SECTION 221323 - ABOVEGROUND FUEL-OIL STORAGE TANKS

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.

1.2 SUMMARY

A. Section Includes:
   1. Insulated, steel, fuel-oil ASTs.

1.3 DEFINITIONS

A. AST: Aboveground storage tank.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, and dimensions of individual components and profiles.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
   3. Fuel-oil storage tank accessories.

B. Shop Drawings:

   1. Include plans, elevations, sections, and ballast pads and anchors, and lifting or supporting points.
   2. Indicate dimensions, components, and location and size of each field connection.
   3. Shop Drawing Scale: 1/4 inch per foot.

1.5 INFORMATIONAL SUBMITTALS

A. Site Survey: Plans, drawn to scale, on which fuel-oil storage tanks are shown and coordinated with other services and utilities.

B. Qualification Data: For qualified professional engineer.

C. Brazing certificates.

D. Welding certificates.

E. Field quality-control reports.

F. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuel-oil equipment and accessories to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. EPA Compliance: Comply with EPA and state and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks.

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

C. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:
1. Horizontal, Double-Wall Steel ASTs: UL 142, STI F921, and STI R931

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of fuel-oil storage tanks that fail in materials or workmanship within specified warranty period.

1. Storage Tanks:

a. Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding 150 deg F:

1) Structural failures including cracking, breakup, and collapse.
2) Corrosion failure including external and internal corrosion of steel tanks.

b. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Factory-installed support attachments for AST shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

B. Tank shall comply with the latest edition of National Fire Protection Association NFPA 30 Flammable and Combustible Liquids Code. The tank system shall also meet or exceed the requirements of:
1. National Fire Protection Association NFPA 30A Automobile And Marine Service Station Code
2. 1997 Uniform Fire Code (UFC) "Protected" AST criteria as per Appendix II-F, including ballistics protection
3. California Air Resources Board (CARB) testing requirements for air emissions
4. International Fire Code

2.2 INSULATED, STEEL, FUEL-OIL AST

A. Manufacturers: shall be Highland Tank. Other manufactures and substitution shall be subject review and approval by the engineer.

1. ConVault, Inc.
2. Highland Tank & Manufacturing Company, Inc.
3. Steel Tank and Fabricating.

B. Description: UL 142, UL 2085, and STI F941, thermally insulated and fire-resistant, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and insulation and with interstitial space.

C. Construction: Fabricated with welded, carbon steel and insulation; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with test temperature according to UL 2085. Tank shall be of double-wall construction and provide complete secondary containment of the primary storage tank’s contents by an impervious steel outer wall. Inner and outer tanks shall be manufactured in accordance with UL-142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids as referenced in UL-2085. Tank shall be fabricated of mild carbon steel with shell seams of continuous lap weld construction.

D. A minimum of 3" of porous, lightweight monolithic thermal insulation material shall be installed at the factory within the interstitial space between the inner and outer wall. Thermal insulating material:
1. Shall be in accordance with American Society of Testing Materials (ASTM) Standards C-332 and C-495.
2. Shall allow liquid to migrate through it to the monitoring point.
3. Shall not be exposed to weathering and shall be protected by the steel secondary containment outer wall (an exterior concrete wall or vault exposed to the elements will NOT be permitted).

E. Each tank shall be delivered as a complete UL-listed assembly including the following fittings and components: (All fittings NPT or flanged, shall be supplied with plastic protectors for shipment)

F. Standard tanks shall include, at a minimum, fittings for normal vent, interstitial monitoring, emergency vent for primary tank, emergency vent for secondary tank, product fill, product pump/supply and liquid level gauge. See standard drawings at www.highlandtank.com for quantity, size and location of fittings on standard tanks. All fittings must be located above the maximum fluid level per UL-2085 / STI Fireguard requirements. Normal vent sizes are equal to, or larger than largest fitting to be used for fill or withdraw from the tank. Emergency vent size is based on the wetted surface area of the tank.

G. Tank shall be manufactured, tested and labeled in conformance with Underwriters Laboratories UL-2085 Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids, Double-wall Construction. Tank shall be manufactured and labeled in strict accordance with Steel Tank Institute (STI) Fireguard® Thermally Insulated, Double-wall Steel Aboveground Storage Tank standards as applied by a licensee of the STI. Tank shall be subject to the STI's Quality Assurance program and shall be backed by the STI 30-year limited warranty.

H. Inner (primary) and outer (secondary) tanks shall be fabricated from mild carbon steel with flat-flanged heads, and lap-welds at all seams and joints. Primary and secondary tanks are air tested at the factory. (Primary tank may need to be retested for tightness at the jobsite prior to commissioning. Consult AHJ for requirements.) Tank shall be supplied with emergency vents for the primary and the secondary containment tanks. Emergency venting by "form of construction" is not equal and will NOT be permitted.

I. Capacities and Characteristics: refer to the plans and equipment notes.

1. Manholes:

a. Number Required: 1.
b. Diameter: 22".

2. Fuel-Oil Grade Number: low sulfur Diesel.
3. Nominal Capacity: 15000-gallons, as indicated on drawing.
4. Nominal Tank Dimensions: Diameter Length
5. Primary Tank: 10-feet, 0-inches 25-feet, 6-inches
6. Secondary Tank: 10-feet, 6-inches 26-feet, 1-inches
7. Minimum Steel Thickness: Head Shell
8. Primary Tank: 5/16-inch 1/4-inch
9. Secondary Tank: 5/16-inch 1/4-inch

2.3 SHOP PAINTING OF AST

A. The exterior steel surface of AST and tank supports preparation: Grit blast - SSPC-SP-6 White Blast.

B. Finish: White urethane paint system 5-7 DFT on the shell and heads

2.4 FUEL-OIL AST ACCESSORIES AND OPTIONAL EQUIPMENT

A. Tank Manholes: 22-inch-minimum diameter; bolted, flanged, and gasketed.

B. Threaded pipe connection fittings on top of tank, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.

C. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.

D. Lifting Lugs: For handling and installation.

E. Ladders: Carbon-steel ladder inside tank, anchored to top and bottom, and located as indicated. Include reinforcement of tank at bottom of ladder.

F. Supply Tube: Extension of supply piping fitting into tank, terminating 6 inches above tank bottom and cut at a 45-degree angle.

G. Sounding and Gage Tubes: Extension of fitting into tank, terminating 6 inches above tank bottom and cut at a 45-degree angle.

H. Two (2) Welded-on Saddles – factory primed and painted. Design, size and location determined per STI specifications.

I. 10-gallon Spill/Overfill Container.

J. HTLP 1.5” Interstitial Float Switch Sensor for leak detection (Requires HTSC 2″ Pipe Cap)

K. HTF-1 Float Switch Interface Stem Sensor for overfill detection.

L. Electronic Alarm Panel. Channel quantity.

M. High-LINK FuelShield®, Fuel Management System.

N. Additional High-LINK Magnetostrictive probe.

2.5 LIQUID-LEVEL GAGE SYSTEM

A. Manufacturers: Subject to review and approval by the Engineer, provide products by one of the following:

1. Franklin Fueling Systems.
2. Highland Tank & Manufacturing Company, Inc.
3. Omni Tech.
4. Pneumercator Inc.

B. Description: Calibrated liquid-level gage system complying with UL 180 with floats UL 1238 with probes or other sensors and remote annunciator panel.

C. Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms; fuel indicator with registration in gallons; and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.

2.6 LEAK-DETECTION AND MONITORING SYSTEM

A. Cable and Sensor System: Comply with UL 1238.

1. Manufacturers: Subject to review and approval by the engineer, provide products by one of the following:

   a. Franklin Fueling Systems.
   b. Highland Tank & Manufacturing Company, Inc.
   c. Pneumercator Inc.

2. Calibrated leak-detection and monitoring system with probes and other sensors and remote alarm panel for fuel-oil storage tanks and fuel-oil piping.
3. Include fittings and devices required for testing.
4. Controls: Electrical, operating on 120-V ac.
5. Calibrated liquid-level gage complying with UL 180 with floats UL 1238 with probes or other sensors and remote annunciator panel.
6. Remote Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms; fuel indicator with registration in gallons and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
7. Controls: Electrical, operating on 120V ac. And shall include the following:
   a. One (1) Magnetostrictive probe for continuous monitoring of product and water levels, and product temperature (provides temperature-compensated volume monitoring).
   b. Probe Specs:
      1) Probe length: (contractor to verify in field before ordering)
      2) Communication cable (contractor to coordinate length required)
      3) RS-485 Communication
         a) 2 floats – (1) for product level, (1) for water level
         b) Thermocouple for product temperature measurement
         c) Measuring accuracy up to +/- 0.02″
         d) Resolution +/- .004″
         e) 316 Stainless Steel Shaft
         f) Polypropylene float material
         g) Explosion-proof head
         h) ¾" compression fitting
         i) ¾" x 2” NPT reducer bushing supplied (min 2″ opening required)

2.7 FUEL OIL

A. Diesel Fuel Oil: ASTM D975, Grade Low Sulfur Grade No. 2-D, general purpose, high volatility.

2.8 SOURCE QUALITY CONTROL

A. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:
   1. Horizontal, Double-Wall Steel ASTs: UL 142, STI F921, and STI R931.
   2.

B. Affix standards organization's code stamp.

2.9 LADDER AND ACCESS PLATFORM

A. Ladders, platforms and walkways shall be designed to comply with strict OSHA regulations. Carbon steel fabrication with a painted finish standard yellow finish. Mounting brackets and other structural accommodations as necessary and required shall be provided and shall be factory-fitted to facilitate field installation. Interior access ladders require a properly sized access manway for safety clearance. Standard or caged external access ladders shall be designed for access to the tank top, fill port, manways or tank appurtenances. Handrails and provisions for anchoring to a support pad are also included steel “subway grating walking with railing shall be provided. Railing shall be fixed type steel pipe railing on the outside and removable chain rail on the inside. (tank side)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for aboveground fuel-oil storage tanks to verify actual locations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUEL-OIL AST INSTALLATION

A. Install tank bases and supports.

B. Concrete Bases: Anchor AST to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use 3000-psig, 28-day, compressive-strength concrete and reinforcement as specified in Section 033000 "Cast-in-Place Concrete."

C. Connect piping and vent fittings.

D. Install ground connections.

E. Install tank leak-detection and monitoring devices.

F. Install steel ASTs according to STI R912.

G. Install insulated and concrete-vaulted, steel ASTs according to STI R942.

H. Fill storage tanks with fuel oil.

3.3 LIQUID-LEVEL GAGE SYSTEM INSTALLATION

A. Install liquid-level gage system. Install panel inside building where indicated.

3.4 LEAK-DETECTION AND MONITORING SYSTEM INSTALLATION

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

1. Double-Wall, Fuel-Oil Storage Tanks: Install probes or use factory-installed integral probes in interstitial space.
2. Double-Containment, Fuel-Oil Piping: Install leak-detection sensor probes in fuel-oil storage tank containment sumps and at low points in piping cable probes in interstitial space of double-containment piping.
3. Install liquid-level gage.

3.5 LABELING AND IDENTIFYING

A. Nameplates, pipe identification, and signs are specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.6 FIELD PAINTING OF AST

A. Prepare and touch up damaged exterior surface of AST and supports as specified in "Shop Painting of AST" Article.

B. FIELD QUALITY CONTROL

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Tanks: Minimum hydrostatic or compressed-air test pressures for fuel-oil storage tanks that have not been factory tested and do not bear the ASME code stamp or a listing mark acceptable to authorities having jurisdiction:
   a. Double-Wall Tanks:
      1) Inner Tanks: Minimum 3 psig and maximum 5 psig.

2) Interstitial Space: Minimum 3 psig and maximum 5 psig, or 5.3-in. Hg vacuum.

b. Where vertical height of fill and vent pipes is such that the static head imposed on the bottom of the tank is greater than 10 psig, hydrostatically test the tank and fill and vent pipes to a pressure equal to the static head thus imposed.

c. Maintain the test pressure for one hour.

E. ASTs will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 231323