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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 30, 2009 | Review/update of the document “Related Sections” |
| 3 | March 27, 2013 | First Draft – Consolidated Comments Spec Update Project |
| 4 | May 15, 2013 | First Draft v3.1 |
| 5 | June 17, 2013 | Finalized for Legal Review. Incorporation of new Commissioning and Computerized Maintenance Management System Data Requirements Specification cross references. |
| 6 | May 20, 2014 | Revised to incorporate Legal Services’ comments (AV) |
| 7 | July 15, 2014 | Amended to reflect changes related to commissioning specification and name change (AV) |
| 8 | September 24, 2014 | Updated, Finalized Specification – Reference eDOCS #1029462-v5 (AV) |
| 9 | February 18, 2015 | Updated standards (AV) |
| **10** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5043351 v12 (AV)** |
| 11 | February 15, 2017 | Updated standards references. Removed the Manufacturers section for Fuel Leak Detectors (CPD PMO, OMM) (AV)  Added References to CSA B139 Series 15 (AAM) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## Scope of Work

### The work of this Section covers the work necessary for completely furnishing and installing the fuel oil systems.

### The work of this section shall fully comply with all applicable requirements of the Technical Standards and Safety Act, 2000 and O. Reg. 213/01 Fuel Oil and CSA B139 Series-15.

### The system is composed of fuel supply and return pumps, day tanks, double wall containment fuel oil piping, miscellaneous piping, manual valves, automatic valves, solenoid valves, instrumentation and controls, and all other necessary and related miscellaneous appurtenances required to produce satisfactory and properly operating systems.

### Refer to the General Conditions of the Contract and Division 1 - General Requirements for additional information and requirements that apply to the work specified in this Section and are mandatory for this Contract.

## Related Sections

*[Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.*

*Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.*

*This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]*

*[List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### *[List Sections specifying products installed but not supplied under this Section and indicate specific items.]*

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### *[List Sections specifying related requirements.]*

### Section 11010 – Equipment General Requirements.

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

### Section 01250 – Substitutions

### Section 01425 – Computerized Maintenance Management System Data Requirements

### Section 01430 – Operation and Maintenance Data

### Section 01640 – Manufacturers’ Services

### Section 01780 – Contract Closeout

### Section 01810 – Equipment Testing and Facility Commissioning

### Section 01820 – Demonstration and Training

### Section 05500 – Metal Fabrication General

### Section 09900 – Painting and Protective Coatings

### Section 11010 – Equipment General Requirements

### Section 11900 – Above Ground Fuel Oil Storage Tanks

### Section 13390 – Package Control Systems

### Section 15200 – Carbon Steel and Pipe Fittings

### Section 16122 – Wires and Cables

### [Division 1 – General Requirements, insert other applicable specifications]

### [Division 13 – SCADA and Instrumentation, insert applicable specifications]

### [Design Guidelines Section 21 - Development and Maintenance of Asset Inventory and Tagging]

### [Product requirements for [item]... for installation under this Section.]

## Standards

### Comply with the latest edition of the following codes and standards, , and where no standards are listed below a standards authority, all applicable statutes, codes and standards of that authority and all amendments thereto:

#### Canadian Standards Association (CSA)

##### CSA B139 Series 15, Installation code for oil-burning equipment and Fuel Oil CAD Amendment FS-219-2016

#### National Pire Protection Association (NFPA)

##### NFPA 30 (2015) Flammable and Combustible Liquids Code

##### NFPA 31 (2016) Standard for the Installation of Oil-Burning Equipment

##### NFPA 37 (2015) Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, 2010 edition

##### NFPA 70 (2017) National Electrical Code

#### Underwriters Laboratories (Canada) (UL, ULC)

##### ULC/ORD-C 80.1-12, Non-Metallic Tank for Oil Burner Fuels and Other Combustible Liquids

##### UL 142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids

##### CAN/ULC S508-02 (R2013), Standard for the Rating and Fire Testing of Fire Extinguishers, Including Amendments 1 and 2

##### ULC ORD-C107.12-1992, Line Leak Detection Devices for Flammable Liquid Piping

#### National Electrical Code (NEC)

#### American Society of Manufacturing Engineers (ASME)

#### Building Officials and Code Administrators International (BOCA (US))

#### Occupational Health and Safety Act RSO 1990 (OHSA)

#### National Electrical Manufacturers Association (NEMA)

##### NEMA 4X Type Enclosures

#### Technical Standards and Safety Authority (TSSA) – Fuels Safety Program

##### TSSA Act, 2000, Ontario Regulation 213/01 Fuel Oil

## Submittals

### Submittals shall be made in accordance with Division 1 - General Requirements.

### Shop Drawings and Product Data:

#### List of proposed system components.

#### Make, model, weight and kW (horsepower) of each equipment assembly.

#### Manufacturer’s catalogue information, descriptive literature, specifications, and identification of materials of construction.

#### Standard and specialized equipment assembly cuts.

#### Performance data showing compliance with specification requirements. Include: Pump curves showing head pressure capacity, horsepower demand, and efficiency over the entire operating range and from shutoff to maximum capacity.

#### Detailed structural, mechanical, and electrical drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and locations of connections to other work, and weights of equipment associated therewith.

#### Tank data indicating equipment number, pressure rating, diameter, straight shell lengths, overall lengths, wall thickness, corrosion allowance, thickness, and details of nozzle designs.

#### Tank capacity chart indicating litres for each centimetre of depth and cumulative total from bottom.

#### Outside utility requirements such as air, water, power, etc., for each component.

#### All required information for all equipment as detailed in Design Guidelines – Section 21 shall be submitted in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

#### Functional description of internal and external instrumentation and controls to be supplied, including list of parameters monitored, controlled, or alarmed.

#### Control panel elevation drawings showing construction and placement of operator interface devices and other elements.

#### Schematic control diagrams.

#### Power and control wiring diagrams including terminals and numbers.

#### Complete motor nameplate data, as defined by NEMA, motor manufacturer, and including any motor modifications.

#### Shop and Field Painting Systems Proposed: Include manufacturer’s descriptive technical catalogue literature and specifications, hazardous communication data sheets (MSDS), and written certification that the factory-applied coating system(s) is identical to the requirements specified in the Contract Documents.

#### Where the system proposed is different from that specified in the Contract Documents, or where, in the manufacturer’s opinion, the coating system(s) exceed(s) the requirements specified, submit complete technical literature of the proposed system(s) to the Consultant for review and approval.

#### Warranty details as outlined in Section 01780 – Contract Closeout.

### Quality Control Submittals:

#### Manufacturer’s Certificate of Compliance with the applicable Canadian federal and provincial safety requirements, OHSA, TSSA, Underwriters’ Laboratory Canada (ULC) requirements, provincial applicable safety code requirements, and other material requirements stated in the Contract Specification Sections.

#### Certified copies of commercial test results for the actual motors being supplied.

#### Factory Acceptance Test results, reports, and certifications. Submissions include:

##### Functional Test Certificates.

##### Performance Test Report and Certificates.

##### Test results of control panels for proper operation, electrical connection, and function.

##### Copies of fabrication, quality control, and testing records for actual tank.

##### Special shipping, storage, protection and handling instructions.

#### Manufacturer’s written/printed installation instructions.

#### Routine maintenance requirements prior to plant startup.

#### Manufacturer’s Field Service Report and Certificates in accordance with Section 01640 - Manufacturers’ Services. Submissions include:

##### Manufacturer’s Certification of Proper Installation.

##### Field Functional Test Certificates.

##### Field Performance Test Certificates.

##### A list of all suggested spare parts required to maintain the equipment in service for a period of five years. Include a list of any special tools, materials, and supplies required for checking, testing, parts replacement, and maintenance with current price information.

##### List any special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance and all other required information as detailed in the equipment information template. Submit the information in an electronic format suitable for upload to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

##### Operation and Maintenance Manuals: As specified in Section 01430 - Operation and Maintenance Data.

## Special Guarantee/Warranty

### The Contractor shall ensure that the manufacturer will furnish an extended guarantee or warranty, with Region named as beneficiary, in writing. The special guarantee/warranty shall provide for correction, or at the option of the Region, the removal or replacement if any material or labor is found defective during a period of [\_\_\_] years after the date of Total Performance of the Work. The duties and obligations for correction or removal and replacement of defective work shall be as specified in General Conditions.

## Spare Parts and Extra Materials

### Fuel Supply Pumps; Fuel Return Pumps:

|  |  |
| --- | --- |
| Item | Quantity |
| Gaskets and Seals | 1 set of each different size and type |
| Mechanical Seal | 1 set of each different size and type |
| Bearings and Bushings | 1 set of each different size and type |
| Special Tools | 1 set of each different size and type |

## Measurement and Payment

[Choose one of the following payment language provisions that best suits the individual project.

If this Section is not specifically referenced by an item in the Bid Form, please use the following language:

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.]

# PRODUCTS

## General

### The use of a manufacturer’s name and model or catalogue number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the General Conditions.

### Equipment manufacturer shall be capable of demonstrating at least 10 consecutive years of successful experience in production of like equipment. Equipment must be similar in size, design, and application required for this Project.

### Regulatory Requirements:

#### Provide equipment and materials in compliance with the applicable CSA, NFPA, ULC, NEC, ASME, TSSA, and OHSA requirements.

#### Equipment and tanks shall meet or exceed federal, provincial, and/or local, building and fire code requirements.

### Materials: Manufacturer’s standard for the intended service, unless otherwise specified in this Section.

### Modify standard products to meet or exceed specified component or system requirements.

## Equipment Description

### Aboveground Fuel Oil Storage Tanks: As specified in Section 11900 - Aboveground Fuel Oil Storage Tanks.

### Fuel Supply Packages:

#### Fuel supply packages [three] consist of [two] skids each, [six] skids total. The skids, as described in this Section and shown on the Contract Drawings, are the pump skid and the day tank skid. It is acceptable for manufacturer to combine these [two] skids into a common skid, [three] skids total. Complete systems including supply pumps, return pumps, day tanks, control panels, valves, piping, instruments, wiring, and all accessories shall be factory mounted on steel skids. Skids shall be located in engine generator room as shown on the Contract Drawings.

### Pump Skids:

#### Provide complete pre-engineered automatic fuel supply and return pump systems suitable for withdrawal of fuel from the storage tanks and pumping/ discharging the fuel to the engine generator day tank systems. The fuel return pumps shall automatically return excess fuel from the day tanks to the storage tanks. The units shall operate intermittently in an ON/OFF mode and shall be activated by level switches in the day tanks.

#### Assembly shall include the following:

Duplex gear pumps, each rated for [     ] Lpm ([     ] gpm) at [     ] kPa ([     ] psi) and equipped with kW (HP), 460V, three phase, 60 Hz, rpm, TEFC motor suitable for pumping fuel oil with a maximum viscosity of 50 Saybolt Seconds Universal (SSU). Pumps shall be directly driven, positive displacement, internal gear type with mechanical shaft seal. The pump shall be a high pressure, hydraulic type consisting of two intermeshing, hardened steel, precision ground gear assemblies enclosed by a high-strength, cast iron housing, hardened drive shaft, pressure loaded mechanical shaft seal.

Pump control system as specified under Division 13 - SCADA and Instrumentation.

Three-phase magnetic motor starter with overload relay in each phase, and control power transformer for each motor.

Disconnect the switch with door interlock for the main power inlet connections equipped with guarded terminals and a padlock-able handle mechanism interlocked to prevent the door from opening unless the switch is in the OFF position.

Pressure monitoring devices including:

###### 1. Suction pressure gauge.

###### 2. Discharge pressure gauge.

###### 3. Discharge pressure switches.

Valves sized by the manufacturer for each pump shall include:

###### 1. Inlet shutoff.

###### 2. Discharge shutoff.

###### 3. Pressure relief.

###### 4. Check.

Common inlet line fusible link valve, self-closing when activated upon sensing a temperature of [     ] °C ([     ]° F) or higher.

Sensor to detect pump flow and indicate any failure of the pump.

Minimum [     ] litres spill containment sump with high level sensing switch.

Permanently mounted hand pump rated [     ] L/S ([     ] gpm), suitable for emptying the containment sump and discharging material into the day tank.

#### Provide the following miscellaneous valves for installation in the piping system. Some valves may be located outside the pump skid. Refer to the Contract Drawings for quantities and locations:

###### 1. 25 mm (1 inch) shutoff, plug type.

###### 2. 25 mm (1 inch) self-closing, fusible link type, with [ ]°C ([ ]°F) set point.

###### 3. 25 mm (1 inch) fuel withdrawal isolation valve, normally closed, solenoid type suitable for operation on 115V ac. Rated [\_\_\_] kPa ([ ] psi), brass body, and Viton or Buna N seal.

###### 4. 25 mm (1 inch) foot valve with drop tube for installation into storage tank through nozzle.

###### 5. 25 mm (1 inch) pressure control valve.

###### 6. 25 mm (1 inch) strainer.

###### 7. For installations involving more than one storage tank, provide valves for all interconnections between all the storage tanks with capabilities to route fuel from any tank to any pump.

#### Provide the manufacturer's three year warranty for parts and labour.

### Day Tank Skids:

#### General: Provide a packaged design fuel oil day tank for each prime mover. Day tanks shall be complete in all respects in order to provide the prime mover with a reliable, local source of fuel. Day tanks shall be for use with storage tanks and pump skids described above in order to provide an automatic, self-refilling fuel supply system.

#### Each day tank shall be designed and supplied as a package engineered system by the manufacturer, and shall include all inlet flow control devices, other valves, level controls, leak alarms, and all other devices as required to form an integrated, functional system such that field installation is restricted largely to external piping, wiring, and such intermediate devices that are required by the TSSA to interconnect the storage tanks to the day tanks, the day tanks to the prime mover and to provide for external vents in accordance with TSSA requirements and UL 142, NFPA 31 (2016), and NFPA 37 (2015). Controls, indications, and alarms shall be integrated with the pump skids.

#### The system shall be for use with fuel oil as described by NFPA 30 (2012), “Flammable and Combustible Liquids Code.” As defined by this standard, the fuel supply system shall be for use with “combustible liquids,” those having a flash point at or above 38° C (100°F) and further defined as Class II or Class III liquids. In no case shall a liquid defined as “flammable,” as “Class I”, or as having a flash point of less than 38° C (100°F) be used. In every case, the system shall not be used or applied at a temperature in excess of the flash point of the contents. Electrical equipment used in the system shall be in accordance with relevant sections of NFPA 30 (2015) related to electrical equipment that may be installed in accordance with provisions of NFPA 70 (2017), National Electric Code.

#### The system shall be designed and installed in accordance with the applicable sections of CSA B139 Series 15, NFPA 30 (2015), NFPA 31 (2016), NFPA 37 (2015), ULC 80, and UL 142. The day tank shall bear the label of UL 142 and CAN/ULC S508-02 (R2013).

### Day Tank Ratings:

#### Capacity: [     ] litres ([     ] gallons) each.

#### Day Tank Construction:

##### All welded steel atmospheric tank of rectangular construction shall be built in accordance with the codes and standards noted above (subsection 1.9.4.2.2) for indoor use with fuel oil.

##### Provide pipe thread connections for:

###### 1. Fuel Oil Supply from Remote Pump Set: [     ] mm ([     ] inches).

###### 2. Supply to Prime Mover: [     ] mm ([     ] inches).

###### 3. Return from Prime Mover: [     ] mm ([     ] inches).

###### 4. Supply to Fuel Return Pump: [     ] mm ([     ] inches).

###### 5. Vent: [     ] mm ([     ] inches).

###### 6. Emergency Vent: [     ] mm ([     ] inches).

###### 7. Drain: [     ] mm ([     ] inches), with drain valve.

##### Provide an inspection port in the top.

##### Equip the tank with a welded steel channel base suitable for bolt attachment to a concrete pad.

##### Provide interior epoxy corrosion protection.

##### Provide a heavy-duty industrial anti-corrosion coating on the exterior of the day tank and provide a painted finish coating.

##### Day tank shall be factory leak tested at [5] kPa ([x] psi). Pressure shall be held over a [xx] hour period with no lower than a [y]% loss in the initial pressure value.

##### Each tank shall be installed and anchored within a UL listed aluminum NEMA 4X steel containment dike/basin having a minimum capacity of 150 percent of the day tank. Containment shall be equipped with a leak detection system and alarm as described below in subsection [ ]. A tank drain with ball valve shall be supplied. The containment shall be painted inside and out to match the day tank.

#### Day Tank Level Control:

##### As specified under Division 13 - SCADA and Instrumentation.

##### Provide the manufacturer’s three year warranty for parts and labour.

#### Day Tank Testing:

##### The day tanks shall be supplied with the following manufacturer’s test certificates.

##### Tank Test: Pressure test, leak-proof test, and structural integrity/appearance test.

##### Level Controller: Operational tests confirming proper functioning of the liquid level sensors, level indicator, level control, alarms, and backup devices.

#### Oil and Vent Piping:

##### Aboveground Fuel Oil and Vent Piping (in accordance with CSA B139.2-15, Sections 11 & 12:

##### As specified in Section 15200-02 - Carbon Steel Pipe and Fittings - Special Service.

##### Flame arrestor to be provided (if applicable).

#### Buried Fuel Oil Piping Fuel Oil Supply (FOS) and Fuel Oil Return (FOR):

##### General: Pipe and fittings shall be UL listed for conveying flammable liquids underground.

##### Carrier Pipe: Flexible, corrugated medium density polyethylene.

##### Double Wall Pipe: Fibre reinforced, smooth bore Polyvinylidene fluoride inner barrier, flexible, coaxial design, double-wall pipe. Pipe shall be rated at 150 psi maximum operating pressure.

##### Fittings: Brass fittings designed for use with the flexible pipe provided.

##### Termination Fittings:

###### Transition to Single-Wall Pipe: Fittings shall be interstitial space.

###### Leak Detection Connection: Provide fittings as required for the installation of leak detection elements.

###### Provide closure fitting to seal the space at the ends of the carrier pipe where double wall pipes exit.

[Consultant to confirm above details conform to CSA B139 Series 15, Installation code for oil-burning equipment and Fuel Oil CAD Amendment FS-219-2016 and amend as required]

### Controls:

#### Process and instrumentation diagrams and these Specifications depict the minimum functional requirements of the systems and controls to be provided under this Section. The system supplier shall provide all components, instrumentation, and controls necessary to provide a complete, safe, and properly operating system. Specific systems and controls proposed shall be subject to the approval of the Consultant.

#### Instrumentation and controls provided under this Section shall comply with the requirements of Section 13390 - Package Control Systems, unless otherwise specified in this Section.

#### Panels: Provide NEMA 4X aluminum control panels to accommodate the required control and monitoring functions.

#### Operator Controls and Indications for each panel:

##### ON/OFF/AUTO selector switch for each pump.

##### OPEN/CLOSE/AUTO selector switch for the main inlet solenoid valve.

##### Pump status ON indication LED lights for each pump.

##### Power available status LED light.

##### Fuel System Alarm Monitoring Unit:

###### 1. Features: LED alarm lights, audible alarm horn, and acknowledge pushbutton.

###### 2. Operation:

Amber flashing light and horn activate on alarm condition

Acknowledge pushbutton silences horn.

Horn reactivates on a subsequent alarm condition.

3. Alarms Monitored:

1. Day tank low-low level.

2. Day tank high-high (overflow) level.

3. Supply pump fail.

4. Storage tank leak.

5. Day tank leak.

6. Piping leak.

4. Provide a common alarm contact closure output on any alarm condition.

#### System Operations and Functional Requirements:

##### UL listed controller package for level control of pumps, tank level indication, system alarms, and manual operations.

##### Manual ON/OFF operation of each pump.

##### Manual OPEN/CLOSE operation of the main inlet solenoid valve.

##### AUTO operation with all pumps and the main inlet solenoid valve selector switches set to the AUTO position:

##### Supply pump starts and main inlet solenoid valve opens on LOW level signal (LSL) from the day tank.

##### Supply pump stops and main inlet solenoid valve closes on tank full HIGH level signal (LSH) from the day tank.

##### Return pump starts and main inlet solenoid valve closes on overflow HIGH-HIGH level signal (LSHH) from the day tank.

##### Return pump stops on tank full HIGH level signal (LSH).

##### Provide a supply pump fail alarm when a pump is signaled to start and no pump flow is detected after a preset time delay.

#### Fuel Tank Level Sensors: Provide level sensors, switches, and relays to meet the system operations, alarms, and external interfaces specified herein.

#### Fuel Leak Detection in accordance with CSA B139 Series 15, Installation code for oil-burning equipment and Fuel Oil CAD Amendment FS-219-2016, Section 9.5:

##### Provide fuel leak sensors to detect leaks in the following locations:

##### Fuel storage tanks ([     ]) specified in Section 11900 - Aboveground Fuel Oil Storage Tanks.

##### Engine generator day tanks.

##### Fuel oil pipe.

##### Provide DC power supply and alarm relays for leak sensors.

##### Provide leak alarm inputs to the fuel system alarm monitoring unit.

##### Sensors: Electro-optic switches designed to sense presence or absence of liquids for purpose of leak detection in double-wall tanks and pipes.

##### Leak detection system to conform to CSA B139- Series 15 (Amendment FS-219-2016).

##### [Consultant to amend as required for compliance with CSA B139 Series 15]

### Fuel Storage Tank Level Measurement:

#### Provide level measurement for each fuel storage tank specified in Section 11900 - Above Ground Fuel Oil Storage Tanks.

#### Level Sensor:

#### Hydrostatic pressure sensing type.

#### Tank top mounted. Sensor probe height equal to the inside height of the tank to measure the level/volume of liquid in the entire tank.

#### Weatherproof conduit hub electrical connections.

#### Level of tank to be telemetered to SCADA with programming logic defined to assess for unexpected volume decreases or increases with appropriate alarming depending on conditions.

#### Indicator/Transmitter:

#### Functions: Receive signal from sensor, indicate tank level, and transmit level signal to plant control system.

#### Indicator: [     ] mm ([     ] inches), 5 digit LCD display in litres of liquid in the tank. No multiplication factors of tank reading is permitted.

#### Enclosure: NEMA 4X polycarbonate, wall mountable.

#### Power: 120V ac.

#### Output Signal: 4 to 20 mA dc.

#### Accuracy: 1 percent of span.

#### External Interfaces:

##### Transmit the following discrete signals to the plant control system:

##### Pump status ON for the fuel supply pumps.

##### Pump status ON for the fuel return pumps.

##### Common alarm for any alarm condition.

##### Low-Low alarm level (LSLL) in the day tank.

##### High-High (overflow) alarm level (LSHH) in the day tank.

##### Hi level contact switch (overflow indicator)

##### Discrete signals: Dry contact closures rated for 2 amps at 120V ac.

##### Transmit the fuel storage tank level analog signal to the plant control system.

## Electrical

### A single point 600V, three-phase, 20A power supply shall be provided to the control panels. All power requirements for skid-mounted equipment shall be derived from the single point connection.

### All skid-mounted equipment shall be factory wired. Conduits shall be in accordance with Section 16051 – Installation of Cables in Trenches and Ducts. Conductors shall be in accordance with Section 16122 – Wires and Cables 0-1000V.

## Accessories

### Lifting Lugs: Provide suitably attached for all equipment assemblies and components weighing over 45 kg (100 pounds).

### Equipment Anchor Bolts: In accordance with Section 05500 - Metal Fabrications General. Provide Type 316 stainless steel bolts, sized by the equipment manufacturer and at least 12mm (1/2 inch) in diameter. Coordinate the required bolt size with the approved shop drawings.

### Equipment Identification Plates: Provide 16-gauge stainless steel identification plates to be securely mounted on each separate equipment component and control panel(s) in a readily visible location. Plates shall bear a 10mm (3/8 inch) high engraved block type black enamel filled equipment identification number indicated in this Specification.

## Shop Fabrication

### Shop/Factory Finishing: Factory prepare, prime, and finish coat exposed metal surfaces of equipment and accessories in accordance with Section 09900 – Painting and Protective Coating.

## Source Quality Control

### Perform the manufacturer’s standard functional and performance tests on equipment, components, and accessories as follows:

#### Gather and furnish test information necessary to show conformance to the requirements in the Contract Documents.

#### Manufacturer’s test representative shall certify test results.

#### Perform tests on equipment and control panels actually furnished.

#### Test control panels for proper construction, electrical connection, and function.

### Perform short commercial motor tests, including running light current at a rated voltage, rated speed, high potential, and locked rotor current. Provide certified copies of the test reports on motor(s) identical to those being furnished by the manufacturer under the Contract.

### Commissioning activities shall be performed in accordance with the requirements set out in Section 01810 – Equipment Testing and Facility Commissioning.

# EXECUTION

## Installation

### The Contractor shall ensure that all work including work by Subcontractors shall be performed by a “certified individual” as defined by O. Reg. 213/01, s. 4 (1) and any other required legislation.

### Install the equipment at the location indicated on the Contract Documents and in accordance with the manufacturer’s recommendations. Assemble piping so there is no strain placed on the enclosures or pump casings.

### Coordinate all piping installations between the fuel oil tanks (when multiple tanks are part of the Contract Drawings) and equipment.

### Fuel Supply Package Installation:

#### General: The pump and day tank skids shall be installed inside the electrical building. Install as shown on the Contract Drawings, on housekeeping pads adjacent to the prime movers. Anchor skids to the pads.

#### Provide piping as shown on the Contract Drawings. Make all connections to fixed installed pipe with pipe unions in order to facilitate the service and/or the removal of the piping.

#### Fuel supply and fuel return from the pump and day tank skids.

#### Fuel supply and fuel return to the prime mover, as recommended by the manufacturer.

#### Vent sizes shall be as shown and as required by the CSA, TSSA, UL 142, NFPA 31 (2016), and NFPA 37 (2015).

### Wiring:

#### Electrical wiring and conduits between equipment, field devices, and panels provided under this section are NOT necessarily shown on the Contract Drawings.

#### The Contractor shall coordinate with the systems supplier regarding the power, control wiring, and conduits required between the equipment, field devices, panels, and other devices. The Contractor shall furnish and install all necessary items to provide a safe and properly operating system.

## Painting

### Contractor shall prepare and finish coat in accordance with Section 09900 – Painting and Protective Coating.

## Field Quality Control

### Tests: The Contractor shall conduct testing on all equipment provided with assistance from the manufacturer’s representative.

#### Functional Test: Perform on all complete assemblies prior to plant startup. Inspect and test the installed equipment for the correct rotation, proper alignment and connection, quiet operation, and satisfactory specified performance.

#### Performance Test: Perform prior to the plant startup on all equipment under actual or approved simulated operating conditions.

#### Perform tests on all completed assemblies, to demonstrate its conformance to these Specifications to the satisfaction of the Consultant. Furnish all labor and instruments required for procedures. Record data during the performance of the tests.

#### The Contractor shall perform the testing with the manufacturer’s authorized representative, in the presence of the Consultant. Schedule the testing with the Consultant in advance.

#### Submit the test log to the Consultant upon the completion of each test.

#### Furnish and install, and subsequently remove, all temporary piping and accessories necessary to permit the full and proper recirculation of testing liquid utilized during the field tests.

#### Continue testing on each pump for a continuous three hour period without malfunction or sign of operation outside of the manufacturer’s nominal expectations.

#### If units fail to meet the requirements of these Specifications or fail to operate to the satisfaction of the Consultant, repeat test after repairs, adjustments or other remedies are completed. If the unit fails first performance test, adjust, realign, or repair the unit as necessary and retest the unit. If the system fails the second test, the unit will be rejected and a new unit that will perform as specified by the Contract Documents, shall be provided.

## Manufacturer’s Services

### Manufacturer’s Authorized Representative: The Contractor shall ensure that the manufacturer’s representative will be present at the Site or the classroom designated by the Region for training for the minimum number of Person-days listed below, travel time excluded:

#### Minimum 2 Person-days for installation assistance, inspection, and certification of installation.

#### 1.5 Person-days for functional and performance testing and completion of the Manufacturer’s Certificate of Proper Installation.

#### 0.5 Person-day for pre-startup classroom or Site training of Region’s personnel.

#### 1 Person-day for facility startup.

#### 1 Person-day for post startup training of the Region’s personnel.

### The Contractor shall ensure that the manufacturer’s representative will furnish assistance, inspection, testing, and certification services at such times as requested by the Region.

### The Contractor must ensure the training will be performed by a technically competent person who may be electronically recorded by the Region during the session. Recorded sessions shall be used for refresher training or to train the Region’s staff absent from the original training.

### See Section 01820 – Demonstration and Training.

### Furnish training of the Region’s personnel at such times as requested by the Region.

### See Section 01640 - Manufacturers’ Services, and Section 01810 - Equipment Testing and Facility Startup.

**END OF SECTION**