

SECTION 220529 - HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Flashing.
5. Equipment curbs.
6. Sleeves.
7. Mechanical sleeve seals.
8. Formed steel channel.
9. Fire stopping relating to mechanical work.
10. Fire stopping accessories.
11. Equipment bases and supports.

B. Related Sections:

1. Section 221100 – Domestic Water Piping: Execution requirements for placement of hangers and supports specified by this section.
2. Section 221300 – Sanitary Piping: Execution requirements for placement of hangers and supports specified by this section.
3. Section 221400 – Storm Piping: Execution requirements for placement of hangers and supports specified by this section.
4. Section 221523 - Gas Piping: Execution requirements for placement of hangers and supports specified by this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
- B. ASTM International:
- C. American Welding Society:
- D. FM Global:
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
- F. Underwriters Laboratories Inc.:

G. Intertek Testing Services (Warnock Hersey Listed):

1.3 GENERAL

- A. In existing structure areas of third floor roof and mechanical penthouse, support piping from every joist structure with maximum intervals of 6 ft. Stagger supports so that weight will be distributed on maximum number of joists.

1.4 DEFINITIONS

- A. Fire stopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.5 SYSTEM DESCRIPTION

- A. Fire stopping Materials: ASTM E814 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
- B. Fire stop interruptions to fire rated assemblies, materials, and components.

1.6 PERFORMANCE REQUIREMENTS

- A. Fire stopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.
- B. Fire stopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.7 SUBMITTALS

- A. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 2. Fire stopping: Submit data on product characteristics, performance and limitation criteria.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with State, Municipality of standard.
- B. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply fire stopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of fire stopping materials.

1.12 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Michigan Hangers
 - 2. Bee-Line
 - 3. Modern.
- B. Pipe Hangers
 - 1. Beam Attachments - Where piping is to be supported from steel structural members of the buildings, use and install Michigan Model 300, Bee Line Model B3034, Modern Model 110W, Universal Beam Attachments with through-threaded rod hole.
 - 2. Uninsulated Piping 4" and Smaller - Michigan Model 100, Bee Line Model B3170, Modern Model 12W malleable iron adjustable nut and steel band.
 - 3. Uninsulated Piping 5" and Larger - Michigan Model 401, Bee Line Model B3100 ZNPLT, Modern Model 590 carbon steel adjustable wrought clevis type.
 - 4. Copper Tubing (Uninsulated) - Michigan Model 102A, Bee Line Model B3170C, Modern Model 11 carbon steel ring PVC coated adjusting nut, completely copper plated.
 - 5. Insulated Piping 2" and Smaller - Model #103, Michigan Model 103, Bee Line Model B3170 w/B3154, Modern Model 12 loop hanger with welded shield, galvanized, Carey-Temp #1500 insulation with vapor barrier.
 - 6. Insulated Piping 2-1/2" and Larger - Michigan Model 403, Bee Line Model B3100 w/B3154, Modern Model 110W clevis hanger with galvanized welded shield, Carey-Temp #1500 insulation with vapor barrier.
 - 7. Rollers - Where thermo-movement causes a hanger rod to deviate more than five degrees (5 deg.) from the vertical or where longitudinal expansion may cause a movement of

more than 1/2" in the piping, use and install roller Hangers or Chairs, Michigan Model 605,610, 615, Bee Line Model B3114, B3110, B3120 Modern Model 475, 661, 335 as applicable with Michigan Model 403, Bee Line Model B3100 w/B3154, Modern Model 590 less hanger.

- C. This contractor can have the option of using pipe hangers model M-CO 103 in lieu of M-CO 1031 and M-CO 403 in lieu of M-CO 4031, specified above. Provide high density, high temperature insulation at the hanger with vapor barrier jacket, similar to perlite as required for hanger loading conditions without crushing similar to product manufactured by "Value Engineered Products" model "Pro-Shield" or "Quick-Shield". Contractor using this option is responsible for Insulating Contractor providing specified material.
- D. Trapeze Hangers
1. Where several pipes occur at the same elevation, trapeze type hangers may be used. The framing shall be of Unistrut or similar construction and the following general rules shall be followed for attachment.
 - a. Uninsulated Steel Piping - Use clamps. For copper tubing, the clamp shall be copper plated.
 - b. Insulated Piping 2" and Smaller - Michigan Model 103 Series, Bee Line Model B3170 w/B3154, Modern Model 12.
 - c. Insulated Piping 2-1/2" and Larger - Michigan Model 403, Bee Line Model B3100 w/B3154, Modern Model 590 less hanger with roller supports.
- E. In Tunnels, Pipe Galleries, and where piping is racked on multiple hangers, supported with the use of prefabricated structural support channels, the piping attachments shall be as specified for Trapeze Hangers.
- F. Riser Clamps; Michigan Model 510, Bee Line Model B3373, Modern Model 500 "Riser Clamps" Michigan Model 511, Bee Line Model B3373CT, Modern Model 28 for copper tubing.
- G. Plumbing pipe chase positioning and supports shall be Sumner plastic pipe support and alignment systems. Sumner Corporation, 2902 DeSoto, Houston, Texas, Sioux Chief or Hubbard Enterprises.
- H. Plumbing Piping - DWV:
1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 2. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 4. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
 5. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
 6. Vertical Support: Steel riser clamp.
 7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 8. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.

I. Plumbing Piping - Water:

1. Hangers for Pipe Sizes **1/2 to 1-1/2 inch**: Malleable iron, adjustable swivel, split ring.
2. Hangers for Cold Pipe Sizes **2 inches** and Larger: Carbon steel, adjustable, clevis.
3. Hangers for Hot Pipe Sizes **2 to 4 inches**: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes **6 inches** and Larger: Adjustable steel yoke, cast iron roll, double hanger.
5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes **6 inches** and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes **3 inches** and Smaller: Cast iron hook.
8. Wall Support for Pipe Sizes **4 inches** and Larger: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes **6 inches** and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes **4 inches** and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes **6 inches** and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
14. Copper Pipe Support: Copper-plated, Carbon-steel ring.

2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

- A. 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.

2.4 FLASHING

- A. Metal Flashing: **26 gage** thick galvanized steel.
- B. Metal Counter flashing: **22 gage** thick galvanized steel.
- C. Lead Flashing:
1. Waterproofing: **5 lb./sq. ft** sheet lead
 2. Soundproofing: **1 lb./sq. ft** sheet lead.
- D. Flexible Flashing: **47 mil** thick sheet buty; compatible with roofing.

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

2.5 EQUIPMENT & PIPE SUPPORT AND CURBS

- A. Manufacturers:

1. Pate.
2. Thy.
3. Roof Products & Systems (RPS).
4. Uni-Curb.

- B. Pipe and Equipment Support: Pate Model ES-5, RPS model ES, Thy Curb model TEMS Welded 18 gage galvanized steel shell and base, mitered cant to match roof insulation, and factory installed wood nailer sized to suit building structural systems and equipment selected.

- C. Pipe Curbs: Pate Model PCA-5, RPS model N, Thy Curb model TCC Welded 18 gage galvanized steel shell and base, mitered cant to match roof insulation. Units shall be with base plate insulated, top nailer, cover, and graduated step neoprene boots with stainless steel band clamps.

- D. All curbs shall be minimum 16" high.

2.6 SLEEVES

- A. Sleeves for Pipes through Non-fire Rated Floors: 18 gage thick galvanized steel.

- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

2.7 MECHANICAL SLEEVE SEALS

- A. Manufacturers:

1. Thunderline Link-Seal, Inc.
2. NMP Corporation.
3. Interlynx

- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.8 FORMED STEEL CHANNEL

- A. Manufacturers:

1. Unistrut Corp.
2. Allied Tube & Conduit Corp.
3. B-Line Systems.

4. Midland Ross Corporation, Electrical Products Division.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.9 FIRESTOPPING

A. Manufacturers:

1. Hilti Corp.
2. 3M fire Protection Products.
3. Dow Corning Corp.
4. Fire Trak Corp.
5. International Protective Coating Corp.
6. Nelson.

B. Provide fire stopping at penetrations required for the passage of a duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

C. Quality Assurance

1. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of fire stop system to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturers written recommendations published in their literature and drawing details.
2. Fire stop system installation must meet requirements of ASTM E-814 or UL1479 tested assemblies that provide a fire rating equal to that of the construction being penetrated.
3. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.
4. Fire stop system does not re-establish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult structural engineer prior to penetrating any load bearing assembly.
5. For those fire stop applications that exist for which no UL system is available through any manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Fire stop Council (September 7, 1994).
6. Engage an experienced installer who is certified, licensed, or otherwise qualified by the fire stopping manufacturer as having the necessary experience, staff and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its fire stopping products to the contractor or to the installer engaged by the contractor does not in itself confer qualifications on the buyer.

D. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Fire stopping Elastomeric Fire stopping: Single component silicone elastomeric compound and compatible silicone sealant.
2. Foam Fire stopping Compounds: Single component foam compound.
3. Formulated Fire stopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Fire stopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Fire stopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Fire stopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Fire stop Pillows: Formed mineral fiber pillows.

E. Color: Dark gray.

2.10 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by fire stopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent:
 1. Mineral fiberboard.
 2. Sheet metal.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
 1. Furnish UL listed products or products tested by independent testing laboratory.
 2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
 2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Division 1 - Administrative Requirements: Verification of existing conditions before starting work.

- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive fire stopping.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of fire stopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing, damming materials to arrest liquid material leakage.
- D. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- E. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS

- A. Install inserts for placement in concrete forms.
- B. Install 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 **4 inches** and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install in accordance with applicable standards
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum **1/2 inch** space between finished covering and adjacent work.
- D. Place hangers within **12 inches** of each horizontal elbow.
- E. Use hangers with **1-1/2 inch** minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with **5 feet** maximum spacing between hangers.
- G. Support vertical piping at every [other] floor. Support vertical cast iron pipe at each floor at hub.
- H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

- I. Support riser piping independently of connected horizontal piping.
- J. Provide copper plated hangers and supports for copper piping.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Provide forged steel beam clamps in the case of steel construction.
- M. Hangers for piping from bottom of steel joist shall be hung thru center of joist flange to prevent twisting of bottom flange or joist.
- N. Provide supplementary angles, channels, plates, etc., where supports are required between building structural members, spanning the space and attached to building structural members by welding, bolting or with concrete anchors.
- O. Provide all rods, angles, rails, struts, brace plates, platforms, etc., required for suspension or support of piping, conduit and equipment.
- P. Provide hangers, rollers, threaded rods, turnbuckles, saddles, insulation protectors, anchors, etc., and all miscellaneous specialties for the attachment of hangers and supports to the structure.
- Q. Provide plumbing pipe chase positioning and supports.
- R. No pipe shall be suspended from another pipe.
- S. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- T. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 220700.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Foundations for supporting work furnished under this section are included under the General Contractor's work only when indicated on the Architectural or Structural Drawings. They will otherwise be furnished at the expense of the Mechanical Trades Contractor. Furnish all required anchor bolts and complete dimensional drawings and instructions for all equipment requiring concrete foundations.
- B. Provide housekeeping pads of concrete, minimum 3 inches thick and extending 6 inches beyond supported equipment.
- C. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- D. Construct supports of formed steel channel. Brace and fasten with flanges bolted to structure.
- E. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 220548.

3.6 INSTALLATION - FLASHING

- A. Provide flexible flashing and metal Counter flashing where 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 x 24 inches** sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, **10 inches** clear on sides with minimum **36 x 36 inch** sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, mop sink drains watertight to adjacent materials.
- E. Provide curbs for roof installations **14 inches** minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach Counter flashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints.
- F. 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.

3.7 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. All sleeves shall be set true to line, grade, position, and plumb or level and shall be so maintained during construction by the installing Contractor. Where a sleeve is provided in concrete, Contractor or Sub-Contractor setting sleeve shall inspect it while and after concrete is poured and correct any deviation from proper position.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors **3 inch** above finished floor level. Caulk sleeves.
- F. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install chrome plated steel escutcheons at finished surfaces.

3.8 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring fire stopping.
- B. Apply primer where recommended by manufacturer for type of fire stopping material and substrate involved, and as required for compliance with required fire ratings.

- C. Apply fire stopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
- E. Remove dam material after fire stopping material has cured.
- F. Fire Rated Surface:
 - 1. Seal opening at floor, wall, partition, as follows:
 - a. Install sleeve through opening and extending beyond minimum of **1 inch** on both sides of building element.
 - b. Size sleeve allowing minimum of **1 inch** void between sleeve and building element.
 - c. Pack void with backing material.
 - d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
- G. Non-Rated Surfaces:
 - 1. Seal opening through non-fire rated wall, partition floor, as follows:
 - a. Install sleeve through opening and extending beyond minimum of **1 inch** on both sides of building element.
 - b. Size sleeve allowing minimum of **1 inch** void between sleeve and building element.
 - c. Install type of fire stopping material recommended by manufacturer.
 - 2. Install escutcheons or floor plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 - 3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
 - 4. Interior partitions: Seal pipe penetrations at data rooms and book drop rooms. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.9 FIELD QUALITY CONTROL

- A. Inspect installed fire stopping for compliance with specifications and submitted schedule.

3.10 CLEANING

- A. Clean adjacent surfaces of fire stopping materials.

3.11 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

3.12 SCHEDULES

A. Pipe Hanger Spacing

Pipe Size	Max. Hanger Spacing	Hanger Rod Diameter
Inches	Feet	Inches
1/2	6	3/8
3/4	6	3/8
1	6	3/8
1-1/4	6	3/8
1-1/2	8	3/8
2	8	3/8
2-1/2	8	1/2
3	8	1/2
4	8	5/8
5	8	5/8
6	10	3/4
8	10	3/4
C.I. Bell and Spigot (or No-Hub) And at Joints	5	5/8

END OF SECTION 230529