**SECTION 21 05 29**

**HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**

**BASED ON DFD MASTER SPECIFICATION DATED 3/3/2020**

***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 support of all fire suppression 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

 Anchors

 Equipment Stands

 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**

Division 3 - Concrete

Section 21 10 00 – Water-Based Fire Suppression Systems

Section 21 30 00 - Fire Pumps

Section 01 91 01 or 01 91 02 – Commissioning Process

**REFERENCE**

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

**REFERENCE STANDARDS**

MSS SP-58

NFPA 13 Installation of Sprinkler Systems (Latest prevailing edition).

NFPA 14 Installation of Standpipe and Hose Systems (Latest prevailing edition).

NFPA 20 Installation of centrifugal fire pumps (Latest prevailing edition).

UL Underwriters' Laboratories Listed.

FM Factory Mutual Approved

**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 fire suppression equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.

Do not hang any fire suppression system item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.

Fasteners depending on soft lead for holding power or requiring explosive 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.

**SHOP DRAWINGS**

Schedule all hanger and support devices indicating attachment method and type of device for each pipe size and type of service. Provide details on the working drawings submitted for approval with all pertinent information listed.

**DESIGN CRITERIA**

Materials and application of pipe hangers and supports shall be in accordance with MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation unless noted otherwise.

Materials and application of pipe hangers and supports shall be in accordance with NFPA rulings and be UL/FM listed and approved.

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**

B-Line, Anvil, Erico, G-Strut, Tolco, Afcon, 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 4":

Carbon steel, adjustable swivel ring with 3/8" min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70.

Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.

Hangers for Pipe Sizes 4" Through 8":

Carbon steel adjustable swivel ring with ½" min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70.

Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.

HANGERS FOR PIPE SIZES 10" and UP

Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260.

Multiple or Trapeze Hangers:

Manufactured steel channel system with manufacturers slotted interlocking pipe clamps with screw/nut securing and threaded hanger rods or steel channels with welded spacers and threaded hanger rods.

Wall Support:

Carbon steel welded bracket with hanger. B-Line 3060 Series, Anvil 190 Series.

Steel channels with pipe clamps.

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 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, Grinnell PS 1400 series.

**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.

# Pipe Size Diam. Of Rod

Up to and

Including 4" 3/8" or 9.5mm min.

5",6" and 8" ½" or 12.7mm min.

10" and 12" 5/8" or 15.9mm min.

**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:

Concrete construction

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

WOOD CONSTRUCTION

Side or bottom mount lag thread by rod thread one piece hanger attachment installed per the Manufacturers standard and carrying capacity limit. Powers Fastener Vertigo, Erico Hangermate or equal.

## CONTINUOUS CONCRETE INSERT CHANNELS

Steel inserts with an industry standard pre-galvanized finish, nominally 1-5/8 inch 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 channel inserts may be used. Select insert length to accommodate all pipe sizes 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.

**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 galvanize 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. Sanitary pumping stations
6. Food service/kitchen areas
7. Walk-in coolers/freezers
8. Locker rooms
9. Greenhouses

**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.

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

**HANGER AND SUPPORT SPACING**

Use hangers with 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

Copper 3/4" through 1" 8'-0" 10'-0"

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

Copper 2" through 3" 12'-0" 10'-0"

Copper 3-1/2" through 8" 15'-0" 10'-0"

Steel 1" through 1-1/4" 12'-0" 15'-0"

Steel 1-1/2" through 8" 15'-0" 15'-0"

Steel 8" through 12" 15'-0" 20'-0"

CPVC 1” through 1-1/4” 6’-0” 10’-0”

CPVC 1-1/2” 7’-0” 10’-0”

CPVC 2” 8’-0” 10’-0”

CPVC 2-1/2” 9’-0” 10’-0”

CPVC 3” 10’-0” 10’-0”

Hangers, supports and hanger spacing for CPVC plastic piping systems shall conform to the requirements of NFPA 13 and the manufacturer’s requirements. Contractor shall provide details on the installation drawings for all proposed means of support.

Restraint hangers shall be installed at all sprinkler head location within 1’-0” for a single restraint and within 5’-0” for two points of restraint. The requirements for hanger restraint for systems in excess of 100 PSI pressure shall be followed.

Hangers for CPVC systems shall not compress, distort, cut or abrade the piping and shall allow free movement of the pipe to permit thermal expansion and contraction.

Unsupported length from the last hanger and an end sprinkler for steel piping systems shall be as follows:

 1" piping Not greater than 36"

 1-1/4" piping Not greater than 48"

 1-1/2" piping Not greater than 60"

 or larger.

**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. Use method of securing the vertical risers to the building structure below in stairwell locations.

**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. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION