

TENDER SPECIFICATION FOR HYDROCARBON LIQUID LEAK DETECTION SYSTEM (HLLDS)

1.0 Overview

1.1 This section of the specification covers the design, supply, installation, testing, commissioning and thereafter maintaining of the non-conductive hydrocarbon liquid leak detection system during and after defect liability period (DLP).

Installation of a **Hydrocarbon Liquid Leak Detection System (HLLDS)** is recommended for continuous protection from the risk of fuel and other oils (such as Diesel, Fuel, Crude Oil, Gasoline etc.) leaking from the storage tank, equipment, pipes, etc.

1.2 This complete HLLDS shall include a digital Supervising Panel with Sensor Modules, distance type non-conductive **REUSEABLE hydrocarbon liquid sensing (HCS) cables** (has to be from same supplier), leader and/or jumper cables and all required auxiliary accessories (such as hold down clip (HDC) & Tag/Label for the sensing cable), as indicated on the design drawings.

1.3 This HLLDS shall detect and locate any abnormal presence of hydrocarbon liquid on any part of the connected sensing cables and also detect multiple leaks simultaneously for each zone (ie: total number of leaks detected is equal to the number of Sensor Interface Modules (SIM) in use). In the event of cable break and serial communication loss faults for different zones are detected, the HLLDS shall be capable to trigger the alarms too.

1.4 The non-conductive sensing cable is non-sensitive to water, dirt, pressure, vibration.

1.5 This HLLDS shall be suitable for industrial, outdoor or challenging environmental conditions

1.6 The HCS cables shall be of such construction that no metallic parts shall be exposed to the environment. The system shall be provided with a standard length of 2m, 5m and 10m. Optional custom "cut-to-length" sensing cable shall be available as and when necessary in order to meet the exact length requirement at each area of protection.

2. System performance

2.1. Supervising Panel and Sensor Interface Module (SIM) System Configuration

The Supervising Panel shall have the capability to supervise and control up to 40 Sensor Interface Modules (whereby each SIM can handle up to max. 5 lengths of same or different length of HCS cables connected together. HCS cable length shall be 2m and 5m and capable of monitoring up to an accumulated max. length of 1,000m (3,280 feet) of sensing cable and accumulated length of 1,000m (3,280 feet) for communication cable. These cables lengths shall not include the jumper cable.

The Control Panel shall have the following features and capabilities:

- LCD display (4 lines X 20 characters) with backlight
- Sound alarm with a 90dB (max) buzzer and silencing button
- Menu with password access to event log, time/date setting, configuration modes
- LEDs indicating "POWER" (green), "LEAK" (red) and "TROUBLE" (yellow).
- Faults alarm communicating with BMS/EMS via Modbus RS485 or dry contact relays
- Cable break location identification to the closest Sensor Interface Module (SIM)

- Power up and communicating with the SIM via the sensing and non-sensing cable connection. Once the alarm condition has been cleared, the System shall be capable to reset itself automatically.

2.2. Single or Multiple leaks fault

Every length of sensing cable shall be able to detect and locate leaks independently. The System shall be able to detect single or multiple leaks simultaneously (i.e: total number of leaks detected is equal to the number of SIM or Zones installed). In the event of leaks, the Supervising panel "LEAK" LED will be lighted up and an audible alarm shall be sounded. The fault messages shall be displayed on the LCD screen showing the leak distance (whereby the precision of the leak location is identified within each cable length with connector), and its corresponding zone name/number of each leak detected. Concurrently, the panel dry contacts shall be activated, and the digital leaks information shall be transmitted to the linked BMS too.

2.3. Cable break & Serial communication loss faults

Besides leaks, the system shall be capable of detecting any damaged sensing cables (ie: cable break). In the event of cable breaks, the Supervising panel "TROUBLE" LED will be lighted up and an audible alarm shall be sounded. The fault message shall be displayed on the LCD screen showing the cable break location of the SIM zone number nearest to the break. Subsequently, fault message for Serial communication loss for the SIM zone after the cable break zone will be displayed too. Concurrently, the panel dry contacts shall be activated, and the digital leaks information shall be transmitted to the linked BMS too.

2.4. Types of detectable Hydrocarbon Liquid

The System shall be capable of detecting non-conductive liquids of hydrocarbon such Diesel, Fuel, Crude oil, Gasoline, Light Naphtha, etc.

2.5. Security

The Supervisory Panel shall need a password to access to the menu and change the configuration data

2.6. Event Log Recording

The Control Panel shall include an event log that record up to 896 time and date stamped events on a FIFO basis

2.7. Power Requirements

The System shall be powered by 110 to 230 +/- 15% Vac, 50/60 Hz single phase. It shall be provided with the option to be powered by 12 to 24Vdc/ac source

2.8. Communication interface

The System shall have high level Modbus RTU (2 wires RS-485) or optional Modbus TCP/IP (RJ45 connector) serial communication interface with the Building Management System (BMS). It shall also have a low level dry contact relay output which is for leak and cable break/power failure monitoring. The dry contact relays output shall have a voltage free contact (N.O/N.C.) for external interfacing.

2.9. Hydrocarbon Liquids Sensing (HCS) cable

2.9.1. Performance

The HCS cable shall be based on semi-conductive elastomeric material swelling property when in contact with non-conductive liquids of hydrocarbon (such as Diesel, Fuel, Crude Oil etc.) and shall be capable to perform the following functions:

- i. Detection of reasonable amount of hydrocarbon liquids and nonconductive solvents along any part of the SC length.
- ii. Communicate with the Control Panel via each SIM digitally.
- iii. Detection of a break or cut along any point of the cable length
- iv. Insensitive to and shall not cause any false alarm when contact with water-based liquids, dirt, pressure or vibration.
- v. HCS shall be very low-voltage, no-spark igniting, thus more efficient to detect leak quicker

The typical response time shall be:

1. Gasoline, Light Naphtha: 2 min 30 sec
2. Diesel, Oil, Jet Fuel: 5 min
3. Crude Oil: 30 to 60 min (depend on oil viscosity)

2.9.2. Construction

The HCS cable shall consist of five wires enclosed within a PE braided sleeves (to protect the wires physically) throughout its whole length and terminated with a male and female connectors at each end respectively

The HCS cable shall be made of material which has no risk of ignition when detected hydrocarbon liquids and is fully mitigated

2.9.3. Cleaning

If required, general cleaning the HCS cable without removing it shall be possible using a slightly damp cloth

2.9.4. Reusable after Resetting

The HCS cable shall be able to reuse after proper method of resetting recommended by the manufacturer

2.10. Accessories

Complete system accessories such as the connectors, jumper cable, hold-down clip & Tag/Label shall be provided by the HLLDS manufacturer

2.11. Installation

The system shall be installed by qualified and well trained contractors, with the procedure recommended by the HLLDS manufacturer

Approved Makes: ELSA / TTK