SECTION 23 0529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe hangers and supports.

B. Fasteners.

1.2 REFERENCES

A. American Society of Mechanical Engineers

1. ASME B31.1: Power Piping.
2. ASME B31.9: Building Services Piping.

B. ASTM International

1. ASTM A 36: Standard Specification for Carbon Structural Steel
2. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A 307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
4. ASTM A 563: Standard Specification for Carbon and Alloy Steel Nuts ASTM A 1064: Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
5. ASTM C 533: Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation
6. ASTM C 552: Standard Specification for Cellular Glass Thermal Insulation
7. ASTM F 594: Standard Specification for Stainless Steel Nuts
8. ASTM F 3125: Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated

C. American Welding Society

1. AWS-D.1.1: Structural Welding – Steel

D. Manufacturer's Standardization Society

1. MSS SP-58: Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

1.3 SUBMITTALS

A. Product data:

1. Provide manufacturer's literature showing compliance with specifications for each type of hanger, framing system, support, fastener and accessory materials.
2. Provide a schedule of piping types and sizes and associated pipe hanger types.
3. Provide a schedule of building attachment types and associated attachment hardware.
4. Provide a schedule of pipe types and sizes and proposed hanger spacing and support rod diameters.
5. Provide manufacturer's recommended pipe hanger spacing criteria for plastic piping.


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B. Welding certificates.

1.4 QUALITY ASSURANCE

A. Qualifications of welders: As specified in Section 23 0500, Common Work Results for HVAC.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Pipe hangers:

1. Anvil International
2. Carpenter and Paterson, Inc.
3. Cooper Industries
4. National Pipe Hanger Corporation
5. PHD Manufacturing, Inc.
6. PHP Systems/Design

2.2 PIPE HANGERS AND SUPPORTS

A. General: Types are identified by MSS type numbers in the article "Installing Pipe Hangers and Supports" below.

B. Materials for hangers and clamps:

1. For copper pipe: Copper plated.
2. For steel, insulated, and cast-iron pipe: Galvanized in crawl spaces, tunnels, or wet areas; galvanized or factory-painted in other areas.
3. For refrigerant piping: Clamp inserts, Cooper "B-line" armafix clamps or Cush-A-Therm by ZSi-Foster, suitable for channel (trapeze) supports.

C. Pipe covering protection saddle: Steel, meeting requirements of MSS SP-58 Type 39, with calcium silicate insulation in the space between saddle and pipe.

D. Hanger rod nuts and washers shall be zinc-plated. Hanger rods shall be solid steel, all threaded, and zinc-plated.

E. Channel: Slotted cold-rolled steel, equal to Grinnell PS 150 S, 12 gage with 0.406- by 3-inch (10 by 76-mm) slots on 4-inch (102-mm) centers.

F. Wall- and floor-mounted supports: Structural support system equal to Grinnell “Power Strut.”

G. Structural shapes: ASTM A 36.

H. Steel pipe: ASTM A 53, standard weight.

I. Threaded rod: MSS SP-58.

2.3 FASTENERS

A. Mechanical expansion anchors: Self-drilling type expansion shields or machine bolt drop-in anchors for drilled holes, equal to ITT Phillips Anchors “Red Head.” Fasteners to floor slabs shall be vibration and shock resistant. Load applied to fasteners shall not exceed 25 percent of manufacturer’s stated load capacity in 3500 psi (24,000 kPa) concrete. Provide zinc-coated anchors for indoor applications and stainless-steel anchors for outdoor applications.


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B. Fasteners to drywall or cavity wall construction: Equal to ITT Phillips Anchors “Red Head” toggle bolts, with hollow wall drive anchors or nylon anchors as required.

C. Bolts, nuts, and washers: ASTM A 307, or ASTM F 3125 where high strength is required.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide hangers and supports in accordance with schedules at the end of this section, as modified by specifications for each location and type.

B. Comply with MSS SP-58. Provide hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

C. Provide hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. Where required, provide structural steel shapes or metal framing system channels and hardware to transfer load from a hanger location to multiple locations in the structure in order to get support from an appropriate location or to increase the strength of the connection to the structure.

E. Support horizontal piping from above with hangers and threaded rod where possible, unless otherwise indicated.

F. Support pipe risers through floor slabs with riser clamps.

G. Provide hanger sizes to allow for continuous insulation for insulated piping systems.

H. Fabricate wall-mounted and floor-mounted supports using metal framing systems or structural steel where required.

I. Support groups of small piping along a structural wall using a metal framing system secured to the wall.

J. Trim threaded rods with a maximum excess length of 1 inch (25 mm). Provide protective rubber red end caps on the ends of threaded rods exposed and within 8 feet (2.4 meters) of the floor, roof, or grade below.

K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Install lateral bracing with pipe hangers and supports to prevent swaying.

M. Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.2 BUILDING ATTACHMENTS

A. Attaching to structural walls:


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1. Provide a minimum of two 0.375 inch (9.5 mm) minimum screw-type fasteners for attaching brackets and a minimum of three 0.5 inch (13 mm) minimum bolt-type fasteners for attaching structural supports.

B. Attaching to structural steel beams, channels, or angles:

1. Secure threaded rods to MSS SP-58 Type 20 adjustable beam clamps that are clamped to the bottom flange of steel beams for any pipe size.
2. Secure threaded rods to MSS SP-58 Type 23 beam clamps for beams with maximum flange thickness of 0.75 inch (19 mm) and for single pipes NPS 2 (DN 50) and smaller.

C. Attaching to bar joists:

1. Provide MSS SP-58 Type 19 top-beam C-clamps attached to top flange of the joists at panel points.
2. Piping perpendicular to joists:

   a. Pipes NPS 2.5 (DN 65) and smaller: Support from at least every other joist to spread the load among joists. Where multiple pipes are grouped together, stagger hangers to distribute the load among available joists.
   b. Pipes NPS 3 (DN 80) and larger: Support from every joist to spread the load among joists.
   c. If additional support is required between joists, hang metal framing system channel or structural steel shape from joists using MSS SP-58 Type 19 C-clamps attached to the top flange of two joists, and hang piping from metal framing system channel or structural steel shape.

3. Piping parallel to joists:

   a. Hang metal framing system channel or structural steel shape from joists using MSS SP-58 Type 19 C-clamps attached to the top flange of two joists. Hang piping from metal framing system channel or structural steel shape.
   b. For pipes NPS 2.5 (DN 65) and smaller: A single pipe may be hung from a single joist.

D. Attaching to concrete slabs and composite slabs: Not permitted.

E. Attaching to steel decks: Not permitted.

3.3 PIPING HANGER AND SUPPORT SCHEDULES

A. Uninsulated hydronic applications: Applications include gas piping.

(See schedule, next page)


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| HANGERS & SUPPORTS FOR UNINSULATED APPLICATIONS | | |
|---|---|---|
| MSS SP-58 Classification | Description | Piping applications |
| Hung from Above | | |
| Type 1 | Clevis hanger | All sizes |
| Type 10 | Adjustable swivel ring | NPS 0.5 (DN 15) through NPS 4 (DN 100) |
| Type 59 | Trapeze pipe hanger with pipe saddles & U-bolts. | NPS 0.5 (DN 15) through NPS 4 (DN 100) |
| N/A | Metal framing system with metal framing system pipe clamps for uninsulated piping. | NPS 0.5 (DN 15) through NPS 4 (DN 100) |
| Supported from Below | | |
| Type 37 | Adjustable pipe stanchion saddle with U-bolt, with floor flange and base anchored to floor. | All sizes where supported from the floor or a concrete support pier. |
| Type 41 | Adjustable roller support (cast-iron roll and sockets, steel roll rod, supported from below with threaded rods). | All sizes where supported from racks, fixed structural supports, or brackets where vertical adjustment is required. |
| Type 44 | Roller chair (cast-iron roll, steel roll rod, steel chair, bolts, and hex nuts). | All sizes where supported from racks, fixed structural supports, or brackets where vertical adjustment is not required. |
| N/A | Metal framing system with metal framing system pipe clamps and pipe clamp insulating inserts. | NPS 0.5 (DN 15) through NPS 8 (DN 200) |
| Risers | | |
| Type 8 | Riser clamp. | All sizes |

B. Minimum threaded rod sizes: Provide at least the following minimum rod diameters for single rods supporting a single pipe hanger.

| PIPE SIZE | MINIMUM ROD DIAMETER |
|---|---|
| NPS 2 (DN 50) and below | 0.375 inches (10 mm) |
| NPS 2.5 and NPS 3 (DN 65 and DN 75) | 0.5 inches (15 mm) |
| NPS 4 and NPS 5 (DN 100 and DN 125) | 0.625 inches (16 mm) |
| NPS 6 and NPS 8 (DN150 and DN 200) | 0.75 inches (20 mm) |

C. Maximum hanger and support spacing: Provide additional hangers or supports for concentrated loads such as flanges, valves, expansion compensators, fittings, and other specialties.

| PIPE SIZE | COPPER HYDRONIC PIPING | STEEL HYDRONIC PIPING | REFRIGERANT PIPING |
|---|---|---|---|
| NPS 0.75 (DN 20) and below | 5 feet (1.5 m) | 7 feet (2.1 m) | 3 feet (0.91 m) |
| NPS 1 (DN 25) | 6 feet (1.8 m) | | |
| NPS 1.25 (DN 32) | 7 feet (2.1 m) | | |
| NPS 1.5 (DN 40) | 8 feet (2.4 m) | 9 feet (2.7 m) | |
| NPS 2 (DN 50) | | 10 feet (3 m) | |
| NPS 2.5 (DN 65) | 9 feet (2.7 m) | 11 feet (3.4 m) | |
| NPS 3 (DN 75) | 10 feet (3 m) | 12 feet (3.7 m) | |
| NPS 4 (DN 100) | 12 feet (3.7 m) | 14 feet (4.3 m) | |
| NPS 5 (DN 125) | | 16 feet (4.9 m) | |
| NPS 6 (DN 150) | 14 feet (4.3 m) | 17 feet (5.2 m) | |
| NPS 8 (DN 200) | | 19 feet (5.8 m) | |


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1. Provide hanger spacing to meet manufacturer's recommendations and MSS SP-58 for plastic hydronic piping.

END OF SECTION


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