

**Part 1            General****1.1                RELATED SECTIONS**

- .1        Section 01 00 10 – General Instructions.
- .2        Section 01 35 29.06 – Health and Safety Requirements.
- .3        Section 21 05 01- Common Work Results for Mechanical.
- .4        Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.
- .5        Section 23 31 13.01 - Metal Ducts - Low Pressure to 500 Pa.

**1.2                REFERENCES**

- .1        American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
  - .1        ANSI/ASME B31.1-07, Power Piping. Includes Addenda A (2008) and Addenda B (2009).
- .2        American Society for Testing and Materials International (ASTM)
  - .1        ASTM A125-96 (2007), Standard Specification for Steel Springs, Helical, Heat-Treated.
  - .2        ASTM A307-07, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3        ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
- .3        Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1        Material Safety Data Sheets (MSDS).
- .4        Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1        MSS SP58-2009, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2        MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.
  - .3        MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.
- .5        Underwriter's Laboratories of Canada (ULC)

**1.3                SYSTEM DESCRIPTION**

- .1        Design Requirements:
  - .1        Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.
  - .2        Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.
  - .3        Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

- .4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.
- .5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.
- .2 Performance Requirements:
  - .1 Design supports, hangers, to withstand seismic events as specified Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

#### **1.4 SUBMITTALS**

- .1 Submittals: in accordance with Section 01 00 10 – General Instructions.
- .2 Submit shop drawings and product data for following items:
  - .1 Bases, hangers and supports.
  - .2 Connections to equipment and structure.
  - .3 Structural assemblies.
- .3 Quality assurance submittals: submit following in accordance with Section 01 00 10 – General Instructions.
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
    - .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.
- .4 Closeout Submittals:
  - .1 Provide maintenance data for incorporation into manual specified in Section 01 00 10 – General Instructions.

#### **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

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

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store and handle in accordance with Section 01 00 10 – General Instructions.
  - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

- .2 Waste Management and Disposal:
  - .1 Construction Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

## **Part 2 Products**

### **2.1 GENERAL**

- .1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

### **2.2 PIPE HANGERS**

- .1 Finishes:
  - .1 Pipe hangers and supports: galvanized.
  - .2 Use hot dipped galvanizing process.
  - .3 Ensure steel hangers in contact with copper piping are epoxy coated.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
  - .1 All piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
    - .1 Rod: 9 mm UL listed .
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
  - .1 All piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed to MSS SP69.
- .4 Hanger rods: threaded rod material to MSS SP58:
  - .1 Ensure that hanger rods are subject to tensile loading only.
  - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
- .5 Pipe attachments: material to MSS SP58:
  - .1 Attachments for steel piping: carbon steel.
  - .2 Attachments for copper piping: copper plated black steel.
  - .3 Oversize pipe hangers and supports.

### **2.3 EQUIPMENT SUPPORTS**

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel. Submit calculations with shop drawings.

**2.4 EQUIPMENT ANCHOR BOLTS AND TEMPLATES**

- .1 Provide templates to ensure accurate location of anchor bolts.

**Part 3 Execution****3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.2 INSTALLATION**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .3 Use approved constant support type hangers where:
  - .1 Vertical movement of pipework is 13 mm or more,
  - .2 Transfer of load to adjacent hangers or connected equipment is not permitted.
- .4 Use variable support spring hangers where:
  - .1 Transfer of load to adjacent piping or to connected equipment is not critical.
  - .2 Variation in supporting effect does not exceed 25 % of total load.

**3.3 HANGER SPACING**

- .1 Plumbing piping: to Canadian Plumbing Code.
- .2 Fire protection: to applicable fire code.
- .3 Diesel and fuel oil piping: up to NPS 1/2: every 1.8 m.
- .4 Copper piping: up to NPS 1/2: every 1.5 m.
- .5 Within 300 mm of each elbow.

| Maximum Pipe Size : NPS | Maximum Spacing Steel | Maximum Spacing Copper |
|-------------------------|-----------------------|------------------------|
| up to 1-1/4             | 2.1 m                 | 1.8 m                  |
| 1-1/2                   | 2.7 m                 | 2.4 m                  |
| 2                       | 3.0 m                 | 2.7 m                  |
| 3                       | 3.6 m                 | 3.0 m                  |

**3.4 HANGER INSTALLATION**

- .1 Install hanger so that rod is vertical under operating conditions.
- .2 Adjust hangers to equalize load.
- .3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

**3.5 HORIZONTAL MOVEMENT**

- .1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- .2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

**3.6 FINAL ADJUSTMENT**

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.
  - .2 Equalize loads.
- .2 Adjustable clevis:
  - .1 Tighten hanger load nut securely to ensure proper hanger performance.
  - .2 Tighten upper nut after adjustment.
- .3 C-clamps:
  - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- .4 Beam clamps:
  - .1 Hammer jaw firmly against underside of beam.

**3.7 FIELD QUALITY CONTROL**

- .1 Site Tests: conduct following tests.
- .2 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of work, in handling, installing, applying, protecting and cleaning of product.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review work.

**END OF SECTION**