



Approval # 20030003
(Replaces 20010019)

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

Wisconsin COMM 10 Material Approval

Equipment: **EECO SYSTEM 1500 and 2000;
EECO SYSTEM SLD; and TLM Tank Level Monitors;
Pressurized Line Leak Detector, Leak Sensor Jr. and
Leak Sensor II Leak Detection Equipment**

Manufacturer: **OPW Fuel Management Systems
6900 Santa Fe Drive
Hodgkins, IL 60525**

Expiration of Approval: December 31, 2008

SCOPE OF EVALUATION

The EECO SYSTEM Family Tank Level Monitor (TLM), EECO SYSTEM Series 0.2 gph SLD, and EECO SYSTEM 1500 and 2000 were evaluated for use in monthly monitoring in accordance with **s. COMM 10.61 (4)**. The TLM was also evaluated for use as a tank tightness testing method in accordance with **s. COMM 10.61 (3)**. The EECO SYSTEM Pressurized Line Leak Detector was evaluated as a method of release detection for piping in accordance with **ss. COMM 10.615 (1) to (3)**. The Leak Sensor Junior and Leak Sensor II and the EECO SYSTEM Family 1500 and 2000 Liquid Phase Detectors were evaluated for use as interstitial, sump, pan, and well monitors with the following sensors in accordance with **s. COMM 10.61 (7)**: Q0001-001 Liquid Proximity, Q0001-004 Liquid Thermistor, Q0001-005, Q0003-001, Q0003-002, Q0003-003, Q0003-xx4, Q0003-005, Q0003-006, and Q0003-009.

This evaluation summary is condensed to provide the specific installation, application and operation parameters necessary to maintain the subject systems in compliance with the Wisconsin Administrative Code – Comm 10.

DESCRIPTION AND USE

EECO SYSTEM Family components and software are packaged into the following products:

The EECO SYSTEM 1500 ATG incorporates the TLM in-tank probe and the EECO SYSTEM Leak Sensors to monitor tanks, sumps, pans, and wells; and the EECO PLLD to monitor product lines.

The EECO SYSTEM 2000 series ATG may include any or all of the following: The TLM in-tank probe, and the EECO SYSTEM Leak Sensors or the EECO PLLD to monitor tanks, lines, sumps, pans, or wells.

The Leak Sensor Jr. and Leak Sensor II are all individually packaged systems used to monitor sumps, pans, and wells using the Q0001 sensors.

EECO SYSTEM TLM In-tank Probe

The TLM in-tank probe included with the EECO SYSTEM 1500 and 2000 ATG's, detects changes in product volume by monitoring changes in the level of a float. The in-tank probe detects the presence of water in the bottom of the tank, and measures the inflow of water as well as the loss of product.

The TLM in-tank probe may be used for tanks containing gasoline, diesel fuel, aviation fuel, #4 fuel oil, solvents, waste oil, and most other liquids that are compatible with the probe. Leak rates are calculated using data determined valid through statistical analysis. Test results are considered to be inconclusive if there is too much variability in the data, excessive temperature changes, or tank wall deformation. Lengthening the stabilization period beyond the minimum time is the only acceptable deviation in the standard test protocol.

The 0.1 "Precision" test, and 0.2 gph monthly test have built-in waiting periods after a product drop.

The actual test time will vary with the tank and the amount of product according to a pre-programmed protocol.

EECO SYSTEM 0.2 gph SLD

The SLD System consists of data hardware, software and a magnetostrictive probe that measures water level, product level and product temperature. The data system collects data during idle times to eliminate the need for downtime and regularly scheduled tank tests. The system merges data from each period with the accumulated data to create a database on which a statistical analysis is performed. When adequate data periods have been collected, the leak rate is calculated and the results are reported.

The SLD System is approved for a single tank with a maximum capacity of 35,000-gallons or up to 2 manifolded tanks with a combined capacity of 35,000-gallons. It can be used with most common petroleum products and other products that are compatible with the probe.

Liquid-Phase Out-of-Tank Product Detectors

The Leak Sensor Jr., EECO SYSTEM Family, and Leak Sensor II Q0001-004 Liquid Thermistor and Q0001-001 Liquid Proximity probes detect liquid in interstitial spaces using a measurement principle of a proximity switch. The detectors have 1-second response times and must be reset manually. The lower detection limits of all probes were less than 0.49 inches.

The Q0001-005 and the Q0003 series sensors have a range of response times depending on the type of sensor and the liquid it is immersed in.

The probes were found to respond to commercial gasoline, synthetic gasoline, diesel fuel, Jet-A jet fuel, n-Hexane, Toluene, Xylene and water.

Line Leak Detection

One pressure transducer, LS-300A, is required for each line. The transducers can be installed at either end of the pressurized line. The system is compatible with a variety of submersible pumps, and can monitor steel, fiberglass or flexible piping. It is compatible with gasoline, diesel, aviation fuel, #4 fuel oil, waste oil and some solvents.

The system works by monitoring system static pressure (must be ≥ 22.5 psi prior to test start or test will not be performed); and pressure decay rate immediately following pump operational off-on-off cycle. Pressure decay is measured from pump operating pressure down to a fixed pressure that is dependant on type of test- hourly, monthly, or annual.

Hourly tests are conducted automatically every 45 minutes by monitoring the rate of pressure decay from the pump operating pressure down to 7.5 psi. After the initial test, a new test is performed every 5 minutes (at 50, 55 minutes and so on) until 3 consecutive pass or fails are achieved. If the system test fails, the pump is shut-off by the system, an audible alarm sounds, alarm light flashes, and a report is printed. If the system passes the leak test, testing is repeated again in 45 minutes.

Monthly monitoring will be conducted automatically after the pump has been turned off for 3 hours by monitoring the rate of pressure decay from pump operating pressure down to 15 psi. If test passes the first time, testing is completed. If a fail occurs, the pump is activated again and the line is repressurized (5 minute interval). After 3 consecutive fails, an alarm light flashes and a report is printed indicating that a 0.20 gph leak has been detected. The system will continue to conduct tests until a test is passed. Upon completion of a single successful test, a report will be printed indicating that a monthly test has been completed.

Annual tightness testing will be conducted automatically after the pump has been turned off for 6 hours by monitoring the rate of pressure decay from the pump operating pressure down to 20 psi. If test passes the first time, testing is completed. If a fail occurs, the pump is activated again and the line is repressurized (5 minute interval). After 3 consecutive fails, an alarm light flashes and a report is printed indicating that a 0.20 gph leak has been detected. The system

will continue to conduct tests until a test is passed. Upon completion of a single successful test, a report will be printed indicating that a monthly test has been completed.

TESTS AND RESULTS

The performance of the EECO SYSTEM 1500 and 2000 ATG's with the TLM in-tank probe was determined in accordance with the EPA testing protocol for automatic tank gauging methods. The 0.1 gph "Precision" test, using a leak declaration of 0.05 gph, showed a probability of detection (P_D) of 95.2% and a probability of false alarm (P_{FA}) of 4.8%. The 0.2 gph monthly test, using a leak declaration threshold of 0.1 gph, showed a P_D of 99.5% and a P_{FA} of 0.5%.

The SLD System for continuous tank monitoring was evaluated according to the protocol for Continuous In-Tank Leak Detection Systems. Using a leak declaration threshold of 0.10 gph, the system was capable of detecting a 0.20 gph leak with a probability of detection of 99.1% and a corresponding probability of false alarm of 0.9%. When tested on a system of two tanks manifolded together, the probability of detection was listed as 99.1% and the corresponding probability of false alarm was listed as 0.9%.

Testing of the OPW Electronic Pressurized Line Leak Detector for hourly, monthly, and annual pipeline tightness testing was conducted in accordance with either the EPA Pressurized Pipeline Leak Detection Systems protocol (rigid piping) or a modified version of the same protocol adapted for flexible piping. When using leak declaration thresholds of 1.5 gph, 0.10 gph, and 0.05 gph, the probabilities of detection for a leak of 3.0, 0.20 and 0.10 gph, respectively, were certified to within the 95-5 ranges required by the EPA protocols.

The performance of the Leak Sensor Jr., EECO SYSTEM Family and Leak Sensor II liquid-phase detection probes were evaluated in accordance with the EPA standard test procedure for liquid-phase out-of-tank product detectors by Ken Wilcox Associates, Inc.

The EPA test procedures used only addressed the issue of the method's ability to detect leaks and not safety hazards.

MONITORING SYSTEM OUTPUT

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

<p>STATION NAME HERE STREET ADDRESS CITY, STATE, ZIP PHONE NUMBER V22.04A</p> <p>04-17-95 03:32:00</p> <p>LEAK TEST REPORT TANK 1 REGULAR</p> <p>TEST TYPE: MANUAL, 0.1 GPH THRESHOLD: 0.05 CONFIDENCE LEVEL: 96/4 LAST DELIVERY: 04-15-95 18:45 TANK CAPACITY: 548 US GAL</p> <p>% FULL VOLUME: 63 TEST START TIME: 10:40 TEST LENGTH: 1.45 HOUR(S) PROD LEVEL CHANGE: 0.0300 " PROD GROSS CHANGE: 0.050 US GAL PROD NET CHANGE: -0.040 US GAL PROD TEMP CHANGE: -0.20 °F RTD 1 CHANGE: 0.02 °F RTD 2 CHANGE: 0.02 °F RTD 3 CHANGE: 0.02 °F RTD 4 CHANGE: 0.02 °F RTD 5 CHANGE: 0.02 °F WAT LEVEL CHANGE: 0.0030 " WAT VOLUME CHANGE: 0.002 US GAL COEFF 1: 0.3400 COEFF 2: 0.0540</p> <p>TEST RESULT: <i>FAILED or PASSED</i> LEAK RATE: 0.10 GPH (VOLUME IS DECREASING.)</p>	<p>Not Available At Time Of Approval</p>
<p>Tank Leak Report Example: Last leak report for an active tank.</p>	<p>Line Leak Report Examples: Automatic, Monthly, and Annual.</p>

(Date and Time of report)

LAST PASSED SLD TESTS

TANK	DATE & TIME
1-TANK 1 REG UL	08-07-97 08:25
2-TANK 2 SUPER UL	08-07-97 04:06

(4 line station header)

(Date and Time of report)

TLM LEAK TEST HISTORY

TANK 1 REG UL

DAILY 0.2 LEAK TESTS

(SLD) 08-15-97 00:45	PASSED
(SLD) 08-14-97 01:00	PASSED
(SLD) 08-13-97 00:56	PASSED
(SLD) 08-12-97 06:16	PASSED
(SLD) 08-11-97 00:04	PASSED
(SLD) 08-10-97 00:02	PASSED
(SLD) 08-09-97 00:49	PASSED
(SLD) 08-08-97 00:58	PASSED
(SLD) 08-07-97 00:01	PASSED
(SLD) 08-06-97 01:03	PASSED
(SLD) 08-05-97 16:58	INCL.-4
(SLD) 08-04-97 00:55	PASSED

TANK 2 SUPER UL

DAILY 0.2 LEAK TESTS

(SLD) 08-15-97 03:14	PASSED
(SLD) 08-14-97 00:21	PASSED
(SLD) 08-13-97 00:55	PASSED
(SLD) 08-12-97 05:58	PASSED
(SLD) 08-11-97 00:12	PASSED
(SLD) 08-10-97 00:22	PASSED
(SLD) 08-09-97 01:24	PASSED
(SLD) 08-08-97 01:08	PASSED
(SLD) 08-07-97 14:18	PASSED
(SLD) 08-06-97 15:26	PASSED
(SLD) 08-05-97 22:40	PASSED
(SLD) 08-04-97 00:40	PASSED

STATION NAME HERE
 STREET ADDRESS
 CITY, STATE, ZIP
 PHONE NUMBER
 V22.04

11-07-94 09:15:00

LEAKSENSOR STATUS REPORT:

CHANNEL 1 IMO
 REG NL SMP
 WATER
 11-01-94 06:08:35

CHANNEL 2 IMO
 PLUS
 NORMAL

CHANNEL 3 IMO
 SUPER SMP
 NORMAL

Auto Leak Report Example: History of 24-hour leak detection (SLD) for all active tanks.

Sensor Status Report Example

LIMITATIONS / CONDITIONS OF APPROVAL

General

- All monitoring equipment shall be installed, calibrated, operated, and maintained in accordance with the manufacturer instructions, and certified every 12 months for operability, proper operating condition, and proper calibration. Records of sampling, testing, or monitoring shall be maintained in accordance with **Comm 10.625**.
- The manufacturer shall submit for a revision to this Wisconsin Material Approval application if any of the functional performance capabilities of this equipment are revised. This would include, but not be limited to changes in software, hardware, or methodology.
- While 3rd party testing does determine a required minimum tank level, EPA leak detection regulations require testing of the portion of the tank system which routinely contains product. Consistent testing at low levels could allow a leak to remain undetected.

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

- If performing a tank tightness test, minimum tank level shall be 95%, regardless of leak detection system minimum capability, in accordance with **Comm 10.61 (3)**.

EECO System 1500 and 2000 with TLM In-Tank Probe

- Critical performance parameters for the **Q0400-4XX** probe with the **EECO System 1500 and 2000** series consoles for annual 0.1 gph and monthly 0.2 gph testing:
(Magnetostrictive probe)

Parameter	Value												
Maximum Tank Size ¹	Up to 20,000 gallons												
Software Version	N/A												
Minimum Product Level (0.2 gph and 0.1 gph testing)	<p>9%</p> <p>The following chart can be used as a reference for the listed sizes :</p> <table border="1"> <thead> <tr> <th><u>Probe Working Length</u> (Tank Inner Diameter in inches)</th> <th><u>Minimum Level (in)</u>²</th> </tr> </thead> <tbody> <tr> <td>48</td> <td>8.5</td> </tr> <tr> <td>64</td> <td>10.5</td> </tr> <tr> <td>72</td> <td>11.5</td> </tr> <tr> <td>96</td> <td>14</td> </tr> <tr> <td>128</td> <td>18</td> </tr> </tbody> </table>	<u>Probe Working Length</u> (Tank Inner Diameter in inches)	<u>Minimum Level (in)</u> ²	48	8.5	64	10.5	72	11.5	96	14	128	18
<u>Probe Working Length</u> (Tank Inner Diameter in inches)	<u>Minimum Level (in)</u> ²												
48	8.5												
64	10.5												
72	11.5												
96	14												
128	18												
Waiting time between filling tank and test start ³ (Stabilization time dependant on tank conditions)	<p>6.8 hours (0.2 gph test)</p> <p>7.5 hours (0.1 gph test)</p>												
Waiting time between dispensing and test start	None												
Minimum Test Period ⁴ . (Test time determined by microprocessor based on tank size and product level)	<p>3.3 hours (0.2 gph test)</p> <p>3.5 hours (0.1 gph test)</p>												

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

2: Minimum level from probe bottom is same as product level in tank, assuming the typical configuration where the probe touches the bottom of the tank.

3: There must be no delivery during waiting time.

4: There must be no delivery or dispensing during testing.

EECO System SLD(24-hour, 0.2 gph monthly monitoring)

- Critical performance parameters for **Q0400-4XX** probe with the **EECO System SLD** console: (Magnetostrictive probe)

Parameter	Value
Maximum Tank Size ¹	35,000 gallons (Single Tank or up to 2 Manifoldded Tanks)
Software Version	N/A
Minimum Tank Level ²	9%
Waiting time between filling tank and test start ^{3,4} (Stabilization time dependant on tank conditions)	6 hours minimum
Maximum Monthly Throughput	130,000 gallons (Single Tank or up to 2 Manifoldded Tanks)

1: Manifoldded tank capacity is an aggregate capacity of all tanks- 2 maximum.

2: The SLD system will automatically check the tank level, and not perform a test if the tank level is below the minimum.

3: There must be no delivery during waiting time.

4: The 6-hour stabilization period after delivery may result in the system not testing the top portion of a very active tank. In this scenario, a periodic test in the shutdown mode with a high product level should be used to test the entire portion of the tank that routinely contains product.

Electronic Pressurized Line Leak Detector

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

Note: OPW has an OEM agreement with Franklin Fueling Components (formerly Campo-Miller) to use the LS-300-120 Plus AL transducer for manufacture and marketing of the OPW Electronic Pressurized Line Leak Detector system.

- An annual test of the operation of the leak detector shall be conducted in accordance with the manufacturer requirements for testing to the recognized leak thresholds by inducing a physical line leak. The individual performing the test must be qualified by the equipment manufacturer or an individual meeting the requirements of **Comm 5.88** for pipe testing.
- **Mechanical line leak detectors cannot be installed in the same line as the electronic line leak detector.**
- This test can be used if trapped vapor is present in the system. No special test is required to check the pipeline for trapped vapor prior to the pipeline test.

- Critical performance parameters for the **Electronic Pressurized Line Leak Detector** :

Parameter	Value
Minimum Flexible Piping Bulk Modulus	4,485 psi
Total maximum allowable volume of product in any flexible test pipeline	39.5 gallons or less
Total maximum allowable volume of product in any rigid test pipeline	163 gallons or less

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

Liquid-Phase Out-of-Tank Product Detectors

- The Leak Sensor Jr., and Leak Sensor II Q0001-004 Liquid Thermistor and Q0001-001 Liquid Proximity probes, and the EECO SYSTEM Family Q0003-003, Q0003-005, Q0003-006, and Q0003-009 sensors are approved for use as interstitial liquid-phase product monitors in accordance with **s. COMM 10.61 (7)**.
- The Q0003-xx4 sensor is approved for use as part of a groundwater monitoring system under **s. COMM 10.61 (6)**.
- All equipment shall be installed, operated and maintained in accordance with procedures specified by Emco Electronics.
- The interstitial probes shall be placed in the lowest point of the interstice and be able to detect a leak in any portion of the primary containment that routinely contains product.

This approval will be valid through December 31, 2008, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Material Approval Number must be provided when plans that include this product are submitted for review.

DISCLAIMER

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

Reviewed by: _____

Greg Bareta, P. E.
Engineering Consultant
Bureau of Petroleum Products and Tanks

Approved by: _____ Date: _____