STATE OF WISCONSIN
Department of Agriculture,
Trade and Consumer Protection

Approval # 20190009
(Renewal for 20150008)

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

Wisconsin ATCP 93 Material Approval

Equipment: TMS2000, TMS2000W, TMS3000 Volumetric In-Tank and LC1000 and LC2000 Secondary Containment Leak Detection

Facility Owner: Pneumercator Co., Inc.
1785 Expressway Drive N.
Hauppauge, NY 11788

Expiration of Approval: December 31, 2022

SCOPE OF EVALUATION

The TMS2000 and TMS3000 Tank Management Systems with the Ametek Patriot 7100 series magnetostrictive tank probe (Pneumercator Model MP450S probe) was evaluated as a means of monthly monitoring in accordance with **s. ATCP 93.510(3)(a)** and **93.515 (5).** TMS2000, TMS2000W, and TMS3000 Tank Management Systems, LC1000, and LC2000 alarm consoles, as used with the LS600 series, LS610, RSU80x series, and ES825 series detectors/sensors, were evaluated as a means of interstitial and/or containment sump monitoring in accordance with **s. ATCP 93.510(3)(a), 93.510(4)(a)3** and **93.515 (7).**

This evaluation summary is condensed to provide the specific installation, application and operational parameters necessary to maintain the subject systems in compliance with the Wisconsin Administrative Code – ATCP 93.

DESCRIPTION OF PROTOCOL

Automatic Tank Gauging Systems:

Pneumercator TMS2000 and TMS3000 Tank Management Systems with the Ametek Patriot 7100 series magnetostrictive tank probes (Pneumercator Model MP450S probe) are approved as complying under the following criteria:

The systems may be used for tanks containing gasoline, ethanol blends up to 10%, diesel, biodiesel blends B6-B20 meeting ASTM D7467, biodiesel B100 meeting ASTM D6751, aviation fuel, solvents, and other products that will not physically damage the probe and are of uniform specific gravity. Number 6 heating oil may be gauged for inventory only and only if the product is heated.

The systems test for water incursion. The minimum water level in the tank that the system can detect is approximately 1/2 inch. The minimum change in water level that can be detected by the system is approximately 1/8 inch provided the water level is above the threshold.

Note: The Pneumercator TMS2000W has not been third-party approved for automatic tank gauging; it has only third-party approved for monitoring sensors as detailed below.

Leak Detection Sensors:

RSU800 Liquid Float-switch Sensor

The RSU800 sensor is a liquid float switch designed for hydrostatic liquid monitoring of double wall fiberglass tanks where the interstice between the walls of the tank are filled with a brine or glycol solution. The sensor is installed in a reservoir chamber and actuates a dual point switch which activates an alarm on the console when the brine or glycol level rises or falls to the levels of the sensor thresholds.

The RSU800 sensor can be used with the LC1000, LC2000 consoles and the TMS2000, TMS2000W, TMS3000 automatic tank gauges.

The low level alarm threshold is approximately 2.3 inches from the bottom of the sensor. The high level alarm threshold is approximately 13.0 inches above the bottom of the sensor.

The time to alarm after the liquid level exceeds the thresholds is less than one second for hard wired sensors, and up to 65 seconds for wireless sensors. The alarm is not maintained if the liquid level changes so that it no longer exceeds the thresholds.

The ability to detect a release of product into the interstice will depend on reservoir geometry and sensor placement.

LS600 LD Liquid Float-Switch Sensor

The LS600 LDBN is a float actuated leak sensor with one magnetic Buna-N float only, the

LS600 LDSS is a float actuated leak sensor with one stainless steel float. When used with the correct console, an alarm is activated when the switch is activated. The alarm threshold for the LS600 LD is approximately one inch from the bottom of the sensor.

The LS600 LD sensor can be used with the LC1000, LC2000 consoles and the TMS2000, TMS2000W, TMS3000 automatic tank gauges.

LS610 Liquid Float-Switch Sensor

The LS610 consists of a flat float that swivels up and down on a square shaped body. The float actuates a switch when the liquid level rises to the threshold activating the console alarm. The alarm threshold for the LS610 is approximately 0.125 inches of liquid.

The LS610 sensor can be used with the LC1000, LC2000 consoles and the TMS2000, TMS2000W, TMS3000 automatic tank gauges.

ES825 Series Liquid Sensors

The ES825-100F/XF/CF and ES825-300F/XF/CF series sensors are non-discriminating sensors utilizing electro-optical technology to detect the presence of liquid. The ES825-200F/XF and ES825-400F/XF sensors are product discriminating sensors utilizing both electro-optical and conductivity technologies to discriminate between water and hydrocarbons. All sensors have a fault-detect option that allows the TMS to continually monitor for sensor or wiring faults.

The ES825-100F/XF/CF and ES825-200F/XF sensors can be used with the LC2000 console and the TMS2000, TMS3000 automatic tank gauges.

The ES825-300F/XF/CF and ES825-400F/XF sensors can be used with the TMS2000W automatic tank gauge.

TESTS AND RESULTS

Testing of the Pneumercator TMS 2000 and TMS 3000 Tank Management Systems with the Ametek Patriot 7100 series magnetostrictive tank probes (Pneumercator Model MP450S) for monthly monitoring and tank tightness testing was conducted in accordance with the EPA Automatic Tank Gauging Systems protocol. When using leak declaration thresholds of 0.05 gph and 0.10 gph, the probabilities of detection of a leak of 0.10 and 0.20 gph, respectively, were certified to within the 95-5 ranges required by the EPA protocols.

Testing of the liquid and brine sensors were conducted in accordance with a modified version of the EPA Standard "Liquid-Phase Product Detectors" protocol.

MONITORING SYSTEM OUTPUT

Detailed here are examples of the typical Probe/Sensor Alarm Status, In-Tank Leak Test Results, and In-Tank Leak Test History.

```
**********************
  NNNNNNNNNNNNNNNNNN

  XXXXXXXXXXXXXXXXXXXX
  XXXXXXXXXXXXXXXXXXXX

    MM/DD/YY
    hh:mm

Site id      XXXXX
Unit id         XX
----------------------
```

"Log" if On-Demand from Log Menu or else Log Name

Printer Header Line 1
Printer Header Line 2

Month / Day / Year – Printed
Hour : Minute – Printed

Site ID
Unit ID

Header - applicable to all reports

```
**********************
 Current Alarm Status

  XXXXXXXXXXXXXXXXXXXX
  XXXXXXXXXXXXXXXXXXXX

    MM/DD/YY
    hh:mm

Site id      XXXXX
Unit id         XX
----------------------
     Tank Alarms
T                P P
A                R R N
N            W T     O
K   L        A H T S R
    E S S S T E I Y M
I   A P P P E F M N A
D   K 1 2 3 R T E C L
----------------------
##  X X X X X X X X X
----------------------
  Leak Sensor Alarms
    T
S   N
E   K
N   /
S   D               N
O   S             A O
R   P             L R
                  A M
I   I             R A
D   D             M L
----------------------
##          nnnnnn L N
----------------------
   ALARM STATUS KEY
A = GENERAL ALARM
F = GENERAL FAULT
O = OPEN-CIRCUIT FAULT
P = PRODUCT ALARM
S = SHORT-CIRC. FAULT
W = WATER ALARM
----------------------
**********************
```

Printer Header Line 1
Printer Header Line 2

Month / Day / Year – Printed
Hour : Minute – Printed

Site ID
Unit ID

= Tank ID, X for applicable column, 1 line per probe

= Sensor ID, n is sensor name, L refer to legend below printout, N for normal status, 1 line per sensor

Probe/Sensor Alarm Status

Log Tank Leak xx	Entry Number (only when On-Demand from Log Menu)
Date MM/DD	Month / Day – of occurrence
Starttime hh:mm	Hour : Minute – of occurrence
End Time hh:mm	Hour : Minute – of occurrence
Name xxxxxxxxx	Tank Name
Prod Type xxxxxxxx	Product Type
Tank ID xx	Tank ID
Net Begin xxxxxxx Gal	Beginning Net Volume
Net End xxxxxxx Gal	Ending Net Volume
Beg Temp xxx.x degF	Beginning Temperature
End Temp xxx.x degF	Ending Temperature
Leaklimit gph 0.x	Programmed Leak Limit
Rate gph xxx.xxx	Detected Leak Rate (GPH)
Result xxxx --------	In-Tank Leak Test Result
Rate Hr1 xxx.xxx	Average Leak Rate after 1 Hour
Rate Hr2 xxx.xxx	Average Leak Rate after 2 Hour
Rate Hr3 xxx.xxx	Average Leak Rate after 3 Hour
Rate Hr4 xxx.xxx	Average Leak Rate after 4 Hour
Rate Hr5 xxx.xxx	Average Leak Rate after 5 Hour
Rate Hr6 xxx.xxx	Average Leak Rate after 6 Hour
Rate Hr7 xxx.xxx	Average Leak Rate after 7 Hour
Rate Hr8 xxx.xxx	Average Leak Rate after 8 Hour

In-Tank Leak Test Results

Log Leak Hist xx	Entry Number (only when On-Demand from Log Menu)
Tank id xx	Tank ID
Name xxxxxxxxx	Tank Name
Prod Type xxxxxxxx	Product Type
Date MM/DD/YY	Month / Day / Year – of occurrence
Starttime hh:mm	Hour : Minute – of occurrence
End Time hh:mm	Hour : Minute – of occurrence
Leaklimit gph 0.x	Programmed Leak Limit
Rate gph xxx.xxx	Detected Leak Rate (GPH)
Result xxxx	In-Tank Leak Test Result

In-Tank Leak Test History

LIMITATIONS / CONDITIONS OF APPROVAL

- 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 in accordance with **s. ATCP 93.510 (2)**. Records of sampling, testing, or monitoring shall be maintained in accordance with **s. ATCP 93.500(9)(a)**.

- 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 **s. ATCP 93.515 (4)**.

- Automatic tank gauges shall be programmed to provide an audible and visual alarm in the event of a tank test fail, periodic monthly tank test not performed within a 30-day interval, or tank interstitial sensor actuation. Silencing of the alarm shall require manual operator action.

- Electronic line leak detection shall be programmed to provide an audible and visual alarm in addition to providing shut-down of the submersible pump in the event of a line test fail. The ELLD shall also be programmed to provide an audible and visual alarm in the event a periodic monthly line test was not performed within a 30-day interval. Silencing of either alarm shall require manual operator action.

- Sensors used for interstitial line monitoring shall be programmed to provide an audible and/or visual alarm in addition to providing shut-down of the submersible pump or individual dispenser(s) in the event of a sump/interstitial monitoring sensor actuation. Silencing of the alarm shall require manual operator action.

TMS2000 and TMS3000 Automatic Tank Gauging Systems with Pneumercator probe model MP450S:

The systems may be used for tanks containing gasoline, diesel fuel, aviation fuel, #2 and #4 heating oil, most gear oils and lubricants and some solvents. Number 6 heating oil may be gauged for inventory only and only if the product is heated.

Parameters applicable to all testing	
Minimum wait time after filling tank 8 hours	8 hours
Maximum tank size 75,000 gallons	75,000 gallons

For Tank Capacities 20,000 Gallons or less:

Minimum product level required for testing	20% of total tank capacity (0.2 gph testing only- 0.1 gph testing must be performed at 95%)
0.1 gal/hr leak rate	
Minimum length of time to conduct test	7 hours*
0.2 gal/hr leak rate	
Minimum length of time to conduct test	2 hours*

For Tank Capacities Greater Than 20,000 Gallons:

Minimum product level required for testing	50% of total tank capacity
0.2 gal/hr leak rate	
Minimum length of time to conduct test	8 hours*

* The probabilities involved in detecting leaks and minimizing false alarms improve with longer test times. There are no acceptable deviations in the standard test protocol.

Leak Detection Sensors:
The Liquid Sensors shall be placed such that a release from any portion of the tank or piping will be detected.

Part Number	Description	Application	Console/ATG
RSU-800	Dual Float Liquid Level	Brine or Glycol Filled Interstitial of Double Wall Fiberglass Tank	LC1000, LC2000 TMS2000, TMS2000W, TMS3000
LS600 LD	Non-Discriminating Liquid Float Switch Sensor	Steel Tank Double Wall Dry Interstitial, Double Wall Piping, and Containment Sumps	LC1000, LC2000 TMS2000, TMS2000W, TMS3000
LS610	Non-Discriminating Liquid Float Switch Sensor	Dry Interstitial of a Fiberglass Double Wall Tank	LC1000, LC2000 TMS2000, TMS2000W, TMS3000
ES825-100F/XF/CF	Electro-optical Nondiscriminating Liquid Sensor	Fiberglass or Steel Tank Dry Interstitial, Double Wall Piping, and Containment Sumps	LC2000 TMS2000, TMS3000
ES825-200F/XF	Electro-optical Discriminating Liquid Sensor	Fiberglass or Steel Tank Dry Interstitial, Double Wall Piping, and Containment Sumps	LC2000 TMS2000, TMS3000
ES825-300F/XF/CF	Electro-optical Nondiscriminating Liquid Sensor	Fiberglass or Steel Tank Dry Interstitial, Double Wall Piping, and Containment Sumps	TMS2000W
ES825-400F/XF	Electro-optical Discriminating Liquid Sensor	Fiberglass or Steel Tank Dry Interstitial, Double Wall Piping, and Containment Sumps	TMS2000W

This approval will be valid through December 31, 2022, 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: June 20, 2019

Approved by: Signature on file Date: _____
Erik Otterson
Environmental Engineering Specialist

Reviewed by: Signature on file Date: _____
Greg Bareta, P. E.
Section Chief
Storage Tank Regulation
Bureau of Weights and Measures