

**PART 1 - GENERAL**

- 1.1 RELATED SECTIONS
- .1 This section shall be read in conjunction with specification Section 21 05 01 - Mechanical General Requirements, all mechanical sections, and all other disciplines related to the project.
  - .2 American Society of Mechanical Engineers (ASME)
    - .1 ASME B31.1-2014, Power Piping.
    - .2 ASME B31.9-2014, Building Services Piping.
  - .3 American Society for Testing and Materials International (ASTM)
    - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - .2 ASTM C591-15, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
    - .3 ASTM D1248-12, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
- 1.2 PRODUCT DATA
- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Quality Assurance:
    - .1 Test reports: submit certified test reports for specified materials from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
    - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
    - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and.
  - .3 Closeout Submittals:
    - .1 Provide operation and maintenance data for piping systems for incorporation into manual.
    - .2 Record Drawings: provide data necessary to produce record drawings on project completion and following requirements:
      - .1 Give details of pipe material, location of fittings, maintenance and operating instructions.
- 1.3 QUALITY ASSURANCE
- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative:
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Co-ordination with other building subtrades.
    - .4 Review manufacturer's installation instructions and warranty requirements.
- 1.4 SCHEDULING
- .1 Schedule work to minimize interruptions to existing services.
  - .2 Submit schedule of expected interruptions for approval by Departmental Representative.

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- 1.4 SCHEDULING (Cont'd) .3 Notify Departmental Representative and building superintendent minimum of 24 hours in advance of interruption in service.
- 1.5 DEFINITIONS .1 HP Systems: High-pressure piping operating at more than 15 psig (104 kPa) as required by ASME B31.1.
- .2 LP Systems: Low-pressure piping operating at 15 psig (104 kPa) or less as required by ASME B31.9.
- .3 Carrier Pipe: Inner most pipe containing the fluid.
- .4 Conduit Pipe: Outer pipe protecting internal assembly; internal assembly consists of carrier pipe, insulation and carrier pipe supports and guides.

## **PART 2 - PRODUCTS**

- 2.1 GENERAL .1 The prefabricated preinsulated distribution lines with fluid temperatures up to 120°C, as shown on the contract drawings, shall be insulated and HDPE jacketed.
- .2 A factory certified field technician shall be required on site to provide inspection during the critical periods of installation defined as:
- .1 Unloading of the first load of material
  - .2 Inspection of the initial trench and bedding
  - .3 Field joint instruction
  - .4 Pouring of anchor blocks
  - .5 Testing
  - .6 Initial backfill
- .3 A field report shall be required from the factory technician detailing work observed while on site. Field reports shall be submitted to the contractor and Departmental Representative.
- 2.2 SERVICE PIPE .1 Internal piping shall be Standard Weight ASTM A53 Gr. B Standard Weight ERW Carbon Steel. All joints shall be butt welded. Where possible, straight sections shall be supplied in 10 m random length with 150 mm of piping exposed at each end for field joint fabrication.
- 2.3 SUBASSEMBLIES .1 End seals and gland seals shall be designed and factory fabricated to prevent the ingress of moisture into the system.
- 2.4 SERVICE PIPE INSULATION .1 Insulation shall be spray applied polyurethane foam, having a nominal 32 kg/m<sup>3</sup> density for all straight lengths and fittings. Quality assurance procedures for the insulation shall include either a visual check prior to jacketing, infrared, or x-ray testing of the entire length, to insure there are no insulation voids. The urethane foam shall meet ASTM C591 and have the minimum characteristics of .14 K-factor, density of 2 pcf and a closed
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- 2.4 SERVICE PIPE INSULATION (Cont'd) .1 (Cont'd)  
cell content of 90 to 95%. The insulation shall be applied to the minimum thickness specified below. The insulation thickness shall not be less than 50 mm.
- 2.5 PROTECTIVE JACKET .1 The outer protective insulation jacket shall be seamless high density polyethylene (HDPE) in accordance with ASTM D1248, Type 3, Class C. PVC or tape materials are not allowed.
- .2 The minimum thickness for HDPE jackets shall be 125 mils.
- 2.6 FITTINGS .1 All fitting shall be supplied by the installing contractor. Insulation and jacketing kits shall be supplied by manufacturer.

**PART 3 - EXECUTION**

- 3.1 TESTING .1 The service pipe shall be hydrostatically tested to 860 kPa or 1½ times the operating pressure, whichever is greater, for a period of not less than 2 hours. No pressure drop shall be allowed. The manufacturer's field service technician shall witness all testing.
- 3.2 FIELD JOINTS .1 After the service pipe has been welded and successfully tested the installer shall insulate the service pipe field joint with factory supplied polyurethane foam. A heat shrinkable adhesive backed shrink wrap shall be applied over the foam. The foam shall be completely sealed. Backfilling shall not begin until the heat shrink-wrap has cooled. The manufacturer shall furnish all insulation and jacketing materials for making the field joint.
- 3.3 INSTALLATION .1 The installing contractor shall handle the system in accordance with the directions furnished by the manufacturer and as approved by Departmental Representative.
- 3.4 TRENCHING / BEDDING / BACKFILL .1 Trench depth, slope and width shall comply with plan details and manufacturer's recommendations. The trench shall comply with OSHA as well as Local, Provincial and Federal safety requirements. The trench shall be kept clear of debris. The trench shall be kept dry and well maintained for pipe installation. A 150 mm layer of sand shall be placed and tamped in the trench to provide a uniform bedding for the pipe. The contractor may use bellholes and sandbags in accordance with manufacturer's requirements for joining the pipe. The entire trench width shall be cleaned of debris then evenly backfilled with a similar material as the bedding in 150 mm compacted layers to a minimum height of 150 mm above the top of the insulated piping system. The remaining trench shall be evenly and continuously backfilled in uniform layers with suitable excavated soil.