

SECTION 23 13 23

ABOVE GROUND FUEL STORAGE TANKS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Above ground main tank design and product requirements.
- B. Day tank design and product requirements.
- C. Piping materials.
- D. Fittings and valves.
- E. Fuel pumps.

1.02 RELATED SECTIONS

- A. Section 01 33 00 - Submittal Procedures
- B. Section 01 33 23 - Shop Drawings, Product Data, and Samples
- C. Section 09 91 00 – Painting
- D. Section 26 32 13 – Engine Generators

1.03 MEASUREMENT AND PAYMENT

- A. General: Separate measurement or payment will not be made for the work required under this Section. All costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract..

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 30 Flammable and Combustible Liquids Code
 - 2. NFPA 54 National Fuel Gas Code
- C. Underwriters Laboratories Inc. (UL):
 - 1. UL 142 Steel Above-ground Tanks for Flammable and Combustible Liquids.
 - 2. UL 2085 Protected Above-ground Tanks for Flammable and Combustible Liquids.
- D. California Fire Code

1. Article 79 Flammable and Combustible Liquids

E. Environmental Protection Agency

1.05 SUBMITTALS

A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Submit the following:

1. Shop drawings of tanks, containment basins, level and fuel transfer controls, drains, vents and connections.
2. Layout and connection diagram showing location of all equipment, vents, grounding requirements and pipe routing.
3. Tank manufacturer's product data.
4. Certificates of Compliance: Manufacturer shall certify that tank will perform as specified.
5. Test reports.
6. Installation instructions.
7. Tank foundation, mounting and seismic anchoring calculations and details.

PART 2 - PRODUCTS

2.01 ABOVE GROUND MAIN TANK DESIGN AND PRODUCT REQUIREMENTS

- A. Manufacture fuel tank in accordance with UL 2085. Tank shall be capable of storing petroleum products with specific gravity up to 1.1 including fuel oils, specifically No. 2 diesel fuel, at temperatures up to 150 degrees F.
- B. Provide useable fuel tank volume of 90 percent. Allow 5 percent for sump volume and 5 percent for expansion. Size tank to store fuel supply for engine generator operating at full capacity 24-hour minimum plus exercising the generator for 30 minutes monthly. Refueling will be performed at six-month intervals. Provide fuel transfer pump(s) and all controls to supply the engine generator or transfer fuel to the day tank depending on design configuration.
- C. Provide fill cap with provisions to be locked closed. Provide required vents (emergency and vapor) with rainproof caps. Provide level controls and alarm to indicate fuel level. Provide rupture containment basin with 150% of tank capacity and fuel in basin alarm. Alarms to sound remotely in the electrical room.
- D. Provide stop cock and plug at tank drain. Provide isolation valve on tank discharge piping with provisions to be padlocked open.

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- E. Provide fuel distribution system in accordance with manufacturer's recommendations. Comply with recommended practices of NFPA.
- F. The internal steel tank shall pass a 5 psig pressure test for a 24-hour period at the factory.
- G. Tank(s) shall be tested in accordance with the Uniform Fire Code, Appendix IIF, Proposed Test Requirements for Protected Tanks: Standard 79-7 (including impact and ballistic tests).
- H. The internal tank shall have an emergency vent as required by the NFPA and Uniform Fire Code.
- I. The secondary containment shall be pressure tested to 15ml. Geomembrane and UL tested as a nonmetallic secondary containment, or may be steel located outside thermal physical protective material.
- J. The secondary containment shall have a 1/4 inch annular space with the capability of physical monitoring. The tube for physical monitoring shall be at least 3/4 inch internal diameter to accept leak detection cable. Physical monitoring shall be accomplished using an engineer approved leak detection system. Access to the 1/4 inch annular space shall be through a 1 inch female NPT opening.
- K. The internal steel tank shall be encased in 6 inch of concrete minimum and as required to meet impact and ballistic testing.
- L. The concrete shall be 6 inch of light-weight insulation concrete that is capable of preventing the internal tank temperature from rising more than 260 degrees F during a 2000 degrees F fire test for 2 hours.
- M. The concrete shall not contain any aggregate/pea gravel.
- N. The tank shall have an outer steel tank that protects the internal concrete tank.
- O. The concrete shall be monolithic (seamless) and contain no cold joints, or heat transfer points between the internal and external tanks.
- P. The outer steel tank shall have a 2 inch vent as required by UL 2085.
- Q. The internal and external steel tanks shall have continuous welds on all sides.
- R. The steel tank openings shall be threaded except for the leak detector tubes.
- S. The tank shall have a saddle support system that meets UBC Zone 4 seismic requirements.
- T. Tanks and appurtenances shall have an exterior factory applied prime and finish coating of epoxy paint in accordance with Section 09 91 00 - Painting.
- U. Tanks shall have warning signs to indicate FLAMMABLE, NO SMOKING, a NFPA Placard H=0, F=2, R=0 and No. 2 diesel. Provide an identical NFPA placard on the entrance gate.

2.02 DAY TANK DESIGN AND PRODUCT REQUIREMENTS

- A. Manufacture steel tank in accordance with UL 142. Tank shall be capable of storing petroleum products with specific gravity up to 1.1 including fuel oils, specifically No. 2 diesel fuel, at temperatures up to 150 degrees F.
- B. Provide useable fuel tank volume of 90 percent. Allow 5 percent for sump volume and 5 percent for expansion. Size the capacity of the day tank for a minimum of 5% of the main fuel storage tank. Provide fuel transfer pump(s) and all controls for refueling of the day tank from the main fuel storage tank.
- C. Provide level controls and alarm to indicate fuel level. Provide required vents (emergency and vapor) with rainproof caps. Provide rupture containment basin with 150% of day tank capacity and fuel in basin alarm. Alarms to sound remotely in the electrical room. Design system to avoid siphoning from one tank to the other.
- D. Provide stop cock and plug at tank drain. Provide isolation valve on tank discharge piping with provisions to be padlocked open.
- E. Provide fuel distribution system in accordance with manufacturer's recommendations. Comply with recommended practices of the Appendix of NFPA.
- F. The internal steel tank shall pass a 5 psig pressure test for a 24-hour period at the factory.
- G. Tank(s) shall be tested in accordance with the Uniform Fire Code, Appendix IIF, Proposed Test Requirements for Protected Tanks: Standard 79-7 (including impact and ballistic tests).
- H. The internal tank shall have an emergency vent as required by the NFPA and Uniform Fire Code.
- I. The secondary containment shall be steel located outside thermal physical protective material.
- J. The secondary containment shall have a 1/4 inch annular space with the capability of physical monitoring. The tube for physical monitoring shall be at least 3/4 inch internal diameter to accept leak detection cable. Physical monitoring shall be accomplished using an engineer approved leak detection system. Access to the 1/4 inch annular space shall be through a 1 inch female NPT opening.
- K. The internal and external steel tanks shall have continuous welds on all sides.
- L. The steel tank openings shall be threaded except for the leak detector tubes.
- M. The tank shall have a support system that meets UBC Zone 4 seismic requirements.
- N. Tanks and appurtenances shall have an exterior factory applied prime and finish coating of epoxy paint in accordance with Section 09 91 00 - Painting.
- O. Tanks shall have warning signs to indicate FLAMMABLE, NO SMOKING, a NFPA placard H=0, F=2, R=0 and No. 2 diesel. Provide an identical NFPA placard on the entrance gate.

2.03 PIPING MATERIALS

- A. All piping shall be ASTM A53, schedule 40 black steel pipe.
- B. All underground piping shall be encased in a continuous schedule 40 PVC sleeve with terminations designed to prevent the intrusion of water.

2.04 FITTINGS AND VALVES

- A. All fittings shall be ANSI B16.3, Class 150 banded, malleable iron, threaded. Connections between dissimilar pipe materials shall be isolated with insulating flanges, unions or gaskets as necessary.
- B. Fuel shutoff valves at the tank(s) shall be ball valves. Valves shall be brass or bronze bodied, stainless steel shaft, chrome plated or stainless steel ball with Teflon seat. Valves shall be rated at 150 psig WOG.
- C. Check valves shall be swing type, 150 psig rated, threaded, brass or bronze bodied, with removable stainless steel hinge pin and screwed cap.
- D. Pressure relief valves shall be 150 psig rated, threaded, brass or bronze bodied, and be adjustable from 20 to 100 psig.
- E. Anti-siphon valve(s): PVMC Type A, Universal 403, EBW 616-300 or equal.
- F. Provision for tank grounding shall be provided.

2.05 FUEL PUMPS

- A. Provide 120 VAC, single phase, 60 Hz, TEFC motor driven, positive displacement gear pumps. Pumps shall be suitable for exterior service. Pumps shall be rated at 150 psig, cast iron with bronze bearings, mechanical seals and built in relief valve.
- B. Pumps and appurtenances shall be mounted in type 304 stainless steel enclosures with adequate room to access and maintain the pump(s) and equipment.

2.06 FUEL LEVEL

- A. All fuel tanks shall be refueled (and full) by the contractor prior to District acceptance.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install tanks and fuel distribution system as indicated, and in accordance with NFPA 30 and the manufacturer's installation instructions.
- B. Pitch both tanks 1/4 inch per foot forward toward drain plug.

- C. Locate day tank outlet even with engine fuel pump centerline.
- D. Provide earthquake restraints on both fuel tanks.
- E. The main fuel storage tank shall be surrounded with a reinforced concrete or concrete masonry unit (CMU) wall meeting the ballistic requirements of the Uniform Fire Code.
- F. Mount fuel tank(s) and engine generator on an integral concrete slab designed to support the loads. Provide spill containment with proper drainage and drainage treatment.

3.02 FIELD QUALITY CONTROL

- A. Prior to engine generator testing, tanks and piping shall be tested in the presence of the Engineer as follows:
 - 1. Air Test: Tank(s) and associated piping shall be pressurized with air to 5 psig for a minimum of 24 hours. The tank(s), fittings, and pipings shall have no more than a 1 psig drop over a period of 24 hours. Air gage shall be calibrated in 1/4 psig increments. Temperature shall be constant during the air test.
 - 2. Soap Test: With tank(s) and associated piping pressurized at 5 psig, a 1 to 2 percent solution of household detergent in water shall be applied to exterior surface of tank with sponge or other acceptable means. Leaks revealed by bubbling of soap film shall be marked and, after tank is depressurized, repaired and retested until there are no leaks.
 - 3. After testing, tank(s) and appurtenances shall be thoroughly cleaned and dried.

END OF SECTION 23 13 23