

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society of Mechanical Engineers (ASME)
    - .1 ASME B31.1-07, Power Piping.
  - .2 ASTM International
    - .1 ASTM A 125-1996(2007), Standard Specification for Steel Springs, Helical, Heat-Treated.
    - .2 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - .3 ASTM A 563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
  - .3 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
    - .1 MSS SP 58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
    - .2 MSS SP 69-2003, Pipe Hangers and Supports - Selection and Application.
    - .3 MSS SP 89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.
- 1.2 ACTION AND INFORMATIONAL SUBMITTALS
- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Product Data:
    - .1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.
  - .3 Manufacturers' Instructions:
    - .1 Provide manufacturer's installation instructions.
- 1.3 CLOSEOUT SUBMITTALS
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
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- 1.4 DELIVERY,  
STORAGE AND  
HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 10 10 - General Instructions and with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements:
    - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
  - .3 Packaging Waste Management: remove for reuse padding, and packaging materials in accordance with Section 01 10 10 - General Instructions.

PART 2 - PRODUCTS

- 2.1 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 SP 58.
    - .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 SP 58.
- 2.2 GENERAL
- .1 Fabricate hangers, supports and sway braces in accordance with MSS SP 58. ANSI B31.1 and
  - .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.
- 2.3 PIPE HANGERS
- .1 Finishes:
    - .1 Pipe hangers and supports: painted with zinc-rich paint after manufacture.
    - .2 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.

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- 2.3 PIPE HANGERS (Cont'd)
- .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 and carbon steel retaining clip.
      - .1 Rod: 9 mm.
  - .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, to MSS SP 69.
  - .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 to MSS SP 69.
  - .5 Hanger rods: threaded rod material to MSS SP 58:
    - .1 Ensure that hanger rods are subject to tensile loading only.
    - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
  - .6 Pipe attachments: material to MSS SP 58:
    - .1 Attachments for steel piping: carbon steel black.
    - .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 SP 69, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
  - .8 U-bolts: carbon steel to MSS SP 69 with 2 nuts at each end to ASTM A 563.
    - .1 Finishes for steel pipework: black.
    - .2 Finishes for copper, glass, brass or aluminum pipework: galvanized, with formed portion plastic coated or epoxy coated.
- 2.4 RISER CLAMPS
- .1 Steel or cast iron pipe: black carbon steel to MSS SP 58, type 42,.
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|---------------------------|---|----|--|
| 2.4                       | <u>RISER CLAMPS<br/>(Cont'd)</u>                    | .2 | Copper pipe: carbon steel copper plated to MSS SP 58, type 42.   |
|                           |   | .3 | Bolts: to ASTM A 307.  |
|                           |   | .4 | Nuts: to ASTM A 563.   |
| 2.5                       | <u>INSULATION<br/>PROTECTION SHIELDS</u>            | .1 | Insulated cold piping:<br>.1 64 kg/m <sup>3</sup> density insulation plus insulation protection shield to: MSS SP 69, galvanized sheet carbon steel. Length designed for maximum 3 m span.   |
|                           |   | .2 | Insulated hot piping:<br>.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 SP 69.  |
| 2.6                       | <u>EQUIPMENT<br/>SUPPORTS</u>                       | .1 | Fabricate equipment supports not provided by equipment manufacturer from structural grade steel.   |
| 2.7                       | <u>EQUIPMENT<br/>ANCHOR BOLTS AND<br/>TEMPLATES</u> | .1 | Provide templates to ensure accurate location of anchor bolts.   |
| <u>PART 3 - EXECUTION</u> |   |    |  |
| 3.1                       | <u>MANUFACTURER'S<br/>INSTRUCTIONS</u>              | .1 | Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.   |
| 3.2                       | <u>INSTALLATION</u>                                 | .1 | Install in accordance with:<br>.1 Manufacturer's instructions and recommendations.   |
|                           |   | .2 | Clamps on riser piping:<br>.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.<br>.2 Bolt-tightening torques to industry standards.<br>.3 Steel pipes: install below coupling or shear lugs welded to pipe. |

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- 3.2 INSTALLATION (Cont'd)
- .2 Clamps on riser piping:(Cont'd)
    - .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.

- 3.3 HANGER SPACING
- .1 Plumbing piping: to Canadian Plumbing Code.
  - .2 Copper piping: up to NPS 1/2: every 1.5 m.
  - .3 Within 300 mm of each elbow.

| Maximum Pipe<br>Size : NPS | Maximum<br>Spacing Steel | Maximum<br>Spacing Copper |
|----------------------------|--------------------------|---------------------------|
| up to 1-1/4                | 2.4 m                    | 1.8 m                     |
| 1-1/2                      | 3.0 m                    | 2.4 m                     |
| 2                          | 3.0 m                    | 2.4 m                     |
| 2-1/2                      | 3.7 m                    | 3.0 m                     |
| 3                          | 3.7 m                    | 3.0 m                     |
| 3-1/2                      | 3.7 m                    | 3.3 m                     |
| 4                          | 3.7 m                    | 3.6 m                     |
| 5                          | 4.3 m                    |                           |
| 6                          | 4.3 m                    |                           |
| 8                          | 4.3 m                    |                           |
| 10                         | 4.9 m                    |                           |
| 12                         | 4.9 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.

- 3.5 HORIZONTAL MOVEMENT (Cont'd)
- .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 CLEANING
- .1 Clean in accordance with Section 01 10 10 - General Instructions.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 10 10 - General Instructions.