



Approval #

980021-U (Replaces 930046-U)

Safety & Buildings Division

201 West Washington Avenue
P.O. Box 2689
Madison, WI 53701-2689

Wisconsin Material Approval

Material

Automatic Tank Gauges and
Liquid and Vapor Product Detectors

Manufacturer

Petro Vend, Inc.
6900 Santa Fe Drive
Hodgkins, IL 60525-9909

SCOPE OF EVALUATION

The Petrosonic III and Site Sentinel automatic tank gauges (ATGs); Petro Sentry TLD III and Site Sentinel vapor detectors; Site Sentinel liquid detector for ground water monitoring; and Petro Sentry IV, Petro Sentry VIII, and Site Sentry interstitial liquid detectors, as manufactured by Petro Vend, Inc., have been evaluated for conformance with the current edition of the Wisconsin Flammable and Combustible Liquids Code.

DESCRIPTION AND USE

Petrosonic III and Site Sentinel ATGs

The Petrosonic III And Site Sentinel ATGs may be used for tanks containing gasoline, diesel fuel, aviation fuel, solvents, and other products that will not physically damage the probe and are covered by API Standard 2540 volume correction tables.

The ATGs do not determine the level of groundwater above the bottom of the tank. The systems test for water incursion. Tank deformation effects are addressed by beginning the test only after the waiting period has passed and the tank is stabilized. Level changes are converted to volume changes using the theoretical ratio calculated from tank geometry or interpolation from the tank manufacturer's chart.

Leak rates are calculated using the average of subsets and all data collected or the difference between the first and last data collected. A threshold value of 0.10 gallon per hour is used to declare that a tank is leaking. Test results are considered to be inconclusive if there is an unexplained product volume increase or there is any product removed from or added to the tank or there are power or equipment failures during the test period. The test will be invalid for some products.

There are no acceptable deviations in the standard test protocol.

Petro Sentry TLD III and Site Sentinel Vapor Detectors

The Petro Sentry TLD III and Site Sentinel vapor detectors both provide quantitative output and continuous sampling frequency.

The evaluation of the vapor detectors was designed to identify strengths and weaknesses so that users could choose suitable detectors. The results of the evaluation are given below.

The detectors were tested for their ability to detect known concentrations of test gas. The following parameters were determined:

Accuracy - How closely test gas concentration or liquid thickness, as measured by the detector, agrees with the actual gas concentration or liquid thickness (for 1000 ppm test gas, or 0.32 cm of floating product).

Detection Time - Amount of time the detector must be exposed to test product before it responds.

Fall time - Amount of time that passes before the detector returns to its baseline reading after test product is removed.

Lower Detection Limit - The smallest concentration or liquid thickness that the detector can reliably detect.

Specificity - Indicates the ability of the detector to detect several different test gases or liquids.

**Accuracy, Response Time, and Lower Detection Limit Results
for Petrosentry TLD III Vapor Detector**

	<u>Benzene</u>	Two- <u>Methylbutane</u>
Accuracy (%)	100	100
Detection Time (Min:sec)	00:05	00:16
Fall Time (Min:sec)	04:12	00:42
Lower Detection Limit (ppm)	12:5	12:5

>Specificity Results

Benzene	Activated
n-Butane	Activated
n-Hexane	Activated
Isobutane	Activated
2-Methylpentane	Activated
Toluene	Activated

The Petrosentry TLD III detectors are UL-listed for use in Class I Groups C and D hazardous locations when connected in accordance with manufacturer's instructions.

**Accuracy, Response Time, and Lower Detection Limit Results
for Site Sentinel Vapor Detector**

Test	<u>Commercial Gasoline</u>	<u>Synthetic Gasoline</u>	<u>JP-4 Jet Fuel</u>
Accuracy (%)	100	100	100
Detection Time (hh:mm:ss)	00:00:05	00:00:07	00:00:10
Fall Time (hh:mm:ss)	00:06:30	00:03:35	00:04:26
Lower Detection Limit (ppm)	10	10	10

>Specificity Results

Commercial Gasoline	Activated
Synthetic Gasoline	Activated
JP-4 Jet Fuel	Activated
n-Hexane	Activated
Toluene	Activated
Xylene(s)	Activated

Site Sentinel Liquid Detector for Interstitial and Groundwater Monitoring

The Site Sentinel liquid sensors are product permeable and provide continuous monitoring. Sensor 30-3206 is designed for interstitial monitoring; sensors 30-3207 and 30-3210 are designed for groundwater monitoring.

The detectors were evaluated for their ability to detect a layer of liquid floating on water. Accuracy, response times, lower detection limits, and specificity were determined.

The evaluation results for tests conducted with 0.32 cm. of product are as follows:

<u>Test</u>	<u>Site Sentinel</u>		<u>Leak Edge</u>	
	<u>Commercial Gasoline</u>	<u>Synthetic Gasoline</u>	<u>Commercial Gasoline</u>	<u>Synthetic Gasoline</u>
Accuracy (%)	100	100	100	100
Detection Time (hh:mm:ss)	(00:01:41)	(00:05:14)	(00:05:41)	(00:05:14)
Fall Time (hh:mm:ss)	(07:28:44)	(00:18:36)	(00:30:39)	(00:18:36)
Lower Detection Limit (cm)	0.02	0.02	0.02	0.02

>Specificity Results

	<u>Site Sentinel</u>	<u>Leak Edge</u>
Commercial Gasoline	Activated	Activated
Synthetic Gasoline	Activated	Activated
Diesel fuel	Activated	Activated
JP-4 Jet Fuel	Activated	Activated
n-Hexane	Activated	Activated
Toluene	Activated	Activated
Xylene(s)	Activated	Activated

Petro Sentry IV, Petro Sentry VIII, and Site Sentinel Interstitial Liquid Detectors

The Liquid Sensor 30-3200 is a point sensor that detects liquids using thermal conductivity; the sensor has a qualitative output and continuous sampling frequency. The Liquid Sensor has a product activation height of less than 2 cm. for the products tested: gasoline, synthetic fuel, diesel fuel, #2 fuel oil, and water.

The Universal Sump sensor 30-3204 is a float switch, providing qualitative output and continuous sampling. The Universal Sump sensor has a product activation height of less than 3.5 cm. for the products tested: gasoline, synthetic fuel, diesel fuel, #2 fuel oil and water.

The Universal Reservoir Probe 30-3205 is a float switch designed to monitor changes in the level of either ethylene glycol or calcium chloride solutions in interstitial or annular spaces in double walled tanks.

The Universal Reservoir Probe is capable of detecting increases in solution height of 20 cm. or more and decreases in solution height of 6 cm. or more.

TESTS AND RESULTS

The performance of the Petrosonic III, version 4.05 with Model 613 probe, and Site Sentinel, version 101A, was determined through tests conducted by Underwriters Laboratories, Inc., in accordance with the EPA protocol for automatic tank gauging systems, and through calculations performed by Ken Wilcox Associates, Inc. The version number refers to the system software. The results of the testing are applicable to Petrosonic III version 4.05 and higher version numbers. The Petrosonic III was found to have a 98.9 percent probability of detection (P_D) of a 0.20 gallon per hour leak, with a probability of false alarm (P_{FA}) of 1.1 percent. At the lowest permitted product level for testing, the Site Sentinel was found to have a 95 percent probability of detection (P_D) of a 0.20 gallon per hour leak, with a probability of false alarm (P_{FA}) of 5 percent; leaks at product levels higher than the minimum will be detected with a probability higher than 95 percent.

The minimum water level (threshold) in the tank that the system can detect was found to be 0.37 inches. The minimum change in water level that can be tested by the system was found to be 0.0062 inches provided the water level is above the threshold.

The performance of the Petrosentry TLD III and Site Sentry with sensor 30-3201 was evaluated by the Carnegie Mellon Research Institute using the EPA protocol for evaluation of vapor-phase out-of-tank product detectors, and the systems were found to be capable of detecting known concentrations of test gases.

The Petrosentry TLD III leak detection system was evaluated by Underwriters Laboratories, Inc., to determine suitability for use in hazardous locations.

The performance of the Site Sentinel with liquid sensors 30-3206, 30-3207, and 30-3210 was evaluated by Underwriters Laboratories Inc. in accordance with the EPA standard test procedure for the evaluation of liquid-phase out-of-tank product detectors, and the system was found to be capable of detecting a layer of product of less than 1/8 inch in thickness floating on water.

The performance of the Petrosentry IV, Petrosentry VIII, and Site Sentinel with Liquid Sensor 30-3200, Universal Sump Sensor 30-3204, and Universal Reservoir Probe 30-3205 was determined by Carnegie Mellon Research Institute using a test procedure developed specifically for point sensor liquid contact detectors following the EPA protocol for evaluation of liquid-phase out-of-tank product detectors.

The test procedures addressed only each method's ability of detect leaks, and not safety hazards.

LIMITATIONS OF APPROVAL

All operating instructions and test procedures specified by Petro Vend, Inc., shall be used to conduct all tests. All equipment shall be installed and maintained in accordance with the manufacturer's recommendations.

Petrosonic III and Site Sentinel ATGs

The Petrosonic III and Site Sentinel ATGs are approved as complying with **section ILHR 10.615 (4)(a)** for use on tanks sizes no larger than 15,000 gallons.

The difference between the temperature of added product and in-tank product shall be no greater than + or - 8.3°F. During the test, the tank shall be filled to at least 59 percent capacity for the Petrosonic III, and at least 14 percent capacity for the Site Sentinel.

The waiting time between adding any substantial amount of product to the tank and the start of test data collection shall be at least 12 hours. The total time for data collection shall be at least 2 hours. Large vapor pockets shall be identified and removed.

A tightness test of the tanks and piping shall be conducted using an approved method in accordance with **s. ILHR 10.61 (3)** prior to placing the tank system in service.

Petroentry TLD III and Site Sentinel Vapor Detectors

The Petroentry TLD III and Site Sentinel consoles when used with the Model 30-3201 vapor sensor are approved for use as vapor phase out-of-tank product detectors to be installed in vapor monitoring systems that comply with **s. ILHR 10.61 (5)**, or to be installed as interstitial monitors in systems that comply with **s. ILHR 10.61 (7)**, and to detect products specified in the Description and Use section.

The vapor monitoring system in which the vapor detectors are used shall be designed and installed in accordance with **s. ILHR 10.61 (5)**. Approval of the design and well placement must be obtained for each site in accordance with **s. ILHR 10.10**.

An assessment shall be made of the installation site to determine the extent of existing soil contamination. The detectors shall be used only if the level of background contamination will not interfere with detection of a release and the probe will be able to detect an increase in contamination of product above background.

Site Sentinel Liquid Detector for Groundwater Monitoring

The Site Sentinel console used with liquid detectors 30-3207 or 30-3210 are approved for compliance with **s. ILHR 10.61 (6)(e)** for use in groundwater monitoring systems that comply with **s. ILHR 10.61 (6)** to detect specified products.

The groundwater monitoring system in which the liquid detectors are used shall be designed and installed in accordance with **s. ILHR 10.61 (6)**. Approval of the well design and placement must be obtained in accordance with **s. ILHR 10.10**.

Monitoring wells shall be located in porous backfill in accordance with **s. ILHR 10.61 (5)(a), (g), and (h)** and shall be clearly marked and secured.

Petroentry IV, Petroentry VIII, and Site Sentinel Liquid Detectors for Interstitial Monitoring

The Petroentry IV and VIII and Site Sentinel consoles used with the Liquid Sensor 30-3200, and Universal Sump sensor 30-3204, or liquid sensor 30-3206 are approved as interstitial monitors to be installed in systems that comply with **s. ILHR 10.61 (7)** to detect products specified in the Description and Use section.

The Petroentry IV and VIII and Site Sentinel consoles used with the Universal Reservoir Probe 30-3205 are approved for monitoring the level of solutions in the interstitial or annular space of double walled tanks where the geometry of the interstice allows detection of leaks in accordance with **s. ILHR 10.61 (8)(a)**.

Interstitial monitoring systems shall be designed and installed in accordance with **s. ILMR 10.61 (7)**. Approval of the sensor placement shall be obtained for each site in accordance with **s. ILHR 10.10**.

Approval of the placement of the Liquid Sensor, Universal Sump Sensor and Universal Reservoir Probe shall be obtained in accordance with **s. ILHR 10.10**. Sensors shall be placed so that they will be able to detect a leak in any portion of the primary containment that routinely contains product. The geometry of the interstice must be such that the detector will be able to detect a 0.2 gph or 150-gallon release within 30 days.

USE OF APPROVAL

This approval will be valid through December 31, 2003, unless manufacturing modifications are made to the products or a reevaluation is deemed necessary by the Department. The Wisconsin Material Approval Number must be provided when plans that include these products are submitted for review.

DISCLAIMER

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

Reviewed by: _____

Approval Date: _____ By: _____

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