

PAL-AT[®]

Leak Detection / Location System

Guide Specification

1.0 GENERAL

- 1.1 The preinsulated piping system shall include a complete cable-type leak detection and location system consisting of a microprocessor based monitoring unit, sensing cable, and auxiliary equipment required to provide continuous monitoring of the sensing cable string(s) for leaks, shorts and breaks. If any of these conditions should occur at any point along the sensing cable, an alarm shall sound, type of condition shall be clearly identified and the location clearly displayed.
- 1.2 The system shall be the PAL-AT Leak Detection and Location System manufactured by PermAlert. The leak detection and location system shall utilize time domain reflectometry (TDR) technology to detect and locate leaks.
- 1.3 The Leak Detection and Location System manufacturer shall have at least ten years experience in supplying leak detection systems for preinsulated piping systems.

2.0 SYSTEM PERFORMANCE

- 2.1 **General**

The Leak Detection and Location System shall locate the point of origin of the first liquid leak or fault (break/short/probe) within $\pm 0.1\%$ of the sensing cable string length, or ± 2.5 m, whichever is greater. The system shall identify the type of alarm leak/break/short as well as the location. The system shall be able to monitor (detect and locate) a first leak with up to 30 m of sensing cable wetted without significant inaccuracy in location.
- 2.2 **Sensing Cable String Length**

The system shall be capable of monitoring up to 1,500 m of sensing cable per sensing cable string from a single monitoring unit.
- 2.3 **Multiple Leaks**

The system shall be capable of monitoring (detecting and locating) for multiple leaks or additional liquid on the sensing cable. The system shall be able to monitor multiple leaks with up to 30 m of sensing cable wetted with reduced location accuracy.
- 2.4 **Breaks and Shorts**

The system shall be capable of identifying the location of breaks and shorts on the sensing cable. When either of these faults occurs, an alarm shall sound and a display visible on the front of the monitoring unit shall clearly indicate the type of fault, i.e. BREAK or SHORT and display the location of the fault.
- 2.5 **Liquids Detected**

The system shall be capable of detecting all aqueous liquids, conductive and nonconductive.

2.6 Remote Annunciation

The system shall provide relays for remote indication of an alarm condition. The relays shall provide indication that no alarm conditions exist, an alarm condition exists but has not yet been acknowledged, and an alarm condition exists and has been acknowledged. Communications shall be available via RS-232 and ASCII communication protocol to allow central point monitoring and control via a remote computer.

2.7 Archives

The system shall record significant events in nonvolatile memory. A minimum of 900 events shall be stored. When the memory becomes full, the recorded events shall be deleted from memory on a FIFO basis. Each recorded event shall include the time and date that the event occurred. Archives shall be retrievable through the RS-232 and ASCII communication protocols.

2.8 System Status

The system shall continuously provide positive indication that it is monitoring the sensing cable string and the status of the sensing cable string. The system clock shall provide the time and date on the LCD of the monitoring panel. The system clock shall be programmable by the user. A time and date indication shall be included for all events recorded in memory.

2.9 Security

The system shall have assignable password security to provide for varying levels of system access. A minimum of 20 passwords shall be available within the system. The system shall not permit unauthorized modifications to the sensing cable string to be made (i.e. shortening sensing cable length) without causing an alarm condition.

2.10 Sensitivity

The sensitivity of the system shall be field adjustable to increase or decrease the amount of wetted sensing cable needed to cause an alarm from 1m to 4 m.

3.0 COMPONENTS

3.1 Monitoring Unit

The monitoring unit shall be microprocessor based and capable of monitoring up to 1,500 m of sensing cable per cable string, including sensing cable and jumper cable. The monitoring unit shall indicate when any liquid comes in contact with the sensing cable by sounding an alarm, actuating the two output relays, displaying a message stating that a leak has been detected and the location of that leak on the sensing cable string.

The monitoring unit shall have a green LED on the front panel to indicate the unit is powered. English language displays shall indicate the status of the sensing cable. A 2-line by 40-character backlit LCD shall be visible from the front of the unit to provide system data. A red LED on the front panel shall indicate an alarm condition has occurred.

The monitoring unit power requirements shall be 120/240 VAC, 100 VA, 50/60 Hz, single-phase. Monitoring units shall be equipped with an RS-232 communication port and a minimum of one common and one per cable string SPDT output relay, rated for 250 VAC, 10 A.

The monitoring unit shall be enclosed in a modified NEMA 12 enclosure.

The ability to locate a leak shall not depend on battery backed up functions. In the event of power failure, system conditions and parameters shall be stored in nonvolatile memory allowing the unit to automatically resume monitoring, without resetting, upon restoration of power. An on-off switch shall be provided in the panel for servicing.

3.2 Sensing Cable

The sensing cable shall be installed on or near the service pipe in the polyurethane insulation. The sensing cable shall be a twisted-pair consisting of 2 insulated 1.5 mm² insulated copper wires suitable for exposure to temperatures up to 130°C. The sensing cable shall detect all water-based liquids. Maximum length of the sensing cable string shall be 1500 m.

4.0 INSTALLATION

4.1 General

The system shall be installed in accordance with the manufacturer's written installation instructions and by properly trained personnel.

4.2 Monitoring Unit Location

The monitoring unit shall be installed in an indoor, temperature controlled environment.

4.3 Location Maps

A location map shall be provided with the system by the installing contractor; indicating the "As Installed" system configuration and sensing cable string layout. Distance along the sensing cable shall be provided as references to locate leaks. Distance shall be based upon Calibration Points taken as describe in paragraph 4.4

4.4 Calibration Points

The installing contractor shall be responsible for taking and recording calibration points along each sensing cable string in accordance with the manufacturer's installation instructions. Calibration points shall be used to prepare the Location Map describe in paragraph 4.3

4.5 Field Service

The Leak Detection and Location System manufacturer shall provide a factory trained field service technician to support the proper installation of the system by the installer. Field technical assistance shall be provided for critical periods of installation including;

- Installation training
- Field joint connections and testing
- Monitoring unit connections and testing
- System start-up and calibration