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**PART 1 GENERAL**

**1.1 SUMMARY**

- .1 Section includes:
  - .1 Materials and installation for light fuel oil piping from oil tanks to engines.

**1.2 RELATED SECTIONS**

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 23 05 05 – Installation of Pipework.
- .3 Section 33 56 13 – Aboveground Fuel Storage Tanks.

**1.3 REFERENCES**

- .1 American Society of Mechanical Engineers (ASME)
  - .1 ASME-B16.3, Malleable-Iron Threaded Fittings.
  - .2 ASME-B16.9, Factory-Made Wrought Steel Butt welding Fittings.
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
  - .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
  - .3 ASTM B61, Standard Specification for Steam or Valve Bronze Castings.
  - .4 ASTM B75M, Standard Specification for Seamless Copper Tube.
- .3 Canadian Standards Association (CSA)
  - .1 CAN/CSA-B139, Installation Code for Oil Burning Equipment.
  - .2 CAN/CSA-B140.0, General Requirements for Oil Burning Equipment.
- .4 Health Canada/Workplace Hazardous Materials Information Systems
  - .1 Material Safety Data Sheets (MSDS)
- .5 Manufacturers Standardization Society of the Valve and Fitting Industry (MSS)
  - .1 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

**1.4 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures
- .2 Product Data

- .1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.
  - .1 Indicate on manufacturer's catalogue literature the following: valves
- .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.

## **1.5 QUALITY ASSURANCE**

- .1 Pre-Installation Meeting:
  - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
  - .2 Trades people to have journey person qualifications.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Waste Management and Disposal:
  - .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
  - .2 Place materials defined as hazardous or toxic in designated containers.
  - .3 Handle and dispose of hazardous materials in accordance with Canadian Environmental Protection Act (CEPA), Transportation of Dangerous Goods Act (TDGA), Regional and Municipal regulations.
  - .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
  - .5 Unused paint, coating materials must be disposed of at official hazardous material collection site as approved by Departmental Representative.
  - .6 Unused sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

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## **PART 2 PRODUCTS**

### **2.1 FILL, VENT AND CARRIER PIPE (ABOVE GROUND)**

- .1 Steel: to ASTM A53/A53M, Schedule 40, continuous weld or electric resistance welded, screwed.
- .2 Copper: type K, soft copper tubing, to ASTM B75M, in continuous lengths.

### **2.2 STEEL PIPE COATING**

- .1 Bituminous paint: in accordance with manufacturer's recommendations for exterior above ground or galvanized.

### **2.3 JOINTING MATERIAL**

- .1 Screwed fittings: Teflon or pulverized lead paste. In accordance with manufacturers recommendations.
- .2 Soldered fittings: 95/5.

### **2.4 FITTINGS**

- .1 Steel:
  - .1 Malleable iron: screwed, banded, Class 150 to ASME-B16.3.
  - .2 Welding: butt-welding to ASME-B16.9.
  - .3 Unions: malleable iron, brass to iron, ground seat, screwed, to ASTM A47/A47M.
  - .4 Nipples: Schedule 40, to ASTM A53/A53M.
- .2 Copper:
  - .1 Piping: soldered type.
  - .2 Connections to equipment: flared.

### **2.5 GATE VALVES**

- .1 NPS 2 and under, screwed bonnet:
  - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, solid wedge disc as specified under Section 23 05 23.01 – Valves - Bronze.

### **2.6 GLOBE VALVES**

- .1 NPS 2 and under, screwed:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, screwed over bonnet, renewable bronze disc as specified under Section 23 05 23.01 – Valves – Bronze.

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**2.7 BALL VALVES**

- .1 NPS 2 and under:
  - .1 Bronze body, screwed ends, TFE seal, hard chrome ball, 4 MPa, WOG as specified under Section 23 05 23.01 – Valves - Bronze.

**2.8 SWING CHECK VALVES**

- .1 NPS 2 and under, screwed:
  - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc suitable for oil service, screw in cap, regrindable seat as specified under Section 23 05 23.01 – Valves - Bronze

**2.9 OIL FILTER**

- .1 Duplex type replaceable cartridge type as recommended by oil burner manufacturer.
- .2 Furnish spare filter cartridge.

**2.10 ANTI-SIPHON VALVE**

- .1 Each tank: Automatic shut-off to prevent spillage in the event of line rupture, cast or ductile iron body, adjustable hydrostatic pressure, brass trim, corrosion-resistant steel spring, fluorocarbon seal, sized for application, built-in thermal expansion pressure relief valve.

**2.11 FUSIBLE VALVE**

- .1 Gate or globe type, gate type preferred, with spring and replaceable fusible element at 74°C, also manually operable.

**2.12 FOOT VALVES**

- .1 Provide and install on the tank suction stub a double poppet foot valve of bronze construction, with lapped-in seats, stem guided poppets and 20 mesh monel screen. At the tank suction stub exit install a foot valve extractor.

**2.13 DIESEL FILTRATION SYSTEM**

- .1 Factory Assembled Fuel Filtration Management System
  - .1 Skid or frame mounted complete system to filter distillate fuel on a timed cycle to maintain CSA C282 fuel requirements.
  - .2 Unit to have control panel for motor control, system status, alarm indication, and capable to be integrated with a building ECMS.
  - .3 NEMA 1 rated enclosure complete with lifting points.
  - .4 All panels to be CSA Certified.
- .2 Pump and Motor Assembly

- .1 Base mounted, TEFC motor, displacement pump, suitable for continuous heavy duty service.
- .2 Capacity: 0.6 L/s of ULSD fuel.
- .3 Motor 120V, 1 ph, 60 Hz, 1750 RPM, 20 Amp.
- .3 Filtration System
  - .1 Stainless steel canister(s) capable of housing different media sizes.
  - .2 Replaceable filter elements.
  - .3 Extract water to 0.009% volume/volume.
  - .4 Particle removal: 0.2 microns.
  - .5 Suitable for No. 2 fuel and diesel.
- .4 Internal Piping
  - .1 ASTM A240 Grade 316 stainless steel, socket welded joints, to ASME B16.11.
  - .2 Flexible braided stainless steel at pump connections with ULC/CSA Certification.
- .5 Controller
  - .1 Programmable Logic Controller (PLC) for automatic program control.
  - .2 Automatic start and run times.
  - .3 Protected against unauthorized use.
  - .4 Local split detection alarm.
  - .5 Local water removal.
  - .6 Local and transmitted differential pressure indication to building ECMS.
  - .7 All alarms visible from PLC display.
- .6 Additional Accessories
  - .1 Drip tray.
  - .2 Pressure transmitters.
  - .3 Switch over valves.
  - .4 Pressure gauges.

## **PART 3 EXECUTION**

### **3.1 PIPING**

- .1 Install oil piping system in accordance with CAN/CSA-B139 and CAN/CSA-B140.0.
- .2 Slope piping down in direction of storage tank unless otherwise indicated.
- .3 Suction and return piping inside building (above ground):
  - .1 Steel, with screwed fittings in trench below floor or run on floor protected by 6 mm checkered aluminum plate cover in traffic areas.

- .2 Install filter and gate valve at burners.
- .3 Where suction line enters building, install union, gate valve, anti-syphon device and cap (for priming purposes).
- .4 Fill, vent, suction and return outside building: (above ground).
  - .1 Steel piping welded throughout except at tanks where use electrically isolating fittings.
  - .2 Grading: slope piping at 1% minimum back to tanks.
- .5 Install suction and return buried piping in outer casings in accordance with provincial regulations and Section 33 56 13 – Aboveground Fuel Storage Tanks.
- .6 Piping at tanks:
  - .1 Suction: terminate 150 mm from bottom of tank with foot valve.
  - .2 Return: terminate 100 mm from bottom of tank with return bend.
  - .3 Vent: vent whistle. Terminate open end 3600 mm above grade with return bend, vent alarm and removable 10 mesh copper screen.
  - .4 Fill: terminate as indicated with liquid-tight and vapourproof cover and locking cap, chain and padlock.
  - .5 Dipstick: extend tube to within 150 mm from bottom of tank. Terminate at grade with cap and chain and watertight cover.
- .7 Interconnections between tanks:
  - .1 Interconnect fill, vent, suction, and tank bottoms.
  - .2 Valve to permit isolation of tanks without interfering with use of other tanks.

### **3.2 VALVES**

- .1 Install valves with stems upright or horizontal unless approved otherwise by Departmental Representative.
- .2 Install ball valves at branch take-offs, to isolate pieces of equipment and as indicated.
- .3 Install globe valves for balancing and in by-pass around control valves.
- .4 Install swing check valves on discharge of pumps and as indicated.

### **3.3 OIL FILTERS**

- .1 Install as indicated
- .2 At time of Substantial Completion, replace filter cartridge with new.

### **3.4 DIESEL FILTRATION SYSTEM**

- .1 Installed and commissioned by manufacturer's representative.

- .2 Manufacturer's representative to provide 8 hours of training to staff on system.
- .3 Locate in generator room, refer to electrical drawings for exact location

### **3.5 OVERFILL AND SPILL PROTECTION**

- .1 See Section 33 56 13 – Aboveground Fuel Storage Tanks.

### **3.6 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspection:
  - .1 Test system in accordance with CSA-B139 and CSA-B140.0 and authorities having jurisdiction.
  - .2 Isolate tanks from piping pressure tests.
  - .3 Maintain test pressure during backfilling.

### **3.7 CLEANING AND START-UP**

- .1 Flush after pressure test with number 2 fuel oil for a minimum of two hours. Clean strainers and filters.
- .2 Dispose of fuel oil used for flushing out in accordance with requirements of authority having jurisdiction.
- .3 Check vents from regulators, control valves are terminated in approved location and are protected against blockage and damage.
- .4 Check entire installation is approved by authority having jurisdiction.
- .5 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**