

## 1 General

### 1.1 REFERENCES

- .1 American National Standards Institute (ANSI).
  - .1 ANSI/NFPA-329, Handling Underground Releases of Flammable and Combustible Liquids.
  - .2 ANSI/API 650, Welded Steel Tanks for Oil Storage.
- .2 American Petroleum Institute (API).
  - .1 API STD 653, Tank Inspection, Repair, Alteration, and Reconstruction.
- .3 Canadian Council of Ministers of the Environment (CCME).
  - .1 CCME-PN1326, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- .4 Department of Justice Canada (Jus).
  - .1 SoR/2008-197 Canadian Environmental Protection Act Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, 2008 (CEPA)
- .5 Canadian Standards Association (CSA)/CSA International.
  - .1 CAN/CSA-B139-09, Installation Code for Oil Burning Equipment.
- .6 The Master Painters Institute (MPI).
  - .1 Architectural Painting Specification Manual.
- .7 National Research Council/Institute for Research in Construction.
  - .1 NRCC 38727, National Fire Code of Canada (NFCC) Latest Edition.
- .8 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act, (TDGA).
- .9 Underwriters' Laboratories of Canada (ULC).
  - .1 ULC/ORD-C58.12, Leak Detection Devices (Volumetric Type) for Underground Storage Tanks.
  - .2 ULC/ORD-C58.14, Leak Detection Devices (Non-volumetric Type) for Underground Storage Tanks.
  - .3 ULC/ORD-C58.15, Overfill Protection Devices for Underground Tanks.
  - .4 ULC/ORD-C107.7, Glass-Fibre Reinforced Plastic Pipe and Fittings.
  - .5 ULC/ORD-C107.19, Secondary Containment of Underground Piping.
  - .6 ULC/ORD-C142.23, Aboveground Waste Oil Tanks.
  - .7 ULC-S601, Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.
  - .8 ULC-S602, Aboveground Steel Tanks for Fuel Oil and Lubricating Oil.
  - .9 ULC-S652, Tank Assemblies for Collection of Used Oil.
- .10 Applicable federal, provincial and municipal codes and regulations.

### 1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate details of construction, appurtenances, installation, leakage detection system.
- .3 Shop drawings to detail and indicate following as applicable to project requirements. Submit manufacturer's product data to supplement shop drawings.
  - .1 Size, materials and locations of ladders, ladder cages, catwalks and lifting lugs.
  - .2 Tanks capacity.
  - .3 Size and location of fittings.
  - .4 Environmental compliance package accessories.
  - .5 Decals, type, size and location.
  - .6 Accessories: provide details and manufacturers product data.
  - .7 Size, material and location of manholes.
  - .8 Size, materials and locations of railings, stairs, ladders and walkways.
  - .9 Finishes.
  - .10 Electronic accessories: provide details and manufacturers product data.

- .11 Insulation types, locations and RSI values.
- .12 Identification, name, address and phone numbers of corrosion expert where applicable.  
Note: Grading drawings to be stamped by licensed corrosion expert.
- .13 Piping, valves and fittings: type, materials, sizes, piping connection details, valve shut-off type and location.
- .14 Spill containment: provide description of methods and show sizes, materials and locations for collecting spills at connection point between storage tank system and delivery truck, or vessel.
- .15 Anchors: description, material, size and locations.
- .16 Concrete: type, composition and strength.
- .17 Size and location of site pads.
- .18 Level gauging: type and locations, include:
  - .1 Reporting systems, types of reports and report frequency.
  - .2 Maximum number of tanks to be monitored.
  - .3 Number of probes required and sizes.
  - .4 Provide details and manufacturer's product data.
- .19 Ancillary devices: provide details and manufacturer's product data.
- .20 Leak detection system, type and locations, and alarm system.
- .21 Grounding and bonding: provide details of design, type, materials and locations.
- .22 Corrosion protection: provide details of design, type, materials and locations.
- .23 Field-erected overfill-protection systems: provide details of design, type, materials and locations.
- .24 Containment system for spills, overfills and storm runoff water: provide details, materials used, and locations.
- .4 Provide maintenance data for tank appurtenances and leakage detection system for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### 1.3 MAINTENANCE DATA

- .1 Provide maintenance data for tank appurtenances for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

### 1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials and appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.
- .5 Place Materials defined as hazardous or toxic in designated containers.
- .6 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- .7 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
- .8 Ensure emptied containers are sealed and stored safely.
- .9 Divert unused metal materials from landfill to metal recycling facility as approved by Owner's Representative.
- .10 Divert unused concrete materials from landfill to local quarry facility as approved by Owner's Representative.
- .11 Dispose of unused paint or coating materials at an official hazardous material collections site as approved by Owner's Representative.
- .12 Do not dispose of unused paint, thinners, solvents, etc. into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .13 Fold up metal banding, flatten and place in designated area for recycling.

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**1.5 MANUFACTURERS GUARANTEE**

- .1 Provide equipment manufacturer's guaranty naming Owner as beneficiary and covering defects and deficiencies for minimum 5 years from date the work is certified as substantially performed.
- .2 Guaranty shall cover materials and include repair or replacement at manufacturer's expense, to extent required, of work of this Section in event of failure if such failure results from defects and deficiencies in product manufacture.

**1.6 WARRANTY**

- .1 Warrant work of this Section for period of 2 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Consultant and at no expense to Owner. Defects include but are not limited to improper installation, failure of equipment for purpose intended, damaged equipment and other similar requirements pertaining to medical equipment.

**2 Products****2.1 STEEL TANKS**

- .1 One (1) double wall tank of 45, 460 Litres (10, 000 Imp. Gallons) capacity with two (2) compartments: 36, 368 litres (8000 IMP. Gallons) for #2 Fuel Oil 9,092 litres (2000 IMP. Gallons) For #1 Generator Diesel supplied and installed by this contractor.
  - .1 Construction horizontal cylindrical double walled (360 secondary containment) to ULC-S601 standards, complete with two coats of red oxide primer to CAN/CGSB-1.150.
  - .2 Tank to be complete with skid saddles, level indicators, spill containment devices with locks, emergency vents, vacuum gauges with switches, lifting lugs, grounding lugs, pipe support bracket, overfill protection to CCME, dipsticks and gauge charts supplied for each individual tank compartment. Provide connections, gauges, and switches to allow for connection to existing appurtenances (i.e. Levelometer, pump panel, alarm panel, level switches), to be connected by this contractor. Provide additional levelometer and connections to pump panel, alarm panel and level switches for second compartment. Existing levelometer and vacuum monitor device to remain in service as long as the existing underground storage tank contains fuel.
  - .3 Platforms, ladders and handrails: Provide two (2) sets of welded steel tank attachments designed to support platform framing, stairs, ladders and live and dead loadings. Provide two (2) ladders with 20mm dia rungs at 300mm on centre. Provide two (2) access platforms and guard rails to allow for tank fueling, level measuring and inspection for each compartment. Clean and coat all surfaces as specified for tank.
  - .4 Compartment provider shall be double wall system designed to provide two (2) completely separated compartments.
  - .5 Vent Caps: Galvanized cast iron or cast aluminum with brass or bronze screens, arranged to permit full venting and prevent entry of foreign material into the vent line. Same pipe size as vent pipe.
  - .6 Fill Boxes: Spill container type enclosing a fill cap assembly with connection coordinated with fittings used by fuel supplier to comply with CCME and S14(2)(b) of the regulations.
    - .1 Liquid and vapor tight assembly, cylindrical body, quick-opening corrosion resistant watertight sealable cover, with minimum 5 gallon capacity.
    - .2 Fill cap shall be lockable, tight-fill design with provision for padlock on the top of the cap. Fill cap shall screw onto threaded adapter that can be removed without removing fill box. Entire assembly shall seal tight with no leakage during filling and when cap is in place.
    - .3 Spill containment device to comply with ORD-C142.19 latest edition.
  - .7 Finishes: Exterior of tank: Factory Applied Prime Coat to CAN/CGSB - 1.181 Ready Mix Organic Zinc Rich Coating, two (2) Coats of Suitable Corrosion Resistant Epoxy Paint, and one (1) top coat of suitable polyurethane paint.

- .8 Vacuum applied to interstitial space. With vacuum gauge and pressure switch for connection to monitoring system.
- .9 Fill signal device: Vent whistle, whistles when tank is being filled and stops whistling when tank at 90% tank capacity. Install on vent pipe at tank.
- .10 Product transfer:
  - .1 Tank to be provided with normal and separate emergency vents for each compartment.
  - .2 Liquid and vapor tight connection to be provided on fill pipes. Camlock or equal.
- .11 Over fill and spill containment.
  - .1 Automatic valve closure on two (2) product supply line to terminate petroleum product flow upon detection of high levels in storage tank.
  - .2 Overfill protection device compatible with intended method of filling designed, built and certified to ULC/ORD-C 158.15

## 2.2 PIPING, VALVES AND FITTINGS

- .1 Flared Fittings to CSA B139 "Installation code for Oil Burning Equipment."
- .2 To Section 23 11 13 - Piping, Valves and Fittings Heating Fuel Oil.
- .3 Installation to meet all requirements of the National Fire Code of Canada, Part 4.

## 2.3 LEVEL GAUGING

- .1 Provide two (2) tank compartments level gauging and indicator.
- .2 Provide gauge and gauge openings protected against liquid overflow and possible liquid and vapour release.

## 2.4 GROUNDING AND BONDING

- .1 Provide grounding for tank.

## 2.5 DIGITAL TANK GAUGE SYSTEM

- .1 Gauge system shall be the mechanically or electronically actuated type that can continuously monitor a tank's usable liquid level storage capacity. The system shall provide a digital readout of both (2) tanks compartments liquid level in terms of mm and L inches and gallons. The system shall be accurate to plus or minus 2mm 1/16 inch. The system shall measure water accumulation in mm inches from 20 to 125mm 3/4 to 5 inches off the bottom of each storage tank compartment. Construct system components to be chemically compatible with the fuel to be handled. For each tank compartment monitored, provide a sending unit that transmits the digital readout from a tank to an electronic display panel. Panel shall be standard industrial enclosure. The panel shall display the digital readout of each monitored tank compartment on an LCD mounted exterior to the panel. The panel shall also have external controls to allow operators to toggle between information on the LCD without having to open the panel and shall provide paper printouts. Standard of Acceptance: Veeder Root or Approved Equal.

## 2.6 LEAK DETECTION SYSTEMS

- .1 Automatic digital continuous monitoring systems responsive to the presence of water and hydrocarbons in the interstitial space of the double-wall tanks, in the tank manhole access enclosures, and in the secondary containment of fuel piping systems. System shall distinguish between hydrocarbon and water and identify location of leak as to individual tank and piping system. System may be combined with tank fluid level monitor and alarm system specified
- .2 Functions and Arrangements:
  - .1 Single control station to monitor all sensing probes.
  - .2 Visual indicator to monitor and identify leaks as water or hydrocarbon and location.
  - .3 Indicators showing system status including faults and alarms.
  - .4 On board printer that provides complete reports of all system functions upon command.
  - .5 Panel circuit test button.

- .6 95 dB audible alarm with silencing control to sound when leak is detected.
- .7 Eight hour memory backup system with battery.
- .8 NEMA 250 Type 4 cabinet.
- .9 UL or other accredited testing laboratory listing.
- .10 Optional RS232 Modbus for future communications with control system to indicate system in service and alarm conditions.
- .3 Sensors:
  - .1 Designed for required locations including: Insertion between walls of double-wall tanks, in sumps in double-wall piping systems and in tank manhole enclosures. Sensing points shall be at lowest point of each tank or sump. Intrinsically safe design.
  - .2 Sensing units shall detect presence of water and a minimum 3mm (0.125 inch) thick layer of hydrocarbon on surface of water and minimum 50mm (2 inch) thickness of hydrocarbon in area that has no water present.
  - .3 Sensors shall be arranged to allow replacement of individual sensors without disturbing other portions of leak detection system or fuel storage and piping system. Underground sensors shall be accessed through caps as grade.
  - .4 Materials of construction shall be non-corroding.
  - .5 Transmit status signal to control unit.
- .4 Components:
  - .1 Provide manholes at grade for each sensor cap similar in construction to fill boxes. Manholes shall be cast iron, quick - opening cover, watertight, minimum size necessary to accommodate sensor caps. Provide identification plates, similar to those specified for fill points, labeled "MONITORING/OBSERVATION WELL-DO NOT FILL". Provide special tools if necessary for opening covers.
  - .2 Sensors housing from tank and piping to grade shall be schedule 40 PVC, or stainless steel.
  - .3 Underground wiring between probes and control unit: Place in water-tight corrosion-resistant conduit system.

## 2.7 FUEL OIL QUALITY MAINTENANCE SYSTEMS

- .1 Complete factory-assembled automatic particulate filtration and dewatering to maintain the purity of No. 1 generator diesel in storage. The system shall circulate the diesel from storage tank, through the system, and back to the storage tank. Provide quantity and capacity of systems to serve tanks as shown, connected to the tank suction and return pipes using 1/2" Npt piping. Units shall be floor-mounted on stainless steel skids. Provide wiring and Conduit by Certified Electrician to nearest available electric panel. Provide dedicated minimum 110V, 15 amp breaker to match system requirements.
- .2 Performance: Design for water removal to exceed 0.001 Karl Fisher to ASTM D4377. Provide 2 micron particulate filtration. Each system shall have 4 GPM capacity at 220 psi. System shall be designed to allow continuous operation with brief interruptions to manually change filters and clean strainers.
- .3 Components:
  - .1 Water Separation Unit: Designed to reduce water content to fuel to less than 10 ppm. Proprietary complex cellulose water coalescing elements. Dual tubes, 600mm x 150mm diameter.
  - .2 Filter: 2 micron filtration with 96% removal efficiency, valved manual drain. Replaceable elements.
  - .3 Filtration Pump: Positive displacement base-mounted gear pump with bronze housing, for circulating the oil from the storage tank, through the water separation and filter units and back to the storage tank. Pump shall have carbon bushings, stainless steel shaft and Teflon mechanical seal, 1/2 Hp continuous duty motor.
  - .4 Controls:
    - .1 Water sensor.
    - .2 Vacuum Gauge

- .3 Flow control
- .4 Electronic programmable timer with battery backup
- .5 Magnetic motor starters with overload protection.
- .6 Circuit breakers.
- .7 Control enclosure shall be NEMA 4, fully gasketed doors with 3 point lockable latching. Interior shall have white gloss finish; exterior shall be chemical-resistant gray enamel. All controls and indicating devices shall be mounted on front of enclosure and labeled with black Phenolic labels with white lettering.
- .4 Enclosure - Floor Mounted Units: stainless steel, NEMA 4 standards, continuously welded, framed cabinet. Provide doors for complete access to all equipment. 800mm height x 500mm wide x 150mm depth.
- .5 Waste Water Holding and Removal System: Automatic system with gear pump and 1.8 litre stainless steel holding tank.
- .6 System design and origin of manufacturing: CANADA

### **3 Execution**

#### **3.1 INSTALLATION**

- .1 Install tanks in accordance with the most stringent requirements of CAN/CSA-B139, CCME-"Code of Practice" Provincial regulations and National Fire Code of Canada.
- .2 New fuel oil tank shall be installed and tagged by certified installer.
- .3 Install exterior piping level with supports as indicated and as required by codes and regulations.
- .4 Position tanks using lifting lugs and hooks, and where necessary use spreader bars. Do not use chains in contact with tank walls.

#### **3.2 FIELD QUALITY CONTROL**

- .1 Test tanks for leaks in presence of authority having jurisdiction.
- .2 Field erected tanks: field test for leaks in accordance with ANSI/API 650. API monogram is acceptable evidence of testing.

#### **3.3 TOUCH-UP**

- .1 Where coating is damaged, touch-up with original coating material.

#### **3.4 LEVEL GAUGE SYSTEM**

- .1 Provide leak and vapour proof caulking at connections and calibrate system.

#### **3.5 COMMISSIONING REQUIREMENTS**

- .1 Provide maintenance manuals and training of site personnel on operation of system.
- .2 Provide system pressure testing reports, and sensor commissioning reports.

#### **3.6 LEAK DETECTION**

- .1 Install leak detection systems for U/G containment sumps and interstitial space of oil tank. Leak detector shall conform to ULC ORD C107.12 and installed in accordance with manufacturer recommendations.

#### **3.7 OVERFILL AND SPILL PROTECTION**

- .1 Install flow restriction type overfill protection. System shall activate at 90% of tank capacity. System shall be installed in accordance with codes. Regulations and manufacturers recommendations.

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**3.8 COMMISSIONING, TRAINING AND CLOSEOUT**

- .1 Submit certificate of completion that certifies all work provided on the fuel system has been completed in accordance with environmental codes, regulations and standards indicated.
- .2 Complete performance verification and calibration over fill prevention device, vent whistle, and leak detection system. Provide commissioning plan 4 weeks prior to first fill for review and acceptance. Provide documentation of performance verification and tests on completion.
- .3 Provide 16 hours of system training to maintenance staff on operation of fuel oil pumps, level monitoring system, over fill prevention devices, leak detection system and associated components and controls.

End of Section