**SECTION 22 05 29**

**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**BASED ON DFD MASTER SPECIFICATION DATED 3/17/2023**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

**P A R T 1 - G E N E R A L**

**SCOPE**

This section includes specifications for supports of all plumbing equipment and materials as well as piping system anchors. Included are the following topics:

PART 1 - GENERAL

 Scope

 Related Work

 Reference

 Reference Standards

 Quality Assurance

 Description

 Shop Drawings

 Design Criteria

PART 2 - PRODUCTS

 Manufacturers

 Structural Supports

 Pipe Hangers and Supports

 Beam Clamps

 Riser Clamps

 Concrete Inserts

 Continuous Concrete Insert Channels

 Anchors

 Equipment Stands

 Roof Mounted Pipe Support

 Corrosive Atmosphere Coatings

PART 3 - EXECUTION

 Installation

 Hanger and Support Spacing

 Riser Clamps

 Concrete Inserts and Continuous Insert Channels

 Anchors

 Roof Mounted Piping Supports

**RELATED WORK**

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 03100 & 03300 - Concrete formwork and cast-in-place concrete for equipment pads.

Section 22 07 00 - Plumbing Insulation for insulation protection at support devices.

**REFERENCE**

Applicable provisions of Division 1 shall govern work under this section.

**REFERENCE STANDARDS**

MSS SP-58

**REFERENCE**

Applicable provisions of Division 1 govern work under this section.

**QUALITY ASSURANCE**

Substitution of Materials: Refer to Section GC - General Conditions of the Contract, Equals and Substitutions.

**DESCRIPTION**

Provide all supporting devices as required for the installation of mechanical equipment and materials. All support and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.

Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord of any truss or joist.

Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

Protect insulation at all hanger points; see Related Work above.

**SHOP DRAWINGS**

Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe size and type of service.

All submittals are to comply with submission and content requirements specified with in section [17 00 00].

**DESIGN CRITERIA**

Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58 unless noted otherwise.

Piping connected to pumps, compressors, or other rotating or reciprocating equipment is to have vibration isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the 100 pipe diameter/3 support distance.

**P A R T 2 - P R O D U C T S**

**MANUFACTURERS**

Anvil, B-Line, FNW, G-Strut, Pate, Piping Technology, Roof Products & Systems or approved equal.

**STRUCTURAL SUPPORTS**

Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the drawings.

**PIPE HANGERS AND SUPPORTS**

Hangers for Pipe Sizes 1/2" through 2":

Carbon steel, adjustable swivel ring. B-Line B3170NF, Anvil 69 or 70.

Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.

Hangers for Pipe Sizes 2" and Larger:

Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.

Multiple or Trapeze Hangers:

Steel channels with welded spacers and hanger rods.

Wall Support:

Carbon steel welded bracket with hanger. B-Line 3068 Series, Anvil 194 Series.

Perforated, epoxy painted finish, 16-12 gauge, min., steel channels securely anchored to wall structure, with interlocking, split-type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000 series clamps, Anvil type PS 200 H with PS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Anvil PS 1400 series.

Vertical Support:

Carbon steel riser clamp. B-Line B3373, Anvil 261 for above floor use.

Floor Support:

Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093.

Copper Pipe Supports:

All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or polyvinylchloride coated. Where steel channels are used, provide isolation collar between supports/clamps/fasteners and copper piping.

Glass Pipe Supports:

All supports, clamps, etc. directly connected to glass piping shall be fully lined with 1/4" neoprene padding.

**PIPE HANGER RODS**

Steel Hanger Rods:

Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.

Size rods for individual hangers and trapeze support as indicated in the following schedule.

Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated.

 Maximum Load (Lbs.) Rod Diameter

 (650°F Maximum Temp.) (inches)

 610 3/8

 1130 1/2

 1810 5/8

 2710 3/4

 3770 7/8

 4960 1

 8000 1-1/4

**BEAM CLAMPS**

MSS SP-58 Types 19 & 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick with a retaining ring and threaded rod of 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Anvil 86/92.

MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter. B-Line B3054, Anvil 228.

**CONCRETE INSERTS**

Poured in Place:

MSS SP-58 Type 18 wedge type to be constructed of a black carbon steel body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity. B-Line B2505, Anvil 281.

MSS SP-58 Type 18 universal type to be constructed of black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. B-Line B3014N, Anvil 282.

Drilled Fasteners:

Carbon steel drop-in type expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

**CONTINUOUS CONCRETE INSERT CHANNELS**

Steel inserts with an industry standard pre-galvanized finish, nominally 1-5/8 inch wide by 1-3/8 inch deep by length to suit the application, designed to be nailed to concrete forms and provide a linear slot for attaching other support devices. Installed channels to provide a load rating of 2000 pounds per foot in concrete. Manufacturer's standard brackets, inserts, and accessories designed to be used with the channel inserts may be used. Select insert length to accommodate all pipe in the area.

**ANCHORS**

Use welding steel shapes, plates, and bars to secure piping to the structure.

**EQUIPMENT STANDS**

Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

**ROOF MOUNTED PIPE ROLLER SUPPORT**

Minimum height of support to be 14" above roof deck.

Constructed of not less than 18 gauge galvanized steel reinforced so it is structurally capable of supporting the intended load with no penetrations through the curb flashing, inside and outside corner sections that are mitered and continuously welded, filled with 3 pound density insulation, integral deck mounting flange, nominal two inch wood nailer, galvanized steel counterflashing with attached galvanized steel channel track for securing pipe roller and roller support. Do not use built-in metal base flashings or cants.

Supports 30" or More in Height:

Use structural steel members supported by pipe supports and use pipe rollers fastened to the structural member. Pipe supports to be secured to the roof structure. Treat with corrosive atmosphere coatings.

**CORROSIVE ATMOSPHERE COATINGS**

Factory coat supports and anchors used in corrosive atmospheres with hot dip galvanizing after fabrication, ASTM A123, 1.5 ounces/square foot of surface each side. Mechanical galvanized threaded products, ASTM B695 Class 50, 2.0 mil coating. Field cuts and damaged finishes to be field covered with zinc rich paint of comparable thickness to factory coating.

Corrosive atmospheres include the following locations:

1. Exterior locations
2. Parking ramps
3. Swimming pool equipment rooms
4. Chemical storage and hazardous waste storage rooms
5. Wet wells
6. Sanitary pumping stations
7. Food service/kitchen areas
8. Walk-in coolers/freezers
9. Locker rooms
10. Greenhouses
11. Meter pits

**P A R T 3 - E X E C U T I O N**

**INSTALLATION**

Size, apply and install supports and anchors in compliance with manufacturers recommendations.

Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Coordinate hanger and support installation to properly group piping of all trades.

Trim steel hanger rods to within one inch of the final lock nut position. Hanger and support cutoff burrs shall be removed and sharp edges ground smooth.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.

Size and install hangers and supports, except for riser clamps, for installation on the exterior of piping insulation. Where a vapor barrier is not required, hangers may be installed either on the exterior of pipe insulation or directly on piping.

Perform welding in accordance with standards of the American Welding Society.

**HANGER AND SUPPORT SPACING**

Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

Use hangers with 1-1/2 inch minimum vertical adjustment.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of these specifications.

Space hangers for pipe as follows:

Pipe Material Pipe Size Max. Horiz. Spacing Max. Vert. Spacing

Cast Iron 2" and larger 5'-0" 15'-0"

Copper 1/2" through 3/4" 5'-0" 10'-0"

Copper 1" through 1-1/4" 6'-0" 10'-0"

Copper 1-1/2" through 2-1/2" 8'-0" 10'-0"

Copper 3" 10'-0" 10'-0"

Copper 4" and larger 12'-0" 10'-0"

Ductile Iron All 10'-0" 20'-0"

Glass Per Pipe Mfr. 8'-0" 12'-0"

Steel 1/2" through 1-1/4" 7'-0" 15'-0"

Steel 1-1/2" through 6" 10'-0" 15'-0"

Steel 8" through 12" 14'-0" 20'-0"

Steel 14" and over 20'-0" 20'-0"

Plastic Drain and Vent 4'-0" 10'-0"

PEXa\* Tubing\* 1/2" through 3/4” 6’-0” 4’-0”

PEXa\* Tubing\* 1” through 1-1/2” 8’-0” 4’-0”

Plastic Pure Water 1-1/2”

or less Continuous 5’-0”

\*PEXa Tubing shall have PEXa continuous pipe support with stainless steel strapping around insulated pipe. PEXa tubing without continuous channel (at fittings) shall be supported no less than every 32”.

**RISER CLAMPS**

Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor.

**CONCRETE INSERTS AND CONTINUOUS INSERT CHANNELS**

Select size based on the manufacturer's stated load capacity and weight of material that will be supported. Locate continuous insert channels on 6'-0" maximum centers and 2'-0" from corners. Furnish inserts to the General Contractor for placement in concrete formwork. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch size. Where concrete slabs form finished ceiling, provide inserts that are flush with the slab surface.

**ANCHORS**

Install where indicated on the drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs between expansion loops. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

**ROOF MOUNTED PIPE ROLLER SUPPORT**

Secure bottom of support flat on roof deck. Apply two coats of zinc rich paint to cut edges of all galvanized steel elements. Flashing and counterflashing by the General Contractor.

END OF SECTION