

**PART 1      General**

**1.1          REFERENCES**

- .1 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)
  - .1 ANSI/ASME B31.1-07, Power Piping, (SI Edition).
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A563-07a, Specification for Carbon and Alloy Steel Nuts.
- .3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
  - .1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
  - .2 MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.

**1.2          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 all 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 to be in accordance with MSS SP58.
- .6 Duct hangars shall follow the recommendations of the SMACNA Duct manual.

**1.3          SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 21 05 01 - Common Work Results – Mechanical. Requirements include:
  - .1 Bases, hangers and supports.
  - .2 Connections to equipment and structure.
  - .3 Structural assemblies.

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**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 after manufacture.
  - .2          Use electro-plating galvanizing process.
  - .3          Ensure steel hangers in contact with copper piping are copper plated.
- .2      Upper attachment structural: Suspension from lower flange of I-Beam.
  - .1          Cold piping NPS 2 maximum: Malleable iron C-clamp with hardened steel cup point setscrew, locknut.
    - .1              Rod: 9 mm UL listed.
- .3      Upper attachment structural: Suspension from upper flange of I-Beam.
  - .1          Cold 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      Upper attachment to concrete.
  - .1          Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
  - .2          Concrete inserts: wedge shaped body with knockout protector plate UL listed to MSS SP69.
- .5      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.
  - .3          Do not use 22 mm rod.
- .6      Pipe attachments: material to MSS SP58.
  - .1          Attachments for steel piping: carbon steel galvanized.
  - .2          Attachments for copper piping: copper plated black steel.
  - .3          Use insulation shields for hot pipework.
  - .4          Oversize pipe hangers and supports.

- .7 Adjustable clevis: material to MSS SP69 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  - .1 Ensure "U" has hole in bottom for rivetting to insulation shields.
- .8 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.
  - .1 Finishes for steel pipework: black.
  - .2 Finishes for copper, glass, brass or aluminum pipework with formed portion plastic coated.
- .9 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

## **2.3 INSULATION PROTECTION SHIELDS**

- .1 Insulated cold piping:
  - .1 64 kg/m<sup>3</sup> density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.
- .2 Insulated hot piping:
  - .1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

## **PART 3 Execution**

### **3.1 INSTALLATION**

- .1 Install in accordance with:
  - .1 Manufacturer's instructions and recommendations.
- .2 Clamps on riser piping:
  - .1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
  - .2 Bolt-tightening torques to be to industry standards.
  - .3 Steel pipes: Install below coupling or shear lugs welded to pipe.
  - .4 Cast iron pipes: Install below joint.
- .3 Clevis plates:
  - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .5 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.

- .6 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.

### **3.2 HANGER SPACING**

- .1 Plumbing piping: most stringent requirements of Canadian Plumbing Code, Territorial Code and authority having jurisdiction.
- .2 Fire protection: to applicable fire code.
- .3 Copper piping: up to NPS 1/2: every 1.5 m.
- .4 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints.
- .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

- .6 Pipework greater than NPS 12: to MSS SP69.

### **3.3 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.

### **3.4 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.

### **3.5 FINAL ADJUSTMENT**

- .1 Adjust hangers and supports:
  - .1 Ensure that rod is vertical under operating conditions.

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- .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.

**END OF SECTION**