000 gallons
Egemin Naamloze Vennootschap	E'SPI IV (Mass Buoyancy Probe)	0.2 gph/0.1 gph/15,000 gallons
Engineered Systems, Inc.	Image II (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Environment and Safety	EASI Level-Tru (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Franklin Fueling Systems (originally evaluated under EBW, Inc.)	AutoStik (Magnetostrictive Probe) **As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.**	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Franklin Fueling Systems (originally listed as EBW, Inc.)	AutoStik II, AutoStik Jr. (Magnetostrictive Probe) **As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.**	*Certification applies to those sold before March 1, 2004.* 0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Franklin Fueling Systems (originally listed as EBW, Inc.)	AutoStik II, AutoStik Jr. (Magnetostrictive Probe) **As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.**	*Certification applies to those sold on or after March 1, 2004 to April 1, 2009.* 0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Franklin Fueling Systems (originally listed as EBW, Inc.)	AutoStik II, AutoStik Jr. (INCON, EBW LL2 Magnetostrictive Probe) **As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.**	*Certification applies to those sold on or after March 1, 2004 to April 1, 2009.* 0.2 gph/0.1 gph/30,000 gallons
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	TS 2000 (Magnetostrictive Probe)	0.2 gph/0.058 gph/15,000 gallons

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AUTOMATIC TANK GAUGING METHOD - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Franklin Fueling Systems	INCON T1 Series TS-750, TS-1000, TS-1001, TS-2000, TS-2001, INCON T5 Series, TS-5, TS-608, TS-550, TS-550 evo, TS-5000, TS-5000 evo, Franklin Colibri CL6 & TS-CL6 Series (INCON Magnetostrictive Probe)	0.2 gph/0.1 gph/30,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Gasboy International (originally evaluated under William M. Wilson's Sons)	Gasboy TMS 500 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Hasstech	Tank Compliance Center, Model 700 (7100 Series Magnetostrictive Probe) **Hasstech is no longer in business.**	0.2 gph/0.1 gph/15,000 gallons
Hectronic GmbH	Optilevel Electronic Level Gauge HLS 3010 HF (Capacitance Probe)	0.2 gph/0.1 gph/20,000 gallons
Keekor Environmental Products	TankTite Leak Detection Kernel Version 1.0 with Keeprobe K7 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
L & J Engineering, Inc.	MCG 1100/MCG 8100 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
OMNTEC Mfg., Inc.	OEL 8000, K-OEL 8000, OEL 8000 II, K-OEL 8000 II, OEL 8000III Series Consoles (Proteus B, K, and X Consoles) (MTG - XX Magnetostrictive Probe, 4 inch dia Floats)	0.2 gph/0.1 gph/30,000 gallons
OMNTEC Mfg., Inc.	OEL 8000, K-OEL 8000 (MTG - XX Magnetostrictive Probe, 4 inch dia Floats)	0.1 gph/0.05 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System 1000, 1500, 2000, 3000 and Galaxy 0.2 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe or OPW 924\B TLM-B Magnetostrictive probe)	0.2 gph/0.1 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System 1000, 1500, 2000, 3000 and Galaxy 0.1 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe)	0.1 gph/0.05 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Petrosonic III (Version 4.05 Model 613, 4 inch dia Floats, Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Site Sentinel Models 2 and 3, (Model 613, 2 inch dia Floats, Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Site Sentinel Models 2 and 3, (Model 613, 4 inch dia Floats, Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.06 gph/15,000 gallons
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Site Sentinel Models 1, 2 and 3, iTouch (Model 924A, 2 inch dia Floats, Magnetostrictive Probe)	0.2 gph/ 0.1 gph/20,000 gallons
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Site Sentinel Models 1, 2 and 3, , iTouch (Model 924A with 4 inch dia Floats, and 924B with 2 inch dia or 4 inch dia Floats, Magnetostrictive Probes)	0.2 gph/0.1 gph/20,000 gallons 0.1 gph/0.053 gph/20,000 gallons

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AUTOMATIC TANK GAUGING METHOD - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
OPW Fuel Management Systems	Site Sentinel Model iSite and Site Sentinel Integra (Model 924B with 2 inch dia or 4 inch dia Floats, Magnetostrictive Probes or Q0400-4xx Magnetostrictive Probe)	0.2 gph/0.1 gph/20,000 gallons 0.1 gph/0.033 gph for 2" float and 0.05 gph for 4" float/20,000 gallons
OPW Fuel Management Systems	Site Sentinel Nano (Model 924B with 2 inch dia Floats)	0.2 gph/0.1 gph/20,000 gallons
Phoenix Technologies Division of Phoenix Group (formerly listed as Arizona Instrument Corp. and NESCO)	Encompass MTS IPAM #17-903 (Magnetostrictive Probe #17-9300)	0.2 gph/0.1 gph/15,000 gallons
Phoenix Technologies Division of Phoenix Group (formerly listed as Arizona Instrument Corp. and NESCO)	Encompass USF IPAM #17-901 (Ultrasonic Probe #17-9100)	0.2 gph/0.1 gph/15,000 gallons
Purpora Engineering, Inc. (originally listed by Alert Technologies, Inc.)	Alert Model 2000 In-Tank Mass Measurement Probe System (Mass Buoyancy Probe)	0.2 gph/0.1 gph/15,000 gallons
Pneumercator Company, Inc.	TMS 2000, TMS 3000 (Magnetostricitive Probe)	0.2 gph/0.1 gph/20,000 gallons 0.1 gph/0.05 gph/20,000 gallons
Pneumercator Company, Inc.	TMS 2000, TMS 3000 (Patriot 7100 Magnetostricitive Probe)	0.2 gph/0.1 gph/75,000 gallons
Ronan Engineering Co.	X76CTM Series Monitoring System (Series 7100 Magnetostrictive Probe, X76MP Series Magnetostrictive Probe)	0.2 gph/0.1 gph, Precision Test, Series 7100 Probe/20,000 gallons 0.2 gph/0.115 gph, Precision Test, X76MP Series Probe/20,000 gallons 0.2 gph/0.115 gph, Quick Test, Series 7100 Probe/20,000 gallons 0.2 gph/0.129 gph, Quick Test, X76MP Series Probe/20,000 gallons 0.1 gph/0.05 gph, 0.1gph Test, Series 7100 Probe /20,000 gallons 0.1 gph/0.066 gph, 0.1gph Test, X76MP Series Probe /20,000 gallons
Ronan Engineering Co.	X76CTM Series Monitoring System (MTS UST Series Magnetostrictive Probe)	0.2 gph/0.124 gph, Precision Test/20,000 gallons 0.2 gph/0.168 gph, Quick Test/20,000 gallons 0.1 gph/0.067 gph, 0.1gph Test/20,000 gallons
Ronan Engineering Co.	X76CTM Series Monitoring System (Veeder-Root 8463/8473/8493 Series Magnetostrictive Probe)	0.2 gph/0.1 gph, Precision Test/20,000 gallons 0.2 gph/0.128 gph, Quick Test/20,000 gallons 0.1 gph/0.06 gph, 0.1gph Test/20,000 gallons
Ronan Engineering Co	X-76 ETM, X-76 ETM-4X (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Simmons Corp. (originally listed as Caldwell Systems Corp.)	Simmons/Caldwell Tank Manager (Ultrasonic Probe)	0.2 gph/0.1 gph/ 20,000 gallons 0.1 gph/0.05 gph/ 20,000 gallons
Tidel Engineering, Inc.	Tidel Environmental Monitoring System, 3500 Series (Ultrasonic Probes #401-0009, #401-0010, #401-0023)	0.2 gph/0.1 gph/15,000 gallons
Tidel Engineering, Inc.	Tidel Environmental Monitoring System, EMS 2000, 3000, 3500 Series (Ultrasonic Probes #401-0009, #401-0010, #401-0021, #401-0022)	0.2 gph/0.1 gph/15,000 gallons

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AUTOMATIC TANK GAUGING METHOD - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Tidel Engineering, Inc.	Tidel Environmental Monitoring System, EMS 4000 (Ultrasonic Probe #312-9000) **Tidel Engineering, Inc. no longer manufactures or supports the use of this method.**	0.2 gph/0.1 gph/15,000 gallons
Tidel Engineering, Inc.	Tidel Environmental Monitoring System, EMS 4000 (Ultrasonic Probe #312-9001) **Tidel Engineering, Inc. no longer manufactures or supports the use of this method.**	0.2 gph/0.1 gph/15,000 gallons
TOPS, Inc. (marketed by Westech, Inc.)	Pnuemercator TMS 2000, TMS 3000 (Magnetostrictive Probe)	0.2 gph/0.1 gph/20,000 gallons 0.1 gph/0.05 gph/20,000 gallons
Universal Sensors and Devices, Inc.	TICS-1000 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
USTest, Inc. (previously listed as Sound Products Manufacturing, Inc.)	UST 2001 and UST 2001 Quick Test (Ultrasonic Probe)	0.2 gph (Quick Test)/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Varec, Inc. (originally listed as Coggins Systems, Inc. and later as Endress+Hauser Systems and Gauging)	Fuels Manager with Barton 3500 Dual-Pressure Transducer ATG	0.2 gph/0.1 gph/75,000 gallons
Varec, Inc.	Fuels Manager with Enraf 854 ATG (Servo Buoyancy Probe)	0.2 gph/0.1 gph/76,500 gallons
Varec, Inc. (originally listed as Coggins Systems, Inc. and later as Endress+Hauser Systems and Gauging)	Fuels Manager with MTS Magnetostrictive Probe	0.2 gph/0.13 gph/75,000 gallons
Veeder-Root	8601 Series/TLS4 Series Consoles (Model 8463 Magnetostrictive Probe)	0.2 gph/0.126 gph/30,000 gallons 0.1 gph/0.063 gph/20,000 gallons
Veeder-Root (originally listed as Control Engineers)	CEI 3000 Tank Level Module - Version TLP2, Normal/Rapid Test Mode (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons 0.1 gph/0.05 gph/15,000 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Prolink System RJE Probes # RE-400-094 thru 112-5 (Magnetostrictive Probe)	0.2 gph/-0.116 gph to declare a **leak**/18,000 gallons 0.2 gph/0.084 gph to declare a **gain**/18,000 gallons 0.1 gph/-0.065 gph to declare a **leak**/18,000 gallons 0.1 gph/0.035 gph to declare a **gain**/18,000 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket ATM System Version RLM 5000, 5001, 9000 (Magnetostrictive Probe)	0.2 gph/0.1 gph/15,000 gallons
Veeder-Root (originally listed as Marley Pump Co.)	Sonic Technology (ST) 1400-1800 Series Tank Monitoring System, ProLink System with Ultrasonic Network Card, ATG Automatic Tank Gauging Monitor, LLM Series Liquid Level Monitor, FMS Fuel Management Monitor (Ultrasonic Probe)	0.2 gph/0.1 gph/73,530 gallons 0.1 gph/0.05 gph/18,000 gallons
Veeder-Root	TLS-200, 200i, 250i, 300, 300C, 300i, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 7842 Digital Sensing Capacitance Probe)	0.2 gph/0.1 gph/15,000 gallons

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AUTOMATIC TANK GAUGING METHOD – Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console EMC Basic Monitoring System Tank Monitors 2, 3, 2.1, 3.1 PAO238000XXXX (Capacitance Probe)	0.2 gph/0.1 gph/15,000 gallons
Veeder-Root	TLS-200, 200i, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 8472 Digital Sensing Capacitance Probe)	0.2 gph/0.126 gph/15,000 gallons 0.1 gph/0.071 gph/15,000 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console EMC Basic Monitoring System Tank Monitors 2.1,3.1, PAO264XXX0000 (Capacitance Probe)	0.2 gph/0.126 gph/15,000 gallons 0.1 gph/0.071 gph/15,000 gallons
Veeder-Root	TLS-200, 200i, 250, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 8473 Digital Sensing Magnetostrictive Probe)	0.2 gph/0.093 gph/15,000 gallons 0.1 gph/0.071 gph/15,000 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console EMC Basic Monitoring System Tank Monitors 2.1, 3.1, PAO265XXX0000 (Magnetostrictive Probe)	0.2 gph/0.093 gph/15,000 gallons 0.1 gph/0.071 gph/15,000 gallons
Veeder-Root	TLS-250, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, 450 Red Jacket ProMax and ProPlus UST ATGS (Models 8473, 8493 Magnetostrictive Probes)	0.2 gph/0.126 gph/15,000 gallons 0.1 gph/0.071 gph/15,000 gallons
Veeder-Root	TLS 300, 350, 350R, 350Plus, 8600 Series (Consoles TLS-450 and TLS-450PLUS), TLS2, Red Jacket ProMax and ProPlus (Models 8463, 8473, 8493 Magnetostrictive Probes)	0.2 gph/0.126 gph/20,000 gallons 0.1 gph/0.071 gph/20,000 gallons
Veeder-Root	TLS 300, 350, 350R, 350Plus, 8600 Series (Consoles TLS-450 and TLS-450PLUS), TLS2, Red Jacket ProMax and ProPlus (Models 8463, 8473, 8493 Magnetostrictive Probes)	0.2 gph/0.126 gph/30,000 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC/PC Series Monitoring Systems PA0265, PA0300 (Magnetostrictive Probe)	0.2 gph/0.126 gph/20,000 gallons
World Telemetry, Inc.	Data Link ATGS v2.6-h (Magnetostrictive Probe)	0.2 gph/0.1 gph/20,000 gallons

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BULK UNDERGROUND STORAGE TANK LEAK DETECTION METHOD (50,000 gallons or greater)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PRODUCT SURFACE AREA
ASTTest Services, Inc.	ASTTest Mass Balance Leak Detection System	[(product surface area in ft² ÷ 5,575 ft²) x 0.88 gph]/[(product surface area in ft² ÷ 5,575 ft²) x 0.44 gph]/13,938 ft²
Engineering Design Group, Inc.	EDG XLD 2000 Plus (Revision 1.02) Leak Detection System (MTS DDA Magnetostrictive Probe)	[(product surface area in ft² ÷ 12,074 ft²) x 1.92 gph]/[(product surface area in ft² ÷ 12,074 ft²) x 0.96 gph]/12,076 ft²
Engineering Design Group, Inc.	Ronan X-76 CTM Automatic Tank Gauging System (MTS Level Plus UST Probe)	[(product surface area in ft² ÷ 564 ft²) x 0.2 gph]/[(product surface area in ft² ÷ 564 ft²) x 0.1 gph]/846 ft²
Leak Detection Technologies	MDleak Enhanced Leak Detection and Leak Location Method	0.005 gph/A tank should not be declared tight when chemical marker is detected outside of the tank/Not limited by capacity.
Mass Technology Corp.	Precision Mass Measurement Systems SIM-1000 and CBU-1000 (24 hour test)	[(product surface area in ft² ÷ 1,257 ft²) x 0.1 gph]/[(product surface area in ft² ÷ 1,257 ft²) x 0.05 gph]/ 3,143 ft²
Mass Technology Corp.	Precision Mass Measurement Systems SIM-1000 and CBU-1000 (48 hour test)	[(product surface area in ft² ÷ 6,082 ft²) x 0.294 gph]/[(product surface area in ft² ÷ 6,082 ft²) x 0.147 gph]/6,082 ft²
Mass Technology Corp.	Precision Mass Measurement Systems SIM-1000 and CBU-1000 (72 hour test)	[(product surface area in ft² ÷ 14,200 ft²) x 0.638 gph]/[(product surface area in ft² ÷ 14,200 ft²) x 0.319 gph]/ 35,500 ft²
Praxair Services, Inc. (originally listed as Tracer Research, Corp.)	Tracer ALD 2000 Automated Tank Tightness Test	0.1 gph/A tank system should not be declared tight when tracer chemical or hydrocarbon greater than the background level is detected outside of the tank./Not limited by capacity.
Universal Sensors and Devices, Inc.	LTC-1000 (Mass Buoyancy Probe)	[(product surface area in ft² ÷ 14,244 ft²) x 1.4 gph]/[(product surface area in ft² ÷ 14,244 ft²) x 0.7 gph]/35,610 ft²
Universal Sensors and Devices, Inc.	LTC-2000 (Differential Pressure Probe)	[(product surface area in ft² ÷ 14,244 ft²) x 3.0 gph]/[(product surface area in ft² ÷ 14,244 ft²) x 1.5 gph]/35,610 ft²
Varec, Inc. (originally listed as Coggins Systems, Inc. and later as Endress+Hauser Systems and Gauging)	Fuels Manager and Remote Terminal Unit RTU/8130 (MTS Magnetostrictive Probe)	[(product surface area in ft² ÷ 616 ft²) x 0.2 gph]/[(product surface area in ft² ÷ 616 ft²) x 0.1 gph]/924 ft²
Varec, Inc. (originally listed as Coggins Systems, Inc. and later as Endress+Hauser Systems and Gauging)	Fuels Manager with Barton Series 3500 ATG (48 hour test) (72 hour test)	[(product surface area in ft² ÷ 6,082 ft²) x 2.0 gph]/[(product surface area in ft² ÷ 6,082 ft²) x 1.0 gph]/15,205 ft²
Varec, Inc.	FuelsManager with Enraf 854 ATG (Servo Buoyancy Probe)	[(product surface area in ft² ÷ 11,786 ft²) x 3.00 gph]/[(product surface area in ft² ÷ 11,786 ft²) x 1.50 gph]/ 11,786 ft²
Varec, Inc.	FuelsManager with MTS M-Series ATG (MTS Magnetostrictive Probe)	[(product surface area in ft² ÷ 11,786 ft²) x 4.50 gph]/[(product surface area in ft² ÷ 11,786 ft²) x 2.25 gph]/ 11,786 ft²
Vista Research, Inc. and Naval Facilities Engineering Service Center	LRDP-24 (V1.0.2, V1.0.3)	[(product surface area in ft² ÷ 6,082 ft²) x 2.0 or 3.0 gph]/[(product surface area in ft² ÷ 6,082 ft²) x (2.0 or 3.0 gph - 0.223 gph)]/15,205 ft²
Vista Research, Inc. and Naval Facilities Engineering Service Center	LRDP-48 (V1.0.2, V1.0.3)	[(product surface area in ft² ÷ 6,082 ft²) x 2.0 or 3.0 gph]/[(product surface area in ft² ÷ 6,082 ft²) x (2.0 or 3.0 gph - 0.188 gph)]/15,205 ft²

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BULK UNDERGROUND STORAGE TANK LEAK DETECTION METHOD (50,000 gallons or greater) - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PRODUCT SURFACE AREA
Vista Research, Inc. and Naval Facilities Engineering Service Center	LRDP-24 (V1.1)	[(product surface area in ft^2 ÷ 6,082 ft^2) x 0.856 gph]/[(product surface area in ft^2 ÷ 6,082 ft^2) x 0.632 gph]/15,205 ft^2
Vista Research, Inc. and Naval Facilities Engineering Service Center	LRDP-48 (V1.1)	[(product surface area in ft^2 ÷ 6,082 ft^2) x 0.749 gph]/[(product surface area in ft^2 ÷ 6,082 ft^2) x 0.563 gph]/15,205 ft^2

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CONTINUOUS IN-TANK LEAK DETECTION METHOD (CONTINUOUS AUTOMATIC TANK GAUGING)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Dresser Wayne Europe	TIG 5000 ATG System (Q0400-4xx Magnetostrictive Probe)	0.2 gph/0.1 gph/35,000 gallons
EBW, Inc.	AutoStik II, AutoStik Jr. with SCALD 2.0 (INCON TSP-LL2 Magnetostrictive Probe) *Certification for those sold on or after March 1, 2004*	0.2 gph/0.1 gph/49,336 gallons
Franklin Fueling Systems	INCON T1 Series TS-750, TS-1000, TS-1001, TS-2000, TS-2001, INCON T5 Series TS-5 , TS-608, TS-550, TS-550 evo, TS-5000, TS-5000 evo, Colibri CL6 & TS-CL6 Series with SCALD 2.0 (INCON TSP-LL2 and FMP-LL3 Magnetostrictive Probe)	0.2 gph/0.1 gph/49,336 gallons
Franklin Fueling Systems	INCON T5 Series, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo, and Colibri consoles with SCALD 3 (INCON TSP-LL2 and FMP-LL3 Magnetostrictive Probe)	0.2 gph/0.16-0.17 gph (single tanks), 0.135-0.155 gph (manifolded tanks)/32,891 gallons
Hectronic GmbH	Hectronic Optilevel Dynamic Leak Detection System, Optilevel CITLDS (Capacitance Probe)	0.2 gph/0.1 gph/11,869 gallons (single tanks), 23,778 gallons (manifolded tanks)
OMNTEC Mfg., Inc.	OEL 8000 II, K-OEL 8000 II, OEL 8000 III (Proteus Series-B, K and X) Monitoring System with CITLDS (MTG - XX Magnetostrictive Probe)	0.2 gph/0.1 gph/18,000 gallons
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System 1000,1000EG, 1500, 2000, 3000 and Galaxy ATG Systems (Q0400-4xx Magnetostrictive Probe or OPW 924/B TLM-B Magnetostrictive Probe)	0.2 gph/0.1 gph/35,000 gallons
OPW Fuel Management Systems	Site Sentinel Model iSite and Site Sentinel Integra with SLD Version 1 (Model 924B Magnetostrictive Probes with 2 inch dia or 4 inch dia Floats or Q0400-4xx Magnetostrictive Probes)	0.2 gph/0.1 gph/30,258 gallons (single tanks and manifolded tank groups up to 3 tanks)
Simmons Corp. (originally listed as Caldwell Systems Corp.)	Simmons/Caldwell Tank Manager Monitoring Systems with CITLDS (Ultrasonic Probe)	0.2 gph/N/A for qualitative methods/18,000 gallons
Veeder-Root	8600 Series and 8601 Series Consoles Monitoring Systems with CSLD	0.2 gph/0.15-0.16 gph (single tanks), 0.12-0.14 gph (manifolded tanks)/43,722 gallons
Veeder-Root	TLS-300i, 300J, 350, 350R, 350Plus, 450, Red Jacket ProMax and ProPlus Monitoring Systems with CSLD (Models 8463, 8473, 8493 Magnetostrictive Probes)	0.2 gph/0.16 gph (single tanks), 0.15 gph (manifolded tanks)/38,170 gallons
Veeder-Root	TLS-300i, 300J, 350, 350R, 350Plus, 450, Red Jacket ProMax and ProPlus Monitoring Systems with CSLD (Models 8463, 8473, 8493 Magnetostrictive Probes)	0.2 gph/0.16 gph (single tanks), 0.15 gph (manifolded tanks)/38,170 gallons
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC, EMC Basic, EMC Enhanced with CSLD PAO265XXXX100, PA0300XXXX100 (Magnetostrictive Probe)	0.2 gph/0.16 gph(single tanks), 0.15 gph (manifolded tanks)/38,170 gallons

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CONTINUOUS IN-TANK LEAK DETECTION METHOD (CONTINUAL RECONCILIATION)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Simmons Corp.	ClearView (Version I) Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines	0.2 gph/0.1 gph/36,096 gallons
Warren Rogers Associates, Inc.	WRA PetroNetwork S3 (Version D) Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines	0.2 gph/0.1 gph/100,000 gallons

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CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE/MAX TANK OR MAX PIPELINE LENGTH (Whichever is applicable)
Ameron International	Dualoy 3000/LCX and MCX Pipe Monitoring System Liquid Filled Interstitial Space	An applicable liquid is used to fill the Ameron Dualoy 3000/LCX and MCX fiberglass double-wall pipe interstice. A reservoir at the high point of the system contains a dual-point level sensor that will alarm if the liquid level is too high or too low./344 feet
Ameron International	Dualoy 3000/LCX and MCX Pipe Monitoring System Liquid Filled Pressurized Interstitial Space	An applicable liquid is used to fill the Ameron Dualoy 3000/LCX and MCX fiberglass double-wall pipe interstice, which is pressurized using an air compressor or gas bottle. A reservoir contains a dual-point level sensor that will alarm if the liquid level is too high or too low./344 feet
Containment Solutions, Inc. (originally listed as Fluid Containment and O/C Tanks)	FCI Liquid Filled Interstitial Monitor Tank Model DWT6 with Model FHRB 810 Level Sensor	A Fluid reservoir is attached to the top of the tank and is open to the interstice through the bottom and is normally filled with a brine solution in freeze areas or water in non-freeze areas. The reservoir is equipped with a dual-point level sensor to provide for low level and high level alarms./For use with all Containment Solution tank sizes.
Western Fiberglass, Inc.	Co-Flow Hydraulic Interstitial Monitoring System	Propylene glycol is used to fill the Western Fiberglass, Inc., double-walled/coaxial flexible pipeline interstice. Two reservoirs are used to contain the liquid, one at each end of the system./200 feet
Western Fiberglass, Inc.	Co-Flow Hydraulic Interstitial Monitoring System Propylene Glycol Filled Pressurized Interstitial Space	Propylene glycol is used to fill the Western Fiberglass, Inc., double-walled/coaxial flexible pipe interstice. A pressurized cylinder is used to maintain pressure in the reservoir./200 feet
Western Fiberglass, Inc.	Liquid-Filled Reservoir for Double-Wall Sumps with Liquid Sensor Models WF-3 and WF-750	Propylene glycol is used to fill the Western Fiberglass double-walled sump or under dispenser containment sump interstice./Not applicable.
Xerxes Corp.	Xerxes Trucheck Continuous Leak Detection System	A Fluid reservoir is attached to the top of the tank and is open to the interstice through the bottom and is filled with a brine solution. The reservoir is equipped with an electronic probe to provide for low level and high level alarms./For use with all Xerxes tank sizes.

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CONTINUOUS INTERSTITIAL LINE MONITORING METHOD (PRESSURE/VACUUM)

VENDOR	EQUIPMENT NAME	LEAK RATE/OPERATING PRINCIPLE/ MAX PIPELINE LENGTH
SGB (Sicherungsgeratebau GmbH)	Overpressure Leak Detection System Model DLR-G	Not determined /System uses pressurized nitrogen gas to continuously maintain an overpressure within the interstitial space of double-walled piping. System is designed to activate a visual and acoustic alarm before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled piping./Not applicable

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CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

VENDOR	EQUIPMENT NAME	LEAK RATE/OPERATING PRINCIPLE/MAX TANK CAPACITY
Beaudreau Electric, Inc.	SytemOne 522T Monitor	Not determined /System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping. System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled tanks and double-walled piping./Not applicable
Bell Avon, Inc.	VIGILANT Leak Detection System	0.1 gph/System alarms when changes in interstitial vacuum exceed a predetermined change in slope versus time curve./15,000 gallons
Franklin Fueling Systems	Secondary Containment Monitoring (SCM) Incon TS-SCM and EBW AS-SCM	Not Determined/ System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping. System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled tanks and double-walled piping./Volume of monitored interstitial space must not exceed 8 m^3 (2114 gal) for tanks and 10 m^3 (2642 gal) for piping.
HT Technologies, Inc.	Vakumatik Models V 60, V 70 Ex	0.1 gph/System alarms when liquid enters interstitial space and vacuum decreases (pressure increases) above 34 millibars./20,000 gallons
OPW Fuel Management Systems (originally listed as Advanced Fuel Filtration Systems, Inc.)	Continuous Vacuum Monitoring System (CVMS)	Not determined/System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping. System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment, and is capable of detecting breaches in both the inner and outer walls of double-walled tanks and double-walled piping./Not applicable
SGB (Sicherungsgeratebau GmbH)	Vacuum Leak Detection System Models VL 30p, VL 350p, and VL 400p	Not determined /System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of a double-walled tank or piping. System is designed to activate a visual and acoustic alarm before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled tanks or double-walled piping./Not applicable

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CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM) - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/OPERATING PRINCIPLE/MAX TANK CAPACITY
SGB (Sicherungsgeratebau GmbH)	Vacuum Leak Detection System Models VLX 30, VLX 350, and VLX 400	Not determined /System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of a double-walled tank. System is designed to activate a visual and acoustic alarm before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled tanks./Not applicable
Veeder-Root	Secondary Containment Leak Detection (SCLD) TLS-350/ProMax/EMC Console with Vacuum Sensors 857280-100, 200, 30x, or Assembly 332175-001	Not Determined/ System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping. System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment. System is capable of detecting breaches in both the inner and outer walls of double-walled tanks and double-walled piping./Not applicable

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CONTINUOUS PRESSURIZED PIPING LEAK DETECTION METHOD (CONTINUOUS ELECTRONIC LINE LEAK DETECTION)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
Franklin Fueling Systems	TS-LS500, TS-LS500E Series with SLLD (for Rigid and/or Flexible Pipelines)	0.2 gph/0.08 gph/391,250 gallons /312.2 gallons (rigid), 95.4 gallons (flexible), 415.8 gallons (hybrid combination of rigid & flexible), 176 gallons (Franklin Fueling Systems UPP semi-rigid pipeline).

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INTERSTITIAL DETECTOR (LIQUID-PHASE)

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Beaudreau Electric, Inc.	Model DFR-1 Liquid Level Switch, Model EOS100, 510 and 516 Discriminating Sensor with Models 500 and 500C Controllers, Model 522 Remote Monitoring System, Model 522T Monitoring System, and ESite Monitoring System	float switch (Model DFR-1), refractive index of liquids (Model EOS100), polymer strip, hydrocarbon-only (Model 510), optical sensor and conductivity (Model 516)
Beaudreau Electric Marketing, LLC	Model MPC100 Controller with Models DCS140L, DCS140NL Liquid Sensors and Model DCS140D Discriminating Liquid Sensor	float switch
Cambria Corporation	Models EOS80, EOS100, and EOS120 Discriminating Sensors with Beaudreau Electric, Inc.'s Models 522 Remote Monitoring System and Model 522T Monitoring System, and Cambria Mark I Monitoring System	Evanescent wave absorption / refractive index of liquids
Containment Solutions, Inc. (originally listed as Fluid Containment and O/C Tanks)	DDAS 910 Discriminating Sensor for Dry Annular Spaces; DCBS 900 Discriminating Sensor for Collars, Bulkheads, Sumps	capacitance change
Containment Solutions, Inc. (originally listed as Fluid Containment and O/C Tanks)	FOVF 600B, FOVF 600S Non-Discriminating Sensors for High Level Overfill (Brass, Steel); FCBS 700 Non-Discriminating Sensors for Collars, Bulkheads, Sumps; FDAS 710 Non-Discriminating Sensor for Dry Annular Spaces; FHRB 810 Non-Discriminating Sensor for Reservoirs	float switch
EBW, Inc.	AutoStik Sensors LS-5, LS-7, LS-10, LS-15, LS-20, LS-35, LS-3A, LS-30A	float switch
Franklin Fueling Systems	Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo with FMP-DIS Discriminating Interstitial Sensor and FMP-EIS Electro-Optical Interstitial Sensor	conductivity, electro-optic
Franklin Fueling Systems	Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo with FMP-DDS Discriminating Dispenser Sump Sensor and FMP-DTS Discriminating Turbine Sump Sensor	float switch
Franklin Fueling Systems	Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo with FMP-HFS Horizontal Float Switch, FMP-HLS High Level Float Switch, FMP-HIS Hydrostatic Interstitial Float Sensor, and FMP-HIS-XL Hydrostatic Interstitial Float Sensor	float switch
Franklin Fueling Systems (originally listed as Beaudreau Electric, Inc.)	Model 404-4 Controller with Models S404 and S406 Liquid Level Sensors,	float switch (Model S404), refractive index of liquids (Model S406)
Franklin Fueling Systems	S940 Alarm Console with TSP-HFS Horizontal Float Switch Sensor, TSP-HLS High Level Sensor, TSP-UHS Universal Hydrostatic Sensor, and TSP-ULS Universal Liquid Sensor	float/reed switch
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	Tank Sentinel TS-1000EFI, TS-1001/TS-2001, and TS-5xxx Series with TSP-DIS BriteSensor; Tank Sentinel TS-1000/TS-2000, TS-1001/TS-2001, and TS-5xxx Series withTSP-EIS Standard Sensor; Tank Sentinel TS-1000/TS-2000 with TSP-PS Liquid Contact Sensor	opto-electric
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	Tank Sentinel TS-1000EFI , TS-1001/TS-2001, and TS-5, TS-550, and TS-5000 with TSP-HIS BriteSensor; Tank Sentinel TS-1000/TS-2000, TS-1001/TS-2001, and TS-5, TS-550, and TS-5000 with TSP-HLS Standard Sensor, TSP-ULS, and TSP-UHS Standard Sensors	magnetic switch

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INTERSTITIAL DETECTOR (LIQUID-PHASE) - Continued

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Franklin Fueling Systems	Tank Sentinel TS-5xxx Series with TSP-DMS 12 and 24 Inch Discriminating Magnetostrictive Sensors	Magnetostrictive probe with dual floats
Fuel Oil Systems	Gems LS-750, Innovative Solutions L176-0108-0803 (Kele FS7SS), and Madison M4602-XXXX Sensors with Fuels Oil Systems Console – FOS-0160-1, software version 001	float switch
Gems Sensors, Inc. (originally listed as Warrick Controls, Inc.)	DMS-47X-X-X(-X), DMS-57X-X-X(-X) Monitoring Panels with Models DLP-1-NC, DLP-2-NC, DLP-2-NO Sensors	float switch
Gems Sensors, Inc. (originally listed as Warrick Controls, Inc.)	Model DFP-25 Sensor	product solubility
Morrison Bros. Co.	924LS, 924 and 925 Sensor for use with the 918AC, 918S, 918D and 918Q Alarm Console	float switch
Oklahoma Environmental Services (originally listed as Arizona Instrument Corp., then NESCO, and then Summit Holdings, Inc. – Oklahoma Environmental, Inc.)	Soil Sentry Liquid 330 (17-330-A/17-330-B), TLM-830, ENCOMPASS APAM with Probes 17-141A, 17-142A, 17-143A, 17-144A	refraction
OMNTEC Mfg., Inc	Controller Models Series LPD, LU, OEL8000 with Sensors L-LL-R-1, LS-ASC, PDS-ASC, PDWS-1, PDWF-1	refractive index of liquids (all), electrical conductivity (PDS-ASC, PDWS-1, PDWF -1)
OMNTEC Mfg., Inc	Controller Models OEL 8000 II, K-OEL 8000 II with Liquid level Sensors BX-L, BX-LS, BX-LWF, BX-RES	optical sensor
OMNTEC Mfg., Inc	Controller Models OEL 8000 II, K-OEL 8000 II with Liquid level Sensors BX-PDS, BX-PDWF, BX-PDWS	optical sensor, conductivity
OMNTEC Mfg., Inc	Controller Models OEL 8000 III (Proteus B, K, and X Consoles) with Liquid level Sensors BX-PDS, BX-PDWF, BX-PDWS, BX-LS, BX-LV, BX-LWF, BX-RES	optical sensor (all), electrical conductivity (PD-PDS, BX-PDWF, and BX-PDWS)
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO System, Leak Sensor II, Leak Sensor Jr. Thermistor and Proximity probes	thermal conductivity, proximity switch
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO 2000, 3000, Leak Sensor II, Leak Sensor Jr. Systems Q0001-005 Interstitial Space Flood Sensor, and EECO 1500, 2000, 3000 Systems Q0003-005 Wet Interstitial Sensor	float switch
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO 1500, 2000, 3000 Systems with Q0003-001 Discriminating Dispenser Pan Sensor, Q0003-002 Discriminating STP Sump Sensor, Q0003-003 Discriminating Interstitial Sensor, Q0003-006 Liquid Only Interstitial Sensor, Q0003-009 Liquid Float Sensor	float switch and polymer strip (Q0003-001, Q0003-002), optical prism and conductivity (Q0003-003), optical prism (Q0003-006), float switch (Q0003-009)
OPW Fuel Management Systems	iSite, iTouch, and EECO Series Fuel Management Systems with OPW Intelligent Sensor (and Company Equivalent): 30-0231-S, 30-0230-S (30-3221-1A/1B, Q003-009); 30-0231-L (30-3221-1); 30-0232-D-10/D-20/D-10B/D-20B (Q0003-001/002); and the 924B Sump Sensor	float switch

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INTERSTITIAL DETECTOR (LIQUID-PHASE) - Continued

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Petrosentry IV, Petrosentry VIII, SiteSentinel Liquid Sensor, Universal Sump Sensor, Universal Reservoir Sensor	thermal conductivity (Liquid Sensor) float switch (Universal Sump Sensor, Universal Reservoir Sensor)
PermAlert	LiquidWatch Leak Detection System LW64-IS with PHLR-LW and PHLR-P-LW Hydrocarbon Probes	Product permeable, magnetic membrane switch
PermAlert	PAL-AT Models AT20C, AT30C, AT50C, AT75C, AT20K, AT30K, AT40K, AT80K with PHLR-S/L and PHLR-P-S/L Hydrocarbon Probes	Product permeable, magnetic membrane switch
PermAlert	PAL-AT Models AT20C, AT50C, AT40K with PHL Hydrocarbon Sensor	electrical conductivity
PermAlert	TankWatch Models PHM10, PHMS with Combination Hydrocarbon/Water Probe, Hydrocarbon Probe	electrical conductivity
Pneumercator Company, Inc.	LC 1000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 2000, TMS 3000 with Level Sensor Models LS600AB, RSU800	float switch
Pneumercator Company, Inc.	LC 1000 Series, LC2000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 2000, TMS 2000W,TMS 3000 with Level Sensor Models LS600 Series, LS600LD Series, LS610	float switch
Pneumercator Company, Inc.	LC 1000 Series, LC 2000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 1000 Series, TMS 2000, TMS 2000W, TMS 3000 with Level Sensor Models RSU800, RSU810	float switch
Pneumercator Company, Inc.	LC 2000, TMS 2000, TMS 3000 with ES825-100F, 100XF, 100CF Non-Discriminating Liquid Sensors, ES825-200F, 200XF Discriminating Liquid Sensors	optical sensor, electrical conductivity
Pneumercator Company, Inc.	LDE 700, LDE 740, LDE 9000 with Sensor Probe Models 9-901, 9-902, 9-903	capacitance
Pneumercator Company, Inc.	TMS 1000, TMS 2000W (wireless) with ES825-300F, 300XF, 300CF Non-Discriminating Liquid Sensor, ES825-400F, 400XF Discriminating Liquid Sensor	optical sensor, electrical conductivity
Pneumercator Company, Inc.	TMS 2000, TMS 3000 with ES820-100 Non-Discriminating Liquid Sensor, ES820-200 Discriminating Liquid Sensor	optical sensor
Preferred Utilities Manufacturing Corporation	PWCN4-CDXRxxx Controller, RBS Non-Discriminating Sensors for Sumps and Containments; PS-LDS Non-Discriminating Sensor for Sumps and Containments; PLS Non-Discriminating Sensor for Reservoirs	reed switch/float
Preferred Utilities Manufacturing Corporation	TG-EL-D3 Controller with HD-A1 Sensor	optical sensor, electrical conductivity
Preferred Utilities Manufacturing Corporation	TG-EL-D4A Fuel Sentry Control Unit, HD-A2-C Optical Discriminating Sensor	optical sensor
Robertshaw Industrial Products	Centeron High Level Alarm System (SM Series Switch Monitor with Centeron FSL Series Float Switches: Models *FSL AAA BB CC DD EE 0 and *FSL AAA BB CC DD EE C)	reed switch
Ronan Engineering Co.	Ronan Controller Models X76S; X76VS; X76LVC; TRS76; X76ETM, LVCS; X76CTM-N4; X76ETM-4X; X76-4X, -3, -6, -9, -12; X76AST-4X with Ronan Sensors LS-3 N.C.; LS-3 N.O.; LS-30; LS-7; HVA; LS-3SS; LS-1	float switch
S Bravo Systems, Inc.	Model B-2000 Shallow Steel Dispenser Containment System, Model B-8600 Aboveground/Marina Steel Dispenser Containment System	float switch

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NTERSTITIAL DETECTOR (LIQUID-PHASE) - Continued

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Simmons Corp. (originally listed as Caldwell Systems Corp.)	Simmons/Caldwell Tank Manager Liquid Sensor, Version TMLIQ	ultrasonic
Simone Engineering, Inc.	Magnetrol Model 918 Ultrasonic Point Level Switch with ABB Automation Freelance 2000 Control System	electrical conductivity, ultrasonic
Tidel Engineering, Inc.	EMS-3500 Liquid Discriminatory Probes Part 301-0635, Containment Sump Probes Part 301-0642, Tidel Detector #301-0752-001	electrical conductivity/hydrocarbon sensitive polymer (part 301-0635) magnetic switch/float and hydrocarbon sensitive polymer (part 301-0642) float switch (#301-0752-001)
Tyco Thermal Controls LLC (originally listed as Raychem Corp.)	TraceTek Alarm and Locator Modules with TT502, TT5000, TT3000 Fuel Sensing Cable	electrical conductivity
Tyco Thermal Controls LLC	TraceTek Alarm and Locator Modules with TT-FFS Fast Fuel Sensor	electrical conductivity
Universal Sensors and Devices, Inc.	Leak Alert System Models LAL-100, LA-01, LA-02, LA-04, LA-X4, LA-08, DLS-01, LS-20, LS-36, LS-70, CATLAS with LALS-1 Liquid Sensor	thermal conductivity
Veeder-Root	8601 Series, 8600 Series, and TLS-3xx Series with Interstitial Liquid Sensor for Fiberglass Tanks 794390-409	float switch
Veeder-Root	Dispenser Pan Sensor 847990-001 and Differentiating Dispenser Pan Sensor 847990-002 with Dispenser Control Interface	product permeable, reed switch/float
Veeder-Root	ILS-250, 350, TLS-250i, 250i Plus, 300, 300C, 300i, 300PC, TLS-350 Series, TLS-450 Series, Red Jacket ProMax and ProPlus with Interstitial Liquid Sensor for Fiberglass Tanks 794390-401, 404, 407, 409 Interstitial Liquid Sensor for Steel Tanks 794390-420, 460 Liquid Sensor for Sumps 0794390-206	float switch
Veeder-Root	ILS-350, TLS-300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, TLS-450 Series, Red Jacket ProMax and ProPlus with Solid-State Pan/Sump Sensor 794380-321, 351, Piping Sump Sensor 794380-208, 209, Micro Sensor 794380-340	float/reed switch (794380-208, 209), optical (794380-321, 340, 351)
Veeder-Root	ILS-350, TLS-300 Series, TLS-450 Series, EMC, EMC Series, Red Jacket ProPlus with Single-Point Mini Hydrostatic Sensor 794380-304	float switch
Veeder-Root	ILS-350, TLS-300 Series, TLS 350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Position Sensitive Sensor 794380-323	float switch
Veeder-Root	TLS4; TLS4B; TLS-300, 300C, 300i, 300PC; TLS-350, 350PC, 350R, 350R-PC; TLS-450 Series; Red Jacket ProMax, ProPlus, and ProPlusPC with Position Sensitive Interstitial Sensor 794380-333	float/reed switch
Veeder-Root	TLS-300 Series, TLS-350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Float Sensor 794380-430	float switch
Veeder-Root	TLS-300 Series, TLS-350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Single Stage Hydrostatic Sensor 794380-301, Dual Stage Hydrostatic Sensors 794380-302, 303	float switch

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INTERSTITIAL DETECTOR (LIQUID-PHASE) - Continued

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Veeder-Root	TLS-300, 300i, TLS-350 Series, TLS-450 Series, Red Jacket ProMax and ProPlus with Discriminating Dispenser Pan Sensor 794380-322, Discriminating Containment Sump Sensor 794380-352	product permeable, reed switch/float
Veeder-Root	TLS-350 Series, TLS-450 Series, EMC, EMC-PC, EMC Enhanced, EMC-PC Enhanced, and Red Jacket ProMax with Magnetostrictive Sump Sensor Series 857060-xxx and 857080-xxx	magnetostrictive probe with dual floats
Veeder-Root	TLS-350 Series, TLS-450 Series, Red Jacket ProMax with Interstitial Liquid Sensor 794380-341, Dispenser Pan Sensor 794380-320, Discriminating Containment Sump Sensor 794380-350, Discriminating Fibertrench Sensor 794380-360, 361, 362	capacitance change/ultrasonic (794380-341) electrical conductivity/ultrasonic (794380-320, 350, 360, 361, 362)
Veeder-Root	TLS-350, 350R Series, TLS-450 Series, Red Jacket ProMax with Discriminating Interstitial Sensor 794380-343, Micro Sensor 794380-344	optical sensor and conductivity (794380-343) optical sensor (794380-344)
Veeder-Root	TLS-350, 350R Series, TLS-450 Series, Red Jacket ProMax with Interstitial Sensor 794380-345	optical sensor
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket Electronics RE400-058-5, RE400-059-5, RE400-147-5, RE400-148-5 Overfill Sensor, RE400 111-5 Sump Sensor, RE400-203-5 Optical Liquid Discrimination Sensor, RE400-204-5 Dispenser Pan Monitor, RE400-180-5 Liquid Refraction Sensor	float switch (RE400-058-5, RE400-059-5, RE400-147-5, RE400-148-5, RE400-111-5), electrical conductivity and optical (RE400-203-5), conductive polymer (RE400-204-5), optical (RE400-180-5)
Veeder-Root (originally listed as Marley Pump Co.)	Red Jacket Electronics RE400-179-5 to RE400-199-5 Combination High Level/Low Level Sensor, RE400-042-5 Hydrostatic Sensor, Red Jacket PPM 4000 with Optical Liquid Discrimination Sensor	float switch (RE400-179-5 to RE400-199-5, RE400-042-5) optical sensor (PPM4000)
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	PA02590XXX000 (Same as Veeder-Root 794390-401, 404, 407, 409), PA02591144000 (Same as Veeder-Root 794390-420, 460), PA02592000010 (Same as Veeder-Root 794380-206)	float switch

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INTERSTITIAL TANK TIGHTNESS TEST METHOD

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Containment Solutions Inc. (originally listed as Fluid Containment and O/C Tanks)	Hydrostatic Precision Tank Test for DWT-Type II Tanks	0.1 gph/0.05 gph without dispensing/30,000 gallons 0.1gph/0.07 gph with dispensing/30,000 gallons
Steel Tank Institute	Permatank Interstitial Vacuum Monitor Liquid Leaks	0.1 gph/A tank system should not be declared tight when the vacuum decreases (pressure increases) 5 inches or more of mercury over the test period specified for each tank size./20,000 gallons
Steel Tank Institute	Permatank Precision Interstitial Vacuum Monitor	0.1 gph/0.01 gph/50,000 gallons
Xerxes Corp.	Xerxes Trucheck Hydrostatic Monitoring System	0.1 gph/0.05 gph/30,000 gallons

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LINE LEAK DETECTION METHOD FOR AIRPORT HYDRANT AND FIELD CONSTRUCTED SYSTEMS (formerly large diameter line leak detection method)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
ATMOS International	ATMOS STMS Statistical Tightness Monitoring System for Airports	0.0019% of pipeline volume (0.000019 gph per gallon of product)/ 0.00095% of pipeline volume (0.0000095 gph per gallon of product)/ 300,000 gallons
Caldon, Inc.	Caldon PF2000 Pipeline Leak Detection System for Bulk Pipelines	10 gph/8 gph/212,000 gallons
EFA Technologies, Inc.	LeakNet	3.0 gph/2.2 gph/116,230 gallons
HansaConsult Ingenieurgesellschaft mbH	HansaConsult Pressure-Step Tightness Control System (TCS) Pipeline Leak Detection System	0.004% of line volume (0.004 gph per gallon of product) in the pipeline segment being tested/0.002% of line volume in gph/Minimum of 22,700 gallons, maximum of 175,110 gallons (range of pipelines evaluated)
Hansa Consult of North America, LLC	HCNA Pipeline Leak Detection System, Version 2.0	0.002% of line volume (0.02 gph per 1000 gallons of product)/0.001% of line volume in gph/175,000 gallons
Hansa Consult of North America, LLC	HCNA Pipeline Leak Detection System, Version 2.1	0.068 gph/0.034 gph/5000 gallons
Leak Detection Technologies International	MDleak Enhanced Leak Detection and Leak Location Method	0.005 gph/A containment system should not be declared tight when chemical marker is detected outside of the pipeline system./Not limited by capacity.
Leak Detection Technologies	Pipeline Hydrostatic Diagnostic Test Method (PHDleak Test)	0.0017% of line volume gph (0.000017 gph per gallon of product)/0.00085% of line volume gph/1,127,000 gallons
Praxair Services, Inc.	SeeperTrace	0.1 gph/A pipeline system should not be declared tight when a confirmable level of chemical tracer in the sample collected exceeds the background level./Not limited by capacity.
Praxair Services, Inc. (originally listed as Tracer Research, Corp.)	Tracer ALD 2000 Automated Line Tightness Test	0.1 gph/A pipeline system should not be declared tight when tracer chemical or hydrocarbon greater than the background level is detected outside of the pipeline./Not limited by capacity.
Vista Research, Inc.	Model HT-100 Monitoring Method and Line Tightness Test Method, Version 1.0, Version 1.1	0.004% of line capacity (0.04 gph per 1000 gallons of product) for Version 1.0 /0.00282% of line volume in gph/612,954 gallons 0.00209% of line capacity (0.0209 gph per 1000 gallons of product) for Version 1.1 /0.000916% of line volume in gph/612,954 gallons
Vista Research, Inc.	Model HT-100 Monitoring Method and Line Tightness Test Method, Version 2.1	0.00189% of line capacity (0.0189 gph per 1000 gallons of product)/0.000945% of line volume in gph/320,000 gallons
Vista Research, Inc.	Model HT-100-n Monitoring Method and Line Tightness Test Method, Version 1.0, Version 1.1	0.004% ÷ $\sqrt{(n)}$ of line capacity (for n=4, 0.02 gph per 1000 gallons of product) for Version 1.0 /0.00282% ÷ $\sqrt{(n)}$ of line volume in gph; where n is the # of tests averaged together/612,954 gallons 0.00209% ÷ $\sqrt{(n)}$ of line capacity (for n=4, 0.01045 gph per 1000 gallons of product) for Version 1.1 /0.000916% ÷ $\sqrt{(n)}$ of line volume in gph; where n is the # of tests averaged together/612,954 gallons
Vista Research, Inc.	Model LT-100 Monthly Monitoring Method and Line Tightness Test Method, Version 1.0 (Manual Method)	0.2 gph/0.177 gph/3,400 gallons 0.1 gph/0.077 gph/3,400 gallons

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LINE LEAK DETECTION METHOD FOR AIRPORT HYDRANT AND FIELD CONSTRUCTED SYSTEMS (formerly large diameter line leak detection method) - continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
Vista Research, Inc.	Model LT-100 Monthly Monitoring Method and Line Tightness Test Method, Version 1.0 (Primary Method)	0.2 gph/0.148 gph/3,400 gallons 0.1 gph/0.06 gph/3,400 gallons
Vista Research, Inc.	Model LT-100 Monthly Monitoring Method and Line Tightness Test Method, Version 1.0 (Segmented Method)	0.2 gph/0.174 gph/3,400 gallons 0.1 gph/0.074 gph/3,400 gallons
Vista Research, Inc.	Model LT-100a Monthly Monitoring Method and Line Tightness Test Method, Version 1.0	0.2 gph at 50 psi/0.148 gph/3,400 gallons 0.1 gph at 50 psi/0.06 gph/3,400 gallons
Vista Research, Inc.	Model LT-100a Monthly Monitoring Method and Line Tightness Test Method, Version 1.0 (Segmented Method)	0.2 gph at 50 psi/0.174 gph/3,400 gallons 0.1 gph at 50 psi/0.074 gph/3,400 gallons
Vista Research, Inc.	Model LT-100a Hourly and Monthly Monitoring Method and Line Tightness Test Method, Version 2.0 (Segmented Method)	3.0 gph/2.936 gph/3,400 gallons 0.2 gph/0.136 gph/3,400 gallons

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LINE TIGHTNESS TEST METHOD

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX PIPELINE CAPACITY
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek Manual Line Leak Detector (for Rigid Pipelines)	0.1 gph/0.05 gph/426 gallons
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek Manual Line Leak Detector (for Flexible Pipelines)	0.1 gph/0.05 gph/101 gallons
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek II Automatic Line Leak Detector	0.1 gph/0.05 gph/129 gallons
Hansa Consult of North America, LLC	HCNA Pipeline Leak Detection System, Version 2.1	0.068 gph/0.034 gph/5000 gallons
Leak Detection Technologies	MDleak Enhanced Leak Detection and Leak Location Method	0.005 gph/A containment system should not be declared tight when chemical marker is detected outside of the pipeline system./Not limited by capacity.
Leighton O'Brien Technologies Ltd.	Quantitative Wet Line Test PM2 (for Rigid and Flexible Pipelines)	0.1 gph/0.05 gph/371.22 gallons (Rigid), 109.8 gallons (Flexible), 481 gallons (combination)
Leighton O'Brien Technologies Ltd.	Qualitative Dry Line Test PM2 (for Rigid and Flexible Pipelines)	0.1 gph/0.05 gph/371.22 gallons (Rigid), 109.8 gallons (Flexible), 481 gallons (combination)
MassTech International Ltd.	ML3P Line Leak Detection System	0.1 gph/0.05 gph/172 gallons
Praxair Services, Inc. (originally listed as Tracer Research, Corp.)	Tracer Tight Line Test	0.1 gph and 0.005gph/A pipeline system should not be declared tight when tracer chemical greater than the background level is detected outside of the pipeline./Not limited by capacity.
ProTank, Inc.	LTH-5000 Line Tester	0.1 gph/0.05 gph/40 gallons
ProTank, Inc.	LTP-5000 Line Tester	0.1 gph/0.05 gph/41 gallons
Purpora Engineering, LLC (originally listed as Heath Consultants, Inc.)	Petro Tite Line Tester	0.1 gph/0.05 gph/129 gallons
Purpora Engineering, LLC (originally listed as Heath Consultants, Inc.)	Petro Tite Line Tester (for Flexible Pipelines)	0.1 gph/0.05 gph/49.6 gallons
Tanknology	Proline Test Series III, Version 1.0	0.1 gph/0.05 gph/41 gallons
Tanknology	PTK-88	0.1 gph/0.05 gph/40 gallons
Tanknology	TLD-1	0.1 gph/0.05 gph/172 gallons
Tanknology	TLD-1 (Flexible Pipelines)	0.1 gph/0.05 gph/119.4 gallons
Training and Services Corp. (originally listed as Hasstech)	AcuRite (for Rigid and Flexible Pipelines)	0.1 gph/0.01 gph/150 gallons
Triangle Manufacturing, Inc. (originally Listed as Triangle Environmental, Inc.)	TEI Model LT-3, Version 1.0 (for Rigid and Flexible Pipelines)	0.1 gph/0.05 gph/110.8 gallons
United Testing Systems	U.T.S. 6000 Line Tester	0.1 gph/0.03 gph/44 gallons
Western Environmental Resources	Model PLT-100R	0.1 gph/0.05 gph/80 gallons

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NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (TRACER)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD MAX TANK CAPACITY
CGRS, Inc.	iota VaporTite - V005 Enhanced Leak Detection (ELD) Method	0.005 gph/ A tank system should not be declared tight when the change in helium concentration in the interstitial space over time exceeds the method's preset threshold./Not limited by capacity.
Leak Detection Technologies	MDleak Enhanced Leak Detection Method	0.005 gph/ A tank system should not be declared tight when chemical marker is detected outside of the tank system./Not limited by capacity.
Praxair Services, Inc. (originally listed as Tracer Research, Corp.)	Tracer Tight	0.1 gph and 0.005 gph/A tank system should not be declared tight when tracer chemical greater than the background level is detected outside of the tank system./Not limited by capacity.

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NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX ULLAGE CAPACITY
MassTech International, Ltd.	MassTech Analog Acoustic Vacuum Method (Vacuum Test)	0.1 gph/Tank ullage should not be declared tight when the acoustic signal characteristic of a leak is detected./20,000 gallons
MassTech International, Ltd.	MassTech Remote Spectral Analysis Method (Vacuum Test)	0.1 gph/Tank ullage should not be declared tight when the digital recording of the noise spectrum of tank under vacuum has a detectable difference from the digital recording of the noise spectrum of tank at zero pressure./20,000 gallons
MassTech International, Ltd.	MassTech 002 Ullage Test System (Pressure or Vacuum Test)	0.1 gph/Tank ullage should not be declared tight when a predetermined threshold is exceeded. This threshold may be modified by the results of the static test./30,000 gallons
ProTank, Inc.	UTA-5000 Ullage Tester (Vacuum or Pressure Test)	0.1 gph/A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is pressurized or evacuated./16,500 gallons
ProTank, Inc.	UTF-5000 Ullage Tester (Pressure Test)	0.1 gph/A tank system should not be declared tight when the make-up gas flow rate into ullage equals or exceeds 0.275 cubic feet/hour./7,500 gallons
ProTank, Inc.	UTFP-5000 Ullage Tester (Pressure Test)	0.1 gph/A tank system should not be declared tight when the pressure decay trend equals or exceeds ± 0.016 psi/hr./10,260 gallons
Purpora Engineering, Inc.	Alert 8200 Series Sonde Ullage	0.1 gph/A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under pressure or vacuum) to the background signal (prior to pressurization or evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band./30,000 gallons
Purpora Engineering, Inc. (originally listed by Alert Technologies, Inc.)	Alert Ullage System Model 1050 (Pressure and Vacuum Test)	0.1 gph/A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under pressure or vacuum) to the background signal (prior to pressurization or evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band./6,000 gallons
Purpora Engineering, Inc. (originally listed by Alert Technologies, Inc.)	Alert Ullage System Model 1050 X (Vacuum Test)	0.1 gph/A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under vacuum) to the background signal (prior to evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band./24,000 gallons
Tanknology	UST Ullage Test, Version U2 (Pressure Test)	0.1 gph/A tank system should not be declared tight when the pressure decay trend equals or exceeds ± 0.016 psi/hr./10,260 gallons
Tanknology	UTS-4T Ullage Test (Pressure Test)	0.1 gph/A tank system should not be declared tight when the make-up gas flow rate into ullage equals or exceeds 0.275 cubic feet/hour./7,500 gallons
Tanknology	U3 Ullage Test (Vacuum or Pressure Test)	0.1 gph/A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is pressurized or evacuated./16,500 gallons

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NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE) - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX ULLAGE CAPACITY
Triangle Manufacturing, Inc. (originally Listed as Triangle Environmental, Inc.)	TEI Ullage Test, Version 1.0 (Vacuum Test)	0.1 gph/A tank system should not be declared tight when an increase in the acoustic noise level (above background) of the tank under vacuum is detected due to air or water ingress./15,000 gallons
USTest, Inc. (previously listed as Sound Products Manufacturing, Inc.)	UST 2000/U (Pressure and Vacuum Test)	0.1 gph/A tank system should not be declared tight when there is a substantial increase in the acoustic noise signal (when the tank is under pressure or vacuum) above the background signal (prior to pressurization or evacuation) in the frequency interval of 10 kHz to 20 kHz/7,550 gallons (pressure test), 5,250 gallons (vacuum test).

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NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY 3	0.1 gph/A tank system should not be declared tight when the vacuum decay is more than 1 inch water column pressure for non-volatile products and 10% of the lower determined vapor pressure for volatile products, or when water ingress is detected by the water sensor./50,000 gallons
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY 3 Locator Plus	0.1 gph/A tank system should not be declared tight when the acoustic signal detected is different from the baseline signal before a vacuum is placed on the tank, or when water ingress is detected by the water sensor./30,000 gallons
Mesa Engineering	Mesa 2-D Method with ACT v1 Water Level Sensor	0.1 gph/A tank system should not be declared tight when an acoustic signal is detected above the background or baseline noise by a computer data acquisition system, or when water ingress is detected by the water sensor./30,000 gallons
Protank, Inc.	Fast Test (Underfill Test)	0.1 gph/A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is evacuated./30,000 gallons
Purpora Engineering, Inc.	Alert 8200 Series Sonde	0.1 gph/A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under vacuum) to the background signal (prior to evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band./30,000 gallons
Tanknology	Quick Test (Underfill Test)	0.1 gph/A tank system should not be declared tight when the acoustic signal detected is different than the baseline. Baseline is the acoustic signal before the tank is evacuated./30,000 gallons
Tanknology	VacuTect	0.1 gph/A tank system should not be declared tight when: sonic emission of air ingress is detected in ullage area and/or; sonic emission of bubbles formed by air ingress is detected in product-filled portion of the tank and/or; water ingress is detected at the bottom of the tank./75,000 gallons
Triangle Manufacturing, Inc. (originally Listed as Triangle Environmental, Inc.)	TEI System 5000, Version 1.0, Version 1.0W	0.1 gph/A tank system should not be declared tight when the acoustic noise level of the tank under vacuum is greater than the calibrated background acoustic noise level (prior to evacuation)./20,000 gallons

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

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Advanced Tank Technology, Inc.	Leak Tracer Dye (LTD)	product solubility - color development
Agar Corp.	LEAKWISE Groundwater Monitor ID-220 Series Hydrocarbon on Water Detector System	radio frequency (RF) attenuation
AT Monitors	AMC 5100 or ATI-5100 Monitor with Leak Detection Cables: AMC-5007 or ATI-5007	electrical conductivity
AT Monitors	AMC 5100 or ATI-5100 Monitor with Cable Sensors: AMC 5016, AMC 5016A, or ATI-5016	electrical conductivity
Brooks KWK, Inc.	Leak Detection Systems KW-140, KW-240 Monitors with Types 1, 2 Sensors	product soluble
EBW, Inc.	AutoStik Discriminating Sensors LS-5, LS-10, LS-15, LS-20, LS-35	product permeability
FCI Environmental, Inc.	Analog Hydrocarbon Probe AHP-100, Digital Hydrocarbon Probe DHP 100	fiber optic chemical sensor
Franklin Fueling Systems (originally listed as INCON Intelligent Controls, Inc.)	Tank Sentinel TS-1000EFI, TS-1001/TS-2001, and TS-5xxx Series with TSP-DDS BriteSensor, TSP-DTS BriteSensor, TSP-MWS BriteSensor Groundwater Probe	magnetic switch and float (TSP-DDS BriteSensor, TSP-DTS BriteSensor) hydrocarbon sensitive polymer (all)
Gems Sensors, Inc. (originally listed as IMO Industries, Inc.)	Gems Smartwell Portable Monitor Model WPM-535 with Groundwater Probe Model WP-535	conductive polymer
Mallory Controls	Pollulert Probes MD221G/T, MD221G/TRA, MD241R, MD241RRA, MD241G, MD241GRA **Mallory Controls no longer manufactures, services, or supports the use of this method.**	electrical conductivity
One Plus Corp.	Leak Edge Models 100-3001, 100-4001	product permeable
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	SiteSentinel Controller with Combination Sensors Part #30-3224 (Consists of Part #30-3221-1A, #30-3219-12), #30-3225 (Consists of Part #30-3221-2, #30-3219-12)	float switch (part #30-3221-1A, #30-3221-2) product permeable (part #30-3219-12)
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	SiteSentinel Controller with Hydrocarbon Sensitive Polymer Cables Part #30-3206, #30-3207-nn, #30-3210-nn, #30-3219-12	product permeable
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	SiteSentinel Controller with Optical Sensor Part #30-3223	optical (part #30-3223)
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	SiteSentinel Controller with Single Float Switches Part #30-3221-1, #30-3221-1A, #30-3221-1B Brine Reservoir Sensor and Dual Float Sensor Part #30-3221-2	float switch
PermAlert	PAL-AT Models AT20C, AT50C, AT40K with AGW Sensor Cable, TFH Hydrocarbon Sensor Cable	impedance change
PermAlert	PAL-AT Models AT20C, AT50C, AT40K with PHFW Hydrocarbon Probe and Type 1 or Type 2 Sensor	product soluble
PermAlert	PAL-AT Models AT30C, AT75C, AT30K with AGW-Gold Sensor Cable, TFH Hydrocarbon Sensor Cable	impedance change
Preferred Utilities Manufacturing Corporation	TG-EL-D4A Fuel Sentry Control Unit, PLS-1 Non-Discriminating Sensor for Reservoirs	reed switch/float
Preferred Utilities Manufacturing Corporation	TG-EL-D4A Fuel Sentry Control Unit, PS-LDS Non-Discriminating Pump Set Leak Detector Switch	reed switch/float

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

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
Preferred Utilities Manufacturing Corporation	TG-EL-D4A Fuel Sentry Control Unit, RBS Non-Discriminating Sensor for Sumps and Containments	reed switch/float
Sensorcomm, Inc.	Models LPS-5036 and TLD-3050 Sensors with Sensorcomm Relay Unit Type-C Alarm Console and TLD-3050X Sensor with Sensorcomm FLASHER-BE Alarm Console	solid state equivalent to selective float switch (no moving parts)
Tidel Engineering, Inc.	EMS-3500 with Monitoring Well Probe Part 301-0641, Sheen Probes Part 301-0687, Tidel Detector #301-0762	conductivity via resistor ladder network (part 301-0641) electrical conductivity/hydrocarbon sensitive polymer (part 301-0687, #301-0762)
Tidel Engineering, Inc.	Tidel Detector #301-0324-001, #301-0325-001, #301-0326-001, #301-0326-002	electrical conductivity
TRM Sensors LLC	Models TRM-CC and TRM-CB Sensors with TRM Relay Unit Type-C Alarm Console and TRM-CBX Sensor with TRM FLASHER-BE Alarm Console	solid state equivalent to selective float switch (no moving parts)
Tyco Thermal Controls LLC (originally listed as Raychem Corp.)	TraceTek Alarm and Locator Modules with TT502, TT5000, TT3000 Fuel Sensing Cable	electrical conductivity
Tyco Thermal Controls LLC	TraceTek Alarm and Locator Modules with TT-FFS Fast Fuel Sensor	electrical conductivity
Veeder-Root	350 Series, TLS-450 Series, Red Jacket ProMax UST Monitoring Systems Models ILS-350, TLS-350, 350R, 350PC, 350RPC with Groundwater Sensors 794380-621, 622, 624	electrical conductivity
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	EMC Environmental Management Console Groundwater Sensor Series PA02700XX0001 (Same as Veeder-Root 794380-621, 622, 624)	electrical conductivity

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

VENDOR	EQUIPMENT NAME	OPERATING PRINCIPLE
AT Monitors	AMC 5100 or ATI-5100 Monitor with Vapor Sensors AMC F4000 or ATI-F4000	metal oxide semiconductor
Chapman Engineering	Fuel Finder Version IV	adsorption sampling
FCI Environmental, Inc.	Analog Hydrocarbon Probe AHP-100, Digital Hydrocarbon Probe DHP-100	fiber optic
FDR Services, Inc.	GasPak Vapor Monitoring System	product permeable detector
Gems Sensors, Inc. (originally listed as Warrick Controls, Inc.)	Model 5700 Meter with PVP-2 Sensor	adsistor
Mallory Controls	Pollulert Probes MD221V, MD221VRA, MD210V, MD210VRA **Mallory Controls no longer manufactures, services, or supports the use of this method.**	adsistor
Mine Safety Appliances	Tankgard, P/N 481532, and Tankgard VIII, P/N 488803	metal oxide semiconductor
OPW Fuel Management Systems (originally listed as Emco Electronics, Tuthill Transfer Systems)	EECO 1500, 2000, 3000, Leak Sensor, Leak Sensor II, Leak Sensor Jr. with Q0002-001, Q0002-005 Sensors	adsistor(Q0002-001), metal oxide semiconductor (Q0002-005)
OPW Fuel Management Systems (originally listed as Petro Vend, Inc.)	Petrosentry TLD III, SiteSentinel, Smart Module and Vapor Sensor	metal oxide semiconductor
PID Analyzers, LLC	Model 102 Photoionizer	photoionization detector
PID Analyzers, LLC (originally listed as HNU Systems, Inc.)	PI-101 with 11.7 EV Probe #101397; HW-101 with 11.7 EV Probe #170214; ISPI-101 with 10.2 EV Probe #111100; DL-101 with 10.2 EV Probe #167085	photoionization detector
Praxair Services, Inc. (originally listed as Tracer Research, Corp.)	Tracer Tight	chromatographic (looks for chemical tracer)
Oklahoma Environmental Services (originally listed as Arizona Instrument Corp., then NESCO, and then Summit Holdings, Inc. – Oklahoma Environmental, Inc.)	Soil Sentry Twelve-X	metal oxide semiconductor
Tidel Engineering, Inc.	EMS-3000, 301-0328-001, 301-0330-001, and EMS-3500, Vapor Sensor Probe Part No. 301-0634	adsistor
Universal Sensors and Devices, Inc.	Leak Alert System Models LAV-100, LA-01, LA-02, LA-04, LA-X4, LA-08, CATLAS with LAVS-1 MOS Vapor Sensor	metal oxide semiconductor
Veeder-Root	ILS-350, TLS-350 Series, TLS-450 Series, Red Jacket ProMax with Adsistor Vapor Probe 794390-700	adsistor
Veeder-Root (originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)	PA02660000000 (Same as Veeder-Root 794390-700)	adsistor

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SECONDARY AND SPILL CONTAINMENT TEST METHODS

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD
Franklin Fueling Systems	Incon TS-STS Sump Test System	0.00192 inch in 15 minutes with PD = 95%/0.0080 inch/hr

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STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUALITATIVE)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Horner Products, Inc.	SIR PRO 1, Versions 1.0, 2.0 **Horner Products is no longer in business. Support for this method may not be available.**	0.2 gph/0.1 gph/18,000 gallons (Version 1.0) 0.1 gph/0.05 gph/18,000 gallons (Version 2.0)
Syscorp, Inc.	Store Vision, Version E.2	0.2 gph/0.0834 gph/12,000 gallons
Veeder-Root (originally listed as Entropy Limited)	Precision Tank Inventory Control System, Version 90	0.1 gph/0.04 gph/15,000 gallons
Veeder-Root (originally listed as USTMAN Industries, Inc.)	USTMAN YES SIR 90	0.2 gph/0.1 gph/15,000 gallons

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STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Computerizing, Inc.	Computank, Version 3.0	0.1 gph/0.05 gph/18,000 gallons
EviroSIR LLC	EnviroSIR Version 1.0	0.2 gph/0.15 gph/45,000 gallons 0.1 gph/0.05 gph/45,000 gallons
Fairbanks Environmental, Ltd.	Westock Wizard Version 4.4	0.2 gph/0.10 gph /45,000 gallons
Horner Products, Inc.	SIR PRO 1 Version 3.0 **Horner Products is no longer in business. Support for this method may not be available.**	0.2 gph/0.1 and 0.16 gph/45,000 gallons
Horner Products, Inc.	SIR PRO 1 Version 4.0 **Horner Products is no longer in business. Support for this method may not be available.**	0.1 gph/0.05 gph/33,000 gallons
Leighton O'Brien Technologies Ltd.	Monitor / Redone	0.1 gph/0.05 gph/33,675 gallons for single tanks, and 60,000 gallons for manifolded tanks
Mostyle Pty Ltd.	GreenScan SIR 3.0.1.2	0.2 gph/0.10 gph/30,000 gallons for single tanks and 45,000 gallons for manifolded tanks 0.1 gph/0.05 gph/30,000 gallons for single tanks, and 45,000 gallons for manifolded tanks
National Environmental, LLC	Tanknetics SIR, Version 2.1	0.2 gph/0.10 gph/45,000 gallons 0.1 gph/0.05 gph/45,000 gallons
Simmons Corp.	SIR 5.7	0.1 gph/0.05 gph/18,000 gallons
Simmons Corp.	SIR 5.7 LM	0.2 gph/0.10 gph/60,000 gallons 0.1 gph/0.05 gph/60,000 gallons
SIR International, Inc.	Mitchell's SIR Program Versions 2.6, 2.7	0.2 gph/0.10 gph/45,000 gallons 0.1 gph/0.05 gph/45,000 gallons
SIR Monitor (originally listed as Environmental Management Technologies)	SIR Monitor	0.1 gph/0.05 gph/18,000 gallons
Sir Phoenix, Inc.	SIR Phoenix	0.1 gph/0.05 gph/18,000 gallons
Sir Phoenix, Inc.	SIR Phoenix LEOMA V01.50	0.2 gph/0.01 gph/18,000 gallons for single tanks, and 45,000 gallons for manifolded tanks
TeleData, Inc.	TankMate, Versions 3.12, 3.20, 4.1	0.1 gph/0.05 gph/60,000 gallons
TotalSIR	TotalSIR, Version 1.0	0.2 gph/0.1 and 0.16 gph/45,000 gallons
TotalSIR	TotalSIR, Version 2.0	0.2 gph/0.10 gph/45,000 gallons 0.1 gph/0.05 gph/45,000 gallons
Veeder-Root (originally listed as Entropy Limited)	Precision Tank Inventory Control System Revision 90	0.1 gph/0.05 gph/22,500 gallons
Veeder-Root (originally listed as USTMAN Industries, Inc.)	USTMAN SIR 1.91	0.1 gph/0.05 gph/18,000 gallons
Veeder-Root (originally listed as USTMAN Industries, Inc.)	USTMAN SIR, Version 94.1	0.1 gph/0.05 gph/30,000 gallons
Veeder-Root (originally listed as USTMAN Industries, Inc.)	USTMAN SIR, Versions 95.2, 95.2A, 95.2B	0.1 gph/0.05 gph/60,000 gallons (Version 95.2) 0.2 gph/0.1 gph/60,000 gallons (Version 95.2A) 0.2 gph/0.16 gph/60,000gallons (Version 95.2B)
Veeder-Root (originally listed as Watson Systems, Inc. and later as EnviroQuest Technologies Limited)	Watson SIRAS Software System Versions 2.0, 2.8.3	0.2 gph/0.1 gph/30,000 gallons 0.1 gph/0.05 gph/30,000 gallons

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STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE) - Continued

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Warren Rogers Associates, Inc.	WRA Statistical Inventory Analysis, Version 5.1	0.1 gph/0.05 gph/18,000 gallons
Warren Rogers Associates, Inc.	WRA Statistical Inventory Analysis, Version 5.2	0.1 gph/0.05 gph/36,000 gallons

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VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Absolute Precision Testing Systems	APT/BKG 1000	0.05 gph/0.02587 gph/6,000 gallons
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek I **Estabrook EZY CHEK Systems no longer manufactures or supports the use of this method.**	0.1 gph/0.05 gph/12,000 gallons
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek II	0.1 gph/0.05 gph/12,000 gallons
Hasstech	Leak Computer Tank Test System **Hasstech is no longer in business.**	0.1 gph/0.05 gph/12,000 gallons
Ibex Industries	Ibex Precision Test System	0.1 gph/0.05 gph/18,000 gallons
Leak Detection Systems, Inc.	Tank Auditor, Version RTD V.2.16	0.1 gph/0.05 gph/15,000 gallons
Purpora Engineering, LLC (originally listed as Heath Consultants, Inc.)	Petro Comp	0.1 gph/0.05 gph/15,000 gallons
Purpora Engineering, LLC (originally listed as Heath Consultants, Inc.)	Petro Tite II	0.1 gph/0.05 gph/15,000 gallons
Schuster Instruments	Tel-A-Leak 1	0.1 gph/0.05 gph/15,000 gallons
Soiltest, Inc.	Soiltest Ainlay Tank 'Tegrity' Tester, S-3	0.1 gph/0.05 gph/15,000 gallons
Tank Automation, Inc.	Automated Precision Tank Testing System (APTT System), R-2	0.1 gph/0.05 gph/15,000 gallons
Western Environmental Resources	AES System II	0.1 gph/0.05 gph/15,000 gallons
Western Environmental Resources	AES System II (Large Tanks)	0.1 gph/0.05 gph/75,000 gallons

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VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

VENDOR	EQUIPMENT NAME	LEAK RATE/THRESHOLD/ MAX TANK CAPACITY
Estabrook EZY CHEK Systems (originally listed as Horner EZY CHEK)	EZY-Chek II **Estabrook EZY CHEK Systems no longer manufactures or supports the use of this method.**	0.1 gph/0.05 gph/12,000 gallons
Hasstech	Leak Computer Tank Test System **Hasstech is no longer in business.**	0.1 gph/0.05 gph/15,000 gallons
MassTech International, Ltd.	MassTech 2 Wet Test (Mass Based)	0.1 gph/0.05 gph/30,000 gallons
Mass Technology Corp.	Precision Mass Measurement Systems CBU-100D	0.1 gph/0.55 gph/76,500 gallons
ProTank, Inc.	VU-5000 Underfill Tester	0.1 gph/0.05 gph/18,000 gallons
ProTank, Inc.	VUP-5000 Underfill Tester	0.1 gph/0.05 gph/18,000 gallons
Purpora Engineering, Inc. (originally listed by Alert Technologies, Inc.)	Alert Model 1000	0.1 gph/0.05 gph/30,000 gallons
Purpora Engineering, Inc.	Alert Model 8200 Series Underfill Method	0.1 gph/0.05 gph/30,000 gallons
Tanknology	Computerized VPLT Testing System	0.1 gph/0.05 gph/18,000 gallons
Tanknology	Sure Test - Assured Tight System, Series IV	0.1 gph/0.05 gph/18,000 gallons
Triangle Manufacturing, Inc. (originally Listed as Triangle Environmental, Inc.)	TEI System 4000, Version 1.0	0.1 gph/0.05 gph/15,000 gallons
USTest, Inc. (previously listed as Sound Products Manufacturing, Inc.)	UST 2001/P (Ultasonic Probe)	0.1 gph/0.05 gph/20,000 gallons
USTest, Inc.	UST 2000/LL **USTest, Inc. no longer supports the use of this method.**	0.1 gph/0.05 gph/15,000 gallons
USTest, Inc.	UST 2000/P **USTest, Inc. no longer supports the use of this method.**	0.1 gph/0.05 gph/45,000 gallons

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PART II

LEAK DETECTION TEST METHODS AND EQUIPMENT/SYSTEMS

ALPHABETICAL BY COMPANY,

THEN BY TEST METHOD,

NEXT BY EQUIPMENT MODEL,

FINALLY BY LEAK RATE

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Absolute Precision Testing Systems

APT/BKG 1000

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.05 gph with PD = 99.2310% and PFA = 0.5451%.

Leak Threshold 0.02587 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.

Tank Capacity Maximum of 6,000 gallons. Tank must be minimum 100% full.

Waiting Time Minimum of 36 hours between delivery and testing.
Minimum of 1.5 hours between "topping off" and testing.
Total minimum waiting time is 36 hours.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour, 48 minutes.
Volume data is collected and recorded by a computer.
Leak rate is calculated from 1 minute of test.
There must be a minimum of 10 tests performed to conclusively declare a tank tight or declare a leak.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a resistance temperature sensor.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a height difference of 6 feet between product and water level.

Calibration Level sensors must be calibrated before each test.
Temperature sensor must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank system.

Absolute Precision Testing Systems
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Dixon Consulting Inc.
Tel: (812) 332-4144
Date of Evaluation: 12/05/95

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Advanced Tank Technology, Inc.

Leak Tracer Dye (LTD)

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

Detector:

Output type: qualitative
Sampling frequency: intermittent
Operating principle: product solubility - color development

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (sec)	<1	<1
Fall time	N/A*	N/A
Lower detection limit (cm)	<0.32	<0.32

*See glossary.

Specificity Results:
Activated: unleaded gasoline (above 23 ppm), synthetic gasoline (above 8 ppm), n-hexane, diesel, jet-A fuel, JP-4 jet fuel, toluene, xylene(s).

Manufacturer's specifications:
Leak Tracer Dye develops color in alcohols, ketones, solvents, and PCBs as well as petroleum products.

Comments:
Sensors are not reusable, and must be replaced after contact with hydrocarbons.
Sensor is listed as "intermittent" because it must be checked periodically; it does not automtatically
Alarm when hydrocarbon is detected.

Advanced Tank Technology, Inc.
820 N. Sylvania
Fort Worth, TX 76111
Tel: (800) 526-31446

Evaluator: Scientific Information Services
Tel: Unavailable
Date of Evaluation: 02/02/93

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Issue Date: March 3, 2000
Revision Date: March 10, 2000

Advanced Telemetrics, Ltd.

Model 1100LD Version 1.07

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 98.9% and PFA = 1.1%.

Leak Threshold 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.

Tank Capacity Maximum of 30,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required is 10 inches.

Waiting Time Determined automatically based on quality of tank data.
Average during evaluation was 8 hours, 56 minutes between delivery and testing.
Dispensing during waiting time may extend waiting time.
There must be no delivery during waiting time.

Test Period Determined automatically based on quality of tank data.
Average during evaluation was 3 hours, 39 minutes.
Test data are acquired and recorded by a microprocessor.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by probe containing 5 or more IC (solid state) temperature sensors.
At least one IC temperature sensor must be submerged in product during test.

Water Sensor Must be used to detect water ingress. Minimum detectable water level in the tank is 0.5 inch.
Minimum detectable change in water level is 0.03 inch.

Calibration IC (solid state) temperature sensors 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.
Evaluated in automatic mode where a test is run whenever conditions in tank are quiet for a sufficient amount of time.
If test is run manually, vendor recommends waiting at least 7 hours after delivery and allowing the automatic tank gauge to determine minimum test period to avoid inconclusive results.
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.

Advanced Telemetrics, Ltd.
PO Box 90413
San Antonio, TX 78209
Tel: (800)-382-1482
E-Mail: drake@advancedtelemetrics.net
Website: www.advancedtelemetrics.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/03/98

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Issue Date: November 22, 1995
Revision Date: December 6, 2002

Agar Corp.

LEAKWISE Groundwater Monitor
ID-220 Series Hydrocarbon on Water Detector System

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: radio frequency (RF) attenuation

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limits (cm)		
"Standard" setting	0.16	0.32
"Sensitive" setting	0.03	0.03

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s), water.

Manufacturer's Specifications:
Operating Range:
Resolution: 0.5 mm of hydrocarbon on water or brine
Variation: groundwater fluctuation of +/- 1 meter standard (larger variations optional)
Oil thickness: 0.3 - 25 mm optional (higher ranges available)
Temperature: 0 - 70 degrees C (higher available)

Comments:
Sensors are reusable.
Color coded signal lights indicate the presence of air, water, and hydrocarbon liquid when activated (yellow, green, and red, respectively).

Agar Corp.
5150Tacoma Drive
Houston, TX 77401
Tel: (832) 476-5100

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/15/91

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: September 19, 2005
Revision Date: June 27, 2011

Ameron International

Dualoy 3000/LCX and MCX Pipe Monitoring System
Liquid Filled Interstitial Space

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, liquid-filled interstitial space leak detection system for use only with Ameron Dualoy 3000/LCX and MCX fiberglass double-wall pipe. Applicable liquids include water and aqueous solutions of brine (i.e., CaCl and NaCl) or glycols (e.g., propylene) in concentration sufficient to reduce evaporation and prevent liquid from freezing in any portion of the monitoring system under extremes of local temperature conditions.
Maximum length is 344 feet.
No restrictions on pipeline diameter.

Operating Principle:
Similar to the methodology that has been applied to liquid-filled interstitial double-walled tanks.
An applicable liquid is used to fill the pipeline interstice.
A vacuum may be placed on the interstice to assist as applicable liquid is filled from the low point in the pipeline to minimize trapped air.
The reservoir is the high point of the system and is open or vented at the top and contains a dual-point level sensor.
The dual-point level sensor system monitors the liquid level in the interstitial reservoir and provides an alarm if the liquid level is either too high (ingress of liquid) or too low (egress of liquid).
The method must be used with a dual-point sensor system that will properly fit into the reservoir, is compatible with the interstitial liquid, and is on the NWGLDE list. The spacing between the high and low sensors must be at least 10 inches.
Sensors can be used to shut down the turbine system and/or alert the operator that a potential problem exists.

Alarm Conditions:
For a leak rate of 0.10 gph in to or out of the interstice, the maximum time to alarm for a 10-inch sensor spacing with a reservoir diameter of 3.33 inches is 3.11 hours.
This method declares a pipeline to be leaking when the loss or gain of applicable liquid in the 3.33 inch reservoir is 0.311 gallons.
The change in level in the reservoir is proportional to the volume of fluid flowing into or out of the interstice. It is cumulative and therefore not dependent on the rate of fluid gain or loss.
Time to alarm is based on evaluations conducted using a 30% $CaCl_2$ (brine) solution and a leak (liquid egress) 341 feet from the reservoir. Equivalent results are expected for other applicable liquids.
Time to alarm for a catastrophic primary pipe failure with a pressure of 38 psi is 8 seconds at a distance of 2.14 feet from the reservoir and 10.48 minutes at a distance of 341 feet. This is based on a liquid level change of 10″ or 0.311 gallons in a reservoir that measures 12 inches in height and 3.33 inches in diameter.

Applicability:
Ameron International underground double-walled piping as specified above containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil. Other liquids may stored after consultation with the manufacturer .

Calibration:
Equipment requires no calibration other than an annual inspection.
The electronics must be calibrated and maintained in accordance with the sensor/monitoring equipment instructions.

Comments:
System must be designed and installation done in accordance with the instructions provided by the manufacturer.
Direct burial of pipeline fittings and reservoir is permitted provided the reservoir has an observation manway at grade level.
The liquid level in the reservoir must be at least 12 inches above the water table.
The interstice must be filled from the low point in the pipeline to minimize trapped air.
The evaluation was conducted in an Ameron, double-wall, fiberglass pipeline with an interstitial capacity of 12.97 gallons, an inside diameter of 2.22 inches, and a length of 344 feet.
The alarm conditions are based on a rise or fall of 10 inches of applicable liquid in a reservoir that is 3.33 inches in diameter and 12 inches in length.
Installers must be certified by both the piping and sensor manufacturer.

Ameron International
1004 Ameron Rd.
Burkburnett, TX 76354
Tel: (940)-569-1471
E-Mail: marcom@ameronfpd.com
URL: www.ameronfpd.com

Evaluator: Texoma Engineering Services, LLC
Tel: (940) 761-2284
Dates of Evaluation: 05/12/05, 05/01/07, 11/13/09
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/08/09

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Ameron International

Dualoy 3000/LCX and MCX Pipe Monitoring System
Liquid Filled Pressurized Interstitial Space

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, liquid-filled interstitial space leak detection system for use only with Ameron Dualoy 3000/LCX and MCX fiberglass double-wall pipe. Applicable liquids include water and aqueous solutions of brine (i.e., CaCl and NaCl) or glycols (e.g., propylene) in concentration sufficient to reduce evaporation and prevent liquid from freezing in any portion of the monitoring system under extremes of local temperature conditions.
Maximum length is 344 feet.
No restrictions on pipeline diameter.

Operating Principle:
Similar to the methodology that has been applied to liquid-filled interstitial double-walled tanks.
An Applicable liquid is used to fill the pipeline interstice, which is pressurized using an air compressor or gas bottle.
High and low level pressure switches are connected to the interstitial space to ensure that pressure remains within allowable limits.
A vacuum may be placed on the interstice to assist as applicable liquid is filled from the low point in the pipeline to minimize trapped air.
The reservoir can be located in any convenient place and does not have to be at the high point of the system.
The dual-point level sensor system monitors the liquid level in the interstitial reservoir and provides an alarm if the liquid level is either too high (interstitial pressure is lost, allowing expansion of trapped vapor) or too low (loss of interstitial liquid).
The method must be used with a dual-point sensor system that will properly fit into the reservoir, is compatible with the interstitial liquid, and is on the NWGLDE list. The spacing between the high and low sensors must be at least 10 inches.
Sensors can be used to shut down the turbine system and/or alert the operator that a potential problem exists.

Alarm Conditions:
For a leak rate of 0.10 gph out of the interstice, the maximum time to alarm for a 10-inch sensor spacing with a reservoir diameter of 3.33 inches is 3.11 hours.
This method declares a pipeline to be leaking when the loss of applicable liquid in the 3.33 inch reservoir is 0.311 gallons.
The change in level in the reservoir is proportional to the volume of fluid flowing out of the interstice. It is cumulative and therefore not dependent on the rate of fluid loss.
Time to alarm is based on evaluations conducted using a 30% $CaCl_2$ (brine) solution and a leak (liquid egress) 341 feet from the reservoir. Equivalent results are expected for other applicable liquids.
Time to alarm for a catastrophic primary pipe failure with a pressure of 38 psi is 13 seconds at a distance of 2.14 feet from the reservoir and 19.76 minutes at a distance of 341 feet. This is based on a liquid level change of 10" or 0.311 gallons in a reservoir that measures 12 inches in height and 3.33 inches in diameter.
A high level alarm indicates that the pressure in the interstice has been lost and needs to be restored.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Ameron International., Models 404 and 406 Liquid Level Sensors, Model DFR-1 Liquid Level Switch, Models EOS100, 510 and 516 Discriminating Sensors with Models 500 and 500C Controllers, Model 522 Remote Monitoring System, Model 522T Monitoring System, and ESite Monitoring System

Applicability:
Ameron International underground double-walled piping as specified above containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil. Other liquids may stored after consultation with the manufacturer .

Calibration:
Equipment requires no calibration other than an annual inspection.
The electronics must be calibrated and maintained in accordance with the sensor/monitoring equipment instructions.

Comments:
System must be designed and installed in accordance with the instructions provided by the manufacturer.
Direct burial of pipeline fittings and reservoir is permitted provided the reservoir has an observation manway at grade level.
The interstice must be filled from the low point in the pipeline to minimize trapped air.
The evaluation was conducted in an Ameron, double-wall, fiberglass pipeline with an interstitial capacity of 12.97 gallons, an inside diameter of 2.22 inches, and a length of 344 feet.
Alarm conditions are based on a fall of 10 inches of applicable liquid in a reservoir that is 3.33 inches in diameter and 12 inches in length.
Installers must be certified by both the piping and sensor manufacturer.
Evaluation was conducted with an interstitial pressure of 50 psig applied to the pipe and fittings.
Care must be taken to avoid damaging the piping by applying excessive interstitial pressure.
The third-party evaluation only addresses the method's ability to detect leaks. It does not test the equipment for safety hazards.

Ameron International
1004 Ameron Rd.
Burkburnett, TX 76354
Tel: (940)-569-1471
E-Mail: marcom@ameronfpd.com
URL: www.ameronfpd.com

Evaluator: Texoma Engineering Services, LLC
Tel: (940) 761-2284
Dates of Evaluation: 05/12/05, 05/01/07, 11/13/09
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/08/09

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AMETEK Automation & Process Technologies
(originally listed as MagneTek, then Patriot Sensors and Controls Corp.)

7021 Digital Tank Gauge
(7030 Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of 2005, the 7021 product line became obsolete.

Certification
Leak rate of 0.2 gph with PD = 99.96% and PFA = 0.044%.
Leak rate of 0.1 gph with PD = 95.34% and PFA = 4.66%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must have minimum product height of 18 inches, or be 14% full, whichever is higher, for leak rate of 0.1 gph.

Waiting Time
Minimum of 2 hours between delivery and testing for leak rate of 0.2 gph.
Minimum of 8 hours between delivery and testing for leak rate of 0.1 gph.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 4 hours.
Test data are acquired and recorded by a 7021 controller (computer).
Leak rate is calculated from data determined to be statistically valid.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 1 resistance temperature detector (RTD).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.947 inch.
Minimum detectable water level change is 0.0254 inch.

Calibration
RTD 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.

AMETEK Automation & Process Technologies
1080 N. Crooks Rd.
Clawson, MI 48017-1097
Tel: (800) 635-0289
URL: www.ametekapt.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/07/91, 4/25/1995

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Issue Date: November 22, 1995
Revision Date: April 14, 2015

AMETEK Automation & Process Technologies
(originally listed as MagneTek, then Patriot Sensors and Controls Corp.)

7021 Digital Tank Gauge
(7100 Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of 2005, the 7021 product line became obsolete.

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 99.6% and PFA = 0.4%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 2 hours between delivery and testing.
Minimum of 2 hours between dispensing and testing.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 6 hours for leak rate of 0.1 gph.
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 a minimum of 5 thermistors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.186 inch.
Minimum detectable water level change is 0.0048 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.

AMETEK Automation & Process Technologies
1080 N. Crooks Rd.
Clawson, MI 48017-1097
Tel: (800) 635-0289
URL: www.ametekapt.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/14/95, 4/25/1995

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Andover Controls Corp.

Andover Infinity Versions CX9900, CX9400, CX9200, CX9000, CMX240 (Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.4% and PFA = 4.6%.

Leak Threshold 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.

Tank Capacity Maximum of 30,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
Minimum of 3 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 6 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 3 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.35 inch.
Minimum detectable change in water level is 0.0028 inch.

Calibration RTDs 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.

Andover Controls Corp.
300 Brickstone Square
Andover, MA 01810
Tel: (978) 470-0555

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/20/97

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

Andover Controls Corp.

Andover Infinity
Versions CX9000, CX9200, CMX240
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA < 0.1%.
Leak rate of 0.1 gph with PD = 97.6% and PFA = 2.4%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 6 hours between delivery and testing.
Minimum of 3 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 6 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 3 resistance temperature detectors (RTDs).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.35 inch.
Minimum detectable change in water level is 0.003 inch.

Calibration
RTDs 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.

Andover Controls Corp.
300 Brickstone Square
Andover, MA 01810
Tel: (978) 470-0555

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/24/93

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Andover Controls Corp.

Versions AC8+, AC256+
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.5% and PFA = 0.5%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
Minimum of 4 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 6 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between first and last data collected, divided by elapsed time between first and last volume changes observed.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 3 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.99 inch.
Minimum detectable change in water level is 0.01 inch.

Calibration RTDs 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.

Andover Controls Corp.
300 Brickstone Square
Andover, MA 01810
Tel: (978) 470-0555

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/03/92

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ASTTest Services, Inc.

ASTTest Mass Balance Leak Detection System

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tank with PSA of 5,575 ft², leak rate is 0.88 gph with PD = 95% and PFA = 5%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 5,575 ft²) x 0.88 gph].
Example: For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 5,575 ft²) x 0.88 gph] = 1.578 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 5,575 ft², leak threshold is 0.44 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 5,575 ft²) x 0.44 gph].
Example: For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 5,575 ft²) x 0.44 gph] = 0.789 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability
Diesel, aviation fuel, fuel oil, kerosene.

Tank Capacity
Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 13,938 ft² (approximately 133 ft diameter).
Performance not sensitive to product level.

Waiting Time
Minimum of 48 hours after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 48 hours.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 10 thermistors.

Water Sensor
None.
Water leaks are measured as changes in level inside tank.

Calibration
Level and temperature sensors must be checked regularly and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments
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.
Evaluated in a nominal 2,000,000 gallon, vertical aboveground tank with product surface area (PSA) of 5,575 ft².
Tests conducted in a vertical wall underground tank may achieve better results.

ASTTest Services, Inc.
2336 Hamlet Drive
Melbourne, FL 32934
Tel: (407) 242-1474

Evaluator: Albert Machlin, P.E.
Tel: (212) 675-5868
Date of Evaluation: 11/98

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AT Monitors

(originally listed as Armstrong Monitoring, Corp. and then Sequence Controls, Inc.)

AMC 5100 or ATI-5100 Monitor with Leak Detection Cables: AMC-5007 or ATI-5007

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:*

	unleaded gasoline
Detection time (sec)	35
Fall time (min:sec)	02:30
Lower detection limit (cm)	0.04

*For tests conducted with 0.32 cm of floating product.

Manufacturer's specifications:
Operating temperature: 32 degrees F to 104 degrees F (0 degrees C to 40 degrees C).

Comments:
Sensors are reusable.

Armstrong Technologies Inc.
14 Birch Drive
Kemptville, Ontario K0G 1J0 Canada
Tel: (613) 258-5225
E-mail: info@atmonitors.com
URL www.atmonitors.com

Evaluator: Environment Canada
Tel: (613) 991-4568
Date of Evaluation: 12/03/92

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AT Monitors

(originally listed as Armstrong Monitoring, Corp. and then Sequence Controls, Inc.)

AMC 5100 or ATI-5100 Monitor with Cable Sensors: AMC 5016, AMC 5016A, or ATI-5016

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:*

	diesel
AMC-5016	
Detection time (min:sec)	20:15
Fall time (min:sec)	Not Reported
Lower detection limit (cm)	0.04
AMC-5016A	
Detection time (min:sec)	9:25
Fall time (min:sec)	Not Reported
Lower detection limit (cm)	0.04

*For tests conducted with 0.32 cm of floating product.

Comments:
Detection times represent the mean of 5 test periods.
Manufacturer indicates that the sensor cables will detect the presence of petroleum fuels ranging from refined naphtha to heavy crude in bunkers.
The cables are designed to be reusable after being subjected to a petroleum product.
If the sensor cable is subjected to trace amounts of diesel fuel, the cable can be removed and dried in the open air in a matter of hours.
If the sensor cables become supersaturated, the manufacturer recommends and provides a procedure to wash the cables.
The washing procedure is included in the AMC-5016 and 5016A manuals for customers that order diesel or heavy petroleum product detection systems.

Armstrong Technologies Inc.
14 Birch Drive
Kemptville, Ontario K0G 1J0 Canada
Tel: (613) 258-5225
E-mail: info@atmonitors.com
URL www.atmonitors.com

Evaluator: Environment Canada
Tel: (613) 991-4568
Date of Evaluation: 08/27/04

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AT Monitors
(originally listed as Armstrong Monitoring, Corp. and then Sequence Controls, Inc.)

AMC 5100 or ATI-5100 Monitor with Vapor Sensors AMC F4000 or ATI-F4000

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: metal oxide semiconductor

Test Results:

	benzene
Detection time (sec)	10
Fall time (min:sec)	04:02
Lower detection limit (ppm)	300

Comments:
Sensors are reusable.

Armstrong Technologies Inc.
14 Birch Drive
Kemptville, Ontario K0G 1J0 Canada
Tel: (613) 258-5225
E-mail: info@atmonitors.com
URL www.atmonitors.com

Evaluator: Environment Canada
Tel: (613) 991-4568
Date of Evaluation: 12/03/92

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ATMOS International

ATMOS STMS Statistical Tightness Monitoring System for Airports

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.0019% of pipeline volume (0.000019 gph per gallon of product) at a defined pressure of 150psi in pipeline segment being tested with PD = >95% and PFA = <5%.
The US EPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
0.00095% of pipeline volume (0.0000095 gph per gallon of product).
A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the preset threshold.

Applicability
Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*, crude oil, petroleum distillates in liquid form, cooling fluids, and water or water soluble liquids.

Specification
System tests either single or double-walled fiberglass or steel piping.

Pipeline Capacity
Minimum of 2,000 gallons, maximum of 300,000 gallons.

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

Test Period
Minimum of 45 minutes after setup for data collection.
Piping must be isolated and blocked during test.

System Features
System is permanently installed on pipeline to perform monitoring.
Average test time for data collection and analysis is 65 minutes. System performance is expressed as a percentage of the piping volume per hour.

Calibration
System must be calibrated in accordance with manufacturer's instructions.

Comments
System designed for use on large underground bulk pipelines such as airport hydrant fueling systems.
Manufacturer claims system is applicable to any size of underground pressurized piping, typically between 2,000 and 300,000 gallons.
The size of the detectable leak scales upward with the size of the piping system.
The third-party evaluation utilized a total of 24 tests. 16 of these tests were conducted with various induced leak rates.

ATMOS International
3100 E. Miraloma Ave, Suite 240 D
Anaheim, CA 92806
Tel: (714) 520-5325
E-mail: marketing@atmosinc.com
URL: www.atmosi.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/30/08

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Barton Instrument Systems, LLC

Barton 3500 ATG

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.3% and PFA = 4.7%.

Leak Threshold
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.

Tank Capacity
Maximum of 75,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 4 hours between delivery and testing.
Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 24 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature
Measurement of product temperature is not required by this system.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.509 inch.
Minimum detectable change in water level is 0.225 inch.

Calibration
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.

Barton Instrument Systems, LLC
900 S. Turnbull Canyon Road
City of Industry, CA 91745
Tel: (626) 961-2547

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/15/00

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Issue Date: April 18, 1997
Revision Date: August 18, 2010

Beaudreau Electric, Inc.

Model DFR-1 Liquid Level Switch, Models EOS100, 510 and 516 Discriminating Sensors with Models 500 and 500C Controllers, Model 522 Remote Monitoring System, Model 522T Monitoring System, and ESite Monitoring System

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type:	qualitative, discriminating
Sampling frequency:	continuous
Operating principle:	float switch (Model DFR-1), refractive index of liquids (Model EOS100), polymer strip, hydrocarbon-only (Model 510), optical sensor and conductivity (Model 516)

Test Results:

Model EOS100 Discriminating Sensor (5 sensing levels)	unleaded gasoline	diesel	water	brine
Detection time (sec)	<1	<1	<1	
Fall time	manual reset	manual reset	automatic reset when water level drops	
Precision (in)				
Level 1 (low level switch)	0.005	0.002	0.003	
Level 2	0.006	0.002	not evaluated	
Level 3	0.004	0.002	not evaluated	
Level 4	0.004	0.002	not evaluated	
Level 5 (high level switch)	0.004	0.002	0.004	
Lower detection limit (in)				
Level 1 (low level switch)	0.536	0.551	0.550	
Level 2	1.266	1.226	not evaluated	
Level 3	2.097	2.074	not evaluated	
Level 4	2.858	2.895	not evaluated	
Level 5 (high level switch)	3.569	3.57	3.596	
Model 510 Discriminating Sensor				
Detection time	5-10 min	1-2 hr	<1 sec	
Fall time (sec)	Replaceable	Replaceable	<1	
Precision - standard deviation (in)	<0.0001	<0.0001	0.0045	
Lower detection limit (in)	0.058	0.058	11.566	
Model 516 Discriminating Sensor	unleaded gasoline	diesel	water	brine
Detection time (sec)	<1	<1	<1	
Fall time	<1	<1	<1	
Precision - standard deviation (in)	0.0038	0.0032	0.0020	
Lower detection limit (in)	0.340	0.369	0.389	
Model DFR-1 Liquid Level Switch				
Detection time (sec) low level switch				<1 Reset is Automatic
Reset time (sec) low and high				<1
Detection time (sec) high level switch				<1
Precision- standard deviation (in) low and high level				0.004
Mean detection limit (in)				2.657 Low 11.777 High

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Beaudreau Electric, Inc., Model DFR-1 Liquid Level Switch, Models EOS100, 510 and 516 Discriminating Sensors with Models 500 and 500C Controllers, Model 522 Remote Monitoring System, Model 522T Monitoring System, and ESite Monitoring System

Specificity Results:
Manufacturer and evaluator claim sensors will respond to any liquid. No additional materials tested.

Manufacturer's Specifications:
Manufacturer states that systems require no calibration.
Annual functional test required.
Model 510 Discriminating Sensor and Model DFR-1 Liquid Level Switch are designed to work with Beaudreau Models 500, and 500C Controllers.
Model 516 Discriminating Sensor is designed to work with Beaudreau Models 500, 500C, and 512 Controllers.
Model EOS100 Discriminating Sensor is designed to work with Beaudreau Model 522 Remote Monitoring System and Model 522T Monitoring System, and ESite Monitoring System.

Comments:
Model DFR-1 Liquid Level Switch, and Models EOS100 and 516 Discriminating Sensors are reusable.
The polymer strip used in Model 510 Discriminating Sensor is designed to be replaceable if desired. This design allows the end-user to immediately reuse the sensor by replacing the polymer strip, instead of having to wait 24 to 48 hours for the polymer strip to dry out. Replacement lowers the risk of false alarms caused by the use of partially dried out polymer strips.
Model 516 Discriminating Sensor is designed to be placed in a sensor well in bottom of a containment sump with at least one other sensor mounted higher as a high-water cut-off.
Both Models 510 and 516 Discriminating Sensors were <u>not</u> evaluated for the ability to detect a layer of hydrocarbon on water.
Model EOS100 has 5 sensing points that can sense fuel or water over a 3.5-inch range. The highest sensor (level 5) acts as a high level switch. If water is detected at level 5, a fuel alarm will be triggered instead of a water alarm. If fuel is detected at any of the levels, a fuel alarm will be triggered. The output from the system can be used to shut down the turbines when fuel is present or when water reaches the high level switch.

Model 522 Remote Monitoring System:
Evaluation indicates that when threshold level of Models EOS100, 510 and 516 Discriminating Sensors was reached, Model 522 Remote Monitoring System produced (1) an audible and visual alarm and (2) an output signal that was recognized by a Veeder-Root TLS-350 Monitoring System.
The TLS-350 Monitoring System produced an alarm within 10 seconds, and displayed and printed a notice of alarm and alarm time.
Manufacturer states that the output signal produced by Model 522 Remote Monitoring System can be recognized by other monitoring systems designed to detect this output signal.
Model 522 Remote Monitoring System was evaluated only using the Veeder-Root TLS-350 Monitoring System.

Model 522T Monitoring System:
Evaluation indicates that when threshold level of Models EOS100, 510 and 516 Discriminating Sensors was reached, Model 522T Monitoring System will generate a visual (LCD readout and LED "alarm" lamp) and audible alarm and also open up to three normally closed relay contacts.
By using a Model 522R Relay, the system can use these normally closed relay contacts to control power to turbine pumps. Alternatively, the normally closed relay contacts can be used to send fuel alarm information to a Veeder-Root TLS-350 for both positive shutdown and additional alarm notification (such as a printout showing the date and time that a release has occurred).

ESite Monitoring System:
Uses an array of EOS-100 fiber optic discriminating sensors to provide for continuous monitoring of interstitial spaces or sumps. Detection of liquid triggers audible and visual alarms on the ESite user interface screen. Alarm information can also be transmitted to remote locations through network or internet connections. The ESite Monitoring System provides for turbine pump and dispenser shutdown via the ESite output controller in the event any amount of fuel is detected, or water level reaches a height of 3.5 inches on the sensor.

Beaudreau Electric, Inc.
183 Providence New London Turnpike
Pawcatuck, CT 06379
Tel: (860) 599-3100
E-mail: customerservice@beaudreauelectric.com
URL: www.beaudreauelectric.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/20/94
(Revised 03/02/01, 09/23/02, 12/23/02, 08/28/03, 12/01/03, 05/23/05, 05/23/07)

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Issue Date: July 27, 2004
Revision Date: February 16, 2005

Beaudreau Electric, Inc.

SystemOne 522T Monitor

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified as equivalent to European leak detection standard EN 13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping.
System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled tanks or double-walled piping.

Alarm Condition:
System alarms when liquid enters the interstitial space or an air leak occurs where the interstitial vacuum decreases (pressure increases) to the appropriate "Alarm Activation" vacuum level (see table below).

Applicability:
Underground double-walled tank, connected double-walled piping, and other connected interstitial spaces where tank and piping contain gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil.

Manufacturer's Specifications:
The interstitial volume shall not exceed 8 m^3 for tanks and 10 m^3 for piping.
The interstitial space shall be rated for the maximum operating vacuum level of the leak detector as indicated in the following table, regardless of temperature and groundwater level fluctuations.

Pressure Switch Number	Alarm Activation Vacuum Level	Maximum Operating Vacuum Level	Restrictions
S1-522T-0.9	0.9" Hg (0.44 psi)	6" Hg (2.95 psi)	Suction line must be installed at lowest point in the interstitial space.
S1-522T-6	6" Hg (2.95 psi)	12" Hg (5.89 psi)	Depth to interstitial space cannot exceed 6 ft unless the suction line is installed at lowest point in the interstitial space.
S1-522T-8	8" Hg (3.93 psi)	14" Hg (6.88 psi)	Depth to interstitial space cannot exceed 8 ft unless the suction line is installed at lowest point in the interstitial space.
S1-522T-10	10" Hg (4.91 psi)	18" Hg (8.84 psi)	Depth to interstitial space cannot exceed 10 ft unless the suction line is installed at lowest point in the interstitial space.

Calibration:
Functional and operational safety tests must be performed annually in accordance with manufacturer's instructions.

Comments:
Interstitial space is tested continuously.
System is connected to the interstitial space by a suction line and a pressure measuring line.
Vacuum is generated by an integral pump, and is measured and controlled by a pressure switch.
Warning – Damage to the tank and piping may result if the pressure or vacuum generated by this leak detection equipment exceeds the UST system manufacturer's warranty.
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.

Beaudreau Electric, Inc.
183 Providence New London Turnpike
Pawcatuck, CT 06379
Tel: (860) 599-3100
E-mail: customerservice@beaudreauelectric.com
URL: www.beaudreauelectric.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/08/04

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Beaudreau Electric Marketing, LLC

Model MPC100 Controller with Models DCS140L, DCS140NL Liquid Sensors and Discriminating Liquid Sensor — Model DCS140D

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative (DCS140L & DCS140NL), discriminating (DCS140D)
Sampling frequency: continuous
Operating principle: float switch

Test Results:

Model DCS140L Liquid Sensor	unleaded gasoline	#2 diesel	water	E85
Detection time (sec)	<1	<1	<1	<1
Fall time	manual reset	manual reset	manual reset	manual reset
Precison - standard deviation (in)	0.019	0.028	0.017	0.021
Lower detection limit (cm)	1.064	1.094	0.915	1.086
Model DCS140NL Liquid Sensor				
Detection time (sec)	<1	<1	<1	<1
Fall time (sec)	<1	<1	<1	<1
Precison - standard deviation (in)	0.022	0.014	0.015	0.014
Lower detection limit (cm)	1.211	1.068	0.918	1.077
Model DCS140D Descriminating Sensor				
Detection time (sec)	<1	<1	<1	-
Fall time (sec)	<1	<1	<1	-
Precison - standard deviation (in)	0.003	0.006	0.004	-
Lower detection limit (cm)	0.878	0.813	0.691	-

Specificity Results:

Manufacturer and evaluator claim sensors will respond to any liquid but evaluator only tested for liquids identified above.

Manufacturer's Specifications:

Manufacturer states that systems require no calibration.
Annual functional test required.
Model DCS140D generates alarms on fuel detection and high liquid while Models DCS140L and DCS140NL generate an alarm on liquid detection.

Comments:

Each sensor is reusable.
If liquid is detected at any of the threshold levels, a fuel alarm will be triggered.
The output from the system can be used to shut down the turbines when fuel is present or when water reaches the high level switch.

Beaudreau Electric Marketing, LLC
100 Mechanic Street
Pawcatuck, CT 06379
Tel: (860) 495-0522
E-mail: djgoodman@beaudreau-electric.com
URL: www.beaudreau-electric.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/09/09

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Bell Avon, Inc.

VIGILANT Leak Detection System

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

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

Leak Threshold System alarms when changes in interstitial vacuum exceed a predetermined change in slope versus time curve.

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

Tank Capacity Maximum of 15,000 gallons based on interstitial volume resulting when flexible liner is properly fitted and held in position against rigid tank wall.
No minimum product level during test.

Waiting Time Minimum of 20 minutes between delivery and testing.

Test Period Minimum of 40 minutes.

Comments System is located within the interstitial space between a properly fitted and installed flexible liner inside a rigid tank.
Flexible liner is held in position by maintaining a vacuum on interstitial space.
Interstitial space is tested continuously.
System allows for permeation of vapor from stored substance into interstitial space.
Vapor discharged from vacuum pump must meet applicable air quality standards.
Vapor recovery of product vapor from interstitial space is feasible when required.
System detects breaches in either flexible internal liner or rigid tank walls.
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.

Bell Avon, Inc.
1200 Martin Luther King, Jr. Blvd.
Picayune, MS 39466-5427
Tel: (601) 799-1217

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/16/95

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Brooks KWK, Inc.

Leak Detection Systems
KW-140, KW-240 Monitors with Types 1, 2 Sensors

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: product soluble

Test Results:

Type 1 Sensor	unleaded gasoline	synthetic gasoline
Detection time (sec)	24	9
Fall time	N/A*	N/A
Lower detection limit (cm)	0.01	0.01
Type 2 Sensor		
Detection time (min:sec)	14:39	08:45
Fall time	N/A	N/A
Lower detection limit (cm)	0.01	0.01

* See glossary.

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A jet fuel, toluene, xylene(s).

Manufacturer's specifications:
Type 1 sensor is recommended by manufacturer for detecting liquid and vapor gasoline, alcohol-blend fuels, and JP-4 jet fuel in wet or dry monitor wells.
Type 2 sensor is recommended by manufacturer for detecting fuel oils #1 and #2, A2M, JP-4 jet fuel, JP-5 jet fuel, unleaded gasoline, and alcohol blend fuels in wet monitoring wells only.

Comments:
Sensors are not reusable, and must be replaced after contact with hydrocarbons.
Formerly manufactured by In-Situ, Inc.

Brooks KWK, Inc.
RR 7, Box 141
Wellsboro, PA 16901
Tel: (717) 724-6448

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 07/29/91

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Caldon, Inc.

Caldon PF2000 Pipeline Leak Detection System for Bulk Pipelines

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 10 gph at 100 psi with PD > 95% and PFA < 5%.
(EPA defined equivalent 3.0 gph at 10 psi).
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
8 gph.
A pipeline system should not be declared tight if pressure decay or change in rate of decay in protected segment indicates a leak that exceeds this threshold.

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

Specification
System tests fiberglass or steel piping up to 18 inches diameter.
Tests are normally conducted at operating pressures of 50 to 150 psi, but system may not work at pressures less that 75 psi, and may need to be 100 psi or higher.
System may be used on pipelines pressurized up to 400 psi

Pipeline Capacity
Maximum of 212,000 gallons.
Evaluation conducted on straight piping runs with capacities to 106,000 gallons.

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

Test Period
Variable up to 15 minutes.

System Features
Permanent installation on pipeline.
Automatic testing under static conditions.
Preset thresholds.
Single test to determine if pipeline is leaking.
Message display or printout, alarm activation if leak is declared.
Test data acquisition and calculation by system's computer.

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

Comments
According to vendor, system works in a complex piping network, can detect leaks developed between static test times, and is capable of detecting gradually increasing leaks once they reach the system's detection range. However, not all these features were demonstrated during this evaluation or other field demonstration testing.

Caldon, Inc.
1070 Banksville Ave.
Pittsburgh, PA 15216
Tel: (412) 341-9920

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/15/98

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Cambria Corporation

Models EOS80, EOS100, and EOS120 Discriminating Sensors with Beaudreau Electric, Inc.'s Models 522 Remote Monitoring System and Model 522T Monitoring System, and Cambria Mark I Monitoring System

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, discriminating
Sampling frequency: continuous
Operating principle: Evanescent wave absorption / refractive index of liquids

Test Results:

	0.05 inch of unleaded gasoline on water	water
Model EOS80		
Liquid Level Sensor*		
(single sensing level)		
Minimum alarm level (inch)	<0.01	<0.01
Maximum level (feet)	≤90	≤90
Models EOS100 and EOS120		
Liquid Level Sensors		
(5 sensing levels)		
Detection time (sec)	<1	<1
Fall time	<1	<1
Lower detection limit (in)		
Level 1 (low level switch)	0.562	0.561
Level 2	1.235	no data
Level 3	2.081	no data
Level 4	2.903	no data
Level 5 (high level switch)	3.580	3.614

Specificity Results:

Manufacturer and evaluator claim sensors will respond to any liquid after its threshold is exceeded.
Testing was specifically conducted for performance in water and water with a thin layer of fuel.

Manufacturer's Specifications:

Can be installed on any control device that accepts RS232 communication from the sensor.
Models EOS100 and EOS120 sensors identify liquid in a range from nominal depth of 0.5 inch to 3.5 inches at 0.75 inch increments.
The Model EOS120 sensor is designed to be a drop-in replacement for the Model EOS100 sensor.

Comments:

*The position of the Model EOS80 sensor can be adjusted for any depth of liquid required.

Cambria Corportation
1328 North 128th Street
Seattle, WA 98133
Tel: (206) 782-8330
E-mail: sales@cambriasensors.
URL: www.cambriasensors.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/08/09

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Campo/Miller, Inc.

LS300, LS300 N/C, LS300-120, LS300-120 XLC, LS300-120 PLUS, LS300-120 PLUS A/S

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification
Leak rate of 3.0 gph at 10 psi* with PD = 96.2% and PFA = 0%.
*Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4, waste oil, kerosene.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 35.36 gallons.

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

Test Period
Response time is 10 seconds for LS300, LS300 N/C.
Response time is 10 seconds, but can be adjusted between 10 seconds and 2 minutes, 30 seconds depending on the bulk modulus* of the piping system for LS300-120, LS300-120 XLC, LS300-120 PLUS, LS300-120 PLUS A/S.
Test data are acquired and recorded by a microprocessor.
*See glossary.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset leak threshold.
Single leak test to determine if pipeline is leaking.
Pump shutdown, indicator light and alarm activation if leak is declared.
Pump control, line pressure display, alarm and test logs.

Calibration
Manufacturer recommends a weekly self check, activated by the operator, and a full functional test every 30 days, estimated to take 5 minutes to perform for LS300, LS300 N/C, LS300-120, LS300-120 XLC.
System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions for LS300-120 PLUS, LS300-120 PLUS A/S .

Campo/Miller, Inc.
P. O. Box 1809
Porterville, CA 93258
Tel: (209) 781-6862

Evaluator: Jetronix Engineering Laboratories
Tel: (213) 377-4668
Date of Evaluation: 06/01/91
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/09/94

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Issue Date: October 4, 2007
Revision Date: February 24, 2009

CGRS, Inc.

iota VaporTite - V005
Enhanced Leak Detection (ELD) Method

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (TRACER)

Certification Leak rate of 0.005 gph as vapor with P_D = 100% and P_{FA} = 0%.

Leak Threshold A tank system should not be declared tight when the change in helium concentration in the interstitial space over time exceeds the method's preset threshold.

Applicability Method tests under pressure the primary containment of secondarily contained tanks, piping and other components.
The primary and secondary components of the system under test must be dry, containing no liquid.

Tank Capacity Not limited by capacity.

Test Period Minimum 10 minutes for piping and 20 minutes for tanks.
Test period varies in accordance with iota software and test procedures, and is a function of several factors, including interstitial volume, flow rate, diffusion rate, and the concentration of helium in the component being tested.

Waiting Time No waiting period is required between adding helium to the primary containment and starting the test.

Dosage Helium dosage varies depending on the component being tested.
In all cases, 100% industrial helium is used as prescribed in the manufacturer's test procedures.

Sampling Points Sampling is performed by circulating air through the interstitial space between the primary and secondary walls of the component(s) being tested and measuring the He levels in the circulated air.

Groundwater Groundwater level is not determined and does not impact the test.
Flow meter is used to verify that the interstitial space is dry and has sufficient air movement.

Detector Helium is measured by the helium detector, which supplies data to the iota system for analysis and pass/fail determination.
Third-party evaluation was conducted using the Varian models PHD-04 and 979 detectors, but evaluator indicates that any helium detector meeting at least the following performance standards can be used:

Minimum Detectable Concentration	2 ppm
Smallest Detectable Leak	5×10^{-6} atm-cc/sec
Response Time	< 2 seconds
Background Suppression	Automatic

Calibration Helium detector performs an auto calibration on start up and must be checked monthly and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments This method is intended primarily for use on new installations before product has been added to the system.
The interstitial volume of the components being tested must be entered manually, or the iota software can calculate volume based on piping type/length or sump dimensions entered by the tester.
Third-party evaluation included tests to show that the method can find leaks on a variety of UST system components, including double-wall piping, double-wall USTs, and primary components contained within tanktop/under dispenser sumps.
This method is only able to test double-walled tanks that have 2 interstitial access ports on opposite ends of the tank and have a dry primary and interstitial space.
The method was evaluated on a 32 foot long tank with access ports spaced 28 feet apart.

CGRS, Inc.
1301 Academy Court
Fort Collins, CO 80524
Tel: (800) 288-2657
E-mail: info@iotaleakdetection.com
URL: www.iotaleakdetection.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/25/07

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Chapman Engineering
(originally listed as Environmental Fuel Systems, Inc.)

Fuel Finder IV

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

Detector:

Output type: quantitative
Sampling frequency: intermittent
Operating principle: adsorption sampling

Test Results:

	benzene	2-methylbutane
Accuracy (%) [Avg. Reading]	106.8 [1647 ppm]	122.7 [1380 ppm]
Bias (%)	64.5	38.2
Precision (%)	22.3	53.2
Detection time	N/A*	N/A
Fall time	N/A	N/A
Lower detection limit (ppm)	77	116

* See glossary.

Specificity Results:

	percentages
Benzene	147.7
n-butane	90.7
n-hexane	55.7
Isobutane	51.1
2-methylpentane	143.7
Toluene	66.5

Chapman Engineering
P.O. Box 1305
213 Commerce Street
Boerne, TX 78066
Tel: (800) 375-7747

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 04/20/93

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Computerizing, Inc.

Computank, Version 3.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.5% and PFA = 2%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 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 18,000 gallons.

Data Requirement
Minimum of 30 days of usable product level and flow through data are required.

Comments
Not evaluated using data from manifolded tank systems.
Of 41 data sets submitted for evaluation, 17 were not analyzed.
Median monthly throughput of tanks evaluated was 2,340 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Computerizing, Inc.
P.O. Box 99
Scottsboro, AL 35768
Tel: (256) 259-1805

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/17/92

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Issue Date: August 23, 1999
Revision Date: June 27, 2011

Containment Solutions, Inc.
(originally listed as Fluid Containment and O/C Tanks)

FCI Liquid Filled Interstitial Monitor
Tank Model DWT6 with Model FHRB 810 Level Sensor

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID-PHASE)

Certification: Certified as a continuous, liquid-filled interstitial space leak detection system for all size tanks manufactured by Containment Solutions, Inc. at time of evaluation.

Operating Principle: A fluid reservoir is attached to the top of the tank and is open to the interstice through the bottom. The interstice is normally filled with a brine solution in freeze areas or water in non-freeze areas. The fluid reservoir is equipped with a dual float sensor to provide for low level and high level alarms.
The dual point-level sensor system monitors the liquid level in the interstitial reservoir and provides an alarm if the liquid level is either too high (ingress of liquid) or too low (egress of liquid).

Applicability:
Containment Solutions, Inc. underground double-walled storage tanks as specified above containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil. Other liquids may stored after consultation with the manufacturer.

Test Results:
System is capable of detecting leaks of 0.1 gph or smaller within one month for all size tanks manufactured by Containment Solutions, Inc. at time of evaluation. Estimated time to activate alarm, given a leak rate of 0.1 gph and assuming initial reservoir is 2 inches below full, ranges from 4 hours for a 500 gallon tank to 267 hours for a 50,000 gallon tank. Minimum detectable leak for alarm within one month ranges from 0.0047gph for a 500 gallon tank to 0.0185 gph for a 50,000 gallon tank, if initial reservoir level is 50%. Other test results listed below.

Summary of Variable Ranges Measured in the Evaluation

Evaluation variable	Range of conditions	Estimated range of effect for gasoline on brine level (in)
Product level change in tank	From 0% to 90%	2.0
Water table changes	48 inches change	1.6
Temperature changes	From 40 to 100 degrees F.	1.8
Vapor trapped in interstice (with temperature change)	45 gallons air trapped (with temperature change from 40 to 100 degrees F.)	<2

Manufacturer's Specifications:
Fluid in reservoir must be filled to proper level.
When alarm condition exists, or annually, sensor must be removed and tested in a bucket of water, according to manufacturer's instructions.

Comments:
Evaluation conducted on DWT6 20,000 gallon tank with a R28 reservoir and FHRB 810 sensor. Other sensors can be used only if they are a dual-point, will properly fit into the reservoir, are compatible with the interstitial liquid, and are on the NWGLDE list.
Evaluation parameters included: tank product level changes, water table changes, temperature changes, measurement of trapped vapor in the interstice, leak effects on the liquid-filled interstice, and scaling factors (application to various tank sizes).
System was not evaluated for ability to detect layer of hydrocarbon on water.

Containment Solutions, Inc.
5150 Jefferson Chemical
Conroe, TX 77301-6834
Tel: (800) 628-2657
E-Mail: dheiman@csiproducts.com
URL: www.containmentsolutions.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/15/98

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Containment Solutions, Inc.
(originally listed as Fluid Containment and O/C Tanks)

DDAS 910 Discriminating Sensor for Dry Annular Spaces; DCBS 900 Discriminating Sensor for Collars, Bulkheads, Sumps

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: capacitance change

Test Results:

DDAS 910 Discriminating Sensor for Dry Annular Spaces	unleaded gasoline	synthetic gasoline
Accuracy (%)	100	100
Detection time (sec)	<1	<1
Fall time (sec)	manual reset	manual reset
Lower detection limit (in)	0.32	0.36
DCBS 900 Discriminating Sensor for Collars, Bulkheads, Sumps		
Accuracy (%)	100	100
Detection time (sec)	<1	<1
Fall time (sec)	manual reset	manual reset
Lower detection limit (in)	0.76	0.74

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s), water.
Evaluations determined these sensors' responses to the liquids shown above as well as those indicated in this section. 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:
Control panel models:
CPF 1, CPF 2, CPF 3, CPF 4 for liquid level sensors;
CPI 1D, CPI 1H, CPI 1N inventory control for liquid level sensors and 1 tank;
CPD 1, CPD 2, CPD 4 for discriminating liquid level sensors;
CPI 4 inventory control for liquid level sensors and up to 4 tanks;
BOMC battery operated control cap for liquid level sensors;
CCF 1DA battery operated control cap for dry annulus monitoring;
CCF 2 battery operated control cap for hydrostatic reservoir monitoring.

Containment Solutions, Inc.
5150 Jefferson Chemical
Conroe, TX 77301-6834
Tel: (800) 628-2657
E-Mail: dheiman@csiproducts.com
URL: www.containmentsolutions.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/11/99

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Containment Solutions, Inc.
(originally listed as Fluid Containment and O/C Tanks)

FOVF 600B, FOVF 600S Non-Discriminating Sensors for High Level Overfill (Brass, Steel); FCBS 700 Non-Discriminating Sensor for Collars, Bulkheads, Sumps; FDAS 710 Non-Discriminating Sensor for Dry Annular Spaces; FHRB 810 Non-Discriminating Sensor for Reservoirs

INTERSTITIAL DETECTOR (LIQUID-PHASE)

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

Test Results:

FOVF 600B, FOVF 600S Non-Discriminating Sensors for High Level Overfill (brass, steel)	unleaded gasoline	diesel*	water
Lower detection limit (in)	3.32	3.26	3.18
Precision-standard deviation (in)	0.0051	0.0025	0.0037
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
FCBS 700 Non-Discriminating Sensors for Collars, Bulkheads, Sumps			
Lower detection limit (in)	0.99	0.97	0.87
Precision-standard deviation (in)	0.0040	0.0027	0.0043
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
FDAS 710 Non-Discriminating Sensors for Dry Annular Spaces			
Lower detection limit (in)	0.44	0.43	0.42
Precision-standard deviation (in)	0.0025	0.0041	0.0031
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
FHRB 810 Non-Discriminating Sensors for Reservoirs - Low Level Float			
Lower detection limit (in)	2.57	2.53	2.31
Precision-standard deviation (in)	0.0042	0.111	0.0042
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
FHRB 810 Non-Discriminating Sensors for Reservoirs - High Level Float			
Lower detection limit (in)	13.31	13.24	13.01
Precision-standard deviation (in)	0.0080	0.0061	0.0042
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Containment Solutions, Inc., FOVF 600B, FOVF 600S Non-Discriminating Sensors for High Level Overfill (Brass, Steel); FCBS 700 Non-Discriminating Sensor for Collars, Bulkheads, Sumps; FDAS 710 Non-Discriminating Sensor for Dry Annular Spaces; FHRB 810 Non-Discriminating Sensor for Reservoirs

*This evaluation determined the sensors' responses to the liqiuids 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:
Control panel models:
CPF 1, CPF 2, CPF 3, CPF 4 for liquid level sensors;
CPI 1D, CPI 1H, CPI 1N inventory control for liquid level sensors and 1 tank;
CPD 1, CPD 2, CPD 4 for discriminating liquid level sensors;
CPI 4 inventory control for liquid level sensors and up to 4 tanks;
BOMC battery operated control cap for liquid level sensors;
CCF 1DA battery operated control cap for dry annulus monitoring;
CCF 2 battery operated control cap for hydrostatic reservoir monitoring.

Containment Solutions, Inc.
5150 Jefferson Chemical
Conroe, TX 77301-6834
Tel: (800) 628-2657
E-Mail: dheiman@csiproducts.com
URL: www.containmentsolutions.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/11/99

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Issue Date: November 22, 1995
Revision Date: October 5, 2010

Containment Solutions, Inc.
(originally listed as Fluid Containment and O/C Tanks)

Hydrostatic Precision Tank Test for DWT-Type II Tanks

INTERSTITIAL TANK TIGHTNESS TEST METHOD

Certification
Leak rate of 0.1 gph with PD = 99.9% and PFA = 1.2% without dispensing.
Leak rate of 0.1 gph with PD = 95% and PFA = 5.0% with dispensing.

Leak Threshold
0.05 gph without dispensing and 0.07 gph with dispensing.
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, motor oil, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 30,000 gallons.
Tank must be between 0 and 100% full. Maximum tank diameter is 10 feet.

Waiting Time
Minimum of 24 hours between delivery and testing.
Minimum of 3 hours between "topping off" the annular space with liquid and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 4 hours.
A leak is not declared unless the threshold is exceeded in two tests, separated by at least 8 hours which are performed without dispensing and with minimal changes in groundwater elevation above bottom of tank as described below.

Other Limitations
Volume of trapped vapor must not exceed 20 gallons.
Change in barometric pressure must be less than 0.04 psia over the 4-hour test period.
Annular space must be at least 100% full with either water or antifreeze.
If groundwater is above bottom of tank, and no product is being dispensed during test, total change in groundwater elevation during test must be less than 1.5 inches per hour.
If groundwater is below bottom of tank or not changing during test, total change in product level during test must be less than 0.75 inch per hour.

Containment Solutions, Inc.
5150 Jefferson Chemical
Conroe, TX 77301-6834
Tel: (800) 628-2657
E-Mail: dheiman@csiproducts.com
URL: www.containmentsolutions.com

Evaluator: Vista Research
Tel: (415) 966-1171
Date of Evaluation: 05/15/91

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Dresser Wayne Europe

TIG 5000 0.2 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.1% and PFA = 0.9% for Precision Test.
Leak rate of 0.2 gph with PD = 95.4% and PFA = 4.6% for Quick Test.

Leak Threshold
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.

Tank Capacity
Maximum of 15,000 gallons. Tanks less than 95% full may be tested. Minimum product level required based on tank diameter as follows:
48" dia/min 8.5";
64" dia/min 10.5";
72" dia/min 11.5";
96" dia/min 14";
126" dia/min 18".
For other tank diameters, see evaluation report.

Waiting Time
Between delivery and testing ranges from 1 to 6 hours depending on tank conditions.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Average of 2 hours, 46 minutes during Precision Test evaluation.
Average of 1 hour, 9 minutes during Quick Test evaluation.
Test data are acquired and recorded by a microprocessor which automatically determines test time based on tank size and product level.
There must be no dispensing or delivery during test.

Temperature
Probe contains 5 resistance temperature detectors (RTDs) to monitor average product temperature.
At least one RTD must be submerged in product during test.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inches.
Minimum detectable change in water level is 0.039 inches.

Calibration
RTDs 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 the portion of tank containing product.
As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure).
Consistent testing at low levels could allow a leak to remain undetected.
EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

Dresser Wayne AB
Limhamnsvagen 109, Box 30049
SE-200 61 Malmo, Sweden
Tel: Unavailable

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/23/93, 06/20/94
08/17/95, 07/28/97, 11/17/99

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Issue Date: July 14, 2003

Dresser Wayne Europe

TIG 1000
(Model 924, 2 inch dia Floats, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.8% and PFA = 2.2% for 30 minute test.
Leak rate of 0.2 gph with PD = 99.4% and PFA = 0.6% for 1 hour test.
Leak rate of 0.2 gph with PD = 99.7% and PFA = 0.3% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for 3 hour test.

Leak Threshold
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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be minimum 50% full for 1 hour test.
Tank must be minimum 14% full for 30 minute, 2 hour and 3 hour test.
Minimum product level required based on 14% full tank and tank diameter is as follows:
48" dia/min 9.5";
120" dia/min 24.7".
For other tank diameters, consult manufacturer.

Waiting Time
Minimum of 8 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period
Variable:
Minimum of 30 minutes, 1, 2 or 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe containing 5 thermistors with the lowest thermistor located at the 10% tank volume level above the bottom of the tank.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.75 inch.
Minimum detectable change in water level is 0.08 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.

Dresser Wayne AB
Limhamnsvagen 109, Box 30049
SE-200 61 Malmo, Sweden
Tel: Unavailable

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/00

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Issue Date: July 14, 2003
Revision Date: February 9, 2012

Dresser Wayne Europe

TIG 1000
(Model 924, 4 inch dia Floats, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.8% and PFA = 2.2% for 30 minute test.
Leak rate of 0.2 gph with PD = 98.7% and PFA = 1.3% for 1 hour test.
Leak rate of 0.2 gph with PD = 99.2% and PFA = 0.8% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.5% and PFA = 0.5% for 3 hour test.

Leak Threshold
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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be minimum 14% full.
Minimum product level required based on 14% full tank and tank diameter is as follows:
48" dia/min 9.5";
120" dia/min 24.7".
For other tank diameters, consult manufacturer.

Waiting Time
Minimum of 8 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period
Variable:
Minimum of 30 minutes, 1, 2 or 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe containing 5 thermistors with the lowest thermistor located at the 10% tank volume level above the bottom of the tank.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.848 inch.
Minimum detectable change in water level is 0.043 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.

Dresser Wayne AB
Limhamnsvagen 109, Box 30049
SE-200 61 Malmo, Sweden
Tel: Unavailable

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/03/00

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: July 14, 2003
Revision Date: June 8, 2005

Dresser Wayne Europe

TIG 5000 ATG System
(Q0400-4xx Magnetostrictive Probe)

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

Certification Leak rate of 0.2 gph with PD = 99.1% and PFA = 0.9%.

Leak Threshold 0.1 gph for single and manifolded tank systems.
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.
The system is designed primarily for use with petroleum fuels.
Other liquids with known coefficients of expansion and density may be tested after consultation with the manufacturer.

Tank Capacity Maximum of 35,000 gallons for single tanks and for up to 2 tanks manifolded together.

Throughput Monthly maximum of 130,000 gallons.

Waiting Time Minimum of 6 hours stabilization time is allowed between delivery and data collection.

Test Period Average data collection time is 12 days.
During evaluation, data collection time ranged from 1 to 31 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 sensors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inch.
Minimum detectable change in water level is 0.039 inch.

Calibration Temperature sensors are factory calibrated.
Probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments System reports a result of "pass" or "fail."
Evaluated using both single and manifolded tank systems with probes in each tank.
Data can be collected when the product level is between 9% and 94.9% of tank volume.
System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail".
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no "passing" tests completed during the month.
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.
The 6-hour stabilization period after delivery may result in the system not testing the top portion of a very active tank. In this situation, a periodic test in the shut-down mode with a high product level should be used to test the entire portion of tank that routinely contains product.
Because the database for evaluation of the system did not include sites with vapor recovery, certification is limited to sites with no vapor recovery.
Evaluated using gasoline.

Dresser Wayne AB
Limhamnsvagen 109, Box 30049
SE-200 61 Malmo, Sweden
Tel: Unavailable

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/13/00

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EBW, Inc.

AS-LS300 Series
(Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI)
(for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4, waste oil, kerosene.

Specification
System tests pressurized rigid or flexible pipelines for all leak rates.
System tests pressurized hybrid combination of rigid and flexible pipelines for 3.0 gph leak rate only.
Tests are conducted at operating pressure.

Pipeline Capacity
For 3.0 gph leak rate test:
- Maximum of 396.6 gallons for rigid pipelines.
- Maximum of 95.5 gallons for flexible pipelines.
- Maximum of 492.1 gallons for hybrid combination of rigid and flexible pipelines (rigid portion cannot exceed 396.6 gallons and flexible portion cannot exceed 95.5 gallons).

For 0.2 leak rate and 0.1 gph leak rate tests:
- Maximum of 163 gallons for rigid pipelines (Example: 350 feet of 3 3/8 inch line).
- Maximum of 39.5 gallons for flexible pipelines (Example: 430 feet of 1 ½ inch line).

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 3 hours between dispensing and testing for leak rate of 0.2 gph.
Minimum of 6 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 10 minutes for leak rate of 3.0 gph.
Minimum of 25 minutes for leak rate of 0.2 gph.
Minimum of 34 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: EBW, Inc., AS-LS300 Series (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

System Features

Permanent installation on pipeline.
Automatic testing of pipeline every 45 minutes for leak rate of 3.0 gph.
Automatic testing of pipeline when pump has been idle for 3 hours for leak rate of 0.2 gph.
Automatic testing of pipeline when pump has been idle for 6 hours for leak rate of 0.1 gph.
Preset threshold.
Triplicate testing to determine if pipeline is leaking.
Pump shutdown, indicator light and alarm activation if leak is declared.
Pump control, line pressure display, alarm and test logs.

Calibration

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/23/95, 09/10/98, 05/26/06

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Issue Date: July 27, 2004
Revision Date: June 8, 2005

EBW, Inc.

AutoStik II, AutoStik Jr., with SCALD 2.0
(INCON TSP-LL2 Magnetostrictive Probe)

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

Certification *Applies only to EBW, Inc. AutoStik II and AutoStik Jr., with SCALD 2.0 models sold on or after March 1, 2004.*
Leak rate of 0.2 gph with PD > 99% and PFA < 1%.

Leak Threshold 0.10 gph for single and manifolded tank systems.
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.

Tank Capacity Maximum of 49,336 gallons for single tanks and for all tanks manifolded together.
Tank must be between 14 and 93.5% full.
Contact manufacturer for tank system applications if total tank capacity exceeds 30,000 gallons.

Throughput Monthly maximum of 257,818 gallons.

Waiting Time None between delivery and data collection when difference between product in tank and product delivered is 6.0 degrees F or less.

Test Period Data collection time ranges from 5 to 28 days. Data sampling frequency is > 1 per second.
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.
Minimum detectable change in water level is 0.011 inch.

Calibration Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments System reports a result of "pass" or "fail".
Evaluated using both single and manifolded tank systems with probes in each tank.
Tests only the portion of the tank containing product.
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.
AutoStik Jr. can support up to 4 tanks.
AutoStik II can support up to 8 tanks.
The database for evaluation of the system includes sites with vapor recovery and blending dispensers.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/11/2003

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Issue Date: April 18, 1997
Revision Date: March 10, 2000

EBW, Inc.

AutoStik Sensors
LS-5, LS-7, LS-10, LS-15, LS-20, LS-35, LS-3A, LS-30A

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

LS-5, LS-35 (float switches)	unleaded gasoline	diesel	water
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	1.317	1.23	1.156
LS-10, LS-15, LS-20 (float switches)			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	2.870	2.822	2.667
LS-3A (N.C. and N.O.)			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	2.59	2.38	2.08
LS-30A (low level)			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	8.79	8.48	8.15
LS-30A (high level)			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	23.65	23.04	22.78
LS-7			
Detection time (sec)	<1	N/A*	<1
Fall time (sec)	<1	N/A	<1
Lower detection limit (cm)	1.09	N/A	0.81

*See glossary.

Specificity Results:

Manufacturer and evaluator claim that sensors will respond to any liquid.

Manufacturer's Specifications:

There is no manufacturer's recommended maintenance schedule.

Comments:

Sensors are reusable.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/20/93, 07/05/94

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Issue Date: April 18, 1997
Revision Date: March 10, 2000

EBW, Inc.

AutoStik Discriminating Sensors
LS-5, LS-10, LS-15, LS-20, LS-35

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeability

Test Results:

LS-5, LS-35 (polymer strips)	unleaded gasoline	diesel	water
Detection time (min)	~7	~60	N/A*
Fall time (sec)	N/A	N/A	N/A
Lower detection limit (cm)	<0.014	<0.014	N/A
LS-10, LS-15, LS-20 (polymer strips)			
Detection time (min)	~7	~60	N/A*
Fall time (sec)	N/A	N/A	N/A
Lower detection limit (in)	<0.014	<0.014	N/A

*See glossary.

Specificity Results:
Manufacturer and evaluator claim sensors will respond to any liquid, except water.

Manufacturer's specifications:
Operating temperature: -20 degrees F to 150 degrees F (-28.9 degrees C to 65.5 degrees C).
There is no manufacturer's recommended maintenance schedule.

Comments:
Sensors can be reset by exposing them to air.
Sensors are reusable.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/05/94

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Issue Date: June 19, 1996
Revision Date: December 4, 2002

EFA Technologies, Inc.

LeakNet

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 3.0 gph at 10 psi with PD = 100% and PFA = 0%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
2.2 gph.
A pipeline 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 fuels, fuel oil #4, waste oil.

Specification
System tests pressurized bulk material transfer pipelines.
Suitable for all pressurized steel, plastic, fiberglass, or concrete pipelines.
System is used as an equivalent 3 gph line leak detector.
Leak detection flow rates are proportional to pressure in pipeline.
Testing is conducted while the product is not flowing in the pipeline.
Pipeline must be full and under pressure.
Gravity feed pipelines under constant static head pressure may be tested with system.

Pipeline Capacity
Maximum of 116,230 gallons.
System tested on 58,115 gallon pipeline.
Use of pipeline test protocol allows system to be used on pipelines twice the volume of test pipeline.
Contact manufacturer prior to using on pipelines exceeding 58,115 gallons through 116,230 gallons.

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

Test Period
Response time is 2 to 5 minutes.
Test data are acquired and recorded by system's computer.
Calculations are automatically performed by system's computer.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline at least once per hour under static conditions.
Continuous operation during flowing conditions (however, thresholds are higher due to hydraulic noise in pipeline).
Declaration of leak if current changes in pressure exceed tuning parameters, or if pressure fluctuates in a manner that is characteristic of a leak. Pump shutdown, indicator light and alarm activation if leak is declared.

Calibration
System must be checked annually.
Standard electronic field instruments used by the system require normal annual inspection and calibration checks.

Comments
Designed to replace a mechanical line leak detector to detect equivalent 3 gph releases at 10 psi on large pipelines at pressures higher than those found at typical service station.

EFA Technologies, Inc.
116 20th St.
Sacramento, CA 95814
Tel: (916) 443-8842

Evaluator: Ms. Terri Regan -
Naval Facilities Engineering Service Center
Tel: (202) 433-5196
Date of Evaluation: 09/26/95

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Egemin Naamloze Vennootschap

E'SPI III (Mass Buoyancy Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.9% and PFA = 1.1%.

Leak Threshold 0.075 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 7 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 5 hours, 30 minutes.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during test.

Temperature Average for product is obtained by a single moving quartz crystal temperature sensor.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.253 inch.
Minimum detectable change in water level is 0.029 inch.

Calibration Temperature sensor 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.

Egemin Naamloze Vennootschap
Bredabaan 1201 - 2900
Schoten, Belgium
Tel: 011-32-3-03/645 27 90

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 12/21/90

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Egemin Naamloze Vennootschap

E'SPI IV (Mass Buoyancy Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.2% and PFA = 0.3%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons. Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 2 hours, 15 minutes.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during 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 0.253 inch.
Minimum detectable change in water level is 0.029 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.

Egemin Naamloze Vennootschap
Bredabaan 1201 - 2900
Schoten, Belgium
Tel: 011-32-3-03/645 2790

Evaluator: Midwest Research Institute
Tel: (816) 753-7600

Date of Evaluation: 12/21/90

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Engineered Systems, Inc.

Image II
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 96.6% and PFA = 3.4%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 90% full.

Waiting Time Minimum of 8 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 6 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.83 inch.
Minimum detectable water level change is 0.0116 inch.

Calibration RTDs 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.

Engineered Systems Inc.
2001 W. Campus Dr.
Tempe, AZ 85282
Tel: (602) 438-1362

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/20/93

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Engineering Design Group, Inc.

EDG XLD 2000 Plus (Revision 1.02) Leak Detection System (MTS DDA Magnetostrictive Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 12,074 ft², leak rate is 1.92 gph with PD = 95% and PFA = 5%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 12,074 ft²) x 1.92 gph].
Example: For a tank with PSA = 1,260 ft²; leak rate = [(1,260 ft² ÷ 12,074 ft²) x 1.92 gph] = 0.2 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 12,074 ft², leak threshold is 0.96 gph
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 12,074 ft²) x 0.96 gph].
Example: For a tank with PSA = 1,260 ft²; leak threshold = [(1,260 ft² ÷ 12,074 ft²) x 0.96 gph] = 0.1 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

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

Tank Capacity
Use limited to single, field-constructed, vertical-walled tanks having a capacity of 50,000 to 2,100,000 gallons.
Minimum product surface area (PSA) is 1260 ft².
Maximum product surface area (PSA) is 12,076 ft².
Performance not sensitive to product level.

Waiting Time
Minimum of 30 hours, 18 minutes after delivery or transfer.

Test Period
Minimum of 40 hours, 12 minutes.
There must be no delivery, transfer, or dispensing during test.

Temperature
Average for product is determined by five resistance temperature detectors (RTDs).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 2.655 inches.
For tanks with a PSA of 12,076 ft² and containing 2.665 inches of water, system takes 52.7 hours to detect a 0.20 gph water ingress rate.

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

Comments
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. Evaluated in nominal 2,100,000 gallon tank with PSA of 12,076 ft² (124 feet in diameter).
If product temperature change exceeds 1.8 degrees F during test, test will abort.

Engineering Design Group, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/16/01

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Engineering Design Group, Inc.

Ronan X-76 CTM Automatic Tank Gauging System (MTS Level Plus UST Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 564 ft², leak rate is 0.2 gph with PD > 99.9% and PFA < 0.1%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 564 ft²) x 0.2 gph].
Example: For a tank with PSA = 846 ft²; leak rate = [(846 ft² ÷ 564 ft²) x 0.2 gph] = 0.3 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 564 ft², leak threshold is 0.1 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 564 ft²) x 0.96 gph].
Example: For a tank with PSA = 846 ft²; leak threshold = [(846 ft² ÷ 564 ft²) x 0.1 gph] = 0.15 gph.
Leak threshold may not be scaled below 0.1 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

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

Tank Capacity
Use limited to single, field-constructed, vertical-walled tanks having a capacity of 50,000 to 75,000 gallons.
Maximum product surface area (PSA) is 846 ft².

Waiting Time
Minimum of 4 hours, 48 minutes after delivery or transfer.

Test Period
Minimum of 6 hours. There must be no delivery, transfer, or dispensing during test.

Temperature
Average for product is determined by five resistance temperature detectors (RTDs).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.874 inch.
Minimum detectable change in water level is 0.011 inch.
For tanks with a product surface area (PSA) of 564 ft² and containing 0.874 inches of water, system takes more than 64 days to detect a 0.20 gph water ingress rate.

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

Comments
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.
Evaluated in nominal 50,000 gallon tank with PSA of 564 ft².

Engineering Design Group, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/16/01

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Environment and Safety

EASI Level-Tru
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.4% and PFA = 4.6%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 4 hours, 6 minutes between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 3 hours, 36 minutes.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from data collected over the entire range of test period.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.896 inch.
Minimum detectable change in water level is 0.023 inch.

Calibration RTDs 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.

Environment and Safety, Inc.
252 Welsh Pool Rd.
Exton, PA 19341-1313
Tel: Unavailable

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 04/11/91

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EnviroSIR LLC

EnviroSIR Version 1.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD = 97.4% and PFA = 0.1%
Leak rate of 0.1 gph with PD = 97.4% and PFA = 2.6%

Leak Threshold
0.15 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 for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in the system.

Data Requirement
Minimum of 28 days of usable product level and flow through data.

System Features
Method of data analysis that system employs, and was used during evaluation process, is exclusive of any external control by vendor.
System consists of a fully automated software package with embedded algorithms for conducting leak detection testing. Consequently, third party evaluation procedure demonstrated that system can be used in-house with no requirement for direct vendor participation, except in certain rare cases when system generates a flag that requires a vendor trained and certified specialist to analyze data and make the final decision.
System incorporates context-sensitive "Help" information.

Evaluation Features
Evaluator tested this system for in-house use. Computer program disk along with instructional documentation was supplied by vendor to evaluator. Evaluator, without vendor involvement, analyzed required data and performed evaluation using program disk and accompanying documentation.
Vendor was not present during evaluation.
This system was also evaluated using a leak threshold of 0.1gph for leak rate of 0.2 gph and is available at the user's request.

Comments
53% of data sets evaluated were from manifolded tank systems.
Of 43 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput for tanks evaluated was 18,897 gallons.
Leak rates of 0.05, 0.10, and 0.20 gph were used in evaluation. Data sets evaluated were supplied by evaluator.

EnviroSIR LLC
1003 East Saint Mary Blvd., P.O. Box 52565
Lafayette, LA 70505
Tel: (337) 935-0205

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/20/98

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Issue Date: November 22, 1995
Revision Date: September 2, 2008

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek Manual Line Leak Detector (for Rigid Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 98.0% and PFA = 1%.

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

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
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 Maximum of 426 gallons.

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

Test Period Under ideal conditions, 30 minutes; actual test time will depend on line size and temperature conditions at the site.
Data are collected every 15 minutes.
Three consecutive consistent readings are required for a valid test, with the first reading taken at zero time.
Test data are acquired and recorded manually.
Manual calculations performed by the operator on site.

Calibration No temperature sensors used.
No calibration required.
System must be checked annually in accordance with manufacturer's instructions.
Technicians must be certified by the manufacturer prior to using this equipment, and recertified every two years.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/09/92, 05/21/08

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Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek Manual Line Leak Detector (for Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.8% and PFA = 0.2%.

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

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

Specification System tests flexible pipelines.
Tests are conducted at 150% operating pressure.
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 Maximum of 101 gallons (example: 275 feet of 3 inch line).

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

Test Period Under ideal conditions 30 minutes; actual test time will depend on line size and temperature conditions at the site.
Data are collected every 15 minutes.
Three consecutive consistent readings are required for a valid test.
Data from the evaluation suggests that the actual minimum test time for a line this size is 2 hours.
Test data are acquired and recorded manually.
Manual calculations performed by the operator on site.

Calibration No temperature sensors used.
No calibration required.
System must be checked annually in accordance with manufacturer's instructions.
Technicians must be certified by the manufacturer prior to using this equipment, and recertified every two years.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/09/92, 09/05/06

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Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek II Automatic Line Leak Detector

LINE TIGHTNESS TEST METHOD

Certification	Leak rate of 0.1 gph with PD = 99.0% and PFA = 1%.
Leak Threshold	0.05 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Specification	System tests fiberglass and steel pipelines. Tests are conducted at 150% operating pressure.
Pipeline Capacity	Maximum of 129 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Minimum of 2 hours. Data are collected every 30 seconds. Testing period consists of a monitor mode and test mode. Data are collected in monitor mode until two consecutive 15 minute records are within 0.01 gallon of each other. Then an additional 15 minutes is required in monitor mode before start of test mode. Data are collected in test mode for 1 hour, 7 minutes. Test data are acquired and recorded by a microprocessor. Calculations are automatically performed by the microprocessor.
Calibration	Sensors must be calibrated in accordance with manufacturer's instructions before each test.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/13/92

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Issue Date: November 22, 1995
Revision Date: May 23, 2007

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY 3

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

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

Leak Threshold A tank system should not be declared tight when the vacuum decay is more than 1 inch water column pressure for non-volatile products and 10% of the lower determined vapor pressure for volatile products, or when water ingress is detected by the water sensor.

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

Tank Capacity Maximum of 12,000 gallons if groundwater is not present.
Maximum of 50,000 gallons if groundwater is present and a vacuum of 1.0 to 1.7 psi can be maintained.
For gasoline, ullage volume must be between 800 and 2,500 gallons.
For diesel, ullage volume must be between 500 and 1,500 gallons.

Waiting Time None between delivery and testing.

Test Period Minimum of 2 hours, 30 minutes for gasoline (1 hour, 30 minutes vapor equilibrium recirculation time* plus 1 hour test period) when groundwater is below bottom of tank.
Minimum of 1 hour, 30 minutes for diesel and less volatile products (30 minutes vapor equilibrium recirculation time* plus 1 hour test period) when groundwater is below bottom of tank.
Minimum of 1 hour when groundwater is above bottom of tank.
Test period based on water ingress depends on tank size and must be calculated in accordance with manufacturer's instructions.
Test data are acquired and recorded manually.
*The vapor equilibrium recirculation time is the time required to apply a vacuum and to saturate ullage with vapors.
There must be no dispensing or delivery during test.

Test Pressure Vacuum must be maintained between 1.0 to 1.7 psi at bottom of tank.
Vacuum must not be greater than 4.0 psi in ullage.

Temperature Vacuum decay is independent of product temperature.

Water Sensor Conductivity water sensor must be used to detect water ingress and must be calibrated for every test.
Minimum detectable water level is 0.014 inch. Minimum detectable change in water level is 0.0095 inch.
Minimum water level in tank must be adjusted to 0.014 inch before calibrating the sensor.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, water sensor must be used and test time extended to ensure water ingress detection during test.

Comments Not evaluated using manifolded tank systems.
Evaluated using gasoline and diesel.
Test may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be detected by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/23/94, 02/08/95

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Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY 3 Locator Plus

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

Certification Leak rate of 0.1 gph with PD = 100% and PFA = 1.6%.

Leak Threshold A tank system should not be declared tight when the acoustic signal detected is different from the baseline signal before a vacuum is placed on the tank, or when water ingress is detected by the water sensor.

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

Tank Capacity Maximum of 30,000 gallons.
Ullage volume must exceed the greater of 1% of tank volume or 50 gallons.
Maximum of 30,000 gallons per tank for manifolded tank systems with microphone, water sensor and pressure monitoring gauges in each tank.

Waiting Time None between delivery and testing.

Test Period When groundwater level in tank excavation backfill is below bottom of tank:
A few minutes to determine background noise and at least 2 minutes to run the test after desired vacuum is reached.
When groundwater level in tank excavation backfill is above bottom of tank or when the groundwater level in the tank excavation backfill has not been determined:
The time it takes for water ingress to increase the water level in the tank to allow the water sensor to detect the "minimum detectable change in water level" (see "Water Sensor" section below).
Test period based on water ingress is dependent on tank size. For example, the test period is 36 minutes for a 10,000 gallon (96" dia x324" long) tank.
Before starting test, water sensor must be calibrated to "minimum detectable water level" (see "Water Sensor" section below) according to manufacturer's instructions.
There must be no dispensing or delivery during test.

Test Pressure Pressure differential across tank wall at bottom of tank must be at least 0.5 psig.
Pressure differential across tank wall is equal to the absolute value of vacuum applied to tank, plus pressure of tank excavation backfill on tank, plus groundwater pressure on tank, minus pressure of liquid in tank.

Temperature Acoustic signal is independent of product temperature.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Estabrook EZY CHEK Systems, EZY 3 Locator Plus

Water Sensor

Conductivity water sensor must be used to detect water ingress and must be calibrated for every test when groundwater level in tank excavation backfill is above bottom of tank or when the groundwater level in the tank excavation backfill has not been determined.
Minimum detectable water level is 0.014 inch.
Minimum detectable change in water level is 0.0095 inch.
Minimum water level in tank must be adjusted to at least 0.014 inch (sensor's minimum detectable water level) before calibrating sensor and starting test.

Groundwater

Groundwater level in tank excavation backfill must be determined by observation well or soil probe in tank excavation backfill.
If groundwater level in tank excavation backfill is above bottom of tank or the groundwater level in the tank excavation backfill has not been determined, water sensor must be used and test time extended to ensure water ingress detection during test.

Comments

Microphone was 25 ft away from leak source during evaluation.
Although not tested on empty tanks, a third party acoustics specialist has certified the device is equally effective when tanks are empty as when tanks contain product.
Test may be inconclusive if there is high background noise.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
An observation well or soil probe in tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and free product. Manufacturer must certify operator at least every 2 years.
More than 4 psi pressure differential across the tank wall at any location in the tank could damage tank.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/28/00

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Issue Date: November 22, 1995
Revision Date: September 10, 2004

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek I

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Estabrook EZ Chek Systems no longer manufactures or supports the use of this method.

Certification	Leak rate of 0.1 gph with PD = 99% and PFA = 1%.
Leak Threshold	0.05 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.
Tank Capacity	Maximum of 12,000 gallons. Tank must be minimum 100% full.
Waiting Time	Minimum of 6 hours between delivery and testing. Minimum of 3 hours between "topping off" and testing. Total minimum waiting time is 6 hours. There must be no product dispensing or delivery during waiting time.
Test Period	Minimum of 1 hour, 30 minutes (30 minute monitor period, plus 1 hour test period). Testing must continue until data meets manufacturer's stop test criteria. Volume data are collected and recorded by a strip chart recorder. Leak rate is calculated from data of last 1 hour of test period. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by a resistance temperature detector (RTD) and displayed on a LCD readout.
Groundwater	Depth to groundwater in tank excavation backfill must be determined. If groundwater is above bottom of tank, product level must be adjusted to provide net pressure of 2-4 psi at bottom of tank. Groundwater level must be stable prior to and during test.
Calibration	Level sensors must be calibrated in accordance with manufacturer's instructions before each test.
Comments	Not evaluated using manifolded tank systems.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: W. A. Kibbe and Associates
Tel: (517) 797-2425
Date of Evaluation: 10/03/90

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Issue Date: November 22, 1995
Revision Date: May 23, 2007

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek II

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 99.95% and PFA = 0.05%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 12,000 gallons.
Tank must be minimum 100% full.

Waiting Time Minimum of 6 hours between delivery and testing. Minimum of 3 hours between "topping off" and testing.
Total minimum waiting time is 6 hours.
There must be no delivery or dispensing during waiting time.

Test Period Minimum of 1 hour, 40 minutes (33 minutes monitor mode and 1 hour, 7 minutes test mode).
At the conclusion of test mode, data are checked for the manufacturer's stop test criteria.
If data do not meet the criteria, testing must continue.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from last 1 hour, 7 minutes of test period data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a resistance temperature detector (RTD).

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide net pressure of 2-4 psi at bottom of tank.
Groundwater level must be stable prior to and during test.

Calibration Load cell must be calibrated in accordance with manufaturer's instructions before each use.

Comments Not evaluated using manifolded tank systems.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: W. A. Kibbe and Associates
Tel: (517) 797-2425
Date of Evaluation: 09/18/90

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Issue Date: November 22, 1995
Revision Date: September 2, 2008

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek II

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Estabrook EZ Chek Systems no longer manufactures or supports the use of this method.

Certification Leak rate of 0.1 gph with PD = 95.79% and PFA = 4.21%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 12,000 gallons.
Tank must be between 98 and 100% full.

Waiting Time Minimum of 8 hours between delivery and testing.
There must be no product dispensing or delivery during waiting time.

Test Period Minimum of 1 hour, 40 minutes (33 minutes monitor mode and 1 hour, 7 minutes test mode).
At the conclusion of test mode, data are checked for the manufacturer's stop test criteria.
If data do not meet the criteria, testing must continue.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from last 1 hour, 7 minutes of test period data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a resistance temperature detector (RTD).

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test. If this cannot be accomplished, then the tank cannot be tested using this system.

Calibration Load cell must be calibrated in accordance with manufacturer's instructions before each use.

Comments Not evaluated using manifolded tank systems.
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.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: W. A. Kibbe and Associates
Tel: (517) 797-2425
Date of Evaluation: 06/25/90

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Fairbanks Environmental Ltd.

Wetstock Wizard Version 4.4

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification	Leak rate of 0.2 gph with PD > 99% and PFA < 1% for both single and manifolded tank systems.
Leak Threshold	0.10 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, kerosene.
Tank Capacity	Maximum of 45,000 gallons for single tanks. Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.
Data Requirement	Minimum of 30 days of product level and throughput data.
Comments	Inventory data was submitted by vendor to evaluator who adjusted data and returned to vendor for analysis. 49% of data sets were from manifolded tank systems. Of 41 data sets submitted for evaluation, 36 were analyzed with conclusive results. Median monthly throughput of tanks evaluated was 25,173 gallons. Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation. Results of evaluation is applicable only for tanks using ATGs to collect data.

Fairbanks Environmental, Ltd.
The Technology Management Center
Moss View Lane
Skelmersdale, Lancashire, UK
Phone +44 (0)1695 51775

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 11/10/2004 (rev. 8/10/2006)

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

FCI Environmental, Inc.

Analog Hydrocarbon Probe AHP-100, Digital Hydrocarbon Probe DHP-100

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: fiber optic chemical sensor

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (min)	<8	<8
Fall time (min)	<5	<5
Lower detection limit (cm)	<0.01	<0.01

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Comments:
Sensors are reusable.

FCI Environmental, Inc.
3250 Grant Street
Signal Hill, CA 90804
Tel: (800) 696-1331

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/15/94

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

FCI Environmental, Inc.

Analog Hydrocarbon Probe AHP-100, Digital Hydrocarbon Probe DHP-100

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

Detector:

Output type:	quantitative
Sampling frequency:	continuous
Operating principle:	fiber optic

Test Results (for tests conducted with 1000 ppm test gas):

AHP-100	unleaded gasoline	synthetic gasoline	xylene	benzene	2-methylbutane
Relative accuracy* (%)	12	22	2	35	N/R*
Bias (%)	-7	-2	1	-23	N/R
Precision (%)	4	15	1	11	N/R
Detection time (min)	<1	<1	<1	<1	N/R
Fall time (min)	<1	<1	<1	<1	N/R
Lower Detection Limit (ppm)	137	220	84	519	N/R
DHP-100					
Relative accuracy* (%)	18	29	0	17	N/R
Bias (%)	1	-12	0	-9	N/R
Precision (%)	9	10	0	11	N/R
Detection time (min)	<1	<1	<1	<1	N/R
Fall time (min)	<1	<1	<1	<1	N/R
Lower Detection Limit (ppm)	73	118	45	280	N/R

* See glossary.

Test Results (for tests conducted with 10 ppm test gas):

AHP-100	unleaded gasoline	synthetic gasoline	diesel	JP-4 jet fuel	JP-8 jet fuel	p-xylene	kero-sene
Lower Detection Limit (ppm)	9.25	13.26	5.79	5.26	10.89	12.94	14.65

Specificity Results (%) (corrected for sensitivity differences):

	AHP-100	**DHP-100**		**AHP-100**	**DHP-100**
unleaded gasoline	93	101	xylene	103	N/R
synthetic gasoline**	100	92	toluene	96	97
synthetic gasoline***	98	88	pentane	N/R	N/R
JP-4 jet fuel	105	109	methane	N/R	N/R
benzene	76	89	butane	N/R	N/R
trimethylbenzene	107	104	2-methylbutane	N/R	N/R
p-xylene	101	100	n-hexane	N/R	108

** EPA March 1990 protocol
*** Radian June 1990 protocol

Comments:
1000 ppm tests used a certified blend of concentrated gas to simulate a leak. 10 ppm test used a measured quantity of liquid product to simulate a leak.

FCI Environmental, Inc.
3250 Grant Street
Signal Hill, CA 90804
Tel: (800) 696-1331

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/07/94, 12/05/94

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FDR Services, Inc.

GasPak Vapor Monitoring System

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

Detector:
Output type: quantitative
Sampling frequency: intermittent
Operating principle: product permeable detector

Test Results (averages of multiple concentrations):

	benzene	heptane, 3-methyl	hexane	Iso-octane
Accuracy (%)	103	102	107	103
Bias (%)	-1	1	2	1
Precision (%)	2	2	4	2
Lower detection limit (ppm)	1	1	1	1
Specificity (%)	100	100	102	101

	pentane, 2,4-dimethyl	pentane, 2,3,4-trimethyl	toluene	m-xylene
Accuracy (%)	105	104	104	99
Bias (%)	1	1	1	-6
Precision (%)	3	3	3	4
Lower detection limit (ppm)	3	1	1	4
Specificity (%)	101	100	100	94

Specificity Results:
See results above.

Comments:
Detection times were not directly measured. However, evaluator states, "experiential evidence predicts that the detector response will reach 'alarm' conditions (30% of maximum fresh fuel response) at a distance of 5 meters in slightly over one day."
Each cartridge is used once, then replaced by another.
GasPak is produced and analyzed by Fayette Environmental Services, Inc., with exclusive marketing and implementation rights assigned to FDR Services, Inc.

FDR Services, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: David G. Bray, Ph.D.
University of Missouri - Columbia
Tel: (573) 882-2439
Date of Evaluation: 07/27/94

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Issue Date: June 24, 1996
Revision Date: May 21, 2008

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

TS-LLD Line Leak Detector

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 163 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph and 0.2 gph.
Minimum of 8 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 3 minutes for leak rate of 3.0 gph.
Response time is 50 minutes to 8 hours for leak rate of 0.2 gph.
Response time is 40 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, numerical "fail" code display and LED alarm light activation if leak is declared.

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

Comments
For test using leak rate of 0.2 gph only:
After 28 days have elapsed since the last passing monthly line leak test, system shuts off the submersible pump.
System display will flash number of days since the last passing test. Operator may reset button to enable dispensing for a 24 hour period.
This procedure may be used for a maximum of 4 days.
After 32 days have elapsed since last monthly test, system will disable dispensing and automatically initiate a test, and system will not authorize dispensing until a test is passed or system is serviced.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/06/95

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Issue Date: June 24, 1996
Revision Date: May 21, 2008

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

TS-LLD Line Leak Detector
(for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 49.6 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph and 0.2 gph.
Minimum of 8 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 3 minutes for leak rate of 3.0 gph.
Response time is 2 hours, 21 minutes for leak rate of 0.2 gph.
Response time is 50 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold. Single test to determine if pipeline is leaking.
Pump shutdown, numerical "fail" code display and LED alarm light activation if leak is declared.

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

Comments
For test using leak rate of 0.2 gph only:
After 28 days have elapsed since the last passing monthly line leak test, system shuts off the submersible pump.
System display will flash number of days since the last passing test.
Operator may reset button to enable dispensing for a 24 hour period.
This procedure may be used for a maximum of 4 days.
After 32 days have elapsed since last monthly test, system will disable dispensing and automatically initiate a test, and system will not authorize dispensing until a test is passed or system is serviced.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/06/95

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Franklin Fueling Systems

TS-LS300 Series
(Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI)
(for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4, waste oil, kerosene.

Specification
System tests pressurized rigid or flexible pipelines for all leak rates.
System tests pressurized hybrid combination of rigid and flexible pipelines for 3.0 gph leak rate only.
Tests are conducted at operating pressure.

Pipeline Capacity
For 3.0 gph leak rate test:
Maximum of 396.6 gallons for rigid pipelines.
Maximum of 95.5 gallons for flexible pipelines.
Maximum of 492.1 gallons for hybrid combination of rigid and flexible pipelines (rigid portion cannot exceed 396.6 gallons and flexible portion cannot exceed 95.5 gallons).
For 0.2 leak rate and 0.1 gph leak rate tests:
Maximum of 163 gallons for rigid pipelines (Example: 350 feet of 3 3/8 inch line).
Maximum of 39.5 gallons for flexible pipelines (Example: 430 feet of 1½ inch line).

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 3 hours between dispensing and testing for leak rate of 0.2 gph.
Minimum of 6 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 10 minutes for leak rate of 3.0 gph.
Minimum of 25 minutes for leak rate of 0.2 gph.
Minimum of 34 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Franklin Fueling Systems, TS-LS300 Series (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

System Features

Permanent installation on pipeline.
Automatic testing of pipeline every 45 minutes for leak rate of 3.0 gph.
Automatic testing of pipeline when pump has been idle for 3 hours for leak rate of 0.2 gph.
Automatic testing of pipeline when pump has been idle for 6 hours for leak rate of 0.1 gph.
Preset threshold.
Triplicate testing to determine if pipeline is leaking.
Pump shutdown, indicator light and alarm activation if leak is declared.
Pump control, line pressure display, alarm and test logs.

Calibration

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/23/95, 09/10/98, 05/26/06

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Issue Date: September 1, 2006
Revision Date: June 22, 2012

Franklin Fueling Systems

TS-LS500, TS-LS500E Series
(for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

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

Specification
On pressurized rigid, flexible, or combination rigid and flexible pipelines, system can perform 3.0 gph, 0.2 gph, and 0.1 gph tests.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 312.2 gallons for steel and fiberglass pipelines (examples: 480 feet of 4 inch line; 671 feet of 3 3/8 inch line).
Maximum of 95.4 gallons for flexible pipelines (examples: 260 feet of 3 inch line; 1040 feet of 1 ½ inch line).
Maximum of 415.8 gallons for hybrid combination of rigid and flexible pipelines (the capacity of the flexible component cannot exceed 95.4 gallons).

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Depending on temperature stability, 1½ to 10 hours between dispensing and testing for leak rates of 0.2 gph and 0.1 gph.

Test Period
Response time is 1 to 2 minutes for leak rate of 3.0 gph.
Minimum of 25 minutes for leak rate of 0.2 gph.
Minimum of 34 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline every 45 minutes for leak rate of 3.0 gph.
Automatic testing of pipeline when pump has been idle for 2 hours for leak rate of 0.2 gph.
Automatic testing of pipeline when pump has been idle for 3½ hours for leak rate of 0.1 gph.
Pump shutdown, indicator light and alarm activation if leak is declared for 3.0 gph and 0.2 gph tests.
The TS-LS500E series is an explosion proof version of the original TS-LS500 series.

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/23/95, 09/10/98, 02/28/06, 08/28/06, 01/10/08

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Franklin Fueling Systems

FE PETRO STP-MLD+G, STP-MLD+AG, STP-MLD+D and STP-MLD+BD Pipeline Leak Detector (for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 3.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, gasoline-alcohol mixtures, aviation fuel, fuel oil #4, solvents, diesel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized rigid and flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum for rigid system is 165.1 gallons.
Maximum for flexible system is 109.8 gallons.
Maximum combined capacity is 274.9 gallons, not to exceed the above individual capacity limitations for rigid or flexible pipelines.

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

Test Period Response time is less than 2 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/16/12, 3/19/14

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Issue Date: November 22, 1995
Revision Date: March 24, 2011

Franklin Fueling Systems
(originally listed as FE Petro, Inc.)

STP-MLD Pipeline Leak Detector (for Rigid and/or Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Specification System tests pressurized rigid and flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 129.14 gallons for rigid pipelines.
Maximum of 101.6 gallons for flexible pipelines.

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

Test Period Response time is less than 30 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/01/92, 10/21/10

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Issue Date: November 22, 1995
Revision Date: March 24, 2011

Franklin Fueling Systems
(originally listed as FE Petro, Inc.)

STP-MLD-D Pipeline Leak Detector

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Diesel

Specification System tests steel and fiberglass pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum for rigid system is 341 gallons.

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

Test Period Average response time is 1 minute.

System Features Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/30/94

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Issue Date: November 22, 1995
Revision Date: March 24, 2011

Franklin Fueling Systems
(originally listed as FE Petro, Inc.)

STP-MLD-E Flexline Line Leak Detector
(for Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel.

Specification System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 49.6 gallons.

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

Test Period Average response time is 3 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Comments Enviroflex pipeline with a bulk modulus* of 1,280 was used during evaluation.
*See glossary.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/24/94

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Issue Date: April 19, 2001
Revision Date: May 8, 2012

Franklin Fueling Systems
(originally listed as FE Petro, Inc.)

STP-MLD-HC and STP-MLD-HCD Pipeline Leak Detectors
(for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel for STP-MLD-HC.
Diesel, kerosene for STP-MLD-HCD.

Specification System tests pressurized rigid, flexible, and combination of rigid and flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 396.6 gallons for rigid pipelines.
Maximum of 95.5 gallons for flexible pipelines.
Maximum combined capacity is 492.1 gallons, not to exceed the above individual capacity limitations for rigid or flexible pipelines.

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

Test Period Response time is less than 30 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Comments STP-MLD-HC test conducted using gasoline in 200 feet of 3.25 inch fiberglass pipe.
STP-MLD-HCD test conducted using diesel in 200 feet of 3.25 inch fiberglass pipe.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 11/07/00, 05/19/06

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: April 6, 2010

Franklin Fueling Systems
(originally evaluated under EBW, Inc.)

AutoStik
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.

Certification
Leak rate of 0.2 gph with PD = 99.96% and PFA = 0.44%.
Leak rate of 0.1 gph with PD = 95.34% and PFA = 4.66%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 2 hours between delivery and testing for leak of 0.2 gph.
Minimum of 8 hours between delivery and testing for leak of 0.1 gph.
Minimum of 2 hours between dispensing and testing for leak of 0.2 gph.
Minimum of 8 hours between dispensing and testing for leak of 0.1 gph.
There must be no delivery during waiting time for leak of 0.2 gph.
There must be no dispensing or delivery during waiting time for leak of 0.1 gph.

Test Period
Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a single thermistor RTD.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.91 inch.
Minimum detectable water level change is 0.025 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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/07/1991

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: April 6, 2010

Franklin Fueling Systems
(originally listed as EBW, Inc.)

AutoStik II, AutoStik Jr.
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.

Certification
Applies only to AutoStik II and AutoStik Jr. models sold before March 1, 2004.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 98.3% and PFA = 1.7%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 6 hours between delivery and testing.
Minimum of 6 hours between dispensing and testing for leak of 0.2 gph.
Minimum of 2 hours between dispensing and testing for leak of 0.1 gph.
There must be no delivery during waiting time for leak of 0.2 gph.
There must be no dispensing or delivery during waiting time for leak of 0.1 gph.

Test Period
Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all data collected.
There must be no dispensing or delivery during 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 0.49 inch.
Minimum detectable water level change is 0.0052 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 tank system which routinely contains product.
Auto Stik Jr. is used with up to 4 magnetostrictive probes and can handle up to 8 input sensors.
Auto Stik II is used with up to 16 magnetostrictive probes and can handle up to 64 input sensors.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/20/93

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Franklin Fueling Systems
(originally listed as EBW, Inc.)

AutoStik II, AutoStik Jr.
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.

Certification
Applies only to AutoStik II and AutoStik Jr. models sold on March 1, 2004 to April 1, 2009.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required based on tank diameter is as follows:
48" dia/min 12";
64" dia/min 14";
72"dia/min 15";
96" dia/min 17.5";
126"dia/min 21.5".
For other tank diameters, see evaluation report.

Waiting Time
Minimum of 6 hours 1 minute between delivery and testing for leak rate of 0.2 gph.
Minimum of 5 hours 18 minutes between delivery and testing for leak rate of 0.1 gph.
None between dispensing and testing.
There must be no delivery during waiting time

Test Period
Length of the test is determined automatically based on quality of test data.
Average data collection time during evaluation was 5 hours 10 minutes for leak rate of 0.2 gph.
Average data collection time during evaluation was 5 hours 44 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Leak rate is calculated from data determined to be valid by statistical analysis.
There must be no dispensing or delivery during the test.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Franklin Fueling Systems, AutoStik II, AutoStik Jr. (Magnetostrictive Probe)

Temperature Probe contains 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 0.208 inch.
Minimum detectable water level change is 0.011 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.
AutoStik Jr. can support up to 4 tanks.
AutoStik II can support up to 8 tanks.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/05/92, 09/05/97, 08/21/02

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Franklin Fueling Systems
(originally listed as EBW, Inc.)

AutoStik II, AutoStik Jr.
(INCON, EBW LL2 Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

As of April 1, 2009, Franklin Fueling Systems no longer manufactures this method.

Certification
Applies only to AutoStik II and AutoStik Jr. models sold on March 1, 2004 to April 1, 2009.
Leak rate of 0.2 gph with PD = 95.7% and PFA = 4.3%.

Leak Threshold
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.

Tank Capacity
Maximum of 30,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required based on tank diameter as follows:
48" dia/min 12";
64" dia/min 14";
72"dia/min 15";
96" dia/min 17.5";
126"dia/min 21.5".
For other diameters, see evaluation report.

Waiting Time
Minimum of 4 hours 9 minute between delivery and testing.
Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period
The length of the test is determined automatically based on quality of test data.
Average data collection time during the evaluation was 6 hours, 51 minutes.
Test data is 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 the test.

Temperature
Probe contains 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 0.208 inches.
Minimum detectable water level change is 0.011 inch.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Franklin Fueling Systems, AutoStik II, AutoStik Jr. (INCON, EBW LL2 Magnetostrictive Probe)

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.
This equipment was not evaluated using manifolded tanks.
Tests only the portion of the tank containing product.
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.
AutoStik Jr. can support up to 4 tanks.
AutoStik II can support up to 8 tanks.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 05/14/98, 08/21/02

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Franklin Fueling Systems

INCON T1 Series TS-750, TS-1000, TS-1001, TS-2000, TS-2001, INCON T5 Series, TS-5, TS-608, TS-550, TS-550 evo TS-5000, TS-5000 evo Franklin Colibri CL6 & TS-CL6 Series (INCON Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.7% and PFA = 4.3%.
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1%.

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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 30,000 gallons for leak rate of 0.2 gph.
Maximum of 15,000 gallons for leak rate of 0.1 gph.
Tanks less than 95% full may be tested.
Minimum product level required based on tank diameter is as follows:
48" dia/min 12";
64" dia/min 14";
72"dia/min 15";
96" dia/min 17.5";
126"dia/min 21.5".
For other tank diameters, see evaluation report.

Waiting Time
Minimum of 4 hours 9 minutes between delivery and testing for leak rate of 0.2 gph.
Minimum of 5 hours 18 minutes between delivery and testing for leak rate of 0.1 gph.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Length of the test is determined automatically based on quality of test data.
Average data collection time during evaluation was 6 hours, 51 minutes for leak rate of 0.2 gph.
Average data collection time during evaluation was 5 hours 44 minutes for leak rate of 0.1 gph.
Test data is 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 the test.

Temperature
Probe contains 5 thermistors to monitor product temperature.
At least one thermistor must be submerged in product during testing.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Franklin Fueling Systems, INCON T1 Series TS-750, TS-1000, TS-1001, TS 2000, TS-2001, INCON T5 Series, TS-5, TS-608, TS-550, TS-550 evo, TS-5000, , TS-5000 evo Franklin Colibri CL6 & TS-CL6 Series (INCON Magnetostrictive Probe)

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 water level change 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

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.
TS-1000 and TS-1001 can support up to 4 tanks.
TS-2001 can support up to 8 tanks.
TS-5 can support up to 12 tanks.
TS-608 can support up to 8 tanks.
TS-550, 550 evo and TS-5000 can support up to 72 tanks.
Colibri CL6 and TS-CL6 can support up to 6 tanks.
TS-750 can support up to 4 tanks, but does not provide fuel logistics, remote monitoring and other business management options available with TS-1000, TS-1001 and TS-2001.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/05/92, 09/05/97, 05/14/98
08/21/02, 01/18/06, 08/18/10, 07/06/11, 04/09/12

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Issue Date: November 22, 1995
Revision Date: May 21, 2008

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

TS 2000
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.5%.

Leak Threshold 0.058 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing. Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 3 hours.
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 a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.04 inches.
Minimum detectable water level change is 0.011 inch.

Calibration RTDs 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.
TS 2000 can support up to 4 tanks.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/10/91

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Franklin Fueling Systems

INCON T1 Series TS-750, TS-1000, TS-1001, TS-2000, TS-2001, INCON T5 Series TS-5 , TS-608, TS-550, TS-550 evo, TS-5000, TS-5000 evo, Colibri CL6 & TS-CL6 Series with SCALD 2.0 (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 > 99% and PFA < 1%.
Leak Threshold	0.10 gph for single and manifolded tank systems. 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 49,336 gallons for single tanks and for all tanks manifolded together. Tank must be between 14 and 93.5% full.
Throughput	Monthly maximum of 257,818 gallons.
Waiting Time	None between delivery and data collection when difference between product in tank and product delivered is 6.0 degrees F or less.
Test Period	Data collection time ranges from 5 to 28 days. Data sampling frequency is > 1 per second. 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.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Franklin Fueling Systems, INCON T1 Series TS-750, TS-1000, TS-1001, TS-2000, TS-2001, INCON T5 Series TS-5 , TS-608, TS-550, TS-550 evo, TS-5000, Colibri CL6 & TS-CL6 Series with SCALD 2.0 (INCON TSP-LL2 Magnetostrictive Probe)

Comments System reports a result of "pass" or "fail".
Evaluated using both single and manifolded tank systems with probes in each tank.
Tests only the portion of the tank containing product.
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.
TS-750, TS-1000 and TS-1001 can support up to 4 tanks.
TS-2000 and TS-2001 can support up to 8 tanks.
TS-5 can support up to 12 tanks.
TS-608 can support up to 8 tanks.
TS-550, TS-550 evo and TS-5000 can support up to 48 tanks.
Colibri CL6 and TS-CL6 can support up to 6 tanks.
TS-750 and TS-2000 do not provide fuel logistics, remote monitoring and other business management options available with TS-1000, TS-1001, and TS-2001.
The database for evaluation of the system includes sites with vapor recovery and blending dispensers.
The FMP-LL3 probe may be configured to operate as an LL2 model.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/11/2003, 03/18/06, 08/18/09, 07/06/11, 04/09/12, 08/04/14

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Franklin Fueling Systems

INCON T5 Series, TS-5, TS-550, TS-5000, TS-550evo, TS-5000evo and Colibri 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.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: INCON T5 Series, TS-550evo and TS-5000evo with SCALD 3 (INCON TSP-LL2 and FMP-LL3 Magnetostrictive Probe)

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 includes sites with vapor recovery and blending dispensers.
Tanks used in this evaluation contained gasoline and diesel.
Tests only the portion of the tank containing product.
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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 09/14/15

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Issue Date: November 17, 2005
Revision Date: February 3, 2011

Franklin Fueling Systems

Secondary Containment Monitoring (SCM)
Incon TS-SCM and EBW AS-SCM

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified as equivalent to European leak detection standard EN 13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping.
System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled tanks and 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 minimum vacuum.
System will also alarm if the interstitial vacuum level decreases at a rate exceeding manufacturer's allowable values. Allowable values are based on an "AutoLearn line leak algorithm." The unit will record two curves (up curve and down curve) while a calibrated leak orifice is connected to the interstitial space being monitored. The "up" curve is learned while the vacuum pump is on and evacuating the interstice. The "down" curve is learned when the vacuum pump is off and interstitial vacuum is decaying. During normal operation when the vacuum level is between the upper and lower limits, the system is continuously comparing vacuum decay rates to the learned curves stored in memory.

Applicability:
Underground double-walled tank, connected double-walled piping, and other connected interstitial spaces storing gasoline, gasohol, diesel*, heating oil #2, kerosene, aviation fuel, motor oil, water.
EN13160-2 requires the use of separate monitoring systems for separate USTs.

*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.

Manufacturer's Specifications:
Alarm will activate when interstitial vacuum decreases to approximately 1 psi vacuum (approx. 2"Hg).
Normal operating vacuum for the system is between 2"Hg and 6"Hg.
System does not restrict the vacuum source to 85±15 liters/hour flow rate at the "Alarm On" vacuum level.
Volume of monitored interstitial space must not exceed 8 m^3 (2114 gal) for tanks and 10 m^3 (2642 gal) for piping.
When monitoring double-walled tanks, the system does not require a liquid stop valve, a condensate trap or liquid sensors. Since the vacuum line is connected to the pump siphon port, any liquid in the vacuum line will be returned to the tank. Suction line must be located at lowest point of interstitial space.

Calibration:
Functional and operational safety tests should be performed in accordance with manufacturer's instructions.
Initial calibration with known leak is performed at system installation, using an orifice supplied by the manufacturer.

Comments:
Interstitial space is tested continuously.
Vacuum source is the submerged turbine pump siphon port.
Presence of a water table above the leak point will allow water to enter the interstice rather than air or vapor. The water would be detected in the same manner as fuel.
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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/11/04

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: September 29, 2010
Revision Date: April 11, 2016

Franklin Fueling Systems

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

CONTINUOUS PRESSURIZED PIPING LEAK DETECTION METHOD

Certification
Leak rate of 0.2 gph at operating pressure with PD = 99.9% and PFA = <0.1%.
*Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.

Leak Threshold
0.08 gph for leak rate of 0.2 gph.
Although the system reports a quantitative leak rate internally, it only reports a pass or fail to the tank system operator.

Applicability
Gasoline, diesel, aviation fuel, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized rigid, flexible, or combination rigid and flexible pipelines.
Tests are conducted at operating pressure by statistically adding increments of stable testing until a test has enough data to be completed.

Pipeline Capacity
Maximum of 312.2 gallons for steel and fiberglass pipelines (examples: 480 feet of 4 inch line; 671 feet of 3 3/8 inch line).
Maximum of 95.4 gallons for flexible pipelines (examples: 260 feet of 3 inch line; 1040 feet of 1½ inch line).
Maximum of 415.8 gallons for combination rigid and flexible pipelines (the capacity of the flexible component cannot exceed 95.4 gallons).
Maximum of 176 gallons for Franklin Fueling Systems UPP semi-rigid pipeline (example 513 feet of 3 inch line; 1892 feet of 1 ½ inch line).

Throughput
Monthly maximum of 391,250 gallons.

Waiting Time
Less than 3 hours to begin data collection.

Test Period
Test data records may cover 10 days for ST(short term) CPPLDS to 30 days for LT(long term) CPPLDS dependent on dispensing, with an average of 16.22 days.
The ST array continuously contains 10 days of data, and the LT array continuously contains 30 days of data that are rolled over as additional data is acquired.
Precedence is given to the ALLD test, if present. If not present, it defaults to SLLD and prints the ST result.
It will only print the LT report if there is no ST test available for the month.
Test data are acquired and recorded by a microprocessor.

System Features
Permanent installation of leak detector on pipeline and software upgrade to the monitor.
The SLLD (Statistical Line Leak Detection) is an added capability for the TS-LS500 and TS-LS500E Automatic Line Leak Detector (ALLD). The ALLD still performs the 3.0 gph tests, and with enough quiet time, the 0.2 gph and 0.1 gph tests; the SLLD is only used for 0.2 gph leak detection if the ALLD did not have enough quiet time to perform that test.
Pump shutdown, indicator light and alarm activation if leak is declared for 3.0 gph and 0.2 gph tests.
The TS-LS500E series is an explosion proof version of the original TS-LS500 series.

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

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/10/10, 1/20/16

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Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo 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:

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 TSP-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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/02/15

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: August 3, 2015

Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo 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 (in)	
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:

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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/02/15

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Franklin Fueling Systems

Incon TS-1001/2001, TS-5, TS-550, TS-5000, TS-550 evo, and TS-5000 evo with FMP-HFS 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
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-XL	
Detection time (min)	<1
Fall time (min)	<1
Threshold Level (in)	
Low level (in)	1.0061
High level (in)	10.9546

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:

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.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/02/15

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Issue Date: April 18, 1997
Revision Date: January 20, 2012

Franklin Fueling Systems

(originally listed as Beaudreau Electric, Inc.)

Model 404-4 Controller with Models S404 and S406 Liquid Level Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: float switch (Model S404)
refractive index of liquids (Model S406)

Test Results:

Model S404 Liquid Level Sensor	unleaded gasoline	diesel	water	unleaded E85	used oil
Detection time (sec)	<1	<1	<1	<1	<1
Fall time	<1	<1	<1	<1	<1
Precision (in)	0.0008	0.0014	0.0027	0.0025	0.0029
Lower detection limit (in)	1.154	1.1146	0.9919	1.1324	1.1482
Model S406 Liquid Level Sensor					
Detection time (sec)	<1	<1	<1	-	<1
Fall time	<1	<1	<1	-	<1
Precision - standard deviation (in)	0.0017	0.0026	0.0032	-	0.0027
Lower detection limit (in)	0.5856	0.6301	0.6884	-	0.6564

Specificity Results:

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.

Manufacturer's Specifications:

Manufacturer states that systems require no calibration.
Annual functional test required.

Comments:

Sensors are reusable.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/20/94, 10/18/11

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Franklin Fueling Systems

S940 Alarm Console with TSP-HFS Horizontal Float Switch Sensor, TSP-HLS High Level Sensor, TSP-UHS Universal Hydrostatic Sensor, and TSP-ULS Universal Liquid Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	unleaded gasoline	diesel*	water	biodiesel*	E85
TSP-HFS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.5146	0.4908	0.4480	0.4690	0.5046
TSP-HLS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	2.0328	1.9408	1.7658	1.8985	2.0030
TSP-UHS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	0.9628	0.8966	0.7952	0.8839	0.9125
TSP-ULS					
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Threshold Level (in)	1.1243	1.0726	0.9529	1.0620	1.0994

*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:

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.
Sensors are reusable.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/23/13

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Issue Date: April 18, 1997
Revision Date: January 27, 2011

Franklin Fueling Systems

(originally listed as INCON Intelligent Controls, Inc.)

Tank Sentinel TS-1000EFI, TS-1001/TS-2001, and TS-5xxx Series with TSP-DIS BriteSensor; Tank Sentinel TS-1000/TS-2000, TS-1001/TS-2001, and TS-5xxx Series with TSP-EIS Standard Sensor; Tank Sentinel TS-1000/TS-2000 with TSP-PS Liquid Contact Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: opto-electric

Test Results:

	unleaded gasoline	synthetic gasoline	diesel fuel**	heating oil #2	water	E85
TSP-DIS BriteSensor						
Detection time (min:sec)	03:13	03:17	3:00	3:02	03:18	--
Fall time (min)	<1	<1	<1	<1	<1	--
Product activation height (cm)	1.60	N/D*	N/D	N/D	1.92	--
Lower Detection Limit (cm)	1.60	1.60	1.50	1.50	1.62	--
TSP-EIS Standard Sensor						
Detection time (min:sec)	03:01	03:17	3:00	3:02	03:07	<1
Fall time (min)	<1	<1	<1	<1	<1	<1
Product activation height (cm)	1.50	N/D	N/D	N/D	N/D	1.99
Lower Detection Limit (cm)	1.50	1.60	1.50	1.50	1.50	1.99
TSP-PS Liquid Contact Sensor						
Detection time (min:sec)	01:14	01:13	01:10	01:16	01:25	--
Fall time (min)	<1	<1	<1	<1	<1	--
Product activation height (cm)	1.37	N/D	N/D	N/D	N/D	--
Lower Detection Limit (cm)	1.22	1.21	1.20	1.24	1.32	--

* See glossary.
**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:

Comparison of Tank Sentinel TS-1001/TS-2001 and TS-5xxx series consoles with Tank Sentinel TS-1000(including EFI)/TS-2000 series consoles showed comparable results when evaluated with representative sensors.
Sensors are reusable.

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

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 12/09/94, 01/30/96, 07/02/93
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/01/08, 11/20/10

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Issue Date: April 18, 1997
Revision Date: August 12, 2015

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

Tank Sentinel TS-1000EFI , TS-1001/TS-2001, and TS-5xxx Series with TSP-HIS BriteSensor; Tank Sentinel TS-1000/TS-2000, TS-1001/TS-2001, and TS-5xxx Series with TSP-HLS Standard Sensor, TSP-ULS, and TSP-UHS Standard Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

TSP-HIS BriteSensor	50% by weight ethylene glycol in water		30% by weight calcium chloride in water	
	high*	low*	high	low
Response time (min:sec)	17:41	16:47	17:28	16:56
Recovery time (min)	<1	<1	<1	<1
Product activation height (cm)	19.56	2.53	19.40	2.50

TSP-HLS Standard Sensor	unleaded gasoline	synthetic gasoline	diesel fuel***	heating oil #2	water	E85	waste oil
Detection time (min:sec)	10:09	10:14	09:55	10:25	09:25	--	--
Fall time (min)	<1	<1	<1	<1	<1	--	--
Product activation height (cm)	5.64	N/D**	N/D	N/D	N/D	--	--
Lower detection limit (cm)	5.03	5.03	4.93	5.17	4.77	--	--
TSP-ULS Standard Sensor							
Detection time (min:sec)	03:50	03:49	03:50	03:41	03:34	<1	<1
Fall time (min)	<1	<1	<1	<1	<1	<1	<1
Product activation height (cm)	2.70	N/D	N/D	N/D	N/D	2.59	--
Lower detection limit (cm)	1.93	1.97	1.93	1.80	1.80	2.58	1.17
TSP-UHS Standard Sensor							
Detection time (min:sec)	03:50	03:49	03:50	03:41	03:34	<1	<1
Fall time (min)	<1	<1	<1	<1	<1	<1	<1
Product activation height (cm)	2.70	N/D	N/D	N/D	N/D	2.96	--
Lower detection limit (cm)	1.93	1.97	1.93	1.80	1.80	2.95	1.22

*The "high" and "low" refer to high and low level alarm points of hydrostatic sensors.
** See glossary.
***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-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.
Comparison of Tank Sentinel TS-1001/TS-2001 and TS-5xxx Series consoles with Tank Sentinel TS-1000 (including EFI)/TS-2000 series consoles showed comparable results when evaluated with representative sensors.
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.

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

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluations: 03/20/95, 01/30/96
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/01/08, 11/20/10, 10/18/11

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Franklin Fueling Systems

Tank Sentinel TS-5xxx Series 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)	1.97	1.86	1.54
Minimum detectable level (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:

These sensors were evaluated for use with the TS-5xxx series consoles only.
Sensors are reusable.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 7/16/08

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Issue Date: April 18, 1997
Revision Date: June 20, 2008

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

Tank Sentinel TS-1000EFI, TS-1001/TS-2001, and TS-5xxx Series with TSP-DDS BriteSensor, TSP-DTS BriteSensor, 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	synthetic gasoline	diesel	heating oil #2	water low level	water high level
TSP-DDS BriteSensor						
Detection time (min:sec)	05:35	06:00	38:43	38:16	06:02	06:09
Fall time (min:sec)	34:27	28:53	> 60:00	> 60:00	<01:00	<01:00
Lower detection limits (cm)						
Product activation height	0.50	N/D*	3.16	N/D	N/D	N/D
Product thickness on water	0.04	N/D	N/D	N/D	N/D	N/D
TSP-DTS BriteSensor						
Detection time (min:sec)	06:02	05:59	38:43	38:16	06:02	06:13
Fall time (min:sec)	22:28	28:53	<01:00	<01:00	> 60:00	> 60:00
Lower detection limits (cm)						
Product activation height	0.50	N/D	3.16	N/D	N/D	N/D
Product thickness on water	0.04	N/D	N/D	N/D	N/D	N/D
TSP-MWS BriteSensor Groundwater Probe						
Detection time (min:sec)	10:13	06:42				
Fall time (min:sec)	26:52	14:43				
Lower detection limit (cm)						
Product thickness on water	0.04	0.04				

* See glossary.

Specificity Results (additional for TSP-MWS BriteSensor Groundwater Probe):

Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Comments:

Comparison of Tank Sentinel TS-1001/TS-2001 and TS-5xxx series consoles with Tank Sentinel TS-1000(including EFI)//TS-2000 series consoles showed comparable results when evaluated with representative sensors. Sensors are reusable.

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

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluations: 12/09/94, 02/19/96
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 4/1/08

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Franklin Fueling Systems

INCON TS-STS Sump Test System

SECONDARY AND SPILL CONTAINMENT TEST METHOD

Certification
Minimum Level Change (MLC) of 0.00192 inch in 15 minutes with PD = 95%
Please be aware that the authority having jurisdiction in your particular state, territory, tribe or municipality may have set a minimum detectable leak rate for Secondary and Spill Containment Test Methods.

Leak Threshold
0.0020 inch/15min (0.008 inch/hour).
A containment vessel should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.

Applicability
Water, water-based test solution.

Specification
System tests wetted portion of turbine, transition and dispenser containment sumps, and spill buckets after test liquid is temporarily added above level of all containment vessel penetration holes, as in accordance with PEI RP-1200 requirements.
Uses a magnetostrictive probe to measure rise or drop of liquid level.

Waiting Time
Water level readings must stabilize (due to distortion of sumps and wave action) and temperature in sump must be close to equilibrium prior to beginning test.

Test Period
15 minutes.

System Features
Up to 4 sumps can be tested at the same time.

Calibration
No calibration is required.

Comments
Operates similar to an automatic tank gauge, but is portable.
Probe must be suspended as described in the installation manual to keep the probe as vertical as possible.
Probe should be adjusted so there is minimal contact between the rod and the float.
The sump water level can be displayed at any time.
A printout of the initial and final levels is provided automatically at the conclusion of the test.
Results may be converted to gal/hr using beginning and ending of test surface area of liquid in test vessel.

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

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/07/02

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Fuel Oil Systems

Gems LS-750, Innovative Solutions L176-0108-0803 (Kele FS7SS), and Madison M4602-XXXX Sensors with Fuels Oil Systems Console – FOS-0160-1, software version 001

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Gems LS-750 Sump Monitoring Sensor	water	diesel	propylene glycol	50% by weight propylene glycol in water
Detection time (sec)	<5	<5	<5	<5
Fall time (sec)	<5	<5	<5	<5
Precision – standard deviation (in)	0.0029	0.0025	0.002	0.0029
Lower detection limit (in)	1.094	1.285	1.053	1.088
Innovative Solutions L176-0108-0803 (Kele FS7SS) Sump Interstice Sensor				
Detection time (sec)	<5	<5	<5	<5
Fall time (sec)	<5	<5	<5	<5
Precision – standard deviation (in)	0.013	0.0027	0.0025	0.0027
Lower detection limit (in)	0.847	0.955	0.840	0.851
Madison M4602-XXXX Tank Interstice Sensor				
Detection time (sec)	<5	<5	<5	<5
Fall time (sec)	<5	<5	<5	<5
Precision – standard deviation (in)	0.0027	0.0023	0.0037	0.0043
Lower detection limit (in)	1.375	1.596	1.389	1.392

Specificity Results:

Manufacturer and evaluator claim sensors will respond to any liquid. No additional materials were tested.

Manufacturer's Specifications

Manufacturer states that any of the sensors can easily be removed, cleaned, and reinstalled if an alarm is triggered or for periodic testing.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Fuel Oil Systems, Gems LS-750, Innovative Solutions L176-0108-0803 (Kele FS7SS), and Madison M4602-XXXX Sensors with Fuels Oil Systems Console – FOS-0160-1, software version 001

Comments:

For sensors mounted on the floor of a sump, the Innovative Solutions L176-0108-0803 sensor is programmed normally open. When liquid rises sufficiently in the bottom of the sump to lift the float, this sensor closes and an alarm condition is generated.

For sensors installed in the hydrostatic fluid reservoir in a sump, the Gems LS-750 is programmed normally closed. When the hydrostatic fluid level in the reservoir drops below the operating level of the float, this sensor opens and an alarm condition is generated.

For underground storage tanks where the tank interstice is filled with fluid, a two position Madison M4602-xxxx level sensor is used. The upper float of the Madison M4602-xxxx level sensor assembly is located above the fluid in the UST hydrostatic reservoir and is programmed normally open. If the level of the hydrostatic fluid in the reservoir increases sufficiently to lift the float, the upper float closes and generates an alarm condition. The lower float of the Madison M4602-xxxx level sensor assembley is immersed in the reservoir's hydrostatic fluid and is programmed normally closed. If the level of the hydrostatic fluid drops below the operating level of the float, this sensor opens and an alarm condition is generated.

If liquid rises above the threshold of the Innovative Solutions L176-0108-0803 sensor in a sump, an alarm condition is generated indicating there is liquid present in the area where the sensor is installed.

If there is liquid in the interstitial space of a sump and it rises above the threshold of the Gems LS-750 sensor, an alarm condition is generated.

If there is liquid in the interstitial space of a tank and it rises above the threshold of the Madison M4602-XXXX sensor, an alarm condition is generated.

Alarms are indicated by an audible alarm; a visual message displayed on the Fuel Oil Systems console; and a printed message if the console is equipped with a printer. The alarms are also recorded as part of the Fuel Oil Systems console "Alarm History Report."

Fuel Oil Systems
3167 Corporate Place
Hayward CA, 94545
(510) 727-6701
E-mail: info@fueloilsystems.net
URL: www.fueloilsystems.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/01/11

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Gasboy International
(originally evaluated under William M. Wilson's Sons)

Gasboy TMS 500
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.1% and PFA = 0.09%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 3 hours.
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 a minimum of 5 resistance sensors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.04 inch.
Minimum detectable change in water level is 0.011 inch.

Calibration Temperature sensors 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.
System is no longer being manufactured although product support is still available.

Gasboy International
P.O. Box 22087
7300 West Friendly Avenue
Greensboro, NC 27420
Tel: (336) 547-5000

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/10/91

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Issue Date: September 11, 1998
Revision Date: June 5, 2002

Gems Sensors, Inc.
(originally listed as Warrick Controls, Inc.)

DMS-47X-X-X(-X), DMS-57X-X-X(-X) Monitoring Panels with Models DLP-1-NC, DLP-2-NC, DLP-2-NO Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	unleaded gasoline	diesel	water
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Threshold (in)*	≤1.54	≤1.50	≤1.43
Precision (in)*	≤0.004	≤0.005	≤0.007

*Results for threshold and precision varied slightly for each sensor; see evaluation for details.

Comments:

Sensors are reuseable.

Gems Sensors Inc.
1 Cowles Rd.
Plainville, CT 06062-1198
Tel: (800) 378-1600

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/01/97

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Issue Date: April 18, 1997
Revision Date: June 5, 2002

Gems Sensors, Inc.
(originally listed as Warrick Controls, Inc.)

Model DFP-25 Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product solubility

Test Results:

	unleaded gasoline	diesel	water
Detection time (hr:min:sec)	0:06:50	4:14:40	N/A
Fall time**	N/A*	N/A	N/A
Lower detection limit (cm)	≤2.54	≤2.54	N/A

* See glossary.
**Fall time is not applicable, since sensor must be replaced after activating.

Specificity Results:
Activated: Evaluator claims that this sensor will respond to any material that is capable of dissolving the hydrocarbon-sensitive wax.
Not Activated: Water.

Comments:
Sensor is activated when hydrocarbon-sensitive wax is dissolved, releasing a spring that activates an alarm.
Sensor is not reusable, and must be replaced after contact with hydrocarbons.
Liquid level was set at 1 inch (2.54 cm) during test.

Gems Sensors Inc.
1 Cowles Rd.
Plainville, CT 06062-1198
Tel: (800) 378-1600

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/18/96

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Gems Sensors, Inc.
(originally listed as IMO Industries, Inc.)

Gems Smartwell Portable Monitor Model WPM-535 with Groundwater Probe Model WP-535

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

Detector:
Output type: qualitative
Sampling frequency: intermittent
Operating principle: conductive polymer

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (min:sec)	09:31	07:05
Fall time (min:sec)	55:42	17:04
Lower detection limit (cm)	0.04	0.08

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Comments:
Sampling frequency is designated as "intermittent" because polymer strip is permanently mounted in monitoring well, while monitor is a hand held unit which is periodically connected to sensor.
Sensors are reusable.

Gems Sensors Inc.
1 Cowles Rd.
Plainville, CT 06062-1198
Tel: (800) 378-1600

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 04/22/93

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Issue Date: November 22, 1995
Revision Date: June 5, 2002

Gems Sensors, Inc.
(originally listed as Warrick Controls, Inc.)

Model 5700 Meter with PVP-2 Sensor

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

Detector:

Output type: quantitative
Sampling frequency: continuous
Operating principle: adsistor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Accuracy (%)	25.4	-100.0	157.1
Bias (%)	14.4	-100.0	108.3
Precision (%)	7.6	N/D*	20.4
Detection time (min)	>60	N/A*	>60
Fall time (min)	38	N/A	>60
Lower detection limit (ppm)	1353.3	N/D	N/D

* See glossary.

Specificity Results:

Not Activated: n-hexane, toluene, xylene(s).

Gems Sensors Inc.
1 Cowles Rd.
Plainville, CT 06062-1198
Tel: (800) 378-1600

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 09/10/91

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Issue Date: December 4, 2002
Revision Date: March 7, 2006

HansaConsult Ingenieurgesellschaft mbH

HansaConsult Pressure-Step Tightness Control System (TCS) Pipeline Leak Detection System

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.004% of line volume (0.04 gph per 1000 gallons of product) in the pipeline segment being tested with PD > 95% and PFA < 5%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
0.002% of line volume in gph.
A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the threshold.

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

Specification
System tests either single or double-walled fiberglass or steel piping.

Pipeline Capacity
Minimum of 22,700 gallons, maximum of 175,110 gallons (range of pipelines evaluated).

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

Test Period
Minimum of 45 minutes after setup.
Piping must be isolated and blocked during test.

System Features
System may be permanently installed on pipeline to perform monitoring, or may be transported and set up to perform line tightness testing.
A single 45 minute test is required to simultaneously test as many sections as required consisting of typically two 15-minute monitoring periods at operating pressure, and one 15-minute monitoring period at a lower pressure level.
System measures change in pressure gradients and reports output quantity in gph, while compensating for thermal and pipeline "creeping" effects.
If leak is declared, message is printed and alarm is automatically activated immediately after completion of test.
Pipeline segment being tested must be completely isolated and have pressure controlled and maintained using a pressure relief valve.

Calibration
System must be calibrated in accordance with manufacturer's instructions.

Comments
System may be used on large underground bulk pipelines such as airport hydrant fueling systems.
Manufacturer claims system is applicable to any size of underground pressurized piping, typically between 3,000 and 500,000 gallons, especially underground pipelines and airport hydrant fueling systems.
The third-party evaluation utilized a total of 306 tests. 16 of these tests were conducted on two lines with various induced leak rates.

HC Fuel Systems LLC
P.O. Box 309
176 Places Mill Road
Alton, NH 03809
Tel: (603) 879-0388
E-mail: jbirnie@hansaconsult.com
URL: www.hansaconsult.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/11/00

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Issue Date: March 7, 2006
Revision Date: February 17, 2011

Hansa Consult of North America LLC

HCNA Pipeline Leak Detection System, Version 2.0

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.002% of line volume (0.02 gph per 1000 gallons of product) in the pipeline segment being tested with PD > 95% and PFA < 5%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
0.001% of line volume in gph.
A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the threshold.

Applicability
Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel B6-B20 meeting ASTM D7467, biodiesel, B100 meeting ASTM D6751*.

Specification
System tests either single or double-walled fiberglass or steel piping.

Pipeline Capacity
Minimum of 3,000 gallons, maximum of 175,000 gallons.

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

Test Period
Minimum of 45 minutes after setup.
Piping must be isolated and blocked during test.

System Features
System may be permanently installed on pipeline to perform monitoring, or may be transported and set up to perform line tightness testing.
A single 45 minute test is required to simultaneously test as many sections as required consisting of typically two 15-minute monitoring periods at operating pressure, and one 15-minute monitoring period at a lower pressure level.
System measures change in pressure gradients and reports output quantity in gph, while compensating for thermal and pipeline "creeping" effects.
If leak is declared, message is printed and alarm is automatically activated immediately after completion of test.
Pipeline segment being tested must be completely isolated.

Calibration
System must be calibrated in accordance with manufacturer's instructions.

Comments
System may be used on large underground bulk pipelines such as airport hydrant fueling systems.
Manufacturer claims system is applicable to any size of underground pressurized piping, typically between 3,000 and 500,000 gallons.
The third-party evaluation utilized a total of 60 tests. 30 of these tests were conducted with various induced leak rates.

Hansa Consult of North America, LLC (HCNA)
200 International Drive, Bldg. 120
Portsmouth, NH 03801
Tel: (603) 422-8833
E-mail: koverman@hcna-llc.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/15/05

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Hansa Consult of North America LLC

HCNA Pipeline Leak Detection System, Version 2.1

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.068 gph with PD = 95% and PFA = 5%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
0.034 gph.
A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the threshold.

Applicability
Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests single or double walled fiberglass, steel and flexible pipelines.
Wet tests are conducted at 30 to 150 psi or 150% of operating pressure.

Pipeline Capacity
Maximum of 5,000 gallons.

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

Test Period
Under ideal conditions, 45 minutes after installing in blocked line section.
Test data is collected continuously and recorded by computer.

System Features
System may be permanently installed on pipeline to perform routine monitoring, or may be transported and set up to perform line tightness testing.
A single 45 minute test is required to simultaneously test as many sections as required consisting of typically two 15-minute monitoring periods at operating pressure, and one 15-minute monitoring period at a lower pressure level.
System measures change in pressure gradients and reports output quantity in gph, while compensating for thermal and pipeline 'creeping' effects.
If leak is declared, message is printed and alarm is automatically activated immediately after completion of test.
Pipeline segment being tested must be completely isolated.

Calibration
No temperature sensors used.
System must be calibrated in accordance with manufacturers instructions.

Comments
The initial third-party evaluation utilized a total of 60 tests. 30 of these tests were conducted with various induced leak rates. An additional review of 87 tests on smaller lines was conducted at 15 sites and comprised 58 sections. 11 of these tests were simulated leak tests. This review is limited to lines less than 5,000 gallons. Pressure changes are converted to volume changes using commissioning data.

Hansa Consult of North America, LLC (HCNA)
200 International Drive, Bldg. 120
Portsmouth, NH 03801
Tel: (603) 422-8833
E-mail: koverman@hcna-llc.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/24/10

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Hansa Consult of North America LLC

HCNA Pipeline Leak Detection System, Version 2.1

LINE TIGHTNESS TEST METHOD

Certification	Leak rate of 0.068 gph with PD = 95% and PFA = 5%.
Leak Threshold	0.034 gph. A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.
Specification	System tests single or double walled fiberglass, steel and flexible pipelines. Wet tests are conducted at 30 to 150 psi or 150% of operating pressure.
Pipeline Capacity	Maximum of 5,000 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Under ideal conditions, 45 minutes after installing in blocked line section. Test data is collected continuously and recorded by computer.
System Features	System may be permanently installed on pipeline to perform routine monitoring, or may be transported and set up to perform line tightness testing. A single 45 minute test is required to simultaneously test as many sections as required consisting of typically two 15-minute monitoring periods at operating pressure, and one 15-minute monitoring period at a lower pressure level. System measures change in pressure gradients and reports output quantity in gph, while compensating for thermal and pipeline 'creeping' effects. If leak is declared, message is printed and alarm is automatically activated immediately after completion of test. Pipeline segment being tested must be completely isolated.
Calibration	No temperature sensors used. System must be calibrated in accordance with manufacturers instructions.
Comments	The initial third-party evaluation utilized a total of 60 tests. 30 of these tests were conducted with various induced leak rates. An additional review of 87 tests on smaller lines was conducted at 15 sites and comprised 58 sections. 11 of these tests were simulated leak tests. This review is limited to lines less than 5,000 gallons. Pressure changes are converted to volume changes using commissioning data.

Hansa Consult of North America, LLC (HCNA)
200 International Drive, Bldg. 120
Portsmouth, NH 03801
Tel: (603) 422-8833
E-mail: koverman@hcna-llc.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/24/10

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Hasstech

Tank Compliance Center, Model 700
(7100 Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Hasstech is no longer in business.

Certification Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 2 hours between delivery and testing. Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours for leak rate of 0.2 gph.
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 a minimum of 5 thermistors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.186 inch.
Minimum detectable change in water level is 0.0048 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.
System no longer being manufactured and no support is available.

Hasstech
out of business

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/14/95

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Hasstech

Leak Computer Tank Test System

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Hasstech is no longer in business.

Certification Leak rate of 0.1 gph with PD = 95% and PFA = 5%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 12,000 gallons.
Tank must be minimum 100% full.

Waiting Time Test data are acquired and recorded by system's computer that calculates a leak rate every minute, and determines waiting time for satisfactory data (test is finished when the standard deviation of 30 sequential leak rates is less than half of the last leak rate determined).
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour, 10 minutes.
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 of product during test.

Temperature Average for product is determined by a minimum of 7 thermistors.

Groundwater If depth to groundwater in tank excavation backfill cannot be determined, tank must pass a two level test with at least a 3 foot difference in product level.
If depth to groundwater in tank excavation backfill can be determined, a single level test can be conducted provided a minimum net pressure of 1 psi exists at bottom of tank during test.

Calibration Level sensor must be calibrated before each test.
Thermistors must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.
Evaluated at EPA Edison Risk Reduction Engineering Laboratory prior to the EPA standard protocols being written.
System no longer being manufactured and no support is available.

Hasstech
out of business

Evaluator: U.S. EPA Risk Reduction
Engineering Laboratory
Tel: (201) 321-6631
Date of Evaluation: 11/88

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Hasstech

Leak Computer Tank Test System

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Hasstech is no longer in business.

Certification Leak rate of 0.1 gph with PD > 99% and PFA < 1.0%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 90% full.

Waiting Time Test data are acquired and recorded by system's computer that calculates a leak rate every minute, and determines waiting time for satisfactory data (test is finished when the standard deviation of 30 sequential leak rates is less than half of the last leak rate determined).
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour, 10 minutes.
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 a minimum of 7 thermistors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Level sensor must be calibrated before each test.
Thermistors must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.
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.
System no longer being manufactured and no support is available.

Hasstech
out of business

Evaluator: Law Engineering Industrial Services
Tel: (800) 672-6601
Date of Evaluation: 04/17/91

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Issue Date: May 10, 2004
Revision Date: September 7, 2006

Hectronic GmbH

Optilevel Electronic Level Gauge HLS 3010 HF (Capacitance Probe)

AUTOMATIC TANK GAUGING METHOD

Certification	Leak rate of 0.2 gph with PD = 95.0% and PFA = 5.0%.
Leak Threshold	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.
Tank Capacity	Maximum of 20,000 gallons. Minimum product level required is 25% of the tank diameter.
Waiting Time	Minimum of 2 hours between delivery and testing. There must be no delivery during waiting time.
Test Period	Minimum of 20 hours. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by a temperature-averaging probe. Temperature is measured by a resistance temperature detector (RTD). The RTD is mounted in a metal pipe that runs the length* of the probe allowing for temperature averaging. (*starts about 1 inch above the tip of the probe)
Water Sensor	Must be used to detect water ingress. Minimum detectable water level in the tank is 1.298 inch. Minimum detectable change in water level is 0.046 inch.
Calibration	The probe features 10 measurement segments (10 capacitance segments) and uses a comparison method (self calibration process) which allows the sensor to run without any external calibration.
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. System consists of a capacitance probe, a micro processing unit inside the head of the probe, and a separate control panel to record and display test data. Probe was not tested with oxygenated fuels. However, manufacturer states that probe will work with these types of blended products. Probe is based on the capacitive comparison method. Product Level measurements taken by probe are not affected by liquid properties such as density or dielectric constant, electrical resistance, or surface turbulence. 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.

Hectronic GmbH
Tank und Parksysteme
Allmendstrasse 15
D-79848 Bonndorf, Germany
Tel: +49 (0)7703 93 88 0
E-mail: mail@hectronic.com
URL: www.hectronic.com/en/

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/06/04

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Hectronic GmbH

Hectronic Optilevel Dynamic Leak Detection System, Optilevel CITLDS (Capacitance Probe)

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

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for single tank systems.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for manifolded tank systems.

Leak Threshold
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.

Tank Capacity
Maximum of 11,869 gallons for single tank systems.
Maximum of 23,778 gallons for manifolded tank systems.
Minimum product level required is 14% of the tank diameter.

Throughput
Monthly Maximum of 126,923 gallons. Applies to single and manifolded tank systems.

Waiting Time
Minimum of 2 hours stabilization time is allowed between delivery and data collection.

Test Period
Average is 5.95 days.
Data sampling frequency depends on tank activity.

Temperature
Average for product is determined by a temperature-averaging probe.
Temperature is measured by a resistance temperature detector (RTD).
The RTD is mounted in a metal pipe that runs the length* of the probe allowing for temperature averaging.
(*starts about 1 inch above the tip of the probe)

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.298 inch.
Minimum detectable change in water level is 0.046 inch.

Calibration
The probe features 10 measurement segments (10 capacitance segments) and uses a comparison method (self calibration process) which allows the sensor to run without any external calibration.

Comments
System consists of a capacitance probe, a micro processing unit inside the head of the probe, and a separate control panel to record and display test data.
Probe was not tested with oxygenated fuels. However, manufacturer states that probe will work with these types of blended products.
Tests only portion of tank containing product.

Hectronic GmbH
Tank und Parksysteme
Allmendstrasse 15
D-79848 Bonndorf, Germany
Tel: +49 (0)7703 93 88 0
E-mail: mail@hectronic.com
URL: www.hectronic.com/en/

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/13/06

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Horner Products, Inc.

SIR PRO 1 Versions 1.0, 2.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUALITATIVE)

Horner Products is no longer in business. Support for this method may not be available.

Certification
Leak rate of 0.2 gph with PD = 100% and PFA = 0% for Version 1.0.
Leak rate of 0.1 gph with PD = 100% and PFA = 0% for Version 2.0.

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 18,000 gallons.

Data Requirement
Minimum of 30 days of product level and flow through data.

System Features
Method of data analysis that system employs, and was used during evaluation process, is exclusive of any external control by vendor.
System consists of a fully automated software package with embedded algorithms for conducting leak detection testing. Consequently, third party evaluation procedure demonstrated that system can be used in-house with no requirement for direct vendor participation.

Evaluation Features
Evaluator tested this system for in-house use.
Computer program disk along with instructional documentation was supplied by vendor to evaluator.
Evaluator, without vendor involvement, analyzed required data and performed evaluation using program disk and accompanying documentation.
Vendor was present as an observer during evaluation.

Comments
Not evaluated using data from manifolded tanks.
Of 120 data sets submitted for evaluation, 10 were inconclusive for Version 1.
Of 120 data sets submitted for evaluation, 9 were inconclusive for Version 2.
Median monthly throughput of tanks evaluated was 13,640 gallons for Version 1.
Median monthly throughput of tanks evaluated was 11,828 gallons for Version 2.
Leak rate of 0.2 gph was used in evaluation for Version 1.
Leak rate of 0.1 gph was used in evaluation for Version 2.
Data sets evaluated were supplied by evaluator.

Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Petro Works
Tel: (913) 681-9379
Date of Evaluation: 04/07/93

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Horner Products, Inc.

SIR PRO 1 Versions 3.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Horner Products is no longer in business. Support for this method may not be available.

Certification
Leak rate of 0.2 gph with PD > 99.9% and PFA < 0.1% for leak threshold of 0.1 gph.
Leak rate of 0.2 gph with PD > 97.2% and PFA < 0.1% for leak threshold of 0.16 gph.

Leak Threshold
0.1 and 0.16 gph for leak rate of 0.2 gph.
These leak thresholds are for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold from the data set. This leak threshold may be different than the above leak thresholds.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 45,000 gallons for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 23 days of product level and flow through data.

System Features
Method of data analysis that system employs, and was used during evaluation process, is exclusive of any external control by vendor.
System consists of a fully automated software package with embedded algorithms for conducting leak detection testing. Consequently, third party evaluation procedure demonstrated that system can be used in-house with no requirement for direct vendor participation.

Evaluation Features
This system was tested for in-house use. Vendor, with evaluator present, analyzed required data and performed evaluation using program disk only.
Results were presented to evaluator directly from the computer without additional vendor involvement.

Comments
73% of data sets were from manifolded tank systems.
Of 41 data sets submitted for evaluation, 4 were inconclusive.
Median monthly throughput of tanks evaluated was 22,370 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/07/93, 07/18/95, 06/16/00

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Horner Products, Inc.

SIR PRO 1 Versions 4.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Horner Products is no longer in business. Support for this method may not be available.

Certification	Leak rate of 0.1 gph with PD = 98% and PFA = 2%.
Leak Threshold	0.05 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 33,000 gallons for single tanks. Size limits using an acceptable protocol for manifolded tank systems have not been determined.
Data Requirement	Minimum of 30 days of product level and flow through data.
Comments	Not evaluated for manifolded tank systems using an acceptable protocol. 73% of data sets were from manifolded tank systems. Of 41 data sets submitted for evaluation, 4 were inconclusive. Median monthly throughput of tanks evaluated was 22,370 gallons. Leak rates ranging from 0.05 to 0.216 gph were used in evaluation. Data sets evaluated were supplied by evaluator.

Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/18/95

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Issue Date: September 11, 1998
Revision Date: February 16, 2005

HT Technologies, Inc.

Vakumatik Models V 60, V 70 Ex

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

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

Leak Threshold System alarms when liquid enters interstitial space and vacuum decreases (pressure increases) above 34 millibars.

Applicability Gasoline, diesel.

Tank Capacity Maximum of 20,000 gallons based on interstitial volume resulting when flexible liner is properly fitted and held in position against rigid tank wall. No minimum product level during test.

Waiting Time None between delivery and testing.

Test Period Minimum of 120 hours.

Comments System tests the interstitial space between a properly fitted and installed flexible liner inside a rigid tank, or between the rigid walls of a double-walled tank.
Flexible liner is held in position by maintaining a vacuum on interstitial space. Interstitial space is tested continuously.
System allows for permeation of vapor from stored substance into interstitial space.
Vapor discharged from vacuum pump must meet applicable air quality standards.
System detects breaches in either flexible internal liner or rigid tank walls.
Reasonable temperature variations will not cause an alarm or missed detection.
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.

HT Technologies
4360 Brownsboro Rd.
Louisville, KY 40207
Tel: (888) 287-9595

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/17/97, 01/28/98

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Ibex Industries

Ibex Precision Test System

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 99.5% and PFA = 0.5%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 18,000 gallons.
Tank must be between 92 and 100% full.

Waiting Time Minimum of 12 hours between delivery and testing.
Minimum of 3 hours between "topping off" and testing.
There must be no product dispensing or delivery during waiting time.

Test Period Minimum of 1 hour.
Test data are acquired and recorded by system's computer. Leak rate is calculated from data determined valid by statistical analysis.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 6 temperature sensors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide net pressure of 2-4 psi on bottom of tank during test.

Calibration Level sensors must be calibrated in accordance with manufacturer's instructions before each test.
Temperature sensors must be calibrated in accordance with manufacturer's instructions semi-annually.

Comments Not evaluated using manifolded tank systems.
Tests only portion of tank containing product.

Ibex Industries
Moved and left no forwarding address
or phone number.

Evaluator: Applied Research Center
Tel: (805) 664-2173
Date of Evaluation: 01/18/91

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Issue Date: November 22, 1995
Revision Date: September 11, 1998

Keekor Environmental Products

TankTite Leak Detection Kernel Version 1.0 with Keeprobe K7 (Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.4% and PFA = 4.6%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 90% full.

Waiting Time Minimum of 8 hours, 6 minutes between delivery and testing.
Minimum of 15 minutes after a maximum dispensing rate of 50 gallons per minute.
There must be no delivery during waiting time.

Test Period Minimum of 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.41 inch.
Minimum detectable water level change is 0.0013 inch.

Calibration Execution of Probe
Check diagnostic routine is recommended prior to leak detect tests to ensure sensor is fully operational and in calibration.
Annual preventative maintenance should be performed 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.

Keekor Environmental Products
P.O. Box 14830
Scottsdale, AZ 85267
Tel: (602) 443-0001

Evaluator: Arizona State University
Tel: (602) 965-3185
Date of Evaluation: 10/25/94

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Issue Date: April 27, 2006
Revision Date: May 23, 2011

L & J Engineering, Inc.

MCG 1100/MCG 8100
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.5% and PFA < 0.5%.

Leak Threshold 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 which equals or exceeds the applicable threshold.

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

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 4 hours between delivery and testing.

Test Period Minimum of 5 hours
Test data are acquired by and recorded by system's computer.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTD's).
Sensors located above the liquid level are electronically removed from the data analysis.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.1 inches.
Minimum detectable water level change is 0.015 inch.

Calibration RTDs 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 which routinely contains product.

L & J Engineering
5911 Butterfield Road
Hillside, IL 60162
Tel: (708) 236-6000.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/01/92

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Leak Detection Systems, Inc.

Tank Auditor, Version RTD V.2.16

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification
Leak rate of 0.1 gph with PD = 99.98% and PFA = 0.02%.

Leak Threshold
0.05 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold, except as noted below.
If using two level testing, the level is changed by 3 feet between the two tests and a tank system should not be declared tight if the net change between the two tests is greater than 0.02 gph.

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

Tank Capacity
Maximum of 15,000 gallons.
Tank must be minimum 100% full.

Waiting Time
Minimum is variable depending on site conditions, but not be less than 6 hours between delivery and testing.
Minimum of 1 hour between "topping off" and testing.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 1 hour.
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 a temperature averaging probe.

Groundwater
If depth to groundwater cannot be determined, two tests must be performed with a level change of at least 3 feet between tests.
If depth to groundwater in tank excavation backfill can be determined and it is above bottom of the tank, product level must be adjusted to provide height differential of 3 feet between product and groundwater in tank excavation backfill during test.

Calibration
Temperature averaging probe and level sensors must be calibrated in accordance with manufacturer's instructions before each test.

Comments
Not evaluated using manifolded tank systems.
Evaluation of system did not include a field evaluation of groundwater compensation by two level testing.

Leak Detection Systems, Inc.
106 Longwater Dr.
Norwell, MA 02061
Tel: (617) 878-7766

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/29/91

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Leak Detection Technologies

MDleak Enhanced Leak Detection Method

ABOVEGROUND STORAGE TANK LEAK DETECTION METHOD

Certification	Leak rate of 0.005 gph, or greater**, with PD = 97.6% and PFA = 0%
Leak Threshold	A tank should not be declared tight when the chemical marker detected exceeds the background level outside of the tank.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6, solvents, waste oil, other gases (LP, Natural, Toxic), ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7647, biodiesel B100 meeting ASTM D6751*.
Tank Capacity	Not limited by capacity.
Waiting Time	A range from 5 to 31 days after the chemical marker is mixed throughout the tank to be tested. The waiting period may be adjusted below or above this range when supported by "Controlled Leak Points" as described below. The waiting time or test period begins once the chemical marker has been mixed and distributed throughout the tank system(s) to be tested.
Controlled Leak Points	"Controlled Leak Point" is a port where chemical marker is injected directly into the soil surrounding the tank to confirm the adjusted leak rate and the rate at which the chemical marker migrates through the backfill. It can be used to demonstrate that the metered amount of chemical marker will migrate through the soil to a detection point in a documented amount of time, as described in manufacturer's procedures. When installing sampling ports in soil conditions that are uniquely different from standard engineered backfill a controlled leak point shall be used.
Chemical marker Dosage	Dosage of the chemical marker, either liquid, vapor or both is based on tank volume and the duration of time the inoculated product will remain within the tank. Tanks are typically tested in an in-service operating condition; tanks that are out of service are tested at working pressure. Chemical marker concentration and sampling points are adjusted to meet the test specifications.
Soil Permeability	Soil permeability must readily allow chemical marker movement through the excavation backfill (greater than 1 Darcy) or the use of a controlled leak point is required.
Sampling Port	Radius of influence of each chemical marker sampling port is maximum 16 feet. Tank must be accurately located to ensure that all tank surfaces are within the zone of influence of a sampling port. Sampling ports must be installed per manufacturer's guidelines. Horizontal ports may be installed in manufactured backfill during the initial tank installation. These sampling ports must be installed per manufacturer's guidelines.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Leak Detection Technologies, MDleak Enhanced Leak Detection and Leak Location Method

Groundwater Depth to groundwater must be determined.
When the regulatory agency allows testing to be performed with high groundwater below the bottom of tanks containing water based or water soluble products, the product must be removed from the tank prior to testing and tested with a non-water soluble product or a vapor chemical marker.

Comments This method can be used to test single-walled and double-walled tanks for leakage to soil by sampling in the backfill or to test the primary containment integrity of a double-wall tank by sampling in the interstitial space.
Evaluator indicates that the detectable leak rate can be adjusted by controlling test variables such as chemical marker concentration and test duration.
The tester may determine that pre or post testing is needed to establish the background level of chemical marker in the soil.
For shorter/longer test periods, for different sampling port spacing, or in soil conditions that are uniquely different from standard engineered backfill, such as water saturated frozen soil, a controlled leak point shall be installed to document the chemical marker migration period.

*NWGLDE Listings apply to leak detection functionality only and not material compatibility – see "Disclaimer".
**See manufacturer instructions for detail.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/07/08

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Leak Detection Technologies

MDleak Enhanced Leak Detection and Leak Location Method

BULK UNDERGROUND STORAGE TANK LEAK DETECTION METHOD (50,000 gllons or greater)

Certification	Leak rate of 0.005 gph with PD = 97.6% and PFA = 0%
Leak Threshold	A tank should not be declared tight when the chemical marker detected exceeds the background level outside of the tank.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6 (if between 60 to 150 degrees F), solvents, waste oil, liquefied petroleum gas, natural gas.
Tank Capacity	Not limited by capacity.
Waiting Time	A range from 5 to 31 days after the chemical marker is mixed throughout the tank to be tested. The waiting period may be adjusted below or above this range when supported by "Controlled Leak Points" as described below. The waiting time or test period begins once the chemical marker has been mixed and distributed throughout the tank system(s) to be tested.
Controlled Leak Points	"Controlled Leak Point" is a port where chemical marker is injected directly into the soil surrounding the tank to confirm the adjusted leak rate and the rate at which the chemical marker migrates through the backfill. It can be used to demonstrate that the metered amount of chemical marker will migrate through the soil to a detection point in a documented amount of time, as described in manufacturer's procedures.
Chemical marker Dosage	Dosage of the chemical marker, either liquid, vapor or both is based on tank volume and the duration of time the inoculated product will remain within the tank. Tanks are typically tested in an in-service operating condition; tanks that are out of service are tested at working pressure. Chemical marker concentration and sampling points are adjusted to meet the test specifications.
Soil Permeability	Soil permeability must readily allow chemical marker movement through the excavation backfill (greater than 1 Darcy) or the use of a controlled leak point is required.
Sampling Port	Radius of influence of each chemical marker sampling port is maximum 16 feet. Tank must be accurately located to ensure that all tank surfaces are within the zone of influence of a sampling port. Sampling ports must be installed per manufacturer's guidelines. Horizontal sampling probes may be installed in manufactured backfill during the initial tank installation. These probes must be installed per manufacturer's guidelines.

DATA SHEET CONTINUED ON NEXT PAGE

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Groundwater The method was not evaluated with groundwater above the bottom of the tank.
Depth to groundwater in tank excavation backfill must be determined.
When the interior hydrostatic pressure of the tank being tested is less than the exterior hydrostatic pressure, the use of other test method(s) such as water ingress measurements must be incorporated for that portion of the tank below water.
At the discretion of the regulatory agency, water ingress measuring devices may be used to supplement test method in high groundwater conditions.
When the regulatory agency allows testing to be performed with groundwater above the bottom of tanks containing water based or water soluble products, the product must be removed from the tank prior to testing and tested with a non-water soluble product or a vapor chemical marker.

Comments This method can be used to test single-walled and double-walled tanks for leakage to soil by sampling in the backfill or to test the primary containment integrity of a double-wall tank by sampling in the interstitial space.
Evaluator indicates that the detectable leak rate can be adjusted by controlling test variables such as chemical marker concentration and test duration.
The tester may determine that pre or post testing is needed to establish the background level of chemical marker in the soil.
For shorter/longer test periods, for different sampling port spacing, or in soil conditions that are uniquely different from standard engineered backfill, such as water saturated frozen soil, a controlled leak point shall be installed to document the chemical marker migration period.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/07/08

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Leak Detection Technologies

MDleak Enhanced Leak Detection and Leak Location Method

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification	Leak rate of 0.005 gph with PD = 100% and PFA = 0% (with pipeline secondary containment) Leak rate of 0.005 gph with PD= 97.5% and PFA = 2.5% (pipeline direct contact to soil)
Leak Threshold	A pipeline system should not be declared tight when the chemical marker detected exceeds the background level outside of the pipeline.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6 (if between 60 to 150 degrees F), solvents, waste oil. Cannot be used where ground-water is above the bottom of the pipe and the pipe is filled with a water-miscible product unless highly volatile evaporative chemical markers are used or pipeline is emptied and tested dry.
Pipeline Capacity	Not limited by capacity.
Waiting Time	A range from 5 to 31 days after the chemical marker is mixed throughout the containment to be tested. The waiting period may be adjusted below or above this range when supported by "Controlled Leak Points" as described below. Waiting time begins after chemical marker has reached all portions of the pipeline being tested.
Controlled Leak Points	"Controlled Leak Point" is a port where chemical marker is injected directly into the soil surrounding the containment to determine the rate at which chemical marker migrates through the backfill. It can be used to demonstrate that the chemical marker will migrate through the soil to a detection point in a documented amount of time, as described in manufacturer's procedures.
Chemical marker Dosage	Dosage of the chemical marker, either liquid or vapor, is based on containment volume, and the duration of time the inoculated product will remain within the test section. The test period begins once the chemical marker has been mixed and distributed throughout the test section(s). Pipelines are typically tested in an in-service operating condition; pipelines that are out of service or under construction are tested at working pressure. Chemical marker concentration and sampling points are adjusted to meet the test specifications.
Soil Permeability	Soil permeability must readily allow chemical marker movement through the excavation backfill (greater than 1 Darcy) or the use of a controlled leak point is required.

DATA SHEET CONTINUED ON NEXT PAGE

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Sampling Port

Radius of influence of each chemical marker sampling port is maximum 16 feet or a maximum separation between sampling points of 32 feet.
Pipeline must be accurately located to ensure that all pipeline surfaces are within the zone of influence of a sampling port.
Sampling ports must be installed per manufacturer's guidelines.
Horizontal sampling probes may be installed in manufactured backfill during the initial containment installation. These probes must be installed per manufacturer's guidelines.

Comments

This method can be used to test single-walled and double-walled components for leakage to soil by sampling in the backfill or to test the primary containment integrity of a double-wall component by sampling in the interstitial space.
The tester may determine that pre or post testing is needed to establish the background level of chemical marker in the soil.
For shorter/longer test periods, for different sampling port spacing, or in soil conditions that are uniquely different from standard engineered backfill, such as water saturated frozen soil, a controlled leak point shall be installed to document the chemical marker migration period.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/07/08

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Leak Detection Technologies

MDleak Enhanced Leak Detection and Leak Location Method

LINE TIGHTNESS TEST METHOD

Certification	Leak rate of 0.005 gph with PD = 100% and PFA = 0% (with pipeline secondary containment). Leak rate of 0.005 gph with PD= 97.5% and PFA = 2.5% (pipeline direct contact to soil).
Leak Threshold	A pipeline system should not be declared tight when the chemical marker detected exceeds the background level outside of the pipeline.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6 (if between 60 to 150 degrees F), solvents, waste oil. Cannot be used where ground-water is above the bottom of the pipe and the pipe is filled with a water-miscible product unless highly volatile evaporative chemical markers are used or pipeline is emptied and tested dry.
Pipeline Capacity	Not limited by capacity.
Waiting Time	A range from 5 to 31 days after the chemical marker is mixed throughout the containment to be tested. The waiting period may be adjusted below or above this range when supported by "Controlled Leak Points" as described below. Waiting time begins after chemical marker has reached all portions of the pipeline being tested.
Controlled Leak Points	"Controlled Leak Point" is a port where chemical marker is injected directly into the soil surrounding the containment to determine the rate at which chemical marker migrates through the backfill. It can be used to demonstrate that the chemical marker will migrate through the soil to a detection point in a documented amount of time, as described in manufacturer's procedures.
Chemical marker Dosage	Dosage of the chemical marker, either liquid or vapor, is based on containment volume, and the duration of time the inoculated product will remain within the test section. The test period begins once the chemical marker has been mixed and distributed throughout the test section(s). Pipelines are typically tested in an in-service operating condition; pipelines that are out of service or under construction are tested at working pressure. Chemical marker concentration and sampling points are adjusted to meet the test specifications.
Soil Permeability	Soil permeability must readily allow chemical marker movement through the excavation backfill (greater than 1 Darcy) or the use of a controlled leak point is required.

DATA SHEET CONTINUED ON NEXT PAGE

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Sampling Port

Radius of influence of each chemical marker sampling port is maximum 16 feet or a maximum separation between sampling points of 32 feet.
Pipeline must be accurately located to ensure that all pipeline surfaces are within the zone of influence of a sampling port.
Sampling ports must be installed per manufacturer's guidelines.
Horizontal sampling probes may be installed in manufactured backfill during the initial containment installation. These probes must be installed per manufacturer's guidelines.

Comments

This method can be used to test single-walled and double-walled components for leakage to soil by sampling in the backfill or to test the primary containment integrity of a double-wall component by sampling in the interstitial space.
The tester may determine that pre or post testing is needed to establish the background level of chemical marker in the soil.
For shorter/longer test periods, for different sampling port spacing, or in soil conditions that are uniquely different from standard engineered backfill, such as water saturated frozen soil, a controlled leak point shall be installed to document the chemical marker migration period.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/07/08

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Leak Detection Technologies

MDleak Enhanced Leak Detection Method

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (TRACER)

Certification	Leak rate of 0.005 gph with PD = 97.6% and PFA = 0%
Leak Threshold	A tank system should not be declared tight when chemical marker is detected outside of the tank system.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6, solvents, waste oil, liquefied petroleum gas, natural gas. Other fluids may be tested after completion of a compatibility evaluation by the manufacturer.
Tank Capacity	Not limited by capacity.
Waiting Time	Ranges from 5 to 31 days after chemical marker is added to the tank, when "Controlled Leak Points" are not used. The waiting period may be adjusted below this range when supported by "Controlled Leak Points" as described below.
Controlled Leak Points	A "Controlled Leak Point" is a port where chemical marker is injected directly into the soil surrounding the UST to determine the rate at which chemical marker moves. It can be used to demonstrate that the chemical marker will migrate through the soil to a detection point in a documented amount of time, as described in manufacturer's procedures.
Chemical Marker Dosage	Dosage of chemical marker of either vapor, liquid or both, is based on factors including tank size, tank volume, frequency and volume of tank refills, and is determined according to manufacturer's procedures.
Soil Permeability	Soil present during the evaluation was sandy in texture, with water table 200 feet below the surface. Type of soil may have an impact on the migration of vapors. Whenever the chemical marker is used outside of the parameters of the evaluation, such as in frozen soil or tanks buried in clay where the clay could plug holes in the tank, "Controlled Leak Point(s)" must be used.
Sampling	When sampling in backfill, radius of influence of each sampling port is a maximum 16 feet. All tank surfaces must be within the zone of influence of a sampling port. Sampling can be taken within a vertical or horizontal sampling port. Sampling port installation and sample collection are conducted per EPA soil gas sampling guidance document SOP#2042.
Sample Analysis	Two detectors were used during the evaluation: a helium detector with minimum detection level of 2 ppm He, and a gas chromatograph with minimum detection level of 1-10 picograms. Other analytical equipment with equivalent performance capabilities may also be used.

DATA SHEET CONTINUED ON NEXT PAGE

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Groundwater The method was not evaluated with groundwater above the bottom of the tank.
Depth to groundwater in tank excavation backfill must be determined.
When the interior hydrostatic pressure of the component* being tested is less than the exterior hydrostatic pressure, the use of other test method(s) such as water ingress measurements must be incorporated.
At the discretion of the regulatory agency, water ingress measuring devices may be used to supplement test method in high groundwater conditions.
When the regulatory agency allows testing to be performed with groundwater above the bottom of tanks containing water based or water soluble products, the product must be removed from the tank prior to testing.

Comments *This method can be used to test single-walled components by sampling in backfill or to test the primary containment inside of secondary containment by sampling in the interstitial space.
Samples are either analyzed on-site with a mobile laboratory or collected on-site and transported to the MDLeak laboratory for analysis.
Evaluator indicates that the detectable leak rate can be adjusted by controlling test variables such as chemical marker concentration and test duration.
Calibration of analytical instrumentation is verified daily per EPA published document SW-846, as referenced in the laboratory guidance document.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/07/08

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Issue Date: January 27, 2011
Revision Date: April 21, 2015

Leak Detection Technologies

Pipeline Hydrostatic Diagnostic Test Method (PHDleak Test)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification

Leak rate of 0.0017% of pipeline volume (0.000017 gph per gallon of product) in the pipeline segment being tested with PD > 95% and PFA < 5%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold

0.00085% of line volume in gph (0.0000085 gph per gallon of product).
A pipeline system should not be declared tight if the test results indicate a loss that equals or exceeds the preset threshold.

Applicability

Gasoline, diesel, aviation fuel, fuel oil #4, solvents, waste oil, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*, crude oil, petroleum distillates in liquid form, cooling fluids, and water or water soluble liquids.

Specification

System tests either single or double-walled fiberglass or steel piping.

Pipeline Capacity

Minimum of 2,000 gallons, maximum of 1,127,000 gallons.

Waiting Time

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

Test Period

Minimum of 24 minutes after setup for data collection.
Piping must be isolated and blocked during test.

System Features

System may be permanently installed on pipeline to perform monitoring, or may be transported and set up to perform line tightness testing.
Total minimum time for data collection and analysis is 35 minutes. System measures change in pressure gradients and reports output quantity in gph, while compensating for thermal and pipeline "creeping" effects. Pipeline segment being tested must be completely isolated and have pressure control. Over pressurization is managed utilizing a backup pressure relief valve

Calibration

System must be calibrated in accordance with manufacturer's instructions.

Comments

System may be used on large underground bulk pipelines such as airport hydrant fueling systems.
Manufacturer claims system is applicable to any size of underground pressurized piping, typically between 2,000 and 1,128,206 gallons.
The third-party evaluation utilized a total of 24 tests. 18 of these tests were conducted with various induced leak rates.

Leak Detection Technologies
1889 North Oracle Road
Tucson, AZ 85705
Phone: 855-255-5325
E-mail: info@LeakDetect.net
URL: www.LeakDetect.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/04/11

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Leighton O'Brien Technologies Ltd.

Monitor / Redone

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification

Leak rate of 0.1 gph with PD > 99.6% and PFA < 0.4% for both single and manifolded tank systems. "If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold

0.05 gph.
This leak threshold is for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak thresholds.

Applicability

Gasoline, diesel, kerosene.
Other more viscous liquids may be tested after consultation with the vendor.

Tank Capacity

Maximum of 33,675 gallons for single tanks.

Data Requirement

Minimum of 26 days of product level and throughput data.

Comments

Inventory data for manifolded tank systems was prepared according to the EPA protocol and submitted to vendor for analysis. Single tank system inventory data was submitted by vendor to evaluator who adjusted data and returned to vendor for analysis.
Water ingress or gains are evaluated on an individual basis by a certified SIR analyst.
73% of data sets were from manifolded tank systems.
Of 56 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 18,459 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data is sent to a central location and analyzed by a certified SIR analyst.

Leighton O'Brien Technologies Ltd.
Suite 1/96 Camberwell Rd.
Hawthorn East, Victoria, Autralia 3123
Tel: +61(03) 9813 5122
E-mail: enquiry@leightonobrien.com
URL: http://www.leightonobrien.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/13/95, 12/15/05

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Leighton O'Brien Technologies Ltd.

Quantitative Wet Line Test PM2 (for Rigid and Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.6% and PFA = 0.4%.

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

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests fiberglass, steel, and flexible pipelines.
Wet Tests are conducted at 45 psi or 150% of operating pressure.
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 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.

Waiting Time None between delivery and testing.
Minimum of 27.5 minutes between dispensing and testing.

Test Period Under ideal conditions, 17.25 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 system during the wet test.

Leighton O'Brien Technologies Ltd.
Suite 1/96 Camberwell Rd.
Hawthorn East, Victoria, Australia 3123
Tel: +61(03) 9813 5122
E-mail: enquiry@leightonobrien.com
URL: http://www.leightonobrien.com

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

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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 Threshold < 0.05 gph. Proprietary for dry test mode.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, Biodiesel B6-B20 biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

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 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 capacity and configuration limitations.

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

Test Period Under ideal conditions, 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.

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.

Leighton O'Brien Technologies Ltd.
Suite 1/96 Camberwell Rd.
Hawthorn East, Victoria, Australia 3123
Tel: +61(03) 9813 5122
E-mail: enquiry@leightonobrien.com
URL: http://www.leightonobrien.com

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

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Mallory Controls

Pollulert Probes MD221G/T, MD221G/TRA, MD241R, MD241RRA, MD241G, MD241GRA

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

Mallory Controls no longer manufactures, services, or supports the use of this method.

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
MD221G/T, MD221G/TRA*			
Detection time (sec)	4	7	2
Fall time (sec)	3	4	4
Lower detection limit (cm)	0.08-0.32	0.08-0.32	0.08-0.32
MD241R, MD241RRA, MD241G, MD241GRA**			
Detection time (sec)	2	2	1
Fall time (sec)	1	2	2
Lower detection limit (cm)	0.16-0.32	0.16-0.32	0.16-0.32

*Evaluation was conducted using probe FD221G/TRA.
**Evaluation was conducted using probe FD241R.

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Comments:
According to manufacturer, probes beginning with "MD" have identical performance as older probes beginning with "FD."
Sensors are reusable.

Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Radian Corp.
Tel: (512) 454-4797
Date of Evaluation: 07/08/91

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Issue Date: November 22, 1995
Revision Date: April 18, 1997

Mallory Controls

Pollulert Probes MD221V, MD221VRA, MD210V, MD210VRA

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

Mallory Controls no longer manufactures, services, or supports the use of this method.

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: adsistor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (sec)	91	65	86
Fall time (min:sec)	5:39	4:23	9:38
Lower detection limit (ppm)	10 to 100	10 to 500	10 to 50

Specificity Results (in addition to above):
Activated: toluene, xylene(s).
Not Activated: n-hexane.

Comments:
Evaluation was conducted using probe FD221V.
According to manufacturer, probes beginning with "MD" have identical performance as older probes beginning with "FD."

Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Radian Corp.
Tel: (512) 454-4797
Date of Evaluation: 07/08/91

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MassTech International, Ltd.

ML3P Line Leak Detection System

LINE TIGHTNESS TEST METHOD

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

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

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

Specification System tests fiberglass and steel pipelines.
Where an electronic or mechanical line leak detector is installed in the system, a complete test includes but is not limited to data collection at ambient pressure and at pressures of 7.5, 15, and 22.5 psi. Where the line leak detector is removed from the system, a complete test includes but is not limited to data collection at ambient pressure and at a pressure of 22.5 psi. Additional data can be collected at pressures higher than 22.5 psi.
Tests can be performed with trapped vapor in pipeline.
Pipeline may be empty, partially full or full of product during testing.

Pipeline Capacity Maximum of 172 gallons. For testing lines greater than 3-inch diameter, contact MassTech.

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

Test Period Test times varied from 29 to 77 minutes during the evaluation.

Calibration System is checked biennially and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Leak rate during testing was adjusted to an equivalent of 0.1 gph at 45 psi.
System monitors for pressure changes which exceed the predicted environmentally compensated pressure changes.
Test data are acquired and recorded automatically.
Data collected by technicians at the test site are analyzed by trained personnel located off-site who notify owner of their pass/fail determination.

MassTech International, Ltd.
102 Basile Road
Scott, LA 70583
Tel: (337) 896-8230
E-mail: masstech1@compuserve.com
URL: http://masstechinternational.com

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Date of Evaluation: 08/23/07

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Issue Date: June 4, 2003
Revision Date: April 28, 2005

MassTech International, Ltd.

MassTech Analog Acoustic Vacuum Method
(Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification Leak rate of 0.1 gph with PD = 96.2% and PFA = 0%.

Leak Threshold Tank ullage should not be declared tight when the acoustic signal characteristic of a leak is detected.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, waste oil. Empty tanks may also be tested. Product-filled portion of the tank must be tested using an underfill test method.

Tank Capacity Maximum ullage volume is 20,000 gallons.

Waiting Time None between delivery and testing.

Test Period Minimum of 2 minutes.
There must be no dispensing or delivery during test.

Test Pressure A nominal vacuum of 1.5 psig must be maintained in the ullage.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater or other liquid is present outside tank ullage, test must not be used.

Comments Microphone (hydrophone) should be located within 25 feet of any possible leak source.
Noise signals are tape recorded (not digitally recorded) so that test data can be reviewed by the test operator or other qualified individuals.
Since the method depends on an audible interpretation of the signal, the test must be conducted under reasonably quiet conditions. Vibrations due to heavy traffic, nearby trains, or construction activities could produce sound levels that could compromise the test.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
A well point or observation well in the tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and free product.
Operators must be trained and certified by the manufacturer.

MassTech International, Ltd.
102 Basile Road
Scott, LA 70583
Tel: (337) 896-8230

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Date of Evaluation: 01/02/01

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Issue Date: June 4, 2003
Revision Date: April 28, 2005

MassTech International, Ltd.

MassTech Remote Spectral Analysis Method (Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification Leak rate of 0.1 gph with P_D = 100% and P_{FA} = 0%.

Leak Threshold Tank ullage should not be declared tight when the digital recording of the noise spectrum of tank under vacuum has a detectable difference from the digital recording of the noise spectrum of tank at zero pressure.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, waste oil. Empty tanks may also be tested.
Tests only ullage portion of the tank.
Product-filled portion of the tank must be tested using an underfill test method.

Tank Capacity Maximum ullage volume is 20,000 gallons.

Waiting Time None between delivery and testing.

Test Period A nominal vacuum of 1.5 psig must be maintained in the ullage.

Test Pressure A nominal vacuum of 1.5 psig must be maintained in the ullage.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater or other liquid is present outside tank ullage, test must not be used.

Comments Microphone (hydrophone) should be located within 25 feet of any possible leak source.
Data are digitally recorded so that it can be reviewed by the test operator or other qualified individuals.
Since the method depends on an audible interpretation of the signal, the test must be conducted under reasonably quiet conditions. Vibrations due to heavy traffic, nearby trains, or construction activities could produce sound levels that could compromise the test.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
A well point or observation well in the tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and free product.
Operators must be trained and certified by the manufacturer.

MassTech International, Ltd.
102 Basile Road
Scott, LA 70583
Tel: (337) 896-8230

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Date of Evaluation: 01/02/01

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MassTech International, Ltd.

MassTech 002 Ullage Test System (Pressure or Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold
Tank ullage should not be declared tight when a predetermined threshold is exceeded. This threshold may be modified by the results of the static test.

Applicability
Gasoline, diesel, aviation fuel, fuel oil #4, waste oil. Empty tanks may also be tested.
Tests only ullage portion of the tank.
Product-filled portion of the tank must be tested using an underfill test method.

Tank Capacity
Maximum ullage volume is 30,000 gallons.

Waiting Time
2.38 hours with tank filled to 5%
1.5 hours with tank filled to 50%
0.27 hours with tank filled to 95%
The wait time may be shortened by the technician when steady state conditions are reached earlier.

Test Period
Total collection time is 2.63 hours with tank filled to 5%
Total collection time is 1.75 hours with tank filled to 50%
Total collection time is 0.52 hours with tank filled to 95%
The 25-minute static test in which the tank is sealed but not pressurized may be shortened by the technician when steady state conditions are reached earlier.
Test data is acquired by computer and forwarded electronically to an analysis center where proprietary software is used to assist in the determination of the tank condition.

Test Pressure
A nominal pressure or vacuum of 1.5 psig must be maintained in the ullage.

Temperature
Method is sensitive to temperature, atmospheric pressure and other environmental fluctuations. These are empirically modeled during the static test.

Groundwater
Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above tank bottom, a water sensor must be located at the bottom of the tank or the test must be conducted in conjunction with the standard MassTech wet test.

Comments
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
A well point or observation well in the tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and free product.
Operators must be trained and certified by the manufacturer.

MassTech International, Ltd.
102 Basile Road
Scott, LA 70583
Tel: (337) 896-8230

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Date of Evaluation: 02/21/05

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MassTech International, Ltd.

MassTech 2 Wet Test (Mass Based)

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD > 100% and PFA < 0%.

Leak Threshold 0.05 gph

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, waste oil.
Ullage portion of the tank must be tested using an ullage test method.

Tank Capacity Maximum product volume of 30,000 gallons with ullage volume greater than 5% of total tank volume.

Waiting Time Minimum of 15 minutes.

Test Period Minimum of 30 minutes.
Test data is acquired by computer and forwarded electronically to an analysis center where proprietary software is used to assist in the determination of the tank condition.
Atmospheric conditions should not be subject to violent change during data collection process.

Temperature System measures product mass (which is not affected by temperature) instead of product volume. The temperature of added product should not differ more than 9.9 degrees Fahrenheit from that already in the tank to minimize ullage or product expansion or contraction due to temperature fluctuation.

Groundwater If groundwater is above tank bottom or if depth to groundwater is not determined, the test must be conducted at two different ullage pressures (nominal 1.5 psi difference) to eliminate leak masking.

Comments A well point or observation well in the tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and free product.
Operators must be trained and certified by the manufacturer.

MassTech International, Ltd.
102 Basile Road
Scott, LA 70583
Tel: (337) 896-8230
E-mail: masstech1@compuserve.com
URL: http://masstechinternational.com

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Date of Evaluation: 11/26/04

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Issue Date: July 13, 2007
Revision Date: May 28, 2008

Mass Technology Corp.

Precision Mass Measurement Systems SIM-1000 and CBU-1000

ABOVEGROUND STORAGE TANK LEAK DETECTION METHOD

Certification
Leak rate of 1.717 gph with PD = 95% and PFA = 5%.
The US EPA has not set a minimum detectable leak rate for aboveground storage tank systems at the time of this evaluation.

Leak Threshold
0.859 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, jet fuel, fuel oil up to #6.

Tank Capacity
AST's with surface areas from 7,854 to 30,172 sq. ft. and diameter's from 100 to 196 feet.
Tank must be 20% full.

Waiting Time
Minimum of 20 minutes.

Test Period
Minimum of 20 hours.
There must be no delivery, transfer, or dispensing during test.

Temperature
One Resistance Temperature Detector (RDT) attached to the bubbler unit.

System Features
This system uses nitrogen under pressure conveyed to the bottom of the tank via a hose to generate (bubbler unit) and release small bubbles at the tank bottom.
The pressure required to produce the bubbles is equal to the hydrostatic head pressure produced by the fluid in the tank plus one atmosphere. This pressure is measured by a pressure transducer.
The measured differential pressure is a direct measurement of the mass of the fluid in the tank.

Calibration
The differential pressure transducer is benchmark calibrated by the manufacturer.
Annual calibration is performed by the CBU/SIM unit and returned to the manufacturer if results fall outside the benchmark calibration values.
RTDs are calibrated annually.
Barometer is replaced every five years.

Comments
Data set is filtered to extract only night time data to eliminate the effects of radiant solar heating.
The CBU/SIM control unit is not rated for installation in areas where an explosive ignition risk may exist.
Method may be applied to steel, concrete, aluminum, or fiberglass tanks with either fixed or floating roofs.
Bubbler test pressure must not exceed 18 psig.

Mass Technology Corp.
P. O. Box 1578
Kilgore, TX 75663
Tel: (903) 986-3564
E-mail: info@mtctesting.com
URL: www.mtctesting.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/31/06

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Issue Date: August 23, 1999
Revision Date: December 29, 2011

Mass Technology Corp.

Precision Mass Measurement Systems SIM-1000 and CBU-1000 (24 hour test)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 1,257 ft² or less, leak rate is 0.1 gph with PD = 97.9% and PFA = 2.1%.
Calculated minimum detectable leak rate is 0.078 gph with PD = 95% and PFA = 5%.
For tanks with larger PSA, leak rate equals [(PSA in ft² ÷ 1,257 ft²) x 0.1 gph].
Example:
For a tank with PSA = 2,000 ft²; leak rate = [(2,000 ft² ÷ 1,257 ft²) x 0.1 gph] = 0.16 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 1,257 ft² or less, leak threshold is 0.05 gph.
For tanks with larger PSA, leak threshold equals [(PSA in ft² ÷ 1,257 ft²) x 0.05 gph].
Example:
For a tank with PSA = 2,000 ft²; leak threshold = [(2,000 ft² ÷ 1,257 ft²) x 0.05 gph] = 0.08 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, ethanol blends up through E100, diesel, aviation fuel, fuel oil #4.

Tank Capacity

Use limited to single field-constructed vertical tanks.
Performance not sensitive to product level.

Waiting Time

Minimum of 1 hour, 6 minutes after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 62 minutes to 31 hours.

Test Period

Minimum of 24 hours.
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None.
Water leaks are measured as increase in mass inside tank.

Calibration

Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments

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.
Evaluated in a nominal 120,000 gallon, vertical underground tank with product surface area (PSA) of 1,257 ft².
Averaging of multiple tests may be used to improve the performance of the system.

Mass Technology Corp.
P. O. Box 1578
Kilgore, TX 75663
Tel: (903) 986-3564
E-mail: info@mtctesting.com
URL: www.mtctesting.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/25/98, 02/04/11

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Issue Date: August 23, 1999
Revision Date: May 28, 2008

Mass Technology Corp.

Precision Mass Measurement Systems SIM-1000 and CBU-1000 (48 hour test)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 0.294 gph with PD = 95% and PFA = 5%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 6,082 ft²) x 0.294 gph].
Example:
For a tank with PSA = 4,000 ft²; leak rate = [(4,000 ft² ÷ 6,082 ft²) x 0.294 gph] = 0.19 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak threshold is 0.147 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x 0.147 gph].
Example:
For a tank with PSA = 4,000 ft²; leak threshold = [(4,000 ft² ÷ 6,082 ft²) x 0.147 gph] = 0.1gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

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

Tank Capacity
Use limited to single field-constructed vertical tanks.
Maximum product surface area (PSA) is 6,082 ft² (approximately 88 ft diameter).
Performance not sensitive to product level.

Waiting Time
Minimum of 1 hour, 6 minutes after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 62 minutes to 31 hours.

Test Period
Minimum of 48 hours.
There must be no dispensing or delivery during test.

Temperature
Measurement not required by this system.

Water Sensor
None. Water leaks are measured as increase in mass inside tank.

Calibration
Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments
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.
Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².

Mass Technology Corp.
P. O. Box 1578
Kilgore, TX 75663
Tel: (903) 986-3564
E-mail: info@mtctesting.com
URL: www.mtctesting.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/25/98

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Issue: August 23, 1999
Revision Date: December 29, 2011

Mass Technology Corp.

Precision Mass Measurement Systems SIM-1000 and CBU-1000 (72 hour test)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 14,200 ft², leak rate is 0.638 gph with PD = 95% and PFA = 5%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 14,200 ft²) x 0.638 gph].
Example:
For a tank with PSA = 20,000 ft²; leak rate = [(20,000 ft² ÷ 14,200 ft²) x 0.638 gph] = 0.898 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 14,200 ft², leak threshold is 0.319 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 14,200 ft²) x 0.319 gph].
Example:
For a tank with PSA = 20,000 ft²; leak threshold = [(20,000 ft² ÷ 14,200 ft²) x 0.319 gph] = 0.449 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability
Gasoline, ethanol blends up through E100, diesel, aviation fuel, fuel oil #4.

Tank Capacity
Use limited to single field-constructed vertical tanks.
Performance not sensitive to product level.

Waiting Time
Minimum of 1 hour, 6 minutes after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 8 minutes to 42.5 hours.

Test Period
Minimum of 72 hours. There must be no dispensing or delivery during test.

Temperature
Measurement not required by this system.

Water Sensor
None. Water leaks are measured as increase in mass inside tank.

Calibration
Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments
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.
Evaluated in a nominal 2,000,000 gallon, vertical underground tank with product surface area (PSA) of 14,200 ft².
Averaging of multiple tests may be used to improve the performance of the system.

Mass Technology Corp.
P. O. Box 1578
Kilgore, TX 75663
Tel: (903) 986-3564
E-mail: info@mtctesting.com
URL: www.mtctesting.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/25/98, 05/19/11

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Mass Technology Corp.

Precision Mass Measurement Systems CBU-1000D

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification	Leak rate of 0.1 gph with PD > 95% and PFA < 5%.
Leak Threshold	0.55 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.
Tank Capacity	Maximum of 76,500 gallons.
Waiting Time	Minimum of 1.5 hours after delivery or dispensing. Waiting times during evaluation ranged from 20 minutes to 1.5 hours.
Test Period	Minimum of 13 hours. There must be no dispensing or delivery during test.
Temperature	Measurement not required by this system.
Groundwater	Tank may not be tested unless the groundwater level is known to be below the tank bottom.
Calibration	Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.
Comments	This method was not evaluated with groundwater taken into account. Test results are not valid when it is not demonstrated that the groundwater level is below the bottom of the tank during the test. Tests only portion of tank containing product. The tank must be at least 90% full. Evaluated in a nominal 51,000 gallon, horizontal cylindrical steel tank with a diameter of 13 feet and a length of 54 feet containing JP-5 jet fuel.

Mass Technology Corp.
P. O. Box 1578
Kilgore, TX 75663
Tel: (903) 986-3564
E-mail: info@mtctesting.com
URL: www.mtctesting.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/19/09

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Mesa Engineering

Mesa 2-D Method with ACT v1 Water Level Sensor

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

Certification Leak rate of 0.1 gph with PD = 100% and PFA = 1.6%.

Leak Threshold A tank system should not be declared tight when an acoustic signal is detected above the background or baseline noise by a computer data acquisition system, or when water ingress is detected by the water sensor.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, fuel oil #6, solvents, and waste oil.

Tank Capacity Maximum of 30,000 gallons.
Evaluated at product levels between 8%* and 91% full.
Maximum of 30,000 gallons per tank for manifolded tank systems. If isolation cannot be performed, the tanks can be tested simultaneously using two sondes (sound amplifier modules) or else they must be pressurized simultaneously and tested separately, depressurizing between tests.

Waiting Time None between delivery and testing.

Test Period When groundwater level in tank excavation backfill is below bottom of tank: After the Vacuum conditions are established on the tank, the data collection times are very short, typically one minute or less.
When groundwater level in tank excavation backfill is above bottom of tank or when the groundwater level in the tank excavation backfill has not been determined: The time it takes for water ingress to increase the water level in the tank to allow the water sensor to detect the "minimum detectable change in water level" (see "Water Sensor" section below).
Test period based on water ingress is dependent on tank size. For example, the test period is 0.97 hours for a 10,000 gallon (96″ dia x319″ lg) tank.
The correct test period is always determined from the field calibration on each specific tank.
Before starting test, water sensor must be calibrated to "minimum detectable water level" (see "Water Sensor" section below) according to manufacturer's instructions.
There must be no dispensing or delivery during test.

Test Pressure A vacuum of 60 inches of water or –2.16 psig must be used.

Temperature Acoustic signal is independent of product temperature.

Water Sensor Conductivity water sensor must be used to detect water ingress and must be calibrated for every test when groundwater level in tank excavation backfill is above bottom of tank or when the groundwater level in the tank excavation backfill has not been determined.
Minimum detectable change in water level is 0.016 inch.
Minimum water level in tank must be adjusted to at least 0.14 inch (sensor's minimum detectable water level) before calibrating sensor and starting test.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Mesa Engineering, Mesa 2-D Method with ACT v1 Water Level Sensor

Groundwater Groundwater level in tank excavation backfill must be determined by observation well or soil probe in tank excavation backfill.
If groundwater level in tank excavation backfill is above bottom of tank or the groundwater level in the tank excavation backfill has not been determined, water sensor must be used and test time extended to ensure water ingress detection during test.

Comments *Although not evaluated using empty tanks, a third party acoustics specialist has certified the device is equally effective when tanks are empty as when tanks contain product.
Test may be inconclusive if there is high background noise.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
An observation well or soil probe in tank excavation backfill may help determine backfill material, water level in tank excavation backfill, and presence of free product. Manufacturer must certify test operator at least every 2 years.
More than 4 psi pressure differential across the tank wall at any location in the tank could damage tank.

Mesa Engineering
5801 Dierker
Houston, TX 77041
Tel: (713) 895-7000
E-mail: charlie@atsenvironmental.com
URL: www.mesatest.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/17/01

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Mine Safety Appliances

Tankgard P/N 481532,Tankgard VIII P/N 488803

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

Detector:

Output type: quantitative
Sampling frequency: continuous
Operating principle: metal oxide semiconductor

Test Results:

	benzene	2-methylbutane
Detection time (sec)	5	16
Fall time (min:sec)	04:12	04:42
Lower detection limit (ppm)	12.5	12.5

Specificity Results (in addition to above):

Activated (100%): n-butane, n-hexane, 2-methylpentane, toluene, isobutane.

Manufacturer's specifications:

Maximum Wire Distance: 500 ft using 18 AWG
Response Time: 30 seconds
Recovery Time: 1 minute maximum
Sensor Life: 2 year warranty

Mine Safety Appliances
P. O. Box 427
Pittsburgh, PA 15230
Tel: (800) 672-4678

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 03/26/91, 03/28/91

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Morrison Bros. Co.
924LS, 924 and 925 Sensor for use with 918AC, 918S, 918D and 918Q Alarm Console

INTERSTITIAL DETECTOR (LIQUID-PHASE)

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

Test Results:
Threshold Levels (in)

Sensor and Float Type	unleaded gasoline		diesel		water		unleaded E85	
	*NC	**NO	NC	NO	NC	NO	NC	NO
924 Adjustable	2.2428	2.5585	2.1886	2.5118	2.0205	2.3403	2.2419	2.5578
924 LS	0.7387	0.9397	0.7229	0.9080	0.6449	0.8155	0.7270	0.9335
925 Multi-Level								
Low level Bottom float	2.8385	2.5141	2.7765	2.4515	2.5872	2.2654	2.8126	2.4986
Low level Top float	4.9891	5.3068	4.9346	5.2676	4.7808	5.0780	4.9636	5.2793
High level Bottom float	53.0901	53.3855	52.9956	53.3214	52.7580	53.0631	53.0349	53.3488
High level Bottom float	55.5567	55.8861	55.4769	55.8120	55.2351	55.5612	55.5133	55.8479

*NC – normally closed; **NO – normally open
The following detection times and fall times apply to each sensor:
Detection time = <5 seconds
Fall time = <5 seconds after liquid level is within threshold of sensor

Specificity Results:
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:
Alarm is audible and visual. Sensors are reusable.
The 924 (adjustable level sensor) is available in four lengths with a magnetic, cylindrical, stainless steel float on a brass or stainless steel stem.
The 924LS (interstitial sensor/level sensor) has a magnetic, cylindrical, Nitrophyl float, stainless steel shroud, and Teflon coated wires.
The 925 (multi-level sensor) is available with one to five magnetic, cylindrical, stainless steel floats on a brass or stainless steel stem ordered to custom specified lengths and level set points.
The time for a liquid level sensor to alarm will depend on the size and geometry of the area in which it is installed and the rate of leakage into this space. The time to alarm can be calculated by dividing the volume necessary to reach the threshold by the leak rate.

Morrison Bros. Co.
570 East 7th Street
Dubuque, IA 52001
Tel: (563) 583-5701
URL: www.morbros.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 09/30/2015
Web: www.kwaleak.com

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: July 16, 2008
Revision Date: September 30, 2016

Mostyle Pty Ltd.
(Originally listed as Clearstone Engineering, Ltd.)

GreenScan SIR 3.0.1.2

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD > 99% and PFA < 1% for both single and manifolded tank systems.
Leak rate of 0.1 gph with PD > 98% and PFA < 2% for single tank systems.
Leak rate of 0.1 gph with PD > 99% and PFA < 1% for manifolded tank systems.

Leak Threshold
0.10 gph for a leak rate of 0.2 gph
0.05 gph for a leak rate of 0.1 gph.
This leak threshold is for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak threshold.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 30,000 gallons for single tank.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in the system.

Data Requirement
Minimum of 26 days of data is required.

System Features
This system requires a detailed evaluation of daily inventory measurements by a trained technician located at the corporate office.

Comments
The evaluation showed significant differences in results from manifolded tank systems and single tank systems resulting in different PA/PFA when used for leak rates of 0.1 gph.
51% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 24,175 gallons.
Variable leak rates ranging from .047 gph to .233 gph were used in the evaluation.
Data sets evaluated were supplied by the evaluator.
Gains (water ingress) are analyzed and evaluated on an individual basis. If found significant, an investigation flag will be triggered, indicating an action is required by the operator.
This system is primarily designed as a service provided by the vendor.

Mostyle Pty, Ltd.
Suite 102 First Floor, 41 Cecil Street
Southbank 3006
Victoria, Australia
Tel: 03 9684 9999
E-Mail: caenquiries@mostyle.com.au
URL: http://www.ems-australia.com/

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 4/14/2003

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Issue Date: November 14, 1997
Revision Date: April 11, 2011

National Environmental, LLC
(formerly Advanced Telemetrics, Ltd.)

Tanknetics SIR, Version 2.1

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.5%.

Leak Threshold
0.10 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 for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 28 days of product level and flow through data.

Comments
51% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 18,897 gallons.
Leak rates ranging from 0.043 to 0.234 gph were used in evaluation. Data sets evaluated were supplied by evaluator.

National Environmental, LLC
560 CR 275
Water Valley, MS 38965
Tel: (800)-520-4802
E-Mail: james@tanknetics.com
Website: www.tanknetics.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/28/97

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Issue Date: November 22, 1995
Revision Date: March 24, 2015

Oklahoma Environmental Services

(originally listed as, Arizona Instrument Corp., then NESCO, and then Summit Holdings, Inc. – Oklahoma Environmental, Inc.)

Soil Sentry Liquid 330 (17-330-A/17-330-B), TLM-830, ENCOMPASS APAM with Probes 17-141A, 17-142A, 17-143A, 17-144A

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: refraction

Test Results:

	unleaded gasoline	synthetic gasoline	diesel	water
Detection time (sec)	3	3	N/D*	N/D
Fall time	manual reset	manual reset	N/D	N/D
Lower detection limits (cm)				
17-141A	0.25	0.28	0.15	0.1
17-142A	0.25	0.30	0.18	0.18
17-143A	0.03	0.15	0.03	0.13
17-144A	0.28	0.30	0.30	0.15

* See glossary.

Specificity Results (in addition to above):
Activated: n-hexane, jet-A fuel, toluene (Only 17-143A was tested with toluene), xylene(s).

Comments:
Detectors are listed as interstitial due to intended use.
Sensors are reusable.
Although ENCOMPASS APAM (Accessory Probe Access Module) was not included in evaluations, according to manufacturer, probes perform in the same manner when connected to any one of these 3 systems.

Oklahoma Environmental Services
4415 North Classen Blvd.
Oklahoma City, Oklahoma 73118
Tel: 888-584-3386 ext. 7000
E-mail: Deanna.Atkinson@OEServices.net
URL: www.OEServices.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/29/92, 01/08/93

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Issue Date: November 22, 1995
Revision Date: March 24, 2015

Oklahoma Environmental Services

(originally listed as, Arizona Instrument Corp., then NESCO, and then Summit Holdings, Inc. – Oklahoma Environmental, Inc.)

Soil Sentry Twelve-X

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

Detector:

Output type: quantitative
Sampling frequency: continuous
Operating principle: metal oxide semiconductor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Accuracy* (%)	170	120	120
Bias* (%)	60	8.0	1.8
Precision* (%)	6.3	7.7	18
Detection time (min:sec)	12:20	12:27	12:33
Fall time* (min:sec)	11:53	11:53	11:55
Lower detection limit (ppm)	150	140	60

* For tests conducted with 1000 ppm of test gas.

Specificity Results:

	percentages
unleaded gasoline	170
synthetic gasoline	110
n-hexane	110
JP-4 jet fuel	90
toluene	43
xylene(s)	22

Manufacturer's specifications:

Calibration is recommended on an annual basis, or whenever the sensor or the main printed circuit board is replaced.

Oklahoma Environmental Services
4415 North Classen Blvd.
Oklahoma City, Oklahoma 73118
Tel: 888-584-3386 ext. 7000
E-mail: Deanna.Atkinson@OEServices.net
URL: www.OEServices.net

Evaluator: Radian Corp.
Tel: (512) 454-4797
Date of Evaluation: 12/28/90

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OMNTEC Mfg., Inc.

Omntec PLLD
(Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI)
(for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuels, fuel oil #4, waste oil, kerosene.

Specification
System tests pressurized rigid or flexible pipelines for all leak rates.
System tests pressurized hybrid combination of rigid and flexible pipelines for 3.0 gph leak rate only.
Tests are conducted at operating pressure.

Pipeline Capacity
For 3.0 gph leak rate test:
- Maximum of 396.6 gallons for rigid pipelines.
- Maximum of 95.5 gallons for flexible pipelines.
- Maximum of 492.1 gallons for hybrid combination of rigid and flexible pipelines (rigid portion cannot exceed 396.6 gallons and flexible portion cannot exceed 95.5 gallons).

For 0.2 leak rate and 0.1 gph leak rate tests:
- Maximum of 163 gallons for rigid pipelines (Example: 350 feet of 3 3/8 inch line).
- Maximum of 39.5 gallons for flexible pipelines (Example: 430 feet of 1½ inch line).

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 3 hours between dispensing and testing for leak rate of 0.2 gph.
Minimum of 6 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 10 minutes for leak rate of 3.0 gph.
Minimum of 25 minutes for leak rate of 0.2 gph.
Minimum of 34 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Omntec Mfg., Inc., Omntec PLLD (Originally listed as Campo/Miller LS300-120 PLUS AL, LS300-120 PLUS AL A/S, LS300-120 PLUS AL LSI) (for Rigid, Flexible or Hybrid Combination of Rigid and Flexible Pipelines)

System Features

Permanent installation on pipeline.
Automatic testing of pipeline every 45 minutes for leak rate of 3.0 gph.
Automatic testing of pipeline when pump has been idle for 3 hours for leak rate of 0.2 gph.
Automatic testing of pipeline when pump has been idle for 6 hours for leak rate of 0.1 gph.
Preset threshold.
Triplicate testing to determine if pipeline is leaking.
Pump shutdown, indicator light and alarm activation if leak is declared.
Pump control, line pressure display, alarm and test logs.

Calibration

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

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/23/95, 09/10/98, 05/26/06

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Issue Date: June 19, 1996
Revision Date: June 1, 2016

OMNTEC Mfg., Inc.

OEL 8000, K-OEL 8000, OEL 8000 II, K-OEL 8000 II, OEL 8000III Series Consoles (Proteus B, K, and X Consoles) (MTG - XX Magnetostrictive Probe, 4 inch dia Floats)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.5% and PFA = 2.5%.

Leak Threshold 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751

Tank Capacity Maximum of 30,000 gallons.
Tanks less than 95% full may be tested. Minimum product level required is based on tank diameter as follows:
48" dia/ min 12";
64" dia/ min 15";
72" dia/ min 16";
96" dia/ min 20";
126" dia/ min 25";
132" dia/ min 26".
For other tank diameters, consult manufacturer.

Waiting Time Proteus Series 8000III: Minimum of 8 hours between delivery and testing.
OEL Series: Minimum of 4 hours between delivery and testing.
There must be no delivery during waiting time.

Test Period Minimum of 4 hours, 30 minutes.
Test data are acquired and recorded by the controller.
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 a probe containing a minimum of 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 0.055 inch.
Minimum detectable change in water level is 0.011 inch.

Calibration 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.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001
Website: www.omntec.com
Email: omntec@omntec.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/17/96, 09/15/97, 10/26/00, 3/20/14

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Issue Date: June 19, 1996
Revision Date: May 25, 2001

OMNTEC Mfg., Inc.

OEL 8000, K-OEL 8000
(MTG - XX Magnetostrictive Probe, 4 inch dia Floats)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.1 gph with PD = 97.8% and PFA = 2.2%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required is based on tank diameter as follows:
48" dia/ min 12";
64" dia/ min 15";
72" dia/ min 16";
96" dia/ min 20";
126" dia/ min 25";
132" dia/ min 26".
For other tank diameters, consult manufacturer.

Waiting Time Minimum of 6 hours, 30 minutes between delivery and testing.
There must be no delivery during waiting time.

Test Period Minimum of 4 hours.
Test data are acquired and recorded by the controller.
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 a probe containing a minimum of 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 0.055 inch.
Minimum detectable change in water level is 0.011 inch.

Calibration 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.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/17/96, 09/15/97

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Issue Date: February 11, 2003
Revision Date: May 6, 2016

OMNTEC Mfg., Inc.

OEL 8000 II, K-OEL 8000 II, OEL 8000 III (Proteus Series-B, K and X) Monitoring System with CITLDS (MTG - XX Magnetostrictive Probe)

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

Certification Leak rate of 0.2 gph with PD = 99% and PFA = 1%.

Leak Threshold 0.1 gph.
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.
The system is designed primarily for use with petroleum fuels.

Tank Capacity Maximum of 18,000 gallons.

Throughput Monthly maximum of 154,195 gallons.

Waiting Time The automatic data collection program allows for 20 minutes for waiting time after the product delivery and stabilization. Once product has settled after a delivery, waiting time is a minimum of 20 minutes.

Test Period Data collection time ranges from 3 hours to 14 days.
Data sampling frequency is every 17 seconds.
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 0.055 inch.
Minimum detectable change in water level is 0.011 inch.

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

Comments System reports a result of "pass" or "fail."
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.
System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail".
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no "passing" tests completed during the month.
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.
Constant and variable leaks were mathematically induced into tight tank test records which were collected by systems installed at various active tank sites.
During the evaluation, data was collected when the product level was between 12.7% and 97.9% of tank volume.
The database for evaluation of the system included sites with vapor recovery.
Tanks used in this evaluation contained gasoline and diesel.
Omntec has stated that the software and algorithm have been copied from the original system and used on the new Proteus console and the third-party evaluator has confirmed that the new software and algorithm produce results identical to the original evaluation when processed through the Proteus console software.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 1/16/03, 2/18/16

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OMNTEC Mfg., Inc.

Controller Models OEL 8000 11, K-OEL 8000 11 with Liquid level sensors BX-L, BX-LS, BX-LWF, BX-RES

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, non-discriminating
Sampling frequency: continuous
Operating principle: optical sensor

Test Results:

	unleaded gasoline	diesel	water
BX-L			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (in)	0.63	0.46	0.40
BX-LS			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (in)	0.464	0.468	0.500
BX-LWF			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (in)	0.63	0.46	0.40
BX-RES			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Low level threshold - lower detection limit (in)	2.61	2.57	2.54
High level threshold - lower detection limit (in)	8.57	8.59	8.56

Specificity Results:

Manufacturer claims sensors will respond to any liquid after its threshold is exceeded. No additional materials tested.

Manufacturer's Specifications:

Manufacturer states that the sensors can also be tested from their location without removal. The test procedure is as follows: When the test button on the controller is pressed, the normally closed light beam is opened, which simulates an actual leak occurrence, sending an alarm signal to the controller. The controller responds to the alarm signal by turning on an audio/visual alarm and printing the test results.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/15/00

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OMNTEC Mfg., Inc.

Controller Models OEL 8000 11, K-OEL 8000 11 with Liquid level sensors BX-PDS, BX-PDWF, BX-PDWS

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, discriminating
Sampling frequency: continuous
Operating principle: optical sensor, conductivity

Test Results:

	unleaded gasoline	diesel	water
BX-PDS			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	0.464	0.468	0.500
BX-PDWF			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	0.63	0.46	0.40
BX-PDWS			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	0.464	0.468	0.500

Specificity Results:

Manufacturer claims sensors will respond to any liquid after its threshold is exceeded. No additional materials tested.

Manufacturer's Specifications:

Manufacturer states that the sensors can also be tested from their location without removal. The test procedure is as follows: When the test button on the controller is pressed, the normally closed light beam is opened, which simulates an actual leak occurrence, sending an alarm signal to the controller. The controller responds to the alarm signal by turning on an audio/visual alarm and printing the test results.

Comments:

Optic sensor BX-PDS also contains a conductivity sensor to determine if the product is hydrocarbon or water.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/15/00

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Issue Date: November 22, 1995
Revision Date: April 14, 2003

OMNTEC Mfg., Inc.

Controller Models Series LPD, LU, OEL8000 with Sensors L-LL-R-1, LS-ASC, PDS-ASC, PDWS-1, PDWF-1

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: refractive index of liquids (all), electrical conductivity (PDS-ASC, PDWS-1, and PDWF-1)

Test Results:

L-LL-R-1 (low level)	unleaded gasoline	diesel	water
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	6.63	6.53	6.45
L-LL-R-1 (high level)			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	21.7	21.8	21.7
LS-ASC , PDS-ASC			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	2.24	2.11	1.42
PDWS-1			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	1.93	1.85	1.63
PDWF-1			
Detection time (sec)	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1
Lower detection limit (cm)	1.60	1.67	1.02

Specificity Results (in addition to above):
Activated: synthetic gasoline, n-hexane, jet-A fuel, toluene, xylene(s).
LS and PD series responds to any liquid with an index of refraction different than air.
PD series responds to any conducting liquid.

Comments:
Detectors are listed as interstitial due to intended use.
Sensors are reusable.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/12/93, (Revised 11/20/98)

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OMNTEC Mfg., Inc.

Controller Models OEL 8000 III Series (Proteus B, K, and X Consoles) with Liquid level sensors BX-PDS, BX-PDWF, BX-PDWS, BX-LS, BX-LV, BX-LWF, BX-RES

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative; discriminating (PD-PDS, BX-PDWF, and BX-PDWS) others non-discriminating
Sampling frequency: continuous
Operating principle: optical sensor (all), electrical conductivity (PD-PDS, BX-PDWF, and BX-PDWS)

Test Results:

	unleaded gasoline	E85	diesel	water
BX-PDS (Discriminating sensor)				
Detection time (sec)	< 1	--	< 1	< 1
Fall time (sec)	< 1	--	< 1	< 1
Lower detection limit (in)	0.7222	--	0.7192	0.7122
BX-PDWF (Discriminating sensor)				
Detection time (sec)	< 1	--	< 1	< 1
Fall time (sec)	< 1	--	< 1	< 1
Lower detection limit (in)	0.2081	--	0.2093	0.2102
BX-PDWS (Discriminating sensor)				
Detection time (sec)	< 1	--	< 1	< 1
Fall time (sec)	< 1	--	< 1	< 1
Lower detection limit (in)	0.7222	--	0.7192	0.7122
BX-LV				
Detection time (sec)	<1	< 1	<1	<1
Fall time (sec)	<1	< 1	<1	<1
Lower detection limit (in)	0.2380	0.2417	0.2474	0.2424
BX-LS				
Detection time (sec)	< 1	< 1	< 1	< 1
Fall time (sec)	< 1	< 1	< 1	< 1
Lower detection limit (in)	0.5542	0.5506	0.5689	0.5404
BX-LWF				
Detection time (sec)	<1	< 1	<1	<1
Fall time (sec)	<1	< 1	<1	<1
Lower detection limit (in)	0.2043	0.2063	0.2044	0.2061
BX-RES				
Detection time (sec)	<1	< 1	<1	<1
Fall time (sec)	<1	< 1	<1	<1
Low level threshold - lower detection limit (in)	2.1418	2.1496	2.1470	2.1425
High level threshold - lower detection limit (in)	13.1819	13.1850	13.1886	13.1813

Comments:

Manufacturer claims sensors will respond to any liquid after its threshold is exceeded.
Manufacturer claims all sensors can easily be removed, cleaned, and reinstalled if an alarm is triggered or for periodic testing.

OMNTEC Mfg., Inc.
1993 Pond Rd.
Ronkonkoma, NY 11779
Tel: (631) 981-2001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 4/9/14

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Issue Date: November 22, 1995
Revision Date: April 18, 1997

One Plus Corp.

Leak Edge
Models 100-3001, 100-4001

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (min:sec)	5:41	5:14
Fall time (min:sec)	30:39	18:36
Lower detection limit (cm)	0.02	0.02

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Manufacturer's specifications:
Operating temperatures: Sensor is -40 degrees C to 74 degrees C; Monitor Module is -20 degrees C to 49 degrees C.

Comments:
Sensors are reusable.

One Plus Corp.
3182 McArthur Blvd.
Northbrook, IL 60062
Tel: (847) 498-0955

Evaluator: Underwriters Laboratories Inc.
Tel: (847) 272-8800
Date of Evaluation: 12/17/91

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System LLD (Q0011)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

Leak Threshold
2.0 gph for leak rate of 3.0 gph.
0.1293 gph for leak rate of 0.2 gph.
0.0793 gph for leak rate of 0.1 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 67.4 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Ranges from 0 to 1 hour, 27 minutes between dispensing and testing for leak rate of 0.2 gph.
Ranges from 0 to 2 hours, 48 minutes between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 2 minutes for leak rate of 3.0 gph.
Minimum of 9 minutes for leak rate of 0.2 gph.
Minimum of 31 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/31/93, 07/18/94

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System LLD
(for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

Leak Threshold
2.0 gph for leak rate of 3.0 gph.
0.0793 gph for leak rate of 0.1 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 49.6 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 14 minutes between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 11 minutes, 24 seconds for leak rate of 3.0 gph.
Minimum of 9 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/18/94

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed by Hasstech and later as Petro Vend, Inc.)

LineTite Pipeline Leak Monitor

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed on the pipeline.

Pipeline Capacity
Maximum of 341 gallons.

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

Test Period
Response time is 1 to 26 minutes for leak rate of 3.0 gph.
Response time is 1 hour, 30 minutes to 12 hours, 30 minutes for leak rate of 1.0 gph.
Test data are acquired and recorded by a permanently installed microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
Formerly manufactured by Hasstech.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/15/91, 04/10/94

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Issue Date: April 18, 1997
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed by Hasstech and later as Petro Vend, Inc.)

LineTite Pipeline Leak Monitor
(for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed on the pipeline.

Pipeline Capacity
Maximum of 49.6 gallons.

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

Test Period
Response time is 1 to 6 minutes for leak rate of 3.0 gph.
Response time is 2 hours, 18 minutes to 5 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by a permanently installed microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
Formerly manufactured by Hasstech.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/15/91, 04/10/94

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Issue Date: August 23, 1999
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed by Hasstech and later as Petro Vend, Inc.)

LineTight Pipeline Leak Monitor Model 2001J

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

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

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 172 gallons.

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

Test Period
Response time is 1 to 5 minutes for leak rate of 3.0 gph.
Response time is 2 hours, 10 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
Formerly manufactured by Hasstech.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/15/97, 05/28/98

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Issue Date: August 23, 1999
Revision Date: April 28, 2005

OPW Fuel Management Systems
(originally listed by Hasstech and later as Petro Vend, Inc.)

LineTight Pipeline Leak Monitor Model 2001J
(for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

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

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 39.5 gallons.

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

Test Period
Response time is 1 minute for leak rate of 3.0 gph.
Response time is 6 hours, 37 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold. Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
Formerly manufactured by Hasstech.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/15/97, 05/28/98

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Issue Date: June 22, 2012

OPW Fuel Management Systems

Model 327 VLLD Line Leak Detector
(for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification
Leak rate of 3.0 gph at 10 psi* with PD = 100% and PFA = 0%.
Leak rate of 0.2 gph at operating pressure with PD = 100% and PFA = 0%.
Leak rate of 0.1 gph at 1.5 times operating pressure* with PD = 97.9% and PFA = 2.1%.
*Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized rigid or flexible or a combination of rigid and flexible pipelines for all leak rates.
Tests are conducted at operating pressure.

Pipeline Capacity
For all leak rates 3.0gph, 0.2gph and 0.1gph:
Maximum of 425.8 gallons for rigid pipelines.
Maximum of 109.8 gallons for flexible pipelines.
Maximum combined capacity is 535.7 gallons, not to exceed the above individual capacity limitations for rigid or flexible pipelines.

Waiting Time
None between delivery and testing.
None between dispensing and testing for all leak rates 3.0gph, 0.2gph and 0.1gph.

Test Period
Response time is 3 minutes or less for leak rate of 3.0 gph.
Minimum of 204 minutes for leak rate of 0.2 gph.
Minimum of 204 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline every 45 minutes for leak rate of 3.0 gph.
Automatic testing of pipeline for leak rate of 0.2 gph based upon thermal condition.
Automatic testing of pipeline for leak rate of 0.1 gph based upon thermal conditions.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, indicator light, and alarm activation if leak is declared.

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

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwglobal.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/26/12

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OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System 1000, 1500, 2000, 3000 and Galaxy 0.2 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe or OPW 924\B TLM-B Magnetostrictive probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph w/ PD = 99.1% and PFA = 0.9% for Precision Test using Q0400-4xxx probe.
Leak rate of 0.2 gph w/ PD = 95.4% and PFA = 4.6% for Quick Test using Q0400-4xxx probe.
Leak rate of 0.2 gph w/ PD = 98.4% and PFA = 1.6% using 924\B TLM-B probe.

Leak Threshold
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.

Tank Capacity
Maximum of 15,000 gallons. Tanks less than 95% full may be tested. Minimum product level required based on tank diameter as follows:
48" dia/min 8.5";
64" dia/min 10.5";
72" dia/min 11.5";
96" dia/min 14";
126" dia/min 18".
For other tank diameters, see evaluation report.

Waiting Time
From 1 to 6 hours between delivery and testing depending on tank conditions with Q0400-4xxx probe.
6 hours between delivery and testing with 924\B TLM-B probe.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Average of 2 hours, 46 minutes using Q0400-4xxx probe during Precision Test evaluation.
Average of 1 hour, 9 minutes using Q0400-4xxx probe during Quick Test evaluation.
Test period of 4 hours using 924\B TLM-B probe.
Test data are acquired and recorded by a microprocessor which automatically determines test time based on tank size and product level.
There must be no dispensing or delivery during test.

Temperature
Probe contains 5 resistance temperature detectors (RTDs) (5 thermistors for 924B\TLM-B probe) to monitor average product temperature.
At least one RTD must be submerged in product during test.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: OPW Fuel Management Systems, EECO System 1000, 1500, 2000, 3000 and Galaxy 0.2 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe or OPW 924\B TLM-B Magnetostrictive probe)

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inches using Q0400-4xxx probe.
Minimum detectable change in water level is 0.039 inches using Q0400-4xxx probe.
Minimum detectable water level in the tank is 0.75 inches using 924\B TLM-B probe.
Minimum detectable change in water level is 0.08 inches using 924\B TLM-B probe.

Calibration RTDs (or 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 the portion of tank containing product.
As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure).
Consistent testing at low levels could allow a leak to remain undetected.
EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/23/93, 06/20/94
08/17/95, 07/28/97, 11/17/99

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Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System 1000, 1500, 2000, 3000 and Galaxy 0.1 gph Precision Test and Quick Test (Q0400-4xx Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.1 gph with PD = 99% and PFA = 1% for Precision Test.
Leak rate of 0.1 gph with PD = 96% and PFA = 4% for Quick Test.

Leak Threshold
0.05 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.

Tank Capacity
Maximum of 15,000 gallons. Tanks less than 95% full may be tested. Minimum product level required based on tank diameter as follows:
48" dia/min 8.5";
64" dia/min 10.5";
72" dia/min 11.5";
96" dia/min 14";
126" dia/min 18".
For other tank diameters, see evaluation report.

Waiting Time
Minimum of 6 hours between delivery and testing.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 3 hours, 45 minutes for Precision Test.
Average of 3 hours 45 minutes at 95% full and 5 hours 58 minutes at 50% full during Precision Test evaluation. Minimum of 1 hour, 49 minutes for Quick Test.
Average of 1 hour 48 minutes at 95% full and 2 hours 48 minutes at 50% full during Quick Test evaluation.
Test data are acquired and recorded by a microprocessor which automatically determines test time based on tank size and product level.
There must be no dispensing or delivery during test.

Temperature
Probe contains 5 resistance temperature detectors (RTDs) to monitor average product temperature.
At least one RTD must be submerged in product during test.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inches.
Minimum detectable change in water level is 0.039inches.

Calibration
RTDs 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 the portion of tank containing product.
As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure). Consistent testing at low levels could allow a leak to remain undetected.
EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 02/08/94, 09/19/97
01/04/00

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Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Petrosonic III
(Version 4.05 Model 613, 4 inch dia Float, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.07% and PFA = 0.93%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 12 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.92 inch.
Minimum detectable change in water level is 0.02 inch.

Calibration RTDs 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.
Petrosonic III version 4.04 is an older model automatic tank gauging system, which is no longer being manufactured.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Underwriters Laboratories, Inc.
Tel: (847) 272-8800
Date of Evaluation: 11/04/94

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: September 18, 2007

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Site Sentinel Models 2 and 3,
(Model 613, 2 inch dia Floats, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 96.55% and PFA = 3.45%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 12 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 2.47 inches.
Minimum detectable change in water level is 0.037 inch.

Calibration RTDs 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.
Site Sentinel models 2 and 3 were formerly models II and III respectively.

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6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
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Issue Date: November 22, 1995
Revision Date: September 18, 2007

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Site Sentinel Models 2 and 3,
(Model 613, 4 inch dia Floats, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.82% and PFA = 0.18%.
Leak rate of 0.1 gph with PD = 99.95% and PFA = 0.35%.

Leak Threshold
0.1 gph for leak rate of 0.2 gph.
0.06 gph for leak rate of 0.1 gph.
A tank system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability
Gasoline, diesel, aviation fuel.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 90% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 12 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 4 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.92 inch.
Minimum detectable change in water level is 0.02 inch.

Calibration
RTDs 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.
Site Sentinel models 2 and 3 were formerly models II and III respectively.

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6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Underwriters Laboratories, Inc.
Tel: (847) 272-8800
Date of Evaluation: 11/04/94

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OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Site Sentinel Models 1, 2 and 3, iTouch
(Model 924A, 2 inch dia Floats, Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.8% and PFA = 2.2% for 30 minute test.
Leak rate of 0.2 gph with PD = 99.4% and PFA = 0.6% for 1 hour test.
Leak rate of 0.2 gph with PD = 99.7% and PFA = 0.3% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for 3 hour test.

Leak Threshold
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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be minimum 50% full for 1 hour test.
Tank must be minimum 14% full for 30 minute, 2 hour and 3 hour test.
Minimum product level required based on 14% full tank and tank diameter is as follows:
48" dia/min 9.5";
120" dia/min 24.7".
For other tank diameters, consult manufacturer.

Waiting Time
Minimum of 8 hours between delivery and testing.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period
Variable:
Minimum of 30 minutes, 1, 2 or 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe containing 5 thermistors with the lowest thermistor located at the 10% tank volume level above the bottom of the tank.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.75 inch.
Minimum detectable change in water level is 0.08 inch.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: OPW Fuel Management Systems, Site Sentinel Models 1, 2 and 3, iTouch (Model 924A, 2 inch dia Floats, Magnetostrictive Probe)

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.
Site Sentinel models 2 and 3 were formerly models II and III respectively.
Model 924A Magnetostrictive Probe was formerly model 924.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/00

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OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Site Sentinel Models 1, 2 and 3, iTouch
(Model 924A with 4 inch dia Floats, and 924B with 2 inch dia or 4 inch dia Floats, Magnetostrictive Probes)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.8% and PFA = 2.2% for 30 minute test.
Leak rate of 0.2 gph with PD = 98.7% and PFA = 1.3% for 1 hour test.
Leak rate of 0.2 gph with PD = 99.2% and PFA = 0.8% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.5% and PFA = 0.5% for 3 hour test.
Leak rate of 0.1 gph with PD = 96.9% and PFA = 1.9% for 2 hour test.
Leak rate of 0.1 gph with PD = 98.2% and PFA = 1.0% for 3 hour test.

Leak Threshold
0.1 gph for leak rate of 0.2 gph.
0.053 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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be minimum 14% full for leak rate of 0.2 gph.
Minimum product level required based on 14% full tank and tank diameter is as follows:
48" dia/min 9.5";
120" dia/min 24.7".
For other tank diameters, consult manufacturer.
Tank must be minimum 90% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 8 hours between delivery and testing for leak rate of 0.2 gph.
Minimum of 12 hours between delivery and testing for leak rate of 0.1 gph.
There must be no delivery during waiting time.
Minimum of 30 minutes between dispensing and testing.

Test Period
Variable:
Minimum of 30 minutes, 1, 2 or 3 hours for leak rate of 0.2 gph and minimum of 2 or 3 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated as the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe containing 5 thermistors with the lowest thermistor located at the 10% tank volume level above the bottom of the tank.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: OPW Fuel Management Systems, Site Sentinel Models 1, 2 and 3, iTouch (Model 924A with 4 inch dia Floats, and 924B with 2 inch dia or 4 inch dia Floats, Magnetostrictive Probes)

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.848 inch.
Minimum detectable change in water level is 0.043 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.
Site Sentinel models 2 and 3 were formerly models II and III respectively.
Model 924A Magnetostrictive Probe was formerly model 924.
Model 924B Magnetostrictive Probe is a newer probe that was not originally listed under Petro Vend, Inc.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 11/03/00, 07/27/06

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Issue Date: January 26, 2009
Revision Date: August 8, 2012

OPW Fuel Management Systems

Site Sentinel Model iSite and Site Sentinel Integra (Model 924B with 2 inch dia or 4 inch dia Floats, Magnetostrictive Probes or Magnetostrictive Probe) Q0400-4xx

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 98.18% and PFA = 1.82% using 924\B probe with 2″ dia float.
Leak rate of 0.2 gph with PD = 95.28% and PFA = 4.72% using 924\B probe with 4″ dia float.
Leak rate of 0.1 gph with PD = 95.9% and PFA = 4.1% using 924\B probe with 2″ dia float.
Leak rate of 0.1 gph with PD = 96.5% and PFA = 3.5% using 924\B probe with 4″ dia float.
Leak rate of 0.2 gph with PD = 98.1% and PFA = 1.9% using Q0400-4xx probe with 4″ dia float.

Leak Threshold
0.1 gph for leak rate of 0.2 gph using 924\B or Q0400-4xx probe with 2″ or 4″ dia floats.
0.033 gph for leak rate of 0.1 gph using 924\B probe with 2″ dia float.
0.05 gph for leak rate of 0.1 gph using 924\B probe with 4″ dia float.
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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be minimum 50% full for leak rate of 0.2 gph using 924\B or Q0400-4xx probe.
Tank must be minimum 90% full for leak rate of 0.1 gph using 924\B probe.

Waiting Time
Minimum of 6 hours between delivery and testing using 924\B or Q0400-4xx probe.
There must be no delivery during waiting time.

Test Period
Average data collection time of 30 minutes using 924\B probe for leak rate of 0.2 gph.
Minimum of 6 hours using 924\B probe with 2″ dia float for leak rate of 0.1 gph.
Minimum of 1.5 hours using 924\B probe with 4″ dia float for leak rate of 0.1 gph.
Minimum of 4 hours for using Q0400-4xx probe with 4″ dia float for leak rate of 0.2 gph.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe containing 5 thermistors. (5 resistance temperature detectors (RTDs) for Q0400-4xx probes.

Water Sensor
Minimum detectable water level that can be detected by the 2″ dia float is 0.75 inch.
Minimum detectable water level that can be detected by the 4″ dia float is 0.848 inch.
Minimum detectable change in water level that can be detected by the 2″ dia float is 0.080 inch.
Minimum detectable change in water level that can be detected by the 4″ dia float is 0.043 inch.

Calibration
Thermistors (or RTDs) 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.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 02/26/08, 12/29/08, 07/24/12

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OPW Fuel Management Systems

Site Sentinel Nano
(Model 924B with 2 inch dia Floats)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 98.18% and PFA = 1.82% using 924B probe with 2" dia float.

Leak Threshold 0.1 gph for leak rate of 0.2 gph using 924B probe with 2" dia float.
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.

Tank Capacity Maximum of 20,000 gallons.
Tank must be minimum 50% full for leak rate of 0.2 gph using 924B probe.

Waiting Time Minimum of 6 hours between delivery and testing using 924B probe.
There must be no delivery during waiting time.

Test Period Average data collection time of 2 hours using 924B probe for a leak rate of 0.2 gph.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a probe containing 5 thermistors.

Water Sensor Minimum detectable water level that can be detected by the 2" dia float is 0.75 inch.
Minimum detectable change in water level that can be detected by the 2" dia float is 0.080 inch.

Calibration Thermistors (or RTDs) 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.
Listing derived from console comparison with OPW Integra; which was based on 7-24-2012 console comparison with OPW iSite; which was based on 2-26-2008 evaluation of OPW iSite.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/03/13

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Issue Date: January 11, 2001
Revision Date: November 13, 2009

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System 1000, 1000EG, 1500, 2000, 3000 and Galaxy ATG Systems
(Q0400-4xx Magnetostrictive Probe or OPW 924/B TLM-B Magnetostrictive Probe)

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

Certification Leak rate of 0.2 gph with PD = 99.1% and PFA = 0.9%.

Leak Threshold 0.1 gph for single and manifolded tank systems.
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.
The system is designed primarily for use with petroleum fuels.

Tank Capacity Maximum of 35,000 gallons for single tanks and for up to 2 tanks manifolded together.

Throughput Monthly maximum of 130,000 gallons.

Waiting Time Minimum of 6 hours stabilization time is allowed between delivery and data collection.

Test Period Average data collection time is 12 days.
During evaluation, data collection time ranged from 1 to 31 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 sensors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inch.
Minimum detectable change in water level is 0.039 inch.

Calibration Temperature sensors are factory calibrated.
Probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments System reports a result of "pass" or "fail."
Evaluated using both single and manifolded tank systems with probes in each tank.
Data can be collected when the product level is between 9% and 94.9% of tank volume.
System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail".
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no "passing" tests completed during the month.
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.
The 6-hour stabilization period after delivery may result in the system not testing the top portion of a very active tank. In this situation, a periodic test in the shut-down mode with a high product level should be used to test the entire portion of tank that routinely contains product.
Because the database for evaluation of the system did not include sites with vapor recovery, certification is limited to sites with no vapor recovery.
Evaluated using gasoline.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/13/00

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Issue Date: June 20, 2012
Revision Date: August 13, 2012

OPW Fuel Management Systems

Site Sentinel Model iSite and Site Sentinel Integra with SLD Version 1 (Model 924B with 2 inch dia or 4 inch dia Floats or Q0400-4xx Magnetostrictive Probe)

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

Certification
Single Tanks - Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.5%.
Manifolded Tanks - Leak rate of 0.2 gph with PD = 97.7% and PFA = 0.1%.

Leak Threshold
0.1 gph.
A tank system should not be declared tight and optionally a message printed for the operator and/or other method should be used to alert the operator, if the test results indicate a loss or gain that exceeds this threshold.

Applicability
Gasoline, diesel, aviation fuel, fuel Oil #4, Solvents and biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 30,258 gallons for single tanks and for manifolded tank groups up to a maximum of 3 tanks. System is able to collect data for tests between 14.7% and 93.7% full.

Throughput
Monthly maximum of 397,883 gallons.

Waiting Time
The waiting time required prior to the collection of data after a delivery event is less than 3 hours.

Test Period
Data collection time ranges from 28 to 30 days.
Data sampling frequency is every 1 to 4 seconds.
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 0.848 inch for all probe models 924B and Q400-4xx with 4" floats and 0.75 inch for 2" floats.
Minimum detectable change in water level is 0.043 inch with 4" floats and 0.08 inch with 2" floats.

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

Comments
System reports a result of "pass" or "fail."
Evaluated using both single and manifolded tank systems with probes in each tank.
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no "passing" tests completed during the month.
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.
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.
Tanks used in this evaluation contained gasoline and diesel.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opglobal.com
URL: www.opglobal.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/07/12, 07/24/12

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Issue Date: June 2, 2004
Revision Date: May 26, 2006

OPW Fuel Management Systems
(originally listed as Advanced Fuel Filtration Systems, Inc.)

Continuous Vacuum Monitoring System (CVMS)

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified as equivalent to European leak detection standard EN-13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping.
System is designed to activate a visual and acoustic alarm and optional turbine pump shutdown before stored product can escape to the environment, and is capable of detecting breaches in both the inner and outer walls of double-walled tanks and 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 minimum vacuum. System will also alarm if liquid is detected in the interstitial space, or if the vacuum level decreases to the designated "Pump On" pressure a fixed number of times within a designated time period. The current default values are 2 times within 5 minutes, but a qualified technician may adjust these values at the time of installation. **Maximum values shall not exceed 24 times within 60 minutes.**

Applicability:
Underground double-walled tank, connected double-walled piping, and other connected interstitial spaces where tank and piping contain gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, motor oil, water.

Manufacturer's Specifications:
Leak detector operates at a vacuum level between 20" and 120" H_2O column (-0.72 and -4.33 psi.). The interstitial space shall be rated for the operating vacuum of the leak detector, regardless of temperature and groundwater level fluctuations. Volume of monitored interstitial space must not exceed 8 m^3 for tanks and 10 m^3 for piping. Suction line must be located at lowest point of interstitial space.

Calibration:
Functional and operational safety tests must be performed annually in accordance with manufacturer's instructions.

Comments:
Interstitial space is tested continuously.
System is connected to the interstitial space by a suction line and a pressure measuring (vacuum sensing) line.
Vacuum is generated by the turbine pump, and is measured and controlled by a differential pressure switch.
Vacuum (air) leaks can be traced to a specific containment area using a permanently installed vacuum dial gauge assembly (optional).
System should be installed with a vacuum dial gauge at the point furthest from the source of the vacuum.
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.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: 708-485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/05/04, 04/17/06

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO System, Leak Sensor II, Leak Sensor Jr.
Thermistor and Proximity probes

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: thermal conductivity, proximity switch

Test Results:

EECO System	unleaded gasoline	synthetic gasoline
Detection time (sec)	<5	<5
Fall time	manual reset	manual reset
Lower detection limits (cm)		
Thermistor	1.22	1.12
Proximity	0.97	1.04
Leak Sensor II		
Detection time (sec)	<5	<5
Fall time	manual reset	manual reset
Lower detection limits (cm)		
Thermistor	1.14	1.14
Proximity	1.12	1.17
Leak Sensor Jr.		
Detection time (sec)	<5	<5
Fall time	manual reset	manual reset
Lower detection limits (cm)		
Thermistor	1.24	1.19
Proximity	1.12	1.17

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s), water.

Comments:
Sensors are reusable.
Systems alarm if either water or product leaks into interstitial space.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/09/92

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Issue Date: November 14, 1997
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO 2000, 3000, Leak Sensor II, Leak Sensor Jr. Systems with Q0001-005 Interstitial Space Flood Sensor and EECO 1500, 2000, 3000 Systems with Q0003-005 Wet Interstitial Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

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

Test Results:

Q0001-005 Interstitial Space Flood Sensor	unleaded gasoline		diesel		water	
	high*	low*	high	low	high	low
Lower detection limit (cm)	31.06	5.49	30.78	5.36	30.35	5.03
Detection time (sec)	<1	<1	<1	<1	<1	<1
Fall time (sec)	<1	<1	<1	<1	<1	<1
Q0003-005 Wet Interstitial Sensor						
Lower detection limit (cm)	30.73	6.73	30.78	6.60	30.12	4.29
Detection time (sec)	<1	<1	<1	<1	<1	<1
Fall time (sec)	<1	<1	<1	<1	<1	<1

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

Specificity Results:
Evaluator claims sensors will respond to any liquid.

Manufacturer's Specifications:
Temperature range: -13 to 158F (-25 to 70C).
Interstitial liquid level should be adjusted to center of sensor.

Comments:
Primary use is interstitial or annular space of a double-walled tank partially filled with brine solution.
Activates alarm if solution level exceeds upper or lower limits.
Sensors are reusable.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/18/96

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Issue Date: November 14, 1997
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO 1500, 2000, 3000 Systems Q0003-001 Discriminating Dispenser Pan Sensor, Q0003-002 Discriminating STP Sump Sensor, Q0003-003 Discriminating Interstitial Sensor, Q0003-006 Liquid Only Interstitial Sensor, Q0003-009 Liquid Float Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: float switch and polymer strip (Q0003-001, Q0003-002), optical prism and conductivity (Q0003-003), optical prism (Q0003-006), float switch (Q0003-009)

Test Results:

	unleaded gasoline		diesel		water	
Q0003-001 Discriminating Dispenser Pan Sensor (float switch, polymer strip)	high*	low*	high	low	high	low
Lower detection limit (cm)	19.91	3.38	19.86	3.30	19.66	3.20
Detection time (sec)	1-24hr	1-24hr	<1	<1	<1	<1
Fall time (sec)	clean	clean	clean	clean	<1	<1
Q0003-002 Discriminating STP Sump Sensor (float switch, polymer strip)						
Lower detection limit (cm)	28.37	3.12	28.24	3.07	28.04	3.00
Detection time (sec)	1-24hr	1-24hr	<1	<1	<1	<1
Fall time (sec)	clean	clean	clean	clean	<1	<1
Q0003-003 Discriminating Interstitial Sensor (optical prism, conductivity)						
Lower detection limit (cm)	1.68		1.68		1.85	
Detection time (hr)	<1		<1		<1	
Fall time (sec)	<1		<1		<1	
Q0003-006 Liquid Only Interstitial Sensor (optical prism)						
Lower detection limit (cm)	1.35		1.55		1.78	
Detection time (hr)	<1		<1		<1	
Fall time (sec)	<1		<1		<1	
Q0003-009 Liquid Float Sensor (float switch)						
Lower detection limit (cm)	2.54		2.49		2.21	
Detection time (hr)	<1		<1		<1	
Fall time (sec)	<1		<1		<1	

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

Specificity Results:

Evaluator claims sensors will respond to any liquid.

Comments:

Q0003-001 and Q0003-002 sensors must be cleaned with rubbing alcohol, or dish soap and water after exposure to product. Sensors are reusable if not completely saturated with product.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/18/96

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OPW Fuel Management Systems

iSite, iTouch, and EECO Series Fuel Management Systems with OPW Intelligent Sensor (and Company Equivalent): 30-0231-S, 30-0230-S (30-3221-1A/1B, Q0003-009); 30-0231-L (30-3221-1); 30-0232-D-10/D-20/D-10B/D-20B (Q0003-001/002); and the 924B Sump Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

30-0231-S, 30-0230-S (30-3221-1A/1B, Q0003-009)	unleaded gasoline E10	unleaded gasoline E15	unleaded gasoline E85
Lower detection limit (in)	0.803	0.995	0.942
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
30-0231-L (30-3221-1)			
Lower detection limit (in)	1.405	1.518	1.518
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
30-0232-D-10/D-20/D-10B/ D-20B (Q0003-001/002)			
Lower detection limit (in)	0.02	<0.125	<0.125
Detection time (min)	<9	<13.72	<13.72
Fall time (min)	<1	<1	<1
924B Sump Sensor			
Lower detection limit (in)	4.029	4.029	4.029
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1

Specificity Results:

Evaluator claims sensors will respond to any liquid.

Comments:

Manufacturer and evaluator claim sensors will respond to any liquid after the sensor's threshold is exceeded.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 5/31/11

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Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Petrosentry IV, Petrosentry VIII, SiteSentinel with Liquid Sensor, Universal Sump Sensor, Universal Reservoir Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type:	qualitative
Sampling frequency:	continuous
Operating principle:	thermal conductivity (Liquid Sensor), float switch (Universal Sump Sensor, Universal Reservoir Sensor)

Test Results:

Liquid Sensor	unleaded gasoline
Response time (min)	0.51
Recovery time (min)	<1
Product activation height (cm)	0.35
Lower detection limit (cm)	0.76
Universal Sump Sensor	
Response time (min)	8.32
Recovery time (min)	<1
Product activation height (cm)	3.37
Lower detection limit (cm)	3.97

Universal Reservoir Sensor	50% by weight ethylene glycol in water		30% by weight calcium chloride in water	
	high*	low*	high	low
Response time (min)	19.62	16.86	17.77	15.91
Recovery time (min)	<1	<1	<1	<1
Product activation height (cm)	20.9	5.90	20.5	5.95

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

Specificity Results (in addition to above for Liquid Sensor and Universal Sump Sensor):
Activated: diesel, synthetic gasoline, heating oil #2, water.

Comments:
Universal Reservoir Sensor is intended to monitor level of either ethylene glycol or calcium chloride solutions in the interstitial or annular space of a double-walled tank.
Universal Reservoir Sensor activates an alarm if any significant gain or loss of solution occurs.
Sensors are reusable.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 10/15/92

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Issue Date: November 7, 2001
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

SiteSentinel Controller with Combination Sensors
Part #30-3224 (Consists of Part #30-3221-1A, #30-3219-12),
Part #30-3225 (Consists of Part #30-3221-2, #30-3219-12)

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: float switch (part #30-3221-1A, #30-3221-2),
product permeable (part #30-3219-12)

Part #30-3224, Part #30-3225	unleaded gasoline	diesel
Detection time (min)	13.602	24.104
Fall time	*	**

* Sensor must be cleaned and dried when exposed to hydrocarbons.
** Sensor must be replaced or threshold needs to be reset when exposed to diesel.

Specificity Results:
Evaluator indicates that sensors respond only to hydrocarbons.

Comments:
Evaluator indicates that since each of the sensors use the same polymer material; the results can be applied to any sensor with this material.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 8/3/00

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Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

SiteSentinel Controller with Hydrocarbon Sensitive Polymer Cables
Part #30-3206, Part #30-3207-nn, Part #30-3210-nn, Part #30-3219-12

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable

Test Results:

Part #30-3206, Part #30-3207-nn*, Part #30-3210-nn***, Part #30-3219-12**	unleaded gasoline	diesel
Detection time (min)	13.602	24.104
Fall time (min)	*	**

* Sensor must be cleaned and dried when exposed to hydrocarbons.
** Sensor must be replaced or threshold needs to be reset when exposed to diesel.
*** "nn" denotes a variable length in feet.

Specificity Results:
Evaluator indicates that sensors respond only to hydrocarbons.

Comments:
Evaluator indicates that since each of the sensors use the same polymer material, the results can be applied to any sensor with this material.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Underwriters Laboratories, Inc.
Tel: (847) 272-8800
Date of Evaluation: 12/10/92
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 8/3/00

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OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

SiteSentinel Controller with Optical Sensor Part #30-3223

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: Optical (Part #30-3223)

Test Results:

	unleaded gasoline	diesel	water
Part #30-3223			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.571	0.561	0.592

Specificity Results:

Part #3223 works with any liquid.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 8/3/00

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Issue Date: November 7, 2001
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

SiteSentinel Controller with **Single Float**
Switches Part #30-3221-1, Part #30-3221-1A, Part #30-3221-1B
Brine Reservoir Sensor and Dual Float Sensor Part #30-3221-2

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

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

	unleaded gasoline	diesel	water
Part #30-3221-1			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	1.225	1.171	1.123
Part #30-3221-1A			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	1.513	1.487	1.375
Part #30-3221-1B			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.876	0.828	0.562
Part #30-3221-2 (Brine Reservoir Sensor)			
Detection time (sec)	-	-	<1
Fall time (sec)	-	-	<1
Low level alarm - Lower detection limit (in)	-	-	2.495
High level alarm - Lower detection limit (in)	-	-	10.389
Part #30-3221-2 (Dual Float Sensor)			
Detection time (sec)	-	-	<1
Fall time (sec)	-	-	<1
Low level alarm - Lower detection limit (in)	-	-	2.533
High level alarm - Lower detection limit (in)	-	-	10.492

Specificity Results:
Evaluator indicates that single float sensors work with any liquid.

Comments:
Evaluator indicates that Sensor Part #30-3221-2 can operate either as a brine reservoir sensor or a dual float sensor based on orientation of the lower float.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 8/3/00

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Issue Date: November 14, 1997
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Emco Electronics, Tuthill Transfer Systems)

EECO 1500, 2000, 3000, Leak Sensor, Leak Sensor II, Leak Sensor Jr. with Q0002-001, Q00002-005 Sensors

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: adsistor (Q0002-001sensor), metal oxide semiconductor (Q0002-005 sensor)

Test Results:

Q0002-001 Sensor	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Accuracy* (%)	100		100
Detection time* (min:sec)	19:32		09:16
Fall time* (hh:mm:ss)	00:32:30		>01:05:33
Lower detection limit (ppm)	1000		500
Q0002-005 Sensor			
Accuracy* (%)	100	100	100
Detection time* (min:sec)	00:30	00:28	01:01
Fall time* (min:sec)	03:34	02:40	05:33
Lower detection limit (ppm)	100	100	100

*For tests conducted with 1000 ppm of test gas.
** See Glossary

Specificity Results (in addition to above):
Activated: n-hexane, toluene, xylene(s).

Comments:
Q0002-001 sensor is not for use with synthetic gasoline.

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 11/12/96, 10/18/96

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Issue Date: November 22, 1995
Revision Date: October 18, 2002

OPW Fuel Management Systems
(originally listed as Petro Vend, Inc.)

Petrosentry TLD III, SiteSentinel Smart Module and Vapor Sensor

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: metal oxide semiconductor

Test Results:

Petrosentry TLD III	benzene	2-methylbutane
Detection time (sec)	5	16
Fall time (min:sec)	4:12	0:42
Lower detection limit (ppm)	12.5	12.5

SiteSentinel Smart Module and Vapor Sensor	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (sec)	5	7	10
Fall time (min:sec)	6:30	3:35	4:26
Lower detection limit (ppm)	10	10	10

Specificity Results (in addition to above for Petrosentry TLD III):
Activated: n-hexane, toluene, n-butane, isobutane, 2-methylpentane.

Specificity Results (in addition to above for SiteSentinal Smart Module and Vapor Sensor):
Activated: n-hexane, toluene, xylene(s).

Manufacturer's specifications:
Petrosentry TLD III maximum wire distance: 500 ft using 18 AWG

OPW Fuel Management Systems
6900 Santa Fe Dr.
Hodgkins, IL 60525-9909
Tel: (708) 485-4200
E-Mail: info@opwfms.com
URL: www.opwfms.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 03/26/91, 04/16/92

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PermAlert

LiquidWatch Leak Detection System LW64-IS with PHLR-LW and PHLR-P-LW Hydrocarbon Probes

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable, magnetic membrane switch

Test Results:

PHLR-LW and PHLR-P-LW Hydrocarbon Probes	unleaded gasoline
Response time (sec)	24
Recovery time (hour)	>16
Product activation height (mm)	2.0
Lower detection limit (mm)	3.9

Specificity Results (in addition to above):

Activated: diesel, jet fuel.
Not activated: water.

Comments:

Sensors are reusable.
"PHLR-LW" sensors are designed for operation in ambient pressure environments while "PHLR-P-LW" sensors are designed for operation in pressurized environments.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Trace Laboratories
Tel: (847) 934-5300
Date of Evaluation: 02/23/07

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Issue Date: June 17, 2008
Revision Date: May 21. 2014

PermAlert

PAL-AT Models AT20C, AT30C, AT50C, AT75C, AT20K, AT30K, AT40K, AT80K with PHLR-S/L and PHLR-P-S/L Hydrocarbon Probes

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable, magnetic membrane switch

Test Results:

PHLR-S/L and PHLR-P-S/L Hydrocarbon Probes	unleaded gasoline
Response time (sec)	24
Recovery time (hour)	>16
Product activation height (mm)	2.0
Lower detection limit (mm)	3.9

Specificity Results (in addition to above):
Activated: diesel, jet fuel.
Not activated: water.

Comments:
Sensors are reusable.
"PHLR-S/L" sensors are designed for operation in ambient pressure environments while "PHLR-P-S/L" sensors are designed for operation in pressurized environments.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Trace Laboratories
Tel: (847) 934-5300
Date of Evaluation: 02/23/07

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Issue Date: November 22, 1995
Revision Date: April 18, 1997

PermAlert

PAL-AT Models AT20C, AT50C, AT40K with PHL Hydrocarbon Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

	unleaded gasoline
Response time (min)	1.13
Recovery time (min)	8.83
Product activation height (cm)	0.53
Lower detection limit (cm)	0.38

Specificity Results (in addition to above):

Activated: synthetic gasoline, diesel, heating oil #2.
Not activated: water.

Comments:

Sensors are reusable.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 02/05/92

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

PermAlert

TankWatch Models PHM10, PHMS with Combination Hydrocarbon/Water Probe, Hydrocarbon Probe

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

Combination Hydrocarbon/Water Probe	unleaded gasoline	water
Response time (min)	0.30	<1
Recovery time (min)	1.97	1.68
Product activation height (cm)	0.18	0.80
Lower detection limit (cm)	0.56	1.93
Hydrocarbon Probe		
Response time (min)	0.25	
Recovery time (min)	2.33	
Product activation height (cm)	0.17	
Lower detection limit (cm)	0.38	

Specificity Results (in addition to above):
Activated: synthetic gasoline, diesel, heating oil #2.

Comments:
Sensors are reusable.
Hydrocarbon probe is not activated by water.
Hydrocarbon/water probe does not discriminate between gasoline and water.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 06/16/92

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

PermAlert

PAL-AT Models AT20C, AT50C, AT40K with AGW Sensor Cable, Hydrocarbon Sensor Cable — TFH

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: impedance change

Test Results:

	unleaded gasoline		
	1/3 MER*	**2/3 MER**	**MER**
AGW Sensor Cable	1348 ft	2644 ft	3982 ft
Response time (min)	9.92	6.25	21.28
Recovery time (min)	1.0	1.0	1.0
Product activation height (cm)	2.03	1.13	5.00
Detection length (cm)	116.3	64.8	286.1
Lower detection limits (cm)			
Product activation height	N/D*	N/D	5.1
Detection length	N/D	N/D	295.6
TFH Hydrocarbon Sensor Cable	1368 ft	2685 ft	4046 ft
Response time (min)	3.40	7.48	16.21
Product activation height (cm)	0.65	1.33	3.53
Detection length (cm)	27.7	56.8	150.4
Lower detection limits (cm)			
Product activation height	N/D	N/D	3.6
Detection length	N/D	N/D	152.9

* See glossary.

Specificity Results (in addition to above):
Activated: synthetic gasoline, diesel, heating oil #2, water (AGW Sensor Cable only).

Comments:
System can monitor interstitial spaces.
Evaluations also covered quantitative leak location.
AGW Sensor Cable is reusable.
TFH Hydrocarbon Sensor Cable is not reusable.
Lower detection limit is calculated at MER only.
Cable is assumed to be equally or more sensitive at shorter lengths.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 01/17/92, 02/11/92

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

PermAlert

PAL-AT Models AT20C, AT50C, AT40K with PHFW Hydrocarbon Probe and Type 1 or Type 2 Sensor

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product soluble

Test Results:

	unleaded gasoline	synthetic gasoline
Type 1 Sensor		
Detection time (sec)	24	9
Fall time	N/A*	N/A
Lower detection limit (cm)	0.01	0.01
Type 2 Sensor		
Detection time (min:sec)	14:39	08:45
Fall time	N/A	N/A
Lower detection limit (cm)	0.01	0.01

* See glossary.

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Manufacturer's specifications:
Operating temperature range is 0 degrees F to 90 degrees F.

Comments:
Sensors are not reusable; sensor filament must be replaced after contact with hydrocarbons.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 09/15/92

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PermAlert

PAL-AT Models AT30C, AT75C, AT30K with AGW-Gold Sensor Cable, Hydrocarbon Sensor Cable

TFH

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: impedance change

Test Results:

	unleaded gasoline		
	1/3 MER*	**2/3 MER**	**MER**
AGW-Gold Sensor Cable	2358 ft	4985 ft	7312 ft
Response time (sec)	29.17	141.67	91.17
Recovery time (sec)	35.17	32.50	13.50
Immersion length at alarm (ft)	6.17	15.00	23.17
Alarm Distance (ft)	2577.00	5011.00	7352.00
Detection accuracy (%)	100	100	100
TFH Hydrocarbon Sensor Cable	2356 ft	4878 ft	7306 ft
Response time (sec)	219.00	538.83	921
Recovery time (sec)	N/A	N/A	N/A
Immersion length at alarm (ft)	6.58	18.50	30.17
Alarm Distance (ft)	2372.00	4890.67	7351.50
Detection accuracy (%)	100	100	100

* See glossary.

Specificity Results (in addition to above):

Activated: synthetic gasoline, diesel, jet fuel, heating oil #2, water.

Comments:

System can monitor interstitial spaces.
AGW-Gold Sensor Cable is reusable.
TFH Hydrocarbon Sensor Cable is not reusable.
Cable is assumed to be equally or more sensitive at shorter lengths.
AGW-Gold Sensor Cable is distinguished from AGW Sensor Cable by a golden color braid wire and black polymer overbraid.

PermAlert
7720 N. Lehigh Ave.
Niles, IL 60714-3491
Tel: (847) 966-2235
Email: marketing@permalert.com
URL: www.permalert.com

Evaluator: Trace Laboratories
Tel: (847) 934-5000
Date of Evaluation: 01/24/13

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Issue Date: November 22, 1995
Revision Date: July 23, 2003

Phoenix Technologies Division of Phoenix Group
(formerly listed as Arizona Instrument Corp. and NESCO)

Encompass MTS IPAM #17-903
(Magnetostrictive Probe #17-9300)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.80% and PFA = 2.2%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 3 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 6 hours.
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 a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.29 inches.
Minimum detectable change in water level is 0.0034 inch.

Calibration RTDs 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. Encompass software provides for remote access capabilities.

Phoenix Technologies Division of Phoenix Group
2125 South 48th Street, Suite 106
Tempe, AZ 85282
Tel: (877) 890-3808
E-mail: sales@opsmart.net
URL: www.opsmart.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/22/94

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Issue Date: November 22, 1995
Revision Date: July 23, 2003

Phoenix Technologies Division of Phoenix Group
(formerly listed as Arizona Instrument Corp. and NESCO)

Encompass USF IPAM #17-901
(Ultrasonic Probe #17-9100)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.94% and PFA = 2.06%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 3 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 6 hours.
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 obtained by a single temperature sensor that measures change in ultrasonic wave velocity.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.86 inches.
Minimum detectable change in water level is 0.012 inch.

Calibration Temperature sensor 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.
Encompass software provides for remote access capabilities.

Phoenix Technologies Division of Phoenix Group
2125 South 48th Street, Suite 106
Tempe, AZ 85282
Tel: (877) 890-3808
E-mail: sales@opsmart.net
URL: www.opsmart.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/22/94

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PID Analyzers, LLC

Model 102 Photoionizer

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

Detector:

Output type: quantitative
Sampling frequency: intermittent
Operating principle: photoionization detector

Test Results:

Model 102	unleaded gasoline	Benzene	2-Methylbutane
Accuracy* (%) - average reading	85 (423 ppm)	112.8 (1125.2 ppm)	8.1 (78.2 ppm)
Detection time* (sec)	<120	11	12
Fall time* (sec)	<120	38	11
Lower detection limit (ppm)	Not Reported	2.1	5.8

*For tests conducted with 1000 ppm of test gas

Specificity Results (in addition to above):

Activated: n-butane, n-hexane, iso-butane, 3-methylpentane, toluene

PID Analyzers, LLC
25 Walpole Park South Drive
Walpole, MA 02081
Tel: (508) 660-5001

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/29/04

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PID Analyzers, LLC
(originally listed as HNU Systems, Inc.)

PI-101 with 11.7 EV Probe #101397, HW-101 with 11.7 EV Probe #170214, ISPI-101 with 10.2 EV Probe #111100, DL-101 with 10.2 EV Probe #167085

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

Detector:
Output type: quantitative
Sampling frequency: intermittent
Operating principle: photoionization detector

Test Results:

PI-101	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Accuracy* (%) - average reading	29.1 (730 ppm)	12.3 (884 ppm)	29.6 (737 ppm)
Detection time* (sec)	31	21	26
Fall time* (sec)	52	14	49
Lower detection limit (ppm)	14.2	11.7	29.7
HW-101			
Accuracy* (%) - average reading	12.6 (888 ppm)	8.5 (1076 ppm)	5.7 (953 ppm)
Detection time* (sec)	20	25	24
Fall time* (sec)	49	10	49
Lower detection limit (ppm)	31.8	21.1	26.8
ISPI-101			
Accuracy* (%) - average reading	63.6 (360 ppm)	59.1 (415 ppm)	70.8 (300 ppm)
Detection time* (sec)	20	21	35
Fall time* (sec)	40	10	37
Lower detection limit (ppm)	2.3	5.8	5.1
DL-101			
Accuracy* (%)	63.3	56.2	59.5
Detection time* (sec)	45	22	51
Fall time* (min:sec)	01:03	00:14	01:01
Lower detection limit (ppm)	11.0	5.8	5.0

*For tests conducted with 1000 ppm of test gas

Specificity Results (in addition to above):
Activated: n-hexane, toluene, xylene(s)

PID Analyzers, LLC
25 Walpole Park South Drive
Walpole, MA 02081
Tel: (508) 660-5001

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 02/5/92, 02/5/92, 03/5/92, 11/28/91

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Issue Date: August 23, 1999
Revision Date: March 10, 2000

Pneumercator Company, Inc.

TMS 2000, TMS 3000
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.0% and PFA = 5% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.8% and PFA = 0.2% for 4 hour test.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for 8 hour test.
Leak rate of 0.1 gph with PD = 95.3% and PFA = 4.7% for 7 hour test.
Leak rate of 0.1 gph with PD = 95.8% and PFA = 4.2% for 8 hour test.

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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be between 20 and 95% full.

Waiting Time
Minimum of 8 hours between delivery and testing.
Minimum of 20 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 7 hours for leak rate of 0.1 gph.
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.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/15/97

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Pneumercator Company, Inc.

TMS 2000, TMS 3000
(Patriot 7100 Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.3% and PFA = 2.7%.

Leak Threshold 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.

Tank Capacity Maximum of 75,000 gallons. Tank must be between 50 and 95% 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 8 hours.
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.
TMS 2000 and TMS 3000 controller are identical except that the TMS 3000 console has more input contacts.
The TMS 2000 can monitor up to 2 probes and 8 leak sensors while the TMS 3000 can monitor up to 12 probes and 40 leak sensors.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/30/01

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Issue Date: April 18, 1997
Revision Date: November 25, 2015

Pneumercator Company, Inc.

LC 1000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 2000, TMS 3000 with Level Sensor Models LS600AB, RSU800

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	unleaded gasoline	diesel	water
LS600AB			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	3.32	3.28	3.18
RSU800 (low level)			
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Lower detection limit (ppm)	2.57	2.53	2.31
RSU800 (high level)			
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Lower detection limit (ppm)	13.31	13.24	13.01

Specificity Results:

Manufacturer claims sensors will respond to any chemically-compatible liquid having a viscosity below 1500 cps, provided liquid does not have sticky or gummy properties.

Comments:

Sensors are reusable.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/22/96, 01/14/10
(Revised 03/02/01)

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Issue Date: April 18, 1997
Revision Date: November 25, 2015

Pneumercator Company, Inc.

LC 1000 Series, LC2000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 2000, TMS 2000W,TMS 3000 with Level Sensor Models LS600 Series, LS600LD Series, LS610

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	unleaded gasoline	diesel	water
LS600 Series			
Detection time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Fall time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Height to Alarm (in)	3.29	3.27	3.17
LS600LD Series			
Detection time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Fall time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Height to Alarm (in)	0.97	0.95	0.85
LS610			
Detection time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Fall time (sec)			
Wired Systems	<1	<1	<1
Wireless Systems	<65	<65	<65
Height to Alarm (in)	0.43	0.41	0.40

Specificity Results:
Manufacturer claims sensors will respond to any chemically-compatible liquid having a viscosity below 1500 cps, provided liquid does not have sticky or gummy properties.

Comments:
Sensors are reusable.
LS600 Series sensors consists of from one to four magnetic cylindrical floats mounted on a brass or stainless steel tube suspended into the top of a liquid storage tank. Each float actuates a switch when the liquid level rises or falls past the float. The LS600 Series sensor encompasses a family of 5 model configurations, LS600 (Standard Model), LS600M (Mini/Compact), LS600F4 (Heavy Duty, High Viscosity or Turbulence, Extended Length), LS600X (Submersible) and the LS600W (Oil/Water Separator). All models consist of one or more magnetic cylindrical or ball floats traveling on a brass, stainless steel, PVC, CPVC or PVDF stem, either mounted at the top of a liquid storage tank, or stabilized at the top while resting on the tank floor.

The LS600LD Series single-float leak sensor consists of 3 basic constructions, LS600LDBN(Buna-N Float, Brass Stem, Stainless Steel/Nylon Housing, PVC-Jacketed Cable), LS600LDSN(Buna-N Float, Stainless Steel Stem, Stainless Steel/Nylon Housing, PVC-Jacketed Cable) and LS600LDSS(Stainless Steel Float and Stem, Stainless Steel/PFA Housing, FEP-Jacketed Cable).

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/22/96, 01/14/10
(Revised 03/02/01)

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Pneumercator Company, Inc.

LC 1000 Series, LC 2000 Series, E-14-29, E-700-1, LDE-700, LDE-740, TMS 1000 Series, TMS 2000, TMS 2000W, TMS 3000 with Level Sensor Models RSU800, RSU810

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	brine		ethylene glycol		propylene glycol	
RSU800 Series Dual-Float	high	low	high	low	high	low
Detection time (sec)						
Wired Systems	<1		<1		<1	
Wireless Systems	<65		<65		<65	
Fall time (sec)						
Wired Systems	<1		<1		<1	
Wireless Systems	<65		<65		<65	
Height to Alarm (in)	13.017	1.901	13.122	2.033	13.298	2.055
RSU810 Single Float						
Detection time (sec)						
Wired Systems	<1		<1		<1	
Wireless Systems	<65		<65		<65	
Fall time (sec)						
Wired Systems	<1		<1		<1	
Wireless Systems	<65		<65		<65	
Height to Alarm (in)	0.608		0.638		0.654	

Specificity Results:

Manufacturer claims sensors will respond to any chemically-compatible liquid having a viscosity below 1500 cps, provided liquid does not have sticky or gummy properties.

Comments:

Sensors are reusable. RSU800 Series consists of normally open high-level and normally closed low-level alarms. The RSU800 is a wet annular tank reservoir leak sensor series consisting of two models. The RSU800-2 is dual-float with normally open high-level and normally closed low-level alarms. The RSU801F is single-float with normally open high-level and normally open low-level alarms, and additionally includes supervised wiring fault detection when used with any TMS series, LC2000 series or LC1000E series monitor panel.

RSU810 is a hydrostatic tank collar reservoir, and has normally closed low-level alarm.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/19/10

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Pneumercator Company, Inc.

LC 2000, TMS 2000, TMS 3000 with ES825-100F, 100XF, 100CF Non-Discriminating Liquid Sensors, ES825-200F, 200XF Discriminating Liquid Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: optical sensor, electrical conductivity

Test Results:

ES825-100F, 100XF, 100CF Non-Discriminating Liquid Sensors	unleaded gasoline	diesel	water
Detection time (sec)	1.4	2.1	1.1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.520	0.477	0.511
ES825-200F, 200XF Discriminating Liquid Sensors			
Detection time (sec)	1.6	2.7	2.3
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.401	0.365	0.416

Specificity Results:
Manufacturer claims sensors will respond to any liquid after sensor's threshold is exceeded.

Manufacturer's Specifications:
All the sensors are designed to connect to a controller system that indicates the status of the sensor. Manufacturer indicates that discriminating sensors ES 825-200F and 200XF incorporate an optical liquid sensor and a conductivity sensor. These sensors discriminate between product and water by determining if the optical sensor, which responds to any liquid, or the conductivity sensor, which responds only to water, causes an alarm.

Comments:
"F", "XF", and "CF" are variations of the same sensor distinguished by the matierial they are made of, such as PVC and Teflon.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/04/01, 01/14/10

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Issue Date: November 22, 1995
Revision Date: January 11, 2001

Pneumercator Company, Inc.

LDE 700, LDE 740, LDE 9000 with Sensor Probe Models 9-901, 9-902, 9-903

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: capacitance

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (sec)	<1	<1
Fall time	manual reset	manual reset
Lower detection limit (cm)		
9-901	0.32	0.36
9-902	0.36	0.34
9-903	0.76	0.74

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s), water.

Comments:
Sensors are reusable.
Capacitance probes do not work with oxygenated fuels.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/14/93

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Pneumercator Company, Inc.

TMS 1000, TMS 2000W (wireless) with ES825-300F, 300XF, 300CF Non-Discriminating Liquid Sensors, ES825-400F, 400XF Discriminating Liquid Sensors

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: optical sensor, electrical conductivity

Test Results:

ES825-300F, 300XF, 300CF Non-Discriminating Liquid Sensors	unleaded gasoline	diesel	water
TMS 1000 Series detection time (sec)	1.4	2.1	1.1
TMS 1000 Series fall time (sec)	<1	<1	<1
TMS 2000W Series detection time (sec)	65	65	65
TMS 2000W Series fall time (sec)	65	65	65
TMS 1000, TMS 2000W Series lower detection limit (in)	0.520	0.477	0.511
ES825-400F, 400XF Discriminating Liquid Sensors			
TMS 1000 Series detection time (sec)	1.6	2.6	2.3
TMS 1000 Series fall time (sec)	<1	<1	<1
TMS 2000W Series detection time (sec)	65	65	65
TMS 2000W Series fall time (sec)	65	65	65
TMS 1000, TMS 2000W Series lower detection limit (in)	0.401	0.365	0.416

Specificity Results:

Manufacturer claims sensors will respond to any liquid after sensor's threshold is exceeded.

Manufacturer's Specifications:

All sensors are designed to connect to a controller system that indicates the status of the sensor.
Manufacturer indicates that discriminating sensors ES 825-400F and 400XF incorporate an optical liquid sensor and a conductivity sensor.
The sensors discriminate between product and water by determining if the optical sensor, which responds to any liquid, or the conductivity sensor, which responds only to water, causes an alarm.

Comments:

"F", "XF", and "CF" are variations of the same sensor distinguished by the material they are made of, such as PVC and Teflon.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/14/10

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Pneumercator Company, Inc.

TMS 2000, TMS 3000 with Discriminating Liquid Sensor, ES820-100 Non-ES820-200 Discriminating Liquid Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: optical sensor

Test Results:

ES820-100			
Non-Discriminating Liquid Sensor	unleaded gasoline	diesel	water
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.35	0.34	0.35
ES820-200			
Discriminating Liquid Sensor			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.36	0.38	0.39

Specificity Results:

Manufacturer claims sensors will respond to any liquid.

Pneumercator Company, Inc.
1785 Expressway Drive North
Hauppauge, NY 11788
Tel: (800) 209-7858, (631) 293-8450 x112
E-mail: jlevy@pneumercator.com
UEL: www.pneumercator.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/22/96
(Revised 03/02/01)

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Issue Date: September 7, 2005
Revision Date: July 13, 2007

Praxair Services, Inc.

Tracer Tight For Large Aboveground Storage Tank Systems

ABOVEGROUND STORAGE TANK LEAK DETECTION METHOD

Certification	Leak rate of 0.1 gph with PD = 100% and PFA = 0%. Leak rate of 0.005 gph with PD = 97% and PFA = 2.9%. **The US EPA has not set a minimum detectable leak rate for aboveground storage tank systems at the time of this evaluation.**
Leak Threshold	A tank system should not be declared tight when tracer chemical greater than the background level is detected outside of the tank system.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, waste oil, crude oil.
Tank Capacity	Not limited by capacity.
Waiting Time	Ranges from 7 to 30 days after tracer is added to tank without support of on-site leak simulation. The waiting period may be adjusted below this range when supported by on-site leak simulations performed as described below.
Leak Simulations	The release of surrogate tracer into the soil beneath the tank to evaluate the migration of a tracer and the sensitivity of the test under on-site sub-surface conditions. Sub-surface conditions throughout the test area must be at least as favorable as those at the leak simulations location in order to use the results. This requirement may be satisfied by sampling the soil beneath the tank, and/or making flow/vacuum measurements from the sampling probes.
Tracer Dosage	Dosage of tracer is based on tank size, product volume in tank, and frequency and volume of tank refills according to manufacturer's recommendations.
Permeability	Soil permeability must readily allow tracer movement (greater than 1 Darcy). The permeability of the soil beneath the tank must be verified by the detection of a leak simulation tracer in a sample collected at least 13 feet from the release location.
Probe	Typical probe radius during evaluation was 10 to 12 feet. All tank surfaces must be within the zone of influence of a sampling probe. Probes must be installed per manufacturer's guidelines. Probe radius below an AST can be increased beyond the 10 foot limit when supported by a leak simulation as described above.
Groundwater	Depth to groundwater must be at least 2 inches below bottom of tank. Groundwater less than 2 inches below bottom of tank may limit effectiveness of test method.
Comments	Tester may determine that pre or post testing is needed to establish the background level of tracer in the soil. The presence of a layer of water saturated soil, or frozen soil, may inhibit the effectiveness of the method by impeding the transport of the tracer labeled product into the unsaturated zone. The system should be installed and operated in accordance with Praxair Services, Inc.'s "AST Testing Procedures" document.

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/04/90
Evaluator: Control Strategies Engineering (out of business)
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/92

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Issue Date: March 10, 2000
Revision Date: April 17, 2002

Praxair Services, Inc.
(originally listed as Tracer Research Corp.)

Tracer ALD 2000 Automated Tank Tightness Test

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

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

Leak Threshold A tank system should not be declared tight when tracer chemical or hydrocarbon greater than the background level is detected outside of the tank system.

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

Tank Capacity Not limited by capacity.

Waiting Time Ranges from 7 to 30 days (normally 2 weeks) after tracer is added to tank.

Tracer Dosage Tracer is added to tank manually at tank fill or automatically using a metered injection pump at pipeline flowing into tank.
Manual dosage of tracer is based on tank size, product volume in tank, and frequency and volume of tank refills according to manufacturer's recommendations.
Automated dosage at pipeline flowing into tank is based on pipeline size and flow rate.
All tanks and piping downstream of the injection point are dosed with tracer compound.

Permeability Soil permeability must readily allow tracer movement through the tank excavation backfill (greater than 1 Darcy).

Probe Radius of influence of each tracer sampling probe is maximum 10 feet.
All tank surfaces must be within the zone of influence of a sampling probe.
Probes must be installed per Manufacturer's guidelines.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
For test method to detect a release of tracer chemical below groundwater, the hydrostatic pressure of product in the tank must exceed the hydrostatic pressure of groundwater during test.
To accomplish this, product level must be maintained at least 6 inches above groundwater for a minimum of 17 hours during the first three days following addition of tracer to the tank.
At the discretion of the regulatory agency, water ingress measuring devices may be used to supplement test method in high groundwater conditions.

Comments The presence of a layer of water saturated soil, that is also frozen, above the location where a leak may exist, may inhibit the effectiveness of the method by impeding the transport of the tracer labeled product into the unsaturated zone.
Groundwater above bottom of tank may limit effectiveness of test method (e.g. when applied to tanks containing water-miscible products or products whose specific gravity is greater than 1).
Test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank and retard tracer movement through the soil.
Third party evaluation of the ALD 2000 System tested the device's ability to collect a sample, transport sample through 2700 feet of 3/32 inch tubing, and analyze sample.
Sample collection, analysis, data storage, and alarm activation is controlled by system's computer.
Prior evaluations tested PD, PFA, leak threshold, dose, tracer movement through soil, and waiting times.

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/04/90, 06/19/99
Evaluator: Control Strategies Engineering (out of business)
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/92

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Issue Date: October 13, 2006
Revision Date: July 13, 2007

Praxair Services, Inc.

SeeperTrace™

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.1 gph with PD = >99% and PFA = <1%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
A pipeline system should not be declared tight when a confirmable level of chemical tracer in the sample collected exceeds the background level.

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

Pipeline Capacity
Not limited by capacity.
Pipeline segments up to 1500 feet in length may be covered by an individual test sample collected continuously along this length.

Waiting Time
Ranges from 1 to 6 days after tracer is added to the product in the pipeline.
All releases at a depth of 5 feet in non-engineered backfill were detected within 1 day after the start of the test. All releases at a depth of 10 feet were detectable 6 days after the start of the test.
Leak simulations conducted at the depth of the pipeline can be used to validate test parameters such as soil permeability and waiting period.
For very large pipeline systems, several days or weeks may be required to circulate tracer-labeled product through all parts of the pipeline.
Waiting time begins after the tracer has reached the portions of the pipeline being tested.

Leak Simulations
Leak simulations are the release of surrogate tracer into the soil or backfill at the depth of the pipeline to evaluate the migration of a tracer and the sensitivity of the test under on-site sub-surface conditions. Sub-surface conditions throughout the test area must be at least as favorable as those at the leak simulation location in order to use the results.

Tracer Dosage
Dosage of tracer is based on pipe capacity and frequency and volume of pipe use according to manufacturer's recommendations.
Tracer-labeled product must be circulated through the pipeline before test period begins.
Pressurized pipeline must be brought up to operating pressure or operated on a daily basis.

System Features
Pipeline must be accurately located to ensure that sampling activity is within the zone of influence of the tracer.
Sampling is conducted using a small metal sled that is pulled on the ground above the pipeline being tested.

Comments
The tester may determine that pre or post testing is needed to establish the background level of tracer in the soil.
Due to the vapors being collected at the surface, testing can be affected by extreme windy conditions. High winds will generally cause a reduction in the amount of tracer from a release that is collected in the test sample.
The presence of a layer of water saturated soil, that is also frozen, above the location where a leak may exist, may impede the transport of the tracer labeled product into the sampling zone.
Groundwater surrounding the pipeline may limit effectiveness of test method (e.g. when applied to pipelines containing water-miscible products or products whose specific gravity is greater than 1).
Leak simulations performed at the depth of the pipeline along sections of the pipeline below the water table or below saturated, frozen soil allow for validation of the method in these conditions.

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/20/02

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Issue Date: March 10, 2000
Revision Date: December 4, 2002

Praxair Services, Inc.
(originally listed as Tracer Research Corp.)

Tracer ALD 2000 Automated Line Tightness Test

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold
A pipeline system should not be declared tight when tracer chemical or hydrocarbon greater than the background level is detected outside of the pipeline system.

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

Pipeline Capacity
Not limited by capacity.

Waiting Time
Ranges from 1 week to 4 weeks (normally 2 weeks) after tracer is added to tank.
For very large pipeline systems, several days or weeks may be required to circulate tracer-labeled product through all parts of the pipeline.
Waiting time begins after tracer has reached all portions of the pipeline being tested.

Tracer Dosage
Tracer is added to tank manually or automatically using a metered injection pump at tank fill or tank discharge pipeline.
Tracer-labeled product must be circulated through pipeline before test period begins.
Pressurized pipeline must be brought up to operating pressure or operated on a daily basis.
Manual dosage of tracer is based on tank size, product volume in tank, and frequency and volume of tank refills according to manufacturer's recommendations.
Automated pipeline injection uses metered injection pumps to automatically inject tracer every time product flows through pipeline.
Dosage is based on pipeline size and flow rate.

Permeability
Soil permeability must readily allow tracer movement through the tank excavation backfill (greater than 1 Darcy).

Probe
Radius of influence of each tracer sampling probe is maximum 10 feet.
Pipeline must be accurately located to ensure that all pipeline surfaces are within the zone of influence of a sampling probe.
Probes must be installed per manufacturer's guidelines.

Comments
The presence of a layer of water saturated soil, that is also frozen, above the location where a leak may exist, may inhibit the effectiveness of the method by impeding the transport of the tracer labeled product into the unsaturated zone.
Groundwater surrounding pipeline may limit effectiveness of test method (e.g. when applied to pipelines containing water-miscible products or products whose specific gravity is greater than 1).
Test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in pipeline and retard tracer movement through the soil.
Third party evaluation of the ALD 2000 System tested the device's ability to collect a sample, transport sample through 2700 feet of 3/32 inch tubing, and analyze sample.
Sample collection, analysis, data storage, and alarm activation is controlled by system's computer.
Prior evaluations tested PD, PFA, leak threshold, dose, tracer movement through soil, and waiting times.

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/04/90, 06/19/99
Evaluator: Control Strategies Engineering (out of business)
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/92

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Issue Date: November 22, 1995
Revision Date: October 2, 2003

Praxair Services, Inc.
(originally listed as Tracer Research Corp.)

Tracer Tight Line Test

LINE TIGHTNESS TEST METHOD

Certification
Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak rate of 0.005 gph with PD = 97% and PFA = 2.9%.

Leak Threshold
A pipeline system should not be declared tight when tracer chemical greater than the background level is detected outside of the pipeline.

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

Pipeline Capacity
Not limited by capacity.

Waiting Time
Ranges from 7 to 30 days after tracer is added to tank without support of on-site simulation.
The waiting period may be adjusted below this range when supported by on-site leak simulations performed as described below.
For very large pipeline systems, several days or weeks may be required to circulate tracer-labeled product through all parts of the pipeline.
Waiting time begins after tracer has reached all portions of the pipeline being tested.

Leak Simulations
The release of surrogate tracer into the soil or backfill to evaluate the migration of a tracer and the sensitivity of the test under on-site sub-surface conditions. Sub-surface conditions throughout the test area must be at least as favorable as those at the leak simulations location in order to use the results. This requirement may be satisfied by sampling the backfill material, and/or making flow/vacuum measurements from the sampling probes.

Tracer Dosage
Dosage of tracer is based on tank size, product volume in tank, and frequency and volume of tank refills according to manufacturer's recommendations.
Tracer-labeled product must be circulated through the pipeline before test period begins.
Pressurized pipeline must be brought up to operating pressure or operated on a daily basis.

Permeability
Soil permeability must readily allow tracer movement through the tank excavation backfill (greater than 1 Darcy).

Probe
Radius of influence of each tracer sampling probe is maximum 10 feet.
Pipeline must be accurately located to ensure that all pipeline surfaces are within the zone of influence of a sampling probe.
Probes must be installed per manufacturer's guidelines.
Horizontal sampling probes may be installed in manufactured backfill during the installation of a new UST system. These probes must be installed per manufacturer's guidelines.

Comments
The tester may determine that pre or post testing is needed to establish the background level of tracer in the soil.
The presence of a layer of water saturated soil, that is also frozen, above the location where a leak may exist, may inhibit the effectiveness of the method by impeding the transport of the tracer labeled product into the unsaturated zone.
Groundwater surrounding pipeline may limit effectiveness of test method (e.g. when applied to pipelines containing water-miscible products or products whose specific gravity is greater than 1).

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/04/90
Evaluator: Control Strategies Engineering (out of business)
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/92

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Issue Date: November 22, 1995
Revision Date: October 2, 2003

Praxair Services, Inc.
(originally listed as Tracer Research Corp.)

Tracer Tight

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (TRACER)

Certification
Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak rate of 0.005 gph with PD = 97% and PFA = 2.9%.

Leak Threshold
A tank system should not be declared tight when tracer chemical greater than the background level is detected outside of the tank system.

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

Tank Capacity
Not limited by capacity.

Waiting Time
Ranges from 7 to 30 days after tracer is added to tank without support of on-site leak simulation.
The waiting period may be adjusted below this range when supported by on-site leak simulations performed as described below.

Leak Simulations
The release of surrogate tracer into the soil or backfill to evaluate the migration of a tracer and the sensitivity of the test under on-site sub-surface conditions. Sub-surface conditions throughout the test area must be at least as favorable as those at the leak simulations location in order to use the results. This requirement may be satisfied by sampling the backfill material, and/or making flow/vacuum measurements from the sampling probes.

Tracer Dosage
Dosage of tracer is based on tank size, product volume in tank, and frequency and volume of tank refills according to manufacturer's recommendations.

Permeability
Soil permeability must readily allow tracer movement through the tank excavation backfill (greater than 1 Darcy).

Probe
Radius of influence of each tracer sampling probe is maximum 10 feet.
All tank surfaces must be within the zone of influence of a sampling probe.
Probes must be installed per manufacturer's guidelines.
Horizontal sampling probes may be installed in manufactured backfill during the installation of a new UST system. These probes must be installed per manufacturer's guidelines.

Groundwater
Depth to groundwater in tank excavation backfill must be determined.
For test method to detect a release of tracer chemical below groundwater, the hydrostatic pressure of product in the tank must exceed the hydrostatic pressure of groundwater during test.
To accomplish this, product level must be maintained at least 6 inches above groundwater for a minimum 17 hours during the first three days following addition of tracer to the tank.
At the discretion of the regulatory agency, water ingress measuring devices may be used to supplement test method in high groundwater conditions.

Comments
The tester may determine that pre or post testing is needed to establish the background level of tracer in the soil.
The presence of a layer of water saturated soil, that is also frozen, above the location where a leak may exist, may inhibit the effectiveness of the method by impeding the transport of the tracer labeled product into the unsaturated zone.
Groundwater above bottom of tank may limit effectiveness of test method (e.g. when applied to tanks containing water-miscible products or products whose specific gravity is greater than 1).

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/04/90
Evaluator: Control Strategies Engineering (out of business)
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/92

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Praxair Services, Inc.
(originally listed as Tracer Research Corp.)

Tracer Tight

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

Detector:
Output type: quantitative
Sampling frequency: intermittent
Operating principle: chromatographic (looks for chemical tracer)

Test Results:

Hydrocarbon Detector (GC/FID)	xylene	benzene	2-methylbutane	unleaded gasoline	chemical tracers
Accuracy (%)	<20	<20	<20	<20	N/R*
Bias (%)	0	0	0	0	N/R
Detection time (sec)	<1	<1	<1	<1	N/R
Fall time (sec)	<1	<1	<1	<1	N/R
Lower detection limit (ppm)	20	20	20	20	N/R
Tracer Detector					
Accuracy (%)	N/R	N/R	N/R	N/R	<20
Bias (%)	N/R	N/R	N/R	N/R	0
Detection time (sec)	N/R	N/R	N/R	N/R	<1
Fall time (sec)	N/R	N/R	N/R	N/R	<1
Lower detection limit (ppm)	N/R	N/R	N/R	N/R	10^{-5}

* See glossary.

Manufacturer's specifications:
Soil permeability at the site must exceed 1 Darcy.

Comments:
System utilizes a chromatographic measurement of a vapor sample collected monthly from the site. Hydrocarbon vapors and the added chemical tracer can be measured independently.
During evaluations, the tracer chemical was declared 159 out of 161 trials.
System evaluation included detectors, analytical procedures, sample containers, sampling procedures, sampling system, monitoring well materials and installations, and tracer mobility.

Praxair Services, Inc.
3755 N. Business Center Dr.
Tucson, AZ 85705
Tel: (800) 394-9929
E-mail: info@praxair.com
URL: www.praxairservices.com

Evaluator: Control Strategies Engineering out of business
out of business
Tel: Contact Praxair Services, Inc.
Date of Evaluation: 05/05/92

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Preferred Utilities Manufacturing Corporation

PWCN4-CDXRxxx Controller, RBS Non-Discriminating Sensors for Sumps and Containments; PS-LDS Non-Discriminating Sensor for Sumps and Containments; PLS Non-Discriminating Sensor for Reservoirs

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Non-Discriminating Sensors	diesel	water
RBS Rupture Basin Switch (Sumps and Containments)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (in)	1.411	1.120
PS-LDS Pump Set Leak Detector Switch (Sumps and Containments)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (in)	1.267	1.255
PLS Liquid Level Switch (Reservoirs – High and Low level floats – up to six floats)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (in)	2.443	2.220

Comments:

Control panel models: PWCN4-CDXRxxx for liquid level sensors;
Can be used in normally open or closed positions, and wired to alarm or to shut down equipment.
Minimum Specific Gravity: RBS=0.65, PS-LDS=0.75; PLS=0.5

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.co
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/20/09

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Preferred Utilities Manufacturing Corporation

TG-EL-D3 Controller with HD-A1 Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, discriminating
Sampling frequency: continuous
Operating principle: optical sensor, electrical conductivity

Test Results:

HD-A1	unleaded gasoline	diesel	water
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (in)	0.179	0.162	0.190

Specificity Results:

Manufacturer claims the sensor responds to any liquid after the sensor's threshold is exceeded. The sensor display on the controller indicates whether product is oil or water. No additional liquids tested.

Manufacturer's Specifications:

Manufacturer states that the HD-A1 leak sensor used with the TG-EL-D3 controller and a tank level sensor (TG-EL-LF, TG-EL-VF, or TG-EL-WF) is a system that is generally applied to oil tanks for boilers and emergency generators.

Comments:

This system is NOT sold for retail gasoline station applications.

Manufacturer recommends a periodic test for the system by the user. The test entails placing a magnet near the HD-A1 transmitter/sensor. When the magnetic "Test Switch" is activated, it simulates an oil leak. This completely tests the wiring to the sensor, the optical detector, the HD-A1 transmitter electronics, and the controller.

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.com
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/12/00

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Preferred Utilities Manufacturing Corporation

TG-EL-D4A Fuel Sentry Control Unit, HD-A2-C Optical Discriminating Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: optical sensor

Test Results:

	unleaded gasoline	diesel*	water
Detection time (sec)	<5	<5	<5
Fall time (sec)	<5	<5	<5
Lower detection limit (in)	0.125	0.125	0.125

Comments:

Control panel: Six intrinsically safe sensor inputs can be used for level indication and/or leak detection. Provides audible and visual alarms.

Sensor: Primarily designed for use with diesel fuel and other distillates but can be used with other fluids - see manufacturer for specific limitations.

*This evaluation determined the 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.

Used to detect the presence of liquids in fiberglass and steel tank annular spaces or the presence of liquids in tank vault spaces.

Can also be used for detection of leaks into sumps or other containment vessels used to collect liquids.

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.com
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/17/10

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Issue Date: March 11, 2011

Preferred Utilities Manufacturing Corporation

TG-EL-D4A Fuel Sentry Control Unit, PLS-1 Non-Discriminating Sensor for Reservoirs

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

Detector:

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

Test Results:

PLS Liquid Level Switch (Reservoirs)	unleaded gasoline	diesel*	water
Detection time (sec)	<5	<5	<5
Fall time (sec)	<5	<5	<5
Lower detection limit (in)	2.603	2.668	2.283

Comments:

Control panel: Six intrinsically safe sensor inputs can be used for level indication and/or leak detection. Provides audible and visual alarms.
Sensor: Primarily designed for use with diesel fuel and other distillates but can be used with other fluids- see manufacturer for specific limitations.
*This evaluation determined the 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.
Provides up to six independent liquid level switches on one sealed probe up to 72 inches length.
May be used with any clean, low viscosity, non adhering fluid compatible with brass, solder, epoxy and Buna-N.
Used on fuel oil day tanks to control the addition of oil from remote pumps and alarm at high and low levels.
Can also be used for detection of leaks into sumps or other containment vessels used to collect liquids containment pipeline leaks or other types of sump.

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.com
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/17/10

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Preferred Utilities Manufacturing Corporation

TG-EL-D4A Fuel Sentry Control Unit, PS-LDS Non-Discriminating Pump Set Leak Detector Switch

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

Detector:

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

Test Results:

PS-LDS Pump Set Leak Detector Switch (Sumps and Containments)	unleaded gasoline	diesel*	water
Detection time (sec)	did not float	<5	<5
Fall time (sec)	did not float	<5	<1
Lower detection limit (in)	did not float	1.332	1.187

Comments:

Control panel: Six intrinsically safe sensor inputs can be used for level indication and/or leak detection. Provides audible and visual alarms.

Sensor:

Primarily designed for use with diesel fuel and other distillates but can be used with other fluids - see manufacturer for specific limitations.

*This evaluation determined the 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.

Detects leakage into the base pan of a pump set.

All stainless steel.

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.com
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/17/10

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Preferred Utilities Manufacturing Corporation

TG-EL-D4A Fuel Sentry Control Unit, RBS Non-Discriminating Sensor for Sumps and Containments

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

Detector:

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

Test Results:

RBS Rupture Basin Switch (Sumps and Containments)	unleaded gasoline	diesel*	water
Detection time (sec)	<5	<5	<5
Fall time (sec)	<5	<5	<1
Lower detection limit (in)	1.584	1.522	1.446

Comments:

Control panel: Six intrinsically safe sensor inputs can be used for level indication and/or leak detection. Provides audible and visual alarms.

Sensor: Primarily designed for use with diesel fuel and other distillates but can be used with other fluids- see mfg. for specific limitations.

*This evaluation determined the 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.

Detects leakage into day tank rupture basins and double wall piping leak containment systems containing diesel or distillate fuel oils.

Horizontally mounted switch has redundant vapor and fluid sealing provisions, level float operated and magnetically activated.

Preferred Utilities Manufacturing Corporation
31-35 South Street
Danbury, CT 06810
Tel: (203) 743-6741
E-Mail: DCosgrove@preferred-mfg.com
URL: www.preferred-mfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/17/10

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ProTank, Inc.

LTH-5000 Line Tester

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.8% and PFA = 1.3%.

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

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed from pipeline for duration of test.

Pipeline Capacity Maximum of 40 gallons.

Waiting Time None between delivery and testing.
Minimum of 1 hour between dispensing and testing.

Test Period Minimum of 10 minutes.
Repeat 10 minute cycles are necessary if data does not meet the manufacturer's criteria.
Test data are acquired and recorded manually.
Manual calculations are performed by operator on site.

Calibration Sensors must be calibrated in accordance with manufacturer's instructions before each test.

ProTank, Inc.
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 02/14/91

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: April 18, 1997
Revision Date: November 6, 1997

ProTank, Inc.

LTP-5000 Line Tester

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.0% and PFA = 0.1%.

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

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed from pipeline for duration of test.

Pipeline Capacity Maximum of 41 gallons.

Waiting Time None between delivery and testing.
Minimum of 1 hour between dispensing and testing.

Test Period Minimum of 1 hour.
Pipe deflection, vapor pockets, and large temperature differences may produce inconsistent readings.
Testing to continue until stable conditions are present.
Test data are acquired and recorded manually.
Manual calculations are performed by operator on site.

Calibration Sensors must be calibrated in accordance with manufacturer's instructions before each test.

ProTank, Inc.
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 08/30/91

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Issue Date: April 18, 1997
Revision Date: December 6, 2002

ProTank, Inc.

UTA-5000 Ullage Tester
(Vacuum or Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is pressurized or evacuated.

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

Tank Capacity Maximum ullage volume is 16,500 gallons.

Waiting Time None between delivery and testing

Test Period A few minutes to determine background noise and a leak.
Depends on background noise at the site and on the size of the leak.
After the desired pressure has been reached, the tank should be allowed to settle for 10 minutes.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 1 psi must be maintained in ullage by a vacuum blower, or total pressure at bottom of tank of 4 psi must be maintained using nitrogen.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above product level, vacuum test should not be used.
Pressure test may only be used if net pressure can be maintained at a minimum 1 psi throughout ullage during test. If this requires more than 5 psi total pressure at tank bottom, the ullage test must not be used.

Comments Not evaluated using manifolded tank systems.
Evaluated using diesel. Tests only ullage portion of the tank.
Product-filled portion of tank must be tested with an underfill test method.
Microphone was 25 feet away from the leak source during evaluation.
If background noise is too high, test is inconclusive.
Noise signals are tape recorded (not digitally recorded).
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

ProTank, Inc.
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/15/93

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Issue Date: April 18, 1997
Revision Date: December 6, 2002

ProTank, Inc.

UTF-5000 Ullage Tester
(Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification Leak rate of 0.1 gph with PD = 95.24% and PFA = 0%.

Leak Threshold A tank system should not be declared tight when the make-up gas flow rate into ullage equals or exceeds 0.275 cubic feet/hour.

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

Tank Capacity Maximum ullage volume is 7,500 gallons.

Waiting time Minimum of 2 hours between delivery and testing.

Test Period Minimum of 20 minutes, consisting of 2 consecutive 10-minute test periods.
Test data are acquired and recorded manually.
There must be no dispensing or delivery during test.

Test Pressure Pressure must be increased in ullage such that total pressure at bottom of tank does not exceed 5.0 psi.
Pressure must be maintained for a minimum of 5 minutes per 1,000 gallons of ullage.
At conclusion of this stabilization period, ullage pressure must be reduced by 0.5 psi for remainder of test.

Temperature Ullage must be monitored for rate of temperature change, which must not exceed manufacturer's tabulated values.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above product level, net pressure must exceed 1 psi in the ullage during test.
If this requires more than 5 psi total pressure at tank bottom, the ullage test must not be used.

Comments Not evaluated using manifolded tank systems.
Evaluated using diesel. Tests only ullage portion of tank.
Product-filled portion of tank must be tested using a volumetric underfill test method.

ProTank, Inc.
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 12/04/92

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ProTank, Inc.

UTFP-5000 Ullage Tester
(Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification	Leak rate of 0.1 gph with PD = 95.24% and PFA = 0%.
Leak Threshold	A tank system should not be declared tight when the pressure decay trend equals or exceeds ± 0.016 psi/hr.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Tank Capacity	Maximum ullage volume is 10,260 gallons.
Waiting time	Minimum of 2 hours between delivery and testing.
Test Period	Minimum of 30 minutes (after data trend has been established). There must be no dispensing or delivery during test.
Test Pressure	Total pressure of 4.0 psi must be applied at bottom of tank.
Temperature	Ullage must be monitored during test, and a correction factor is applied to account for temperature changes. If ullage temperature changes exceed 5 degrees F, test must not be conducted.
Groundwater	Depth to groundwater in tank excavation backfill must be determined. If groundwater is above product level, net pressure must be maintained at a minimum of 1 psi in the ullage during test.
Comments	Not evaluated using manifolded tank systems. Evaluated using diesel. Tests only ullage portion of tank. Product-filled portion of tank must be tested using a volumetric underfill test method.

ProTank, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: ADA Technologies, Inc.
Tel: (303) 792-5615
Date of Evaluation: 04/10/92

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ProTank, Inc.

Fast Test
(Underfill Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

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

Leak Threshold A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is evacuated.

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

Tank Capacity Maximum product volume of 30,000 gallons.
Tank product level must be between 7 and 86 inches.

Waiting Time None between delivery and testing

Test Period A few minutes to determine background noise and a leak.
Depends on background noise at the site and on size of leak.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 0.5 psi beyond the vacuum required to overcome the tank bottom pressure must be maintained in ullage by a vacuum blower.
Net vacuum applied = 0.5 psi + [inches of product level x the specific gravity of product x 0.036].

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above the tank bottom, this test system may not be used.

Comments Not evaluated using manifolded tank systems.
Evaluated using diesel. Tests only portion of tank containing product.
Ullage portion of tank must be tested with an ullage test method.
Microphone was 25 feet away from the leak source during evaluation.
If background noise is too high, test is inconclusive.
Noise signals are tape recorded (not digitally recorded).
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test. A well point in tank excavation backfill may help identify presence of this condition.

ProTank, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/25/96

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Issue Date: April 18, 1997
Revision Date: November 21, 2002

ProTank, Inc.

VU-5000 Underfill Tester

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 18,000 gallons.
Minimum product level required is 24 inches.

Waiting Time Must be long enough between delivery and testing to ensure a temperature change of less than 0.09 degrees F per hour, typically a minimum of 2 hours.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average over data window.
There must be no dispensing or delivery during test.

Temperature Average for product is typically determined by 5 thermistors.
A minimum of 1 thermistor is required.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test.

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

Comments Not evaluated using manifolded tank systems.
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.

ProTank, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/15/93

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ProTank, Inc.

VUP-5000 Underfill Tester

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.005%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 18,000 gallons.
Tank must be between 11 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by temperature sensor probes.
A minimum 12 inches of product must be present for the temperature probes to operate properly.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted during test to provide a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Temperature probes and floats must be checked for proper operation prior to each test.

Comments Not evaluated using manifolded tank systems.
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.

ProTank, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: ADA Technologies
Tel: (303) 792-5615
Date of Evaluation: 09/09/92

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: February 6, 2015

Purpora Engineering, Inc.
(originally listed by Alert Technologies, Inc.)

Alert Model 2000 In-Tank Mass Measurement Probe System
(Mass Buoyancy Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.4% and PFA = 4.6% (calculated based on a 1-hour test).

Leak Threshold 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, waste oil.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 15 hours between delivery and testing.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours.
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 Product measurement not required.
System measures product mass (which is not affected by temperature) instead of product volume.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.175 inch (0.27 inch for waste oil).
Minimum detectable change in water level is 0.088 inch (0.031 inch for waste oil).

Calibration Mass measurement probe and water sensor 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.
System is battery operated and does not automatically generate a hard copy of the leak test result. However, a hard copy of the results can be obtained by transfer of data to another unit (see manufacturer's instructions for further details).
System is not equipped with any alarms (e.g. high water alarm, or failed leak test alarm).
The manufacturer does not support test results if the technician does not hold a current Alert Technologies certification when the test is performed. Recertification is required by the manufacturer every two years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 03/11/91

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Issue Date: November 22, 1995
Revision Date: April 11, 2011

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Tite Line Tester

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.34%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Vendor claims this equipment can detect leaks at .01 gph, and trains operators to declare leaks at .01 gph.

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

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

Pipeline Capacity Maximum of 129 gallons.

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

Test Period Minimum of 30 minute (two 15 minute readings) test when the detected leak does not exceed 0.005 gph, or minimum of 1 hour (four 15 minute readings) test when the detected leak is more than 0.005 gph for the first 30 minutes.
Test data are acquired and recorded manually.

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

Comments The manufacturer does not support test results if the technician does not hold a current Petro-Tite certification when the test was performed. Re-certification is required by the manufacturer every 2 years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/11/91, 05/06/01

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Issue Date: March 10, 2000
Revision Date: April 11, 2011

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Tite Line Tester
(for Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.37%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Vendor claims this equipment can detect leaks at .01 gph, and trains operators to declare leaks at .01 gph.

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

Specification System tests flexible pipelines.
Tests are conducted at 60 psi.
Mechanical line leak detectors shall be removed or manually isolated from the pipeline for duration of the test, or check valve in pump must be manually closed if testing is to be conducted with mechanical line leak detector in place.

Pipeline Capacity Maximum of 49.6 gallons.

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

Test Period Minimum of 30 minute (two 15 minute readings) test when the detected leak does not exceed 0.005 gph, or minimum of 1 hour (four 15 minute readings) test when the detected leak is more than 0.005 gph for the first 30 minutes. Test data are acquired and recorded manually.

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

Comments The manufacturer does not support test results if the technician does not hold a current Petro-Tite certification when the test was performed. Re-certification is required by the manufacturer every 2 years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 3/11/91, 12/07/94, 05/06/01

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Purpora Engineering, Inc.

Alert 8200 Series Sonde

NON-VOLUMETRIC TANK TIGNTNESS TEST METHOD (VACUUM)

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

Leak Threshold A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under vacuum) to the background signal (prior to evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band.

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

Tank Capacity Maximum of 30,000 gallons.

Waiting Time None between delivery and testing.

Test Period 2 minutes reference plus 2 minutes test.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Test Pressure Minimum of -0.5 psi to a maximum of -2 psi.

Temperature Acoustic/ultrasonic and background signals are independent of product temperature.

Groundwater Groundwater level in tank excavation backfill must be determined by observation well or soil probe in tank excavation backfill.
If groundwater level in tank excavation backfill is above bottom of tank or the groundwater level in the tank excavation backfill has not been determined, this method cannot be used.

Comments Method can also be used on double wall tanks to test the primary tank where a dry interstice is present.
Microphone was 25 ft away from leak source during evaluation.
Although not tested on completely empty tanks, a third party acoustics specialist has certified the device is equally effective when tanks are empty as when tanks contain product.
Test may be inconclusive if there is high background noise.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
More than 4 psi pressure differential across the tank wall at any location in the tank could damage tank.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/19/13

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Purpora Engineering, Inc.

Alert 8200 Series Sonde Ullage

NON-VOLUMETRIC TANK TIGNTNESS TEST METHOD (ULLAGE)

Certification	Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak Threshold	A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under pressure or vacuum) to the background signal (prior to pressurization or evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, waste oil.
Tank Capacity	Maximum ullage volume of 30,000 gallons.
Waiting Time	None between delivery and testing if test is conducted after an underfill tank tightness test.
Test Period	Minimum of 5 minutes. Test data are acquired and recorded by system's computer. There must be no dispensing or delivery during test.
Test Pressure	Net pressure of 2 psi or vacuum of 1.5 psi must be maintained in ullage. Pressure or vacuum must be maintained in the tank with a loss of less than 0.4 psi.
Temperature	Acoustic/ultrasonic and background signals are independent of product temperature.
Groundwater	Depth to groundwater in tank excavation backfill must be determined, in order to correctly calculate pressure/vacuum levels.
Comments	Manifolded tank systems must be isolated prior to test. Tests only ullage portion of tank. Product-filled portion of tank must be tested using an underfill test method. Vibration due to nearby equipment or dripping condensation may interfere with test. Microphone was located 25 feet away from leak source during evaluation. Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank. If soil is saturated with product, air or water ingress may not be detected by vacuum test. A well point in the tank excavation backfill may help identify presence of this condition.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/19/13

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Issue Date: November 22, 1995
Revision Date: February 6, 2015

Purpora Engineering, Inc.
(originally listed by Alert Technologies, Inc.)

Alert Ullage System Model 1050
(Pressure and Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under pressure or vacuum) to the background signal (prior to pressurization or evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band.

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

Tank Capacity Maximum ullage volume is 6,000 gallons.

Waiting time None between delivery and testing if test is conducted after an underfilled tank tightness test.

Test Period Minimum of 5 minutes.
Test data are acquired and recorded by system' computer.
There must be no dispensing or delivery during test.

Test Pressure Net pressure of 1.5 psi or vacuum of 1.0 psi must be maintained in ullage.
Pressure or vacuum must be maintained in the tank with a loss of less than 0.4 psi.

Temperature Ultrasonic and background signals are independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is present outside ullage, vacuum test in ullage must not be used.
Pressure test must be conducted using a net pressure of 1.5 psi in the ullage.

Calibration System must be calibrated before each test.

Comments Manifolded tank systems must be isolated prior to test.
Evaluated using unleaded gasoline.
Tests only ullage portion of tank.
Product-filled portion of tank must be tested using an underfill test method.
Vibration due to nearby equipment or dripping condensation may interfere with test.
Microphone was located 25 feet away from leak source during evaluation.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be detected by vacuum test. A well point in the tank excavation backfill may help identify presence of this condition.
The manufacturer does not support test results if the technician does not hold a current Alert Technologies certification when the test is performed. Recertification is required by the manufacturer every two years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/15/92

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Issue Date: November 22, 1995
Revision Date: February 6, 2015

Purpora Engineering, Inc.
(originally listed by Alert Technologies, Inc.)

Alert Ullage System Model 1050 X
(Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight if the ratio of the ultrasonic signal (when the tank is under vacuum) to the background signal (prior to evacuation) equals or exceeds 1.5 for either 12 kHz or 25 kHz frequency band.

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

Tank Capacity Maximum ullage volume is 24,000 gallons.

Waiting time None between delivery and testing if test is conducted after an under filled tank tightness test.

Test Period Minimum of 5 minutes.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 1.5 psi must be maintained in ullage.
Vacuum must be maintained in the tank with a loss of less than 0.4 psi.
Zero pressure (background) must produce a flat line response.

Temperature Ultrasonic and background signals are independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is present outside ullage, test must not be used.

Calibration System must be calibrated before each test.

Comments Manifolded tank systems must be isolated prior to test. Evaluated using #4 fuel oil.
Tests only ullage portion of tank.
Product-filled portion of tank must be tested using an underfill test method.
Vibration due to nearby equipment or dripping condensation may interfere with test.
Microphone was located 25 feet away from leak source during evaluation.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be detected by vacuum test. A well point in the tank excavation backfill may help identify presence of this condition.
The manufacturer does not support test results if the technician does not hold a current Alert Technologies certification when the test is performed. Recertification is required by the manufacturer every two years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/28/94

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Issue Date: November 22, 1995
Revision Date: April 27, 2005

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Comp

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification	Leak rate of 0.1 gph with PD = 99% and PFA = 0.98%.
Leak Threshold	0.05 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, water.
Tank Capacity	Maximum of 15,000 gallons. Tank must be minimum 100% full. An automatic product leveler must be used to maintain a constant product level during test.
Waiting Time	None between delivery and testing. There must be no dispensing or delivery during waiting time.
Test Period	Minimum of 2 hours after the completion of the high level circulation. Test data are acquired and recorded by system's computer after the completion of the high level circulation. Leak rate is calculated based on cumulative volume change during low level test (generally based on 1 hour average volume change). Product must be mixed continuously throughout test period. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by a single temperature sensor.
Groundwater	Depth to groundwater in tank excavation backfill must be determined. If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 4 psi at bottom of tank during test.
Calibration	Temperature sensor is self calibrating. Level sensor must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/15/90

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Issue Date: November 22, 1995
Revision Date: April 27, 2005

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Tite II

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 99% and PFA = 1%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 100% full.
An automatic product leveler must be used to maintain a constant product level during test.

Waiting Time None between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded manually.
Leak rate calculated based on cumulative volume change during low level test (generally based on 1 hour average volume change).
Product must be mixed continuously throughout test period.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a single DTS-2000 digital sensor.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 4 psi at bottom of tank during test.

Calibration Sensor calibration must be checked at each use and, if necessary, calibrated in accordance with manufacturer's instructions.
The DTS-2000 digital sensor must be recertified a minimum of once every 3 years.

Comments Not evaluated using manifolded tank systems.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/01/90

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Issue Date: November 22, 1995
Revision Date: February 6, 2015

Purpora Engineering, Inc.

(originally listed as Alert Technologies, Inc.)

Alert Model 1000

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification
Leak rate of 0.1 gph with PD = 98.2% and PFA = 1.8% for 2 hour test.
Leak rate of 0.1 gph with PD = 99.8% and PFA = 0.2% for 4 hour test.

Leak Threshold
0.05 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, waste oil.

Tank Capacity
Maximum of 30,000 gallons.
Tank must be between 20 and 95% full.

Waiting time
Minimum of 1 hour between delivery and testing.
Minimum of 1 minute between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours to achieve PD = 98.2% and PFA = 1.8%.
Minimum of 4 hours to achieve PD = 99.8% and PFA = 0.2%.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the data determined to be valid by statistical analysis.
There must be no dispensing or delivery during test.

Temperature
System measures product mass (which is not affected by temperature) instead of product volume.

Groundwater
Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 2 psi at bottom of tank during test.

Calibration
Load cell must be calibrated before each test.

Comments
Not evaluated using manifolded tank systems.
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.
The manufacturer does not support test results if the technician does not hold a current Alert Technologies certification when the test is performed. Recertification is required by the manufacturer every two years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/26/91

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Purpora Engineering, Inc.

Alert 8200 Series Underfill Method

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99.58% and PFA = 0.42% for 1 hour test.

Leak Threshold 0.05 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, waste oil, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751.

Tank Capacity Maximum of 30,000 gallons.
Tank must be between 16% (with a fuel height of 14" or more) and 95% full.

Waiting time Minimum of 3 hours 41 minutes between delivery and testing.
There must be no delivery during waiting time.

Test Period Minimum of 1 hour 28 minutes to achieve PD = 99.58% and PFA = 0.42%.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the data determined to be valid by statistical analysis.
There must be no dispensing or delivery during test.

Temperature System measures product mass (which is not affected by temperature) instead of product volume.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 0.2 psi pressure differential between the water table and fuel level at the bottom of tank during test.
If no water table info available, two tests are required at different product heights of different tank pressures.

Calibration Load cell must be calibrated at least once per year following manufacturers recommended practices, but not necessarily by manufacturer.

Comments Not evaluated using manifolded tank systems.
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.
The manufacturer does not support test results if the technician does not hold a current Pupora Enginerring certification when the test is performed. Recertification is required by the manufactuer every two years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/14/15

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Robertshaw Industrial Products

Centeron High Level Alarm System (SM Series Switch Monitor with Centeron FSL Series Float Switches: Models *FSL AAA BB CC DD EE 0 and *FSL AAA BB CC DD EE C)

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Model *FSL AAA BB CC DD EE 0	unleaded gasoline	diesel	water
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Minimum Product Level (in)	0.883	0.895	0.827
Model *FSL AAA BB CC DD EE C			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Minimum Product Level (in)	0.902	0.893	0.809

Comments:

*FSL AAA BB CC DD EE X indicates switch models where:

"AAA" represents the switch assembly nominal length in inches;
"BB" represents the nominal wire harness length in feet;
"CC" represents the housing material;
"DD" represents the float material;
"EE" represents the mounting threads (if applicable);
"X" where a "C" in this position indicates that the assembly is designed to be suspended by its cable, otherwise this character will be "0".

The FSL series switches alone were evaluated at the bottom of the test chamber.
The evaluator states that the switch mechanism can be suspended from the top of a tank or other location where a high level alarm is needed. Depth of the liquid will therefore differ from levels reported.
The evaluator reports that the FSL series switches meet the requirements for level sensors installed in tanks, sumps, interstitial spaces or other configurations where the presence of liquid needs to be indicated.
The FSL series switches are connected to the switch monitor. An alarm signal is transmitted by radio frequency (RF) to the alarm console where the condition of the sensor is indicated.
The evaluator reports that alarm information from the switch monitor can also be received by a Centeron TC series controller which can relay sensor condition by phone line to the Centeron Data Collector for remote data access over the Internet. Transmission of the RF signal to the controller was not evaluated.

Robertshaw Industrial Products
1602 Mustang Drive
Maryville, TN 37801
Tel: (800) 237-7429
E-mail: centeron@rsipd.com
URL: www.centeron.net

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/07/03

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Ronan Engineering Co.

Ronan X-76 Automatic Line Leak Detector with Version X-76 DM-4 Microprocessor and JT-H2 Line Pressure Sensor

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

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

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 45 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 2 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 20 seconds for leak rate of 3.0 gph.
Response time is 20 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a permanently installed microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold. Single test to determine if pipeline is leaking. Pump shutdown, message display, and alarm activation if leak is declared.

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

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 10/04/91

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Issue Date: January 11, 2001

Ronan Engineering Co.

X76CTM Series Monitoring System with: (Series 7100 Magnetostrictive Probe, X76MP Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for Precision Test with either probe.
Leak rate of 0.2 gph with PD = 99.2% and PFA = 0.1% for Quick Test with Series 7100 Probe.
Leak rate of 0.2 gph with PD = 99.6% and PFA = 0.1% for Quick Test with X76MP Series Probe.
Leak rate of 0.1 gph with PD = 95.1% and PFA = 4.9% for 0.1gph Test with Series 7100 Probe.
Leak rate of 0.1 gph with PD = 95.1% and PFA = 1.8% for 0.1gph Test with X76MP Series Probe.

Leak Threshold
0.1 gph for leak rate of 0.2 gph, Precision Test with Series 7100 Probe.
0.115 gph for leak rate of 0.2 gph, Precision Test with X76MP Series Probe.
0.115 gph for leak rate of 0.2 gph, Quick Test with Series 7100 Probe.
0.129 gph for leak rate of 0.2 gph, Quick Test with X76MP Series Probe.
0.05 gph for leak rate of 0.1 gph, 0.1gph Test with Series 7100 Probe.
0.066 gph for leak rate of 0.1 gph, 0.1gph Test with X76MP Series Probe.
A tank system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Tank Capacity
Maximum of 20,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required based on test mode as follows:
For Quick Test with either probe, Precision Test with Series 7100 Probe, and 0.1gph Test with X76MP Series Probe, the minimum product level is computed as probe length divided by 6 plus 5 inches.
For Precision Test with X76MP Series Probe and 0.1 gph Test with Series 7100 Probe, the minimum product level is 50% of tank capacity.

Waiting Time
Minimum of 1 hour between delivery and testing for Quick Test.
Minimum of 6 hours between delivery and testing for Precision Test and 0.1 gph Test.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for all tests.
Test data are acquired and recorded by system's computer. Leak rate is calculated from data determined to be statistically valid.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe with 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 0.661 inch.
Minimum detectable water level change is 0.011 inch.
System is default programmed to report a water depth only when it exceeds 3.5 inches.
System can be programmed to report a water depth of 0.661 inch and above.

Calibration
System 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.

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/15/99

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Ronan Engineering Co.

X76CTM Series Monitoring System (MTS UST Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for Precision Test.
Leak rate of 0.2 gph with PD = 95.0% and PFA = 0.1% for Quick Test.
Leak rate of 0.1 gph with PD = 95.2% and PFA = 2.5% for 0.1 gph Test.

Leak Threshold
0.124 gph for leak rate of 0.2 gph, Precision Test.
0.168 gph for leak rate of 0.2 gph, Quick Test.
0.067 gph for leak rate of 0.1 gph, 0.1 gph Test.
A tank system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Tank Capacity
Maximum of 20,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required based on test mode as follows:
For Quick Test, the minimum product level is computed as probe length multiplied by 0.12 plus 5 inches.
For Precision Test and 0.1 gph Test, the minimum product level is 50% of tank capacity.

Waiting Time
Minimum of 1 hour between delivery and testing for Quick Test.
Minimum of 6 hours between delivery and testing for Precision Test and 0.1 gph Test.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for all tests.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from data determined to be statistically valid.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe with 5 resistance temperature detectors (RTDs).
The bottom RTD must be submerged in at least 5 inches of product during test.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.874 inch.
Minimum detectable water level change is 0.011 inch.
System is default programmed to report a water depth only when it exceeds 3.5 inches.
System can be programmed to report a water depth of 0.874 inch and above.

Calibration
System 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.

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/15/99

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Issue Date: January 11, 2001

Ronan Engineering Co.

X76CTM Series Monitoring System
(Veeder-Root 8463/8473/8493 Series Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for Precision Test.
Leak rate of 0.2 gph with PD = 97.0% and PFA = 0.1% for Quick Test.
Leak rate of 0.1 gph with PD = 95.2% and PFA = 0.8% for 0.1 gph Test

Leak Threshold
0.1 gph for leak rate of 0.2 gph, Precision Test.
0.128 gph for leak rate of 0.2 gph, Quick Test.
0.06 gph for leak rate of 0.1 gph, 0.1 gph Test.
A tank system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Tank Capacity
Maximum of 20,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required based on tank diameter is as follows:
48" dia/ min 18";
64" dia/ min 21";
72" dia/ min 24";
96" dia/ min 30";
126" dia/ min 39".
Minimum product level required for other tank diameters; multiply probe length by 0.08 and add 5 inches.

Waiting Time
Minimum of 1 hour between delivery and testing for Quick Test.
Minimum of 6 hours between delivery and testing for Precision Test and 0.1 gph Test.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for all tests.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from data determined to be statistically valid.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe with 5 thermistors.
The bottom thermistor must be submerged in at least 5 inches of product during test.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.878 inch.
Minimum detectable water level change is 0.013 inch.
System is default programmed to report a water depth only when it exceeds 3.5 inches.
System can be programmed to report a water depth of 0.878 inch and above.

Calibration
System 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.

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/15/99

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

Ronan Engineering Co.

X-76 ETM, X-76 ETM-4X (Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.96% and PFA = 0.044%.
Leak rate of 0.1 gph with PD = 95.34% and PFA = 4.66%.

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 that equals or exceeds this threshold.

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

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rates of 0.2 and 0.1 gph.
Tank must have minimum product height of 12 inches or be 14% full, whichever is higher, when leak threshold is set at 0.049 gph (PD = 95% and PFA = 5%).

Waiting Time
Minimum of 2 hours between delivery and testing for leak rate of 0.2 gph.
Minimum of 8 hours between delivery and testing for leak rate of 0.1 gph.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from data determined to be statistically valid.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 1 resistance temperature detector (RTD).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.947 inch.
Minimum detectable water level change is 0.0254 inch.

Calibration
RTD 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.
X76ETM-4X console has different housing which allows it to be mounted outside.

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 02/07/91, 11/21/91

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Issue Date: November 14, 1997
Revision Date: September 11, 1998

Ronan Engineering Co.

Ronan Controller Models X76S; X76VS; X76LVC; TRS76; X76ETM, LVCS; X76CTM-N4; X76ETM-4X; X76-4X, -3, -6, -9, -12; X76AST-4X with Ronan Sensor Models LS-3 N.C.; LS-3 N.O.; LS-30; LS-7; HVA; LS-3SS; LS-1

INTERSTITIAL DETECTOR (LIQUID-PHASE)

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

Test Results:

LS-3 N.C. (normally closed)	unleaded gasoline	water
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	2.77	2.31
LS-3 N.O. (normally open)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	2.31	1.70
LS-30 (high level)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	N/D*	15.24
LS-30 (low level)		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	N/D	4.72
LS-7		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	1.09	0.81
HVA		
Detection time (sec)	<1	<1
Fall time (sec)	<1	<1
Lower detection limit (cm)	0.84	0.71

*See Glossary

Comments:
Sensors are reusable.
LS-3SS is identical to LS-3 N.C. and LS-3 N.O. except that LS-3SS also tests for methanol and has a stainless steel float.
The only difference between LS-1 and LS-3 is that LS-1 is smaller in diameter.

Ronan Engineering Co.
21200 Oxnard St.
Woodland Hills, CA 91367
Tel: (800) 327-6626

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/06/92

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Issue Date: March 5, 2002
Revision Date: November 25, 2003

S Bravo Systems, Inc.

Model B-2000 Shallow Steel Dispenser Containment System
Model B-8600 Aboveground/Marina Steel Dispenser Containment System

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, non-discriminating
Sampling frequency: continuous
Operating principle: float switch

Test Results:

	unleaded gasoline	diesel	water
Detection time (hrs)	0.52	0.48	1.43
Fall time (sec)	*	*	*
Lower detection limit (ml)	197.39 (6.7 ounces)	181.08 (6.12 ounces)	542.10 (18.3 ounces)

*The fall time was not determined. Evaluator notes that fall time is irrelevant because the only way to reset the system is to remove the liquid from the float sump and manually reset the shear valve.

Specificity Results:

Responds to any liquid in sufficient quantities to raise the float which trips the shear valve. No additional materials tested.

Manufacturer's Specifications:

The Model B-2000 and Model B-8600 systems use a float coupled to the shear valve mechanism of the dispenser. When any liquid (water or fuel) enters the sump in sufficient amounts to raise the float, the shear valve is tripped, preventing dispensing of fuel from that particular dispenser. The systems are designed with baffles that initially restrict the tripping to the dispenser in question. If sufficient liquid enters the section, it will overflow the baffle and trip the shear valves on the adjacent product inlet within the dispenser pan.

S Bravo Systems, Inc.
2929 Vail Avenue
Commerce, CA 90040
Tel: (714) 888-4133
E-mail: info@sbravo.com
URL: www.sbravo.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/27/02, 11/05/03

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Schuster Instruments

Tel-A-Leak 1

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 99.86% and PFA = 0.14%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 100% full.

Waiting Time Minimum of 6 hours between delivery and testing.
Minimum of 1 hour between "topping off" and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour.
Test data are acquired and recorded manually and by system's computer.
Leak rate is calculated from average of the last 10 consecutive 6 minute readings.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 10 temperature sensors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide net pressure of 2-4 psi at bottom of tank during test.

Calibration Temperature sensors must be checked annually and calibrated annually in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.

Schuster Instruments
211 E. Grove St.
Kawkawlin, MI 48631
Tel: (517) 684-6638

Evaluator: W. A. Kibbe and Associates
Tel: (517) 797-2425
Date of Evaluation: 11/26/90

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Sensorcomm, Inc.

Models LPS-5036 and TLD-3050 Sensors with Sensorcomm Relay Unit Type-C Alarm Console and TLD-3050X Sensor with Sensorcomm FLASHER-BE Alarm Console

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: solid state equivalent to selective float switch (no moving parts)

Test Results:

LPS-5036	unleaded gasoline	diesel	crude oil	jet A fuel	water	***produced water
Detection time (min)	<1	6	29	5	N/A	N/A
Fall time (min)	22	*	**	*	N/A	N/A
Threshold (in)	<0.0625	0.1887	0.1776	0.1783	N/A	N/A
TLD-3050						
Detection time (min)	<1	6	29	5	N/A	<1
Fall time (min)	22	*	**	*	N/A	<1
Threshold (in)	<0.0625	0.1894	0.1776	0.1819	N/A	0.4728
TLD-3050X						
Detection time (min)	<1	6	29	<5	N/A	<1
Fall time (min)	22	*	**	*	N/A	<1
Threshold (in)	<0.0625	0.2139	0.1776	0.1821	N/A	0.4167

*Indicates sensor must be cleaned
**Indicates sensor may require being sent to manufacturer for extra cleaning
***produced water is oil field brine

Specificity Results:
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:
The LPS-5036 sensor responds to hydrocarbon liquids only and ignores water and produced water.
The TLD-3050 and TLD-3050X sensors respond to hydrocarbon liquids and produced water but ignore water.
Sensors can be removed, cleaned, and reinstalled if alarm is triggered or for periodic testing, unless otherwise indicated. Once a sensor is exposed to diesel fuel or Jet A fuel, the sensor will need to be removed and cleaned before it can be used again. For crude oil, the sensor may require extra cleaning or may require return to the factory for rework or replacement.
These sensors do not require calibration.
These sensors are listed under NWGLDE's out-of-tank detectors (liquid-phase) category, but can function as interstitial detectors (liquid-phase).

Sensorcomm, Inc.
30831 Seminole Pl.
Laguna Nigel, CA 92677
Tel: 1 949 495 0509
E-mail: sensorcomm@cox.net
URL: http://www.eng-lds.com/

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Web: www.kwaleak.com
Date of Evaluation: 11/09/15

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Issue Date: May 27, 2004
Revision Date: February 16, 2005

SGB (Sicherungsgeratebau GmbH)

Overpressure Leak Detection System Model DLR-G

CONTINUOUS INTERSTITIAL LINE MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified per European leak detection standard EN 13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses pressurized nitrogen gas to continuously maintain an overpressure within the interstitial space of double-walled piping.
System is designed to activate a visual and acoustic alarm before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled piping.

Alarm Condition:
System alarms when a leak occurs which causes the pressure within the interstitial space to decrease to the "Minimum Interstitial Space Alarm Pressure" (see table below).

Applicability:
Double-walled piping, underground or aboveground, having a design strength capable of safely sustaining the required operating pressure in the interstitial space. Pipes may convey flammable, combustible, or non-combustible liquids including gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, motor oil, and acidic or caustic solutions. Note: Conveyed product must not react with pressurized nitrogen. Interstitial space to be monitored must not exceed 150 ft^3.

Manufacturer's Specifications:
The leak detector can be configured to monitor primary lines with operating pressures up to 120 psi, as indicated in the following table. The interstitial space shall be rated for the operating pressure (interstitial space refilling "off" pressure) of the leak detector, as indicated in the following table. Pressures shall be set as follows:

Maximum Primary Line Pressure (psi)	Minimum Interstitial Space Alarm Pressure (psi)	Maximum Interstitial Space Refilling "Off" Pressure (psi)
Unpressurized	15	30
15	30	45
30	45	60
45	60	75
60	75	90
75	90	105
90	105	120
105	120	135
120	135	150

The DLR-G leak detector is not explosion protected. Do not install in a volatile, combustible or explosive atmosphere. Install the detector inside the building in a dry, frost-proof area. When using nitrogen gas, ensure that the room is ventilated according to applicable codes due to asphyxiation hazard. If installed outside in a protected area, place in a weatherproof protection box with a transparent lid.

Calibration:
Functional and operational safety tests must be performed annually in accordance with manufacturer's instructions.

Comments:
Interstitial space is tested continuously.
System can operate in two modes: with or without a nitrogen bottle continuously connected. Nitrogen bottle must be connected unless the piping is "impermeable" (e.g. double-walled steel).
Pressure is generated by inert gas bottle (nitrogen) and is measured and controlled by a pressure switch.
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.

SGB (Sicherungsgeratebau GmbH)
Hofstrabe 10
57076 Siegen, Germany
Tel: +49/ (0) 271 / 48964-0
E-Mail: Sgb-mail@t-online.de

Evaluator: TUV (Technischer Uberwachungs-Verein Nord e.V.)
Date of Evaluation: 01/27/04

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SGB (Sicherungsgeratebau GmbH)

Vacuum Leak Detection System Models VL 30p, VL 350p, and VL 400p

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified per European leak detection standard EN 13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of a double-walled tank or double-walled piping.
System is designed to activate a visual and acoustic alarm before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled tanks or double-walled piping.

Alarm Condition:
System alarms when liquid enters the interstitial space or an air leak occurs where the interstitial vacuum decreases (pressure increases) to the appropriate "Alarm 'On' Pressure" (see table below).

Applicability:
Double-walled or lined single-walled horizontal (underground or aboveground) cylindrical tank with flat or dished head, storing, heating oil or diesel fuel, or double-walled piping conveying those liquids.
Other liquids can also be stored or conveyed if the Flashpoint is above 55° C (no explosion protection required).

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: SGB (Sicherungsgeratebau GmbH), Vacuum Leak Detection System Models VL 30p, VL 350p, and VL 400p

Manufacturer's Specifications:

The interstitial space shall be rated for the operating vacuum of the leak detector as indicated in the following table, regardless of temperature and groundwater level fluctuations.

Model	Pump "Off" Pressure (Operating vacuum is reached)	Alarm "On" Pressure (Leak exceeds pump capacity)	Restrictions for Tanks	Restrictions for Piping
VL 30p	1.2 ± 0.25 psi (2.44 + 0.5" Hg, or 83 + 17 mbar)	0.7 ± 0.25 psi (1.43 ± 0.5 " Hg, or 48 ± 17 mbar)	Suction line must be mounted at lowest point in the interstitial space regardless of tank diameter.	This type is not applicable for piping.
VL 350p	6.6 + 0.4 psi (13.4 + 0.8 " Hg, or 455 + 28 mbar)	5.4 + 0.3 psi (11 + 0.6 "Hg, or 372 + 21 mbar)	Tank diameter cannot exceed 10 feet 6 inches unless the suction line is mounted at lowest point in the interstitial space.	Height between the low point of the interstice and *node point (the double-walled pipe may terminate higher than the node point without restrictions to the height if the pressure in the primary pipe does not exceed the given limits) cannot exceed 10 feet 6 inches.
VL 400p	7.4 + 0.4 psi (15.1 + 0.8 " Hg, or 510 + 28 mbar)	6.1 + 0.3 psi (12.4 + 0.6 " Hg, or 421 + 2 mbar)	Tank diameter cannot exceed 12 feet unless the suction line is mounted at lowest point in the interstitial space.	Height "H" between the low point of the interstice and *node point (the double-walled pipe may terminate higher than the node point without restrictions to the height "H" if the pressure in the primary pipe does not exceed the given limits) cannot exceed 12 feet.

*Node Point – The point where the suction and measuring lines are connected together.

Calibration:

Functional and operational safety tests must be performed annually in accordance with manufacturer's instructions.

Comments:

Interstitial space is tested continuously.
System is connected to the interstitial space by a suction line and a pressure measuring line.
The VL ..p leak detector is not explosion protected. Do not install in a volatile, combustible or explosive atmosphere.
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.

SGB (Sicherungsgeratebau GmbH)
Hofstrabe 10
57076 Siegen, Germany
Tel: +49/ (0) 271 / 48964-0
E-Mail: Sgb-mail@t-online.de

Evaluator: TUV (Technischer Uberwachungs-Verein Nord e.V.)
Date of Evaluation: 02/11/04

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Issue Date: April 22, 2003
Revision Date: February 16, 2005

SGB (Sicherungsgeratebau GmbH)

Vacuum Leak Detection System Models VLX 30, VLX 350, and VLX 400

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified per European leak detection standard prEN 13160-2, Part 2, Version 2, as a Class I leak detection system.

Operating Principle:
System uses an integral vacuum pump to continuously maintain a partial vacuum within the interstitial space of a double-walled tank.
System is designed to activate a visual and acoustic alarm before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled tanks.

Alarm Condition:
System alarms when liquid enters the interstitial space or an air leak occurs where the interstitial vacuum decreases (pressure increases) to the appropriate "Alarm 'On' Pressure" (See table below).

Applicability:
Double-walled or lined single-walled horizontal (underground or aboveground) cylindrical tank with flat or dished head, storing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, motor oil, water.

Manufacturer's Specifications:
The interstitial space shall be rated for the operating vacuum of the leak detector as indicated in the following table, regardless of temperature and groundwater level fluctuations.

Model	Pump "Off" Pressure (Operating vacuum is reached)	Alarm "On" Pressure (Leak exceeds pump capacity)	Restrictions
VLX 30	1.2 ± 0.25 psi	0.7 ± 0.25 psi	Not for use where suction line is mounted on top of tank.
VLX 350	6.6 ± 0.4 psi	5.4 ± 0.3 psi	Tank diameter cannot exceed 10 feet 6 inches unless the suction line is mounted at lowest point in the interstitial space.
VLX 400	7.4 ± 0.4 psi	6.1 ± 0.3 psi	Tank diameter cannot exceed 12 feet unless the suction line is mounted at lowest point in the interstitial space.

Calibration:
Functional and operational safety tests must be performed annually in accordance with manufacturer's instructions.

Comments:
Interstitial space is tested continuously.
System is connected to the interstitial space by a suction line and a pressure measuring line.
Vacuum is generated by an integral pump, and is measured and controlled by a pressure switch.
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.

SGB (Sicherungsgeratebau GmbH)
Hofstrabe 10
57076 Siegen, Germany
Tel: +49/ (0) 271 / 48964-0
E-Mail: Sgb-mail@t-online.de

Evaluator: TUV (Technischer Uberwachungs-Verein Nord e.V.)
Date of Evaluation: 05/24/02

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Issue Date: April 18, 1997
Revision Date: July 21, 2009

Simmons Corp.
(originally listed as Caldwell Systems Corp.)

Simmons/Caldwell Tank Manager (Ultrasonic Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 96.7% and PFA = 3.3%.

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, waste oil.

Tank Capacity
Maximum of 20,000 gallons.
Minimum product level required to conduct a test is 18 inches.

Waiting Time
Minimum of 12 hours, 25 minutes between delivery and testing.
Minimum of 15 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 3 hours, 15 minutes.
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 from the measurement of the change in the speed of sound.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.921 inch.
Minimum detectable change in water level is 0.0315 inch.

Calibration
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.
Water sensor, temperature sensor and product level monitor are contained in a single ultrasonic probe.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (800) 848-8378
E-mail: howard.dockery@simmons-corp.com
URL: www.simmons-corp.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/22/96, 04/05/99

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Issue Date: March 31, 2006
Revision Date: July 21, 2009

Simmons Corp.
(originally listed as Caldwell Systems Corp.)

Simmons/Caldwell Tank Manager Monitoring Systems with CITLDS (Ultrasonic Probe)

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

Certification Leak rate of 0.2 gph with PD = 100% and PFA = 0%.

Leak Threshold Not applicable for qualitative methods.
Method is qualitative and reports a result of "pass" or "fail".

Applicability Gasoline, diesel, aviation fuel, solvents, waste oil, fuel oil #4, water.

Tank Capacity Maximum of 18,000 gallons for single tanks
Maximum of 54,000 gallons cumulative capacity for manifolded tank systems.
Minimum product level required to conduct a test is 20 inches.

Throughput Monthly maximum of 147,136 gallons.

Waiting Time Minimum of 4 hours stabilization time is allowed between delivery and data collection.

Test Period Data collection time ranges from 3 to 27 days.
Data sampling frequency is every 1 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 sensors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.736 inch.
Minimum detectable change in water level is 0.031 inch.

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

Comments Evaluated using both single and manifolded tank systems with probes in each tank.
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no " passing" tests completed during the month.
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.
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.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (800) 848-8378
E-mail: howard.dockery@simmons-corp.com
URL: www.simmons-corp.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/08/05

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Simmons Corp.

ClearView (Version I)

Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines

CONTINUOUS IN-TANK LEAK DETECTION METHOD (Continual Reconciliation)

Certification	Leak rate of 0.2 gph for tanks and associated pipelines with PD > 99% and PFA < 1%.
Leak Threshold	0.1 gph for single and manifolded tank systems including associated pipelines. A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold Gains (water ingress) are analyzed and evaluated on an individual basis.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, solvents, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751
Tank Capacity	Maximum of 36,096 gallons for single tanks and for up to 3 tanks manifolded together. The tank must be between 8.9% and 92.5% full.
Throughput	Monthly maximum of 289,250 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 2.8 to 11.6 days. Data sampling frequency is multiple times per minute. System collects data (sales and levels) multiple times per minute without interfering with normal site operation.
Temperature	Average for product is determined by a probe that contains 5 thermistors.
Water Sensor	Must be used to detect water ingress. Automatic tank gauges that pass the US EPA standard are sufficient.
Calibration	Dispenser meter calibrations must be known. Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Simmons Corp., ClearView (Version I) Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines

Comments

System tests each tank and associated piping for the tank system.
System reports a calculated leak rate and "Pass" or "Fail" for each tank system.
System notifies operator for each tank system that is not "Passing".
System tested on tank systems that operated 24-hours per day, had stage 2 vapor recovery and blending dispensers.
ATGs used at the sites in the evaluation were from:
Franklin Fueling 550, Colibri, 1001
Veeder-Root TLS-350, TLS 450
OPW fuel Management System EECO 1000, EECO 2000
ATGs all equipped with magnetostrictive probes.
Automatic tank Gauges used with this method must be on the NWGLDE list, employ a magnetostrictive probe, and be certified at a leak rate of 0.1 gph.
The maximum size tank system in the evaluation was 40,373 gallons.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (972) 497-9002
URL: www.simmons-corp.com

Evaluator: SSG Associates
220 Saint Andrews Circle, Oxford, MS 38655
Tel: (662) 234-1179
Date of Evaluation: 01/20/2016

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Simmons Corp.
(originally listed as Caldwell Systems Corp.)

Simmons/Caldwell Tank Manager Liquid Sensor, Version TMLIQ

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: ultrasonic

Test Results:

Horizontal Position	unleaded gasoline	diesel	water
Response time (sec)	<1	<1	<1
Recovery time (sec)	<1	<1	<1
Lower detection limit (cm)	1.28	1.30	2.43
Precision - standard deviation (cm)	0.05	0.06	0.25
Vertical Position			
Response time (sec)	<1	<1	<1
Recovery time (sec)	<1	<1	<1
Lower detection limit (cm)	8.56	7.59	9.27
Precision - standard deviation (cm)	0.22	0.11	0.44

Specificity Results:
Evaluator claims sensor will detect fuels or other liquids.

Comments:
Sensor is designed to alarm only when liquid is present from one end of sensor to the other. Therefore, sensor orientation (vertical or horizontal) will affect lower detection limit.
Sensors are reusable.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (800) 848-8378
E-mail: howard.dockery@simmons-corp.com
URL: www.simmons-corp.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/09/98

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Issue Date: November 22, 1995
Revision Date: May 5, 2003

Simmons Corp.

SIR 5.7

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.0% and PFA = 1.0%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Gains (water ingress) are analyzed and evaluated on and individual basis.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 18,000 gallons.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
Not evaluated using manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 7,000 gallons.
Leak rates ranging from 0.05 to 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (800) 848-8378
E-mail: howard.dockery@simmons-corp.com
URL: www.simmons-corp.com

Evaluator: S.S.G. Associates
Tel: (662) 234-1179
Date of Evaluation: 12/15/92

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Issue Date: April 18, 1997
Revision Date: July 14, 2003

Simmons Corp.

SIR 5.7 LM

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 < 1.0%.

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.
Gains (water ingress) are analyzed and evaluated on and individual basis.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 60,000 gallons for single tank.
Maximum of 60,000 gallons cumulative capacity for manifolded tank systems with no more than 5 tanks in system.

Data Requirement
Minimum of 27 days of product level and flow through data.

Comments
61% of data sets evaluated were from manifolded tank systems.
17% of data sets evaluated used data collected by Automatic tank gauges.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 55,791 gallons.
Leak rates of 0.05, 0.1 and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Simmons Corp.
106 E. Main Street
Richardson, TX 75081-3327
Tel: (800) 848-8378
E-mail: howard.dockery@simmons-corp.com
URL: www.simmons-corp.com

Evaluator: S.S.G. Associates
Tel: (662) 234-1179
Dates of Evaluation: 10/28/95, 02/15/00, 09/03/01

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Simone Engineering, Inc.

Magnetrol Model 918 Ultrasonic Point Level Switch with ABB Automation Freelance 2000 Control System

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, non-discriminating
Sampling frequency: continuous
Operating principle: electrical conductivity, ultrasonic

Test Results:

	trichloroethylene	acetone	water
Lower detection limit (in)	0.143	0.166	0.164
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1

Specificity Results:

Evaluator claims sensors will respond to any liquid after threshold is exceeded.

Comments:

The Magnetrol Model 918 has not been evaluated for application with petroleum hydrocarbons. The sensor has been evaluated specifically for application in water, acetone, and trichloroethylene.
The ABB Automation Freelance 2000 was used to detect the 8 to 16 milliamp change that occurred in the Magnetrol sensor when it became submerged in product. Audible and visual alarms were activated when the sensor indicated that alarm conditions were present.

FCX Performance
55 North Lively Blvd.
Elk Grove Village, IL 60007
Tel: (847) 806-1885
E-Mail: chill@FCxPerformance.com
URL: www.fcxperformance.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/27/00

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Issue Date: November 22, 1995
Revision Date: March 26, 2009

SIR International, Inc.

Mitchell's SIR Program Versions 2.6, 2.7

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD = 99% and PFA = 1% (Version 2.7).
Leak rate of 0.1 gph with PD = 99% and PFA = 1% (Version 2.6).

Leak Threshold
0.10 gph for a leak rate of 0.2 gph (Version 2.7).
0.05 gph for a leak rate of 0.1 gph (Version 2.6).
These leak thresholds are for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak thresholds.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 45,000 gallons for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 23 days of product level and flow through data.

Comments
68% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 22,370 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets used in this evaluation were supplied by evaluator.
100% of inventory data used in this evaluation were gauge stick readings.
Gains (water ingress) are analyzed and evaluated on an individual basis.
The same data sets were used for both the 1995 and 1997 evaluations.

SIR International, Inc.
P.O. Box 1740
Canyon Lake, TX 78133
Tel: (830) 899-7565, (800) 793-1919, Fax: (830) 899-7566
sir@gvtc.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/27/92, 06/8/95, 07/27/97

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SIR Monitor
(originally listed as Environmental Management Technologies)

SIR Monitor

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99% and PFA = 1%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 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 18,000 gallons.

Data Requirement
Minimum of 90 days of product level and flow through data are required before making the first evaluation.
Following the first evaluation, subsequent evaluations are made based on minimum of 30 days of data.

Comments
Not evaluated using data from manifolded tank systems.
Of 41 data sets submitted for evaluation, 5 were inconclusive.
Median monthly throughput of tanks evaluated was 14,600 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by vendor.

SIR Monitor
665 Evergreen Dr.
Murfreesboro, TN 37128
Tel: (615) 896-4723

Evaluator: Nathan Adams,
Middle Tennessee State University
Tel: (615) 898-2644
Date of Evaluation: 11/05/92

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Sir Phoenix, Inc.

SIR Phoenix

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.0% and PFA = 1%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Gains (water ingress) are analyzed and evaluated on and individual basis.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 18,000 gallons.

Data Requirement
Minimum of 90 days of product level and flow through data are required before making the first evaluation.
Following the first evaluation, subsequent evaluations are made based on minimum of 30 days of data.

Comments
Not evaluated using manifolded tank systems.
Of 41 data sets submitted for evaluation, 5 were inconclusive.
Median monthly throughput of tanks evaluated was 14,600 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were evaluated.
Data sets evaluated were supplied by vendor.

SIR Phoenix, Inc.
15995 Indian Rd.
La Conner, WA 98257
Tel: (360) 466-0206

Evaluator: Nathan Adams,
Middle Tennessee State University
Tel: (615) 898-2644
Date of Evaluation: 11/05/92

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Sir Phoenix, Inc.

SIR Phoenix LEOMA V01.50

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD > 99.3% and PFA < 0.7% for single tanks.
Leak rate of 0.2 gph with PD > 99.9% and PFA < 0.1% for manifolded tanks.

Leak Threshold
0.1 gph for both single and manifolded tank systems.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.
Gains (water ingress) are analyzed and evaluated on and individual basis.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 18,000 gallons for single tanks.
Maximum of 45.000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 28 days of product level and flow through data.

Comments
54% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 18,897 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets used in this evaluation were supplied by evaluator.
Inventory data used in this evaluation were obtained from manual tank stick readings and automatic tank gauge readings.
Manufacturer also provides Leoma™ as an "in-house" product that licenses PC hardware and software. This "in-house" SIR product creates SIR reports based on SIR Phoenix LEOMA V01.50.
Remote sites/stations enter data over ordinary phones into the Leoma™ PC database which uses a voice recognition system.

SIR Phoenix, Inc.
15995 Indian Rd.
La Conner, WA 98257
Tel: (360) 466-0206

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/18/00

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Soiltest, Inc.

Soiltest Ainlay Tank 'Tegrity' Tester, S-3

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification	Leak rate of 0.1 gph with PD = 99% and PFA = 1%.
Leak Threshold	0.05 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 15,000 gallons. Tank must be minimum 100% full.
Waiting Time	Minimum of 10 hours between delivery and testing. Minimum of 2 hours between "topping off" and testing. There must be no dispensing or delivery during waiting time.
Test Period	Minimum of 1 hour, 30 minutes. Test data are acquired and recorded manually and by a strip chart recorder. Leak rate is calculated from last 1 hour, 30 minutes of test period data. There must be no dispensing or delivery during test.
Temperature	Average for product is determined by a minimum of 3 thermistors.
Groundwater	Depth to groundwater in tank excavation backfill must be determined. If groundwater is above bottom of tank, product level must be adjusted to provide net pressure of 2-4 psi at the bottom of tank during test.
Calibration	Level sensors must be calibrated before each test in accordance with manufacturer's instructions. Thermistors must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Not evaluated using manifolded tank systems.

Soiltest, Inc.
Manufacturer's Previously Listed Contact
Information is No Longer Valid.

Evaluator: Law Engineering Industrial Services
Tel: (800) 672-6601
Date of Evaluation: 11/28/90

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Issue Date: August 23, 1999
Revision Date: January 24, 2008

Steel Tank Institute

Permatank Interstitial Vacuum Monitor Liquid Leaks

INTERSTITIAL TANK TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 100% and PFA < 5%.

Leak Threshold A tank system should not be declared tight when the vacuum decreases (pressure increases) 5 inches or more of mercury over the test period specified for each tank size.
Vacuum prior to test must be minimum of 14 inches of mercury.

Applicability Gasoline, diesel, water.

Tank Capacity Maximum of 20,000 gallons. No minimum product level during test.

Waiting Time None between delivery and testing.

Test Period Test periods required for selected tank sizes to detect a leak rate of 0.1 gph

Selected Tank Sizes	gasoline	diesel	water
500 gal	0.4 hr	5.0 hr	4.8 hr
5,000 gal	1.3 hr	16.2 hr	15.7 hr
8,000 gal	2.1 hr	24.9 hr	24.2 hr
20,000 gal	3.7 hr	44.8 hr	43.6 hr

Comments System tests the interstitial space between inner steel wall and outer fiberglass wall of Steel Tank Institute's Permatank.
System detects breaches in either inner or outer tank walls.
System can perform tank tightness testing of Steel Tank Institute's double wall Permatank after product has been added to the primary tank.
System was not evaluated for ability to detect layer of hydrocarbons on water.
Evaluation did not cover any liquid sensors.

Steel Tank Institute
570 Oakwood Rd.
Lake Zurich, IL 60047
Tel: (847) 438-8265

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/24/94

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Steel Tank Institute

Permatank Precision Interstitial Vacuum Monitor

INTERSTITIAL TANK TIGHTNESS TEST METHOD

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

Leak Threshold 0.01 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.

Tank Capacity Maximum of 50,000 gallons.

Waiting Time None.

Test Period 12 hours for tanks less than 10,000 gallons.
24 hours for tanks 10,000 gallons to 50,000 gallons.

Comments System performs post installation tank tightness test of Steel Tank Institute's double-wall Permatank prior to adding product to tank.
System conducts vacuum test on interstitial space between inner steel wall and outer fiberglass wall of Steel Tank Institute's Permatank and detects breaches in either inner or outer wall.
For use only on Permatank underground storage tanks manufactured by Steel Tank Institute.
Minimum initial vacuum on interstitial space is 13 inches mercury.
Tank declared tight when vacuum decrease is less than 5 inches mercury over specified test period. Vacuum readings must be recorded on Steel Tank Institute's installation checklist.

Steel Tank Institute
570 Oakwood Rd.
Lake Zurich, IL 60047
Tel: (847) 438-8265

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/25/93

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Syscorp, Inc.

Store Vision Version E.2

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUALITATIVE)

Certification	Leak rate of 0.2 gph with PD = 95.7% and PFA = 0%.
Leak Threshold	0.0834 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 12,000 gallons.
Data Requirement	Minimum of 29 days of product level and throughput data.
Comments	Not evaluated using manifolded tank systems. Of 120 data sets submitted for evaluation, 32 were inconclusive. Median monthly throughput of tanks evaluated was 8,097 gallons. Leak rate of 0.2 gph was used in evaluation. Data sets evaluated were supplied by evaluator.

Syscorp, Inc.
531 Highland Park Circle
Birmingham, AL 35242
Tel: (205) 981-7413

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 09/30/93

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Tank Automation, Inc.

Automated Precision Tank Testing System (APTT System) R-2

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 99% and PFA = 1%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 100% full.

Waiting Time Minimum of 10 hours, 30 minutes between delivery and testing.
Minimum of 2 hours, 30 minutes between "topping off" and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour.
Test data are acquired and recorded manually for level measurement and by system's computer for temperature measurement.
Leak rate is calculated from last 1 hour of test period data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 10 thermistors.

Groundwater Groundwater presence must be determined to a depth of 5 feet below grade in tank excavation backfill.
Product level must be a minimum of 5 feet 6 inches above grade to ensure a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Thermistors and level sensors must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.

Tank Automation, Inc.
Manufacturer's Previously Listed Contact Information is No Longer Valid.

Evaluator: Wildwood Engineering
Tel: Unavailable
Date of Evaluation: 11/14/90

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Issue Date: November 22, 1995
Revision Date: September 22, 2009

Tanknology

Proline Test Series III, Version 1.0

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.0% and PFA = 0.1%.

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

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed from pipeline for duration of test.

Pipeline Capacity Maximum of 41 gallons.

Waiting Time None between delivery and testing.
Minimum of 1 hour between dispensing and testing.

Test Period Minimum of 1 hour.
Pipe deflection, vapor pockets, and large temperature differences may produce inconsistent readings, testing to continue until stable conditions are present.
Test data are acquired and recorded manually.
Manual calculations are performed by the operator on site.

Calibration Sensors must be calibrated before each test in accordance with manufacturer's instructions.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 08/30/91

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Issue Date: November 22, 1995
Revision Date: September 22, 2009

Tanknology

PTK-88

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.8% and PFA = 1.3%.

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

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed from pipeline for duration of test.

Pipeline Capacity Maximum of 40 gallons.

Waiting Time None between delivery and testing.
Minimum of 1 hour between dispensing and testing.

Test Period Minimum of 10 minutes.
Repeat 10 minute cycles are necessary if data does not meet the manufacturer's criteria.
Test data are acquired and recorded manually.
Manual calculations are performed by the operator on site.

Calibration Sensors must be calibrated before each test in accordance with manufacturer's instructions.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 02/14/91

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Tanknology

TLD-1

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.5% and PFA = 0.5%.

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

Applicability Gasoline, diesel, aviation fuel.

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

Pipeline Capacity Maximum of 172 gallons.

Waiting Time Testing may begin immediately after system is installed in the line.

Test Period Response time is 30 minutes to 6 hours.
Test may not be ended until pass/fail criteria set by manufacturer has been met.
Pipe deflection, vapor pockets, and large temperature differences may produce inconsistent readings.
Testing must continue until stable conditions are present.
Test data are acquired and recorded manually.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/29/91, 03/04/02

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Tanknology

TLD-1 (for Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.7% and PFA = 0.3%.

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

Applicability Gasoline, diesel, aviation fuel.

Specification System tests flexible pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed or isolated from pipeline for duration of test.

Pipeline Capacity Maximum of 119.4 gallons.

Waiting Time Testing may begin immediately after system is installed in the line.

Test Period Minimum of 30 minutes.
Consistent readings for at least three readings must be obtained for a valid test.
The actual test time will depend on line size and temperature conditions at the site. The data from this evaluation suggests that the actual minimum test time is 50 minutes for a line of this capacity.
Test may not be ended until pass/fail criteria set by manufacturer has been met.
Pipe deflection, vapor pockets, and large temperature differences may produce inconsistent readings.
Testing must continue until stable conditions are present.
Test data are acquired and recorded manually.

Comments Enviroflex pipeline wih a bulk modulus* of 8,359 was used during evaluation.
*See glossary.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/30/94, 07/22/04

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Tanknology

UST Ullage Test, Version U2 (Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification	Leak rate of 0.1 gph with PD = 95.24% and PFA = 0%.
Leak Threshold	A tank system should not be declared tight when the pressure decay trend equals or exceeds ± 0.016 psi/hr.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Tank Capacity	Maximum ullage volume is 10,260 gallons.
Waiting time	Minimum of 2 hours between delivery and testing.
Test Period	Minimum of 30 minutes (after data trend has been established). There must be no dispensing or delivery during test.
Test Pressure	Total pressure of 4.0 psi must be applied at bottom of tank.
Temperature	Ullage must be monitored during test, and a correction factor is applied to account for temperature changes. If ullage temperature changes exceed 5 degrees F, test must not be conducted.
Groundwater	Depth to groundwater in tank excavation backfill must be determined. If groundwater is above product level, net pressure must be maintained at a minimum of 1 psi in the ullage during test.
Comments	Not evaluated using manifolded tank systems. Evaluated using diesel. Tests only ullage portion of tank. Product-filled portion of tank must be tested using a volumetric underfill test method.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: ADA Technologies, Inc.
Tel: (303) 792-5615
Date of Evaluation: 04/10/92

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Tanknology

UTS-4T Ullage Test (Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

Certification Leak rate of 0.1 gph with PD = 95.24% and PFA = 0%.

Leak Threshold A tank system should not be declared tight when the make-up gas flow rate into ullage equals or exceeds 0.275 cubic feet/hour.

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

Tank Capacity Maximum ullage volume is 7,500 gallons.

Waiting time Minimum of 2 hours between delivery and testing.

Test Period Minimum of 20 minutes, consisting of 2 consecutive 10-minute test periods.
Test data are acquired and recorded manually.
There must be no dispensing or delivery during test.

Test Pressure Pressure must be increased in ullage such that total pressure at bottom of tank does not exceed 5.0 psi.
Pressure must be maintained for a minimum of 5 minutes per 1,000 gallons of ullage.
At conclusion of this stabilization period, ullage pressure must be reduced by 0.5 psi for remainder of test.

Temperature Ullage must be monitored for rate of temperature change, which must not exceed manufacturer's tabulated values.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above product level, net pressure must exceed 1 psi in the ullage during test.
If this requires more than 5 psi total pressure at tank bottom, the ullage test must not be used.

Comments Not evaluated using manifolded tank systems. Evaluated using diesel. Tests only ullage portion of tank. Product-filled portion of tank must be tested using a volumetric underfill test method.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 12/04/92

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Tanknology

U3 Ullage Test (Vacuum or Pressure Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is pressurized or evacuated.

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

Tank Capacity Maximum ullage volume is 16,500 gallons.

Waiting Time None between delivery and testing

Test Period A few minutes to determine background noise and a leak.
Depends on background noise at the site and on the size of the leak.
After the desired pressure has been reached, the tank should be allowed to settle for 10 minutes.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 1 psi must be maintained in ullage by a vacuum blower, or total pressure at bottom of tank of 4 psi must be maintained using nitrogen.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above product level, vacuum test should not be used.
Pressure test may only be used if net pressure can be maintained at a minimum 1 psi throughout ullage during test.
If this requires more than 5 psi total pressure at tank bottom, the ullage test must not be used.

Comments Not evaluated using manifolded tank systems.
Evaluated using diesel.
Tests only ullage portion of the tank.
Product-filled portion of tank must be tested with an underfill test method. Microphone was 25 feet away from the leak source during evaluation.
If background noise is too high, test is inconclusive.
Noise signals are tape recorded (not digitally recorded).
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/15/93

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Tanknology

Quick Test (Underfill Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

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

Leak Threshold A tank system should not be declared tight when the acoustic signal detected is different from the baseline. Baseline is the acoustic signal before tank is evacuated.

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

Tank Capacity Maximum product volume of 30,000 gallons.
Tank product level must be between 7 and 86 inches.

Waiting Time None between delivery and testing

Test Period A few minutes to determine background noise and a leak.
Depends on background noise at the site and on size of leak.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 0.5 psi beyond the vacuum required to overcome the tank bottom pressure must be maintained in ullage by a vacuum blower.
Net vacuum applied = 0.5 psi + [inches of product level x the specific gravity of product x 0.036].

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above the tank bottom, this system may not be used.

Comments Not evaluated using manifolded tank systems.
Evaluated using diesel.
Tests only portion of tank containing product.
Ullage portion of tank must be tested with an ullage test method.
Microphone was 25 feet away from the leak source during evaluation.
If background noise is too high, test is inconclusive.
Noise signals are tape recorded (not digitally recorded).
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator : Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/25/96

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Tanknology

VacuTect

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

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

Leak Threshold A tank system should not be declared tight when:
sonic emission of air ingress is detected in ullage area and/or; sonic emission of bubbles formed by air ingress is detected in product-filled portion of the tank and/or; water ingress is detected by the water sensor.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, waste oil.
Water miscible products limit the effectiveness of water ingress detection.

Tank Capacity Maximum of 75,000 gallons.
Test may be performed at any product level, including empty, if total ullage volume does not exceed 20,000 gallons.
Maximum of 30,000 gallons per tank and 60,000 gallons cumulative capacity for manifolded tank systems with microphone (hydrophone) and water sensor in each tank.

Waiting Time None between delivery and testing.

Test Period Minimum not specified to declare a tank "non-tight".
There must be no dispensing or delivery during test.
When water level in tank excavation backfill is below bottom of tank:
Minimum of 1 hour to declare tank tight.
When water level in tank excavation backfill is above bottom of tank:
Minimum to declare a tank tight may need to be extended because a water sensor must be used.
When water level in tank excavation backfill is not determined:
Minimum to declare a tank tight may need to be extended because a water sensor must be used.
To determine test period, water level in tank excavation backfill must be assumed to be just above bottom of tank.

When using a water sensor, the test period is determined based on tank size, water level inside tank prior to test, tank tilt, type of water sensor, water sensor location in the tank, and water level in tank excavation backfill relative to bottom of tank. Tank tilt is determined by an inclinometer, or by measuring tank bottom elevations at two points within tank. Water sensor is placed in low end of tank or in pre-existing cross section of water inside tank.
For example:
For a printed circuit board water sensor, the test period to detect a 0.1 gph leak rate in a 10,000 gallon (96"dia x 324"lg) level tank without a striker plate and without water in the tank is 51 minutes for water ingress to contact the water sensor plus 38 minutes to allow the sensor to detect the "minimum detectable change in water level" (see "Water Sensor" section below).

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Tanknology, VacuTect

Test Period

For example:
For a magnetostrictive water sensor, the test period to detect a 0.1 gph leak rate in a 10,000 gallon (96"dia x 324"lg) level tank without a striker plate and without water in the tank is 37 minutes for water ingress to contact the water sensor plus 2 minutes to allow the sensor to detect the "minimum detectable change in water level" (see "Water Sensor" section below).

Test Pressure

Required test pressure is a function of tank construction, burial depth, product level in the tank, and water level in tank excavation backfill.
Pressure differential across tank wall at the bottom of the tank must be at least 0.5 psi.
Pressure differential across the tank wall is equal to the absolute value of vacuum applied to tank, plus the pressure of the tank excavation backfill on tank, plus groundwater pressure on tank, minus pressure of liquid in tank.
If water level in tank excavation backfill is not determined by wells, probes or pump boxes in the tank excavation backfill, test pressure calculation must account for both:
1) water level just above bottom of tank to achieve minimum 0.5 psi at worst case condition, and
2) tank completely submerged to assure tank is not damaged from over pressurization.

Temperature

Sonic emission and water ingress are independent of product temperature.

Water Sensor

Must be used if water level in tank excavation backfill is above tank bottom or if water level in tank excavation backfill was not determined.
Printed circuit board sensor minimum detectable water level is 0.022 inch, and minimum detectable change in water level is 0.016 inch.
Magnetostrictive sensor minimum detectable water level is 0.017 inch, and minimum detectable change in water level 0.001 inch.

Groundwater

If groundwater level in tank excavation backfill is above bottom of tank, or if groundwater level in tank excavation backfill is not determined, test time must be sufficient to detect water ingress using one of the above water sensors.

Comments

Evaluated using gasoline, diesel, Jet-A, and JP-4.
Microphone (hydrophone) should be located within 60 feet of any possible leak source.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If free product is present in tank excavation backfill, a leak in the free product zone may not be detected by a vacuum test method.
A well point or observation well in the tank excavation backfill can help identify the presence of free product, tank excavation backfill material, and water elevation in the tank excavation backfill.
More that 4 psi pressure differential across the tank wall at any location in the tank could damage tank.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/28/91, 09/18/92, 02/20/92, 01/18/94, 02/23/96

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Tanknology

Computerized VPLT Testing System

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1%.

Leak Threshold 0.05 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, waste oil.

Tank Capacity Maximum of 18,000 gallons. Tank must contain minimum 24 inches of product.

Waiting Time Must be long enough between delivery and testing to ensure a temperature change of less than 0.09 degrees F per hour, typically a minimum of 2 hours.
None between dispensing and testing. There must be no delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average over data window.
There must be no dispensing or delivery during test.

Temperature Average for product is typically determined by 5 thermistors.
A minimum of 1 thermistor is required.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test.

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

Comments Not evaluated using manifolded tank systems.
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.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/15/93

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Tanknology

Sure Test - Assured Tight System, Series IV

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.005%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 18,000 gallons.
Tank must be between 11 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing. None between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by temperature sensor probes.
A minimum 12 inches of product must be present for the temperature probes to operate properly.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted during test to provide a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Temperature probes and floats must be checked for proper operation prior to each test in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.
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.

Tanknology
11000 North MoPac Expressway, Suite 500
Austin, TX 78759
Tel: (800) 800-4633

Evaluator: ADA Technologies
Tel: (303) 792-5615
Date of Evaluation: 09/09/92

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Issue Date: February 17, 1998
Revision Date: April, 14, 2015

TeleData, Inc.

TankMate Versions 3.12, 3.20, 4.1

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.8% and PFA = 0.02% for both single and manifolded tank systems.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
This leak threshold is for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak threshold.
Gains (water ingress) are analyzed and evaluated on and individual basis.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 60,000 gallons for single tank.
Maximum of 60,000 gallons cumulative capacity for manifolded tank systems with no more than 3 tanks in the system.

Data Requirement
Minimum of 15 days of data is required.

System Features
Method of data analysis that system employs, and was used during evaluation process, is exclusive of any external control by vendor.
System consists of a fully automated software package with embedded algorithms for conducting leak detection testing. Consequently, third party evaluation procedure demonstrated that system can be used in-house with no requirement for direct vendor participation.

Evaluation Features
Evaluator tested this system for in-house use.
Computer program disk along with instructional documentation was supplied by vendor to evaluator.
Evaluator, without vendor involvement, analyzed required data and performed evaluation using program disk and accompanying documentation. Vendor was NOT present as an observer during evaluation.

Comments
46% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 53,349 gallons.
Leak rates of 0.05, 0.10, and 0.20 gph were used in the evaluation.
Data sets evaluated were supplied by the evaluator.
According to vendor, TankMate Versions 3.12 and 3.20 used the same legacy software language to program those versions and Version 4.1 used current software language to program this version.

TeleData, Inc.
900 East Ocean Blvd., Suite 250
Stuart, FL 34994
Tel: (772) 219-4661

Evaluator: Piotr Blass, Ph.D.
Tel: (407) 369-3467
Date of Evaluation: 05/15/97
The Comparison of Version 4.1 with Version 3.20 Was Performed by Dr. Bob Mitchell, SIR International
Date of Comparison: 04/06/15

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Tidel Engineering, Inc.

LIPSPC-301-0730-001, LIP-301-0729-001
Line Integrity Probe and Submersible Pump Controller

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification	Leak rate of 3.0 gph at 10 psi* with PD = 100% and PFA = 0%. Leak rate of 0.1 gph at 1.5 times operating pressure* with PD = 100% and PFA = 0%. *Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.
Leak Threshold	2.0 gph for leak rate of 3.0 gph. 0.06 gph for leak rate of 0.1 gph. A pipeline 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.
Specification	System tests pressurized fiberglass and steel pipelines. Tests are conducted at operating pressure.
Pipeline Capacity	Maximum of 129 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Response time is 1 minute for leak rate of 3.0 gph. Response time is 1 hour, 30 minutes for leak rate of 0.1 gph. Test data are acquired and recorded by a permanently installed microprocessor. Calculations are automatically performed by the microprocessor.
System Features	Permanent installation on pipeline. Automatic testing of pipeline. Preset threshold. Single test to determine if pipeline is leaking. Pump shutdown, message display, and alarm activation if leak is declared.
Calibration	System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/02/93

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Issue Date: April 18, 1997
Revision Date: September 11, 1998

Tidel Engineering, Inc.

Tidel Environmental Monitoring System, 3500 Series (Ultrasonic Probes #401-0009, #401-0010, #401-0023)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.3% and PFA = 4.7% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.5% and PFA = 0.5% for 4 hour test.

Leak Threshold
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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 2 hours, 29 minutes between delivery and testing.
Minimum of 15 minutes after dispensing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours to achieve PD = 98.6% and PFA = 1.4%.
Minimum of 4 hours to achieve PD = 99.5% and PFA = 0.5%.
Test data are acquired and recorded by the microprocessor contained within the EMS console.
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 from the measurement of the change in the speed of sound.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.48 inches.
Minimum detectable water level change is 0.035 inch.

Calibration
Temperature sensors and ultrasonic 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.
The water sensor, temperature sensor, and product level monitor are contained in a single ultrasonic probe. Not evaluated using manifolded tank systems.
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.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/16/95

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Issue Date: November 22, 1995
Revision Date: March 10, 2000

Tidel Engineering, Inc.

Tidel Environmental Monitoring System, EMS 2000, 3000, 3500 Series (Ultrasonic Probes #401-0009, #401-0010, #401-0021, #401-0022)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 96.2% and PFA = 3% for ultrasonic probes #401-0009 and #401-0010.
Leak rate of 0.2 gph with PD = 99.91% and PFA = 0.09% for ultrasonic probes #401-0021 and #401-0022.

Leak Threshold
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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 2 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 6 hours.
Test data are acquired and recorded by a microprocessor contained within the EMS console.
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 a minimum of 5 temperature sensors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.48 inches.
Minimum detectable water level change is 0.035 inch.

Calibration
Temperature sensors and ultrasonic 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.
EMS 2000 and 3000 Series are no longer manufactured by Tidel.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/07/93

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Issue Date: April 18, 1997
Revision Date: May 23, 2011

Tidel Engineering, Inc.

Tidel Environmental Monitoring System, EMS 4000
(Ultrasonic Probe #312-9000)

AUTOMATIC TANK GAUGING METHOD

Tidel Engineering, Inc. no longer manufactures or supports the use of this method.

Certification
Leak rate of 0.2 gph with PD = 97.4% and PFA = 2.6% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for 4 hour test.

Leak Threshold
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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 2 hours, 29 minutes between delivery and testing.
Minimum of 15 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours to achieve PD = 97.4% and PFA = 1.8% for leak rate of 0.2 gph.
Minimum of 4 hours to achieve PD = 99.9% and PFA = 0.1% for leak rate of 0.2 gph.
Test data are acquired and recorded by the microprocessor contained within the EMS console.
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 from the measurement of the change in the speed of sound.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.045 inches.
Minimum detectable water level change is 0.053 inch.

Calibration
Gain adjustment on probe must be checked annually 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.
This is a longer version of model #312-9001.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/16/95

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Issue Date: April 18, 1997
Revision Date: May 23, 2011

Tidel Engineering, Inc.

Tidel Environmental Monitoring System, EMS 4000
(Ultrasonic Probe #312-9001)

AUTOMATIC TANK GAUGING METHOD

Tidel Engineering, Inc. no longer manufactures or supports the use of this method.

Certification Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 2 hours, 23 minutes between delivery and testing.
Minimum of 15 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours for leak rate of 0.2 gph.
Test data are acquired and recorded by the microprocessor contained within the EMS console.
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 from the measurement of the change in the speed of sound.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.045 inches.
Minimum detectable water level change is 0.053 inch.

Calibration Gain adjustment on probe must be checked annually 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.
This is a shorter version of model #312-9000.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/16/95

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Tidel Engineering, Inc.

EMS-3500 Liquid Discriminatory Probes Part 301-0635, Containment Sump Probes Part 301-0642, Tidel Detector #301-0752-001

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity/hydrocarbon sensitive polymer (Liquid Discriminatory Probes Part 301-0635), magnetic switch/float and hydrocarbon sensitive polymer (Containment Sump Probes Part 301-0642), float switch (Tidel Detector #301-0752-001)

Test Results:

Liquid Discriminatory Probes Part 301-0635	unleaded gasoline	water
Response time (min)	3.59	0.96
Recovery time (min)	13.18	<1
Product activation height (cm)	1.76	0.49
Lower detection limit (cm)	4.19	1.52

Containment Sump Probes Part 301-0642		high*	low*
Response time (min)		4.12	4.76
Recovery time (min)	>60	<1	<1
Product activation height (cm)	2.27	19.22	4.31
Lower detection limit (cm)	2.32	N/A**	4.31

	50% by weight ethylene glycol in water		30% by weight calcium chloride in water	
Tidel Detector #301-0752-001	high	low	high	low
Response time (min)	21.91	30.10	22.27	31.08
Recovery time (min)	<1	<1	<1	<1
Product activation height (cm)	28.92	2.75	28.82	2.48

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

Specificity Results (in addition to above for Liquid Discriminatory Probes Part 301-0635 and Containment Sump Probes Part 301-0642):

Activated: synthetic gasoline, diesel, heating oil #2.

Comments:

Liquid Discriminatory Probes Part 301-0635 and Tidel Detector #301-0752-001 are reusable.
Containment Sump Probes Part 301-0642 was tested to determine its capability of detecting hydrocarbons floating on water. A Lower detection limit thickness of 0.04 cm was declared, on average, in 16 minutes, 41 seconds with recovery time averaging 12 minutes, 55 seconds.
Tidel Detector #301-0752-001 is intended to monitor the level of either ethylene glycol or calcium chloride solutions in interstitial or annular space of a double-walled tank. Detector activates an alarm if any significant gain or loss of solution occurs.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 01/29/93, 02/17/93, 04/20/93

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Tidel Engineering, Inc.

EMS-3500 with Monitoring Well Probe Part 301-0641, Sheen Probes Part 301-0687, Tidel Detector #301-0762

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: conductivity via resistor ladder network (Monitoring Well Probe Part 301-0641), electrical conductivity/hydrocarbon sensitive polymer (Sheen Probes Part 301-0687 and Tidel Detector #301-0762).

Test Results:

Monitoring Well Probe Part 301-0641	unleaded gasoline	synthetic gasoline
Detection time (min:sec)	0:04	0:07
Fall time (min)	<1	<1
Lower detection limit (cm)	0.32	0.32
Sheen Probes Part 301-0687		
Detection time (min:sec)	7:45	3:35
Fall time (min:sec)	18:01	16:57
Lower detection limit (cm)	0.02	0.04
Tidel Detector #301-0762		
Detection time (min:sec)	9:31	7:05
Fall time (min:sec)	55:42	17:04
Lower detection limit (cm)	0.04	0.08

Specificity Results (in addition to above):

Activated: n-hexane, diesel, jet-A fuel, JP-4 jet fuel (except Sheen Probes Part 301-0687), toluene, xylene(s).

Comments:

Sensors are reusable.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 02/02/93, 01/31/93, 03/18/93

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Tidel Engineering, Inc.

Tidel Detector #301-0324-001, #301-0325-001, #301-0326-001, #301-0326-002

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

Tidel Detector #301-0324-001, #301-0325-001	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (sec)	2	2	1
Fall time (sec)	1	2	2
Lower detection limit (cm)	0.16-0.32	0.16-0.32	0.16-0.32
Tidel Detector #301-0326-001, #301-0326-002			
Detection time (sec)	4	7	2
Fall time (sec)	3	4	4
Lower detection limit (cm)	0.08-0.32	0.08-0.32	0.08-0.32

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Manufacturer's specifications:
Tidel Detector #301-0324-001
Application: Liquid sensor, water, used in 4" monitoring well.
Sensor: Magnetism and conductivity pins.
Detection Range: 1/8" floating product on groundwater or 1.5" free product.
Tidel Detector #301-0325-001
Application: Liquid sensor, water or hydrocarbon used in reservoir, sump or pipeline trench.
Sensor: Magnetism and conductivity pins.
Detection Range: 1/8" floating product on groundwater or 1.5" free product.
Tidel Detector #301-0326-001
Application: Liquid sensor, water, used in 2" monitoring well.
Sensor: Magnetism and conductivity pins.
Detection Range: 1/8" floating product on groundwater or 2.5" free product.
Tidel Detector #301-0326-002
Application: Liquid sensor, water, used in annulus of double-wall steel tanks.
Sensor: Magnetism and conductivity pins.
Detection Range: 1/8" floating product on groundwater or 2.5" free product.

Comments:
Sensors are reusable.
Lower detection limit has been statistically determined to be within the range specified above.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Radian Corp.
Tel: (512) 454-4797
Date of Evaluation: 07/08/91

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Tidel Engineering, Inc.

EMS-3000 301-0328-001, 301-0330-001
and
EMS-3500 Vapor Sensor Probe Part #301-0634

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: adsistor

Test Results:

EMS-3000 301-0328-001, 301-0330-001	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (min:sec)	1:31	1:05	1:26
Fall time (min:sec)	5:39	4:23	9:38
Lower detection limit (ppm)	10-100	10-500	10-50
EMS-3500 Vapor Sensor Probe Part #301-0634			
Detection time (min:sec)	2:46	1:41	1:50
Fall time (hr)*	>1	>1	>1
Lower detection limit (ppm)	100	500	100

* The vapor sensor probe was recalibrated when it did not recover, after 1 hour, from exposure to test vapors.

Specificity Results (in addition to above for EMS-3000 301-0328-001, 301-0330-001):
Activated: toluene, xylene(s)
Not Activated: n-hexane.

Specificity Results (in addition to above for EMS-3500 Vapor Sensor Probe Part No. 301-0634):
Activated: n-hexane, toluene, xylene(s).

Manufacturer's specifications:
EMS-3500 Vapor Sensor Probe Part No. 301-0634 is for use in normally dry monitoring wells to detect hydrocarbon vapors. It can be used in monitoring wells up to 20 feet deep. The probe will alarm if it comes in contact with water and must be removed immediately to prevent damage to probe.

Comments:
EMS-3000 lower detection limit has been statistically determined to be within the range specified above.

Tidel Engineering, Inc.
2025 West Beltline Road, #114
Carrollton, TX 75006
Tel: (800) 678-7577

Evaluator: Radian Corp.
Tel: (512) 454-4797
Dates of Evaluation: 07/08/91, 03/18/93

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Tokheim Corp.

Tokheim Pressure Monitor, Models PM 101, 585A-PM

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification	Leak rate of 3.0 gph with PD = 100% and PFA = 0%.
Leak Threshold	2.25 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel.
Specification	System tests pressurized fiberglass and steel pipelines. Tests are conducted at 150% operating pressure.
Pipeline Capacity	Maximum of 78 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Response time is 4 seconds.
System Features	Permanent installation on pipeline. Automatic testing of pipeline. Preset threshold. Single test to determine if pipeline is leaking. Restricted flow to dispenser if leak is declared.
Calibration	System must be checked semi-annually and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	No longer manufactured by Tokheim Corporation.

Tokheim Corp.
U. S. Division is bankrupt as of 02/2003
Website: www.tokheim.com

Evaluator: Vista Research
Tel: (415) 966-1171
Date of Evaluation: 11/02/90

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Issue Date: July 31, 2009
Revision Date: August 20, 2009

TOPS, Inc.
(marketed by Westech Inc.)

Pnuemercator TMS 2000, TMS 3000
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.0% and PFA = 5% for 2 hour test.
Leak rate of 0.2 gph with PD = 99.8% and PFA = 0.2% for 4 hour test.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 0.1% for 8 hour test.
Leak rate of 0.1 gph with PD = 95.3% and PFA = 4.7% for 7 hour test.
Leak rate of 0.1 gph with PD = 95.8% and PFA = 4.2% for 8 hour test.

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.

Tank Capacity
Maximum of 20,000 gallons.
Tank must be between 20 and 95% full.

Waiting Time
Minimum of 8 hours between delivery and testing.
Minimum of 20 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 7 hours for leak rate of 0.1 gph.
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.
Equipment is manufactured by Pneumercator for TOPs, Inc. and is marketed by Westech, Inc.

TOPS, Inc.
P.O. Box 57307
Salt Lake City, Utah 84157
Tel: (800) 433-8831

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/15/97

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TotalSIR

TotalSIR Version 1.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD > 99.9% and PFA < 0.1% for leak threshold of 0.1 gph.
Leak rate of 0.2 gph with PD > 97.2% and PFA < 0.1% for leak threshold of 0.16 gph.

Leak Threshold
0.1 and 0.16 gph for leak rate of 0.2 gph.
These leak thresholds are for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak thresholds.

Applicability
Gasoline, diesel, kerosene.

Tank Capacity
Maximum of 45,000 gallons for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 23 days of product level and flow through data.

System Features
Method of data analysis that system employs, and was used during evaluation process, is exclusive of any external control by vendor.
System consists of a fully automated software package with embedded algorithms for conducting leak detection testing. Consequently, third party evaluation procedure demonstrated that system can be used in-house with no requirement for direct vendor participation.

Evaluation Features
This system was tested for in-house use.
Vendor, with evaluator present, analyzed required data and performed evaluation using program disk only.
Results were presented to evaluator directly from the computer without additional vendor involvement.

Comments
Gains (water ingress) are investigated using current and previous month raw inventory data.
73% of data sets were from manifolded tank systems.
Of 41 data sets submitted for evaluation, 4 were inconclusive.
Median monthly throughput of tanks evaluated was 22,370 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

TotalSIR
P.O. Box 2040
Cornelius, NC 28031
Tel: (704) 892-9941
E-mail: information@totalsir.com
URL: www.totalsir.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/07/93, 07/18/95, 06/16/00, 08/27/01

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. Please refer to complete "DISCLAIMER" on page ii of this list.

TotalSIR

TotalSIR Version 2.0

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD = 99% and PFA = 1%.
Leak rate of 0.1 gph with PD = 99% and PFA = 1%.

Leak Threshold
0.10 gph for a leak rate of 0.2 gph.
0.05 gph for a leak rate of 0.1 gph.
These leak thresholds are for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak thresholds.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 45,000 gallons for single tanks.
Maximum of 45,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 23 days of product level and flow through data.

Comments
68% of data sets evaluated were from manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 22,370 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets used in this evaluation were supplied by evaluator.
100% of inventory data used in this evaluation were gauge stick readings.
Gains (water ingress) are analyzed and evaluated on an individual basis.
The same data sets were used for both the 1995 and 1997 evaluations.

TotalSIR
P.O. Box 2040
Cornelius, NC 28031
Tel: (704) 892-9941
E-mail: information@totalsir.com
URL: www.totalsir.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/27/92, 06/8/95, 07/27/97

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Training and Services Corp.
(originally listed as Hasstech)

AcuRite
(for Rigid and Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

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

Leak Threshold 0.01 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

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

Pipeline Capacity Maximum of 150 gallons.

Waiting Time Minimum of 6 hours between delivery and testing.
Minimum of 30 minutes between dispensing and testing.

Test Period Minimum of 30 minutes.
Test data are acquired and recorded manually.
Manual calculations are performed by the operator on site.

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

Comments Operating instructions include specific procedures for flexible pipelines.
Formerly manufactured by Hasstech.

Training and Services Corp.
501 Bains St., Suite 113
Brookshire, TX 77423
Tel: (281) 934-3839

Evaluator: Lamar University
Tel: (409) 880-8788
Dates of Evaluation: 03/25/91, 04/02/01

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Issue Date: November 22, 1995
Revision Date: January 13, 2015

Triangle Manufacturing, Inc.

TEI Model LT-3, Version 1.0 (for Rigid and Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

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

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

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

Specification System tests rigid and flexible pipelines.
Tests are conducted at 150% operating pressure.

Pipeline Capacity Maximum of 110.8 gallons.

Waiting Time None between delivery and testing.
Minimum of 15 minutes between dispensing and testing of rigid pipelines (steel, fiberglass).
Minimum of 45 minutes between dispensing and testing of flexible pipelines (15 minute line stretch period at either 150% of pump operating pressure plus 10% or at a minimum 60 psi, whichever is greater; **and** a stabilization period of 30 minutes at either 150% of pump operating pressure or at a minimum 50 psi, whichever is greater).

Test Period Minimum of 15 minutes.
Test data are acquired and recorded manually.
Manual calculations are performed by the operator on site.

Temperature Product change per hour must be less than 4 degrees F.

Calibration Sensors must be checked annually and calibrated semi-annually in accordance with manufacturer's instructions.

Triangle Manufacturing, Inc.
3726 Park Place
Montrose, CA 91020
Tel: (818) 301-7777

Evaluator: United States Testing Co., Inc.
Tel: (213) 723-7181
Date of Evaluation: 03/03/92
Evaluator: Consolidated Testing Laboratories, Inc.
Tel: (559) 592-3555
Date of Evaluation: 11/05/14

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Triangle Manufacturing, Inc.

TEI Ullage Test, Version 1.0 (Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight when an increase in the acoustic noise level (above background) of the tank under vacuum is detected due to air or water ingress.

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

Tank Capacity Maximum ullage volume is 15,000 gallons.
Microphone should be located within 24 feet of all points within the ullage.

Waiting Time None if test is conducted after the underfilled tank test.

Test Period Minimum of 1 minute.
There must be no dispensing or delivery during test.

Test Pressure Vacuum of 1 psi must be maintained in ullage.
If vacuum cannot be maintained, see manufacturer's instructions.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to the groundwater in tank excavation backfill must be determined.
If groundwater is above product level, vacuum must be adequate to detect an ingress of groundwater.

Calibration Sensors must be calibrated before each test in accordance with manufacturer's instructions.

Comments Manifolded tank systems must be isolated prior to test. Evaluated using unleaded gasoline.
Tests only ullage portion of tank.
Product-filled portion of tank must be tested using an underfill test method.
Microphone was 24 feet away from the leak source during evaluation.
Headphones are used during test to listen for the signal of air ingress.
Noise signals are tape recorded (not digitally recorded).
Test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

Triangle Manufacturing, Inc.
3726 Park Place
Montrose, CA 91020
Tel: (818) 301-7777

Evaluator: United States Testing Co., Inc.
Tel: (213) 723-7181
Date of Evaluation: 05/05/93

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Triangle Manufacturing, Inc.

TEI System 5000, Version 1.0, Version 1.0W

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (VACUUM)

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

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

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

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

Waiting Time None between delivery and testing.

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

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

Temperature Acoustic signal is independent of product temperature.

Water Sensors Version 1.0W (includes either Triangle TEI System 5000 Water Sensor or Estabrook EZ-3 Conductivity Water Sensor) must be used to detect water ingress.
For Triangle TEI System 5000 Water Sensor:
Minimum detectable water level is 0.0532 inch.
Minimum detectable change in water level is 0.00013 inch.
Minimum water level in tank must be adjusted to at least 0.0532 inch at the sensor before starting the test.
For Estabrook EZ-3 Conductivity Water Sensor:
Minimum detectable water level is 0.014 inch.
Minimum detectable change in water level is 0.0095 inch.
Minimum water level in tank must be adjusted to at least 0.014 inch at the sensor before starting the test.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Triangle Environmental, Inc., TEI System 5000 Version 1.0, Version 1.0W

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

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

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

Triangle Manufacturing, Inc.
3726 Park Place
Montrose, CA 91020
Tel: (818) 301-7777

Evaluator: United States Testing Co., Inc.
Tel: (213) 723-7181
Date of Evaluation: 02/04/93
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/20/98

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Issue Date: November 22, 1995
Revision Date: January 13, 2015

Triangle Manufacturing, Inc.

TEI System 4000, Version 1.0

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 99% and PFA = 4.8%.

Leak Threshold 0.05 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, fuel oil #4.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 100% full.

Waiting Time Minimum of 6 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum is determined by system's computer.
Average was 4 hours during the evaluation.
Leak rate is calculated from last 2 hours of test period data.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 3 thermistors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Thermistors must be calibrated before each test in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.
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.
May also be used as an overfill test method.

Triangle Manufacturing, Inc.
3726 Park Place
Montrose, CA 91020
Tel: (818) 301-7777

Evaluator: United States Testing Co., Inc.
Tel: (213) 723-7181
Date of Evaluation: 04/02/91

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TRM Sensors LLC

Models TRM-CC and TRM-CB Sensors with TRM Relay Unit Type-C Alarm Console and TRM-CBX Sensor with TRM-FLASHER-BE Alarm Console

OUT-OF-TANK DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: solid state equivalent to selective float switch (no moving parts)

Test Results:

TRM-CC	unleaded gasoline	diesel	crude oil	jet A fuel	water	***produced water
Detection time (min)	<1	6	29	5	N/A	N/A
Fall time (min)	22	*	**	*	N/A	N/A
Threshold (in)	<0.0625	0.1887	0.1776	0.1783	N/A	N/A
TRM-CB						
Detection time (min)	<1	6	29	5	N/A	<1
Fall time (min)	22	*	**	*	N/A	<1
Threshold (in)	<0.0625	0.1894	0.1776	0.1819	N/A	0.4728
TRM-CBX						
Detection time (min)	<1	6	29	<5	N/A	<1
Fall time (min)	22	*	**	*	N/A	<1
Threshold (in)	<0.0625	0.2139	0.1776	0.1821	N/A	0.4167

*Indicates sensor must be cleaned
**Indicates sensor may require being sent to manufacturer for extra cleaning
***produced water is oil field brine

Specificity Results:
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:
The TRM-CC sensor responds to hydrocarbon liquids only and ignores water and produced water.
The TRM-CB and TRM-CBX sensors respond to hydrocarbon liquids and produced water but ignore water.
Sensors can be removed, cleaned, and reinstalled if alarm is triggered or for periodic testing, unless otherwise indicated. Once a sensor is exposed to diesel fuel or Jet A fuel, the sensor will need to be removed and cleaned before it can be used again. For crude oil, the sensor may require extra cleaning or may require return to the factory for rework or replacement.
These sensors do not require calibration.
These sensors are listed under NWGLDE's out-of-tank detectors (liquid-phase) category, but can function as interstitial detectors (liquid-phase).

TRM Sensors LLC
2320 Cheshire Way
Redwood City, CA 94061
Tel: 1-415 860 2044
E-mail: ken.mccoy@trmsensors.com
URL: www.trmsensorss.com

Evaluator: Ken Wilcox Associates, Inc.
Tel: (816) 443-2494
Web: www.kwaleak.com
Date of Evaluation: 11/09/15

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Issue Date: November 22, 1995
Revision Date: April 17, 2003

Tyco Thermal Controls LLC
(originally listed as Raychem Corp.)

TraceTek Alarm and Locator Modules with TT502, TT5000, TT3000 Fuel Sensing Cable

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

	unleaded gasoline		
	1/3 MER*	2/3 MER	MER
TT502	334 m	665 m	995 m
Response time (min)	22.11	17.13	19.42
Product activation height (cm)	1.53	1.53	1.53
Detection length (cm)	61	61	61
Lower detection limits (cm)			
Product activation height	N/D*	N/D	0.77
Detection length	N/D	N/D	10

	1/3 MER	2/3 MER	MER
TT5000	508 m	1016 m	1524 m
Response time (min)	12.02	9.18	7.51
Product activation height (cm)	0.74	0.74	0.74
Detection length (cm)	30.5	30.5	30.5
Lower detection limits (cm)			
Product activation height	N/D	N/D	0.74
Detection length	N/D	N/D	10

	3% by weight salt in water			other solutions**
	1/3 MER	2/3 MER	MER	MER
TT3000	508 m	1016 m	1524 m	1524 m
Response time (min)	<1	<1	<1	<1
Recovery time (min)	<1	<1	<1	<1
Product activation height (cm)	<0.3	<0.3	<0.3	<0.3
Detection length (cm)	<15.2	<15.2	<15.2	<15.2
Lower detection limits (cm)				
Product activation height	N/D	N/D	<0.3	N/D
Detection length	N/D	N/D	<5.08	N/D

* See glossary.
** 5% by volume oil in 3% by weight salt water, 10% by volume oil in 3% by weight salt water, 0.1 M hydrochloric acid (HCl), 0.1M sodium hydroxide (NaOH).

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Tyco Thermal Controls LLC, TraceTek Alarm and Locator Modules with TT502, TT5000, TT3000 Fuel Sensing Cable

Specificity Results (in addition to above for TT502 and TT5000):
Activated: synthetic gasoline, diesel, heating oil #2, jet-A fuel (TT5000 only).
Not Activated: water.

Specificity Results (in addition to above for TT3000):
Activated: water
Not Activated: unleaded gasoline, synthetic gasoline, diesel, JP-8 fuel.

Comments:
Evaluation also covered quantitative leak location.
TT502, TT5000 Fuel Sensing cable is not reusable.
Lower detection limit is calculated at MER only, and cable is assumed to be equally or more sensitive at shorter lengths.

Tyco Thermal Controls LLC
300 Constitution Dr.
Menlo Park, CA 94025-1164
Tel: (800) 545-6258

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 05/15/92, 12/20/95, 02/20/98

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Tyco Thermal Controls LLC

TraceTek Alarm and Locator Modules with TT-FFS Fast Fuel Sensor

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

TT-FFS (.005" fuel on water)	synthetic gasoline	diesel	jet-A fuel	crude oil
Response time (min:sec)	<1	<1	<1	2:33
TT-FFS (.024" fuel on flat surface)				
Response time (min)	<1	<1	<1	11

Specificity Results:
Activated: synthetic gasoline, diesel, jet-A fuel, crude oil.
Not Activated: water

Comments:
All data points are the average of 6 samples.
Dry surface fuel layer depth estimated at .005" for gasoline, diesel and jet-A, .024" for crude oil.
Fuel layer for fuel floating on water estimated to be .005" for all tests.
Sensors can be cleaned and reset by soaking in naphtha and allowing them to dry in the air for 1 hour.
Sensors that do not reset must be replaced.
Sensor can be periodically tested with naphtha. Manufacturer recommends 6 month interval.

Tyco Thermal Controls LLC
300 Constitution Dr.
Menlo Park, CA 94025-1164
Tel: (800) 545-6258

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/06

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United Testing Systems

U.T.S. 6000 Line Tester

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.9% and PFA = 5%.

Leak Threshold 0.03 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

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

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
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 Maximum of 44 gallons.

Waiting Time None between delivery and testing. 30 minutes between dispensing and testing.

Test Period 1 hour under ideal conditions. Actual test time will depend on line size and temperature conditions at the site.
Data is collected every 5 minutes.
Three consecutive consistent readings are required for a valid test, with the first reading taken at zero time.
Test data are acquired and recorded manually.
Manual calculations performed by the operator on site.

Calibration No temperature sensors used.
No calibration required.
System must be checked annually in accordance with manufacturer's instructions.
Technicians must be certified by the manufacturer prior to using this equipment and recertified every two years.

United Testing Systems
R.R. 1, Box 44
Beulah, ND 58523
Tel: (701) 748-2381
E-mail: metepee@westriv.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 12/22/94

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: November 14, 1997

Universal Sensors and Devices, Inc.

TICS-1000
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 96.6% and PFA = 3.4%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 90% full.

Waiting Time Minimum of 8 hours between delivery and testing.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 6 hours.
Test data are acquired and recorded by a microprocessor.
Leak rate is calculated from average of subsets of all collected data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.83 inch.
Minimum detectable water level change is 0.0116 inch.

Calibration RTDs 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.

Universal Sensors and Devices, Inc.
9205 Alabama Ave., Unit C
Chatsworth, CA 91311
Tel: (800) 899-7121, (818) 998-7121

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/20/93

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: April 18, 1997
Revision Date: August 23, 1999

Universal Sensors and Devices, Inc.

LTC-1000
(Mass Buoyancy Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 14,244 ft², leak rate is 1.4 gph with PD = 97.2% and PFA = 2.8%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 14,244 ft²) x 1.4 gph].
Example:
For a tank with PSA = 20,000 ft²; leak rate = [(20,000 ft² ÷ 14,244 ft²) x 1.4 gph] = 2.0 gph.
Calculated minimum detectable leak rate is 1.18 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 14,244 ft², leak threshold is 0.7 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 14,244 ft²) x 0.7 gph].
Example:
For a tank with PSA = 20,000 ft²; leak threshold = [(20,000 ft² ÷ 14,244 ft²) x 0.7 gph] = 1.0 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

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

Tank Capacity
Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 35,610 ft² (approximately 213 ft diameter).
Performance not sensitive to product level.

Waiting Time
Minimum of 3 hours, 42 minutes after delivery.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
None between dispensing and testing.

Test Period
Minimum of 49 hours.
There must be no dispensing or delivery during test.

Temperature
Measurement not required by this system.

Water Sensor
None.
Water leaks are measured as increase in mass inside tank.

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

Comments
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.
Evaluated in a nominal 2,000,000 gallon, vertical underground tank with product surface area (PSA) of 14,244 ft².

Universal Sensors and Devices, Inc.
9205 Alabama Ave.
Chatsworth, CA 91311
Tel: (800) 899-7121, (818) 988-7121

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/17/96

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: April 18, 1997
Revision Date: August 23, 1999

Universal Sensors and Devices, Inc.

LTC-2000
(Differential Pressure Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 14,244 ft², leak rate is 3.0 gph with PD = 98.8% and PFA = 1.2%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 14,244 ft²) x 3.0 gph].
Example:
For a tank with PSA = 20,000 ft²; leak rate = [(20,000 ft² ÷ 14,244 ft²) x 3.0 gph] = 4.2 gph.
Calculated minimum detectable leak rate is 2.15 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 14,244 ft², leak threshold is 0.7 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 14,244 ft²) x 1.5 gph].
Example:
For a tank with PSA = 20,000 ft², leak threshold = [(20,000 ft² ÷ 14,244 ft²) x 1.5 gph] = 2.1 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

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

Tank Capacity
Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 35,610 ft² (approximately 213 ft diameter).
Performance not sensitive to product level.

Waiting Time
Minimum of 3 hours, 30 minutes after delivery.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
None between dispensing and testing.

Test Period
Minimum of 48 hours, 18 minutes.
There must be no dispensing or delivery during test.

Temperature
Measurement not required by this system.

Water Sensor
None.
Water leaks are measured as increase in mass inside tank.

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

Comments
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.
Evaluated in a nominal 2,000,000 gallon, vertical underground tank with product surface area (PSA) of 14,244 ft².

Universal Sensors and Devices, Inc.
9205 Alabama Ave.
Chatsworth, CA 91311
Tel: (800) 899-7121, (818) 988-7121

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/17/96

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Universal Sensors and Devices, Inc.

Leak Alert System Models LAL-100, LA-01, LA-02, LA-04, LA-X4, LA-08, DLS-01, LS-20, LS-36, LS-70, CATLAS with LALS-1 Liquid Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: thermal conductivity

Test Results:

	unleaded gasoline
Response time (min)	1.24
Recovery time (min)	<1
Product activation height (cm)	0.61
Lower detection limit (cm)	0.76

Specificity Results (in addition to above):

Activated: synthetic gasoline, diesel, heating oil #2, water.

Comments:

Sensors are reusable.

Universal Sensors and Devices, Inc.
9205 Alabama Ave., Unit C
Chatsworth, CA 91311
Tel: (800) 899-7121, (818) 998-7121

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 06/01/94, 04/22/97

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Issue Date: November 22, 1995
Revision Date: August 23, 1999

Universal Sensors and Devices, Inc.

Leak Alert System Models LAV-100, LA-01, LA-02, LA-04, LA-X4, LA-08, CATLAS with LAVS-1 MOS Vapor Sensor

OUT-OF-TANK DETECTOR (VAPOR-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: metal oxide semiconductor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4jet fuel
Detection time (sec)	31	40	42
Fall time (min:sec)	4:43	4:25	4:30
Lower detection limit (ppm)	100	N/D*	N/D

* See glossary.

Specificity Results (in addition to above):

Activated: n-hexane, toluene, xylene(s).

Universal Sensors and Devices, Inc.
9205 Alabama Ave., Unit C
Chatsworth, CA 91311
Tel: (800) 899-7121, (818) 988-7121

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 06/01/94

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Issue Date: July 19, 1996
Revision Date: April 4, 2007

USTest, Inc.
(previously listed as Sound Products Manufacturing, Inc.)

UST 2001 and UST 2001 Quick Test
(Ultrasonic Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.5% and PFA = 2.5% for Quick Test.
Leak rate of 0.1 gph with PD = 95.2% and PFA = 4.8%.

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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time
Minimum of 4 hours between delivery and testing.
Minimum of 15 minutes between dispensing and testing. There must be no delivery during waiting time.

Test Period
Minimum of 30 minutes for leak rate of 0.2 gph (Quick Test).
With a test period of 1 hour, system has PD = 99.9% and PFA = 0.1%.
Minimum of 1 hour for leak rate of 0.1 gph.
With a test period of 2 hours, system has PD = 98.6% and PFA = 1.4%.
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 from the measurement of the change in the speed of sound.

Water Sensor
Must be used to detect water ingress. Water is declared via an ultrasonic signal ranging to the water interface.
Minimum detectable water level in the tank is less than 0.1 inch.
Minimum detectable change in water level is 0.046 inch.

Calibration
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.

Southwest Environmental Services, Inc.
102 Abigayle Row
Scott, LA 70508
Tel: (337) 235-1184

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/06/95

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Issue Date: November 22, 1995
Revision Date: April 4, 2007

USTest, Inc.
(previously listed as Sound Products Manufacturing, Inc.)

UST 2000/U
(Pressure and Vacuum Test)

NON-VOLUMETRIC TANK TIGHTNESS TEST METHOD (ULLAGE)

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

Leak Threshold A tank system should not be declared tight when there is a substantial increase in the acoustic noise signal (when the tank is under pressure or vacuum) above the background signal (prior to pressurization or evacuation) in the frequency interval of 10 kHz to 20 kHz.
The acoustic signal to noise ratio is preprogrammed into the system's computer and is not revealed to or adjustable by the operator.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4, waste oil.
Equipment is not in contact with the product.

Tank Capacity Maximum ullage volume is 7,550 gallons for pressure test and 5,250 gallons for vacuum test.

Waiting Time None if test is conducted after an underfilled tank tightness test.

Test Period Minimum of 15 minutes (includes collection of background information).
There must be no dispensing or delivery during test.

Test Pressure Net pressure of 2.0 psi or vacuum of 1.0 psi must be maintained in ullage.

Temperature Acoustic signal is independent of product temperature.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above product level, vacuum test must not be used.
Pressure test must be conducted using net pressure exceeding 2.0 psi in the ullage.

Calibration Test equipment must be checked and, if necessary, calibrated by tester before each test.

Comments Not evaluated using manifolded tank systems.
Evaluated using unleaded gasoline as test product.
Tests only ullage portion of tank.
Product-filled portion of the tank must be tested using an underfill test method.
Microphone was less than 8 feet, 6 inches from the leak source during evaluation.
If the background noise is too high, test is inconclusive.
Maximum background noise is preprogrammed into system's computer and not revealed to or adjustable by the technician.
Vibration due to nearby equipment or dripping condensation may interfere with test.
Vacuum test method may not be effective in some tank excavation backfill (such as clay) because it may plug holes in tank.
If soil is saturated with product, air or water ingress may not be declared by vacuum test.
A well point in tank excavation backfill may help identify presence of this condition.

Southwest Environmental Services, Inc.
102 Abigayle Row
Scott, LA 70508
Tel: (337) 235-1184

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/24/92

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Issue Date: April 17, 2002
Revision Date: January 12, 2011

USTest, Inc.

(previously listed as Sound Products Manufacturing, Inc.)

UST 2001/P
(Ultrasonic Probe)

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

Certification Leak rate of 0.1 gph with PD = 97.0% and PFA = 0.6%

Leak Threshold 0.05 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.

Tank Capacity Maximum of 20,000 gallons.
Minimum product level required is 15 inches (1 inch above lowest calibration rod).

Waiting Time Minimum of 4 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 1 hour.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by an ultrasonic probe containing 5 temperature targets.
Targets located above the product surface are not used in data analysis.
If a test is to be conducted following a product delivery, the temperature difference between the product in the tank and the product delivered should not exceed 7.7 degrees F.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of the tank during test.

Calibration Probe must be checked regularly and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments System consists of an ultrasonic probe which interfaces with a micro processing unit.
Not evaluated using manifolded tank systems.
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.

Southwest Environmental Services, Inc.
102 Abigayle Row
Scott, LA 70508
Tel: (337) 235-1184

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/11/01

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Issue Date: November 22, 1995
Revision Date: March 20, 2003

USTest, Inc.

UST 2000/LL

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

USTest, Inc., no longer supports the use of this method *

Certification Leak rate of 0.1 gph with PD = 98.12% and PFA = 1.88%.

Leak Threshold 0.05 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, water, kerosene.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 15% full.
There must be at least 20 inches and not more than 67 inches of product in the tank.

Waiting Time Ranges from 3 to 12 hours between delivery and testing.
Testing may begin when the rate of product temperature change does not exceed 0.1 degree F per hour.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded by system's computer, which does a regression analysis to determine the leak rate.
An ultrasonic device is used to measure changes in product level.
There must be no dispensing or delivery during test.

Temperature Average for product is determined from the measurement of the change in the speed of sound.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of tank during test.

Calibration Temperature sensors and probes must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.
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.

*** USTest Inc. has requested removal of the 2000/LL equipment from the NWGLDE List and discourages the use of this method due to software security and data integrity problems.**

USTest, Inc.
c/o Dubois, Bryant, Campbell & Schwartz
P.O Box 909
Austin, TX 78767
512-457-8000

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/09/94

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Issue Date: November 22, 1995
Revision Date: March 20, 2003

USTest, Inc.

UST 2000/P

VOLUMETRIC TANK TIGHTNESS TEST METHOD (UNDERFILL)

USTest, Inc., no longer supports the use of this method *

Certification
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1% for tanks up to 15,000 gallons.
Leak rate of 0.1 gph with PD = 99.7% and PFA = 0.3% for tanks from 15,000 gallons up to 45,000 gallons.

Leak Threshold
0.05 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, water, kerosene.

Tank Capacity
Maximum of Between 20,000 gallons and 45,000 gallons.
Tank must be minimum 78.6% full.

Waiting Time
Minimum for tanks up to 45,000 gallons must be determined from the manufacturer's chart of "Wait Time versus Tank Volume." This chart must be included in the tank test report.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum for tanks less than 10,000 gallons is one hour.
Minimum for tanks from 10,000 to 45,000 gallons is determined from the manufacturer's chart of "Differential Volume versus Test Duration."
Line labeled PD = 99.9% must be used. This chart must be included in the tank test report. Test data are acquired and recorded by system's computer, which does a regression analysis to determine the leak rate. There must be no dispensing or delivery during test.

Temperature
Average for product is determined from the measurement of the change in the speed of sound.

Groundwater
Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 1 psi at bottom of the tank during test.

Comments
Not evaluated using manifolded tank systems.
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.

*** USTest Inc. has requested removal of the 2000/P equipment from the NWGLDE List and discourages the use of this method due to software security and data integrity problems.**

USTest, Inc.
c/o DuBois, Bryant, Campbell & Schwartz.
P.O Box 909
Austin, TX 78767
512-457-8000

Evaluators: Midwest Research Institute
Tel: (816) 753-7600
and Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/05/90 (1000-10,000 gallons),
08/04/92 (10,000-45000 gallons)

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Issue Date: August 23, 1999
Revision Date: April 28, 2005

Vaporless Manufacturing

Vaporless LD-2100 or PLC-5000 with 98LD-2000PLC (for Rigid and Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized flexible, fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 172 gallons for rigid pipelines.
Maximum of 39.5 gallons for flexible pipelines.

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

Test Period
Response time is less than 8 minutes for leak rate of 3.0 gph.
Response time is 1 hour, 48 minutes to 10 hours, 54 minutes for leak rates of 0.2 and 0.1 gph.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold. Single test to determine if pipeline is leaking.
LD-2100 is a stand alone system.
PLC-5000 must be coupled with the 98LD-2000.
Pump shutdown, message display and alarm activation if leak is declared.

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

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 05/20/98, 11/10/98

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Vaporless Manufacturing

Vaporless LD-2000, LD-2000S

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification	Leak rate of 3.0 gph with PD = 100% and PFA = 0%.
Leak Threshold	1.7 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel.
Specification	System tests pressurized fiberglass or steel pipelines. Tests are conducted at operating pressure.
Pipeline Capacity	Maximum of 129 gallons.
Waiting Time	None between dispensing and testing. None between delivery and testing.
Test Period	Response time is 5 seconds.
System Features	Permanent installation on pipeline. Automatic testing of pipeline. Preset threshold. Single test to determine if pipeline is leaking. LD2000 - restricted flow to dispenser if leak is declared. LD2000S - pump shutoff if leak is declared.
Calibration	System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/19/90

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Vaporless Manufacturing

Vaporless LD-2000E, LD-2000E-S
(for Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel.

Specification System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 59.6 gallons.

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

Test Period Response time is 30 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
LD2000E - restricted flow to dispenser if leak is declared.
LD2000ES - pump shutoff if leak is declared.

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

Comments Enviroflex piping with a bulk modulus* of 1,352 psi was used during evaluation.
*See glossary.

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/11/92

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Issue Date: November 22, 1995
Revision Date: November 14, 1997

Vaporless Manufacturing

Vaporless LD-2000T, LD-2000T-S

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.5 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel.

Specification System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 129 gallons.

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

Test Period Response time is 1 minute.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
LD2000T - restricted flow to dispenser if leak is declared.
LD2000T-S - pump shutoff if leak is declared.

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

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/13/93

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Issue Date: August 23, 1999
Revision Date: March 11, 2004

Vaporless Manufacturing

Vaporless 98LD-2000, 99LD-2000, 99LD-2200, LD-2200 Scout (for Rigid and Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification	Leak rate of 3.0 gph with PD = 100% and PFA = 0%.
Leak Threshold	2.5 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel.
Specification	System tests pressurized flexible, fiberglass, and steel pipelines. Tests are conducted at operating pressure.
Pipeline Capacity	Maximum of 172 gallons for rigid pipelines. Maximum of 39.5 gallons for flexible pipelines.
Waiting Time	None between dispensing and testing. None between delivery and testing.
Test Period	Response time is less than 1 minute without a leak and 1 to 8 minutes with a leak.
System Features	Permanent installation on pipeline. Automatic testing of pipeline. Preset threshold. Single test to determine if pipeline is leaking. Restricted flow to dispenser if leak is declared.
Calibration	System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Functionality and operability of the 99 LD-2000 and 99 LD-2200 are unchanged by installation of the Leak Detection Sensor (piston switch) that supports the VMI ISM-4080 and ISM-4081 Integrated Shutdown Module.

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 05/20/98, 11/10/98

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Issue Date: November 22, 1995
Revision Date: November 28, 2012

Vaporless Manufacturing

Vaporless 99 LD-3000, LD-3000, 99 LD-3000S, LD-3000S
(for Rigid, Flexible, or Hybrid Combination of Rigid and Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel.

Specification System tests pressurized steel and fiberglass pipelines and combination of rigid and flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 404 gallons for steel and fiberglass pipelines
Maximum of 96 gallons for flexible pipelines
Maximum combined capacity is 500 gallons, not to exceed the above individual capacity limitations for combinationrigid or flexible pipelines.

Waiting Time None between dispensing and testing.

Test Period Response time is less than 9 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
LD3000 - restricted flow to dispenser if leak is declared.
LD3000S - pump shutoff if leak is declared.

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

Comments Functionality and operability of the 99 LD-3000 are unchanged by installation of the Leak Detection Sensor (piston switch) that supports the VMI ISM-4080 and ISM-4081 Integrated Shutdown Module.

Vaporless Manufacturing
8700 East Long Mesa Drive
Prescott Valley, AZ 86314
Tel: (928) 775-5191

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/20/93, 4/17/06

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Varec, Inc.

(originally listed as Coggins Systems, Inc. and later as Endress + Hauser Systems and Gauging)

Fuels Manager with Barton 3500 Dual-Pressure Transducer ATG

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.3% and PFA = 4.7%.

Leak Threshold 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.

Tank Capacity Maximum of 75,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 4 hours between delivery and testing.
Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 24 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature Measurement of product temperature is not required by this system.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.509 inch.
Minimum detectable change in water level is 0.225 inch.

Calibration 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.

Varec, Inc.
5834 Peachtree Corners East
Norcross, Ga 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/15/00

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Varec, Inc.
Fuels Manager with Enraf 854 ATG
(Servo Buoyancy Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 96.9% and PFA = 3.1%.

Leak Threshold 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.

Tank Capacity Maximum of 76,500 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 12 hours between delivery and testing.
There must be no delivery or dispensing during waiting time.

Test Period Minimum of 24 hours.
Test data are acquired and recorded by system's computer.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by 5 or more thermistors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.52 inch.
Minimum detectable change in water level is 0.032 inch.

Calibration 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.
Operates on buoyancy principle which employs a servo gauge.
Evaluated in a 51,000 gallon horizontal underground storage tank, 13 feet diameter by 54 feet long.
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.

Varec, Inc.
5834 Peachtree Corners East
Norcross, Ga 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 09/30/08

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Varec, Inc.

(originally listed as Coggins Systems, Inc. and later as Endress + Hauser Systems and Gauging)

Fuels Manager with MTS Magnetostrictive Probe

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.1% and PFA = 2.7%.

Leak Threshold 0.13 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.

Tank Capacity Maximum of 75,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 7.3 hours between delivery and testing.
Minimum of 2 hours between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 24 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the average of subsets of all data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by 5 temperature resistance detectors (RTDs).

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.238 inch.
Minimum detectable change in water level is 0.017 inch.
Water level in tank should not exceed 2 inches.

Calibration 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.

Varec, Inc.
5834 Peachtree Corners East
Norcross, Ga 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/21/99

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Issue Date: August 9, 2001
Revision Date: December 21, 2005

Varec, Inc.

(originally listed as Coggins Systems, Inc. and later as Endress + Hauser Systems and Gauging)

Fuels Manager and Remote Terminal Unit RTU/8130
(MTS Magnetostrictive Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 616 ft², leak rate is 0.2 gph with PD = 96.4% and PFA = 3.6%
For other tank sizes, leak rate equals [(PSA in ft² ÷ 616 ft²) x 0.2 gph].
Example:
For a tank with PSA = 900 ft²; leak rate = [(900 ft² ÷ 616 ft²) x 0.2 gph] = 0.29 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA). For tanks with PSA of 616 ft², leak threshold is 0.1 gph. For other tank sizes, leak threshold equals [(PSA in ft² ÷ 616 ft²) x 0.1 gph].
Example:
For a tank with PSA = 900 ft²; leak threshold = [(900 ft² ÷ 616ft²) x 0.1 gph] = 0.1gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability
Gasoline, diesel, aviation fuel.

Tank Capacity
Use limited to single field-constructed vertical tanks 50,000 gallons or greater.
Maximum product surface area (PSA) is 924 ft².
Product must be at full operating level.

Waiting Time
Minimum of 4 hours, 26 minutes after delivery or dispensing.

Test Period
Minimum of 24 hours.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 resistance temperature detectors (RTDs).
Product temperature change during test should not exceed 0.72 degrees F.

Water Sensor
Must be used to detect water ingress. Minimum detectable water level in the tank is 0.238 inch.
Minimum detectable change in water level is 0.0017 inch.

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

Comments
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.
Leak Manager uses PC-based software to process probe data.
Remote Terminal Unit (RTU/8130) contains software embedded in a CPU housed in a stand-alone console.
Evaluated in a nominal 50,000 gallon vertical underground tank with product surface area (PSA) of 616 ft².
The maximum product level in the tank during test was 65% (32,500 gallons).

Varec, Inc.
5834 Peachtree Corners East
Norcross, GA 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/24/98

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Varec, Inc.

(originally listed as Coggins Systems, Inc. and later as Endress + Hauser Systems and Gauging)

Fuels Manager with Barton Series 3500 ATG (48 hour test) (72 hour test)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 2.0 gph with PD = 97.8% and PFA = 2.2% for 48 hour test and PD = 98.5% and PFA = 1.5% for 72 hour test.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 6,082 ft²) x 2.0 gph].
Example:
For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 6,082 ft²) x 2.0 gph] = 3.29 gph.
Calculated minimum detectable leak rate is 1.59 gph with PD = 95% and PFA = 5% for 48 hour test and 1.44 gph with PD = 95% and PFA = 5% for 72 hour test.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak threshold is 1.0 gph. For other tank sizes, leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x 1.0 gph].
Example:
For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 6,082 ft²) x 1.0 gph] = 1.64 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single field-constructed vertical tanks 50,000 gallons or greater.
Maximum product surface area (PSA) is 15,205 ft². Performance not sensitive to product level.

Waiting Time

Minimum of 12 hours, 20 minutes after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 7.3 to 17.2 hours.

Test Period

Minimum of 48 hours (48 hour test). Minimum of 72 hours (72 hour test).
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None.
Water leaks are measured as increase in mass inside tank.

Calibration

The differential pressure sensor must be checked regularly and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments

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.
Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².

Varec, Inc.
5834 Peachtree Corners East
Norcross, GA 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 05/20/98

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Issue Date: June 14, 2008

Varec, Inc.

Fuels Manager with Enraf 854 ATG
(Servo Buoyancy Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification
Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 11,786 ft², leak rate is 3.00 gph with PD = 95.3% and PFA = 4.7%
For other tank sizes, leak rate equals [(PSA in ft² ÷ 11,786 ft²) x 3.00 gph].
Example: For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 11,786 ft²) x 3.00 gph] = 2.54 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold
Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 11,786 ft², leak threshold is 1.50 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 11,786 ft²) x 1.50 gph].
Example: For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 11,786 ft²) x 1.50 gph] = 1.27 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability
Gasoline, diesel, aviation fuel.

Tank Capacity
Use limited to single field-constructed vertical tanks 50,000 gallons to 2,100,000 gallons.
Maximum product surface area (PSA) is 11,786 ft².
Tank must be at least 44% full.

Waiting Time
None.
Testing may be initiated immediately following a delivery provided a minimum of 72 hours of quality data are collected and analyzed.

Test Period
Minimum of 72 hours.
There must be no dispensing or delivery during test.

Temperature
Measurement not required by this system.
System is self-compensating for product temperature changes.
Buoyancy of float changes with product density in response to temperature changes.

Water Sensor
None.
Water ingress leaks are measured as an increase in product level inside the tank.

Calibration
Servo product level measurements must be verified annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments
Not evaluated using manifolded tank systems.
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.
Evaluated in a nominal 2,100,000 gallon vertical underground tank with diameter of 122.5 ft., height of 23.4 ft., and PSA of 11,786 ft².
System is a volumetric measurement test method.

Varec, Inc.
5834 Peachtree Corners East
Norcross, GA 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/07/08

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Issue Date: June 14, 2008

Varec, Inc.

Fuels Manager with MTS M-Series ATG
(MTS Magnetostrictive Probe)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 11,786 ft², leak rate is 4.50 gph with PD = 96.3% and PFA = 3.7%
For other tank sizes, leak rate equals [(PSA in ft² ÷ 11,786 ft²) x 4.50 gph].
Example: For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 11,786 ft²) x 4.50 gph] = 3.80 gph.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 11,786 ft², leak threshold is 2.25 gph. For other tank sizes, leak threshold equals [(PSA in ft² ÷ 11,786 ft²) x 2.25 gph].
Example: For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 11,786 ft²) x 2.25 gph] = 1.91 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single, field-constructed, vertical-walled tanks having a capacity of 50,000 to 2,100,000 gallons.
Maximum product surface area (PSA) is 11,786 ft².
Tank must be at least 44% full.

Waiting Time

None.
Testing may be initiated immediately following a delivery provided a minimum of 72 hours of quality data are collected and analyzed.

Test Period

Minimum of 72 hours.
There must be no dispensing or delivery during test.

Temperature

Average for product is determined by resistance temperature detectors (RTDs) located at 18 inch increments from the bottom of the tank.

Water Sensor

Must be used to detect water ingress.
Minimum detectable water level in the tank is based on the length of the probe as follows:
<25 feet = 3.0 inches
<40 feet = 3.8 inches
<60 feet = 4.7 inches
The water sensor "inactive zone" can be countered by installing the probe over the tank sump.
Minimum detectable change in water level is 0.015 inch.
Water ingress sensing is continuous and independent of leak detection testing.

Calibration

No scheduled maintenance or recalibration is required.
The sensor pipe should be checked annually for build up of process material.
Floats should move freely along the sensor pipe. If they do not, routine cleaning should be performed.

Comments

Not evaluated using manifolded tank systems.
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.
Evaluated in a nominal 2,100,000 gallon vertical underground tank with diameter of 122.5 ft., height of 23.4 ft., and PSA of 11,786 ft².
System is a volumetric measurement test method.

Varec, Inc.
5834 Peachtree Corners East
Norcross, GA 30092
Tel: (770) 447-9202

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/07/08

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Veeder-Root
(originally listed as Control Engineers)

Line Leak Detector
Model LLP2

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 89 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 15 minutes between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is approximately 10 seconds for leak rate of 3.0 gph.
Minimum of 30 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a permanently installed microprocessor.
Calculations are automatically performed by a microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, indicator light and alarm activation if leak is declared.

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

Comments
Control Engineers no longer manufactures this equipment.
The company and rights for this product were sold to Veeder-Root.
*For product support information, contact Veeder-Root.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 07/18/94

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket PPM 4000, RLM 9000

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, methanol and methanol blends, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 55.1 gallons.

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

Test Period
Response time is 2 minutes for leak rate of 3.0 gph.
Response time is 10 minutes to 3 hours for leak rate of 0.2 gph.
Response time is 2 hours, 30 minutes to 3 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Recording and display of day, date, and time of conclusive test.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
PPM 4000 is a stand alone automatic electronic line leak detector. RLM 9000 is a combination of RLM 5000 automatic tank gauge and PPM 4000 automatic electronic line leak detector.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/07/91, 04/94, 03/24/11(letter)

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Issue Date: September 11, 1998
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket PPM 4000, RLM 9000, ST 1401L, ST 1801L
(for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, methanol and methanol blends, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 27.6 gallons.

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

Test Period
Response time is 9 minutes to 2 hours, 30 minutes for leak rate of 0.2 gph.
Response time is 26 minutes to 4 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking. Recording and display of day, date, and time of conclusive test.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
PPM 4000 is a stand alone automatic electronic line leak detector.
RLM 9000 is a combination of RLM 5000 automatic tank gauge and PPM 4000 automatic electronic line leak detector.
ST 1401L is a combination of ST 1400 automatic tank gauge and ST 1401L automatic electronic line leak detector.
ST 1801L is a combination ST1800 automatic tank gauge and ST 1801L automatic electronic line leak detector.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/28/96, 01/31/97, 03/24/11(letter)

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Issue Date: September 11, 1998
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket ST 1401L, ST 1801L, CPT, ProLink

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, fuel oil #4, methanol and methanol blends, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity
Maximum of 172 gallons for leak rate of 3.0 gph.
Maximum of 163 gallons for leak rates of 0.2 gph and 0.1 gph.

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

Test Period
Response time is 2 to 4 minutes for leak rate of 3.0 gph.
Response time is 2 minutes to 4 hours for leak rate of 0.2 gph.
Response time is 4 minutes to 4 hours, 45 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking. Recording and display of day, date, and time of conclusive test.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Comments
ST 1401L is a combination of ST 1400 automatic tank gauge and the ST 1401L automatic electronic line leak detector.
ST 1801L is a combination of ST 1800 automatic tank gauge and ST 1801L automatic electronic line leak detector.
CPT is an electronic line leak detector component.
ProLink is either a stand alone electronic automatic line leak detector, or a combination of and automatic tank gauge and an automatic electronic line leak detector.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/16/96, 01/31/97, 03/24/11(letter)

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Issue Date: March 31, 2015

Veeder-Root

Series 8590 DPLLD with 8600 Series System (for Rigid and/or Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized rigid, flexible, and combinations of rigid and flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
For 3.0 gph (hourly) leak rate test:
Maximum of 425.84 gallons for rigid pipelines.
Maximum of 109.84 gallons for flexible pipelines.
Maximum of 535.68 gallons for hybrid combination of rigid and flexible pipelines.
For 0.2 gph (monthly) and 0.1 gph (annual) leak rate test:
Maximum of 165.08 gallons for rigid pipelines.
Maximum of 109.84 gallons for flexible pipelines.
Maximum of 267.84 gallons for hybrid combination of rigid and flexible pipelines.

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

Test Period
Response time is 1 to 5 minutes for leak rate of 3.0 gph.
Response time is 48 minutes to 270 minutes for leak rate of 0.2 gph.
Response time is 48 minutes to 489 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
8600 Series console used in this evaluation with Series 8590 DPLLD.
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/23/14

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root

TLS-350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Line Leak Detector, Series 8475 VLLD

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 158 gallons.

Waiting Time
None between delivery and testing.
Minimum between dispensing and testing depends on volume of product and temperature gradient which is determined by system's computer.

Test Period
Response time is 14 seconds for leak rate of 3.0 gph.
Response time is 6 minutes for leak rate of 0.2 gph.
Response time is 14 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline
Preset threshold.
If pump side leak testing is required, total vertical rise of pipeline must not exceed 8 feet above VLLD Controller.
Single test to determine if pipeline is leaking.
Pump shutdown, message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 09/20/91
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/12/93, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console with Line Leak Detector, Series PA02630000501 (Same as Veeder-Root Series 8475)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 158 gallons.

Waiting Time
None between delivery and testing.
Minimum between dispensing and testing depends on volume of product and temperature gradient which is determined by system's computer.

Test Period
Response time is 14 seconds for leak rate of 3.0 gph.
Response time is 6 minutes for leak rate of 0.2 gph.
Response time is 14 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 09/20/91
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/12/93

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root

TLS-350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Line Leak Detector, (for Flexible Pipelines) — Series 8475 VLLD

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 49.6 gallons.

Waiting Time
None between delivery and testing.
Minimum between dispensing and testing depends on volume of product and temperature gradient which is determined by system's computer.

Test Period
Response time is 1 minute for leak rate of 3.0 gph.
Response time is 45 minutes to 8 hours, 51 minutes for leak rate of 0.2 gph.
Response time is 1 hour, 12 minutes to 12 hours, 54 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
If pump side leak testing is required, total vertical rise of pipeline must not exceed 8 feet above VLLD Controller.
Single test to determine if pipeline is leaking.
Pump shutdown, message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/04/93, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: April 28, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console with Line Leak Detector, Series PA02630000501 (Same as Veeder-Root Series 8475) (for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 49.6 gallons.

Waiting Time
None between delivery and testing.
Minimum between dispensing and testing depends on volume of product and temperature gradient which is determined by system's computer.

Test Period
Response time is 1 minute for leak rate of 3.0 gph.
Response time is 45 minutes to 8 hours, 51 minutes for leak rate of 0.2 gph.
Response time is 1 hour, 12 minutes to 12 hours, 54 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold. Single test to determine if pipeline is leaking.
Pump shutdown, message display, and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/04/93

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Veeder-Root

TLS 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 Series 8590 DPLLD

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

Certification	Leak rate of 3.0 gph at 10 psi* with PD = 100% and PFA = 0%. Leak rate of 0.2 gph at operating pressure with PD = 100% and PFA = 0%. Leak rate of 0.1 gph at 1.5 times operating pressure* with PD = 100% and PFA = 0%. *Since leak rate varies as a function of pressure, this leak rate and pressure were certified using an equivalent leak rate and pressure, in accordance with an acceptable protocol.
Leak Threshold	1.88 gph for leak rate of 3.0 gph. 0.17 gph for leak rate of 0.2 gph. 0.05 gph for leak rate of 0.1 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.
Specification	System tests pressurized fiberglass and steel pipelines. Tests are conducted at operating pressure. System will not function with a mechanical line leak detector installed in the pipeline.
Pipeline Capacity	Maximum of 98.4 gallons.
Waiting Time	None between delivery and testing. Minimum of 16 minutes between dispensing and testing for leak rate of 3.0 gph. Minimum of 45 minutes to 1 hour between dispensing and testing for leak rate of 0.2 gph. Minimum of 2 hours, 30 minutes between dispensing and testing for leak rate of 0.1 gph.
Test Period	Response time is 28.8 seconds for leak rate of 3.0 gph. Response time is 32 to 48 minutes for leak rate of 0.2 gph. Response time is 18 minutes for leak rate of 0.1 gph. Test data are acquired and recorded by a microprocessor. Calculations are automatically performed by the microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 Series 8590 DPLLD

System Features

TLS 350 console can only be used with Series 8484 PLLD.
TLS 450 console can only be used with Series 8590 DPLLD.
When using Red Jacket BIG-FLO Submersible Pump Models P100H1, P200H1, P200H3, P300H3, P500H3, the PLLD only performs 3.0 gph testing and not precision (0.2 and 0.1 gph) testing.
{USER DEFINED} pipe type must be selected under the PLLD setup to allow precision (0.2 and 0.1 gph) testing with Red Jacket BIG-FLO Submersible Pump Models: MAXXUM MXP300, MAXXUM MXP500.
Total vertical rise of pipeline must not exceed 11 feet above transducer.
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

Calibration

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 08/07/91, 12/18/96
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 2/27/08, 7/28/09, 03/24/11(letter)

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Issue Date: September 11, 1998
Revision Date: April 28, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems) EMC Environmental Management Console with Line Leak Detector, Series PA0263000060X (Same as Veeder-Root Series 8484)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 98.4 gallons.

Waiting Time
None between delivery and testing.
Minimum of 16 minutes between dispensing and testing for leak rate of 3.0 gph.
Minimum of 45 minutes to 1 hour between dispensing and testing for leak rate of 0.2 gph.
Minimum of 2 hours, 30 minutes between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 28.8 seconds for leak rate of 3.0 gph.
Response time is 32 to 48 minutes for leak rate of 0.2 gph.
Response time is 18 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking. Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 08/07/91, 12/18/96

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Issue Date: June 2, 1998
Revision Date: September 20, 2011

Veeder-Root

TLS 350, 350PC, 350R, 350RPC, 350Plus, LLD-300, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD (for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 40.8 gallons.

Waiting Time
None between delivery and testing.
Minimum of 13 minutes between dispensing and testing for leak rate of 3.0 gph.
Minimum of 4 minutes to 1 hour, 9 minutes between dispensing and testing for leak rate of 0.2 gph.
Minimum of 1 to 4 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 1 to 6 minutes for leak rate of 3.0 gph.
Response time is 40 minutes to 1 hour for leak rate of 0.2 gph.
Response time is 45 minutes to 1 hour, 15 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS 350, 350PC, 350R, 350RPC, 350Plus, LLD-300, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPLLD (for Flexible Pipelines)

System Features

TLS 350 console can only be used with Series 8484 PLLD.
TLS 450 console can only be used with Series 8590 DPLLD.
When using Red Jacket BIG-FLO Submersible Pump Models P100H1, P200H1, P200H3, P300H3, P500H3, the PLLD only performs 3.0 gph testing and not precision (0.2 and 0.1 gph) testing.
{USER DEFINED} pipe type must be selected under the PLLD setup to allow precision (0.2 and 0.1 gph) testing with Red Jacket BIG-FLO Submersible Pump Models:
MAXXUM MXP300, MAXXUM MXP500.
Total vertical rise of pipeline must not exceed 11 feet above transducer.
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

Calibration

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 10/16/95, 01/31/97
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 2/27/08, 7/28/09, 03/24/11(letter)

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Issue Date: September 11, 1998
Revision Date: April 28, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console with Line Leak Detector, Series PA0263000060X (Same as Veeder-Root Series 8484) (for Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 40.8 gallons.

Waiting Time
None between delivery and testing.
Minimum of 13 minutes between dispensing and testing for leak rate of 3.0 gph.
Minimum of 4 minutes to 1 hour, 9 minutes between dispensing and testing for leak rate of 0.2 gph.
Minimum of 1 to 4 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 4 to 6 minutes for leak rate of 3.0 gph.
Response time is 40 minutes to 1 hour for leak rate of 0.2 gph.
Response time is 45 minutes to 1 hour, 15 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 10/16/95, 01/13/97

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Veeder-Root

TLS 350, 350PC, 350R, 350RPC, 350Plus, 350J, Red Jacket ProMax Line Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPPLD, Software Version X19 or Higher (for Rigid and/or Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized rigid, flexible, and combination of rigid and flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 212 gallons.

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

Test Period
Response time is 1 to 6 minutes.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
TLS 350 console can only be used with Series 8484 PLLD.
TLS 450 console can only be used with Series 8590 DPLLD.
When using Red Jacket BIG-FLO Submersible Pump Models P100H1, P200H1, P200H3, P300H3, P500H3, the PLLD only performs 3.0 gph testing and not precision (0.2 and 0.1 gph) testing.
{USER DEFINED} pipe type must be selected under the PLLD setup to allow precision (0.2 and 0.1 gph) testing with Red Jacket BIG-FLO Submersible Pump Models: MAXXUM MXP300, MAXXUM MXP500.
Total vertical rise of pipeline must not exceed 11 feet above transducer.
Permanent installation on pipeline.
Automatic testing of pipeline. Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Comments
System was evaluated on a pipeline consisting of rigid and flexible piping, and the resulting combined bulk modulus was determined by physical measurement at evaluator's facility. To use this system, a measurement of bulk modulus must be made at the owner's facility so that the software can be programmed to deal with the specific characteristics of the piping system at the facility.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/19/02, 2/27/08, 03/24/11(letter)

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Veeder-Root

TLS 350, 350PC, 350R, 350RPC, 350Plus, 450, LLD-300, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPPLD, Software Version X19 or Higher (for Rigid and/or Flexible Pipelines)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized rigid, flexible, and combination of rigid and flexible pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 119.4 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 4 minutes to 1 hour, 9 minutes between dispensing and testing for leak rate of 0.2 gph.
Minimum of 1 to 4 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is 1 to 6 minutes for leak rate of 3.0 gph.
Response time is 40 minutes to 227 minutes for leak rate of 0.2 gph.
Response time is 45 minutes to 333 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS 350, 350PC, 350R, 350RPC, 350Plus, 450, LLD-300, Red Jacket ProMax Leak Detector, with Series 8484 PLLD and TLS 450 with Series 8590 DPPLD, Software Version X19 or Higher
(for Rigid and/or Flexible Pipelines)

System Features

TLS 350 console can only be used with Series 8484 PLLD.
TLS 450 console can only be used with Series 8590 DPLLD.
When using Red Jacket BIG-FLO Submersible Pump Models P100H1, P200H1, P200H3, P300H3, P500H3, the PLLD only performs 3.0 gph testing and not precision (0.2 and 0.1 gph) testing.
{USER DEFINED} pipe type must be selected under the PLLD setup to allow precision (0.2 and 0.1 gph) testing with Red Jacket BIG-FLO Submersible Pump Models: MAXXUM MXP300, MAXXUM MXP500.
Total vertical rise of pipeline must not exceed 11 feet above transducer.
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

Calibration

System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
System was evaluated on a pipeline consisting of rigid and flexible piping, and the resulting combined bulk modulus was determined by physical measurement at evaluator's facility. To use this system, a measurement of bulk modulus must be made at the owner's facility so that the software can be programmed to deal with the specific characteristics of the piping system at the facility.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 10/16/95, 01/31/97
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/20/04, 2/27/08, 7/28/09, 03/24/11(letter)

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Issue Date: April 18, 1997
Revision Date: September 20, 2011

Veeder-Root

TLS 350, 350PC, 350R, 350 RPC, 350Plus, LLD-300, Red Jacket ProMax Line Leak Detector, Series 8494, Wireless Pressurized Line Leak Detector (WPLLD)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 100 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 45 minutes between dispensing and testing for leak rate of 0.2 gph.
Minimum of 2 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is less than 1 minute for leak rate of 3.0 gph.
Response time is 30 to 45 minutes for leak rate of 0.2 gph.
Response time is 32 to 48 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Total vertical rise of pipeline must not exceed 11 feet above transducer.
Transmits leak detection test data to console through submersible pump power wiring.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 05/08/96, 03/24/11(letter)

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Issue Date: September 11, 1998
Revision Date: April 28, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC, EMC-PC, EMC Enhanced, EMC-PC Enhanced, LMS Environmental Management Consoles with Line Leak Detector, PA0263000100X (Same as Veeder-Root Series 8494), PA0277000060X (Same as Veeder-Root Series 8494)

AUTOMATIC ELECTRONIC LINE LEAK DETECTOR

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

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

Applicability
Gasoline, diesel, aviation fuel.

Specification
System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.
System will not function with a mechanical line leak detector installed in the pipeline.

Pipeline Capacity
Maximum of 100 gallons.

Waiting Time
None between delivery and testing.
None between dispensing and testing for leak rate of 3.0 gph.
Minimum of 45 minutes between dispensing and testing for leak rate of 0.2 gph.
Minimum of 2 hours between dispensing and testing for leak rate of 0.1 gph.

Test Period
Response time is less than 1 minute for leak rate of 3.0 gph.
Response time is 30 to 45 minutes for leak rate of 0.2 gph.
Response time is 32 to 48 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Single test to determine if pipeline is leaking.
Pump shutdown (optional), message display and alarm activation if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 05/08/96

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket DLD, XLD

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized fiberglass and steel pipelines.
Tests are conducted at 8-12 psi.

Pipeline Capacity Maximum of 129 gallons.

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

Test Period Response time is 6 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Total vertical rise of pipeline must not exceed 10 feet above leak detector.
Preset threshold.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/21/90, 03/24/11(letter)

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket FX1, FX2

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized fiberglass and steel pipelines.
Tests are conducted at 8-12 psi.

Pipeline Capacity Maximum of 316 gallons for FX1.
Maximum of 362 gallons for FX2.

Waiting Time None between delivery and testing.
None between dispensing and testing.
Stabilization time up to 45 minutes may be required after dispensing when temperature extremes are present.

Test Period Response time is less than 5 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 11 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/14/94, 06/01/94, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket FX1, FX2 Flexline
(for Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized flexible pipelines.

Pipeline Capacity Maximum of 49 gallons.

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

Test Period Response time is less than 3 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 11 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Comments Enviroflex pipeline with a bulk modulus* of 1,280 psi was used during this evaluation.
To perform a valid test, time delays must be integrated into electronic dispensing equipment or retrofitted in junction box. Without this delay, there is no guarantee that a nozzle will be closed for sufficient time to allow leak detector to perform pipeline test and provide uninterrupted service.
*See glossary.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/22/94, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket FX1D, FX2D, FX1DV, FX2DV Installed in the Big-Flow

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Diesel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized fiberglass and steel pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 362 gallons.

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

Test Period Response time is less than 3 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 11 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/15/94, 07/30/96, 03/11/99, 03/24/11(letter)

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Issue Date: July 31, 2001
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket FX1DV, FX2DV Installed in the Big-Flow (for Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Diesel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 39.4 gallons.

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

Test Period Response time is less than 3 minutes.

System Features Permanent installation on pipeline.
Automatic hourly testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 11 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/15/94, 07/30/96, 03/11/99, 03/24/11(letter)

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Issue Date: February 6, 2006
Revision Date: September 20, 2011

Veeder-Root

Red Jacket FX1V, FX2V in Big Flow or Packer Manifold (for Rigid and Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA = 0%.

Leak Threshold 1.5 gph at 10 psi.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, ethanol blends up through E100.

Specification System tests pressurized pipelines.
Tests are conducted at 8-12 psi.

Pipeline Capacity Maximum of 416.7 gallons for rigid pipelines.
Maximum of 95.4 gallons for flexible pipelines.

Waiting Time None between delivery and testing.
None between dispensing and testing.
Stabilization time up to 45 minutes may be required after dispensing when temperature extremes are present.

Test Period Response time is less than 5 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 11 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/14/94, 03/22/94, 06/01/94, 11/21/05, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket XLP

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA =0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized fiberglass and steel pipelines.
Tests are conducted at 15-22 psi.

Pipeline Capacity Maximum of 129 gallons.

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

Test Period Response time is 6 seconds.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 6 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/22/94, 03/24/11(letter)

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Issue Date: November 22, 1995
Revision Date: September 20, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket XLP
(for Flexible Pipelines)

AUTOMATIC MECHANICAL LINE LEAK DETECTOR

Certification Leak rate of 3.0 gph with PD = 100% and PFA =0%.

Leak Threshold 2.0 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, ethanol blends up through E100, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Specification System tests pressurized flexible pipelines.
Tests are conducted at operating pressure.

Pipeline Capacity Maximum of 48.9 gallons.

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

Test Period Response time is less than 3 minutes.

System Features Permanent installation on pipeline.
Automatic testing of pipeline.
Preset threshold.
Total vertical rise of pipeline must not exceed 6 feet above leak detector.
Single test to determine if pipeline is leaking.
Restricted flow to dispenser if leak is declared.

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

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/19/93, 03/24/11(letter)

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Veeder-Root

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

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 97.1% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 95% and PFA = 0.4%.

Leak Threshold
0.126 gph for leak rate of 0.2 gph.
0.063 gph for leak rate of 0.1gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds this threshold.

Applicability
Gasoline, diesel, aviation fuel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 30,000 gallons for leak rate of 0.2 gph.
Maximum of 20,000 gallons for leak rate of 0.1 gph.
Product level in tank required to conduct the test must be 50% or more.

Waiting Time
Minimum of 8 hours between delivery and testing.
Minimum of 30 minutes between dispensing and testing.
There must be no dispensing or delivery during test.

Test Period
Minimum of 3 hours
Test data are acquired and recorded by system's computer (microprocessor).
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a probe which contains 5 thermistors.
At least two thermistors must be submerged in product during test.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.5 inch.
Minimum detectable change in water level in tank is 0.023 inch.

Calibration
Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments
Not evaluated using manifolded tank systems. Therefore, for manifolded tank systems, this certification is only applicable when there is a probe used in each tank and the siphon is broken during testing.
Tests only portion of tank containing product.
As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure).
Consistent testing at low levels could allow a leak to remain undetected.
EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
E-mail: kwilcox@kwaleak.com
URL: www.kwaleak.com
Dates of Evaluation: 01/15/14 (30,000 gallon tank), 04/09/14 (20,000 gallon tank)

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Issue Date: April 18, 1997
Revision Date: April 9, 2002

Veeder-Root
(originally listed as Control Engineers)

CEI 3000 Tank Level Module - Version TLP2 Normal/Rapid Test Mode (Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 95.0% and PFA = 0.1% for normal test mode.
Leak rate of 0.2 gph with PD = 95.0% and PFA = 5.0% for rapid test mode.
Leak rate of 0.1 gph with PD = 99.2% and PFA = 0.08% for normal test mode.
Leak rate of 0.1 gph with PD = 95.0% and PFA = 5.0% for rapid test mode.

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

Applicability
Gasoline, diesel, aviation fuel.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 95% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 6 hours, 40 minutes between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period
Minimum of 4 hours for normal test mode and 1 hour, 12 minutes for rapid test mode and for leak rate of 0.2 gph.
Minimum of 6 hours, 23 minutes for normal test mode and 2 hours, 40 minutes for rapid test mode and for leak rate of 0.1 gph.
Test data are acquired and recorded by a microprocessor.
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 a minimum of 5 temperature resistance detectors (RTDs).

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.49 inch.
Minimum detectable change in water level is 0.05 inch.

Calibration
RTDs 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.
Control Engineers no longer manufactures this equipment.
The company and rights for this product were sold to Veeder-Root.
*For product support information, contact Veeder-Root.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 05/21/92, 05/27/92

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Veeder-Root
(originally listed as Marley Pump Co.)

Prolink System RJE Probes # RE-400-094 thru 112-5
(Magnetostrictive Probes)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.95% and PFA = 0.005%.
Leak rate of 0.1 gph with PD = 95.2% and PFA = 0.5%.

Leak Threshold
-0.116 gph to declare a leak for leak rate of 0.2 gph.
0.084 gph to declare a gain for leak rate of 0.2gph.
-0.065 gph to declare a leak for leak rate of 0.1 gph.
0.035 gph to declare a gain for leak rate of 0.1 gph.
A tank system should not be declared tight if the test indicates a loss or gain that equals or exceeds the threshold.

Applicability
Gasoline, diesel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 18,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required is based on tank diameter as follows:
48" dia/ min 16";
64" dia/ min 21";
72" dia/ min 24";
126" dia/ min 41".
For other tank diameters, see evaluation report.

Waiting Time
Minimum of 13 hours 54 minutes between delivery and testing.
Minimum of 10 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 4 hours, 31 minutes for leak rate of 0.2 gph.
Minimum of 6 hours, 39 minutes for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from all the data collected during entire test period.
There must be no dispensing or delivery during testing.

Temperature
Probe contains 5 or more resistance temperature detectors (RTDs) to monitor product temperature.
At least one RTD must be submerged in product during testing.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.106 inches.
Minimum detectable change in water level is 0.058 inches.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, Prolink System RJE Probes # RE-400-094 thru 112-5 (Magnetostrictive Probes)

Calibration RTDs 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.
System has a bias of -0.016 gph for leak rate of 0.2 gph.
System has a bias of -0.015 gph for leak rate of 0.1 gph.
Tests only the portion of tank containing product.
As product level is lowered, leak rate in a leaking tank decreases (due to lower head pressure).
Consistent testing at low levels could allow a leak to remain undetected.
EPA leak detection regulations require testing of the portion of the tank which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: ADA Technologies, Inc.
Tel: (303) 792-5615
Date of Evaluation: 10/29/96

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Issue Date: November 22, 1995
Revision Date: March 1, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket ATM System, Version RLM 5000, 5001, 9000
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 100% and PFA = 0%.

Leak Threshold 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 6 hours between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 3 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from all data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 temperature sensors.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.04 inches.
Minimum detectable water level change is 0.011 inch.

Calibration Temperature sensors 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.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/02/91

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Veeder-Root
(originally listed as Marley Pump Co.)

Sonic Technology (ST) 1400-1800 Series Tank Monitoring System, ProLink System with Ultrasonic Network Card, ATG Automatic Tank Gauging Monitor, LLM Series Liquid Level Monitor, FMS Fuel Management Monitor (Ultrasonic Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99.9% and PFA = 2.98% for single tanks.
Leak rate of 0.2 gph with PD = 99.9% and PFA = 2.53% for manifolded tanks.
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.01%.

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

Applicability
Gasoline, diesel, jet fuel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
For leak rate of 0.2 gph:
Maximum of 73,530 gallons.
Maximum of 73,530 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in the system.
Tank must contain at least 15 inches of product.
For leak rate of 0.1 gph:
Maximum of 18,000 gallons.
Tank must be minimum 95% full.

Waiting Time
Minimum of 9.1 hours between delivery and testing for leak rate of 0.2 gph.
Minimum of 12 hours between delivery and testing for leak rate of 0.1 gph.
None between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours, 20 minutes for a leak rate of 0.2 gph.
Minimum of 2 hours, 21 minutes for a leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from all data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by five or more temperature sensors.

DATA SHEET CONTINUED ON NEXT PAGE

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Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.112 inch.
Minimum detectable water level change is 0.011 inch.

Calibration Temperature sensors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Evaluated using both single and manifolded tank systems with probes in each tank.
The difference between the product level and groundwater level must be at least 2.75 feet if groundwater is present above the bottom of the tank.
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.
System was previously known as LT1 Automatic Product Level Monitor and was manufactured by Level Tech, Inc. (purchased by Marley 9/91).

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: ADA Technologies
Tel: (303) 792-5615
Dates of Evaluation: 09/25/92, 09/30/92, 02/05/96, 11/21/1998

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Issue Date: November 22, 1995
Revision Date: March 1, 2011

Veeder-Root

TLS-200, 200i, 250i, 300, 300C, 300i, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 7842 Digital Sensing Capacitance Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99% and PFA = 1%.

Leak Threshold 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 8 hours, 18 minutes between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 5 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a temperature averaging probe.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.40 inches.
Minimum detectable change in water level is 0.040 inch.

Calibration Temperature averaging 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.
Capacitance probes do not work with oxygenated fuels.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 05/14/93

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Issue Date: November 22, 1995
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console
EMC Basic Monitoring System Tank Monitors 2, 3, 2.1, 3.1,
PAO238000XXXX (Same as Veeder-Root Model 7842)
(Capacitance Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99% and PFA = 1%.

Leak Threshold 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be between 50 and 95% full.

Waiting Time Minimum of 8 hours, 18 minutes between delivery and testing.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 5 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is obtained by a temperature averaging probe.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.40 inches.
Minimum detectable change in water level is 0.040 inch.

Calibration Temperature averaging 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.
Capacitance probes do not work with oxygenated fuels.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 05/14/93

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Issue Date: November 22, 1995
Revision Date: March 1, 2011

Veeder-Root

TLS-200, 200i, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 8472 Digital Sensing Capacitance Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99% and PFA = 0.2%.
Leak rate of 0.1 gph with PD = 99% and PFA = 0.1%.

Leak Threshold
0.126 gph for leak rate of 0.2 gph.
0.071 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 fue, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 95% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 8 hours, 18 minutes between delivery and testing for leak rate of 0.2 gph.
There must be no dispensing or delivery during waiting time for leak rate of 0.2 gph.
Minimum of 8 hours, 15 minutes between delivery and testing for leak rate of 0.1 gph.
Minimum of 30 minutes between dispensing and testing for leak rate of 0.1 gph.
There must be no delivery during waiting time for leak rate of 0.1 gph.

Test Period
Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 thermistors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.52 inches.
Minimum detectable change in water level is 0.027 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.
Capacitance probes do not work with oxygenated fuels.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 05/14/93

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Issue Date: November 22, 1995
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console
EMC Basic Monitoring System Tank Monitors 2.1, 3.1,
PAO264XXX0000 (Same as Veeder-Root Model 8472)
(Capacitance Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99% and PFA = 0.2%.
Leak rate of 0.1 gph with PD = 99% and PFA= 0.1%.

Leak Threshold
0.126 gph for leak rate of 0.2 gph.
0.071 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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 95% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 8 hours, 18 minutes between delivery and testing for leak rate of 0.2 gph.
There must be no dispensing or delivery during waiting time for leak rate of 0.2 gph.
Minimum of 8 hours, 15 minutes between delivery and testing for leak rate of 0.1 gph.
Minimum of 30 minutes between dispensing and testing for leak rate of 0.1 gph.
There must be no delivery during waiting time for leak rate of 0.1 gph.

Test Period
Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 thermistors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 1.52 inches.
Minimum detectable change in water level is 0.027 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.
Capacitance probes do not work with oxygenated fuels.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 05/14/93

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Issue Date: November 22, 1995
Revision Date: March 1, 2011

Veeder-Root

TLS-200, 200i, 250, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, Red Jacket ProMax and ProPlus UST ATGS (Model 8473 Digital Sensing Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99% and PFA= 0.1%.
Leak rate of 0.1 gph with PD = 99% and PFA= 1%.

Leak Threshold
0.093 gph for leak rate of 0.2 gph.
0.071 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 95% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 8 hours, 18 minutes between delivery and testing for leak rate of 0.2 gph.
Minimum of 8 hours, 15 minutes between delivery and testing for leak rate of 0.1 gph.
Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 3 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 thermistors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.544 inch.
Minimum detectable change in water level is 0.027 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.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 05/14/93, 03/14/95

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Issue Date: November 22, 1995
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console
EMC Basic Monitoring System Tank Monitors 2.1, 3.1,
PAO265XXX0000 (Same as Veeder-Root Model 8473)
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 99% and PFA = 0.1%.
Leak rate of 0.1 gph with PD = 99% and PFA = 1%.

Leak Threshold
0.093 gph for leak rate of 0.2 gph.
0.071 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.

Tank Capacity
Maximum of 15,000 gallons.
Tank must be between 50 and 95% full for leak rate of 0.2 gph.
Tank must be minimum 95% full for leak rate of 0.1 gph.

Waiting Time
Minimum of 8 hours, 18 minutes between delivery and testing for leak rate of 0.2 gph.
Minimum of 8 hours, 15 minutes between delivery and testing for leak rate of 0.1 gph.
Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 3 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by a minimum of 5 thermistors.

Water Sensor
Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.544 inch.
Minimum detectable change in water level is 0.027 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.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 05/14/93, 03/14/95

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Veeder-Root

TLS-250, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, 450
Red Jacket ProMax and ProPlus UST ATGS
(Models 8473, 8493 Magnetostrictive Probes)

AUTOMATIC TANK GAUGING METHOD

Certification
Leak rate of 0.2 gph with PD = 98.9% and PFA = 0.3%.
Leak rate of 0.1 gph with PD = 95.8% and PFA = 0.9%.

Leak Threshold
0.126 gph for leak rate of 0.2 gph.
0.071 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity
Maximum of 15,000 gallons.
Tanks less than 95% full may be tested. Minimum product level required is based on tank diameter as follows:
48" dia/ min 18";
64" dia/ min 21";
72" dia/ min 24";
96" dia/ min 30";
126" dia/ min 39".
For other tank diameters, see evaluation report.

Waiting Time
Minimum of 8 hours between delivery and testing. Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period
Minimum of 2 hours for leak rate of 0.2 gph.
Minimum of 3 hours for leak rate of 0.1 gph.
Test data are acquired and recorded by system's computer. Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature
Average for product is determined by 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 0.544 inch.
System is programmed to report water depth only when it exceeds 0.75 inch.
Minimum detectable change in water level is 0.027 inch.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS-250, 250i, 300, 300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, 350Plus, 450 Red Jacket ProMax and ProPlus UST ATGS (Models 8473, 8493 Magnetostrictive 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 which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-7684
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 09/04/97, 07/01/98
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/29/08

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Veeder-Root

TLS 300, 350, 350R, 350Plus, 8600 Series (Consoles TLS-450 and TLS-450PLUS), TLS2, Red Jacket ProMax and ProPlus (Models 8463, 8473, 8493 Magnetostrictive Probes)

AUTOMATIC TANK GAUGING METHOD

Certification

Leak rate of 0.2 gph with PD = 99.5% and PFA = 1.6% for 2 hour test.
Leak rate of 0.1 gph with PD = 96.0% and PFA = 3.4% for 5 hour test.
Leak rate of 0.1 gph with PD = 96.2% and PFA = 2.2% for 4 hour test.
Leak rate of 0.1 gph with PD = 96.4% and PFA = 1.5% for 3 hour test.
Leak rate of 0.1 gph with PD = 97.3% and PFA = 2.3% for 2 hour test.

Leak Threshold

0.126 gph for leak rate of 0.2 gph.
0.071 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity

Maximum of 20,000 gallons.
Tanks less than 95% full may be tested. Minimum product level required is based on tank diameter as follows:
48" dia/min 18";
64" dia/min 21";
72" dia/min 24";
96" dia/min 30";
126" dia/min 39";
132" dia/min 39".
For other tank diameters, see evaluation report.

Waiting Time

Minimum of 8 hours between delivery and testing for 2 hour test and leak rate of 0.2 gph.
Minimum of 8 hours between delivery and testing for 5 hour test and leak rate of 0.1 gph.
Minimum of 9 hours between delivery and testing for 4 hour test and leak rate of 0.1 gph.
Minimum of 10 hours between delivery and testing for 3 hour test and leak rate of 0.1 gph.
Minimum of 11 hours between delivery and testing for 2 hour test and leak rate of 0.1 gph.
Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS 300, 350, 350R, 350Plus, 450, TLS2, Red Jacket ProMax and ProPlus (Models 8463, 8473, 8493 Magnetostrictive Probes)

Test Period

Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature

Average for product is determined by probe which contains 5 thermistors.
At least two thermistors must be submerged in product during test.

Water Sensor

Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inch for model 8463 and 8493 probe.
Minimum detectable water level in the tank is 0.75 inch for model 8473 probe.
Minimum detectable water level in the tank is 0.38 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or 8600 series with software version 3A or higher.
Minimum detectable change in water level is 0.005 inch for leak rate of 0.2 gph.
Minimum detectable change in water level is 0.027 inch for leak rate of 0.1 gph.
Minimum detectable change in water level in tank is 0.01 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or 8600 series with software version 3A or higher.

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 which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-7684
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 06/29/98 (Rev. 04/17/02),
08/31/10 (water sensor),
02/29/08 (TLS-450 console comparison),
10/06/14 (TLS-450PLUS console comparison)

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: August 23, 1999
Revision Date: July 23, 2015

Veeder-Root

TLS 300, 350, 350R, 350Plus, 8600 Series (Consoles TLS-450 and TLS-450PLUS), TLS2, Red Jacket ProMax and ProPlus (Models 8463, 8473, 8493 Magnetostrictive Probes)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 95.6% and PFA = 0.3%.

Leak Threshold 0.126 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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.

Tank Capacity Maximum of 30,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required is based on tank diameter as follows:
48" dia/min 18";
64" dia/min 21";
72" dia/min 24";
96" dia/min 30";
126" dia/min 39";
132" dia/min 39".
For other tank diameters, see evaluation report.

Waiting Time Minimum of 8 hours between delivery and testing.
Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by probe which contains 5 thermistors.
At least two thermistors must be submerged in product during test.

DATA SHEET CONTINUED ON NEXT PAGE

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Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inch for model 8463 and 8493 probe.
Minimum detectable water level in the tank is 0.75 inch for model 8473 probe.
Minimum detectable water level in the tank is 0.38 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or 8600 series with software version 3A or higher.
Minimum detectable change in water level is 0.005 inch.
Minimum detectable change in water level in tank is 0.01 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or 8600 series with software version 3A or higher.

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 which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-7684
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 08/14/98 (Rev. 04/17/02),
08/31/10 (water sensor),
02/29/08 (TLS-450 console comparison),
10/06/14 (TLS-450PLUS console comparison)

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: August 23, 1999
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC/PC Series Monitoring Systems PA0265 (Same as Veeder-Root Model 8473), PA0300 (Same as Veeder-Root Model 8473) (Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 99.5% and PFA = 1.6%.

Leak Threshold 0.126 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.

Tank Capacity Maximum of 20,000 gallons.
Tanks less than 95% full may be tested.
Minimum product level required is based on tank diameter as follows:
48" dia/min 18"; 64" dia/min 21";
72" dia/min 24"; 96" dia/min 30";
126" dia/min 39"; 132" dia/min 39".
For other tank diameters see evaluation report.

Waiting Time Minimum of 8 hours between delivery and testing.
Minimum of 30 minutes between dispensing and testing.
There must be no delivery during waiting time.

Test Period Minimum of 2 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the difference between the first and last data collected.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by probe which contains 5 thermistors.
At least two thermistors must be submerged in product during test.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.66 inch.
System is programmed to report water depth only when it exceeds 0.75 inch.
Minimum detectable change in water level is 0.005 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 which routinely contains product.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/29/98

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Issue Date: February 13, 2015
Revision Date: December 8, 2016

Veeder-Root

8600 Series and 8601 Series Consoles
Monitoring Systems with CSLD

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

Certification Leak rate of 0.2 gph with PD = 100% and PFA = 0%.

Leak Threshold

	Threshold	PD	PFA
Single Tank Systems:	0.15	99%	<0.001%
	0.16	96%	<0.001%
Manifolded Tank Systems:	0.12	99%	<0.05%
	0.14	96%	<0.01%

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, solvents, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751, waste oil.

Tank Capacity Maximum of 43,722 gallons for single tanks and for up to 3 tanks manifolded together.
The minmum product level required to conduct a test is 15% full.

Throughput Monthly maximum of 235,000 gallons.

Waiting Time Minimum of 3 hours stabilization time is allowed between delivery and data collection.

Test Period Data collection time ranges from 25 to 28 days.
Data sampling frequency is 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 probe which contains 5 thermistors.
At least two thermistors must be submerged in product during test.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.75 inch.
Minimum detectable change in water level is 0.08 inch.

Calibration Thermistors and probe must be checked and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments System reports a leak rate and a "pass" or "fail" result.
Evaluated using both single and manifolded tank systems with probes in each tank.
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no " passing" tests completed during the month.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/29/98 (Rev. 4/17/02)
10/26/07, 02/29/08(water sensor), 10/03/14

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Veeder-Root

TLS-300i, 300J, 350, 350R, 350Plus, 450, Red Jacket ProMax and ProPlus Monitoring Systems with CSLD (Models 8463, 8473, 8493 Magnetostrictive Probes)

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

Certification Leak rate of 0.2 gph with PD = 100% and PFA = 0%.

Leak Threshold 0.16 gph for single tanks at 99% operating mode.
0.15 gph for manifolded tank systems at 99% operating mode.
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, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751, waste oil.

Tank Capacity Maximum of 38,170 gallons for single tanks and for all tanks manifolded together.
Contact manufacturer for tank system applications if total tank capacity exceeds 30,000 gallons.

Throughput Monthly maximum of 221,890 gallons.

Waiting Time Minimum of 3 hours stabilization time is allowed between delivery and data collection.

Test Period Data collection time ranges from 5 to 28 days.
Data sampling frequency is every 1 to 4 seconds.
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 0.54 inch for model 8463 and 8493 probe.
Minimum detectable water level in the tank is 0.75 inch for model 8473 probe.
Minimum detectable water level in the tank is 0.38 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or TLS 450 with software version 3A or higher.
Minimum detectable change in water level is 0.027 inch.
Minimum detectable change in water level in tank is 0.01 inch when using TLS 350 with model 8463 probe with 88610x-0x0 water float and software version 30B or higher, or TLS 450 with software version 3A or higher.

DATA SHEET CONTINUED ON NEXT PAGE

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. Please refer to complete "DISCLAIMER" on page ii of this list.

DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS-300i, 300J, 350, 350R, 350Plus, 450, Red Jacket ProMax and ProPlus Monitoring Systems with CSLD (Models 8463, 8473, 8493 Magnetostrictive Probes)

Calibration

Thermistors and probe must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
System set-up menu must be checked to verify that the 99% operating mode option has been selected.

Comments

During installation, the set-up menu provides a choice between a 99% or a 95% operating mode.
This evaluation covers only the 99% operating mode.
At this time, there is no evaluation covering the 95% mode.
System reports a result of "pass" or "fail."
Evaluated using both single and manifolded tank systems with probes in each tank.
System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail" or as "no idle."
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns operator if there are no " passing" tests completed during the month.
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.
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.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 06/10/96, 4/02/02
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/26/07, 08/31/10 (water sensor)

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: November 14, 1997
Revision Date: June 8, 2005

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC, EMC Basic, EMC Enhanced with CSLD, PAO265XXXX100 (Same as Veeder-Root Model 8473), PA0300XXXX100 (Same as Veeder-Root Model 8473) (Magnetostrictive Probe)

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

Certification Leak rate of 0.2 gph with PD = 100% and PFA = 0%.

Leak Threshold 0.16 gph for single tanks at 99% operating mode.
0.15 gph for manifolded tank systems at 99% operating mode.
A tank system should not be declared tight, and a message is printed for the operator, if the test results indicate a loss or gain that exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel.

Tank Capacity Maximum of 38,170 gallons for single tanks and for all tanks manifolded together.
Contact manufacturer for tank system applications if total tank capacity exceeds 30,000 gallons.

Throughput Monthly maximum of 221,890 gallons.

Waiting Time Minimum of 3 hours stabilization time is allowed between delivery and data collection.

Test Period Data collection time ranges from 5 to 28 days.
Data sampling frequency is every 1 to 4 seconds.
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 0.54 inch.
Minimum detectable change in water level is 0.027 inch.

Calibration Thermistors and probe must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
System set-up menu must be checked to verify that the 99% operating mode option has been selected.

DATA SHEET CONTINUED ON NEXT PAGE

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. Please refer to complete "DISCLAIMER" on page ii of this list.

DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, EMC, EMC Basic, EMC Enhanced with CSLD, PAO265XXXX100 (Same as Veeder-Root Model 8473), PA0300XXXX100 (Same as Veeder-Root Model 8473) (Magnetostrictive Probe)

Comments

During installation, the set-up menu provides a choice between a 99% or a 95% operating mode. This evaluation covers only the 99% operating mode.
At this time, there is no evaluation covering the 95% mode.
System reports a result of "pass" or "fail."
Evaluated using both single and manifolded tank systems with probes in each tank.
System distinguishes large leak rates (> 1gph) from dispensing activities and reports those as "fail" or as "no idle."
For valid monthly testing, a conclusive test report must be produced for each tank every month.
System warns the operator if there are no " passing" tests completed during the month.
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.
Constant and variable leaks were mathematically induced into tight tank test records which were collected by systems installed at various active tank sites.
The data base for evaluation of the system included sites with vapor recovery and blending dispensers.
Tanks used in this evaluation contained gasoline and diesel.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Dates of Evaluation: 06/10/96, 4/02/02

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: September 1, 2004
Revision Date: April 8, 2011

Veeder-Root

Secondary Containment Leak Detection (SCLD)
TLS-350/ProMax/EMC Console with Vacuum Sensors 857280-100, 200, 30x, or Assembly 332175-001

CONTINUOUS INTERSTITIAL TANK SYSTEM MONITORING METHOD (PRESSURE/VACUUM)

Certification:
Certified as equivalent to European leak detection standard EN-13160-2, Part 2, as a Class I leak detection system.

Operating Principle:
System uses vacuum generated by the turbine pump to continuously maintain a partial vacuum within the interstitial space of double-walled tanks and double-walled piping.
System is designed to activate a visual and acoustic alarm, and optional turbine pump shutdown before stored product can escape to the environment.
System is capable of detecting breaches in both the inner and outer walls of double-walled tanks and 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 minimum vacuum. 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 85±15 liters/hour.

Applicability:
Underground double-walled tank, connected double-walled piping, and other connected interstitial spaces 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.

Manufacturer's Specifications:
Alarm will activate when interstitial vacuum decreases to 1.7 psi vacuum (3.5"Hg).
Default maximum vacuum level (pump-off pressure) is 8 psi vacuum (16.3" Hg), but can be set as low as 4 psi (8.2" Hg) if the monitored system requires that a lower level of vacuum be maintained.
The interstitial space shall be rated for the operating vacuum of the leak detector, regardless of temperature and groundwater level fluctuations.
Volume of monitored interstitial space must not exceed 8 m^3 for tanks and 10 m^3 for piping.
When monitoring double-walled tanks, a liquid sensor must be located at lowest point of interstitial space.

Calibration:
Functional and operational safety tests should be performed in accordance with manufacturer's instructions.

Comments:
Interstitial space is tested continuously.
System is connected to the interstitial space by a single vacuum line.
Vacuum is generated by the turbine pump, and is measured and controlled by a vacuum sensor.
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.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/09/2004

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Issue Date: October 7, 2015

Veeder-Root

8601 Series, 8600 Series, and TLS-3xx Series with Interstitial Liquid Sensor for Fiberglass Tanks 794390-409

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

8601 Series	unleaded gasoline	diesel	water
Response time (min)	<1	<1	<1
Recovery time (min)	<1	<1	<1
Lower detection limit (cm)	0.2767	0.2677	0.2600
8600 Series			
Response time (min)	<1	<1	<1
Recovery time (min)	<1	<1	<1
Lower detection limit (cm)	0.2770	0.2647	0.2630
TLS-3xx Series			
Response time (min)	<1	<1	<1
Recovery time (min)	<1	<1	<1
Lower detection limit (cm)	0.2782	0.2695	0.2578

Specificity Results (in addition to above):

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 consoles in each series are identical other than there name for marketing purposes. Each of the consoles within a given series will perform identically.
The 8601 Series consists of the following derivatives: TLS4, TLS4B, TLS4c, TLS4i, and TLS-S1 consoles.
The 8600 Series consists of the following derivatives: TLS-450PLUS and TLS-450 consoles.
The TLS-3xx Series consists of the following derivatives: TLS-350, TLS-350Plus, TLS-350J, TLS-350R, TLS-300, TLS-300C, TLS-300i and Red Jacket ProMax and ProPlus consoles.
These sensors can easily be removed, cleaned, and reinstalled if an alarm is triggered or for periodic testing.
This listing is for redesigned sensor model 794390-409. The cable length remains the same (284") as the original sensor. The original design of the sensor has mesh netting around the sensor. The new design does not have mesh netting around the sensor. The original design 409 sensor remains listed under Veeder Root ILS-250, 350, TLS-250i, 250i Plus, 300, 300C, 300i, 300PC, TLS-350 Series, TLS-450 Series, Red Jacket ProMax and ProPlus with Interstitial Liquid Sensor for Fiberglass Tanks 794390-401, 404, 407, 409, Interstitial Liquid Sensor for Steel Tanks 794390-420, 460, Liquid Sensor for Sumps 794390-206 interstitial Detector (Liquid Phase).

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 03/09/15

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Issue Date: June 5, 1998
Revision Date: April 8, 2011

Veeder-Root

Dispenser Pan Sensor 847990-001 and Differentiating Dispenser Pan Sensor 847990-002 with Dispenser Control Interface

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable, reed switch/float

Test Results:

	polymer strip		float switch
Dispenser Pan Sensor 847990-001	unleaded gasoline	diesel*	water
Detection time (sec)	<1	<1	<1
Minimum product level (in)	1.71	1.66	1.62
Precision (in)	0.006	0.004	0.008
Differentiating Dispenser Pan Sensor 847990-002			
Minimum product thickness (in)	0.06	0.06	N/A**
Minimum product level (in)	0.03	0.06	6.39
Precision (in)	N/A***	N/A***	0.008
Detection time (min:sec)	06:30	19:50	<00:01

*Evaluations determined these sensors' responses to the liquids shown above and those indicated in the following section. 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.
**See glossary.
***Tested at discrete levels only.

Specificity Results (in addition to above):
Activated: synthetic gasoline, n-hexane, toluene, xylene(s)
Not activated: water (polymer strip only)

Comments:
Sensors are reusable.
These sensors do not require a console.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 11/15/93, 11/02/98

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Issue Date: November 22, 1995
Revision Date: October 7, 2015

Veeder-Root

ILS-250, 350, TLS-250i, 250i Plus, 300, 300C, 300i, 300PC, TLS-350 Series, TLS-450 Series, Red Jacket ProMax and ProPlus with Interstitial Liquid Sensor for Fiberglass Tanks 794390-401, 404, 407, 409, Interstitial Liquid Sensor for Steel Tanks 794390-420, 460, Liquid Sensor for Sumps 794390-206

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Interstitial Liquid Sensor for Fiberglass Tanks 794390-401, 404, 407, 409	unleaded gasoline*	synthetic gasoline**	used oil**
Response time (min)	3.66	3.45	N/D*****
Recovery time (min)	<1	<1	N/D*****
Product activation height (cm)	1.28	1.27	N/D*****
Lower detection limit (cm)	1.84	1.65	N/D*****
Interstitial Liquid Sensor for Steel Tanks 794390-420*, 460**			
Response time (min)	6.00	6.51	<1
Recovery time (min)	<1	<1	<1
Product activation height (cm)	3.67	3.62	N/D*****
Lower detection limit (cm)	4.05	4.17	2.65
Liquid Sensor for Sumps 794390-206******			
Response time (min)	8.19	8.49	N/D*****
Recovery time (min)	<1	<1	N/D*****
Product activation height (cm)	4.12	3.95	N/D*****
Lower detection limit (cm)	4.67	4.36	N/D*****

* ILS-250, TLS-250i, 250i Plus
** ILS-350, TLS-350 Series
***This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.
****Liquid Sensor for Sumps 794390-206 is no longer manufactured and is not supported by the TLS-450 series console. It was replaced by sensor models 794380-208, 209 which are included on the NWGLDE list.
***** See glossary.

Specificity Results (in addition to above):
Activated: diesel, heating oil #2, water.
Evaluations determined these sensors' responses to the liquids shown above as well as those indicated in this section. 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:
Comparison of TLS-450 Series console with TLS-350 series console showed comparable results when evaluated with representative sensors in water and diesel fuel.
Sensors are reusable.
Veeder-Root has redesigned sensor model 794390-409. The cable length remains the same (284"). The original design of the sensor has mesh netting around the sensor. The new design does not have mesh netting around the sensor. The old sensor parameters are as shown above. The redesigned sensor is listed under Veeder Root 8601 Series, 8600 Series, and TLS-3xx Series with Interstitial Liquid Sensor for Fiberglass Tanks 794390-409 interstitial Detector (Liquid Phase).

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 07/17/92, 04/22/98
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 03/03/2008, 08/05/10

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Issue Date: November 22, 1995
Revision Date: June 10, 2013

Veeder-Root

ILS-350, TLS-300C, 300i, 300PC, 350, 350PC, 350R, 350RPC, TLS-450 Series, Red Jacket ProMax and ProPlus with Solid-State Pan/Sump Sensor 794380-321, 351, Piping Sump Sensor 794380-208, 209, Micro Sensor 794380-340

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: float/reed switch (794380-208, 209), optical (794380-321, 340, 351)

Test Results:

Solid-State Pan/Sump Sensor 794380-321, 351	unleaded gasoline	diesel*	water	used oil
Minimum product thickness (cm)	2.60	2.50	2.60	N/D****
Precision (cm)	0.010	0.010	0.010	N/D****
Detection time (sec)	<1	<1	<1	N/D****
Piping Sump Sensor 794380-208, 209**				
Minimum product level (cm)	3.51	3.40	3.03	3.76
Precision (cm)	0.011	0.011	0.011	0.036
Detection time (sec)	<1	<1	<1	<1
Micro Sensor 794380-340* **				
Minimum product thickness (cm)	0.51	0.46	0.48	N/D****
Precision (cm)	0.011	0.007	0.007	N/D****
Detection time (sec)	<1	<1	<1	N/D****

*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.
**This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids. Results stated for used oil applicable to this sensor only.
***Micro Sensor 794380-340 is not supported by TLS 450 series console.
****See Glossary

Comments:

Sensors are reusable.
208 and 209 sensors are also compatible with 300 series.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 10/20/94, 05/22/02, 3/3/08, 4/15/11

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Issue Date: September 28, 2004
Revision Date: December 6, 2010

Veeder-Root

ILS-350, TLS-300 Series, TLS-450 Series, EMC, EMC-Series, and Red Jacket ProMax, Red Jacket ProPlus with Single-Point Mini Hydrostatic Sensor 794380-304

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Single-Point Mini Hydrostatic Sensor 794380-304	30% by Weight $CaCl_2$	50% by Volume Propylene Glycol
Detection time (sec)	<15	<60
Fall time (sec)	<15	<60
Minimum product level (in)	0.793	0.669

Comments:

Manufacturer states that Sensor 794380-304 is installed near the bottom of a brine reservoir.
An alarm is triggered if the brine level falls below the threshold level of the sensor.
Manufacturer also states that the sensor withstands removal and replacement from the reservoir without damage to the sensor.
The testing conducted for this evaluation determined the sensor's response to brine and propylene glycol.
The evaluator states that other liquids would also produce an alarm if the sensor threshold is exceeded. These thresholds would be slightly different for different liquids due to the differing densities. These liquids, and the threshold for each, have not been determined at this time.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 05/18/04, 03/3/08, 08/04/10

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Issue Date: July 8, 2003
Revision Date: April 8, 2011

Veeder-Root

ILS-350, TLS-300 Series, TLS 350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Position Sensitive Sensor 794380-323

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative, non-discriminating
Sampling frequency: continuous
Operating principle: float switch

Test Results:

Position Sensitive Sensor 794380-323	unleaded gasoline	diesel*	water	E85
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Product activation height (in)	1.520	1.449	1.359	1.479

*The evaluation determined this sensor's responses to the liquids shown above as well as those indicated in the following section. 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.

Specificity Results:
Evaluator reports this sensor will respond to any liquid once sensor's threshold level has been exceeded. This testing included water, diesel fuel, gasoline, and E85.

Manufacturer's Specifications:
Sensor is reusable.

Comments:
Sensor will alarm if it is raised from the bottom of the containment vessel.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.
This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 04/08/03, 02/02/06, 03/03/08

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Issue Date: November 22, 1995
Revision Date: January 4, 2011

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

PA02590XXX000, (Same as Veeder-Root 0794390-401, 404, 407, 409),
PA02591144000, (Same as Veeder-Root 0794390-420, 460),
PA02592000010, (Same as Veeder-Root 0794380-206)

INTERSTITIAL DETECTOR (LIQUID-PHASE)

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

Test Results:

PA02590XXX000	unleaded gasoline	synthetic gasoline
Response time (min)	3.66	3.45
Recovery time (min)	<1	<1
Product activation height (cm)	1.28	1.27
Lower detection limit (cm)	1.84	1.65
PA02591144000*		
Response time (min)	6.00	6.51
Recovery time (min)	<1	<1
Product activation height (cm)	3.67	3.62
Lower detection limit (cm)	4.05	4.17
PA02592000010		
Response time (min)	8.19	8.49
Recovery time (min)	<1	<1
Product activation height (cm)	4.12	3.95
Lower detection limit (cm)	4.67	4.36

* This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.

Specificity Results (in addition to above):
Activated: diesel, heating oil #2, water.

Comments:
Sensors are reusable.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 07/17/92, 04/22/98

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Issue Date: November 14, 1997
Revision Date: April 8, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket Electronics RE400-058-5, RE400-059-5, RE400-147-5, RE400-148-5 Overfill Sensor, RE400-111-5 Sump Sensor, RE400-203-5 Optical Liquid Discrimination Sensor, RE400-204-5 Dispenser Pan Monitor, RE400-180-5 Liquid Refraction Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: float switch (RE400-058-5, RE400-059-5, RE400-147-5, RE400-148-5 Overfill Sensor, RE400-111-5 Sump Sensor), electrical conductivity and optical (RE400-203-5 Optical Liquid Discrimination Sensor), conductive polymer (RE400-204-5 Dispenser Pan Monitor), optical (RE400-180-5 Liquid Refraction Sensor)

Test Results:

	unleaded gasoline	diesel*	water
RE400-058-5, RE400-059-5, RE400-147-5, RE400-148-5 Overfill Sensor			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	2.97	2.82	2.57
RE400-111-5 Sump Sensor			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	3.60	3.41	3.20
RE400-203-5 Optical Liquid Discrimination Sensor			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	1.17	1.12	1.10
RE400-204-5 Dispenser Pan Monitor			
Detection time (hr:min:sec)	<00:30:00	<02:00:00	<00:00:01
Fall time (hr:min:sec)	<01:20:00	1-2 days	<00:00:01
Lower detection limit (cm)	0.44	0.44	1.08
RE400-180-5 Liquid Refraction Sensor			
Detection time (sec)	<1	<1	<1
Fall time (sec)	<1	<1	<1
Lower detection limit (cm)	1.17	1.12	1.10

*Evaluations determined these sensors' responses to the liquids shown above and those indicated in the following section. 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.

Specificity Results (in addition to above):

Activated: synthetic gasoline, n-hexane, jet-A fuel, toluene, xylene(s).

Comments:

Evaluator claims sensors will respond to any liquid once threshold has been exceeded.
After exposure to diesel, RE400-204-5 Dispenser Pan Monitor reading may not return to pre-contaminated level.
Sensors are reusable.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 06/01/95

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Issue Date: November 22, 1995
Revision Date: April 8, 2011

Veeder-Root
(originally listed as Marley Pump Co.)

Red Jacket Electronics RE400-179-5 to RE400-199-5 Combination High Level/Low Level Sensor, RE400-042-5 Hydrostatic Sensor, Red Jacket PPM 4000 with Optical Liquid Discrimination Sensor

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: float switch (RE400-179-5 to RE400-199-5 Combination High Level/Low level sensor, RE400-042-5 Hydrostatic Sensor), optical sensor (Red Jacket PPM 4000 with Optical Liquid Discrimination Sensor)

Test Results:

RE400-179-5 to RE400-199-5 Combination High Level/Low Level Sensor	unleaded gasoline		diesel*		water	
	high	low	high	low	high	low
Detection time (sec)	<1	<1	<1	<1	<1	<1
Fall time (sec)	<1	<1	<1	<1	<1	<1
Lower detection limit (cm)	N/D**	3.80	N/D	4.26	N/D	3.53
RE400-042-5 Hydrostatic Sensor						
Detection time (sec)	<1	<1	<1	<1	<1	<1
Fall time (sec)	<1	<1	<1	<1	<1	<1
Lower detection limit (cm)	30.42	4.93	30.22	4.61	29.93	4.19

Red Jacket PPM 4000 with Optical Liquid Discrimination Sensor	unleaded gasoline	synthetic fuel	diesel*	Heating oil #2	water
Response time (min)	2.19	2.20	1.93	2.23	2.81
Recovery time (min)	< 1	< 1	< 1	< 1	< 1
Product activation height (cm)	1.08	1.10	1.03	1.07	1.20
Lower detection limit (cm)	0.30	N/D	N/D	N/D	N/D

*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.

**See glossary.

Specificity:

Evaluator claims RE400-179-5 to RE400-199-5 Combination High Level/Low Level Sensor and RE400-042-5 Hydrostatic Sensor will respond to any liquid once threshold has been exceeded.

Comments:

RE400-179-5 to RE400-199-5 Combination High Level/Low Level Sensor model numbers and high level detection limit vary with length of sensor.
PPM 4000 with Optical Liquid Discrimination Sensor evaluation lists all PPM, RLM, and ST models, including the Multiplexer Unit. However, evaluation procedures were performed using model PPM 4000.
Sensors are reusable.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/01/95, 04/28/92

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Veeder-Root

TLS4; TLS4B; TLS-300, 300C, 300i, 300PC; TLS-350, 350PC, 350R, 350R-PC; TLS-450 Series; Red Jacket ProMax, ProPlus, and ProPlusPC with Position Sensitive Interstitial Sensor 794380-333

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

	unleaded gasoline	diesel*	water	E85
794380-333 with TL-S4 Series				
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Threshold Level (in)	1.3912	1.2981	1.2437	1.3400
794380-333 with TL-300 Series				
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Threshold Level (in)	1.3712	1.2728	1.2466	1.3412
794380-333 with TL-350 Series				
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Threshold Level (in)	1.3759	1.2869	1.2413	1.3511
794380-333 with TL-450 Series				
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Threshold Level (in)	1.3950	1.2966	1.2404	1.3360

*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:

Sensor will alarm if it is raised from the bottom of the containment. Sensor can easily be removed, cleaned and reinstalled if an alarm is triggered or for periodic testing.
The consoles within each series are identical other than their name for marketing purposes. Therefore, each of the consoles within a given series will perform identically. The TLS-4 Series consists of the TLS-4 and TLS-4B. The TLS-300 Series consists of the TLS-300, 300C, 300i, 300PC, and Red Jacket ProPlus consoles. The TLS-350 Series consists of the TLS-350, 350R, and Red Jacket ProMax. The TLS-450 Series consists of the TLS-450.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/22/13

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Issue Date: April 4, 2007
Revision Date: April 8, 2011

Veeder-Root

TLS-300 Series, TLS-350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Float Sensor 794380-430

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Float Sensor 794380-430	unleaded gasoline	diesel*	water	E85
Product activation height (in)	0.95	0.90	0.89	0.90
Response time (min)	<1	<1	<1	<1
Recovery time (min)	<1	<1	<1	<1

*The evaluation determined this 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:

Evaluator reports that alarms may be indicated by an audible alarm, a displayed message on the TLS-350R or TLS-350 console, and a printed message if the console is equipped with a printer.
The alarms are also recorded as part of the TLS-350R or TLS-350 Alarm History Report.
Evaluator reports sensors can easily be removed, cleaned, and reinstalled after an alarm is triggered or for periodic testing.
Sensors are reusable.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.
This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 06/13/05, 05/09/06, 03/03/08

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Veeder-Root

TLS-300 Series, TLS-350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Single Stage Hydrostatic Sensor 794380-301, Dual Stage Hydrostatic Sensors 794380-302, 303

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

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

Test Results:

Single Stage Hydrostatic Sensor 794380-301	30% by weight calcium chloride in water	50% by weight propylene glycol in water	*50% by weight propylene glycol in water
Product activation height (in)	1.74	1.94	1.5
Response time (min)	<1	<1	35.75
Recovery time (min)	<1	<1	<1

Dual Stage Hydrostatic Sensor 794380-302**	water high***	water low***
Product activation height (in)	12.25	1.62
Response time (min)	<1	<1
Recovery time (min)	<1	<1

Dual Stage Hydrostatic Sensor 794380-303	30% by weight calcium chloride in water high***	30% by weight calcium chloride in water low***	50% by weight ethylene glycol in water high***	50% by weight ethylene glycol in water low***
Product activation height (in)	13.13	1.20	13.15	1.48
Response time (min)	<1	<1	<1	<1
Recovery time (min)	<1	<1	<1	<1

*Evaluation performed by Carnegie Mellon Institute.
** Dual Stage Hydrostatic Sensor 794380-302 was replaced by Sensor 794380-303 and is not supported by TLS-450 series console.
***The "high" and "low" refer to high and low level alarm points of dual stage hydrostatic sensors.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS-300 Series, TLS-350 Series, TLS-450 Series, EMC Series, EMC Basic, Red Jacket ProMax and ProPlus with Single Stage Hydrostatic Sensor 794380-301, Dual Stage Hydrostatic Sensors 794380-302, 303

Comments:
EMC Series and EMC Basic controllers have been evaluated only for use with sensors 794380-301 and 794380-303.
Evaluator reports that sensors will respond to any liquid after their thresholds are exceeded.
Response times measured from trigger point, except for sensor 794380-301 with 50% by weight ethylene glycol in water, where response time also included time for liquid level to rise from bottom of a test cylinder to trigger point.
Evaluator reports sensors can easily be removed, cleaned, and reinstalled after an alarm was triggered or for periodic testing.
Sensors are reusable.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Single Stage Hydrostatic Sensor 794380-301:
Intended to monitor level of either propylene glycol, ethylene glycol, or calcium chloride solutions in interstitial or annular space of a double-walled tank.
If the brine level in the reservoir drops below the threshold of the sensor, an alarm condition is generated.
The evaluation using 30% by weight calcium chloride in water was reevaluated using a different acceptable test protocol.
Dual Stage Hydrostatic Sensor 794380-302:
Alarm is activated if any significant gain or loss of solution occurs.
Dual stage hydrostatic sensor 794380-303 has replaced this sensor and is fully interchangeable with this sensor.
Vendor will discontinue production of this sensor as of December 31, 2003.
Dual Stage Hydrostatic Sensor 794380-303:
If brine level or propylene glycol level in reservoir drops below the threshold of low-level sensor or if any liquid rises above the threshold of high level sensor, an alarm condition is generated.
Alarms are indicated by an audible alarm, displayed message on the console, printed message (if the console is equipped with a printer), and recorded as part of the console "Alarm History Report."

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 12/07/92, 03/16/98
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 07/08/02, 02/03/03, 3/3/08, 02/05/10

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Issue Date: August 28, 1998
Revision Date: April 8, 2011

Veeder-Root

TLS-300, 300i, TLS-350 Series, TLS-450 Series, Red Jacket ProMax and ProPlus with Discriminating Dispenser Pan Sensor 794380-322, Discriminating Containment Sump Sensor 794380-352

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: product permeable, reed switch/float

Test Results:

	polymer strip		float switch water	
Discriminating Dispenser Pan Sensor 794380-322	unleaded gasoline	diesel*	high**	low**
Response time (sec)	~10 min	2-12 hrs	<1	<1
Recovery time (sec)	N/A***	N/A	<1	<1
Lower detection limit - height (in)	N/D***	N/D	7.66	1.37
Lower detection limit - thickness (in)	0.005	0.005	N/A	N/A
Discriminating Containment Sump Sensor 794380-352				
Response time (sec)	~10 min	2-12 hrs	<1	<1
Recovery time (sec)	N/A	N/A	<1	<1
Lower detection limit - height (in)	N/D	N/D	12.28	1.35
Lower detection limit - thickness (in)	0.005	0.005	N/A	N/A

*Evaluations determined these sensors' responses to the liquids shown above and those indicated in the following section. 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.
**The "high" and "low" refer to high and low level alarm points of float switch sensors.
*** See glossary.

Specificity Results (in addition to above):
Activated: synthetic gasoline, jet-A fuel, n-hexane, toluene, xylene(s)
Not activated: water (polymer strip only)

Comments:
Polymer strip must be air dried after exposure to unleaded fuel.
Polymer strips must be cleaned with solvent and dried after exposure to diesel.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 01/02/95, 06/23/97, 04/20/98, 03/03/08

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Issue Date: December 22, 2003
Revision Date: April 8, 2011

Veeder-Root

TLS-350 Series, TLS-450 Series, EMC, EMC-PC, EMC Enhanced, EMC-PC Enhanced, and Red Jacket ProMax with Magnetostrictive Sump Sensor Series 857060-xxx* and 857080-xxx*

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, discriminating
Sampling frequency: continuous
Operating principle: magnetostrictive probe with dual floats

Test Results:

24" Sump Sensor Series 857060-xxx* and 857080-xxx*	unleaded gasoline	diesel**	water	gas on 7" of water (fuel alarm in presence of water)	diesel on 7" of water (fuel alarm in presence of water)
Detection time (sec)	~10	~10	~10	~10	~10
Fall time (sec)	~10	~10	~10	~10	~10
Minimum product level (in)	1.368	1.329	1.614	1.116	1.101

***xxx** designates sensors in the 857060 and 857080 series containing: 857060 and 857080-101, -102, -111, -112, -121, -122, -211, -212, -221, and -222.
** 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:

One sensor length (24") was evaluated. Results are typical for the other sensors in the 857060-xxx and 857080-xxx series, regardless of length and programmability options.
All sensors are based on the use of a magnetostrictive sensor that is equipped with two floats. The lower float will only float on water. The upper float will float on fuel as well as water.
Results for the "water alarm" threshold will vary based upon programmed alarm levels.
The "fuel alarm" is based upon a fixed threshold and is not programmable.
Systems containing these sensors can be programmed to alarm continuously and to shut down the dispensing system.
Sensor will issue an alarm if raised from the bottom of the containment vessel.
Sensors are reusable.
Vendor claims sensors are easily removable, cleaned, and reinstalled if an alarm is triggered or for periodic testing.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 08/26/03, 05/17/04, 04/21/05, 05/27/05, 4/26/07, 03/03/08

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Issue Date: November 22, 1995
Revision Date: April 8, 2011

Veeder-Root

TLS-350 Series, TLS-450 Series, Red Jacket ProMax with Interstitial Liquid Sensor 794380-341, Dispenser Pan Sensor 794380-320, Discriminating Containment Sump Sensor 794380-350, Discriminating Fibretrench Sensor 794380-360, 361, 362

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type:	qualitative
Sampling frequency:	continuous
Operating principle:	capacitance change/ultrasonic (794380-341), electrical conductivity/ultrasonic (794380-320, 350, 360, 361, 362)

Test Results:

Interstitial Liquid Sensor 794380-341*	unleaded gasoline	diesel**	water
Response time (min)	<1	<1	<1
Recovery time (min)	<1	<1	<1
Product activation height (cm)	<0.125	<0.125	<0.125

Dispenser Pan Sensor 794380-320, Containment Sump Sensor 794380-350, Discriminating Fibertrench Sensors 794380-360, 361, 362*		High****	Low****
Response time (min)	6.59	5.00	4.60
Recovery time (min)	17.17	<1	<1
Product activation height (cm)	3.40	20.3	2.45

* Interstitial Liquid Sensor 794380-341 was replaced by Discriminating Interstitial Sensor 794380-343 and is not supported by TLS-450 series console.
**Evaluations determined 794380-320, 794380-341, and 794380-350 sensors' responses to the liquids shown above and those indicated in the following section. 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.
*** Discriminating Fibertrench Sensors 794380-360, 361, 362 were replaced by sensors 794380-320 and 794380-350 and are not supported by TLS-450.
****The "high" and "low" refer to high and low level alarm points of hydrostatic sensors.

Specificity Results (in addition to above for 794380-341):
This sensor will respond to any liquid after its threshold is exceeded.

Specificity Results (in addition to above for 794380-320, 350):
Activated: diesel (at liquid height of 4.75 cm), synthetic fuel (at 2.58 cm), heating oil #2 (at 4.67 cm).

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Veeder-Root, TLS-350 Series, TLS-450 Series, Red Jacket ProMax with Interstitial Liquid Sensor 794380-341, Dispenser Pan Sensor 794380-320, Discriminating Containment Sump Sensor 794380-350, Discriminating Fibretrench Sensor 794380-360, 361, 362

Comments:

Interstitial Liquid Sensor 794380-341 was listed as a discriminating sensor in the 7th edition of this list. However, the vendor has since indicated that the sensor is sometimes unable to determine if the liquid is product or water and the sensor was re-evaluated as a non-discriminating liquid sensor. Therefore, all alarms initiated by any new or existing Interstitial Liquid Sensor 794380-341 should be treated as a liquid alarm indicating product and/or water. This may make it necessary to reprogram previously installed systems.

For Discriminating Fibertrench Sensor 794380-360, lowest water level detection and alarm activation is set at 23 inches high and highest water alarm is set at 25 inches high; for 794380-361, values are 13 inches and 16 inches; for 794380-362, values are 3 inches and 12 inches, (based on manufacturer's specifications).

Sensors are reusable.

Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 06/30/93, 05/26/93, 06/30/97
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 5/26/93, 11/01/00, 03/03/08

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Issue Date: December 7, 2001
Revision Date: April 8, 2011

Veeder-Root

TLS-350, 350R Series, TLS-450 Series, Red Jacket ProMax with Discriminating Interstitial Sensor 794380-343, Micro Sensor 794380-344

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type:	qualitative, discriminating (794380-343), non-discriminating (794380-344)
Sampling frequency:	continuous
Operating principle:	optical sensor and conductivity (794380-343), optical sensor (794380-344)

Test Results:

Discriminating Interstitial Sensor 794380-343	unleaded gasoline	diesel*	water
Detection time (min)	<1	<1	<1
Fall time (min)	<1	<1	<1
Lower detection limit (in)	<0.1	<0.1	<0.1

Micro Sensor 794380-344**	unleaded gasoline	diesel*	water	E85	Used Oil
Detection time (min)	<1	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1	<1
Lower detection limit (in)	<0.1	<0.1	<0.1	<0.1	<0.125

*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.
** This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.

Specificity Results:
Evaluator claims both 794380-343 and 794380-344 sensors will respond in any liquid after the sensor threshold is exceeded.
Sensor 794380-343 is designed to discriminate between product and water.
Separate alarms are designed to be triggered for product and water.

Manufacturer's Specifications:
Sensors 794380-343 and 794380-344 can be removed, cleaned, and reinstalled, for periodic testing, if an alarm is triggered or if service is necessary.
Sensor 794380-343 has no moving parts.
Sensor 794380-344 is designed for use in contained risers and the interstitial space of double-wall steel tanks. When product or an open sensor (referred to as "Sensor Out") is detected, an audible alarm is actuated, a message is displayed on the TLS-350 or TLS-350R console, and a printed message is generated if the console is equipped with a printer. The alarms are also recorded as part of the TLS-350 or TLS-350R "Alarm History Report".
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 05/10/01, 02/02/06, 03/03/08, 08/05/10

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Issue Date: June 26, 2006
Revision Date: April 8, 2011

Veeder-Root

TLS-350, 350R Series, TLS-450 Series, Red Jacket ProMax with Interstitial Sensor 794380-345

INTERSTITIAL DETECTOR (LIQUID-PHASE)

Detector:

Output type: qualitative, non-discriminating
Sampling frequency: continuous
Operating principle: optical sensor

Test Results:

Interstitial Sensor 794380-345	unleaded gasoline	diesel*	water	E85
Detection time (min)	<1	<1	<1	<1
Fall time (min)	<1	<1	<1	<1
Lower detection limit (in)	<0.2	<0.2	<0.2	<0.2

*Evaluations determined this 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.

Specificity Results:

Evaluator claims sensor will respond in any liquid after the sensor threshold is exceeded. This testing included water, diesel fuel, gasoline, and E85.

Manufacturer's Specifications:

Sensor can be removed, cleaned, and reinstalled, for periodic testing, if an alarm is triggered or if service is necessary.
Sensor has no moving parts.
Sensor is designed for use in the interstitial space of double-wall fiberglass tanks. When product or an open sensor (referred to as "Sensor Out") is detected, an audible alarm is actuated, a message is displayed on the TLS-350 or TLS-350R console, and a printed message is generated if the console is equipped with a printer. The alarms are also recorded as part of the TLS-350 or TLS-350R "Alarm History Report".
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.
This sensor is identified as an interstitial sensor, but will function properly in other containment areas such as containment sumps, contained risers and other contained enclosures. This sensor must be installed at the lowest point of the containment enclosure to insure early detection of liquids.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 02/02/06, 03/03/08

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Issue Date: November 22, 1995
Revision Date: June 20, 2008

Veeder-Root

350 Series, TLS-450 Series, Red Jacket ProMax UST Monitoring Systems Models ILS-350, TLS-350, 350R, 350PC, 350RPC with Groundwater Sensors 794380-621, 622, 624

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (min:sec)	8:55	6:18
Fall time (min:sec)	54:50	26:02
Lower detection limit (cm)	0.02	0.02

Specificity Results (in addition to above):
Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Calibration:
Sensor must be checked annually for operability or in accordance with manufacturer's instructions and, if necessary, calibrated or replaced.

Comments:
Sensors are reusable.
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 11/20/91, 07/28/92
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluations: 03/03/008

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Issue Date: November 22, 1995
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

EMC Environmental Management Console Groundwater Sensor Series, PA02700XX0001 (Same as Veeder-Root 794380-621, 622, 624)

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: electrical conductivity

Test Results:

	unleaded gasoline	synthetic gasoline
Detection time (min:sec)	8:55	6:18
Fall time (min:sec)	54:50	26:02
Lower detection limit (cm)	0.02	0.02

Specificity Results (in addition to above):

Activated: n-hexane, diesel, jet-A fuel, toluene, xylene(s).

Calibration:

Sensor must be checked annually for operability or in accordance with manufacturer's instructions and, if necessary, calibrated or replaced.

Comments:

Sensors are reusable.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Dates of Evaluation: 11/20/91, 07/28/92

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Issue Date: November 22, 1995
Revision Date: June 20, 2008

Veeder-Root

ILS-350, TLS-350 Series, TLS-450 Series, Red Jacket ProMax with Adsistor Vapor Probe 794390-700

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

Detector:
Output type: qualitative
Sampling frequency: continuous
Operating principle: adsistor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (min:sec)	7:46	N/A*	17:01
Fall time (min:sec)	2:38	N/A	3:05
Lower detection limit (ppm)	500	>1000	500

*See Glossary.

Specificity Results:
Not Activated: n-hexane, toluene, xylene(s).
Comparison of TLS-450 with TLS-350 series console showed comparable results when evaluated with representative sensors.

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 07/24/92
Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluations: 03/03/08

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Issue Date: November 22, 1995
Revision Date: June 24, 2002

Veeder-Root

(originally listed as Gilbarco Environmental Products and later as Marconi Commerce Systems)

PA02660000000 (Same as Veeder-Root 794390-700)

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

Detector:

Output type: qualitative
Sampling frequency: continuous
Operating principle: adsistor

Test Results:

	unleaded gasoline	synthetic gasoline	JP-4 jet fuel
Detection time (min:sec)	7:46	N/A*	17:01
Fall time (min:sec)	2:38	N/A	3:05
Lower detection limit (ppm)	500	>1000	500

*See glossary.

Specificity Results:

Not activated: n-hexane, toluene, xylene(s).

Veeder-Root
125 Powder Forest Dr.
Simsbury, CT 06070-2003
Tel: (860) 651-2700
E-mail: info@veeder.com
URL: www.veeder.com

Evaluator: Carnegie Mellon Research Institute
Tel: (412) 268-3495
Date of Evaluation: 07/24/92

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Issue Date: November 22, 1995
Revision Date: November 21, 2003

Veeder-Root
(originally listed as Entropy Limited)

Precision Tank Inventory Control System Version 90

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUALITATIVE)

Certification Leak rate of 0.1 gph with PD = 97.9% and PFA = 0%.

Leak Threshold 0.04 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 15,000 gallons.

Data Requirement Minimum of 64 days of product level and flow through data.

Comments Not evaluated using data from manifolded tank systems.
Of 120 data sets submitted for evaluation, 13 were not evaluated and 16 were inconclusive.
Median monthly throughput of tanks evaluated was 42,835 gallons.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder-Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 04/02/91

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Issue Date: November 14, 1997
Revision Date: April 5, 2002

Veeder-Root
(originally listed as Ustman Industries, Inc.)

USTMAN YES SIR 90

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUALITATIVE)

Certification Leak rate of 0.2 gph with PD = 96.3% and PFA = 3.9%.

Leak Threshold 0.1 gph.
A tank system should not be declared tight when a consistent loss or gain equals or exceeds this threshold that is statistically significant from zero at the 5% confidence level.

Applicability Gasoline, diesel.

Tank Capacity Maximum of 15,000 gallons.

Data Requirement Minimum of 35 days of product level and flow through data.

Comments Not evaluated using manifolded tank systems.
Of 120 data sets submitted for evaluation, 15 were inconclusive.
Median monthly throughput of tanks evaluated was 15,867 gallons.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 12/17/90

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Issue Date: November 22, 1995
Revision Date: November 21, 2003

Veeder-Root
(originally listed as Entropy Limited)

Precision Tank Inventory Control System, Revision 90

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.5% and PFA < 0.5%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods:
Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 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 22,500 gallons for single tanks.
Maximum of 60,000 gallons cumulative capacity for manifolded tank systems with no more than 3 tanks in system.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
32% of data sets evaluated were from manifolded tank systems.
Of 56 data sets submitted for evaluation, 6 were not analyzed due to unusable data and none were inconclusive.
Median monthly throughput of tanks evaluated was 52,207 gallons.
Leak rates ranging from 0.0497 to 0.203 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Simpson, Gumpertz and Heger, Inc.
Tel: (617) 643-2000
Date of Evaluation: 11/30/93

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Issue Date: November 22, 1995
Revision Date: April 5, 2002

Veeder-Root
(originally listed as Ustman Industries, Inc.)

USTMAN SIR 1.91

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 98.4% and PFA = 1.6%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
A tank system should not be declared tight when a consistent loss or gain equals or exceeds this threshold at the 5% level of significance.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 18,000 gallons.

Data Requirement
Minimum of 42 days of product level and flow through data.

Comments
Not evaluated using data from manifolded tank systems.
Of 41 data sets submitted for evaluation, 4 data sets were not analyzed and 7 were inconclusive.
Median monthly throughput of tanks evaluated was 10,978 gallons.
Leak rates ranging from 0.048 to 0.201 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 10/31/91

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Issue Date: November 22, 1995
Revision Date: April 5, 2002

Veeder-Root
(originally listed as Ustman Industries, Inc.)

USTMAN SIR Version 94.1

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD > 99% and PFA < 1.0%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 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 30,000 gallons.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
Evaluated using some data from manifolded tank systems.
Of 53 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 25,408 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.
Some data sets used USTMAN SIR 1.91 (0.1 gph) analysis as documentation that tanks were tight.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 03/31/94

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Issue Date: November 22, 1995
Revision Date: April 5, 2002

Veeder-Root
(originally listed as Ustman Industries, Inc.)

USTMAN SIR Versions 95.2, 95.2A, 95.2B

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD > 99.2% and PFA < 0.08% (Version 95.2).
Leak rate of 0.2 gph with PD > 99.9% and PFA < 0.1% (Version 95.2A).
Leak rate of 0.2 gph with PD > 97.2% and PFA < 0.1% (Version 95.2B).

Leak Threshold
0.05 for leak rate of 0.1 gph (Version 95.2).
0.1 for leak rate of 0.2 gph (Version 95.2A).
0.16 for leak rate of 0.2 gph (Version 95.2B).
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 60,000 gallons for single tanks.
Maximum of 60,000 gallons cumulative capacity for manifolded tank systems with no more than 4 tanks in system.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
44% of data sets evaluated were from manifolded tank systems.
Of 94 data sets submitted for evaluation, all were analyzed with conclusive results.
Results obtained from combined data for USTMAN Version 94.1 and 95.2.
Data used in the evaluation were obtained from manual tank sticking.
Median monthly throughput of tanks evaluated was 15,483 gallons.
Leak rates of 0.05, 0.1, and 0.2 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluation: 12/12/95, 07/21/00

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Issue Date: November 22, 1995
Revision Date: June 25 2002

Veeder-Root

(originally listed as EnviroQuest Technologies Limited and later as Watson Systems, Inc.)

Watson SIRAS Software System Versions 2.0, 2.8.3

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.2 gph with PD = 99.999% and PFA = 0.01%
Leak rate of 0.1 gph with PD = 99.3% and PFA = 0.7%

Leak Threshold
0.1 for leak rate of 0.2 gph.
0.05 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 30,000 gallons.
Size limits using an acceptable protocol for manifolded tank systems have not been determined.

Data Requirement
Minimum of 30 days of usable product level and flow through data.

System Features
Backup technical support for the end user was part of the service feature of these SIR versions and was provided through contract with Watson Systems, Inc.
Since these SIR versions are now owned by Veeder-Root, information, assistance, and technical support for these versions are at their discretion.

Comments
Not evaluated for in-house use that is independent of vendor participation.
Not evaluated for manifolded tank systems using an acceptable protocol. 27% of data sets evaluated were from manifolded tank systems.
Of 56 data sets submitted for evaluation, 6 were not analyzed due to unusable data.
Median monthly throughput for tanks evaluated was 73,518 gallons.
Leak rates ranging from 0.0458 to 0.2500 gph were used in evaluation.
Data sets evaluated were supplied by evaluator.

Gilbarco/Veeder Root
Attn: CMS Mailstop F-76
7300 West Friendly Ave.
P.O. Box 22087
Greensboro, NC 27420-2087
Tel: (800) 253-8054

Evaluator: Midwest Research Institute
Tel: (816) 753-7600
Date of Evaluation: 08/23/93

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Issue Date: August 23, 1999

Vista Precision Solutions, Inc.

(Originally listed as Vista Research, Inc. and Naval Facilities Engineering Service Center)

LRDP-24 (V1.0.2, V1.0.3)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 2.0 or 3.0 gph with PD = 95% and PFA < 0.001%.
Choose one to determine the scaled leak rate and scaled leak threshold for the tank being monitored.
For other tank sizes, scaled leak rate equals [(PSA in ft² ÷ 6,082 ft²) x (leak rate in gph)].
Example:
For a tank with PSA = 10,000 ft², leak rate = 2.0 gph; scaled leak rate = [(10,000 ft² ÷ 6,082 ft²) x 2.0 gph] = 3.29 gph.
Calculated minimum detectable leak rate is 0.446 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft² and leak rate of 2.0 or 3.0 gph, leak threshold is 1.777 or 2.77gph respectively.
For other tank sizes, scaled leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x (leak rate in gph - 0.223 gph)].
Example:
For a tank with PSA = 10,000 ft², leak rate = 2.0 gph; scaled leak threshold = [(10,000 ft² ÷ 6,082 ft²) x (2.0 gph - 0.223 gph)] = 2.92 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 15,205 ft² (approximately 139 ft diameter).
Performance not sensitive to product level.

Waiting Time

Minimum of 24 hours after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 16.08 to 115.8 hours.

Test Period

Minimum of 24 hours.
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None.
Water leaks are measured as increase in mass inside tank.

Calibration

Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments

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. Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².
Not evaluated as a stand alone system.
Significant bias of 0.103 gph was detected during the evaluation.
Evaluator believes this bias was the result of product inflow into the tank from valve leaks and product drain back from the pump return line and thus evaluator did not use this bias in calculating above results.
Performance of the system can be improved by combining results of 2 or more tests.
If this option is used, it is important to determine the number of tests, their timing and the number of passing results necessary to confirm a tank is tight.
The LRDP-24-5 (V1.0) combines the results of 5 tests and is one evaluated option to improve the performance of this system.

Vista Research, Inc. & Naval Facilities Engineering Service Ctr.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/29/99

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Issue Date: August 23, 1999

Vista Precision Solutions, Inc.

(Originally listed as Vista Research, Inc. and Naval Facilities Engineering Service Center)

LRDP-48 (V1.0.2, V1.0.3)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 2.0 or 3.0 gph with PD = 95% and PFA < 0.001%.
Choose one to determine the scaled leak rate and scaled leak threshold for the tank being monitored.
For other tank sizes, scaled leak rate equals [(PSA in ft² ÷ 6,082 ft²) x (leak rate in gph)].
Example:
For a tank with PSA = 10,000 ft², leak rate = 2.0 gph; scaled leak rate = [(10,000 ft² ÷ 6,082 ft²) x 2.0 gph] = 3.29 gph.
Calculated minimum detectable leak rate is 0.376 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft² and leak rate of 2.0 or 3.0 gph, leak threshold is 1.812 or 2.812 gph respectively.
For other tank sizes, scaled leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x (leak rate in gph - 0.188 gph)].
Example:
For a tank with PSA = 10,000 ft², leak rate = 2.0 gph; scaled leak threshold = [(10,000 ft² ÷ 6,082 ft²) x (2.0 gph - 0.188 gph)] = 2.98 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 15,205 ft² (approximately 139 ft diameter).
Performance not sensitive to product level.

Waiting Time

Minimum of 24 hours after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 16.08 to 115.8 hours.

Test Period

Minimum of 48 hours.
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None. Water leaks are measured as increase in mass inside tank.

Calibration

Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments

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. Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².
Not evaluated as a stand alone system.
Significant bias of 0.078 gph was detected during the evaluation.
Evaluator believes this bias was the result of product inflow into the tank from valve leaks and product drain back from the pump return line and thus evaluator did not use this bias in calculating above results.
Performance of the system can be improved by combining results of 2 or more tests.
If this option is used, it is important to determine the number of tests, their timing and the number of passing results necessary to confirm a tank is tight.
The LRDP-48-4 (V1.0) combines the results of 4 tests and is one evaluated option to improve the performance of this system.

Vista Research, Inc. & Naval Facilities Engineering Service Ctr.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/29/99

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Issue Date: August 23, 1999

Vista Precision Solutions, Inc.

(Originally listed as Vista Research, Inc. and Naval Facilities Engineering Service Center)

LRDP-24 (V1.1)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 0.856 gph with PD = 95% and PFA = 0.017%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 6,082 ft²) x 0.856 gph].
Example:
For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 6,082 ft²) x 0.856 gph] = 1.407 gph. Calculated minimum detectable leak rate is 0.446 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak threshold is 0.632 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x 0.632 gph].
Example:
For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 6,082 ft²) x 0.632 gph] = 1.039 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 15,205 ft² (approximately 139 ft diameter).
Performance not sensitive to product level.

Waiting Time

Minimum of 24 hours after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 16.08 to 115.8 hours.

Test Period

Minimum of 24 hours.
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None.
Water leaks are measured as increase in mass inside tank.

Calibration

Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments

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. Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².
Not evaluated as a stand alone system.
Significant bias of 0.103 gph was detected during the evaluation.
Evaluator believes this bias was the result of product inflow into the tank from valve leaks and product drain back from the pump return line and thus evaluator did not use this bias in calculating above results.
Performance of the system can be improved by combining results of 2 or more tests.
If this option is used, it is important to determine the number of tests, their timing and the number of passing results necessary to confirm a tank is tight.
The LRDP-24-5 (V1.1) combines the results of 5 tests and is one evaluated option to improve the performance of this system.

Vista Research, Inc. & Naval Facilities Engineering Service Ctr.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/29/99

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Issue Date: August 23, 1999

Vista Precision Solutions, Inc.

(Originally listed as Vista Research, Inc. and Naval Facilities Engineering Service Center)

LRDP-48 (V1.1)

BULK UNDERGROUND STORAGE TANK LEAK DETECTION (50,000 gallons or greater)

Certification

Leak rate is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak rate is 0.749 gph with PD = 95% and PFA = 0.012%.
For other tank sizes, leak rate equals [(PSA in ft² ÷ 6,082 ft²) x 0.749 gph].
Example:
For a tank with PSA = 10,000 ft²; leak rate = [(10,000 ft² ÷ 6,082 ft²) x 0.749 gph] = 1.232 gph.
Calculated minimum detectable leak rate is 0.376 gph with PD = 95% and PFA = 5%.
Leak rate may not be scaled below 0.2 gph.

Leak Threshold

Leak threshold is proportional to product surface area (PSA).
For tanks with PSA of 6,082 ft², leak threshold is 0.563 gph.
For other tank sizes, leak threshold equals [(PSA in ft² ÷ 6,082 ft²) x 0.563 gph].
Example:
For a tank with PSA = 10,000 ft²; leak threshold = [(10,000 ft² ÷ 6,082 ft²) x 0.563 gph] = 0.926 gph.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the calculated leak threshold.

Applicability

Gasoline, diesel, aviation fuel.

Tank Capacity

Use limited to single field-constructed vertical tanks larger than 50,000 gallons.
Maximum product surface area (PSA) is 15,205 ft² (approximately 139 ft diameter).
Performance not sensitive to product level.

Waiting Time

Minimum of 24 hours after delivery or dispensing.
Valve leaks and pump drain-back may mask a leak.
Allow sufficient waiting time to minimize these effects.
Waiting times during evaluation ranged from 16.08 to 115.8 hours.

Test Period

Minimum of 48 hours.
There must be no dispensing or delivery during test.

Temperature

Measurement not required by this system.

Water Sensor

None.
Water leaks are measured as increase in mass inside tank.

Calibration

Differential pressure sensor must be checked regularly in accordance with manufacturer's instructions.

Comments

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.
Evaluated in a nominal 600,000 gallon, vertical underground tank with product surface area (PSA) of 6,082 ft².
Not evaluated as a stand alone system.
Significant bias of 0.078 gph was detected during the evaluation.
Evaluator believes this bias was the result of product inflow into the tank from valve leaks and product drain back from the pump return line and thus evaluator did not use this bias in calculating above results.
Performance of the system can be improved by combining results of 2 or more tests.
If this option is used, it is important to determine the number of tests, their timing and the number of passing results necessary to confirm a tank is tight.
The LRDP-24-5 (V1.1) combines the results of 5 tests and is one evaluated option to improve the performance of this system.

Vista Research, Inc. & Naval Facilities Engineering Service Ctr.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 01/29/99

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. Please refer to complete "DISCLAIMER" on page ii of this list.

Issue Date: August 23, 1999
Revision Date: March 31, 2006

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model HT-100 Monitoring Method and Line Tightness Test Method Version 1.0, Version 1.1

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification

Leak rate of 0.004% of line capacity (0.04 gph per 1000 gallons of product) with PD = 95% and PFA = 1.25% for Version 1.0, (smallest leak rate for Version 1.0 evaluation, which was conducted on a 306,477 gallon line at 160 psi, was 12.3 gph).
Leak rate of 0.00209% of line capacity (0.0209 gph per 1000 gallons of product) with PD = 95% and PFA = 5% for Version 1.1, (smallest leak rate for Version 1.1 evaluation, which was conducted on a 306,477 gallon line at 160 psi, was 6.42 gph).
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold

0.00282% of line volume in gph for Version 1.0.
0.000916% of line volume in gph for Version 1.1
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds these thresholds.

Applicability

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

Specification

System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity

Maximum of 612,954 gallons. Minimum of 3,000 gallons.

Waiting Time

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

Test Period

Minimum of 3 hours, 10 minutes after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features

System may be permanently installed on pipeline to perform monitoring, or may be transported and set up to perform line tightness testing.
A single 3-hour 10-minute test is required consisting of a 1-hour 10-minute monitoring period at operating pressure, and a 2-hour monitoring period at atmospheric pressure.
System measures change in volume and reports output quantity in gph, while compensating for thermal effects.
Printed message and alarm activation if leak is declared.

Calibration

System must be calibrated in accordance with manufacturer's instructions.

Comments

System is to be used only on large bulk pipelines and airport hydrant fueling systems.
This evaluation utilized a total of 87 tests, one with induced leak rate of 13.1 gph.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/98

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Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model HT-100 Monitoring Method and Line Tightness Test Method Version 2.1

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification	Leak rate of 0.00189% of line capacity (0.0189 gph per 1000 gallons of product) with PD = 95% and PFA = 5% for Version 2.1, (smallest leak rate for this evaluation, which was conducted on a 160,000 gallon line at 150 psi, was 3.03 gph). **The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.**
Leak Threshold	0.000945% of line volume in gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds these thresholds.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4, biodiesel B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751*.
Specification	System tests fiberglass or steel piping.
Pipeline Capacity	Maximum of 320,000 gallons, minimum of 3,000 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Minimum 60 minutes after line setup. Test data are acquired and recorded by a microprocessor. Calculations are automatically performed by the microprocessor.
System Features	System may be permanently installed on pipelines to perform monitoring, or may be transported and set up to perform line tightness testing. A single 60-minute test is required consisting of a 30-minute monitoring period at operating pressure, and a 30–minute monitoring period at a lower pressure, approximately 30 psi. System measures change in pressure and reports output quantity in gph, while compensating for thermal effects. Printed message and alarm activation if leak is declared.
Calibration	System must be calibrated prior to the initial test in accordance with manufacturer's instructions.
Comments	System is to be used on large bulk pipelines and airport hydrant fueling systems.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/25/07

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Issue Date: August 23, 1999
Revision Date: March 31, 2006

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model HT-100-n Monitoring Method and Line Tightness Test Method Version 1.0, Version 1.1

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification

Leak rate of 0.004%÷ √(n) of line capacity (for n=4, 0.02 gph per 1000 gallons of product) with PD = 95% and PFA = 1.25% for Version 1.0, where n is the number of tests averaged together (smallest leak rate for Version 1.0 evaluation, which was conducted on a 306,477 gallon line at 160 psi where n = 3, was 7.08 gph).
Leak rate of 0.00209%÷ √(n) of line capacity (for n=4, 0.01045 gph per 1000 gallons of product) with PD = 95% and PFA = 5% for Version 1.1, where n is the number of tests averaged together (smallest leak rate for Version 1.1 evaluation, which was conducted on a 306,477 gallon line at 160 psi where n = 3, was 3.71 gph).
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

Leak Threshold

0.00282% ÷ √(n) of line volume in gph for Version 1.0. 0.000916% ÷ √(n) of line volume in gph for Version 1.1.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds these thresholds.

Applicability

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

Specification

System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity

Maximum of 612,954 gallons.
Minimum of 3,000 gallons.

Waiting Time

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

Test Period

Minimum of 3 hours, 10 minutes after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.
Averaging of individual tests, where tests may be selected over any time frame yet not necessarily consecutive.

System Features

System may be permanently installed on pipeline to perform monitoring, or may be transported and set up to perform line tightness testing.
A single 3-hour 10-minute test is required consisting of a 1-hour 10-minute monitoring period at operating pressure, and a 2-hour monitoring period at atmospheric pressure.
System measures change in volume and reports output quantity in gph, while compensating for thermal effects.
Printed message and alarm activation if leak is declared.

Calibration

System must be calibrated in accordance with manufacturer's instructions.

Comments

System is to be used only on large bulk pipelines and airport hydrant fueling systems.
This evaluation utilized a total of 87 tests, one with an induced leak rate of 13.1 gph.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/24/98

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Issue Date: April 18, 1997
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100 Monthly Monitoring Method and Line Tightness Test Method Version 1.0 (Manual Method)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification	Leak rate of 0.2 gph with PD = 96% and PFA < 4%. Leak rate of 0.1 gph with PD = 96% and PFA = 4%. **The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.**
Leak Threshold	0.177 gph for leak rate of 0.2 gph. 0.077 gph for leak rate of 0.1 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Specification	System tests fiberglass or steel piping. Tests are conducted at operating pressure to a maximum of 200 psi.
Pipeline Capacity	Maximum of 3,400 gallons.
Waiting Time	None between delivery and testing. None between dispensing and testing.
Test Period	Minimum of 2 hours after setup and after pipeline is fully isolated. Test data are acquired and recorded manually. Calculations are performed by tester.
System Features	System may be permanently installed on pipeline to perform monthly monitoring or line tightness testing, or may be transported and set up to perform line tightness testing. A single 2-hour test is required consisting of a 1-hour monitoring period at operating pressure and a 1-hour monitoring period at atmospheric pressure. Preset threshold. Printed message and alarm activation if leak is declared.
Calibration	System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/15/96

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Issue Date: April 18, 1997
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100 Monthly Monitoring Method and Line Tightness Test Method Version 1.0 (Primary Method)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.2 gph with PD = 97% and PFA < 3%.
Leak rate of 0.1 gph with PD = 97% and PFA = 3%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

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

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

Specification
System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity
Maximum of 3,400 gallons.

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

Test Period
Maximum of 2 hours after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
System may be permanently installed on pipeline to perform monthly monitoring or line lightness testing, or may be transported and set up to perform line tightness testing.
A single 2-hour test is required consisting of a 1-hour monitoring period at operating pressure, and a 1-hour monitoring period at atmospheric pressure.
Preset threshold. Printed message and alarm activation if leak is declared.

Calibration
System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/15/96

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Issue Date: April 18, 1997
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100 Monthly Monitoring Method and Line Tightness Test Method Version 1.0 (Segmented Method)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.2 gph with PD = 97% and PFA = 3%.
Leak rate of 0.1 gph with PD = 97% and PFA = 3%.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

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

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

Specification
System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity
Maximum of 3,400 gallons.

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

Test Period
Minimum of 2 hours after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
System may be permanently installed on pipeline to perform monthly monitoring or line tightness testing, or may be transported and set up to perform line tightness testing.
A single 2-hour test is required consisting of two 5-minute monitoring segments at atmospheric pressure spaced 25 minutes apart, and two 5-minute monitoring segments at operating pressure spaced 25 minutes apart.
Preset threshold.
Printed message and alarm activation if leak is declared.

Calibration
System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 04/15/96

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Issue Date: August 23, 1999
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100a Monthly Monitoring Method and Line Tightness Test Method Version 1.0

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.2 gph at 50 psi with PD > 97% and PFA < 3% for Monthly Monitoring Method.
Leak rate of 0.1 gph at 50 psi with PD = 97% and PFA = 3% for Line Tightness Test Method.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

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

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

Specification
System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity
Maximum of 3,400 gallons.

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

Test Period
Minimum of 2 hours after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
System may be permanently installed on pipeline to perform monthly monitoring or line tightness testing, or may be transported and set up to perform line tightness testing.
A single 2-hour test is required consisting of a 1-hour monitoring period at operating pressure, and a 1-hour monitoring period at atmospheric pressure.
Discrete test method (Monthly Monitoring Method only).
Preset threshold.
Printed message and alarm activation if leak is declared.

Calibration
System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/98

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Issue Date: August 23, 1999
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100a Monthly Monitoring Method and Line Tightness Test Method Version 1.0 (Segmented Method)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 0.2 gph at 50 psi with PD > 97% and PFA < 3% for Monthly Monitoring Method.
Leak rate of 0.1 gph at 50 psi with PD = 97% and PFA = 3% for Line Tightness Test Method.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

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

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

Specification
System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity
Maximum of 3,400 gallons.

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

Test Period
Minimum of 2 hours after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
System may be permanently installed on pipeline to perform monthly monitoring or line tightness testing, or may be transported and set up to perform line tightness testing.
A single 2-hour test is required consisting of two 5-minute monitoring segments at atmospheric pressure spaced 25 minutes apart, and two 5-minute monitoring segments at operating pressure spaced 25 minutes apart.
Discrete test method (Monthly Monitoring Method only).
Preset threshold.
Printed message and alarm activation if leak is declared.

Calibration
System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/98

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Issue Date: August 23, 1999
Revision Date: December 4, 2002

Vista Precision Solutions, Inc.
(Originally listed as Vista Research, Inc.)

Model LT-100a Hourly and Monthly Monitoring Method and Line Tightness Test Method Version 2.0 (Segmented Method)

LARGE DIAMETER LINE LEAK DETECTION METHOD (6 inches diameter or above)

Certification
Leak rate of 3.0 gph with PD = 95% and PFA < 0.1% for Hourly Monitoring Method.
Leak rate of 0.2 gph with PD = 95% and PFA = 2.9% for Monthly Monitoring Method.
The USEPA has not set a minimum detectable leak rate for large diameter pipeline systems (airport hydrant systems) at the time of this evaluation.

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

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

Specification
System tests fiberglass or steel piping.
Tests are conducted at operating pressure to a maximum of 200 psi.

Pipeline Capacity
Maximum of 3,400 gallons.

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

Test Period
Minimum of 15 minutes after setup and after pipeline is fully isolated.
Test data are acquired and recorded by a microprocessor.
Calculations are automatically performed by the microprocessor.

System Features
System may be permanently installed on pipeline to perform hourly monitoring or monthly monitoring, or may be transported and set up to perform line tightness testing.
A single 15-minute test is required consisting of two 3-minute monitoring segments at atmospheric pressure spaced 0 minutes apart, and two 3-minute monitoring segments at operating pressure spaced 0 minutes apart.
Discrete test methods.
Preset threshold.
Printed message and alarm activation if leak is declared.

Calibration
System must be calibrated in accordance with manufacturer's instructions during system setup.

Vista Research, Inc.
755 North Mary Ave.
Sunnyvale, CA 94085
Tel: (408) 830-3300

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 11/06/98

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Warren Rogers Associates, Inc.

WRA PetroNetwork S3 (Version D)
Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines

CONTINUOUS IN-TANK LEAK DETECTION METHOD
(Continual Reconciliation)

Certification	Leak rate of 0.2 gph for tanks and associated pipelines with PD > 99% and PFA < 1%.
Leak Threshold	0.1 gph for single and manifolded tank systems including associated pipelines. 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. System is designed primarily for use with petroleum fuels.
Tank Capacity	Maximum of 100,000 gallons for single tanks and for up to 5 tanks manifolded together. Tank must be between 9% and 94.4% full. Contact manufacturer for tank system applications if total tank capacity exceeds 100,000 gallons.
Throughput	Monthly maximum of 2,718,013 gallons.
Waiting Time	None between delivery and data collection when difference between product in tank and product delivered is 7.4 degrees F or less.
Test Period	Data collection time ranges from 6 to 31 days. Data sampling frequency is every 1 to 15 minutes. System collects data at naturally occurring product levels upon completion of a sales transaction or set of overlapping sales transactions without interfering with normal tank operation, and at time periods when the tank system is dormant.
Temperature	Average for product is determined by a minimum of 5 thermistors.
Water Sensor	Must be used to detect water ingress in accordance with the certified performance of the Automatic Tank Gauge used.
Calibration	The Automatic Tank Gauge used must have thermistors and probe checked and, if necessary, calibrated in accordance with manufacturer's instructions. Meter calibration must be checked at outset of monitoring and recalibrated when system detects significant departure from original calibration.

DATA SHEET CONTINUED ON NEXT PAGE

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DATA SHEET CONTINUED FROM PREVIOUS PAGE: Warren Rogers Associates, Inc., WRA PetroNetwork S3 (Version D) Continual Reconciliation System for CITLDS Using Multiple ATG System with Magnetostrictive Tank Probes for Tanks and Associated Pipelines

Comments

Tests only the portion of tank system containing product.
System reports a result of "pass" or "fail" and indicates minimum detectable leak and leak threshold for tanks and associated pipelines.
Evaluated for tanks and associated pipelines for both single and manifolded tank systems with probes in each tank.
For valid monthly testing, a conclusive report must be generated for each tank system every month.
Constant and variable leaks were mathematically induced into tight tank records and data collected at various tank sites by previously evaluated Veeder-Root TLS-350 and OPW Fuel Management Systems EECO 1500 Automatic Tank Gauges with magnetostrictive probes.
Automatic Tank Gauges used with this method must be on the NWGLDE List, employ a magnetostrictive probe, and be certified at a leak rate of 0.1 gph.
The database for evaluation of the system included tank and pipeline leaks at sites with vapor recovery and blending dispensers.
System is designed for use with pipelines equipped with mechanical or electronic line leak detectors to detect emergent catastrophic leaks in the pipelines.
Tank systems used in this evaluation contained gasoline and diesel.
Custom tank charts are generated for each tank system.
Meter Drift analyses are performed during monitoring.

Warren Rogers Associates, Inc.
747 Aquidneck Avenue.
Middletown, RI 02840
Tel: (800) 972-7472

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/11/2003

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Issue Date: November 22, 1995
Revision Date: May 5, 2003

Warren Rogers Associates, Inc.

WRA Statistical Inventory Analysis, Version 5.1

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.98% and PFA = 0.02%.
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
This leak threshold is for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak threshold.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 18,000 gallons.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
Not evaluated using manifolded tank systems.
Of 41 data sets submitted for evaluation, all were analyzed with conclusive results.
Median monthly throughput for tanks evaluated was 1000 gallons.
Leak rates of 0.05, 0.1, and 0.20 gph were used in evaluation.
A portion of data sets evaluated was supplied by vendor.

Warren Rogers Associates, Inc.
747 Aquidneck Ave.
Middletown, RI 02840
Tel: (800) 972-7472

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/18/90

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Issue Date: February 17, 1998
Revision Date: May 5, 2003

Warren Rogers Associates, Inc.

WRA Statistical Inventory Analysis, Version 5.2

STATISTICAL INVENTORY RECONCILIATION TEST METHOD (QUANTITATIVE)

Certification
Leak rate of 0.1 gph with PD = 99.9% and PFA = 0.1%
"If a method meets the requirement for detecting a leak rate of 0.1 gph, it will meet the requirement for 0.2 gph.", according to "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990, Section 7.2.3, page 30.

Leak Threshold
0.05 gph.
This leak threshold is for evaluation purposes only.
A tank system should not be declared tight if the test result indicates a loss or gain that equals or exceeds the leak threshold calculated from the data set. This leak threshold may be different than the above leak threshold.

Applicability
Gasoline, diesel.

Tank Capacity
Maximum of 36,000 gallons for single tank.
Maximum of 36,000 gallons cumulative capacity for manifolded tank systems with no more than 3 tanks in system.

Data Requirement
Minimum of 30 days of product level and flow through data.

Comments
50% of data sets evaluated were from manifolded tanks systems.
82 data sets were submitted for evaluation.
All were analyzed with conclusive results.
Median monthly throughput of tanks evaluated was 52,207 gallons.
Median monthly throughput of separate manifolded tank system evaluation was 14,944 gallons. Leak rates of 0.05, 0.10, and 0.20 gph were used in evaluation.
All manifolded tank system data sets evaluated were supplied by evaluator.
A portion of the data sets drawn from the WRA Statistical Inventory Analysis Version 5.1 evaluation for tanks that were not manifolded, were provided by the vendor.

Warren Rogers Associates, Inc.
747 Aquidneck Ave.
Middletown, RI 02840
Tel: (800) 972-7472

Evaluator: Ken Wilcox Associates
Tel : (816) 443-2494
Date of Evaluation: 12/08/97

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Western Environmental Resources

Model PLT-100R

LINE TIGHTNESS TEST METHOD

Certification	Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak Threshold	0.05 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Specification	System tests fiberglass and steel pipelines. Tests are conducted at 150% operating pressure. Mechanical line leak detector must be removed from pipeline for duration of test.
Pipeline Capacity	Maximum of 80 gallons.
Waiting Time	None between delivery and testing. Minimum of 1 hour between dispensing and testing.
Test Period	Minimum of 30 minutes. Test data are acquired and recorded manually. Two tests with no time between tests are required before a leak can be declared.
Calibration	System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Western Environmental Resources
PO Box 37
Bakersfield, CA 93302
Tel: (805) 326-0173

Evaluator: Vista Research
Tel: (415) 966-1171
Date of Evaluation: 11/21/90

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Western Environmental Resources

AES System II

VOLUMETRIC TANK TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 97.7% and PFA = 2.3%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 15,000 gallons.
Tank must be minimum 100% full.

Waiting time Between delivery and the beginning of test, waiting time is included in the waiting time after "topping off". Between "topping off" and beginning test, waiting time is computer-dictated by real-time analysis of level and temperature data.
Total waiting time is approximately 4 to 12 hours. There must be no dispensing or delivery during waiting time.

Test Period Minimum of 2 hours (two 1-hour tests).
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the last 1 hour, 30 minutes of test period data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 5 temperature sensors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 2 psi at bottom of the tank during test.

Calibration Level sensors must be calibrated before each test in accordance with manufacturer's instructions.
Temperature sensor must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.

Western Environmental Resources
PO Box 37
Bakersfield, CA 93302
Tel: (805) 326-1073

Evaluator: Vista Research
Tel: (415) 966-1171
Date of Evaluation: 12/20/90

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Issue Date: November 22, 1995
Revision Date: November 6, 1997

Western Environmental Resources

AES System II (Large Tanks)

VOLUMETRIC TIGHTNESS TEST METHOD (OVERFILL)

Certification Leak rate of 0.1 gph with PD = 98.9% and PFA = 1.1%.

Leak Threshold 0.05 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.

Tank Capacity Maximum of 75,000 gallons.
Tank must be minimum 100% full.

Waiting Time Minimum of 24 hours after delivery. Between "topping off" and beginning test, waiting time is computer-dictated by real-time analysis of level and temperature data and must be minimum of 1 hour.
There must be no dispensing or delivery during waiting time.

Test Period Minimum of 4 hours.
Test data are acquired and recorded by system's computer.
Leak rate is calculated from the last 3 hours of test period data.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a minimum of 12 thermistors.

Groundwater Depth to groundwater in tank excavation backfill must be determined.
If groundwater is above bottom of tank, product level must be adjusted to provide a minimum net pressure of 2 psi at bottom of the tank during test.

Calibration Level sensors must be calibrated before each test in accordance with manufacturer's instructions.
Thermistors must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments Not evaluated using manifolded tank systems.

Western Environmental Resources
PO Box 37
Bakersfield, CA 93302
Tel: (805) 326-0173

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/28/92

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Issue Date: October 27, 2004
Revision Date: June 27, 2011

Western Fiberglass, Inc.

Co-Flow Hydraulic Interstitial Monitoring System

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, liquid-filled interstitial space leak detection system for use only with Western Fiberglass, Inc., double-walled/coaxial flexible pipelines.
Maximum length is 200 feet.
No restrictions on pipeline diameter.

Operating Principle:
Similar to the methodology that has been applied to liquid-filled interstitial double-walled tanks.
Propylene glycol is used to fill the interstice.
Two reservoirs are used to contain the liquid, one at each end of the system. The reservoir at one end is closed to the atmosphere, includes a valve that is used to fill the system, and is designed to operate at a lower elevation than the other reservoir. The reservoir at the other end is open at the top and contains a dual-point level sensor.
The dual-point level sensor system monitors the liquid level in the interstitial reservoir and provides an alarm if the liquid level is either too high (ingress of liquid) or too low (egress of liquid).
The method must be used with a dual-point sensor system that will properly fit into the reservoir, is compatible with the interstitial liquid, and is on the NWGLDE list.
Sensors can be used to shut down the turbine system and/or alert the operator that a potential problem exists.

Alarm Conditions:

Leak Rate (gph)	Time to Alarm* (hours) for 5-Inch Sensor Spacing as a Function of Leak Rate for Various Reservoir Diameters (in)					Time to Alarm* (hours) for 3-Inch Sensor Spacing as a Function of Leak Rate for Various Reservoir Diameters (in)				
	3.75	3	2.87	2	1.5	3.75	3	2.87	2	1.5
0.05	4.8	3.0	2.8	1.4	0.76	2.9	1.8	1.7	0.8	0.5
0.10	2.4	1.5	1.4	0.68	0.38	1.4	0.91	0.84	0.41	0.23
0.20	1.2	0.76	0.70	0.34	0.19	0.71	0.46	0.42	0.20	0.11

*Time to alarm is based on evaluations conducted with 100% glycol solution and a leak (liquid egress) 190 feet from the highest reservoir. Leaks closer to the highest elevation reservoir, and the use of a diluted glycol solution, will shorten alarm times. Both theoretical calculations and laboratory measurements confirm that dilution of the propylene glycol used in the interstice of the WFG system will produce a significant reduction in the alarm time. This system has not been evaluated for locations with temperatures outside the range of 32 to 100 degrees Fahrenheit.
*Time to alarm for a catastrophic primary pipe failure with a pressure of 40 psi is 20 seconds at a distance of 10 feet from the reservoir and 84 minutes at a distance of 190 feet. This is based on a 5-inch spacing of the float sensors.

Applicability:
Western Fiberglass, Inc. underground double-walled/coaxial flexible pipelines containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil.

Calibration:
Equipment requires no calibration other than to insure the upper reservoir is half full.
The electronics must be calibrated and maintained in accordance with the sensor/monitoring equipment instructions.

Comments:
Pipeline fittings with interstitial communication tubing must only be located in sumps or pump pits – direct burial is not permitted.
The liquid level in the reservoir must be at least 20 inches above the water table.
The interstice must be filled from the low point in the pipeline to minimize trapped air.
The evaluation was conducted in a Western Fiberglass, Inc., double-walled/coaxial flexible pipeline with an interstitial capacity of 1.64 gallons, an inside diameter of 1.5 inches, and a length of 200 feet.
Installers must be certified by both the piping and sensor manufacturer.
Third-party evaluator certifies that this method performs equally well on the present version (manufactured beginning March, 2006) as the previous version of Western Fiberglass, Inc., double-walled/coaxial flexible pipeline.

Western Fiberglass, Inc.
1555 Copperhill Parkway
Santa Rosa, CA 95403
Tel: (707) 523-2050
E-Mail: sales@westernfg.com
URL: www.westernfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 08/09/04

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Issue Date: August 30, 2007
Revision Date: June 27, 2011

Western Fiberglass, Inc.

Co-Flow Hydraulic Interstitial Monitoring System — Propylene Glycol Filled Pressurized Interstitial Space

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, liquid-filled interstitial space leak detection system for use only with Western Fiberglass, Inc., double-walled/coaxial flexible pipelines.
Maximum length is 200 feet.
No restrictions on pipeline diameter.

Operating Principle:
Similar to the methodology that has been applied to liquid-filled interstitial double-walled tanks.
A pressurized reservoir is attached to the piping interstice and filled with propylene glycol.
A pressurized cylinder is used to maintain pressure in the reservoir. Pressure is normally adjusted to 50 psig for a typical service station. The cylinder contains nitrogen or air and a pressure switch to monitor pressure in the reservoir (low pressure alarm is typically set at 35 psig).
The reservoir contains a dual-point level sensor that monitors the liquid level and provides an alarm if the liquid level is either too high (ingress of liquid) or too low (egress of liquid).
Once the liquid leaks out of the system, the leak becomes an air leak. Pressure drops are rapid and a pressure loss alarm is produced.
The method must be used with a dual-point sensor system that will properly fit into the reservoir, is compatible with the interstitial liquid, and is on the NWGLDE list.
Sensors can be used to shut down the turbine system and/or alert the operator that a potential problem exists.

Alarm Conditions:

Average Liquid Level Required to Alarm*	
Lower Level Alarm (in)	High Level Alarm (in)
3.2	15.1

Time to Alarm in Hours, as a Function of Leak Rate	
Leak Rate (gph)	For 3 inch Dia Reservoir (hours)
3.0	0.1
0.2	1.3
0.1	2.6
0.005	51.5

*The liquid level required to alarm is controlled by the level of liquid in the reservoir.

This level is determined by the operator when filling the reservoir. The reservoir is filled to a level where the dual point sensor is floating midway between the low and high level alarm.
Previously conducted theoretical calculations and laboratory measurements confirm that dilution of the propylene glycol used in the interstice of the WFG system will produce a significant reduction in the alarm time. The use of diluted propylene glycol (from100% to 50%) will reduce the alarm time by a factor of approximately 7.2. For example, an alarm time of 80 minutes would be reduced to around 11 minutes.

Applicability:
Western Fiberglass, Inc. underground double-walled/coaxial flexible pipelines containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil.

Calibration:
Equipment requires no calibration other than to ensure the reservoir is at a level where the dual point sensor is floating midway between the low and high level alarm.
The electronics must be calibrated and maintained in accordance with the sensor/monitoring equipment instructions.

Comments:
Pipeline fittings with interstitial communication tubing must only be located in sumps or pump pits – direct burial is not permitted.
The interstice must be filled from the low point in the pipeline to minimize trapped air.
The evaluation was conducted in a Western Fiberglass, Inc. double-walled/coaxial flexible pipeline with an interstitial capacity of 1.64 gallons, an inside diameter of 1.5 inches, and a length of 200 feet.
Installers must be certified by both the piping and sensor manufacturer.
The testing was conducted on the "new" double-walled/coaxial flexible pipe (manufactured beginning March, 2006). It can be used in place of the "old" double-walled/coaxial flexible pipe where the pressure is near ambient.
Evaluation was conducted with an interstitial pressure of 50 psig.

Western Fiberglass, Inc.
1555 Copperhill Parkway
Santa Rosa, CA 95403
Tel: (707) 523-2050
E-Mail: sales@westernfg.com
URL: www.westernfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 02/23/07

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Issue Date: November 2, 2007
Revision Date: June 27, 2011

Western Fiberglass, Inc.

Liquid-Filled Reservoir for Double-Wall Sumps with Liquid Sensor Models WF-3 and WF-750

CONTINUOUS INTERSTITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, liquid-filled interstitial space leak detection system for use only with Western Fiberglass, Inc., double-walled sumps or under dispenser containment sumps.

Operating Principle:
Hydrostatic monitoring using single-level float switch. Methodology is similar to that which has been applied to liquid-filled interstitial double-walled tanks.
Propylene glycol is used to fill the interstice of Western Fiberglass' double-walled sumps or under dispenser containment sumps.
An interstitial liquid reservoir is connected to a port at the highest point of the double-walled space.
Single-point liquid level sensor, model WF-3 or WF-750, monitors the liquid in the interstitial reservoir and provides an alarm if the liquid drops too low (egress of liquid).

Alarm Conditions:

	0.05 gph Leak, Plastic Reservoir with WF-3 Sensor		**0.05 gph Leak, Stainless Steel Reservoir with WF-750 Sensor**	
	Normal Liquid Volume	Minimum Liquid Volume	Normal Liquid Volume	Minimum Liquid Volume
* **Volume of Liquid Lost at Alarm (ml)**	41.8	2.5	74.3	16.7
Time to Alarm (min)	< 1	< 1	< 1	< 1
Time to Reset (min)	< 1	< 1	< 1	< 1

* Volume of liquid lost to alarm depends on the amount of liquid in the reservoir. This amount is determined by the operator when filling the reservoir. This amount needs to be sufficient to prevent false alarms from occurring due to the normal fluctuations in the reservoir which result from temperature and pressure variations in the sump. Minimum alarm volumes were obtained by filling the reservoir to the lowest possible level to reset the alarm. While this condition provides the shortest response time, it is also subject to the highest false alarm rate.

Applicability:
Western Fiberglass, Inc. underground double-walled sumps and under dispenser sumps designed to contain water, gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil.

Calibration:
Reservoir requires no calibration other than to insure the upper reservoir is half full.
Sensors must be calibrated and maintained in accordance with manufacturer's instructions.

Comments:
Fluid reservoir volumes and connection tightness between reservoir and sump should be inspected annually.
Liquid level in the stainless steel reservoir should be visible in the sight glass.
Liquid level in the plastic reservoir should be approximately one inch above the float switch.
Western Fiberglass WF-3 and WF-750 sensors are for use only in specific Western Fiberglass method applications, as listed.

Western Fiberglass, Inc.
1555 Copperhill Parkway
Santa Rosa, CA 95403
Tel: (707) 523-2050
E-Mail: sales@westernfg.com
URL: www.westernfg.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 12/20/2006

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World Telemetry, Inc.

Data Link ATGS v2.6-h
(Magnetostrictive Probe)

AUTOMATIC TANK GAUGING METHOD

Certification Leak rate of 0.2 gph with PD = 97.2% and PFA = 2.8%

Leak Threshold 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.

Tank Capacity Maximum of 20,000 gallons.
Tanks greater than 90% full may not be tested.
Product level must be at least 2 inches above the lowest temperature sensor.
Minimum product level required is based on tank diameter as follows:
48" dia/min 10.4";
64" dia/min 13";
96" dia/min 18.4";
120" dia/min 22.4";
144" dia/min 26.4".
For other tank diameters, consult manufacturer.

Waiting Time Minimum of 8 hours between delivery and testing.
There must be no delivery during waiting time.

Test Period Minimum of 8 hours.
There must be no dispensing or delivery during test.

Temperature Average for product is determined by a magnetostrictive probe containing 5 temperature sensors.
Sensors located above the product surface are not used in data analysis.

Water Sensor Must be used to detect water ingress.
Minimum detectable water level in the tank is 0.81 inch.
Minimum detectable change in water level is 0.011 inch.

Calibration 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.
System consists of a magnetostrictive probe, a micro processing unit, and a modem that provides a data link to the home office.
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.

World Telemetry, Inc.
6914 South Yorktown, Suite 210
Tulsa, OK 74136
Tel: (918) 494-0672
E-mail: techsupport@worldtelemetry.com
URL: www.worldtelemetry.com

Ken Wilcox Associates
Tel: (816) 443-2494
Date of Evaluation: 07/31/03

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Xerxes, Corp.

Xerxes Trucheck Continuous Leak Detection System

CONTINUOUS INTERSTIITIAL MONITORING METHOD (LIQUID FILLED)

Certification:
Certified as a continuous, brine-filled interstitial space leak detection system for tanks up to 30,000 gallons manufactured by Xerxes, Corp.

Operating Principle:
A Fluid reservoir is attached to the top of the tank and is open to the interstice through the bottom and is filled with a brine solution. The reservoir is equipped with an electronic probe to provide for low level and high level alarms.

Alarm Conditions:
The brine level is set at 5 inches above the low level alarm. The low level alarm will sound for reservoirs of 18, 24 or 36 inches diameter in 5, 9 and 19 days respectively. Under average conditions, leaks of 0.009, 0.015 or 0.032 gal/hr will trigger the low level alarm in 30 days for the same three reservoirs, respectively. If the brine level is originally higher than 5 inches above the low-level alarm point, the alarm time will be proportionally longer and the leak detection value in thirty days will be proportionally longer.

Applicability:
Xerxes Corp. underground double-walled storage tanks as specified above containing gasoline, gasohol, diesel, heating oil #2, kerosene, aviation fuel, or motor oil.

Manufacturer's Specifications:
Fluid in reservoir must be filled to proper level.

Comments:
The method must be used with a dual-point sensor system that will properly fit into the reservoir, is compatible with the interstitial liquid, and is on the NWGLDE list.

Xerxes Corp.
7901 Xerxes Ave.
Minneapolis, MN 55431
Tel: (952) 887-1890

Evaluator: Robert Plunkett, Ph.D.
Tel: (612) 338-0945
Dates of Evaluation: 01/07/93, 03/28/05

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Issue Date: November 22, 1995
Revision Date: September 11, 1998

Xerxes Corp.

Xerxes Trucheck Hydrostatic Monitoring System

INTERSTITIAL TANK TIGHTNESS TEST METHOD

Certification	Leak rate of 0.1 gph with PD = 99% and PFA = 1%.
Leak Threshold	0.05 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.
Tank Capacity	Maximum of 30,000 gallons. Tank must be between 0 to 100% full.
Waiting Time	None between delivery and testing.
Test Period	Minimum of 10 hours.
Groundwater	Depth to groundwater in tank excavation backfill must be determined before and after test. When groundwater level is above bottom of tank but below top, test should be repeated if groundwater level increases by more than 7 inches during test. When groundwater level is above tank, test should be repeated if groundwater level increases by more than 5 inches during test.

Xerxes Corp.
7901 Xerxes Ave.
Minneapolis, MN 55431
Tel: (952) 887-1890

Evaluator: Robert Plunkett, Ph.D.
Tel: (612) 338-0945
Date of Evaluation: 01/07/93

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PART III

ACCEPTABLE TEST PROTOCOLS

ALPHABETICAL BY TEST METHOD,

THEN BY PROTOCOL DATE

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Aboveground Storage Tank Leak Detection Method

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Mass-Based Leak Detection Systems for Aboveground Storage Tanks", Ken Wilcox Associates, November 2004.

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Volumetric Leak Detection Systems for Aboveground Storage Tanks," Ken Wilcox Associates, December, 2009.

- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

Automatic Electronic Line Leak Detector

- "Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Systems", EPA/530/UST-90/010, September 1990.

- "Protocol for Reduced Testing Evaluations for Extending Line Volume or Additional Types of Line Condtruction Materials", Ken Wilcox Associates, March 8, 2011.

Automatic Mechanical Line Leak Detector

- "Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Systems", EPA/530/UST-90/010, September 1990.

- "Protocol for Reduced Testing Evaluations for Extending Line Volume or Additional Types of Line Condtruction Materials", Ken Wilcox Associates, March 8, 2011.

Automatic Tank Gauging Method

- "Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems", EPA/530/UST-90/006, March 1990.

- "Test Procedures for Comparison of Different ATGS Probes", Ken Wilcox Associates, March 27, 2000. (With acceptable modification, this method is also applicable to comparisons of different ATG controllers.)

- "ATG/CITLDS Water Detection Testing in Ethanol or Blends Greater Than 10% Ethanol, "NWGLDE addendum to "Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems", EPA/530/UST-90/006, March 1990. Developed under coordination by the ATG team of the National Work Group on Leak Detection Evaluations, December 2007.

- Amendment to EPA ATG and Non Volumetric TTT Protocols for Water Sensor Testing, Jairus D. Flora Jr. Ph.D., December 17, 2008.

- Test Procedures for Comparison of Different Automatic Tank Gauge Consoles, Ken Wilcox Associates, October 4, 2010.

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Bulk Underground Storage Tank Leak Detection Method (50,000 gallons or greater)

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Mass-based and Volumetric Leak Detection Systems for Bulk Field-constructed Tanks", Ken Wilcox Associates, November 2000.

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Bulk Field-constructed Tanks", Ken Wilcox Associates, February 1996 (Evaluations prior to November 2000 only).

- "Protocol for Certification of the ASTTest Mass Balance Leak Detection System", ASTTest Systems Inc., May 1997 (Evaluations prior to November 2000 only).

- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

Continuous In-Tank Leak Detection Method

- "Evaluation Protocol for Continuous In-Tank Leak Detection Systems", Midwest Research Institute, April 7, 1995.

- "Evaluation Protocol for Continuous In-Tank Leak Detection Systems", Jairus D. Flora, Jr. Ph.D., January 7, 2000.

- "ATG/CITLDS Water Detection Testing in Ethanol or Blends Greater Than 10% Ethanol, "NWGLDE addendum to "Standard Test Procedures for Evaluating Leak Detection Methods: Evaluation Protocol for Continuous In-Tank Leak Detection Systems" by Jairus D. Flora, Jr. Ph.D., January 7, 2000. Developed under coordination by the ATG team of the National Work Group on Leak Detection Evaluations, December 2007.

- Amendment to EPA ATG and Non Volumetric TTT Protocols for Water Sensor Testing, Jairus D. Flora Jr. Ph.D., December 17, 2008.

Continuous Interstitial Line Monitoring Method (Pressure/Vacuum Decay)

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Vacuum Interstitial Monitoring Methods," Ken Wilcox Associates, September 1996.

- "Draft European Standard prEN 13160-32", Leak Detection Systems - Parts 2, Version 2.0, European Committee for Standardization, August 2001.

- "Final European Standard EN 13160-2", Leak Detection Systems - Part 2: Pressure and Vacuum Systems (Note: Acceptance also applies to sections of the other 6 parts of EN 13160 which are referenced within Part 2.), European Committee for Standardization, May 2003. This Standard may be purchased from Standards Direct.

- "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.

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Continuous Interstitial Monitoring Method (Liquid Filled)

- "Test Procedure for the Evaluation of Double-Wall Pipe with Liquid Filled Interstice for Loss Prevention", Ken Wilcox Associates, May 21, 2004.
- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Liquid Level Sensors," Ken Wilcox Associates, September 1996.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems", EPA/530/UST-90/006, March 1990.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

Continuous Interstitial Tank System Monitoring Method (Pressure/Vacuum Decay)

- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Vacuum Interstitial Monitoring Methods," Ken Wilcox Associates, September 1996.
- "Draft European Standard prEN 13160-2", Leak Detection Systems - Part 2, Version 2.0, European Committee for Standardization, August 2001.
- "Final European Standard EN 13160-2", Leak Detection Systems - Part 2: Pressure and Vacuum Systems (Note: Acceptance also applies to sections of the other 6 parts of EN 13160 which are referenced within Part 2.), European Committee for Standardization, May 2003. This Standard may be purchased from Standards Direct.

Continuous Pressurized Piping Leak Detection Method

- "Evaluation Protocol for Continuous Pressurized Piping Leak Detection Systems Revision 1.1," Jairus D. Flora, Jr., Ph.D., March 2009.

Interstitial Product Detectors (Liquid-Phase)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Liquid-Phase Out-of-Tank Product Detectors", EPA/530/UST-90/009, March 1990.
- "Development of Procedures to Assess the Performance of External Leak Detection Devices: Liquid-Phase ASTM-Formatted Methods - Revised Draft to Include JP-4 Jet Fuel", Radian Corporation, June 29, 1990.
- "Test Procedures for Third-party Evaluation of Leak Detection Methods: Cable Sensor Liquid Contact Leak Detection Systems", Carnegie Mellon Research Institute, November 11, 1991.
- "Test Procedures for Third-party Evaluation of Leak Detection Methods: Point Sensor Liquid Contact Leak Detection Systems", Carnegie Mellon Research Institute - Advanced Devices and Materials Group, November 11, 1991.
- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Liquid Level Sensors," Ken Wilcox Associates, September 1996. (Interstitial only.)

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Interstitial Tank Tightness Test Method

- "Standard Test Procedures for Evaluating Leak Detection Methods: Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/004, March 1990.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.
- "Alternative Test Procedures for Evaluating Leak Detection Methods: Evaluation of Vacuum Interstitial Monitoring Methods," Ken Wilcox Associates, September 1996.

Large Diameter Line Leak Detection Method (6 inches diameter or above)

- "Modified Third-party Testing Protocol for Large Pipeline Leak Detection", EFA Technologies, Inc., August 1995.
- "Proposed Protocol for the Performance Evaluation of the MALT and MALTtm Plus", Ken Wilcox Associates, February 9, 1996.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Systems", EPA/530/UST-90/010, September 1990.
- "Protocol for Reduced Testing Evaluations for Extending Line Volume or Additional Types of Line Condtruction Materials", Ken Wilcox Associates, March 8, 2011.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

Line Tightness Test Method

- "Standard Test Procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Systems", EPA/530/UST-90/010, September 1990.
- "Protocol for Reduced Testing Evaluations for Extending Line Volume or Additional Types of Line Condtruction Materials", Ken Wilcox Associates, March 8, 2011.
- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

Non-Volumetric Tank Tightness Test Method (Tracer, Ullage, Vacuum Induced Acoustic Signal)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.
- Amendment to EPA ATG and Non Volumetric TTT Protocols for Water Sensor Testing, Jairus D. Flora Jr. Ph.D., December 17, 2008.

Out-of-Tank Product Detectors (Liquid-Phase)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Liquid-Phase Out-of-Tank Product Detectors", EPA/530/UST-90/009, March 1990.

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Out-of-Tank Product Detectors (Liquid-Phase) – Continued

- "Development of Procedures to Assess the Performance of External Leak Detection Devices: Liquid-Phase ASTM-Formatted Methods - Revised Draft to Include JP-4 Jet Fuel", Radian Corporation, June 29, 1990.

- "Test Procedures for Third-party Evaluation of Leak Detection Methods: Cable Sensor Liquid Contact Leak Detection Systems", Carnegie Mellon Research Institute, November 11, 1991.

- "Test Procedures for Third-party Evaluation of Leak Detection Methods: Point Sensor Liquid Contact Leak Detection Systems", Carnegie Mellon Research Institute - Advanced Devices and Materials Group, November 11, 1991.

Out-of-Tank Product Detector (Vapor-Phase)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Vapor-Phase Out-of-Tank Product Detectors", EPA/530/UST-90/008, March 1990.

- "Development of Procedures to Assess the Performance of External Leak Detection Devices: Vapor-Phase ASTM-Formatted Methods", Radian Corporation, June 6, 1990.

- "Development of Procedures to Assess the Performance of External Leak Detection Devices: Vapor-Phase ASTM-Formatted Methods", Radian Corporation, June 29, 1990.

Secondary and Spill Containment Test Methods

- "Standard Test Procedures for Evaluating Leak Detection Methods: Non-Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/005, March 1990.

- "Standard Test Procedures for Evaluating Leak Detection Methods: Automatic Tank Gauging Systems", EPA/530/UST-90/006, March 1990.

- Amendment to EPA ATG and Non Volumetric TTT Protocols for Water Sensor Testing, Jairus D. Flora Jr. Ph.D., December 17, 2008.

Statistical Inventory Reconciliation Test Method (Qualitative, Quantitative)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods", EPA/530/UST-90/007, June 1990.

- "Protocol for Determining Applicability of a SIR Method for Manifolded Tanks and Determining Size Limitation", Developed under coordination by the SIR team of the National Work Group on Leak Detection Evaluations, November 1996.

- "SIR Reliability Comparison (Limited Application) Protocol," Developed by Dr. Mitchell, SIR International, in coordination with the SIR team of the NWGLDE, July 2016.

Volumetric Tank Tightness Test Method (Overfill, Underfill)

- "Standard Test Procedures for Evaluating Leak Detection Methods: Volumetric Tank Tightness Testing Methods", EPA/530/UST-90/004, March 1990.

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APPENDIX

GLOSSARY OF TERMS

Accuracy:
The degree to which the measured leak rate agrees with the induced leak rate on the average. If a system is accurate, it has a very small or zero bias.

Activated:
Refers to the state of a qualitative detector's response when indicating the presence of product.

Alternative Fuel:
A fuel or petroleum fuel blend containing any amount of non-petroleum component, including but not limited to ethanol, methanol, or animal/vegetable oil, with the exception of petrodiesel blends containing no more than 5% biodiesel.

Bias:
An indication of whether the device's measured leak rate consistently overestimates (positive bias) or underestimates (negative bias) the actual induced leak rate.

Bulk Modulus (of Elasticity):
The ratio of hydrostatic pressure to the relative change it produces in volume.

Bulk Underground Storage Tank:
Generally applies to underground storage tanks 50,000 gallons or greater.

Continual Reconciliation:
Combines product level and temperature monitoring from the tank with data from dispensing meters. Data from delivery records may also be included. In addition, it may address leaks or unexplained losses of product from the tank vessel, the pressurized lines, or a combination to monitor the tank and line system. It allows a combination of monitoring data from a static tank and inventory data from a dynamic tank to be combined in monitoring the system for a leak. It is also designed to meet the monthly monitoring performance standard of detecting a leak of 0.20 gallon per hour or 150 gallons per month with 95% probability and 5% false alarm.

Continuous Automatic Tank Gauging:
Uses an automatic tank gauge probe to collect data continually and combines this with software to identify time intervals when there is no activity in the tank and the data are stable enough for analysis. An algorithm then combines data from a number of such periods until there is enough evidence to make a determination about the leak status of the tank. It functions like an automatic tank gauge except that it does not require that the tank be taken out of service for a set period of several hours whenever a test is to be done. Instead, it uses data from shorter stable time periods and combines the results to estimate a leak rate and perform a test. It may default to a standard or shut down automatic tank gauge test (requiring the tank to be out of service for a few hours) at the end of the month if sufficient good quality data have not been obtained over the month. It is designed to meet the monthly monitoring performance standard of detecting a leak of 0.20 gallon per hour or 150 gallons per month with 95% probability of detection (P_D) and 5% probability of false alarm (P_{FA}). It tests the tank vessel itself.

Continuous Detector:
Detectors that operate continuously are always present and are never turned off.

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GLOSSARY OF TERMS (Continued)

Continuous In-Tank Leak Detection Method:
Designed to allow the tank to operate continuously or nearly continuously without interruption for leak detection tests. Typically, sensors are permanently installed in the tank, combined with a microprocessor in a console. In addition, they may be connected to the dispensing meters, allowing for automatic recording and use of dispensing data. There may also be a provision for direct input of data from a keyboard or pad, to allow for entry of delivery receipts.
Currently, there are two different types of Continuous In-Tank Leak Detection Methods: **Continuous Automatic Tank Gauging** (See above definition), and **Continual Reconciliation** (See above definition).

Continuous Monitoring:
Methods that are electronic and/or automated mechanisms that perform leak detection on an uninterrupted basis and immediately communicate an alarm condition to an individual, independent of the actions of an observer.

Detection time:
The sum of rise time and lag time.

Diesel or Diesel Fuel:
Hydrocarbon oil that may contain up to 5% biodiesel in accordance with the current edition of ASTM standard D975.

Fall time:
The elapsed time after a detector has responded to a test hydrocarbon and is removed and has recovered to 95% of its original baseline level or there is no detectable signal output.

False Alarm:
Declaring a tank to be leaking when in fact it is tight.

Gasohol:
A blend of finished motor gasoline containing alcohol (generally ethanol but sometimes methanol) at a concentration between 5.7 percent and nominal 10 percent by volume; also referred to as "E 10" when the ethanol component is a nominal 10% of the blend.

Groundwater:
Water table or water within the excavation around a tank.

Independent Third-Party Evaluator:
Consulting firms, test laboratories, not-for-profit research organizations, or educational institutions; with no organizational conflict of interest.

Induced Leak Rate:
The actual leak rate, in gallons per hour (gph), used during the evaluation against which the results from a given test device will be compared.

Intermittent Detector:
Detectors that monitor on a periodic basis. An intermittent detector may be a hand held device that is portable or a permanently installed device that is used to periodically test for the presence of product.

Lag Time:
The elapsed time from the detector's first contact with test product to the first detectable signal.

Large Diameter Pipeline:
Generally, a pipeline that has a diameter of 6 inches and above.

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GLOSSARY OF TERMS (Continued)

Leak threshold:
The measured leak rate at which the system detects the tank to be leaking. This leak rate will always be less than or equal to the leak rate requirement for the various release detection methods given in 40 CFR § 280 Subpart D-Release Detection. (Please note that some states and other regulatory authorities may have different requirements). The minimum leak threshold for declaring a leak is experimentally determined from the results of the evaluation of the release detection system.

Lower Detection Limit:
The smallest liquid concentration or level that a detector can reliably detect ($P_D > 95\%$, $P_{FA} < 5\%$).

Manifolded tank systems:
Tanks connected by piping that allow the tank system to function as a single tank. A typical manifolded tank system usually consists of two tanks connected by a siphon tube that permits the product in the tanks to be at the same level while product is being pumped out of only 1 tank.

Minimum Detectable Leak Rate:
The leak rate that can be detected with a Probability of Detection (P_D) of 95% and a Probability of False Alarm (P_{FA}) of 5%. The minimum threshold is calculated setting the P_{FA} at 5%. For a P_D of 95%, the leak rate is then equal to twice the threshold that gives a P_{FA} of 5% assuming the bias is not significant.

Measured Leak Rate:
A positive number in gallons per hour (gph) measured by test device that indicates the amount of product leaking out of the tank system. A negative number would indicate that something was being added to the tank. The performance of a system is based on how well the measured leak rate compares to the actual induced leak rate.

MER:
The Maximum Effective Range, the longest length of sensor cables and/or jumper cables that can be connected to form a leak detection network.

N/A:
Not Applicable

N/D:
Not Determined

N/R:
No Response

Net Pressure:
In this document this term refers to a pressure difference between the pressure in the tank and the pressure related to the groundwater. If the net pressure is positive, the pressure in the tank is greater than that due to groundwater. If net pressure is negative, the pressure in the tank is less than that due to groundwater.

Nominal Leak Rate:
The set or target leak rate to be achieved as closely as possible during the evaluation of a leak detection system. It is a positive number expressed in gallons per hour (gph).

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GLOSSARY OF TERMS (Continued)

Periodic Monitoriing:
Methods that rely upon a procedure with a specified observation period to determine a leak condition. During the observation period, an individual observes, interprets, and reports the status of the system.

Precision:
The degree of agreement of repeated measurements of the same parameter. Precision estimates reflect random error and are not affected by bias.

Pressure:
In this document this term refers to a pressure which is at or above atmospheric. Any pressure reading at or above atmospheric is listed as positive; any pressure reading less than atmospheric (vacuum) is listed as negative.

Probability of Detection (P_D):
The probability of detecting a leak of a given size usually expressed as a percentage.

Probability of False Alarm (P_{FA}):
The probability of declaring a tank to be leaking when it is tight usually expressed as a percentage.

Probe:
A component of a detection system that must come into contact with product before product can be declared or measured.

Product Activation Height:
The minimum height of liquid required to cause sensor activation (this value does not have to meet the $P_D > 95\%$, $P_{FA} < 5\%$ criteria).

Qualitative Response:
The type of detector response that indicates only the presence or absence of product without determining the specific product concentration or thickness.

Quantitative Response:
A type of detector response that quantifies the concentration or thickness of product present.

Relative Accuracy:
A function of systematic error, or bias, and random error, or precision. Smaller values indicate better accuracy. See entry for "Accuracy."

Resolution:
The smallest change in the quantity being measured which the measurement system is capable of detecting.

Response Time:
A general term that refers to the more specific terms of lag time, rise time, and fall time.

Rise Time:
The elapsed time from a detector's first detectable signal in response to the presence of product to an output that is 95% of full scale for a quantitative detector or activated for a qualitative detector.

Statistical Inventory Reconciliation (SIR), In-House System:
Data gathered and input by owner or operator. System does analysis. If analysis presents problems, technical support and analysis are available from vendor or vendor representative.

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GLOSSARY OF TERMS (Continued)

Statistical Inventory Reconciliation (SIR), Stand Alone System:
No human interface required. Data gathered and analyzed automatically without owner/operator input.

Specificity:
Specificity applies to vapor and liquid sensors and lists products or components of products that these sensors can detect. Specificity for quantitative sensors is the ratio of sensor output, or measured concentration, to the actual concentration of hydrocarbon test gas expressed as a percentage. Specificity for qualitative sensors is reported as activated if the sensor responds within 24 hours. Otherwise, specificity is reported as inactivated.

Throughput:
The volume of product dispensed from a tank system in a month.

Total Pressure:
In this document this term equals the sum of the pressure in ullage space and the pressure due to product head.

Ullage:
The un-wetted portion of the tank, i.e. that portion of the tank not in contact with product.

Vacuum:
In this document this term refers to any pressure that is less than atmospheric.

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We wish him the best in his retirement!