



Approval # 20040011
(Revised 990050-U)

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: Red Jacket Tank and Line Leak Detection
Systems

Manufacturer: Veeder Root Company
P.O. Box 1676
6th Avenue at Burns Crossing
Altoona, PA 16603

Expiration of Approval: December 31, 2009

SCOPE OF EVALUATION

The XLP, DLD, XLD, FX1, FX2, FX1D, FX2D, FX1V, FX2V, FX1DV, FX2DV, CPT, and Big Flo systems were evaluated for use in hourly monitoring of rigid piping in accordance with **s. Comm 10.615 (1)**. The XLP, FX1, FX2, FX1V, FX2V, FX1DV, FX2DV, CPT, and Big Flo systems were also evaluated for use in hourly monitoring of flexible piping in accordance with **s. Comm 10.615 (1)**.

The CPT was evaluated for use as a line tightness testing method for rigid and flexible piping in accordance with **s. Comm 10.615 (2)**. The CPT was evaluated for use in continuous monthly monitoring of rigid or flexible piping in accordance with **s. Comm 10.615 (3)**.

DESCRIPTION AND USE

CPT Line Leak Detection System

The CPT system may be used on lines containing gasoline, diesel, aviation fuel, alcohol and their blends with gasoline, #4 fuel oil and some solvents. The control unit is a microprocessor controlled, automatic line leak detector that differentiates between the types of signals produced by thermal contraction, line leaks and trapped air. The system monitors the product line between the tank and dispenser, including pump manifold and discharge line.

Tests are initiated after each operation of the submersible pump and may be conducted on demand. Annual line tightness testing may be manually initiated.

Time and pressure are both monitored by the console with the results displayed continuously on a liquid crystal display. The microprocessor stores information, determines if a leak exists and shuts down the system if a leak is detected. The control unit may be programmed to transmit leak alarm conditions or daily status reports to a remote location through a modem.

Three levels of tests are conducted automatically in the following sequence:

1. A Catastrophic Level Test is automatically conducted each time the pump is turned on. Large leaks of the order of 10 gallons per hour are detected in approximately eight seconds.
2. If the system passes the catastrophic level test, a Standard Level Test and a Precision Level Test are conducted sequentially after the pump is shut off. These tests will detect leaks small enough to meet the monthly monitoring and annual tightness test requirements specified in the EPA test protocol.
3. A Precision Level Test that will detect leaks as small as 0.1 gallons per hour in 35 minutes is conducted if the system passes the standard level test and the pump remains off for the required time period.

The CPT uses a precision functional element to hold the line pressure at 11 to 22 psi after the pump is shut off. The precision functional element is normally installed directly in the submersible pump for lines up to 4 inches in diameter. The CPT system includes a high pressure algorithm.

XLP, DLD, and XLD Line Leak Detection Systems

The Red Jacket XLP, DLD and XLD line leak detectors may be used on systems containing gasoline, diesel fuel, aviation fuel, fuel oil # 4 and solvents specified by the manufacturer. When used on flexible pipeline systems, the XLP may be used with systems containing gasoline, diesel fuel, aviation fuel and solvents specified by the manufacturer. The detectors use a preset threshold and single test to determine whether a pipeline is leaking. The systems declare a leak if the output of the measurement system exceeds a threshold of 3 gallons per hour.

The systems may be used when trapped vapor is present in the pipeline during the test.

Flow restrictors must be located at a depth such that pressure from lines will not adversely affect functioning of the system. The manufacturer recommends that the vertical elevation from the center line of the pump to the dispenser be no more than 5 feet for the XLP, and 11 feet for the DLD and XLD .

There is no waiting period between the last delivery of product to the tank or the last dispensing of product through the pipeline system and the start of data collection.

The total time for data collection for the automatic line detectors is approximately one to 15 minutes, depending on temperature.

FX1, FX2, FX1D, FX2D, FX1V, FX2V, FX1DV, FX2DV and Big Flo Line Leak Detector Systems

The FX series line leak detectors are mechanical devices that are permanently installed in pressurized line systems. The unit may be installed in a standard Red Jacket pump, downstream from the pump in a special adapter, or as a pilot valve for the Big Flo Leak Detector unit. When the pump is activated, product is metered into the line through a poppet valve. When the line pressure reaches a nominal value of 10-15 psi, the poppet valve opens and full flow into the line occurs. If the pressure does not reach 10-15 psi (i.e., a leak is present), the poppet does not open, and product flow in the line is restricted to approximately 3 gallons per minute. The FX models are designed to operate at lower flow rates than the Big Flo system.

The Big Flo leak detector is a diaphragm-operated valve which uses a pilot control valve to detect a leak. The pilot leak detector is mounted "piggy back" onto the Big Flo unit and controls the pressure on one side of the Big Flo's control diaphragm. If the pilot detector detects a leak, it will close and put full pump pressure on the Big Flo's control diaphragm. This will keep the control diaphragm closed and restrict the product flow. If the pilot valve is in the fully open position, which occurs when there is no leak greater than its threshold value, the pressure on the control diaphragm will be lower. This pump pressure will then lift the Big Flo's poppet which allows the normal flow rate.

The FX1, FX2, FX1V and FX2V line leak detectors can be used with or without the Big Flo system, on rigid or flexible piping which has either single wall or double wall construction and which contains gasoline, diesel fuel, aviation fuel or some solvents. The FX1D, FX2D, FX1DV and FX2DV line leak detectors can be used with the Big Flo system, on single or double wall rigid piping which has a bulk modulus typically greater than 20,000 psi and which contains diesel fuel or some solvents. Rigid piping diameters can be from 1 to 6 inches, and flexible piping diameters can be up to 3 inches.

TESTS AND RESULTS

The performance of the Red Jacket CPT pipeline monitoring system was determined using the EPA protocol for evaluation of pipeline leak detection systems. When used as an hourly line leak detector, this system is capable of detecting a 3 gallon per hour leak at 10 psi with a probability of false alarm (P_{FA}) of 0 percent and probability of detection (P_D) of 100 percent. When used for monthly monitoring, this system is capable of detecting a 0.2 gallon per hour leak at 20 psi with a P_{FA} of 0 percent and a P_D of 100 percent. When used as a line tightness test, the CPT system is capable of detecting a 0.1 gallon per hour leak at 45 psi with a P_{FA} of 0 percent and a P_D of 100 percent.

The performance of the DLD, XLD and XLP hourly pipeline monitoring systems was determined using the EPA protocol for evaluation of pipeline leak detection systems. When used as an automatic line leak detector, the systems are capable of detecting a 3 gallon per hour leak at 10 psi with a P_{FA} of 0 percent and P_D of 100 percent.

The FX1, FX2, FX1V, FX2V, FX1DV and FX2DV line leak detectors for hourly monitoring of both flexible and rigid lines were shown to have a probability of detecting a 3.0 gallon per hour leak at 10 psi of 100 percent.

The FX1D, FX2D, FX1DV and FX2DV line leak detectors for hourly monitoring of rigid lines was shown to have a probability of detecting a 3.0 gallon per hour leak at 10 psi of 100 percent. The performance of the Liquid-Phase Product Detectors was determined using a test procedure developed following the EPA protocol for evaluation of liquid-phase, out-of-tank product detectors.

LIMITATIONS / CONDITIONS OF APPROVAL

General

- All monitoring equipment shall be installed, calibrated, operated, and maintained in accordance with the manufacturer instructions, and verified every 12 months for operability, proper operating condition, and proper calibration by a certified service technician. 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.
- The Veeder Line Leak Detectors are approved for use on pipeline systems for underground storage tank facilities that contain petroleum or other chemical products. They are approved for use on rigid piping and flexible piping.
- 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.

CPT Line Leak Detection System

- Critical performance parameters for the **CPT** Line Leak Detectors:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	1,280 psi
Total maximum allowable volume of product in any rigid or flexible test pipeline	172 gallons or less (3.0 gph) 163 gallons or less (0.2/0.1 gph)

XLP, DLD, and XLD Line Leak Detection Systems

- Critical performance parameters for the **XLP, DLD, and XLD** Line Leak Detectors:

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Total maximum allowable volume of product in any rigid test pipeline	55.1 gallons or less

- Critical performance parameters for the **XLP** Line Leak Detectors:

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	1,280 psi
Total maximum allowable volume of product in any flexible test pipeline	48.6 gallons or less

FX1, FX2, FX1D, FX2D, FX1V, FX2V, FX1DV, FX2DV and Big Flo Line Leak Detector Systems

- Critical performance parameters for the **FX1, FX2, FX1V and FX2V** Line Leak Detectors **with or without the Big Flo System:**

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Total maximum allowable volume of product in any rigid test pipeline	316 gallons or less

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	1,280 psi
Total maximum allowable volume of product in any flexible test pipeline	50 gallons or less

- Critical performance parameters for the **FX1D, FX2D, FX1DV** and **FX2DV** Line Leak Detectors **with or without the Big Flo System:**

Rigid Piping: (Fiberglass or steel)

Parameter	Value
Total maximum allowable volume of product in any rigid test pipeline	362 gallons or less

Flexible Piping:

Parameter	Value
Minimum Flexible Piping Bulk Modulus	1,280 psi
Total maximum allowable volume of product in any flexible test pipeline	50 gallons or less

This approval will be valid through December 31, 2009, 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: January 1, 2005

Reviewed by: _____
 Greg Bareta, P. E.
 Engineering Consultant
 Bureau of Petroleum Products and Tanks

Approved by: _____ Date: _____