# GENERAL

## SECTION INCLUDES

### Pipe, ductwork, and equipment hangers, supports, anchors, saddles and shields.

### Mechanical flashing.

### Equipment curbs.

### Mechanical sleeves and seals.

### Flashing and sealing equipment and pipe stacks.

### Sealants, firestop insulation, putty and compounds.

### Pipe Stands

## REFERENCE SECTION 23 05 00 FOR THE FOLLOWING:

### Quality assurance.

### References.

### Submittals.

### Operation and maintenance manuals.

### Project record documents.

### Delivery, storage, and handling.

# PRODUCTS

## PIPE HANGERS AND SUPPORTS

### Hydronic Piping:

#### Conform to International Mechanical Code, ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89 as applicable.

### Steam and Steam Condensate Piping:

#### Conform to International Mechanical Code, ASME B31.1, ASTM F708, MSS SP58, MSS SP69, MSS SP89, as applicable.

### Refrigerant Piping

#### Conform to International Mechanical Code, ASME B31.1, ASTM F708, MSS SP58, MSS SP69, MSS SP89, as applicable.

### Hangers and Supports:

#### Hangers for Hot and Cold Pipe Sizes 1/2 to 1‑1/2 Inch, Carbon steel, adjustable swivel, band type.

#### Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

#### Hangers for Hot Pipe Sizes 2 to 4 Inches; Carbon steel, adjustable, clevis.

#### Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

#### Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

#### Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.

#### Wall Support for Hot Pipe Sizes 6 Inches (150 mm) and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.

#### Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

#### Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.

#### Vertical Support: Steel riser clamp.

#### Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

#### Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

#### Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

#### Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

#### Roof Support for Hot and Cold Pipe: See PIPE STANDS section below.

#### Hangers for insulated pipe shall be enlarged to compensate for insulation thickness so that hangers support insulation. See Section 23 07 19.

#### See Section 23 05 48 for vibration isolation hangers and supports if applicable.

## DUCTWORK HANGERS AND SUPPORTS

### Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

### Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

### Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

### Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

### Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

### Trapeze and Riser Supports:

#### Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

#### Supports for Exposed Stainless-Steel Ducts: Stainless-steel shapes and plates.

## ACCESSORIES

### Hanger Rods: ASTM A36 steel or galvanized threaded both ends, threaded one end, or continuous threaded.

#### Ductwork: Use double nuts and lock washers on threaded rod supports.

## INSERTS

### Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

## FLASHING

### Metal Flashing: 26 gage galvanized steel.

### Metal Counterflashing: 22 gage galvanized steel.

### Flexible Flashing: 47 mil thick sheet buty; compatible with roofing.

### Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

## EQUIPMENT CURBS

### Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match roof insulation, 1‑1/2 inch thick insulation, factory installed wood nailer. Minimum 18 inch height, unless specified otherwise.

## SLEEVES

### Sleeves for Pipes through Fire Rated Floors and Walls: Schedule 40 steel pipe.

### Sleeves for Pipes Through Non‑fire Rated Floors and Walls: 18 gage galvanized steel.

### Sleeves for Ductwork: Galvanized steel.

## SEALANTS, FIRESTOP INSULATION, PUTTY, AND COMPOUNDS

### Firestopping Insulation: Glass fiber type, non‑combustible, UL listed.

### Firestop Putty: Non-harding, non-shrinking, UL listed.

### Firestop Compounds: Cementitous material, non-shrinking, UL listed.

### Sealants:

#### Non fire/smoke rated partitions: Acrylic or silicone based caulking.

#### Fire/smoke rated partitions: Silicone based caulking, UL listed.

## MECHANICAL SEALS

### Mechanical Seals: Modular mechanical type, consisting of interlocking EPDM synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with type 316 stainless steel bolts and reinforced plastic polymer pressure plates which cause rubber sealing elements to expand when tightened, providing a watertight and gas-tight seal and electrical insulation.

#### Provide high-temperature silicone links rated for 400 Deg. F for steam and condensate applications.

#### A sleeve shall be provided for each mechanical seal.

##### Thermoplastic sleeves: Sleeve shall have smooth walls and shall be made of molded non-metallic high density polyethylene (HDPE) with an integral solid water stop, Advance Products & Systems Model PWS or equivalent.

##### Steel sleeves: Sleeve shall have smooth walls, shall be made of Schedule 40 steel with an integral welded solid water stop, and shall have corrosion-resistant coating, Advance Products & Systems Model GWS or equivalent.

## PIPE STANDS (ROOF)

### General Requirements for Pipe Stands: Shop or field –fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

### Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

### High-Type, Single-Pipe Stand:

#### Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

#### Base: Plastic

#### Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.

#### Horizontal Member: Cadmium-plated-steel or stainless-steel with plastic or stainless-steel, roller-type pipe support.

### High-Type, Multiple-Pipe Stand:

#### Description: Assembly of Bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

#### Bases: One or more; plastic

#### Vertical Members: Two or more protective-coated-steel channels.

#### Horizontal member: Protective-coated-steel channel.

#### Pipe Supports: galvanized-steel, clevis-type pipe hangers.

### Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

# EXECUTION

## INSTALLATION

### Install in accordance with manufacturer's instructions.

## INSERTS

### Provide inserts for placement in concrete formwork.

### Provide 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 inches.

### Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

### Where inserts are omitted, drill through concrete slab from below and provide through‑bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

## PIPE HANGERS AND SUPPORTS

### Support horizontal piping as scheduled.

### Support fire protection systems piping independently from other piping systems. Fire main piping may be trapezed with other piping systems. Coordinate trapeze hangers with the Sprinkler Contractor.

#### Reference sections 21 05 29 and 22 05 29 for additional information regarding fire protection and plumbing piping supports and hangers.

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

### Place hangers within 12 inches of each horizontal elbow.

### Use hangers with 1‑1/2 inch minimum vertical adjustment.

### Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

### Support vertical piping at every floor and at intervals of no more than 12 ft. Support vertical cast iron pipe at each floor at hub.

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

### Support riser piping independently of connected horizontal piping.

### Provide copper plated hangers and supports for non-insulated copper pipe.

### Design hangers for pipe movement without disengagement of supported pipe.

### Prime coat steel hangers and supports in the mechanical room and other exposed areas. Refer to the Architectural reflected ceiling plans for location of exposed ceilings. Hangers and supports located in attic space, crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

### Adjust hangers to distribute loads equally on attachments and to achieve specified pipe slopes.

### Saddles, Shields and Inserts

#### Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

#### Install protective shields MSS Type 40 on cold piping that has vapor barrier. Shields shall span an arc of 180 degrees (360 degrees on trapeze hangers with U-bolt clamps) and shall have dimensions in inches not less than the following:

NPS LENGTH THICKNESS

 1 through 3-1/2 12 0.048

 4 12 0.060

 5 & 6 18 0.060

 8 through 14 24 0.075

 16 through 24 24 0.105

#### Pipes 8 inches and larger shall have wood inserts.

#### Insert materials shall be at least as long as the protective shield.

#### Provide manufacturer-recommended saddles, inserts, and/or shields where cellular foam insulation is used. The removal of sections of cellular foam insulation for the purpose of pipe support is not acceptable.

## HANGER AND SUPPORT INSTALLATION

### Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

#### Verify attachment selection and spacing in first two paragraphs below with structural engineer.

### Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

#### Where practical, install concrete inserts before placing concrete.

#### Install powder-actuated concrete fasteners after concrete is placed and completely cured.

#### Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.

#### Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

### Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

### Hangers Exposed to View: Threaded rod and angle or channel supports.

### Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

### Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## INSTALLATION OF ANCHORS

### Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

### Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and with AWS Standards D1.1.

### Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.

### Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

## FLASHING

### Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls and floors.

### Seal floor, shower, mop sink, etc. drains watertight to adjacent materials.

### Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

## SLEEVES

### Provide pipe and duct sleeves at all fire/smoke rated partitions, exterior wall penetrations and wall penetrations into exposed areas. Pipe and duct sleeves are not required for penetrations through non-rated concealed partitions.

### Wall sleeves shall not be used to support pipes or ducts.

### Set sleeves in position in formwork. Provide reinforcing around sleeves.

### Size sleeves large enough to allow for movement due to expansion and contraction. Size so as to allow for continuous insulation wrapping through sleeve.

### Sleeves through floors shall extend a minimum 2” above the finish floor level. Sleeves through walls should be flush with wall surface.

### Where piping or ductwork penetrate non-rated ceilings or walls, close off space between pipe or duct and adjacent work with urethane rod stock and caulk air tight.

### Seal pipe and duct penetrations through non-rated floors.

#### Where piping is not located in a rated shaft and it penetrates a single non-rated floor, close off space between pipe and adjacent work with urethane rod stock and caulk air tight.

#### Where piping is not located in a rated shaft and it penetrates multiple non-rated floors, close off space between pipe and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound.

#### Where ductwork is not located in a rated shaft and it penetrates a single non-rated floor, close off space between duct and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound.

#### Where ductwork is not located in a rated shaft and it penetrates multiple non-rated floors, close off space between duct and adjacent work with appropriate fire-rated sealant, insulation, putty, or compound. Install fire damper in duct at each floor level. Ductwork containing fume exhaust air shall not be provided with fire dampers.

### Where piping or ductwork penetrate rated floor, ceiling, or wall, close off space between pipe or duct with appropriate fire rated sealant, insulation, putty or compound. Refer to the Drawings for fire/smoke rated wall locations and the appropriate ratings.

### Provide on ductwork close fitting metal collar or escutcheon covers on the side of penetration that are exposed to view.

### Install chrome plated steel escutcheons on piping at finished surfaces.

### Provide mechanical seals and sleeves through exterior wall and floor penetrations and 3 hour or higher fire rated partitions.

### All ductwork through exterior walls to be installed with flashing and counter flashing.

## HANGER SCHEDULES

### Reference International Plumbing Code and International Mechanical Code where applicable.

END OF SECTION 23 05 29