

**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 01 33 00 – Submittal Procedures.
- .2      Section 01 74 11 – Cleaning.
- .3      Section 01 74 21 – Construction Waste Management.

**1.2            REFERENCES**

- .1      American Society of Mechanical Engineers (ASME):
  - .1      ASME-B16.3-98, Malleable-Iron Threaded Fittings.
- .2      ASTM International:
  - .1      ASTM A53/A53M-04, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3      CSA International:
  - .1      CSA-B139-09, Installation Code for Oil Burning Equipment;
  - .2      CSA-B140.0-03, Oil Burning Equipment: General Requirements;
- .4      Canadian National Research Council / Institute for Research in Construction:
  - .1      CNRC 38727, Canadian Fire Prevention Code.
- .5      Transport Canada (TC):
  - .1      Transport of Dangerous Goods Act (1992).
- .6      Canadian Council of Ministers of the Environment:
  - .1      CCME-PN1327-2004, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.
- .7      Department of Justice Canada (DoJ):
  - .1      Canadian Environmental Protection Act (1999);
  - .2      Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (2008).
- .8      Quebec Construction Code 2007, Chapter 8 –Petroleum Equipment Installations.
- .9      Quebec Safety Code 2007, Chapter 6 – Petroleum Equipment Installations.

### **1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-Installation Meeting:
  - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installations, where the following will be outlined:
    - .1 Verify project requirements;
    - .2 Review manufacturer's installation instructions and warranty requirements.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Provide manufacturer's printed product literature, specifications and datasheets for piping, fittings and equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Manufacturers' Instructions: provide manufacturer's installation instructions.

### **1.5 QUALITY ASSURANCE**

- .1 Ensure piping is installed by company authorized by authority having jurisdiction.

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

- .1 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

## **Part 2 Products**

### **2.1 FILL VENT AND CARRIER PIPE**

- .1 Steel: to ASTM A53/A53M, Schedule 40, threaded ends.
- .2 Double Wall Polyethylene: Conforms to CAN/ULC-s660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquid.

### **2.2 STEEL PIPE COATING**

- .1 Interior enamel paint and alkyd outdoor paint, urethane and silicone for metal only and specially formulated as a primer and finisher to stop rust from forming on new or rusted ferrous metals.

## **2.3 JOINTING MATERIAL**

- .1 Filleted pipe joints for petroleum products must be used with joint compound or Teflon (polytetrafluoroethylene) tape rated to CAN/ULC-S642 Standards « Sealing Products for Filleted Pipe Joints ».

## **2.4 FITTINGS**

- .1 Steel:
  - .1 Malleable iron: screwed, banded, Class 150 to ASME-B16.3;
  - .2 Flexible metal joint, to ULC/ORD-C536

## **2.5 VALVES**

- .1 Valves must be ball-type, screwed ends, full flow, conforms to ULC/ORD-C842.

## **2.6 CHECK VALVES**

- .1 Check valves will be of type Swing Check and Y-Pattern, with threaded end connections, class 150, conforms to API-602.

## **2.7 TRANSITION SUMPS**

- .1 Transition sump with aboveground top made of stainless steel, same dimensions as OPW's model: PTS-4021 or equivalent. The aboveground part must be made of stainless steel 304, 14 gauge, polished finish and brushed welds.
- .2 Accepted product: OPW model PTS-4021 or equivalent.

## **2.8 DISCRIMINATING DETECTION SENSOR**

- .1 Discriminating detection sensor can be connected to the existing leak detection system Veeder-Root TLS-350.
- .2 Accepted Products: Veeder-Root model 794380-322 or equivalent.
- .3 Hydrostatic sensor with double detection for brine that can be connected to the existing leak detection system Veeder-Root TLS-350.
- .4 Accepted Products: Veeder-Root model 794380-303 or equivalent.
- .5 The probe support must be made by the same manufacturer.
- .6 Accepted Products: Veeder-Root model 330020-012 or equivalent.



## 2.9 PRIMARY BACKFILL

- .1 The backfill material must be new and cannot contain clay or clay chunks, sand, roots, pyretic shale, construction debris or organic material.
- .2 Underground pipes:  
     Fine gravel, naturally rounded aggregate, larger than 3mm and less than 18mm.

## 2.10 GEOTEXTILE MEMBRANE

- .1 Geotextile membrane nonwoven needled made of polypropylene.
- .2 Properties:

PROPERTIES	TEST METHOD	VALUE
Tension Resistance at Rupture	CGSB 148.1 No. 7.3	800 N
Percent Elongation at Rupture	CGSB 4.2 No. 7.3	45-105%
Shear Resistance at Rupture	CGSB 4.2.1 No. 12.2	360 N
Burst Resistance	CGSB 148.1 No. 11.1	2275 kPa
Permeability	CGSB 148.1 No. 7.3	0.20 cm/s
Permittivity	CGSB 148.1 No. 4	0.96 s-1
FOS	CGSB 148.1 No. 10	150 µm
Standard Width	ASTM D 461.9	3.5 m
Standard Length	CGSB 148.1 No. 8	100 m

- .3 Accepted Products: Texel model 7612 or equivalent.

## Part 3 Execution

### 3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 CLEARANCE

- .1 Leave a clearance around all equipment to facilitate inspection, maintenance and observation of proper working order, based on manufacturer's recommendations, the Canadian Fire Prevention Code and CSA B139 Standards.

### **3.3 PIPING**

- .1 Install oil piping system in accordance with NFCC and CSA-B139.
- .2 Underground piping to be protected in conformance with CAN/ULC-S660-08.  
Slope piping down in direction of storage tank unless otherwise indicated.
- .3 Cover threaded joints with a sealant for petroleum products.
- .4 Prevent foreign objects from entering into non-connected openings.
- .5 Install pipes to isolate individual devices to allow for removal without interrupting the operation of other devices in the network.
- .6 Group pipes when and where possible.
- .7 Deburr pipe ends, and clean insides for any debris before assembly.
- .8 Anticipate movement of pipes due to thermal expansion, and incorporate flexible metallic joints to compensate.
- .9 Fill immediate area around pipe as per the plans.

### **3.4 FLEXIBLE PIPES**

- .1 Flexible pipes must not be installed in straight lines, but in a wave like fashion to compensate for thermal expansion and contraction, and as recommended by the manufacturer.
- .2 Prepare trenches for piping, such that they are free of debris, uniformly level and contain no sharp elevated points, as well as a 1% slope towards the reservoir.
- .3 Compact the ground of the trench to 95% PM.
- .4 Cover the bottom and wall of the trench with a geotextile membrane permeable separation.
- .5 Before installing the pipes in the trench, put a first layer of primary fill as specified. Then install the pipes and cover with second layer of fill.
- .6 The flexible piping must be filled in order to obtain:
  - .1 150mm of fill below each pipe;
  - .2 150mm of fill between the pipe and the sides of the membrane;
  - .3 At least twice the nominal diameter from another pipe;
  - .4 150 mm of fill above each pipe, including the finishing layer.

- .7 All fill material will be contained inside the permeable membrane, Each membrane will be installed in a continuous manner in the trench and folded over towards the center. They will prevent migration of soils into the primary fill.
- .8 Cover the membranes with crushed stone and 2 green metallic warning tapes. The tape is equipped with 2 steel wires which will allow easy detection of pipes, as well as a visual warning in the case of future excavation. This tape will be approximately 200mm above the pipes, or based on manufacturer recommendations.
- .9 The surfaces to fill must be clear of debris, clay, ice, stray or frozen ground, foreign matter or debris, or any other substance that will affect the compaction of ground.
- .10 The pipes will be subjected to sealing tests as mentioned in the Construction Code, and as per the directives of the manufacturer concerning these sealing tests. The Contractor must perform all the tests outlined in the installation manual of the pipes and must fill out all necessary documents before submitting the warranty application to the manufacturer. The Contractor must send these documents to both the manufacturer and the Client.

### **3.5 PIPE PAINTING**

- .1 All interior pipes, new and existing, including the pipes located in canals, must have a fresh layer of paint applied, the painting will be done once the sealing tests have been passed.
- .2 All the pipes and joints inside of all the transition sumps must receive a fresh coat of paint.
- .3 The surface of the pipe must be dry and clean, without any dirt, oil, grease, wax, efflorescent salts, cracked paint or any other contaminant.
- .4 Dull and glossy surfaces.
- .5 Remove any cracked paint and any removable rust using a steel brush or scraper.
- .6 Using a cleaning product and rust remover for metal, approved product: Corrostop Ultra 635-104 or equivalent.
- .7 Paint the surfaces according to manufacturer specifications. Accepted product: Corrostop Ultra 0635-085 or equivalent.

### **3.6 SLEEVES**

- .1 Install sleeves in transitions such as masonry or concrete and building interiors and other indicated locations.
- .2 Use sleeves made of black steel pipe, schedule 40.
- .3 Use caulking of ULC/ORD-S115 standard for the interior and exterior finish.

### **3.7 VALVES**

- .1 Install valves with stems upright or horizontal unless approved otherwise by Consultant.
- .2 Install ball valves as indicated.  
  
Install swing check valves and as indicated.

### **3.8 TRANSITION SUMPS**

- .1 Install a transition sump close to the building as indicated in the plans.

### **3.9 METER**

- .1 Repair and then calibrate, the meter at the outlet of the pump assembly.

### **3.10 DISCRIMINATING DETECTION SENSOR**

- .1 In the new transition sump, install a liquid discriminating detection sensor 0mm above the bottom of the box, which can be connected to the existing leak detection system Veeder-Root TLS-350. The support of the probe must be made by the same manufacturer.
- .2 Connect the new probe to the existing Veeder-Root system using wiring and equipment recommended by the manufacturer.

### **3.11 GEOTEXTILE MEMBRANE**

- .1 Install the geotextile membrane between the primary and secondary backfill according to the state of the art rules.
- .2 Install the membrane in such a way to obtain a smooth surface while avoiding and tension, folds or warping.
- .3 Remove any objects that could damage the membrane before installation.
- .4 Prevent displacement, and protect the membrane, before, during and after the installation, with a covering layer.
- .5 Geotextiles must be installed in a manner to have a minimum overlap of 300mm, or sewn together with thread resistant to chemical and biological agents equally, or superior to the resistance of the geotextiles.

### **3.12 PIPE PRESSURE TESTS**

- .1 In addition to the instructions listed hereafter, The Contractor must perform all tests specified by the manufacturers, by the codes and by the Client of their representative.
- .2 The Contractor must supply a report of pressure tests to the Client's representative. Before the tests, the Contractor must inform the representative so they can witness the tests and confirm the results.

- .3 During the tests, either the Client or their representative must be present.
- .4 In order for the Client to be present at the test, the Contractor must notify the Client 48 hours prior to the start of the test.

All tests involving petroleum equipment will be done using nitrogen.

- .5 For underground pipes, tests for primary and secondary piping can be carried out simultaneously.

### **3.13 LEAK REPAIR**

- .1 In all cases or seal tests where a leak is found on new or existing equipment, the pipes and all the joints and equipment that leak will be repaired or replaced, and then the system will be subject to a new seal test.

### **3.14 TESTS FOR ABOVEGROUND PIPES**

- .1 Once installed, an aboveground pipe must pass a pressure test following the following criteria:
  - .1 A gauge test pressure of at least 350 kPa, or one and a half times the maximum operating pressure must be created inside the pipes;
  - .2 The pipes and its joins must be verified with a leak detection fluid;
  - .3 The pressure created inside the pipes must be measured by two graduated manometers with units no larger than 4 kPa for pressures less than or equal to 700 kPa, and units corresponding to no greater than 1% of the test pressure for systems operating at higher than 700 kPa, and if the pipe is able to contain that pressure.
- .2 If the test pressure surpasses the operating pressure produced by the pumps and other equipment in the pipe system, those equipment do not need to be pressure tested.
- .3 All new and existing piping must undergo a pressure test.
- .4 Once the temperature stabilizes and the source of pressure is removed, the induced pressure must be maintained in the pipes for at least 2 hours.

### **3.15 TESTS ON THE PRIMARY WALL FOR UNDERGROUND PIPES**

- .1 The pressure test of the primary wall of a pipe follows the following criteria:
  - .1 The ends of the pipe must be hermetically sealed;
  - .2 The pressure must be measured using two manometers graduated in units of 10 kPa maximum;
  - .3 A hydrostatic pressure of Nitrogen at least 350 kilopascals and no more than 515 kilopascals must be applied;
  - .4 Each pipe joint must be verified using leak detection liquid;



- .5 Once the temperature stabilizes and the source of pressure removed, the pressure applied must be maintained for at least 2 hours.

### **3.16 TESTS OF THE SECONDARY WALL FOR UNDERGROUND PIPES**

- .1 The pressure test of the secondary wall of a pipe follows the following criteria:
  - .1 Slide the cofferdam until it contacts the double wall;
  - .2 A hydrostatic pressure of Nitrogen of maximum 35 kPa must be applied;
  - .3 All joints and surfaces of the pipes must be checked using leak detection liquid.
- .2 Once the temperature has stabilized and the source of pressure removed, the pressure applied must be maintained for at least 1 hour.

### **3.17 GENERAL UNDERGROUND EQUIPMENT TESTS**

- .1 After the tests on the primary and secondary walls, and all leaks have been fixed, a general test on the petroleum system must be done:
  - .1 A safety valve of no more than 40 kPa capable of releasing the flow from the source pressure must be installed and inspected before the test;
  - .2 The induced pressure inside the reservoir and the pipes must be measure using a manometer graduated in units of no more than 1 kPa;
  - .3 A pressure of at least 30 kPa and at most 35 kPa must be created in the assembly undergoing the test;
  - .4 All joints between the reservoir and the pipes must be verified while the assembly is under pressure using leak detection liquid;
  - .5 Once the temperature has stabilized and the source of pressure removed, the pressure in the system must be maintained for at least 2 hours.

**END OF SECTION**