

SECTION 231113 - FACILITY FUEL-OIL PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and pipe fittings.
- B. Valves.
- C. Fuel oil storage tanks.
- D. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 312316 - Excavation.
- B. Section 312323 - Fill.
- C. Section 312316.13 - Trenching.
- D. Section 099123 - Interior Painting.
- E. Section 230553 - Identification for HVAC Piping and Equipment.

1.3 REFERENCE STANDARDS

- A. API Std 650 - Welded Steel Tanks for Oil Storage; American Petroleum Institute; 2009.
- B. API RP 1615 - Installation of Underground Petroleum Storage Systems; American Petroleum Institute; 1996 (Reapproved 2001).
- C. API RP 1632 - Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems; American Petroleum Institute; 1996 (Reapproved 2002).
- D. API Std 2000 - Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated; American Petroleum Institute; 2009.
- E. ASME (BPV) - Boiler and Pressure Vessel Code; The American Society of Mechanical Engineers; 2007.
- F. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers; 2007.
- G. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).

- H. ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005) (ANSI B16.18).
- I. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- J. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; The American Society of Mechanical Engineers; 2006.
- K. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2007 (ANSI/ASME B31.1).
- L. ASME B31.4 - Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids; The American Society of Mechanical Engineers; 2006.
- M. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).
- N. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers; 2004.
- O. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2007.
- P. ASTM A 234/A 234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2007.
- Q. ASTM B32 - Standard Specification for Solder Metal; 2008.
- R. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- S. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2005.
- T. ASTM D2310 - Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe; 2006.
- U. ASTM D2996 - Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe; 2001 (Reapproved 2007).
- V. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2004 and errata.

- W. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2005 (ANSI/AWWA C105/A21.5).
- X. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2008.
- Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 1996.
- Z. NACE SP0169 - Control of External Corrosion on Underground or Submerged Metallic Piping Systems; NACE International; 2007.
- AA. NACE RP0285 - Corrosion Control of Underground Storage Tank Systems by Cathodic Protection; NACE International; 2002.
- AB. NFPA 30 - Flammable and Combustible Liquids Code; National Fire Protection Association; 2008.
- AC. NFPA 31 - Standard for the Installation of Oil Burning Equipment; National Fire Protection Association; 2006.
- AD. STI STI-P3 - Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks; Steel Tank Institute; 2007.
- AE. UL 58 - Steel Underground Tanks for Flammable and Combustible Liquids; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- AF. UL 80 - Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- AG. UL 142 - Steel Aboveground Tanks for Flammable and Combustible Liquids; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate tanks, system layout, pipe sizes, location, and elevations. For fuel oil tanks, indicate dimensions and accessories including manholes and hold down straps.
- D. Certificates: Certify that products meet or exceed specified requirements.
- E. Project Record Documents: Record actual locations of piping system, storage tanks, and system components.

- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Valve Repacking Kits: One for each type and size of valve.

1.5 QUALITY ASSURANCE

- A. Welding Materials and Procedures: Conform to ASME (BPV) Code.
- B. Welders Certification: In accordance with ASME (BPV IX).
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- D. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of experience and approved by manufacturer.
- E. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable regulations for installation of fuel oil system.
- B. Conform to ASME B31.1 for installation of fuel oil piping.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of fuel oil system.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for tanks.

PART 2 PRODUCTS

2.1 BURIED PIPING

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASTM B16.22 wrought copper or bronze.
 - 2. Joints: ASTM B 32, alloy Sn95 solder.
- B. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M, wrought carbon steel or alloy steel welding type.
 - 2. Joints: ASME B31.1 welded.
 - 3. Jacket: AWWA C105/A21.5 polyethylene or double layer, half-lapped 10 mil (0.25 mm) polyethylene tape.

2.2 ABOVE GROUND PIPING

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.
- B. Steel Pipe: ASTM A53/A53M or ASME B36.10M, Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought carbon steel or alloy steel welding type.
 - 2. Joints: NFPA 30, threaded or welded to ASME B31.1.

2.3 UNDERGROUND PIPING CONTAINMENT SYSTEM

- A. RTR Pipe: ASTM D2310 and ASTM D2996, UL listed filament wound fiberglass reinforced epoxy pipe with integral epoxy liner and exterior coating.
 - 1. Fittings: Two piece, compression molded, filament wound fiberglass reinforced epoxy, mechanically joined.

2.4 PIPE HANGERS AND SUPPORTS

- A. Conform to NFPA 31.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (15 to 40 mm): Malleable iron, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

- E. Wall Support for Pipe Sizes to 3 Inches (80 mm): Cast iron hook.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.5 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches (50 mm) and Under:
 - 1. Ferrous pipe: 150 psi (1034 kPa) malleable iron threaded unions.
 - 2. Copper tube: 150 psi (1034 kPa) bronze unions with brazed joints.

2.6 GATE VALVES

- A. Manufacturers:
 - 1. Conbraco Industries: www.conbraco.com.
 - 2. Nibco, Inc: www.nibco.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.

2.7 GLOBE VALVES

- A. Manufacturers:
 - 1. Conbraco Industries: www.conbraco.com.
 - 2. Nibco, Inc: www.nibco.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder ends.

2.8 BALL VALVES

- A. Manufacturers:
 - 1. Conbraco Industries: www.conbraco.com.
 - 2. Nibco, Inc: www.nibco.com.

3. Milwaukee Valve Company: www.milwaukeevalve.com.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. MSS SP-110, Class 150, 400 psi CWP (Class 150, 2760 kPa CWP), bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder.

2.9 SWING CHECK VALVES

- A. Manufacturers:
1. Hammond Valve: www.hammondvalve.com.
 2. Nibco, Inc: www.nibco.com.
 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. MSS SP-80, Class 125, bronze body and cap, bronze swing disc, solder ends.

2.10 RELIEF VALVES

- A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
 2. ITT McDonnell & Miller: www.mcdonnellmiller.com.
 3. Spirax-Sarco: www.spiraxsarco.com.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated at maximum 60 psi (400 kPa), UL listed for fuel oil, capacities ASME certified and labelled.

2.11 STRAINERS

- A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
 2. Viking:
 3. Substitutions: See Section 016000 - Product Requirements.
- B. Threaded brass body for 175 psi (1200 kPa) CWP, Y pattern with 1/32 inch (0.8 mm) stainless steel perforated screen.

2.12 FLEXIBLE CONNECTORS

- A. Manufacturers:

1. Flexicraft Industries: www.flexicraft.com.
2. Substitutions: See Section 016000 - Product Requirements.

2.13 UNDERGROUND FUEL STORAGE TANKS

- A. Manufacturers:
 1. Highland:
 2. Xerxes Corporation: www.xerxescorp.com.
 3. Substitutions: See Section 016000 - Product Requirements.
- B. Tank: Heavy gage welded steel, API 650, UL listed and labelled, closed single wall type, coated with corrosion-resistant asphalt base paint; with anchor straps and attachments, fittings, lifting lugs, and tappings for accessories.
- C. Filler Cap: 3 inch (75 mm) watertight brass with lock, recessed box and cover.
- D. Gage: Remote reading, electronic, for two wire, 24 volt power, with wall mounted direct reading gage.
- E. Cathodic Protection: API RP 1632, Galvanic type with sacrificial magnesium anodes welded to tank, to NACE RP0285.

2.14 ABOVEGROUND FUEL STORAGE TANKS

- A. Manufacturers:
 1. Highland:
 2. Convault, Inc: www.convault.com.
 3. Substitutions: See Section 016000 - Product Requirements.
- B. Tank: UL 80, welded steel, oval with steel support saddles, tappings for accessories, threaded connections.
- C. Accessories: Tank fill, gage, vent, and outlet connections.
- D. Gage: Remote reading, electronic, for two wire, 24 volt power, with wall mounted direct reading gage.

2.15 FUEL OIL PUMPS

- A. Manufacturers:
 1. Simplex, Inc: www.simplexdirect.com.
 2. Viking Pump, Inc: www.vikingpump.com.
 3. Substitutions: See Section 016000 - Product Requirements.

- B. Casing: Cast Iron, rated for 150 psi working pressure.
- C. Impeller: positive displacement.
- D. Drive: Direct connected with flexible coupling.
- E. Accessories: integral relief valve, NEMA standard motor, couplings, coupling guards, reducer, and mechanical seal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, are dry, and have not been over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Excavate in accordance with Section 31 2316 for work of this section.
- E. Backfill in accordance with Section 31 2323 for work of this section.

3.3 PIPING INSTALLATION

- A. Install in accordance with manufacturer's instructions and AP1 RP 1615.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install to NACE RP0169.
- C. Route piping in orderly manner and maintain gradient.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.

- H. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 099000.
- I. Identify piping systems including underground piping. Refer to Section 230553.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.4 FUEL TANK INSTALLATION

- A. Install tanks in accordance with manufacturer's instructions and API RP 1615.
- B. Clean and flush underground tanks prior to delivery to site. Seal until pipe connections are made.
- C. Install underground tanks on concrete ballast pad with mass equal to tank capacity, and secure with hold-down straps and turnbuckles.
- D. Install underground tanks with minimum 24 inches (600 mm) cover.
- E. Backfill steel tanks in accordance with NFPA 30 and 31.
- F. Backfill glass fiber tanks with sand. Do not bed on timbers, beams, or cradles.
- G. Provide piping connections to tanks with unions and swing joints. Provide venting to API 2000.
- H. Extend fill line and cover to grade and provide minimum 24 x 24 x 6 inch (600 x 600 x 150 mm) concrete pad.
- I. Mount aboveground tanks on steel support saddles and stands as indicated.
- J. Clean and flush day tank prior to delivery to site. Seal until pipe connections are made.

END OF SECTION