

SECTION 15060
HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Materials and Methods" apply to work specified in this Section.

1.02 SUMMARY

- A. This Section specifies hangers and supports for mechanical systems piping and equipment.
- B. Related Work Specified in Other Sections:
 - 1. Division 15 Section 15070 "Vibration Control and Seismic Restraints" for vibration-isolation hangers and supports.

1.03 REFERENCED STANDARD

- A. MSS: Manufacturers Standardization Society
- B. Terminology used in this Section is defined in MSS SP-90.

1.04 PERFORMANCE REQUIREMENTS

- A. Design seismic restraint hangers and supports, for piping and equipment.
- B. Design and obtain approval from authority with jurisdiction over seismic restraint hangers and supports for piping and equipment.

1.05 SUBMITTALS

- A. Product data for each type of hanger and support.
- B. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly. Designate hanger and support to specified systems.
- C. Licensed Engineer's hanger and support drawings specified in the "Quality Assurance" Article.
- D. Licensed Engineer's hanger and support installation report specified in the "Field Quality Control" Article.

1.06 QUALITY ASSURANCE

- A. NFPA Compliance: Comply with NFPA 13 for hangers and supports used as components of fire protection systems.
- B. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.
 - 1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- C. Licensed Operators: Use operators that are licensed by powder-operated tool manufacturers to operate their tools and fasteners.
- D. Licensed Engineer: Prepare hanger and support design drawings, and calculations for seismic restraint of piping and equipment. Include seal and signature of Registered Engineer, licensed in jurisdiction where Project is located, certifying compliance with IBC 2003 Building Code.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
- B. Hangers and Supports:
 - 1. Elcen Metal Products Co.
 - 2. Fee & Mason Mfg. Co.
 - 3. ITT Grinnel Corp.
 - 4. B-Line Systems, Inc.
- C. Thermal Hanger Shield Inserts:
 - 1. Elcen Metal Products Co.
 - 2. Pipe Shields, Inc.

2.02 MANUFACTURED UNITS

- A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.
 - 1. Components include galvanized coatings where installed for piping and equipment that will not have a field-applied finish.
 - 2. Pipe attachments include nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Thermal-Hanger Shield Inserts: 100-psi (690kPa) average compressive strength, waterproofed calcium silicate, encased with sheet metal shield. Insert and shield cover entire circumference of pipe and are of length indicated by manufacturer for pipe size and thickness of insulation.

- C. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.
- D. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Fasteners for fire protection systems include UL listing and FM approval.

2.03 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.
- C. Washers: ASTM F 844, steel, plain, flat washers.
- D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.
 1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
 2. Design Mix: 5000-psi (34.5MPa), 28-day compressive strength.
 3. Water: Potable.
 4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

- A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.
- C. Install supports with maximum spacing complying with MSS SP-69.
- D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
- E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.
- F. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.

- H. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.
- I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- J. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM A 36 steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.
- K. Support fire protection systems piping independent of other piping.
- L. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- M. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and to not exceed maximum pipe deflections allowed by ASME B31.9 "Building Services Piping".
- O. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs of pipe carrying fluids 100 degrees F. or lower unless specified on drawings and all piping 1-1/2 inch and smaller.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal runs of pipe 2-inch and larger carrying fluids 100 degrees F. or higher.
 - 3. Pipe roller complete - MSS Type 44 for multiple horizontal runs supported on a trapeze, regardless of fluid temperature.
 - 4. Provide adjustable roller hangers for all exterior piping. All exterior hangers and supports to be galvanized steel.
 - 5. Spring hangers to support vertical runs.
- P. Install hangers with the following minimum rod sizes and maximum spacing:

Nom. Pipe Size	Max. Span-Ft.	Min. Rod Size-Inches
1	7	3/8
1-1/2	9	3/8
2	10	3/8
3	12	1/2
4	14	5/8
5	16	5/8
6	17	3/4
8	19	7/8
10	22	7/8
12	23	7/8

- Q. Support vertical runs at each floor.
- R. Insulated Piping: Comply with the following installation requirements.

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
2. Saddles: Install protection saddles MSS Type 39 where pipe roller supports are indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
3. Shields: Install MSS Type 40, protective shields on cold piping with vapor barrier. Shields span an arc of 180 degrees and have dimensions in inches not less than the following:

NPS (Inches)	Length (Inches)	Thickness (Inches)
1/4 to 3	12	0.048
4	12	0.060
5 and 6	18	0.060
8 to 14	24	0.075
16 to 24	24	0.105

4. Inserts: Provide rigid calcium silicate inserts on hot and cold piping , 1-1/2 inches and larger.
5. Insert Material: Length at least as long as the protective shield.
6. Thermal-Hanger Shields: Install with insulation of same thickness as piping.

3.02 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor. All exterior steel supports and hangers/rollers shall be galvanized steel.
- B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.03 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.05 PAINTING

- A. Touching Up: Clean field welds and abraded areas of shop paint and paint exposed areas immediately after erection of hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal is specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.06 FIELD QUALITY CONTROL

- A. Licensed Engineer's Report: Prepare hanger and support installation report. Include seal and signature of Registered Engineer, licensed in jurisdiction where Project is located, certifying compliance with IBC 2003 Building Code

END OF SECTION 15060