

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASME B31.1, Power Piping.
 - .2 ASTM International
 - .1 ASTM A 125, 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 Factory Mutual (FM)
 - .4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP 58, Pipe Hangers and Supports - Materials, Design and Manufacture.
 - .2 MSS SP 69, Pipe Hangers and Supports - Selection and Application.
 - .3 MSS SP 89, Pipe Hangers and Supports - Fabrication and Installation Practices.
 - .5 Underwriter's Laboratories of Canada (ULC)
- 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 Shop Drawings:
 - .1 Submit shop drawings for:
 - .1 Bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.
 - .4 Manufacturers' Instructions:
 - .1 Provide manufacturer's installation instructions.
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- 1.2 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)
- .4 Manufacturers' Instructions: (Cont'd)
 - .1 (Cont'd)
 - .1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.
- 1.3 CLOSEOUT SUBMITTALS
- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- 1.4 DELIVERY, STORAGE AND HANDLING
- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 and return packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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.
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- 2.1 SYSTEM DESCRIPTION (Cont'd)
- .1 (Cont'd)
 - .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: galvanized after manufacture.
 - .2 Ensure steel hangers in contact with copper piping are epoxy coated.
 - .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 UL listed.
 - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, 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.
 - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed.
 - .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.
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- 2.3 PIPE HANGERS
(Cont'd)
- .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.
 - .3 Do not use 22 mm or 28 mm rod.
 - .6 Pipe attachments: material to MSS SP 58:
 - .1 Attachments for steel piping: carbon steel black 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 SP 69 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 SP 69 with 2 nuts at each end to ASTM A 563.
 - .1 Finishes for steel pipework: black galvanized.
 - .2 Finishes for copper, glass, brass or aluminum pipework: with formed portion plastic coated.
- 2.4 RISER CLAMPS
- .1 Copper pipe: carbon steel copper plated to MSS SP 58, type 42.
 - .2 Bolts: to ASTM A 307.
 - .3 Nuts: to ASTM A 563.
- 2.5 INSULATION
PROTECTION SHIELDS
- .1 Insulated cold piping:
 - .1 64 kg/m³ 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:
 - .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.
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2.6 EQUIPMENT SUPPORTS .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel unless otherwise indicated.

2.7 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 Vibration Control Devices:
.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.
.3 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 industry standards.
.3 Steel pipes: install below coupling or shear lugs welded to pipe.
.4 Cast iron pipes: install below joint.
.4 Clevis plates:
.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

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

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum 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.
 .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.
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- 3.6 FINAL ADJUSTMENT (Cont'd)
- .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 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.