

SECTION 13201

FUEL OIL SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- 1.1.1 Drawings and general provisions of Contract, including General Conditions, Conditions of Particular Application and Division-1 Specification Sections, apply to work of this section.

1.2 SUMMARY

- 1.2.1 Provide new **Underground Storage Tank (UST) systems** for monthly diesel fuel storage in accordance with the drawings, the referenced publications, and the manufacturer's written instructions, checklists, and warranty requirements for each system component. UST systems include the products, equipment and systems identified in this section.
- 1.2.2 Provide all bedding material as specified on the drawings and these specifications.
- 1.2.3 Provide all necessary piping between the underground monthly fuel storage tanks and the daily storage tanks inside the building. Work includes the necessary turbine pumps, wiring connection, control panels, filling system, etc..
- 1.2.4 Related Sections: The following sections include requirements which are related to this section:
- Division 2 Section "Earthwork" for Excavation, Demolition and Disposal, Backfilling
 - Division 3 Section "Cast – In Place Concrete"

1.3 SUBMITTALS

- 1.3.1 Product Data: Submit all catalog data and other descriptive literature to fully substantiate the conformance with specifications of equipment and materials submitted. Mark product data to indicate exactly those items that are to be provided and cross out unrelated or non applicable items. In addition, submit manufacturer's detailed installations instruction on all equipment and materials submitted.
- 1.3.2 Shop Drawings: Submit drawings for fabrication and installation of all system components. Include fully dimensioned layout of all piping, equipment and all associated connection details. Coordinate shop drawings with work of other trades.
- 1.3.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

- 1.3.4 Certificates: submit certificates signed by manufacturer certifying stress analysis related to underground fuel pipes.
- 1.3.5 Instructions: submit manufacturer's installation instructions.
- 1.3.6 Contractor shall investigate the capacity and space requirements of the proposed equipment before submitting shop drawings.
- 1.3.7 Operation and Maintenance Data: Submit in accordance with Section Contract Closeout.

1.4 **QUALITY ASSURANCE**

- 1.4.1 Installation of new tanks shall be accordance with the tank manufacturer's installation instructions and API Recommended Practice 1615, "Installation of Underground Petroleum Storage Systems".
- 1.4.2 All work and materials shall be in accordance with requirements of all applicable local codes, regulations and ordinances, the National Electrical Code, Uniform Building Code, Uniform Plumbing Code, Uniform Mechanical Code, the latest standards of the NFPA National Fire Codes, and the regulations of all other authorities having jurisdiction.
- 1.4.3 Contractor shall furnish without any extra charge any additional material and labor when required for compliance with codes, rules and regulations, even though the work may not be mentioned in the specifications or shown on the drawings.
- 1.4.4 All electrical motors, starters, controls, devices and wiring shall comply with standards of NEC and shall be UL listed and so identified.
- 1.4.5 Reference Standards and Codes:

American Petroleum Institute (API) Recommended Practices

Publication 1615	Installation of underground petroleum storage systems.
Publication 1621	Recommended practice for bulk liquid stock control at retail outlets.
Publication 1632	Cathodic protection of underground storage tanks and piping systems.

National Fire Protection Association (NFPA) Standards

Standard 30	Flammable and combustible liquids code.
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ASTM - American Society for Testing and Materials

ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated (Galvanized), Welded and Seamless.
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ASTM A 234 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

ANSI - American National Standard Institute

ANSI B1.20.1 Pipe Threads.

ANSI B16.1 Cast Iron Flanges and Flanged Fittings, Classes 25, 125, 250 and 800.

ANSI B16.3 Malleable-Iron Threaded Fittings, Classes 150 and 300.

ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.

ANSI B16.39 Threaded Pipe Unions, Malleable-Iron, Classes 150, 250 and 300.

Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.

1.5 QUALIFICATIONS

- 1.5.1 Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.
- 1.5.2 Installer: Company specializing in performing Work of this section with minimum three years' experience.

1.6 WARRANTY

- 1.6.1 Equipment specified shall be granted by the manufacturer's standard warranty for 1 year from the date of issuance of the Certificate of Substantial Completion. If within 12 months from the Date of Substantial Completion any of the equipment herein described is shown to be defective in workmanship or materials, it shall be replaced or repaired free of charge by the Contractor.

1.7 DELIVERY, STORAGE AND HANDLING,

- 1.7.1 Contractor is responsible for protection of all material, equipment, and apparatus provided from damage, water, and dust, both in storage and when installed, until

final acceptance.

- 1.7.2 Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- 1.7.3 Pipes and fittings shall be stored and protected from direct sunlight and harmful soil elements until ready for installation.
- 1.7.4 Provide storage facilities for material and equipment.
- 1.7.5 Material, equipment, or apparatus damaged because of improper storage or protection will be rejected and replaced at Contractor's expense.

1.8 COORDINATION

- 1.8.1 Coordination of Work: The Contractor shall coordinate all trades whose work is adjacent, in order to avoid field interference and delay in execution of the work of all trades. Furnish detailed advance information regarding all requirements related to work by others.
- 1.8.2 Special Requirements: Maintain emergency and service entrances usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic when required by Contracting Officer.
- 1.8.3 Schedule of Work: Arrange work to comply with schedule of construction.

PART 2 PRODUCTS

2.1 MATERIALS

- 2.1.1 Materials and apparatus shall be new and each shall have all necessary trimmings, accessories and controls required to make it functionally complete. All items of the same type shall be of the same manufacturer.

2.2 UNDERGROUND TANKS FOR STORAGE OF PETROLEUM PRODUCTS

- 2.2.1 General: Tanks shall be constructed of steel closed double wall type, welded steel, cleaned and coated with corrosion protection system. Each tank shall be provided with filling pipe connection complete with leak detection system. The underground fuel tank shall comply with UL58 for buried application and UL1746 requirements.
- 2.2.2 Corrosion protection system: For buried tanks in contact with soil; each steel tank shall be field installed with cathodic protection.
- 2.2.3 Steel tanks shall meet the provision of NFPA 30 and 31, the Uniform Fire Code Article 79 and Environmental Protection Agency requirements

2.3 Pumps

2.3.1 Submersible turbine type :

- Fuel oil pump is submersible turbine type, pump discharge head and manifold assembly are grey iron in accordance to ASTM A 98 Class 30, the pump shall be provided with check valve. Syphon check valve, leak detector, air eliminator and pressure relief valve.
- The pumps shall be controlled by level sensors in daily fuel tank and monitored from fuel oil system control panel.

2.4 TANK APPURTENANCES

2.4.1 General: Tank appurtenances shall be as shown on drawings. All appurtenances in contact with soil shall be tested and painted/coated with the same coating going on the tanks before installation.

2.4.2 Tank accessories: Fuel filling, fuel return, fuel outlet, normal vent, annular space fill / vacuum/ pressurization, level gauge, man way/ hole must be provided top mounted location.

2.4.3 For underground, double wall buried tank shall be equipped with stand-off rings and saddles.

2.4.4 Flexible Connectors:

- Flexible connectors shall conform to ANSI Z21.45.

2.4.5 Valves

- Valves shall be of iron body plug type conforming to API 6D, including air seat test.

2.4.6 Overfill prevention device:

- Anodized aluminum body.
- Teflon vertical slide float design protected by shroud.
- Viton main poppet seal.
- Install for shut-off at 90% tank capacity.

2.4.7 Level Indicator System

- Each underground tank shall be provided with a suitable level indicator system.

2.5 DOUBLE-CONTAINMENT PIPE AND FITTINGS

2.5.1 Double-Containment Piping:

- Carrier pipe material must be compatible with fluids transported:

- Carbon Steel Piping: Supply and return shall be standard weight carbon steel, ASTM A-53, Grade B, Schedule 40 seamless pipe. with 12 m or 6 m lengths.
- Joints: Shall be butt welded for sizes 2½ inches and greater, and socket or butt welded for 2 inches and below.
- Secondary Containment: enclose the fuel supply, return and fill pipes in factory-engineered and fabricated secondary containment conduit systems. The systems shall be complete with end seals, with 25 mm (1.0 inches) minimum continuous annular space, 37 mm (1.5 inches) between carrier pipes, which shall contain all leakage and which has provisions for leak detection system as specified.
- Steel Conduit with Fiberglass Reinforced Plastic (FRP) Coating:
 - Piping: Carbon steel pipe, ASTM A53, Grade B, Schedule 40.
 - Coating: Blast clean exterior .Apply fiberglass reinforced polyester (FRP) external cladding at least 2.5 mm (0.10 inches) thick with ultra-violet inhibitor.
 - Joints: Shall be butt welded for all sizes.

2.6 LEAK-DETECTION AND MONITORING SYSTEM

- 2.6.1 Cable and Sensor System: Comply with UL 1238.
- 2.6.2 Basis-of-Design Product: Subject to compliance with requirements, Visual and audible alarms must be used as part of leak-detection system.
- 2.6.3 Calibrated, leak-detection and monitoring system with probes and other sensors and remote alarm panel for fuel-oil storage tanks and fuel-oil piping.
- 2.6.4 Include fittings and devices required for testing.
- 2.6.5 Controls: Electrical operation.
- 2.6.6 Remote Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overflow alarm. Include volume range that covers fuel-oil storage capacity.

PART 3 EXECUTION

3.1 INSTALLATION

- 3.1.1 Install new UST systems in accordance with the drawings, the referenced publications and the manufacturer's written instructions, checklists, and warranty requirements for each system component.
- 3.1.2 Underground tanks shall be buried, Installed inside a concrete room as per indicated in the drawings. The level of the backfill shall not exceed 1.5 meters above the tank surface. If the depth exceeds the specified level, additional

supports must be added and thickness of the tank shall be increased to withstand soil pressure as per UL requirement. Install tank leak-detection and monitoring devices.

3.2 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION

3.2.1 Install leak-detection and monitoring system. Install alarm panel inside building where indicated.

3.2.2 Double-Wall, Fuel-Oil Storage Tanks: Install probes in interstitial space.

3.2.3 Double-Containment, Fuel-Oil Piping: Install leak-detection sensor cable in interstitial space of double-containment piping.

3.2.4 Test leak-detection and monitoring system for accuracy by manually operating sensors and checking against alarm panel indication.

3.3 TANK TESTING

3.3.1 Perform aboveground air tests in accordance with the tank manufacturer's written instructions. Do not apply a high air pressure line directly to the interstitial space of the double wall tank at any time.

3.4 PIPE TESTING

3.4.1 Perform a pipe tightness test in accordance with API 1615, using compressed air and a soap solution.

3.5 DEMONSTRATION

3.5.1 Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain liquid-level, leak-detection and monitoring systems, fuel-oil pumps.

END OF SECTION 13201