



Digital Addressable Liquid Leak Detection and Alarm System Water | Acid | Hydrocarbon

DIGITAL ADDRESSABLE LIQUID LEAK DETECTION AND ALARM SYSTEM SPECIFICATION

PART 1 GENERAL

1.1 Summary

- A. OmniLeak, a French manufacturer, of Digital Addressable Liquid Leak Detection and alarm system, providing a reliable system to detect and locate any leaks along the entire length of the sensing cables in critical areas of the project.
- B. OmniLeak provide an adaptable system used for many different applications. The typical applications for this use are Data Centers, Commercial Buildings, Banking & Finance, Telecom, Transportation, High rise buildings, Energy Sector, Pipelines, Oil & Gas industries.
- C. The manufacturer (OmniLeak – France) shall have a minimum of seven years' experience with leak detection and location technology for both alarm terminals and sensing cables.
- D. Installation of a liquid leak detection system shall provide continuous protection from the risk of water and other liquids leaking within critical areas of the building/protected zone.
- E. This complete liquid leak detection system shall be based on a digital addressable alarm monitoring terminal, digital addressable sensing cables, jumper cables and all required auxiliary equipment.
- F. This system shall be able to detect and locate cable breaks, communication loss and multiple leaks simultaneously
- G. The areas to be covered under the liquid leak detection system have been identified in the drawings.

1.2 Overall System

- A. The liquid leak detection system (OL-ECAT) shall be able to detect and locate exact location of both conductive liquids and hydrocarbons using, specific to the liquid type sensor cables and connectors to signal an audio-visual alarm to the alarm terminal.
- B. The digital addressable extended coverage alarm terminal (OL-ECAT) shall provide a redundancy loop-back function enabling a continuous protection of the critical area, leaving no areas compromised, due to an unfortunate event of a cable break/communication loss. The loopback feature shall be available in T-branched layout as well.
- C. The (OL-ECAT) system shall provide animated graphic display map on the system HMI with pin-point location of the leak to the nearest meter.
- D. The (OL-ECAT) system shall provide real-time leak alarm sensitivity (1 to 9) adjustment functionality to adjust the sensitivity of each connected sensing cable (1-High Sensitivity & 9 Low Sensitivity).
- E. Sensor cables shall be able to detect and locate cable breaks and multiple leaks simultaneously



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- F. For conductive liquids leak detection, the system shall be capable of detecting leaks on unaffected section of the sensing cable even in case this same sensing cable is in cable break condition
- G. For combustible and flammable liquids detection, the system shall be compliant to explosible atmosphere zone 0, sensing cable shall be intrinsically safe for gases of group IIC, tested to Standards IEC 60079-0 and IEC 60079-11, IECEx approved by a recognized worldwide third-party certification body.
- H. The electrical equipment shall be compliant to the local regulations for electrical safety. If no relevant codes are available for low-power circuits supplied by voltages of up to 30VAC/40VDC, the US National Electrical Code (NEC) shall be used. Equipment powered by voltages higher than 30VAC or 40VDC shall be compliant to the EU Low Voltage Directive (2014/35/EU), or to the US NFPA 70, National Electrical Code (NEC)
- I. The leak detection system (OL-ECAT) shall come fully equipped with an Alarm Terminal, Sensing Cables, Connectors, Leader & Jumper Cables and any other accessories required fit for purpose.
- J. The leak detection system sensing cables and accessories shall have IP68 connectors.

1.3 References

- A. Reference Standards
 - 1. IEC 60079-0 and IEC 60079-11 – International Electro-technical Commission
 - 2. NFPA 70, National Electrical Code
 - 3. Low Voltage Directive (2014/35/EU)

1.4 Submittals

- A. Pre-contract submittals shall be the following
 - 1. Provide a detailed CAD drawing of circuit layout in the critical area showing location of alarm terminal monitoring unit, sensing cables & communication cable routing.
 - 2. Provide product data for each item used for the liquid leak detection system.
 - 3. All the certifications related to the system shall be provided.
- B. Product Data
 - 1. Provide product technical data sheets for each item used for the liquid leak detection system.
 - 2. Area of application information for the system shall be provided.
 - 3. Provide installation manuals for digital addressable alarm terminal, digital addressable sensing cables, accessories and installation tools & equipment.
 - 4. Provide operation & maintenance manuals for the complete system
- C. Shop Drawings
 - 1. Provide the liquid leak detection layout drawing detailing the following information for each alarm terminal monitoring unit and output's:
 - a. Master smart alarm terminal location
 - b. Sensing cable routing and location
 - c. Sensing cable number
 - d. Shop drawings shall include a floor plan map of the building with cable sensor to include on the pin point animated map.



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1.5 Quality Assurance

A. Qualifications

1. Manufacturer

- a. Manufacturer shall have a minimum of ten years' experience in the manufacturing of digital addressable liquid leak detection and location technology.
- b. The system shall include digital addressable alarm terminals, digital addressable sensing cables, control cables & accessories.

2. Installation

- a. Installation team shall be trained at a professional standard as per manufacturer's standard and have experience in the installation of Liquid Leak Detection Systems.
- b. Installation shall be supervised by an OmniLeak representative with a final inspection and sign off before handover to client.
- c. Work carried out shall be in accordance with provisions of any given standards and codes specified at the start of the project.
- d. Testing and inspections shall be provided after installation in accordance with this specification.

1.6 Delivery, Storage & Handling

- A. All products and accessories, if in stock, to be stored in a clean and dry environment away from direct sunlight so they are protected prior to installation of liquid leak detection sensors & alarm terminals
- B. Take necessary precautions when handling and transporting to prevent any damage to the products i.e., contact with sharp edges, dropping from height etc.
- C. Delivery of products shall be in working condition

1.7 Site Conditions

- A. The area of which the system is to be installed shall be cleaned and free from debris prior to installation
- B. The work area shall be inspected for safety to allow installation to commence
- C. Sufficient waste collection bins shall be provided at each working zone

1.8 Warranty

A. Manufacturer Warranty

1. Contractor shall provide standard manufacturer's warranty of 5 years from the date of final testing and commissioning of the liquid leak detection system.

B. Extended Warranty

2. Contractor shall submit all system testing records to manufacturer to qualify for manufacturer extended warranty on the following products:
 - a. Digital addressable Extended Coverage Alarm Terminal – 10 years
 - b. Digital addressable Sensing Cables – 10 years



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PART 2 SYSTEM PERFORMANCE

2.1 General

- A. The (OL-ECAT) system shall provide a redundancy loop-back feature and enable the system to monitor all the protected zones/areas even in case of communication loss or cable break on any one of the sensing cable or communication cables on the entire system.
- B. The (OL-ECAT) system shall provide animated graphic display map on the system HMI with pin-point location of the leak to the nearest meter.
- C. The (OL-ECAT) system shall provide real-time leak alarm sensitivity (1 to 9) adjustment functionality to adjust the sensitivity of each sensing cable (1-High Sensitivity & 9 Low Sensitivity).
- D. The liquid leak detection system shall identify any abnormal presence of liquid on any point of its connected sense cables, to the nearest meter.
- E. The (OL-ECAT) system shall provide real-time leak alarm sensitivity (1 to 9) adjustment functionality to adjust the sensitivity of each sensing cable (1-High Sensitivity & 9 Low Sensitivity).
- F. In the event of a leak, an audible alarm shall be triggered and the dry contact shall be activated. The panel's touch screen HMI display shall show the date and time of the alarm, the type of alarm and the location of the leak to the nearest metre with alarm and cable ID
- G. Animated graphic display floor plan zone maps pinpoint the alarm (leak) on the panel's HMI touch screen shall be available.
- H. A power failure relay shall be activated when the power shuts down.
- I. The panel shall be able to show all the cables connected and group them by zone as required.
- J. Each and every sensing cable connected to the system shall communicate independently to the alarm terminal to detect and locate the leaks independently.
- K. The system shall detect and show multiple alarms simultaneously.
- L. Besides leaks, the system shall be capable of detecting any damaged sense cables (cable break) and communication loss (bus break).
- M. In the event of a cable break or communication loss, an audible alarm shall be triggered and the dry contact associated to it shall be activated. The panel's touch screen HMI display shall show the date and time of the alarm, the type of alarm and the location of the cable break with alarm and cable ID.
- N. Animated graphic display floor plan zone maps pinpoint the alarm (break) on the panel's HMI touch screen shall be available.
- O. The system shall be capable of detecting conductive liquids such as water, bases and acid, or non-conductive liquids as hydrocarbon and solvents. The system shall be able to manage all different types of sense cables mixed on the same output of alarm terminals.
- P. The system shall have USB port to export the system setting and event logs for system backup.
- Q. The system shall provide different levels of security
 1. Unprotected
 2. Default User (Limited Access)
 3. Administrator (All Access)



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PART 3 PRODUCTS

3.1 WATER LEAK DETECTION SYSTEM

- A. System design, installation, testing & commissioning and trailing shall be done by the contractor.
- B. Contractor shall provide a complete water leak detection system including alarm terminals, sensing cables & accessories designed for the areas as indicated in the drawings.
- C. For each function, the system shall provide three levels of security Unprotected, Default User (Limited Access), Administrator (All Access) to the administrator.
- D. Contractor shall submit system design, schematic & shop drawings to Engineer for approval.

3.2 OL-ECAT EXTENDED COVERAGE DIGITAL ADDRESSABLE ALARM TERMINAL

- A. General
 - 1. The extended coverage digital addressable alarm terminal shall be a microprocessor based complete leak detection and alarm locating system.
 - 2. It shall receive data processed and transmitted by each sense cable as well as raising the alarm.
 - 3. The communication with the sensing cables shall be based on a proprietary long-range failsafe bus with redundancy loop back bus.
 - 4. The digital addressable alarm terminal shall have 4 addressable outputs.
 - 5. The maximum addressable sensing cables per output shall be 50.
 - 6. The panel shall be able to show on the 7 or 12-inch touch screen, all cables connected and to group them in zones and label them as per user's requirements.
 - 7. The panel shall be able to detect multiple leaks of different liquids / hydrocarbons simultaneously when using the correct sensor cables with matching connectors.
 - 8. The event logs shall be stored in system internal memory.
 - 9. There shall be USB port available to export the history events.
 - 10. The system shall be made up of anti-false alarm design.
 - 11. Sensitivity levels (1-9) shall be adjusted to suit user's requirements depending on environmental conditions of the protected area where sensing cables are installed.
 - a. 1 High Sensitivity
 - b. 9 Low Sensitivity
- B. Power
 - 1. The digital addressable alarm terminal unit shall be supplied by 100-240VAC, 50-60Hz, single phase power supply, or by 12-24VDC.
 - 2. The total power consumption shall not exceed 36W max
- C. Touch screen display
 - 1. A 7" or 12" touch screen HMI display shall be provided on the front of the digital addressable alarm terminal.
 - 2. The touch screen HMI shall provide the user/admin access to enter the system configuration.
 - 3. The HMI shall provide the access to system configuration and animated floor plan.
 - 4. In the event of simultaneous leaks or multiple alarms, the display shall show all alarms.
 - 5. English shall be the default language.



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D. Interface

1. There shall be 12 (SPDT) configurable dry contacts available in the system to enable remote monitoring and control. The dry contacts shall have NO, COM & NC terminals. The dry contacts shall indicate normal and alarm condition by LED indication. The maximum switching capacity of dry contacts shall be 60W.
2. Any interruption in power shall be indicated by a specific dry contact.
3. RS-485 serial ports with Modbus communication protocol shall be available on the digital addressable alarm terminal.
4. An Ethernet port shall be available on the digital addressable alarm terminal motherboard for providing network functionalities.

E. Enclosure

1. The digital monitoring unit shall be enclosed in a dust-tight enclosure.
2. Ingress Protection: IP54
3. Enclosure type: NEMA 3S

F. Installation

The digital monitoring unit shall be able to wall-mounted (Flush mount possible)

G. Norms and Standards

The monitoring unit shall have CE approval.

3.3 SENSING CABLES

A. OL-CLS Conductive Liquid Sensing Cable

Leak detection sensing cables shall be specifically designed for the purpose of conductive liquid leak detection and shall be compatible with the alarm terminals and control systems used.

1. Performance

The sensing cable shall perform the following functions with continuous monitoring

- a. Detect the presence of any conductive liquid at any point along the entire length of the sensing cable.
- b. Locate the conductive liquid to the nearest meter.
- c. Pin points the leak location on the animated graphics
- d. Able to adjust the sensitivity of the sensing cable

2. Detection of cable break or communication loss at any point of sensing cable

- a. Detect the type of fault (cable break or communication loss)
- b. Detect the output number and sensing cable number
- c. Detection location of the fault to the alarm terminal

3. Construction

- a. OL-CLS shall consist of 5 wires: External Jacket (pink), 2 Dust proof Sensor Wires (Black), 2 Jumper Wires (Red & Yellow) wined over a central core conductor
- b. OL-CLS shall detect the unwanted presence of conductive liquids along the full length of the cable
- c. Sensor cable shall have a special dust-proof construction and shall not be affected if in contact with any metal parts like cable baskets, flooring etc.
- d. The sensor cable shall have a maximum bend radius of 25mm and a maximum breaking strength of 150kg / 330lbs.



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- e. Flexible enough to bend, but rigid enough to maintain shape, so the sensing wires are not compressed.
- f. Designed to provide rapid detection whilst being protected against a build-up of dust and dirt affecting their detection capabilities.
- g. Resistant to abrasion.
- h. Quick drying after being in contact with water and any other conductive liquids
- i. Suitable for wipe-down cleaning.
- j. Detection cable shall be fixed in place using specially designed/selected clips that do not compress them.
- k. Cable routes/locations shall be selected to be adjacent to potential sources of leaks whilst providing coverage to the whole area.
- l. Communication of leaks shall be transmitted and located to the nearest meter on the connecting panel
- m. The range of detection cables will consist of 3, 7, 15, 30 and 45 meters long.
- n. OL-CLS shall be corrosion resistant and to withstand temperatures ranging from -55 degrees centigrade to +100 degrees centigrade without losing its reliability on leak detection.
- o. Sending Cable shall be quick drying after being in contact with water or other conductive liquids.
- p. The detector cable shall be non-propagator of the flame

3.4 Accessories

- A. Contractor shall provide all accessories specific to the project requirements for a complete leak detection system:
- B. OL-SLDM – Smart leak detection module used for the detection of unwanted presence of water and other conductive liquids. Module shall be compatible with OL-CLS & OL-ALS.
- C. OL-HCM – Heavy-duty hydrocarbon module used for detection of unwanted presence of hydrocarbons. Module shall be compatible with OL-HCS.
- D. OL-LOOP BACK – a 5m neutral cable shall have a male connector allowing the circuit to get a loop back connection back to the alarm terminal
- E. OL-LEADER – a 5m neutral cable shall have a female connector allowing the circuit to begin from the alarm terminal
- F. OL-JUMPER – a 5m neutral cable shall have a male and female connector allowing connection between two sensor cables or zones.
- G. OL-KIT – Leak Detection connector kit with male & female connectors along with heat shrinkable sleeves and hot melt glues.
- H. OL-END – Digital end termination shall end the circuit for sensing cables and if use of loop back is not required, each sensing cable zone shall end with termination plug.
- I. OL-BUS – This communication cable shall allow connection between alarm terminal & sensing cables and also shall provide a link between two sensing cables.
- J. OL-CLIPS - Clips shall be used to hold sensing cables in position at no more than 1meter intervals or wherever required.
- K. OL-TAGS - Identification tags shall be attached to the sensing cables at no more than 3meter intervals



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3.5 Animated Graphic Display Map

- A. Zone map feature shall allow the user to view the entire area of which is protected in each output or sensing cable connected to the alarm terminal.
- B. Alarm map feature shall allow the user to determine what type of alarm has occurred when alarm is sounded i.e., Cable break/communication loss or leak, and location of this shall be shown on the alarm map.
- C. The alarm zone shall be named as per the user's requirement, e.g. Zone – 1 Data Hall, Zone 2 UPS room, Zone- 3 Mechanical Room etc.
- D. If leak occurs, the alarm map shall allow the user to locate leak to the nearest meter with the pinpoint location. The map also shows the alarm message with alarm ID, Cable ID.
- E. If cable break/communication loss occurs, the alarm map shall allow the user to locate cable break with the pinpoint location. The map also shows the alarm message with alarm ID, Cable ID.
- F. Pinpoint location of leak shall have an accuracy of +/-1m. Multiple leak locations can be detected and located throughout the full length of the sensor cable.
- G. Pinpoint animated graphic display may shall show multiple alarms in same page.
- H. The graphic display map shall show both cable break and leak alarm simultaneously on the HMI screen.

PART 4 EXECUTION

4.1 Examination

- A. Verification of Conditions: Examine all areas of work for compliance with requirements for installation and for conditions affecting the performance and quality of work. Identify the conditions, and if standard not met to contractor's expectations, notify the engineer to have these conditions rectified to a standard where a proper and timely completion of the leak detection system can be done.

4.2 Preparation

- A. In a typical preparation for liquid leak detection system, degrease and clean surfaces of the area of which clips and tags will be attached. A clean, dry and free from dust and dirt area is required for surfaces of which the sensor cables will be attached to. Ensure all items and accessories are in hand prior to work commencing.

4.3 Installation

- A. The system shall be installed by professionally trained staff following a procedure recommended by the manufacturer
- B. All leak detection system components shall be installed in accordance with the manufacturers installation instructions and the local fire and electrical safety regulations.
- C. The sensing cable shall be installed after all piping, air conditioning, raised flooring, and other mechanical work has been completed, and prior to installation of other data or power distribution cabling. The sub floor sensing cable path shall remain clear of water, oil, solder, flux, dirt or other materials that may soil the sensing cable. Contractor shall prepare floor surface for cable installation, install hold down clips for sensing cable, route and fix the sensor cable, route and fix any interconnect accessories such as jumper cable, point probes, branch connectors, leader cables and end terminations.



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- D. The sensing cable should be kept away from any sharp edges, floor pedestals and uninsulated ground conditions.
- E. Install digital addressable alarm terminal on the wall where detailed on drawings and supply 20 amps, 100-240VAC, 50-60Hz, single phase power supply to it.
- F. Connect sensing cables into the digital addressable alarm terminal.
- G. All wiring shall be checked and tested by the installation contractor to ensure there are no grounds, opens or shorts.
- H. Provide additional protection to the sensing cable in heavy traffic areas determined by the engineer, by means of cable shield without affecting the performance of the sensing cable.

4.4 Field Quality Control

- A. A preliminary system test shall be carried out to determine whether the system is in a suitable condition to conduct an acceptance test.
- B. General contractor shall be trained in the event of an alarm during remaining construction.
- C. System acceptance test shall be carried out by testing of the following, sensing cables, alarm devices, system interfaces and all responsible personnel to be trained.
- D. Provide a system acceptance report signed by installing contractor confirming that the system has been installed and tested with the manufacturers recommendations and conforms to industry standards and is operating correctly.

4.5 Commissioning & Demonstration

- A. The contractor shall be responsible for the verification of each component in the system is fully functioning and conforms with the specification. They shall also be responsible the system as a whole is fully operational and is in accordance with the specification.
- B. Commissioning shall be done in a phased manner as the installation of the equipment proceeds.
- C. Commissioning shall be carried out by the system supplier & experienced, qualified engineers.
- D. Commissioning shall include verification and demonstration of other systems interface operations and functions e.g. Alarm Terminal, BMS, SCADA etc.

PART 5 MANUFACTURER

5.1 Manufactured by:

OmniLeak by DAGMAN S.A.S
32-34 Rue des Osiers 78 310,
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