

SECTION 23 10 00  
FACILITY FUEL SYSTEMS

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Diesel fuel oil tank provide as an integral part of the diesel generator unit within the structural steel base rails of the equipment as shown on contract drawings. Refer to contract drawings for type of fuel and for tank capacities.
- B. Tank fluid level monitoring and alarm systems.
- C. Leak detection system.

1.2 RELATED WORK:

- A. Section 26 32 13, ENGINE GENERATORS

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 tanks, tank and piping accessories, tank fluid level monitoring and leak detection systems, fuel quality management systems.
  - 2. Manufacturers of steel tanks participate in the Quality Assurance Program of the Steel Tank Institute (STI).
  - 3. The design and size of each item of equipment provided for this project is of current production and has been in satisfactory operation on at least three installations for approximately three years. Current models of fluid level and leak detection systems with less than three years service experience are acceptable if similar previous models from the same manufacturer have at least three years service experience.
- B. Apply and install materials, equipment and specialties in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract drawings and specifications shall be referred to the Contracting Officers Representative (COR) for resolution. Provide copies of installation instructions to the COR two weeks prior to commencing installation of any item.
- C. All equipment shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components or overall assembly.

- D. Tanks and Containment Systems, Tank Level Monitoring Systems, Leak Detection Systems, Fuel Quality Management Systems: 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.
- E. Tank and piping installation contractor shall be certified as acceptable by local and state pollution control authorities.
- F. Entire installation shall conform to requirements of local and state pollution control authorities.
- G. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a safe, complete and fully operational system which conforms to contract requirements and in which no item is subject to conditions beyond its design capabilities.

#### 1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Fuel Piping:
  - 1. ASTM and UL compliance.
  - 2. Grade, class or type, schedule number.
  - 3. Manufacturer.
- C. Pipe Fittings, Unions, Flanges:
  - 1. ASTM and UL compliance.
  - 2. ASTM standards number.
  - 3. Catalog cuts.
  - 4. Pressure and temperature rating.
- D. Check Valves, Overfill Prevention Valves:
  - 1. Catalog cuts showing design and construction.
  - 2. Pressure and temperature ratings.
  - 3. Pressure loss and flow rate data.
  - 4. Materials of construction.
  - 5. Accessories.
  - 2. Layout of system.
  - 3. Installation instructions.
- E. 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.
- F. 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.
- G. Tank and Piping Accessories: Design, construction, and dimensions of vent caps, fill boxes, fill caps, spill containers and other accessories.
- 1.5 DELIVERY, STORAGE AND HANDLING:
- A. Protection of Equipment:
1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
  2. Place damaged equipment in first class, new operating condition; or, replace same as determined and directed by the RE/COTR. Such repair or replacement shall be at no additional cost to the Government.
  3. Protect new equipment and piping systems against entry of foreign matter on the inside. Clean both inside and outside before painting or placing equipment in operation.
- B. Cleanliness of Equipment and Piping:
1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
  2. Piping systems shall be flushed, blown or pigged as necessary to provide clean systems.
  3. Clean interior of all tanks prior to delivery for beneficial use by the Government.
  4. Contractor shall be fully responsible for all costs, damages and delay arising from failure to provide clean systems and equipment.

## 1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. ASTM International (ASTM):
- A36/A36M-08.....Carbon Structural Steel
  - A53/A53M-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
  - A106/A106M-10.....Seamless Carbon Steel Pipe for High Temperature Service
  - A126-04(R2009).....Gray Iron Castings for Valves, Flanges and Pipe Fittings
  - A234/A234M-10.....Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
  - B62-09.....Composition Bronze or Ounce Metal Castings
  - D2996-01(2007).....Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pipe
- C. American Society of Mechanical Engineers (ASME):
- B16.5-09.....Pipe Flanges and Flanged Fittings (NPS ½-24).
  - B16.11-09.....Forged Fittings, Socket-Welding and Threaded
  - B31.1-10.....Code for Pressure Piping, Power Piping with Current Amendments
- D. National Electrical Manufacturers Association (NEMA):
- 250-08.....Enclosures for Electrical Equipment (1000 Volts Maximum)
- E. National Fire Protection Association (NFPA):
- 30-12.....Flammable and Combustible Liquids Code
  - 31-11.....Installation of Oil Burning Equipment
  - 70-11.....National Electrical Code
- F. Underwriters Laboratories Inc. (UL):
- 58-98.....Steel Underground Tanks for Flammable and Combustible Liquids
- G. Steel Tank Institute (STI):
- F001.....Standard for Fire Resistant Tanks
  - F841.....Dual Wall Underground Steel Storage Tanks

- F894.....ACT-100 Specification for External Corrosion  
Protection of FRP Composite Steel Underground  
Storage Tanks
- F911.....Standard for Diked Aboveground Storage Tank  
System
- F941.....Standard for Fireguard Thermally Insulated  
Aboveground Storage Tanks
- F961.....ACT-100-U Specification for External Corrosion  
Protection of Composite Steel Underground  
Storage Tanks
- P3.....STI-P3 Specification and Manual for External  
Corrosion Protection of Underground Steel  
Storage Tanks
- R891.....Recommended Practice for Hold Down Strap  
Isolation
- H. NACE International (Corrosion Engineers) (NACE):
- SP0169-07.....Control of External Corrosion on Underground or  
Submerged Metallic Piping Systems
- NACE 3/SSPC-SP6-07.....Commercial Blast Cleaning
- NACE 4/SSPC-SP7-07.....Brush-off Blast Cleaning
- I. American Petroleum Institute (API):
- 1631-01.....Interior Lining and Periodic Inspection of  
Underground Storage Tanks

#### 1.7 PERMITS:

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

#### I. Pipe Connections to Tanks:

1. Conform to UL 58.
2. Pipe sizes 100 mm (4 inches) and smaller, threaded. Pipe sizes 150 mm (6 inches) and larger, raised faced slip-on flanges, 1025 kPa (150 pound) ASME rating.
3. Welded joints required on steel piping located inside tanks.
4. Provide and coordinate tank connection quantities, sizes and types with requirements of fluid level gage unit; leak detector sensor; sounding rod; vent, fill, supply and return pipes; and other pipes as shown.
5. Dielectric insulation on all connections to steel piping.

## 2.1 STEEL TANK:

- A. Type: Factory fabricated all welded steel, horizontal cylindrical configuration, atmospheric pressure, internal and external corrosion protection as specified. In addition to specified requirements, tanks shall be fabricated in accordance with Steel Tank Institute (STI) design standards by manufacturer that participates in STI Quality Assurance Program.
- B. Construction:
  - 1. ASTM A36 steel, conform to UL 142. Inner and outer tanks of double wall tanks shall both conform. Provide label of conformance.
  - 2. Conform to NFPA 30 or 31 as applicable
  - 3. Welded joints required on steel piping located inside tanks.
  - 4. Provide and coordinate tank connection quantities, sizes and types with requirements of tank level gage unit; vent, fill, supply and return pipes; and other pipes as shown.
  - 5. On double-wall tanks, provide valved drain of interstitial space.
- L. Emergency Relief Vents for Fire Exposure: Venting capacity shall conform to NFPA 30 or 31 as applicable.

## 2.6 TANK AND PIPING ACCESSORIES:

- A. Vent Caps: Galvanized cast iron or cast aluminum with brass or bronze screens, arranged to permit full venting and to prevent entry of foreign material into the vent line. Same pipe size as vent pipe.
- B. Fill Boxes:
  - 1. Spill-container type enclosing a fill cap assembly with camlock hose connector with closure coordinated with fittings used by fuel supplier.
  - 2. Watertight assembly, cylindrical body, quick-opening corrosion-resistant watertight sealable cover, polyethylene spill containment compartment with minimum 5 gallon capacity. Integral drain valve with discharge to fill pipe.
  - 3. Fill cap shall be lockable, tight-fill design with provision for padlock on the top of the cap. Fill cap shall screw onto threaded adapter that can be removed without removing fill box. Entire assembly shall seal tight with no leakage during filling and when cap is in place.
  - 4. Provide special tools necessary for opening fill boxes and fill caps.

## H.Fill Point Identification:

1. Fill Caps above Grade: Aluminum, brass or bronze plate, clamped to fill pipe, with stamped or engraved letters 18 mm (0.75 inch) high.
2. Legend: "BURNER FUEL OIL FILL" "DIESEL FUEL FILL" or "SOUNDING" as appropriate.

## 2.7 PIPING, VALVES, FITTINGS:

## A. Fuel tank fill, vents.

## B. Steel Pipe and Fittings:

1. Piping: Steel, seamless or electric resistance welded (ERW), ASTM A53 Grade B or ASTM A106 Grade B, Schedule 40. Aboveground piping shall be painted. Refer to Section 09 91 00, PAINTING.
2. Joints: Socket or butt-welded. Threaded joints not permitted except at valves, unions and tank connections.
3. Fittings:
  - a. Butt-welded joints: Steel, ASTM A234, Grade B, ASME B16.9, same schedule as adjoining pipe.
  - b. Socket-welded joints: Forged steel, ASME B16.11, 13 700 kPa (2000 psi) class.
4. Unions: Malleable iron, 2050 kPa (300 psi) class.
5. Companion flanges: Flanges and bolting, ASME B16.5.
6. Welding flanges: Weld neck, ASME B16.5, forged steel ASTM A105, 1025 kPa (150 psi).

## 2.9 LEAK DETECTION SYSTEMS:

## A. 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. Sensors shall be arranged to allow replacement of individual sensors without disturbing other portions of leak detection system or fuel storage and piping system.
3. Provide relay contacts for monitoring by both the generator control panel and fuel fill station annunciator. Provide interposing relays as necessary to provide required number of alarm and monitoring points.

## 2.10 TANK FLUID LEVEL MONITOR AND ALARM SYSTEMS:

- A. High and low level visual and audible alarms.
- B. Low level alarm actuation 50% percent of tank capacity. High level alarm actuation adjustable 90% of tank capacity.

C. Remote Alarm Annunciator:

1. Visual and audible high level alarms at generator controller and at tank fill box location.
3. Provide identification sign: "WHEN ALARM SOUNDS - FUEL TANK FILLED TO CAPACITY - DO NOT OVERFILL".

D. 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 relay contacts for monitoring by both the generator control panel and fuel fill station annunciator. Provide interposing relays as necessary to provide required number of alarm and monitoring points.

PART 3 - EXECUTION

3.1 INSTALLATION AND TESTING, UNDERGROUND STEEL TANKS:

- A. Conform to NFPA 30 or 31 as applicable.

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