

## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 21 05 01 – Common Work Results - Mechanical.
- .2 Section 23 05 05 – Installation of Pipework.
- .3 Section 23 05 29 – Hangers and Supports for Piping and Equipment.
- .4 Section 23 05 93 – Testing, Adjusting and Balancing (TAB).

### 1.2 REFERENCES

- .1 ASTM International Inc.:
  - .1 ASTM D3350 Standard Specification for Polyethylene Plastic Pipe and Fittings Material.
  - .2 ASTM D1505 Standard Test Method for Density of Plastics by the Density Gradient Technique.
  - .3 ASTM D1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
  - .4 ASTM D2837 Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
  - .5 ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials.
  - .6 ASTM D638 Standard Test Method for Tensile Properties of Plastics.
  - .7 ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness.
  - .8 ASTM F1473 Standard Test Method for Notch Tensile to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins.
  - .9 ASTM D1525 Standard Test Method for Vicat Softening Temperature of Plastics.
  - .10 ASTM D746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
  - .11 ASTM D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
  - .12 ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
  - .13 ASTM D3035 Standard Specifications for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
  - .14 ASTM D2239 Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
  - .15 ASTM D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
- .2 CSA:
  - .1 CSA B137.1-05 Polyethylene (PE) Pipe, Tubing and Fittings for Cold Water Pressure Services.
  - .2 CSA C448 Design and Installation of Earth Energy Systems.
- .3 AWWA:
  - .1 AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 13 mm to 75 mm for Water Service.

- .2 AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 100 mm to 1575 mm for Water Distribution and Transmission.
- .4 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):
  - .1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
  - .2 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
  - .3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- .5 NSF:
  - .1 NSF/ANSI 14 – Plastic Piping System Components and Related Materials.
  - .2 NSF/ANSI 61 – Drinking Water System Components – Health Effects.
- .6 National Plumbing Code of Canada (NPC) - 2010.

### 1.3 SUBMITTALS

- .1 Provide Shop Drawing and Maintenance Manual submittals in accordance with Section 01 33 00 - Submittal Procedures and section 21 05 01 – Common Work Results – Mechanical.

## 2 Products

### 2.1 HDPE PIPING (25 mm)

- .1 Application: Domestic Cold Water system and Domestic Cold Water Recirculation system (Location – Jetty Tunnel and Underground Piping).
- .2 High Density Polyethylene (HDPE) potable water pressure piping to AWWA, ASTM, NSF and CSA. Black PE3608 resin to ASTM D3350 c/w ultraviolet (UV) stabilizers for maximum UV ray protection.
- .3 Cell classification to 345434, listed with the Plastic Pipe Institute's (PPI) TR4.
- .4 Piping and fittings shall be clearly identified by the manufacturer, in terms of the mfg'r's name, pressure class, size, dimensional ratio, material code, pipe OD, standard approval markings and the production date.
- .5 For piping less than 75 mm nominal diameter, coil lengths are preferred. For larger pipe sizes, straight lengths of piping is preferred.
- .6 Pressure class: 1.1 MPa.
- .7 SDR 11.0.
- .8 Acceptable Materials: IPL Plastics VERSApipes HD80; IPEX; J-M Manufacturing Company Inc.; Dura Line.

## 2.2 HDPE PIPING (50 mm and 100 mm)

- .1 Application: Domestic Cold Water system and Domestic Cold Water Recirculation system (Location – Jetty Tunnel and Underground Piping).
- .2 High Density Polyethylene (HDPE) potable water pressure piping to AWWA, ASTM, NSF and CSA. Black PE4710 (PE3408) resin to ASTM D3350 c/w ultraviolet (UV) stabilizers for maximum UV ray protection.
- .3 Cell classification to 445574C/E, listed with the Plastic Pipe Institute's (PPI) TR4.
- .4 Piping and fittings shall be clearly identified by the manufacturer, in terms of the mfg'r's name, pressure class, size, dimensional ratio, material code, pipe OD, standard approval markings and the production date.
- .5 For piping less than 75 mm nominal diameter, coil lengths are preferred. For larger pipe sizes, straight lengths of piping is preferred.
- .6 Pressure class: 1.4 MPa.
- .7 Dimensional Ratio (DR): 11.0.
- .8 Acceptable Materials: Performance Piping (a Division of Chevron Phillips Chemical Company LP) DriscoPlex; IPEX; J-M Manufacturing Company Inc.; Dura Line.

## 2.3 HDPE PIPING JOINTS, ELBOWS, FITTINGS AND SADDLES

- .1 HDPE fittings shall be by the same manufacturer as the HDPE piping.
- .2 Socket weld heat fusion to ASTM F2620- Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings and ASTM D2683 Standard Specification for Socket Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
- .3 Provide SDR 11, 1.4 MPa rated molded butt fusion flange adapters where required.
  - .1 Acceptable Materials: Integrity Fusion Products, Inc. or equivalent.
- .4 Provide SDR 11, 1.4 MPa rated, stainless steel (SS), Type 316 backup rings where required.
  - .1 Acceptable Materials: Integrity Fusion Products, Inc. IntegriFuse or equivalent.
- .5 Provide SDR 11, 1.4 MPa rated, stainless steel (SS), Type 316 standard NPT transition fittings where required.
  - .1 Acceptable Materials: Integrity Fusion Products, Inc. IntegriFuse or equivalent.
- .6 Provide branch saddles, 1.1 MPa rated for 100 mm diameter piping.
  - .1 Acceptable Materials: Friatec or equivalent.

- .7 Provide 90 degree socket weld HDPE piping elbows where required.
  - .1 Acceptable Materials: Rahn Plastics Inc. or equivalent.

## **2.4 COPPER PIPING (25 mm and 38 mm)**

- .1 Application: Domestic Cold Water system and Domestic Cold Water Recirculation system (Location – Conditioning Backflow Preventer Closet, Location of Circulation Pumps, Immediately After Coming Through Floor).
- .2 Pipe to be Type 'L' copper conforming to ASTM B42.
- .3 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 50 mm and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.
- .6 Smaller than 50 mm: wrought copper to ANSI/ASME B16.22 cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

## **3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets. Install in accordance with NPC Code and the local Authority Having Jurisdiction (AHJ).
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Do cold weather work in accordance with the manufacturer's instructions and/or recommendations. Follow ASTM F2620 for cold weather procedures.

### **3.2 PIPE INSULATION**

- .1 Piping and fittings shall be insulated as per Section 23 07 15 Thermal Insulation for Piping.

### **3.3 ELECTRICAL HEAT TRACING**

- .1 Refer to the Electrical Drawings for the electrical heat tracing details and requirements.

- .2 Electrical heat tracing shall be installed following pipe testing and prior to installation of the piping insulation.

### **3.4 VALVES**

- .1 Isolate equipment and branches with ¼ turn, full port ball valves unless shown otherwise on the Drawings.
- .2 Balance recirculation system using circuit balancing valves. Mark settings and record on “As-Built” Drawings.

### **3.5 PIPING IDENTIFICATION**

- .1 All piping shall be identified c/w directional flow arrows, as per Section 23 05 53 Mechanical Identification.

### **3.6 FLUSHING AND CLEANING**

- .1 Clean all piping and fitting surfaces.
- .2 Systems to be complete, prior to flushing, testing and start-up.
- .3 Refer also to Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

### **3.7 START-UP**

- .1 Timing: start up after:
  - .1 Pressure tests have been completed.
  - .2 Disinfection procedures have been completed.
- .2 Start-up procedures:
  - .1 Establish circulation and ensure that air is eliminated.
  - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
  - .3 Monitor piping systems for freedom of movement, pipe expansion as designed.
  - .4 Check control, limit, safety devices for normal and safe operation.

### **3.8 PERFORMANCE VERIFICATION**

- .1 Scheduling:
  - .1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued.
- .2 Procedures:
  - .1 Balance DCW Recirculation system in accordance with Section 23 05 93 - Testing, Adjusting and Balancing.
  - .2 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

- .3 Reports:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: Reports, using report forms as specified in Section  
01 91 13 - General Commissioning (Cx) Requirements: Report Forms and  
Schematics.

**END OF SECTION**