

University of Houston Master Specification

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<Insert U of H Proj #>

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SECTION 22 5010 - FUEL OIL STORAGE TANKS

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in **bold**.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and special Conditions for Construction*.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide fuel oil storage tanks as specified, scheduled, and indicated.
- B. Types: The types of fuel oil tanks required for the project include, but are not limited to, the following:
 - 1. Underground fuel oil tanks.
 - 2. Fuel oil day tanks.

1.3 QUALITY ASSURANCE

[EDIT MANUFACTURERS TO SUIT PROJECT]

- A. Manufacturers: Provide products complying with these specifications and produced by one of the following:
 - 1. Owens/Corning Fiberglas **[FIBERGLASS]**.
 - 2. Xerxes **[FIBERGLASS]**.

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3. Modem Welding Co., Inc. **[STEEL]**.
4. Buffalo Tank **[STEEL/FIBERGLASS]**.
5. Leak-X Corporation.

B. Manufacturer's Qualifications:

1. Manufacturer of tanks to be reputable firm regularly engaged in design and manufacture of equipment specified.
2. Equipment to be substantially manufactured in manufacturer's own facilities.
3. Equipment furnished to be type that has been commercially available and in satisfactory operation for five years minimum.

C. Regulatory Requirements:

1. Tanks shall be constructed to meet or exceed applicable requirements as set forth for non-metallic underground flammable liquid storage per following:
 - a. National Fire Protection Association (NFPA):
 - 1) 30, Flammable and Combustible Liquids Code.
 - 2) 31, Standard for Installation of Oil Burning equipment.
 - 3) ASTM Standard document number D4021-81.] **[FIBERGLASS TANKS ONLY]**.
 - 4) Tanks shall be UL-certified per UL Standard 52, 142 and 1316, as applicable for storage of flammable liquids. A UL-certification plate shall be attached to each tank.
2. Tanks shall be Factory Mutual approval per FM Standard IM 7A0AF.
3. Equipment and accessories shall meet or exceed applicable federal, state and local requirements for installation and shall comply with local fire department requirements.
4. Installation shall comply with U.S. Code Title 40 of Federal EPA Clean Water Act to provide Spill Prevention Control Countermeasures, SSPC Plan, for spill catch basin in final grade and paving in proximity to fill pipes.
5. Tank construction shall comply with Federal Law (P.L.) 98-616.
6. Tank installation shall comply with the latest EPA Underground Fuel Oil Storage Act.

1.4 SUBMITTALS

A. Shop drawings submittals shall include, but not be limited to, the following:

1. Tank cut sheets with all features and accessories clearly indicated.
2. Cut sheets on tank monitoring system, including accessories, options and wiring diagrams.
3. Certification that tanks conform with all applicable current standards and requirements.

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4. Complete wiring diagrams for tank monitoring equipment.
5. Manufacturer's written tank installation instructions.
6. Additional information as required in Division 23 Sections.

PART 2 - PRODUCTS

2.1 [UNDERGROUND FIBERGLASS] [VAULT TYPE STEEL] FUEL OIL TANKS

- A. General: Provide [**reinforced polyester underground**] [**welded carbon steel**] fuel oil storage tanks with a primary (internal) tank and a secondary (external) tank. Tanks shall be suitable for [**direct burial**] [**below grade vault installation**] as shown on the Drawings.
- B. Accessories: Provide all required appurtenances for tanks, [**saddles,**] taps, manholes, fittings, fill pipes, internal risers, [**FRP anchor straps**] and monitoring fittings by tank manufacturer for each tank.
- C. Loading Conditions and Design Criteria: Each tank shall meet or exceed the following criteria:
 1. Internal Load:
 - a. Primary and secondary tanks shall withstand [**2.5**] [**5**] psi air pressure test with 5:1 safety factor at factory.
 - b. Field pressure test each tank individually again for leakage upon delivery to the site and prior to installation. Test pressures shall be [**5**] [**7**] psi.
 2. Vacuum Test: Each tank shall be mercury vacuum tested by tank manufacturer to assure structural integrity. Primary tank shall be tested to 11.5 inches and secondary tank tested to 9.5 inches mercury vacuum.
 3. Annular Space: Tank shall have a space between the primary and secondary shell walls to allow for the free flow and containment of all leaked product from the primary tank. Space shall allow insertion of a monitoring device through a monitoring fitting.
 4. Design: Tanks to be designed to support accessories and equipment of standpipes, ladders, fill pipes, manways, fittings, risers, pumps and similar accessories when installed according to manufacturer's recommendations and limitations.
 5. Venting: All tanks shall be vented, such that tanks operate at atmospheric pressure.
 6. Design tanks for products to be stored at the pressure and temperature required for the proposed installation.

[FIBERGLASS TANKS ONLY]

7. [**External Hydrostatic Pressure:**
 - a. Buried in ground with 7 feet of overburden on top of tank.
 - b. Hole fully flooded and safety factor of 7:1 against general buckling.]

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8. **[Surface Loads: When installed according to manufacturer's installation instructions, tanks shall withstand surface H-20 axle loads.]**
- D. Materials: Tanks (primary and secondary) shall be manufactured with **[100% isophthalic polyester resin and glass fiber reinforcement with no sand fillers.] [carbon steel. Tanks shall be sandblasted to a SSPC-6 finish and the outside of the primary tank and the outside and inside of the secondary tank shall be primed using the manufacturer's standard paint system.]**
- E. Certification Plate: Permanently affix Underwriters' Laboratories, Inc. label to each tank.
- F. Threaded Fittings - NPT:
 1. Threaded fittings shall be a material consistent with the requirements of the tank's UL label and shall be 4 inches in diameter half-couplings with cast iron plugs and with provisions for terminating a secondary containment system where applicable.
 2. Use reducers for smaller sizes where specified and provided with tank.
 3. All threaded fittings shall have machine tolerances in accordance with ANSI standard for each fitting size.
 4. Provide NPT fittings to withstand minimum of 150 feet/pounds of torque and 1,000 feet/pounds of bending, both with 2:1 factor of safety.
 5. Provide fittings as required for the project installation.
- G. Lifting Lugs: Provide lifting lugs on tanks capable of withstanding weight of tank with safety factor of 3:1.
- H. Manways:
 1. Provide manways as required and as detailed on the Drawings.
 2. All manways to be flanged and **[22"] [24"]** I.D. complete with UL-listed gaskets, bolts and covers.
 3. Each steel manway cover shall have three 4-inch NPT fittings welded in place, in locations as required to suit project piping.
- I. Piping Sumps:
 1. Provide piping sumps for installation above **[manways] [tank openings]** as shown on the Drawings.
 2. Piping sumps shall be **[two-piece isophthalic polyester fiberglass and drilled for bolting to manway flange.] [carbon steel and welded to the tank shell.]**

[FIBERGLASS TANKS ONLY]

3. **[Sump cover shall be an FRP manway with a steel cover, gasket and hardware.**
4. **Sump shall be provided with lifting handles, two 4-inch FRP pipe couplings, four one-inch (1") NPT couplings, gasket, mounting hardware and sensor mounting bracket.]**
- J. Ladders: Provide **[manufacturer's standard ladder inside tank at one manway] [a hot dip galvanized vault access ladder end cage]** as detailed or required.

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K. Monitoring System:

1. Provide a Leak-X or approved equal continuously monitoring leak detection system capable of detecting the presence of hydrocarbon, water or liquid in the dry annulus space of each double wall tank **[, in the tank vault sump]** and in each piping sump.
 2. The monitoring system shall be approved for intrinsic safety in hazardous locations, and shall be FM-approved or UL-listed. The equipment shall be installed in accordance with NEC, federal, state and local codes.
 3. The system shall consist of a controller designed to display the normal or dry condition of the monitored spaces and alarm with both audible and visual indications when liquid is detected by a continuous monitoring sensor. Power requirements for the controller shall be 120 volt ac, 60 Hz. Where the controller is exposed to the environment it shall have a NEMA 4 rating. The controller shall include a dry alarm output contact for remote monitoring by **[_____]**.
 4. The system annulus sensors shall be designed to be installed into the double wall tanks annulus space. The sensor shall be designed for Class I, Division I, Group D hazardous locations.
 5. The system piping sensors for the piping sump shall be designed to be installed in the tank attached manway piping sump and be capable of detecting the presence of hydrocarbon, water or other liquids that may enter the sump. The sensor shall be designed for Class I, Division I, Group D hazardous locations if required.
 6. The continuous monitoring system shall be designed to detect and alarm within 5 minutes after the sensors come into contact with the liquids being monitored.
 7. The materials supplied shall be corrosion resistant to the materials being stored and not be corrosive to the materials of construction in the **[FRP] [carbon steel]** tank. The system shall consist of a controller, sensors, connecting cables and all necessary materials needed for installation into the tank and its appurtenances.
- L. Warranty: Tanks shall be provided with the manufacturer's standard one-year materials and workmanship and 30- -year leak warranty.
- M. Monitor Fittings: Tank shall have a minimum two test monitor fittings, consisting of 4-inch NPT fittings directly above the secondary tank.

[FIBERGLASS TANKS ONLY]

- N. **[Anchor Straps: Provide fiberglass-reinforced plastic anchor straps for each tank. Number and location of straps to be as recommended by tank manufacturer and shall be capable of withstanding the installed tank buoyancy load.]**

[STEEL TANKS ONLY]

- O. **[Tank Saddles: Provided welded steel support saddles for each tank. Number and location of saddles to be as recommended by the tank manufacturer and shall be capable of supporting the installed tank load.]**

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- P. Nameplate and Labels: Affix non-corrosive nameplate showing manufacturer's name, address, identifying model number, serial number, fluid, size, capacity and other pertinent data.

2.2 [FUEL OIL DAY TANKS:]

[Insert text as required]

PART 3 - EXECUTION

3.0 INSTALLATION

- A. Install tanks and accessories in accordance with manufacturer's written installation instructions and all applicable codes, standards and regulations.
- B. Install **[pumps,] [connections,]** fittings, fill pipes and vents as detailed on the Drawings and required for each tank.
- C. Install monitoring system per manufacturer's written installation instructions. Locate monitor panel as shown on the Drawings and provide wiring in empty conduit provided by Division 26. Provide the services of a factory Service Engineer to check, start-up, calibrate and certify monitoring systems. Coordinate monitoring panel remote monitoring connections with [_____].

3.1 FIELD QUALITY CONTROL

- A. Testing: Check each individual tank system after installation for satisfactory performance and leak-free operation as recommended by the manufacturer and required by applicable current codes, standards and regulations. Minimum testing shall include pressure testing primary and secondary tanks at 5 psi with pressure gauge and soap solution on tank fittings for one hour with no detectable leakage.
- B. Certification: Certify in writing to Owner that the complete fuel oil storage tank and monitoring systems are installed in accordance with all applicable current local, state and federal codes, standards and regulations.

3.2 ADJUSTMENT AND CLEANING

- A. Clean loose resins, dirt, dust, and mandrel coatings from inside of tanks prior to filling.
- B. Verify interior of tank is dirt and dust-free prior to filling tanks.

3.3 DIESEL FUEL

- A. General: Provide all diesel fuel required for generator testing and to fill tank(s) at the time of project acceptance.

END OF SECTION 22 5010

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