

**SECTION 23 10 00
FACILITY FUEL SYSTEMS**

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Tank fluid level monitoring and alarm systems.
- C. Leak detection system for tanks and underground piping.

1.3 QUALITY ASSURANCE:

- A. Approval by Contracting Officer is required of products or services of proposed manufacturers, suppliers and installers, and will be based on Contractor's certification that:
 - 1. Manufacturers regularly and currently manufacture, tank fluid level monitoring and leak detection systems, fuel quality management systems.
- B. Label of Conformance (definition): Labels of accredited testing laboratories showing conformance to the standards specified.
- E. Entire installation shall conform to requirements of local and state pollution control authorities.
- F. All equipment shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components or overall assembly.
- G. Provide copies of manufacturer's installation instructions for all equipment to the RE/COTR two weeks prior to commencing installation of any item.
- H. Authorized manufacturers representatives shall provide on-site training of installers and supervision of the installation and testing of the equipment and systems to assure conformance to written instructions of manufacturers. This applies to tank level monitoring systems, leak detection systems, fuel quality management systems, cathodic protection systems.
- I. Apply and install materials, equipment and specialties in accordance with manufacturer's written instructions. Immediately refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Resident Engineer (RE)/Contracting Officers Technical Representative (COTR) for resolution.
- J. Where specified codes or standards conflict, consult the RE/COTR.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 013323, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Leak Detection System:
 - 1. Drawings, description and performance data on sensors, control units.

2. Description of operation.
3. Layout of system.
4. Installation and operating instructions.
5. Data on interconnecting wiring systems to be furnished.

C. Tank Fluid Level Monitoring Instrumentation System:

1. Drawings showing instruments and in-tank sensing units, with dimensions.
2. Design and construction of all elements of system.
3. Installation instructions.

1.7 PERMITS:

Contractor shall obtain and complete all tank permit and registration forms required by governmental authorities.

PART - 2 PRODUCTS:

2.2 LEAK DETECTION SYSTEMS:

- A. Automatic digital continuous monitoring systems responsive to the presence of water and hydrocarbons in the interstitial space of the double-wall tanks, in the tank manhole access enclosures, and in the secondary containment of fuel piping systems. System shall distinguish between hydrocarbon and water and identify location of leak as to individual tank and piping system. System may be combined with tank fluid level monitor and alarm system

B. Functions and Arrangement:

1. Single control station to monitor all sensing probes.
2. Visual indicator to monitor and identify leaks as water or hydrocarbon and location.
3. Indicators showing system status including faults and alarms.
4. On board printer that provides complete reports of all system functions upon command.
5. Panel circuit test button.
6. 95 dB audible alarm with silencing control to sound when leak is detected.
7. Eight hour memory backup system with battery.
8. NEMA 250 Type 4 cabinet.
9. UL or other accredited testing laboratory listing.
10. RS232 Modbus communications with //engineering control system// boiler plant computer workstation// to indicate system in service and alarm conditions.

C. Sensors:

1. Designed for required locations including: Insertion between walls of double-wall tanks, in sumps in double-wall piping systems and in tank manhole enclosures. Sensing points shall be at lowest point of each tank or sump. Intrinsically safe design.
2. Sensing units shall detect presence of water and a minimum 3 mm (0.125 inch) thick layer of hydrocarbon on surface of water and minimum 50 mm (2 inch) thickness of hydrocarbon in area that has no water present.
3. Sensors shall be arranged to allow replacement of individual sensors without disturbing other portions of leak detection system or fuel storage and piping system. Underground sensors shall be accessed through caps as grade.
4. Materials of construction shall be non-corroding.
5. Transmit status signal to control unit.

D. Components:

1. Sensor housings from tank and piping to grade shall be Schedule 40 PVC, or stainless steel.
2. Underground wiring between probes and control unit: Place in water-tight corrosion-resistant conduit system conforming to Section 260541, UNDERGROUND ELECTRICAL CONSTRUCTION.

E. Manufacturer: Preferred Utilities, Veeder-Root, or equal.

2.3 TANK FLUID LEVEL MONITOR AND ALARM SYSTEMS:

A. Digital systems for central monitoring of fuel and water levels in all fuel oil storage tanks in the project. High and low level visual and audible alarms. Volumetric tank-tightness testing. Complete with all transducing, transmitting, and receiving devices. On board printer to provide complete report of all system functions upon command.

B. Fluid Level Monitor:

1. Digital continuous readout, showing tank oil and water levels in gallons. Provide identification of product measured, measuring units, and the tank number.
2. Tank and fuel characteristics contained in preprogrammed non-volatile field-replaceable databases. Protected power supply.

C. High and Low Fluid Level Alarm System:

1. Automatic continuous on-line monitoring of all tanks.
2. Visual and audible indicators combined with fluid level monitor. Identify the tank that is in alarm condition.
3. Manual alarm test and silencing controls.
4. Low level alarm actuation adjustable 0-25 percent of tank capacity. High level alarm actuation adjustable 75-100 percent of tank capacity.

- D. Locate all indicators, selector switches, alarms on face of wall-mounted NEMA 250, Type 4 panel.
- E. Remote Alarm Annunciator:
 - 1. Visual and audible high level alarms adjacent to tank fill box locations. Locate in NEMA 250 Type 4X weatherproof exterior wall or pole-mounted panels.
 - 2. Alarm shall include flashing red light with 180 degree visibility for each tank and 95 dB horn or 100 mm (4 inch) diameter bell. Provide alarm silence control.
 - 3. Provide identification sign: "WHEN ALARM SOUNDS - FUEL TANK FILLED TO CAPACITY - DO NOT OVERFILL".
- F. Modbus communication to building automation system and boiler plant computer workstation to indicate tank fluid level and alarm conditions. Telephone modem communication capability.
- G. System Performance: Accuracy plus or minus 2.5 mm (0.01 inch) of fluid height in inventory mode and 0.25 mm (0.001 inch) in leak detection mode. Automatic compensation for fluid temperature changes. Volumetric tank tightness sensitivity of 0.4 lph (0.1 gph).
- H. Sensors:
 - 1. Provide sensor types such as magnetostrictive, capacitance, float, hydrostatic and other types as necessary for the applications.
 - 2. Apply in accordance with manufacturer's instructions with provisions for easy future replacement without need for excavation.
 - 3. Provide for each hydrostatic sensor a constant flow differential pressure regulator and pneumatic transmitter protected from fuel contamination. Air supply shall include filter and over-pressure protection. Provide desiccant-type dryer on air supply designed for removal of water vapor. Dryer rating, minimum 280 cubic liters per minute (10 scfm). Provide moisture indicator. Dryer may be deleted if air supply source has a refrigerated dryer.
 - 4. Float-type units shall be designed for installation and removal through a 100 mm (4 inch) diameter vertical pipe mounted in the top of the tank.
- J. Code Conformance: NFPA-70.
- K. Manufacturer: Preferred Utilities, Veeder-Root, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING, ABOVEGROUND TANKS:

- A. Conform to NFPA 30 or 31 as applicable.
- B. Support tanks on steel saddles welded to the tanks. Anchor to concrete foundations. Provide molded neoprene isolation pads between the steel supports and the concrete foundation.

- C. After tanks are installed, test steel tanks with air pressure of 20 kPa to 35 kPa (3 - 5 psi), using soapsuds to locate leaks. Tank leaks shall be repaired as directed by tank manufacturer. Retest until all leaks are corrected. Repair all damaged areas of prime coat on tanks and steel dikes (if furnished). Test interstitial area between steel tank walls with air at pressure recommended by tank manufacturer. Tests shall be witnessed by the RE/COTR.
- F. Provide electrical grounding in accordance with NFPA 70.

- - - E N D - - -