



STATE OF WISCONSIN
Department of Agriculture,
Trade and Consumer Protection

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Bureau of Weights and Measures
Storage Tank Regulation
P.O. Box 7837
Madison, WI 53707-7837

Wisconsin ATCP 93 Material Approval

Equipment: Alert 8200 Series Sonde Ullage and Underfill
Tightness Testing Methods; and Alert
Technologies Automatic Tank Gauging
System Model 2000-XB

Manufacturer: Purpora Engineering, Inc.
658 North Progress Drive
Saukville, WI 53080

Expiration of Approval: December 31, 2020

SCOPE OF EVALUATION

The Alert 8200 Sonde ullage and underfill test methods, and the 2000-XB Automatic Tank Gauging System as manufactured by Purpora Engineering, Inc.; have been evaluated for use as tank testing systems complying with **ATCP 93.130(3)** and **ATCP 93.515(4)** of the current edition of the Wisconsin Flammable, Combustible, and Hazardous Liquids Code.

DESCRIPTION AND USE

Alert 8200 Series Underfill as a Volumetric Tank Tightness Testing Method

The Alert 8200 series uses volumetric tank tightness testing methods, which consists of a console that houses a probe interface and microprocessor to process data obtained from a Mass Displacement Probe. The Probe measures changes in buoyancy which relates to changes in liquid levels in the tank. The system may be used for tanks containing gasoline, diesel, aviation fuel, fuel oil #4, solvents, used oil, biodiesel and ethanol blends compatible with the probe.

The groundwater level is to be determined by an observation well near the tank before the test is administered. The test procedure corrects for interference due to the presence of groundwater levels above the tank bottom by calculation of differential pressure from the measured water table. The product level must be adjusted so that there is at least a 0.2 psi pressure differential between the water table and the fuel level at the bottom of the tank. The calculation of this level difference must include the product type and whether or not the product level is above or below the outside water table.

Alert 8200 Series Sonde as a Non-Volumetric Tank Tightness Testing Method

The Alert 8200 Series Sonde consists of a microphone placed in the ullage area of the underground tank. The microphone is connected to a computer that processes the acoustic and ultrasonic data in the ullage area of the tank. Signals produced by leaks into the ullage or by bubbles produced by leaks below the product level are both detected by the microphone. The system may be used for gasoline, diesel, aviation fuel, fuel oils #4 and #6, solvents, and used oil.

Two types of signals are considered. First the acoustic/ultrasonic signature of the tank is recorded at atmospheric pressure in the ullage of the tank. Air will not leak into the tank under these conditions so that the acoustic signals present will not include the leak. After the background signal is recorded, a vacuum of sufficient capacity to develop at least a 2.0 psig vacuum above the pressure of the tank bottom or up to a 2 psi pressure is established using an explosion proof pump. Air will leak into the tank under these conditions producing an audio signal that can be processed and identified by the Alert computer program

The water table must be below the leak for the test described in this evaluation to operate properly. The water table in the tank pit is measured directly by the tester prior to each test. If existing monitoring wells are not available, the technician must drive a well point for this purpose. Water ingress is detected by using Mass Based Technology. Leaks below the water table are detected using a different technology.

Since this method depends upon an audible interpretation of the signal, the test must be conducted under reasonably quiet conditions. Heavy traffic, nearby trains, or construction activities could produce sound levels that could compromise the test. When this happens it is necessary to wait until traffic or other loud noises are at a minimum.

Alert Technologies Automatic Tank Gauging (ATG) System Model 2000-XB

The model 2000-XB is a computerized system designed to be networked with up to three other Model 2000-XB ATGS's on a single network controller. Each ATG receives power from an Alert intrinsically safe nine-volt power supply and instructions from the network controller. At a programmed time the ATGS is instructed to BEGIN LEAK TEST. After four hours, at the completion of the test, the ATGS is instructed to TRANSMIT TEST RESULTS. The Results are saved on the network controller and are available for display or printing at any time. This system is not required to be permanently installed. This system can be used with gasoline, diesel, aviation fuel, fuel oils #4 and #6, solvents, used oil, and other chemicals that are compatible with the sensors used.

The Model 2000-XB has the ability to measure changes in mass of the tank contents directly. This eliminates the need for the system to compensate for product expansion and contraction due to temperature variations.

Changes in the mass of the tank contents are monitored by a specifically shaped displacement probe (displacer) which is only slightly shorter than the tank diameter. The probe is suspended from a digital load cell. The digital load cell data is input to a microprocessor which calculates the leak rate over the period of the test. If a product loss occurs, the loss of fluid in the tank will reduce the buoyancy force exerted on the displacer. The differential in buoyancy forces changes the applied load to the load cell which is mounted at the base of the riser pipe. The cross sectional area of the probe is designed to be proportional to the cross-sectional area of the tank at any product height. This linear proportionality assures that any product density change will be properly accounted for, and also make the system equally sensitive to volumetric changes at any height.

TESTS AND RESULTS

Alert 8200 Series Underfill as a Volumetric Tank Tightness Testing Method

The performance of the Alert 8200 Series was determined in accordance with the EPA's protocol for volumetric tank testing methods.

The Alert 8200 series was found to have a probability of false alarm ($P_{(FA)}$) of 0.42 percent. The probability of detection ($P_{(D)}$) of a 0.10 gal/hr leak was found to be 99.58 percent.

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

Alert 8200 Series Sonde as a Non-Volumetric Tank Tightness Testing Method

The performance of the Alert 8200 Series Sonde was determined in accordance with the EPA's protocol for non-volumetric tank testing methods.

The Alert 8200 Series Sonde was found to be capable of detecting ullage leaks equivalent to 0.1 gal/hr with a probability of 100%. The 95 percent confidence interval for P_d is from 93.95 to 100 percent. The false alarm rate was determined to be 0 percent. The confidence interval for P_{FA} is from 0 to 6.05 percent.

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

Alert Technologies Automatic Tank Gauging (ATG) System Model 2000-XB

The performance of the Alert Technologies Model 2000-XB Automatic Tank Gauging system was determined in accordance with the EPA volumetric test protocol for automatic tank gauges.

The Model 2000-XB Automatic Tank Gauging system was found to be capable of detecting leaks equivalent to 0.20 gal/hr with a probability of detection (P_D) greater than 99.5 percent. The corresponding probability of false alarm (P_{FA}) was found to be less than 0.5 percent.

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

Limitations/Conditions of Approval

Procedures specified by the manufacturer shall be used to install and maintain all equipment and to conduct all tests.

Alert 8200 Series Underfill as a Volumetric Tank Tightness Testing Method

- The Alert 8200 series is approved for a method of tank tightness testing specified in **ATCP 93.515(4)** for tanks at product levels of 14 inches or greater.
- The system may be used for tanks containing gasoline, diesel, aviation fuel, fuel oil #4, solvents, used oil, biodiesel and ethanol blends compatible with the probe.

- The test procedure corrects for interference due to the presence of groundwater levels above the tank bottom by calculation of differential pressure from the measured water table. **The product must be adjusted so that there is at least a 0.2 psi pressure differential between the water table and the fuel level at the bottom of the tank.**

Table. 1 Critical Parameters for the Alert 8200 Series Volumetric Test Method

Parameter	Value
Tank size for a single tank	30,000 gallons
Minimum allowable product level	14 inches or greater
Average waiting time after filling tank	3 hours and 41 minutes
Maximum allowable temperature difference between product in tank and product delivered just prior to running a test	± 6.9 deg F
Average data collection time per test	1 hour 28 Minutes

Alert 8200 Series Sonde as a Non-Volumetric Tank Tightness Testing Method

- The Alert 8200 Sonde series is approved for a method of tank tightness testing specified in **ATCP 93.515(4)**.
- The system may be used for gasoline, diesel, aviation fuel, fuel oils #4 and #6, solvents, and used oil.
- Test conditions shall be reasonably quiet during the data collection process.
- **The water table must be below the leak for the test described in this evaluation to operate properly.**

Table 2. Critical Parameters for the Alert 8200 Series Sonde Non-Volumetric Test Method

Parameter	Value
Tank size for a single tank	30,000 gallons
Minimum allowable product level	Between 1 and 96 percent of the tank capacity
Average waiting time after filling tank	No stabilization period is required.
Maximum allowable temperature difference between product in tank and product delivered just prior to running a test	No temperature compensation is required
Average data collection time between test	No stabilization period is required.

Automatic Tank Gauging (ATG) System Model 2000-XB Tank Tightness Testing Method

- The Model 2000-XB series is approved for a method of tank tightness testing specified in **ATCP 93.515(4)**.
- The minimum water level change that the sensor can detect at a 95 percent confidence interval was determined to be 0.031 inches.
- The time for the water sensor to detect a 0.20 gal/h water incursion was found to be 2.4 hours.

Table 3. ATG System Model 2000-XB Tank Tightness Testing Method

Parameter	Value
Tank size for a single tank	72,948 gallons
Minimum allowable product level	50 to 95 percent of the tank capacity
Average waiting time after filling tank	No stabilization period is required.
Maximum allowable temperature difference between product in tank and product delivered just prior to running a test	No temperature compensation is required
Average data collection time between test	No stabilization period is required.

This approval will be valid through December 31, 2020, 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.

Effective Date: 10/4/2017

Reviewed by: Signature on File
 Erik Otterson
 Environmental Engineering Specialist
 Bureau of Weights and Measures
 Storage Tank Regulation

Date: 10/4/2017

Approved by: Signature on File
 Greg Bareta, P. E.
 Section Chief
 Bureau of Weights and Measures
 Storage Tank Regulation

Date: 10/4/2017