

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 03 30 00: Cast-in-Place Concrete.
- .2 Section 05 12 23: Structural Steel for Buildings.
- .3 Section 05 50 00: Metal Fabrications.

1.2 REFERENCES

- .1 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME):
 - .1 ANSI/ASME B31.1-2014, Power Piping, (SI Edition).
 - .2 ANSI/ASME B31.3-2014, Process Piping.
 - .3 ANSI/ASME B31.5-2013, Refrigeration Piping and Heat Transfer Components.
 - .4 ANSI/ASME B31.9-2014, Building Services Piping.
- .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM A125-96(2013), Specification for Steel Springs, Helical, Heat Treated.
 - .2 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563-15, 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 SP58-2009, Pipe Hangers and Supports Materials, Design and Manufacture, and Selection, Application and Installation.
- .5 Underwriter's Laboratories of Canada (ULC).

1.3 DESIGN REQUIREMENTS

- .1 Construct 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, B31.3, B31.5, B31.9 or MSS SP58.

1.4 PERFORMANCE REQUIREMENTS

- .1 Design supports and hangers to withstand seismic events for location as per the National Building Code.

1.5 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit shop drawings and product data for following items:
 - .1 Bases, hangers and supports.
 - .2 Connections to equipment and structure.
 - .3 Structural assemblies.

1.6 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 – Closeout Procedures.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 Fabricate hangers and supports 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.
- .3 Acceptable materials: Cooper B-Line, Unistrut, Thaler.

2.2 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: galvanized painted with zinc rich paint after manufacture.
 - .2 Use electroplating galvanizing process or hot dipped galvanizing process.
 - .3 Confirm steel hangers in contact with copper piping are copper plated or 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: 9mm UL listed, 12mm FM approved.
 - .2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed, FM approved where required to MSS SP58.
- .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 FM approved where required to MSS SP58.
 - .2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron top of beam jaw clamp with hooked rod, spring washer, plain washer and nut UL listed, FM approved where required.
- .4 Upper attachment to concrete:
 - .1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weld-less forged steel eye nut. Confirm eye is 6mm minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate UL listed FM approved where required to MSS SP58.
- .5 Shop and field fabricated assemblies.
 - .1 Trapeze hanger assemblies: MSS SP58.
 - .2 Steel brackets: MSS SP58.
 - .3 Sway braces for seismic restraint systems: to MSS SP58.
- .6 Hanger rods: threaded rod material to MSS SP58.
 - .1 Only subject hanger rods to tensile loading.
 - .2 Provide linkages where lateral or axial movement of pipework is anticipated.
 - .3 Do not use 23mm or 25mm rod.
- .7 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 saddles for hot pipework.
 - .4 Oversize pipe hangers and supports for insulated pipes.
- .8 Adjustable clevis: material to MSS SP58, UL listed FM approved, where required clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
 - .1 Confirm "U" has hole in bottom for riveting to insulation shields.

- .9 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP58.
- .10 Ubolts: carbon steel to MSS SP58 with two (2) nuts at each end to ASTM A563.
 - .1 Finishes for steel pipework: galvanized.
 - .2 Finishes for copper, glass, brass or aluminum pipework: black with formed portion plastic coated or epoxy coated.
- .11 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP58.

2.3 INSULATION PROTECTION SHIELDS

- .1 Insulated cold piping:
 - .1 64 kg/m² density insulation plus insulation protection shield to: MSS SP58, galvanized sheet carbon steel. Length designed for maximum 3.0m span.
- .2 Insulated hot piping:
 - .1 Curved plate 300mm long, with edges turned up, welded in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP58.

2.4 EQUIPMENT SUPPORTS

- .1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05 12 23 - Structural Steel for Buildings. Submit calculations with shop drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's instructions and recommendations.
- .2 Vibration Control Devices:
 - .1 Install on piping systems at pumps, AHU's, compressors and elsewhere as indicated.
- .3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- .4 Use approved constant support type hangers where:

- .1 Vertical movement of pipework is 12mm or more.
- .2 Transfer of load to adjacent hangers or connected equipment is not permitted.

3.2 HANGER SPACING

- .1 Plumbing piping: most stringent requirements of Canadian Plumbing Code.
- .2 Fire protection: to applicable fire code, or as indicated below, whichever is more stringent.
- .3 Copper piping: up to NPS 1/2: every 1.5m.

<u>Maximum Pipe Size NPS</u>	<u>Hanger Rod Diameter (mm)</u>	<u>Copper Maximum Spacing (mm)</u>	<u>Steel Maximum Spacing (mm)</u>
up to			
1-1/4	8	1800	2080
1-1/2	8	2750	2750
2	8	2750	3000
2-1/2	8	3000	3650
3	12	3000	3650
3-1/2	12	3275	3950
4	12	3650	4260
5	16		4876
6	19		5181
8	23		5791
10	23		6700
12	23		7010

- .4 Within 300mm of each elbow.
- .5 Pipework greater than NPS 12: to MSS SP58
- .6 Rolled groove piping: Any section 1.2m in length or longer shall have at least one hanger.

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. Comprised of angel iron or c-channel.

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 12mm 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.
 - .2 Equalize loads.
- .2 C-clamps:
 - .1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

END OF SECTION