

**PART 1 - GENERAL****1.1 RELATED SECTIONS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 61 00 - Common Product Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 23 05 00 - Common Work Results for Mechanical.

**1.2 REFERENCES**

- .1 Furthermore, the works will be done in accordance with any other code or standard having jurisdiction, as per the latest edition, notably including, but not limited to:
  - .1 American Society for Testing and Materials International (ASTM).
    - .1 ASTM A125-1996(R2001), Specification for Steel Springs, Helical, Heat-Treated.
    - .2 ASTM A307-04, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - .3 ASTM A563-04a, Specification for Carbon and Alloy Steel Nuts.
  - .2 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS).
    - .1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
    - .2 ANSI/MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.
    - .3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.
  - .3 Underwriter's Laboratories of Canada (ULC).
  - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
    - .1 Material Safety Data Sheets (MSDS).

**1.3 SUBMITTALS**

- .1 Submittals: 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.
- .3 Certificates:
  - .1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Instructions:
  - .1 Submit manufacturer's installation instructions.
- .5 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 in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, store, and handle materials in accordance with manufacturer's written instructions.

**PART 2 - PRODUCTS****2.1 SYSTEM DESCRIPTION**

- .1 Design Requirements.
  - .1 Construct pipe hanger and support to manufacturer's recommendations using manufacturer's regular production components, parts, and assemblies.
  - .2 Base maximum load ratings on allowable stresses prescribed by MSS SP58 or ASME B31.1 Standard.
  - .3 Design hangers and supports to support piping, air ducts, systems and mechanical equipments under operating conditions allow free expansion and contraction of

supported elements, to prevent excessive stress from being introduced into piping or connected equipments.

- .4 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58 Standard.

## **2.2 GENERAL**

- .1 Fabricate hangers, supports, and sway braces in accordance with ANSI B31.1 and MSS SP58 Standards.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.
- .3 Perforated metal strips will not be accepted.
- .4 "Ramset" type anchors permitted only in poured concrete. Use beam clamps to avoid piercing steel beams.

## **2.3 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 epoxy coated.
- .2 Steel Beam (suspension from lower flange).
  - .1 Piping up to NPS 2: Malleable cast iron "C" flanges, complying with MSS-SP-58 Standard, type 23, ULC and FM approved.
    - .1 Acceptable products: Anvil, Fig. 93.
  - .2 Piping NPS 2½ and greater: Malleable cast iron beam attachments, complying with MSS-SP-69 Standard, type 20, ULC and FM approved.
    - .1 Acceptable products: Anvil, Fig. 218 (with extension piece Fig. 157) or Fig. 228, if 218 is too small.
- .3 Steel Beam (suspension from upper flange).
  - .1 Malleable cast iron "C" flanges, complying with MSS-SP-58 Standard, type 23, ULC, and FM approved.
    - .1 Acceptable products: Anvil, Fig. 93 or 94.

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- .2 Retaining stirrup in the upper sill of a beam, assembly made of a steel jaw, a rod-hook with nut, a spring washer and a common washer corresponding to MSS-SP-69 Standard, type 25, and approved by ULC and FM.
    - .1 Acceptable products: Anvil, Fig. 227 for suspension rod of NPS  $\frac{3}{8}$  and NPS  $\frac{1}{2}$ .
  - .4 Steel Joist.
    - .1 Piping up to NPS 2: Steel support plates, with two (2) lock nuts.
      - .1 Acceptable products: Anvil, Fig. 60.
    - .2 Piping NPS 2½ and over: Steel support plates, with two (2) lock nuts, carbon steel weldable attachment and malleable cast iron eyelet bolt.
      - .1 Acceptable products: Anvil - support plate, Fig. 60, weldable attachment, Fig. 66 and malleable cast iron eyelet bolt, Fig. 290.
    - .3 Carbon steel welded attachments with two blocking nuts and in accordance with MSS SP69 Standard, type 22.
      - .1 Acceptable products: Anvil, Fig. 66.
  - .5 Steel Shaped or Angle (bottom flange).
    - .1 Malleable cast iron "C" flanges, complying with MSS-SP-58 Standard, type 23, ULC approved.
      - .1 Acceptable products: Anvil, Fig. 93 or 94.
  - .6 Steel Shaped or Angle (upper flange).
    - .1 Retaining stirrup in the upper sill of a beam, assembly made of a steel jaw, a rod-hook and a common washer, corresponding to MSS-SP-69 Standard, type 25, and approved by ULC and FM.
      - .1 Acceptable products: Anvil, Fig. 227 for suspension rod of NPS  $\frac{3}{8}$  and NPS  $\frac{1}{2}$ .
  - .7 Wood Elements.
    - .1 Ceiling flange made of malleable cast iron.
      - .1 Acceptable products: Anvil, Fig. 128R.
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- .8 Anchors for suspensions fixed to poured concrete elements:
    - .1 Items to anchor to ceiling: Stirrups, plates, fasteners, bushings with welded eye rod made of carbon steel, with an eyelet nut made of cast iron without any welds. The eyelet must be 6 mm (0.236 in) greater in diameter than the rod.
      - .1 Acceptable products: Anvil, plate, Fig. 49 and eyelet nut, Fig. 290.
    - .2 Expanding fasteners:
      - .1 Acceptable products: Phillips Red Head.
    - .3 Wedge type concrete insert for poured concrete, complete with corner and plate protections and a knockout plate, approved by UL, ULC, and FM, and complying with MSS-SP-69 Standard.
      - .1 Acceptable products: Anvil, Fig. 281.
  - .9 Assemblies made in a shop or on site:
    - .1 Suspension with rollers.
    - .2 Steel supports.
    - .3 Bracing items for earthquake systems: Complying with Section 23 05 48.
  - .10 Threaded Suspension Rods: Complying with MSS-SP-58 Standard:
    - .1 Rods are only submitted to tension forces.
    - .2 Provide elements that will enable the horizontal and vertical movements of the supported piping.
    - .3 Acceptable products: Anvil, Fig. 146.
  - .11 Support elements installed directly on the piping:
    - .1 Steel or plastic piping with less than 25 mm of movement: Adjustable stirrups complying with MSS-SP-69 Standard, type 10, and approved by UL and FM.
      - .1 Acceptable products: Anvil, Fig. 69.
    - .2 Copper piping with less than 25 mm (1 in) of movement: Copper adjustable stirrups complying with MSS-SP-69 Standard, type 10.
      - .1 Acceptable products: Anvil, Fig. CT-69.
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- .3 Steel or plastic piping with greater than 25 mm of movement: Stirrups with rollers conforming MSS-SP-69 Standard, type 43.
  - .1 Acceptable products: Anvil, Fig. 181.
- .4 Steel or plastic piping supported from the underside: Base with rollers complying with MSS-SP-69 Standard, type 44.
  - .1 Acceptable products: Anvil, Fig. 175, 177, and 271.
- .12 "U" Bolts: Made of carbon steel complying with MSS-SP-69 Standard, complete with two (2) nuts complying with ASTM A563 Standard on each end.
  - .1 Galvanized finish for steel piping.
  - .2 Plastic finish for copper, glass, brass, or aluminum piping.

## **2.4 EQUIPMENT SUPPORTS**

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

## **2.5 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 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.

- .2 Anchorage components for hangers mounted on concrete structure.
  - .1 Attach elements (plates and stirrup) using at least four (4) concrete inserts, one at each corner.

### 3.3 SPACING BETWEEN SUPPORTS AND SUSPENSIONS

- .1 Follow the requirements of the Alberta Construction Code for plumbing piping network.
- .2 Install supports/suspension at each 1.5 m for NPS ½ or smaller copper piping.
- .3 Install a support/suspension at a maximum of 300 mm from each elbow.
- .4 Install supports at base of vertical piping, at the high point of each floor.
- .5 In addition to the above required supports, install supports and suspensions on the straight lengths of the piping as described in the tables below:

PLUMBING PIPING						
MAXIMUM SPACING FOR HORIZONTAL PIPING, IN METERS						
Ø PIPING (NPS)	Ø ROD mm	STEEL	COPPER	ASBESTOS CEMENT	ABS PVC	CPVC
Up to ½	10	2.1	1.5	---	0.9	0.8
¾	10	2.1	1.5	---	1.0	0.9
1	10	2.1	1.8	---	1.1	1.0
1¼	10	2.1	2.1	2.0	1.2	1.2
1½	10	2.7	2.4	2.0	1.3	1.3
2	10	3.0	2.4	2.0	1.5	1.4
2½	13	3.4	2.7	2.0	---	1.7
3	13	3.6	3.0	2.0	1.9	1.8

DIESEL PIPING			
MAXIMUM SPACING FOR HORIZONTAL PIPING, IN METERS			
Ø PIPING (NPS)	Ø ROD mm	STEEL	COPPER
Up to ½	10	1.8	1.8
¾	10	2.4	2.4
1	10	2.4	2.4
1¼	10	3.0	3.0
1½	10	3.0	3.0

<b>DIESEL PIPING</b>			
<b>MAXIMUM SPACING FOR HORIZONTAL PIPING, IN METERS</b>			
<b>Ø PIPING (NPS)</b>	<b>Ø ROD mm</b>	<b>STEEL</b>	<b>COPPER</b>
2	10	3.0	3.0
2½	13	3.0	3.0
3	13	4.6	4.6
3½	13	4.6	4.6
4	16	4.6	4.6

### 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.
- .4 Fix support and suspension elements to the frame. Provide and install all additional steel frame parts that are required.
- .5 Piping and equipment must be supported independently from one another.

### 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 in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
- .2 Manufacturer's Field Services.
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .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, as directed in PART 1 - QUALITY ASSURANCE.

### **3.8 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Dispose of construction materials surplus, waste, tools, and equipment.

**END OF SECTION**

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