

## **1. PART 1 – GENERAL**

### **1.1 Summary**

- .1 Section Includes.
  - .1 Materials and installation for steel piping, valves and fittings for hydronic systems
- .2 Related Sections.
  - .1 Section 230500E - Common Work Results for Mechanical.
  - .2 Section 230517E - Pipe Welding.
  - .3 Section 230802E - Cleaning and Start-up of Mechanical Piping Systems.
  - .4 Section 230593E - Testing, Adjusting and Balancing for HVAC.

### **1.2 References**

- .1 American Society of Mechanical Engineers (ASME).
  - .1 ASME B16.1-[98], Cast Iron Pipe Flanges and Flanged Fittings.
  - .2 ASME B16.3-[98], Malleable Iron Threaded Fittings.
  - .3 ASME B16.5-[03], Pipe Flanges and Flanged Fittings.
  - .4 ASME B16.9-[01], Factory-Made Wrought Butt welding Fittings.
  - .5 ASME B18.2.1-[03], Square and Hex Bolts and Screws (Inch Series).
  - .6 ASME B18.2.2-[87(R1999)], Square and Hex Nuts (Inch Series).
- .2 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM A 47/A47M-[99], Standard Specification for Ferritic Malleable Iron Castings.
  - .2 ASTM A 53/A53M-[02], Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
  - .3 ASTM A 536-[84(1999)e1], Standard Specification for Ductile Iron Castings.
  - .4 ASTM B 61-[02], Standard Specification for Steam or Valve Bronze Castings.
  - .5 ASTM B 62-[02], Standard Specification for Composition Bronze or Ounce Metal Castings.
  - .6 ASTM E 202-[00], Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols.
- .3 American Water Works Association (AWWA).
  - .1 AWWA C111-[00], Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .4 Association canadienne de normalisation (CSA)/CSA International.
  - .1 CSA B242-[M1980 (R1998)], Groove and Shoulder Type Mechanical Pipe Couplings.
  - .2 CAN/CSA W48-[01], Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).
  - .1 MSS-SP-67-[025], Butterfly Valves.
  - .2 MSS-SP-70-[98], Cast Iron Gate Valves, Flanged and Threaded Ends.
  - .3 MSS-SP-71-[97], Cast Iron Swing Check Valves Flanged and Threaded Ends.
  - .4 MSS-SP-80-[03], Bronze Gate, Globe, Angle and Check Valves.
  - .5 MSS-SP-85-[02], Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.

## **2. PART 2 - PRODUCTS**

### **2.1 Heating or chilled water piping (with or without glycol)**

- .1 General
  - .1 Use steel piping for NPS-2 ½ and larger and copper tubing for NPS-2 and smaller (steel pipes optional). A dielectric device shall be inserted between two different metals.
- .2 Steel pipes and accessories
  - .1 Schedule 40, Victaulic of flanged types for fittings with welded joints on NPS-2 ½ and larger, screwed fittings and joints on NPS-2 and smaller, black steel ASTM-A53 grade B.
  - .2 Forged steel fittings class 200 per ANSI B-16.9.
- .3 Copper piping and accessories
  - .1 Rigid type "L" tubing per ASTM-B-88M.
  - .2 Brazed joints with 95% tins and 5% antimony.
  - .3 Forged brass fitting per ANSI B-16.15 and B-16.22.
  - .4 Class 125 cast steel flanged c/a rubber gasket.
- .4 Valves
  - .1 Ball valves up to NPS-2 : Crane F-902, Watts B-6000, Victaulic or M.A. Stuart.
  - .2 Butterfly valves from NPS-2 : Appollo no. 148, Mueller Steam specialty, Victaulic, Keystone or Bray-Valve.
  - .3 Supply with and extension stem to clear the insulation material according to thickness.
  - .4 Dielectric joint as per ASTM F492.
  - .5 Manual balancing valves of Venturi type 2A Griswold, Preso, Flow Design or Hays on low flows, and as Armstrong CBV, Tour & Anderson or Preso for NPS-2 ½ on larger, sized for the flow by the manufacturer.
- .5 Supports
  - .1 Support and anchor piping with screwed rods chosen for the definite charge and in consideration of expansion and contraction of pipes and as per MSS-SP-58 recommendations.
  - .2 Refer to section 230529E – Hangers and supports for HVAC piping and equipment, and also to section 230548E – Vibration and seismic controls for HVAC piping and equipment, for material and installation.
- .6 Fire protection
  - .1 Fill the annular space around the pipe going through partitions and floors having a fire resistance with CSA approved caulking products as Hilti or equivalent.

## **3. PART 3 - EXECUTION**

### **3.1 Piping installation**

- .1 Install pipework in respect of the building lines and leaving the maximum room in the premises.

### **3.2 Circuit balancing valves**

- .1 Install flow measuring stations and flow balancing valves as indicated.
- .2 Remove handwheel after installation and when TAB is complete.
- .3 Tape joints in prefabricated insulation on valves installed in chilled water mains.

### 3.3 Cleaning, flushing and start-up

- .1 In accordance with Section 230802E - Cleaning and Start-Up of Mechanical Piping Systems.

### 3.4 Testing

- .1 Test the network to 1.5 times the service pressure, but never less than 860 kPa.
- .2 Segregate all equipment of accessory of nominal pressure low than the testing pressure.
- .3 The testing pressure shall be maintained during at least 4 hours without dropping.
- .4 Correct all leaks and remake the test.
- .5 For gas networks, make tests as per standard CAN/CGA-B-149.10, Natural and Propane gas installation Code.

### 3.5 Balancing

- .1 Balance water systems to within plus or minus 5 % of design output.
- .2 Refer to Section 230593E - Testing, Adjusting and Balancing for HVAC or applicable procedures.