

1 General

1.1 **DESCRIPTION OF WORK**

- .1 Specialized lube system provider to design and install complete lube storage and dispensing systems with all design, material, equipment, labor, accessories, services, tests, start-up, commissioning and training necessary to completely execute the specialties work as herein specified and indicated on the Drawings.

- .2 Services covered under this Specification shall include the following systems:

System Name	Piping Designation
Engine Antifreeze Fluid	EAF
Engine Oil	EO
Waste Engine Oil	WO

- .3 Scope of work

- .1 Refer to respective lube system process flow diagram for the minimum requirements, design criteria and scope of work for the lube systems provider.
- .2 Lube systems provider to coordinate with general contractor for providing all power, controls, conduits and wiring to lube system components as required.
- .3 Lube system provider is responsible to design and provide complete operating lubes storage and dispensing systems including all mechanical, electrical, and control systems. Design and Install as indicated on the Drawings and Specifications, including but not necessarily limited to:
- .1 Lubes storage tanks, totes, drums and accessories.
- .2 Lubes distribution piping (tubing), valves and fittings.
- .3 Lubes compressed air transfer pumps and controls.
- .4 Lube Tanks monitoring system.
- .5 Tanks fill and containment.
- .6 Installation of tanks (complete with concrete pad) and piping system.
- .7 Lube and compressed air hose reels.
- .4 Some lube local systems (i.e. waste antifreeze, etc.) are shown and described directly in the drawings and do not have a correspondent specification. Lube supplier to provide a standard equipment c/w all components customarily used for an operational system.

- .4 Acceptable system providers:

- .1 **COMCO Canada Inc.**, 100 Welham Rd., Barrie, On L4N 8Y4
Toll Free: 1-800-461-6620
Local 705-728-0905
Fax 705-728-1438
Attn: James Picton
- .2 **TMS (Total Meter Services)** 70 Worcester Rd. Toronto, ON. M9W 5X2
Tel: 416-225-5867

Fax: 416-225-1938

Attn: Dennis Swanek

1.2 **REFERENCE SECTIONS**

- .1 Section 23 05 01 Basic Mechanical Requirements
- .2 Section **41 68 10** **Aboveground Storage Tanks for Process Fluids**
- .3 Section 43 40 06 Pressure Piping
- .4 Section 43 40 07 Valves - Pressure Piping

1.3 **CODES AND STANDARDS**

- .1 References (Latest Editions)
 - .1 National Fire Protection Association (NFPA)
 - .2 Ontario Fire Code
 - .3 Underwriters' Laboratories of Canada (ULC)
 - .4 Canadian Standards Association (CSA)
 - .5 Ontario Electrical Safety Code
 - .6 Liquid Fuels Handling Code
 - .7 Canadian Petroleum Product Institute
 - .8 ASTM A36 - Specification for Structural Steel
 - .9 ASTM A53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - .10 ASTM A283 - Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars
 - .11 CAN/CSA G40.40/G40.21-M - General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels
 - .12 SSPC - Steel Structures Painting Council "Steel Structures Painting Manual"
 - .13 CAN-S630 - Shop Fabricated Steel Aboveground Vertical Tank for Flammable and Combustible Liquids
 - .14 ASTM A167-89A - Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip
 - .15 ASTM A276-89A - Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes
 - .16 ASTM A209-88A - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
 - .17 ANSI/ASME B36.19M-85 - Stainless Steel Pipe
 - .18 AW A5.4 - Covered Corrosion-Resisting Chromium and Chromium Nickel Steel Welding Electrodes

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| .19 | AW A5.9 | - Corrosion-Resisting Chromium and Chromium-Nickel Steel Bare and Composite Metal Cored and Stranded Welding Electrodes and Welding Rods |
| .20 | AWS C5.5 | - Gas Tungsten Arc Welding, Recommended Practices for |
| .21 | AWS C5.6 | - Gas Metal Arc Welding, Recommended Practices for |
| .22 | CSA W47.1 | - Certification of Companies for Fusion Welding of Steel Structures |
| .23 | CSA W48.1-M | - Carbon Steel Covered Electrodes for Shielded Metal Arc Welding |
| .24 | CSA W59-M | - Welded Steel Construction (Metal Arc Welding) |
| .25 | CAN/CSA-W117.2-M | - Safety in Welding, Cutting and Allied Processes |
| .26 | CSA W178.1 | - Certification of Welding Inspection Organizations |
| .27 | CSA W178.2 | - Certification of Welding Inspectors |

1.4 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 Product Data.
- .2 Shop Drawings: Provide a process flow detailed schematic indicating a complete system, signed by licensed engineer, indicating system layout, pipe sizes, location of supports, elevations, and equipment mounting details, for each lube system. For lube tanks, indicate dimensions, and location of all accessories.
- .3 Product data: Provide data on pipe (tubing) materials, pipe (tube) fittings, valves and accessories. Provide manufacturers catalog information for all equipment.
- .4 Electrical system design: Provide Drawings and Specifications stamped by licensed engineer that include the proposed layout and wiring diagrams for equipment covered in this section that requires electrical connections. Indicate number and size of wires, location of wiring in classified areas and location of intrinsically safe circuits.
- .5 Control system design: Provide control system design stamped by licensed engineer including electrical schematics, panel dimensions and field wiring diagrams.
- .6 Calculations: Provide calculations for pump selection, pipe sizes, pipe support requirements, atmospheric vent sizing, and emergency vent sizing.
- .7 Equipment data: Provide manufacturers information for all equipment.

2 Products

2.1 TANKS

- .1 Refer to Section 43 40 00 Aboveground Welded Steel Storage Tanks.

2.2 **AIR ACTUATED PUMPS**

.1 Low Pressure Fluid Systems

.1 Compressed Air Powered Diaphragm Pump – Waste Oil

- .1 This pump shall be a double acting double diaphragm pump with a self-lubricating non-stalling air valve.
- .2 This pump shall be of the self-priming design. This pump shall be compatible with waste antifreeze or waste oil.
- .3 This pump shall be abrasion resistant, and able to handle suspended solids of up to 1/8" OD.
- .4 This pump shall have dual inlet capability for 50-50 product mixture.
- .5 This pump includes all accessories customarily incorporated into this model.

.2 Engine Antifreeze Fluid 50:50 mixture

- .1 Heavy duty integrated air motor and pump tube must be capable of supplying 6 litres (1.5 gallons) per minute simultaneously at three dispensing locations for a total of 1.8 Lpm (4.5 gpm).
- .2 Must be capable of wall mounting as determined to be suitable for the application.
- .3 3:1 ratio to be confirmed by lube system supplier during detail design, based on lube piping layout shown on the drawings.
- .4 108 mm diameter air motor piston minimum with 40 to 150 psig of working air pressure. Larger air motors are optional.
- .5 Air motor to include Airbrake technology to prevent damage due to run-away.
- .6 Double acting pump, oil output from pump will be equal for both up and down stroke.
- .7 Stall pressure will be equal for both up and down stroke.
- .8 Ball check seats will be hardened and suitable for the application.
- .9 Integrated muffler exceeds OSHA noise requirements.
- .10 Corrosion resistant air motor will be fully pneumatic logic controlled with divorced from pump tube design. Modular design with a maximum of five moving parts for longer life and ease of maintenance.
- .11 The pump tube is to contain a carbon steel plunger case hardened with polyurethane seal or equal arrangement. Acceptable manufacturers: Lincoln Industrial or equal

.2 Medium Pressure Fluid Systems

.1 Heavy Duty Integrated Air Motor and Pump Tube for Engine Oil, Automatic Transmission Fluid:

- .1 Must be capable of supplying 6 Lpm (1.5 gpm) simultaneously at three dispensing locations for a total of 18 Lpm (4.5 gpm).

- .2 Must be capable of wall mounting as determined to be suitable for the application.
 - .3 5:1 ratio to be confirmed by lube system supplier during detail design, based on lube piping layout shown on the drawings.
 - .4 108 mm diameter air motor piston minimum with 40 to 150 psig of working air pressure. Larger air motors are optional.
 - .5 Air motor to include Airbrake technology to prevent damage due to run-away.
 - .6 Double acting pump, oil output from pump will be equal for both up and down stroke.
 - .7 Stall pressure will be equal for both up and down stroke.
 - .8 Ball check seats will be hardened and suitable for the application.
 - .9 Integrated muffler exceeds OSHA noise requirements.
 - .10 Corrosion resistant air motor will be fully pneumatic logic controlled with divorced from pump tube design. Modular design with a maximum of five moving parts for longer life and ease of maintenance.
 - .11 The pump tube is to contain a carbon steel plunger case hardened with polyurethane seal or equal arrangement.
 - .12 Acceptable manufacturers: Lincoln Industrial or approved equal
- .3 Air Pumps Accessories:
- .1 Service Shut off Valves
 - .1 All pumps shall be equipped with a service shut off valve to isolate the pump from the system for testing or service. This valve shall be rated for a working pressure greater than the maximum output pressure of the pump for which it is intended.
 - .2 All pumps shall be equipped with flexible hoses at inlet and outlet of pump to minimize shock transmitted to pump support brackets.
 - .3 Pumps shall be complete with wall mounting frame.
 - .4 Provide neoprene pads between frame and walls, pump and frame, to minimize transmission of vibrations to building structure.
 - .5 Filters Regulators and Lubricators
 - .1 Each compressed air powered diaphragm pump shall have incorporated into its supply line a filter regulator assembly. This assembly shall be securely mounted to the wall or the pump. The filter shall be equipped with an automatic drain and the regulator shall be equipped with an air gauge.

2.3

HOSE REELS

Features and Construction for Heavy Duty, Low Pressure Reels for: Engine Antifreeze and Compressed Air Applications

- .1 Working pressure rating of 1,000 psig.
- .2 13 mm (1/2") NPT (F) thread inlet and outlet connections with ninety degree swivel.

- .3 9 mm (3/8") I.D. hose by 15.24 m (50 ft) in length.
- .4 Multi position, dual arm support.
- .5 For antifreeze applications, all wet parts be stainless steel.
- .6 Components are individually powder coat painted prior to assembly.
- .7 Strain relief for hose connection through reel sheave.
- .8 Spring tension adjustable without disconnected hose, control valve or ball stop.
- .9 One hundred and eighty degree opposed double ratchet non-sparking hose reel stop mechanism.
- .10 Anti-lockout hose clamp.
- .11 Rolled sheave edges.
- .12 Dual needle bearings reduce friction to rotate reels providing smooth balanced operation during both hose extension and retraction.
- .13 Easily accessible yet fully contained power springs designed for optimum performance at various operating pressures.
- .14 Five year limited warranty.
- .15 Acceptable Manufacturers and Models
 - .1 Prime manufacturer or accepted equal: Specifications are based on the equipment identified herein by manufacturers name to establish acceptable standards of quality, performance, features and construction.
 - .2 Prime manufacturer: Lincoln
- .2 Features and Construction for Heavy Duty, Medium Pressure Reels for: Engine Oil and Automatic Transmission Fluid:
 - .1 Working pressure rating of 2500 psig.
 - .2 13 mm NPT thread inlet and outlet connections with ninety degree swivel.
 - .3 13 mm I.D. hose by 15.24 m in length.
 - .4 Multi position, dual arm support.
 - .5 Low restriction, fully ported swivel designed to be corrosion resistant when used with engine antifreeze.
 - .6 Components are individually powder coat painted prior to assembly.
 - .7 Strain relief for hose connection through reel sheave.
 - .8 Spring tension adjustable without disconnected hose, control valve or ball stop.
 - .9 One hundred and eighty degree opposed double ratchet non-sparking hose reel stop mechanism.
 - .10 Anti-lockout hose clamp.
 - .11 Rolled sheave edges.
 - .12 Dual needle bearings reduce friction to rotate reels providing smooth balanced operation during both hose extension and retraction.
 - .13 Easily accessible yet fully contained power springs designed for optimum performance at various operating pressures.

- .14 Five year limited warranty.
- .15 Acceptable Manufacturers and Models
 - .1 Prime manufacturer or accepted equal: Specifications are based on the equipment identified herein by manufacturers name to establish acceptable standards of quality, performance, features and construction.
 - .2 Prime manufacturer: Lincoln
- .3 Features and Construction of Metered Dispense Valves:
 - .1 Maximum flow rate of 45.4 Lpm (12 gpm) and maximum working pressure of 1500 psi (103 bar). Operating temperature range is -40-180°F (-40-82°C).
 - .2 EO and ATF in repair bays:
 - .1 Supply electronic meter with valve (9 mm flexible hose or rigid extension) to dispense lubes (see drawing(s) for quantities).
 - .2 Meter and valve to have range of 1-18.9 Lpm (.26-5 gpm) and operating pressure range for oils from 45-1000 psi (3.1-69 bar), and an operating pressure range for gear lube from 20-1000 psi (1.4-69 bar).
 - .3 Meter accuracy + .5% and repeatability of +15%. Operating temperature range is 32-120°F (-34.4-48.8°C). Valve is re-settable for daily, weekly or lifetime dispense reports.
 - .4 Provide an isolation valve just upstream the dispensing nozzle, hose mounted.
 - .5 Meter/valve must have a full two year warranty.
 - .6 Acceptable manufacturer: Lincoln or approved equal.
 - .3 Reel Mounting Channels and Brackets
 - .1 -Structural contractor shall provide reel banks support beam. Lube system supplier to order the reels complete with mounting plates and brackets to suit structural beam size and shape.
 - .2 Inlet connection hose.
 - .3 All reels shall be furnished with an inlet connection hose of identical construction as the previously specified outlet hoses to isolate the reel from the supply piping. The inlet connection hose shall be minimum two feet in length and the same diameter as the outlet hose.
- .4 Service Shut Off Valve
 - .1 All hose reels shall be equipped with a service shut off valve to isolate the reel from the system for testing or service. This valve shall be rated for a working pressure greater than the maximum output pressure of the pump which is supplying it.
 - .2 Service shut off valves shall include: Low pressure 13 mm valves, low pressure 25 mm valves, medium pressure 13 mm valves medium pressure 19 mm valves, high pressure 13 mm" valves.

2.4 **IDENTIFICATION TAGS FOR LUBES**

- .1 Clearly identify all lubes and process fluids piping/tubing.
- .2 Provide plastic identification tags on each lube dispensing hose, close to the dispensing nozzle for easy identification.
- .3 Provide plastic identification tags on each reel.

2.5 **PRESSURE GAUGES**

- .1 Pressure Gauge Assembly (Interior)
 - .1 Gauge: Dry type with 114 mm dual-scale (kPa/psi) dial, solid front, blowout back, polypropylene case, brass movement with bronze bushings, phosphor bronze silver brazed Bourdon tube, ¼ NPT brass socket. Accuracy, 1 percent of scale range, Grade 1A, in accordance with ANSI B40.1.
 - .2 All gauges installed over 3.66 m above finished floor shall be remotely mounted on nearest column at 1.68 m above finished floor and tubing extended to gauge from piping or tank. Install gauge lock at pipe and at gauge. Each gauge remotely mounted shall have manufacturer compensate for elevation and temperature difference at factory.
 - .3 Impulse dampener: Brass body and insert, ¼ NPT.
 - .4 Gauge lock: Brass body and plug, "T" handle.
 - .5 Diaphragm seal: Plain design with removable 316 stainless steel diaphragm Teflon coated on process side. Flushing port, 316 stainless steel process housing, ¼ NPT instrument connection, 15 mm process connection.
- .2 Pressure Gauge Assembly (Exterior)
 - .1 Gauge: Glycerin filled, with 12 mm dual-scale dial (kPa/psi), solid front, blowout back, polypropylene case, brass movement with bronze bushings, phosphor bronze silver brazed Bourdon tube, ¼ NPT brass socket. Accuracy, 1 percent of scale range, Grade 1A, in accordance with ANSI B40.1.
 - .2 Impulse dampener: Brass body and insert, ¼ NPT.
 - .3 Gauge lock: Brass body and plug, "T" handle.
 - .4 Diaphragm seal: Plain design with removable 316 stainless steel diaphragm Teflon coated on process side. Flushing port, 316 stainless steel process housing, ¼ NPT instrument connection, ½ NPT process connection.
- .3 Differential Pressure Gauge Assembly (Exterior)
 - .1 Gauge: Glycerin filled, with 114 mm dual-scale dial (kPa/psi), solid front, blowout back, aluminum or polypropylene case, brass movement with bronze bushings, phosphor bronze silver brazed Bourdon tube, ¼ NPT brass socket. Accuracy, 1% of scale range, Grade 1A, in accordance with ANSI B40.1.
 - .2 Impulse dampener: Brass body and insert, ¼ NPT.
 - .3 Gauge lock: Brass body and plug, "T" handle.
 - .4 Diaphragm seals: Plain design with removable 316 stainless steel diaphragm Teflon coated on process side. Flushing port, 316 stainless steel process housing, ¼ NPT instrument connection, ½ NPT process connection.

2.6 **POWER CORD REELS**

- .1 Industrial and heavy duty cord reels, automatic spring retractable.
- .2 115V, 20 amp rating, double power box at the end of each power reel, minimum 10m power reel cable.

3 Execution

3.1 **CLEANING OF PIPING SYSTEMS**

- .1 Refer to section 43 40 06 "Pressure Piping"

3.2 **PIPE AND VALVE IDENTIFICATION**

- .1 Refer to section 23 05 53 "Mechanical Identification."

3.3 **PIPING INSTALLATION**

- .1 Refer to section 23 05 01 "Basic Mechanical Requirements."
- .2 Refer to section 43 40 06 "Pressure Piping"

3.4 **PIPING SUPPORTS AND HANGERS**

- .1 Refer to section 23 05 29 "Pipe Hangers and Supports."

3.5 **HOSE REEL INSTALLATION**

- .1 Coordinate hose reel installation with structural steel drawings and structural steel Shop Drawings.

3.6 **EXAMINATION**

- .1 Examine areas, equipment foundations, and conditions with Installer present for compliance with requirements for installation and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- .2 Examine roughing-in of utilities to verify actual locations of piping / electrical connections prior to equipment installation.

3.7 **INSTALLATION**

- .1 General: Comply with equipment manufacturer's written installation instructions.
- .2 Refer to Section 43 40 06 "Pressure Piping" for piping, fittings, piping installation, flushing and startup of piping systems
- .3 Install equipment in locations indicated and arrange to provide access for periodic maintenance.
- .4 Support piping so that weight of piping is not supported by equipment.
- .5 Lube system provider in coordination with the General Contractor shall perform the following:
 - .1 Arrange for TSSA registration and inspection as required for all pressure systems.
 - .2 Perform all pressure tests as required by code and provide test reports to consultant for review.
 - .3 Perform the start-up check and provide a signed check list to Consultant for review.

3.8 **TRAINING**

- .1 Provide eight hours training session for two lube systems maintenance personnel and two hours sessions for twenty-one vehicle maintenance operators.

3.9 **COMMISSIONING REPORT**

- .1 Upon completion of the installation, start-up and testing procedures, lube system supplier to provide a final commissioning report containing the following:
 - .1 Pressure testing, start-up check list, O&M, training performed.
 - .2 A cover letter, signed and sealed by a Professional Engineer, listing the systems which have undergone the pre-functional and functional testing, and stating any deficiencies.
- .2 Substantial completion of the building's construction phase is dependent on the Owner's acceptance of the final commissioning report.

End Of Section