

**CONSTRUCTION SPECIAL SPECIFICATIONS**

**SECTION 15060\_S**

**HANGERS AND SUPPORTS**

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## **CONSTRUCTION SPECIAL SPECIFICATIONS**

### **SECTION 15060\_S**

#### **HANGERS AND SUPPORTS**

##### **PART 1 - GENERAL**

###### **1.01 SECTION INCLUDES**

- A. Furnish and install supports, anchors and sleeves applicable to mechanical, plumbing, and fire protection systems, including:
  - 1. Pipe, duct, and equipment hangers, supports, and associated anchors.
  - 2. Equipment bases and supports.
  - 3. Sleeves and seals.
  - 4. Flashing and sealing equipment and pipe stacks.

###### **1.02 PAINTING**

- A. Paint all exposed pipe hangers, supports, braces, and accessories. Paint non-galvanized exterior pipe stands and supports. Painting techniques and materials to be as defined in Section 09900.

###### **1.03 SUBMITTALS**

- A. Submit product data on all hangers, supports, sleeves, bases and accessories.
- B. Submit shop drawings for all anchors and guides.

##### **PART 2 - PRODUCTS**

###### **2.01 PIPE HANGERS AND SUPPORTS**

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Provide malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis.
- C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll.

- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp; adjustable steel yoke and cast iron roll for hot pipe sizes 6 inches and over.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- J. Roof top pipe support: Pre-engineered, portable system specifically designed for installation without the need for roof penetrations or flashings, and without causing damage to the roofing membrane.
  - a. Custom design systems for specific installation conditions
  - b. Provide suitable hangers and supports
  - c. Utilize manufacturer’s recommended accessory materials
  - d. Acceptable Manufacturers:
    - i. Portable Pipe Hangers
    - ii. Engineer approved equal
- K. Design hangers without disengagement of supported pipe.
- L. Copper Pipe Support and Hangers: Carbon steel ring, adjustable, copper plated.
- M. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180-degree segments, minimum 12 inches long at pipe support.
- N. Shields for insulated piping 2-1/2 Inch and Larger: Galvanized steel shields in 180-degree segments in accordance with following table:

Pipe	Metal Gage	Shield Length
2 1/2" to 5"	16	12"
6" to 12"	14	24"
Over 12"	12	24"

- O. Shields for Vertical Copper Pipe Risers: Sheet lead.

## 2.02 HANGER RODS

- A. Steel, threaded both ends, continuous threaded.

## 2.03 INSERTS

- A. Provide 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.

## 2.04 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Lead Flashing: 5 pounds per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gage minimum; use 16 gage at fire resistant elements.

## 2.05 EQUIPMENT BASES AND SUPPORTS

- A. Provide concrete pads and equipment bases for all outdoor equipment on grade, floor mounted equipment in mechanical rooms or CUB's, areas with floors below grade, penthouse equipment rooms, floor mounted air handling units and where shown on Drawings.
- B. Provide prefabricated curbs for roof mounted equipment with the equipment.

## 2.06 SLEEVES

- A. Refer to requirements in 15050 – Basic Mechanical Materials and Methods.

## 2.07 FINISHES

- A. Paint exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- B. Provide corrosion resistant hangers and supports for all piping and ductwork in corrosive atmosphere.

## 2.09 ANCHOR BOLTS

- A. Provide galvanized anchor bolts for all equipment placed on concrete pads or on concrete slabs of the size and number recommended by the manufacturer of the equipment.

## 2.09 ALIGNMENT GUIDES

- A. Description: Steel, factory fabricated, with bolted two-section outer cylinder and base for alignment of piping and two-section guiding spider for bolting to pipe.
- B. Manufacturers: Subject to compliance with requirements, provide product by one of the following:
  - i. Adscos Manufacturing, LLC.
  - ii. Advanced Thermal Systems, Inc.
  - iii. Flex-Hose Co., Inc.
  - iv. Flexicraft Industries.
  - v. Grinnell
  - vi. Hyspan Precision Products, Inc.
  - vii. Metraflex, Inc.
  - viii. Piping Technology & Products, Inc.
  - ix. Senior Flexonics, Inc.; Pathway Division.

## 2.10 MATERIALS FOR ANCHORS

- A. Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex head.
- C. Washers: ASTM F 844, steel, plain, flat washers.
- D. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, and tension and shear capacities appropriate for application.
  - i. Stud: Threaded, zinc-coated carbon steel.
  - ii. Expansion Plug: Zinc-coated steel.
  - iii. Washer and Nut: Zinc-coated steel.
- E. Chemical Fasteners: Insert-type-stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application.
  - i. Bonding Material: ASTM C 881, Type IV, Grade 3, 2-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.

- ii. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
  - iii. Washer and Nut: Zinc-coated steel.
- F. Concrete: Portland cement mix, 3000 psi (20.7 MPa) minimum. Comply with requirements in Section 03300 "Cast-in-Place Concrete" for formwork, reinforcement, and concrete.
- G. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink, nonmetallic grout; suitable for interior and exterior applications.
- i. Properties: Nonstaining, noncorrosive, and nongaseous.
  - ii. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

### PART 3 - EXECUTION

#### 3.01 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
1/2" to 1-1/4"	6'-6"	3/8"
1-1/2" to 2"	10'-0"	3/8"
2-1/2" to 3"	10'-0"	1/2"
4" to 6"	10'-0"	5/8"
8" to 12"	14'-0"	7/8"
14" and Over	14'-0"	1"
PVC (All Sizes)	6'-0"	3/8"
C.I. Bell and Spigot (or No-Hub)	5'-0" and at Joints	
Spacing does not apply where span calculations are made or where concentrated loads are placed between supports such as flanges, valves, specialties, etc.		

- B. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with five feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide corrosion resistant hangers by Corr-Tech for all piping hangers in corrosive areas. Provide hanger rods, bolts, nuts and all metal parts coated with the same material as hangers.
- J. Install the first three hangers at all equipment connections with spring isolators sized for 2” deflection.

### 3.02 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, provide inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

### 3.03 FLASHING

- A. Provide flexible flashing and metal counterflashing where sleeves, piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24-inch by 24-inch sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36-inch by 36-inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- F. Flexible sheet flash and counterflash all curbs for mechanical equipment on roof with sheet metal; seal watertight.

### 3.04 EQUIPMENT BASES AND SUPPORTS

- A. Coordinate installation of equipment bases of concrete type specified under Division 3 for all outdoor equipment on grade and floor mounted equipment in main central plant area, areas with floors below grade, penthouse equipment rooms, floor mounted air handling units and where shown on Drawings.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.
- E. Provide base of a minimum height of 4 inches above finished grade and a width that projects a minimum of 2 inches beyond equipment on all sides. Bevel edges of base.
- F. Prepare surface under bases by cleaning, clearing, chipping and roughing.
- G. Provide curbs of 14 inches minimum height above roofing surface for installation of mechanical equipment on roof.

### 3.05 SLEEVES

- B. Refer to requirements in 15050 – Basic Mechanical Materials and Methods.

### 3.06 ANCHOR BOLTS

- A. Locate position of anchor bolts by means of suitable templates.
- B. When equipment is placed on vibration isolators, secure equipment to the isolator and the isolator to the floor, pad or support as recommended by the vibration isolator manufacturer.

### 3.07 INSULATION SHIELDS

- A. Provide insulation shields at every hanger support.
- B. Provide shields of the proper length to distribute weight evenly and to prevent sagging or indentation of insulation at hanger.
- C. Install shield so that hanger is placed at the center of the shield.
- D. Attach shield to insulation with adhesive to prevent slippage or movement; refer to Section 15083.

### 3.08 ALIGNMENT-GUIDE INSTALLATION

- A. Show locations and quantity of guides on Drawings.
- B. Install guides on piping adjoining pipe expansion fittings and loops.
- C. Coordinate paragraph below with structural Sections and Drawings if welding is included in structural work.
- D. Attach guides to pipe and secure to building structure.

### 3.09 ANCHOR INSTALLATION

- A. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.
- C. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.
- D. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints or compensators are indicated.
- E. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

END OF SECTION