SECTION 15140
SUPPORTS & ANCHORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and equipment hangers and supports.
B. Equipment bases and supports.
C. Sleeves and seals.
D. Flashing and sealing equipment and pipe stacks.

1.02 RELATED SECTIONS

A. Section 03300 - CAST-IN-PLACE CONCRETE: EQUIPMENT BASES.
B. Section 07270 - FIRESTOPPING: JOINT SEALS FOR PIPING AND DUCT PENETRATION OF FIRE RATED ASSEMBLIES.
C. Section 15242 - VIBRATION ISOLATION.
D. Section 15310 - FIRE PROTECTION PIPING.
E. Section 15410 - PLUMBING PIPING.
F. Section 15510 - HYDRONIC PIPING.

1.03 REFERENCES

A. ASME B31.1 - POWER PIPING.
B. ASME B31.2 - FUEL GAS PIPING.
C. ASME B31.9 - BUILDING SERVICES PIPING.
D. ASTM F708 - DESIGN AND INSTALLATION OF RIGID PIPE HANGERS.
E. MSS SP58 - PIPE HANGERS AND SUPPORTS - MATERIALS, DESIGN AND MANUFACTURER.
F. MSS SP69 - PIPE HANGERS AND SUPPORTS - SELECTION AND APPLICATION.
G. MSS SP89 - PIPE HANGERS AND SUPPORTS - FABRICATION AND INSTALLATION PRACTICES.
H. NFPA 13 - INSTALLATION OF SPRINKLER SYSTEMS.
I. NFPA 14 - INSTALLATION OF STANDPIPE AND HOSE SYSTEMS.
1.04 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings:
   1. Indicate system layout with location and detail of trapeze hangers.
   2. Specially fabricated supports.
   3. Supports for loads exceeding 1000 lbs.
   4. Hanger types and locations for all piping greater the 4 in., and any suspended loads exceeding 250 lb. which are suspended from metal deck slab from floor.
   5. Structural calculations by a licensed structural engineer.

C. Product Data: Provide manufacturers catalog data including load capacity.

D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers, upper attachments, anchors and guides.

E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.05 REGULATORY REQUIREMENTS

A. Provide an adequate pipe suspension system in accordance with recognized engineers practices, using standard commercially acceptable pipe hangers and accessories.

B. Supports for Sprinkler Piping: In conformance with NFPA 13.


D. Where applicable codes require supports in excess of specifics herein, the Code shall govern.

E. Where thermal movement in pipe line occurs, hanger assembly shall support pipe line in all operating conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hangers, Inserts and Supports:
   1. PHD Manufacturers.
   2. ITT Grinnell Corporation.
4. Tolco.

B. Pipe Protection and Thermal Hanger Shields:
   1. Pipe Shields, Inc.
   2. PHD Manufacturers.
   3. Midland-Ross Corp.: Superstrut.
   4. Uni-Grip.

C. Expansion Shields:
   1. ITT Phillips Drill Co.: Red Head.
   3. Omark Industries, Inc.

D. Miscellaneous Devices:
   1. Kopty.
   2. Wejit.

2.02 PIPE HANGERS AND SUPPORTS

A. Model numbers are Superstrut, unless otherwise indicated.

B. Individual Pipe Hangers:
   1. All hangers for pipes 2 in. and larger to be provided with means of vertical adjustment.
   2. Cold pipe all sizes: Clevis hanger, No. C710.
   3. Cast iron pipe: Hanger No. C-710-R.

C. Multiple or Trapeze Hangers:
   1. Factory channel:
      a. 12 gauge thick steel.
      b. Single or double section.
      c. Electro-chromate finish.
      d. Strutnuts: Series A-100 or CM-100.
      e. Straps: Series 702.
      f. Other accessories.
      g. No. A-1200 or A-1202.

D. Wall Supports:
   1. Pipe sizes up to 3 in.: Steel bracket No. C738.
   2. Pipe sizes 4 in. and larger: Welded steel bracket C-735.

E. Vertical Support:
   1. Riser clamp Series C-720.
   2. At each floor unless otherwise indicated.
F. Thermal Hanger Shields.

1. Insulated pipe supports:
   a. Insulated pipe supports shall be supplied and installed by the contractor on all insulated pipe and tubing.
   b. All insulated pipe supports shall be load rated. Load ratings shall be established by pipe support manufacturer based upon testing and analysis in conformance with the latest edition of the following codes: ASME B 31.1, MSS SP-58, MSS SP-69, and MSS SP-89.

2. Approved insulated pipe support:
   a. Pipe supported on rod hangers:
      1) Equal to pipe shield A1000, A2000, A3000, A4000, and A9000.
   b. Pipe supported on flat surfaces:
      1) Equal to pipe shield A1000, A2000, A5000, A6000, and A7000 to A7400 Series.
   c. Pipe supported on pipe rolls:
      1) Equal to pipe shield A3000, A4000, A5000, A6000, and A8000 to 8400 Series.
   d. Pipe Risers:
      1) Equal to Pipe Shield Models E1000 to E1300 Series and E2000 to E2300 Series.

3. Shield lengths and gauges per manufacturer's published catalog recommendations.

4. Similar to Pipe Shields Incorporated.

G. Pipe Isolators:

1. Galvanized steel shell with felt padding.
2. Similar to:

H. Insulated Pipe Strap:

1. 1/2 in. to 1 in. plumbing piping in wood frame construction.
2. Felt insulated.
3. Nailable pipe straps:
   a. In lieu of other hangers and dielectric isolators.
4. Similar to Kopty.
STRUCTURAL ATTACHMENTS

A. Model Numbers are Superstrut, unless otherwise indicated.

B. Anchor Bolts: Size as specified for hanger rods.

C. Concrete Inserts:
   1. Malleable iron.
   2. Place reinforcing steel through insert as recommended by manufacturer for recommended loads.
   3. Equal to No. 452.

D. Beam Clamps:
   1. All with U-568 safety strap or equal.
   2. All with locknuts on:
      a. Set Screw.
      b. Hanger rod.
   3. Bottom flange attachment:
      a. Loading 150 lb. and less: U-563 or equal.
      b. Loading 150 lb. to 300 lb.: U-562 or equal.
      c. Loading more than 300 lb.: U-560 or U-52, 521, or 522, depending on loading, or equal.
   4. Top flange attachment:
      a. Permitted only when bottom flange attachment cannot be used.
      b. Loading 400 lb. and less: M-777 or equal.
      c. Loading more than 400 lb.: M-778 or equal.

E. Welded Beam Attachments:
   1. No. C-780 or equal.

F. Side Beam Brackets:
   1. No. 542. or equal.

G. Hanger Rods:
   2. ANSI B1.1 threads.
   3. Threaded both ends, threaded one end, or continuous threaded.

H. Hanger Rod Fixtures:
   1. Turnbuckles:
a. No. F-112 or equal.

2. Linked Eye Rod:
   a. Rod swivel.
   b. No. E-131 or equal.

3. Clevis:
   a. No. F-111 or equal.

I. Expansion Shields:
   2. Stainless steel for corrosive atmospheres.
   3. For normal concrete use:
      a. Self-drilling anchor.
      b. Sleeve anchor.
      c. Stud anchor.
   4. For thin concrete use:
      a. Wedge anchor.
   5. For brick or concrete block use:
      a. Sleeve anchor.
   6. Maximum load safety factors:
      a. Static loads - 4.
      b. Vibratory loads - 8 - 10.
      c. Shock loads - 8 - 10.
   7. Size to suit hanger rods.
   8. ITT Phillips "Red Head" or equal.

J. Steel Deck Inserts:
   1. Factory stud with:
      a. Clip.
      b. Spring.
      c. Coupling.
   2. ITT Phillips "Red-Head" or equal.

K. Miscellaneous Metal:
   1. Steel plate, shapes and bars: ASTM A36.
   3. Bolts and nuts: regular hexagon-head type, ASTM A307, Grade A.

2.04 DUCT HANGERS AND SUPPORTS

A. See Section 15840: DUCTWORK.

PART 3 EXECUTION

3.01 PIPE HANGERS, SUPPORTS AND GUIDES

A. General:
1. Assure adequate support for pipe and contents.
2. Prevent vibration or swaying.
3. Provide for expansion and contraction.
4. Supports of wire, rope, wood, chain, strap perforated bar or any other makeshift device not permitted.
5. Comply with applicable requirements at ANSI B31.1.0 and B31.2 for piping.
6. Support piping independently so that equipment is not stressed by piping weight of expansion.
7. See Section 15210: VIBRATION ISOLATION AND SEISMIC CONTROL for hangers, guides, anchors and supports requiring vibration isolation units.
8. Hangers and supports shall have minimum safety factor of five (5), based on ultimate tensile or compressive strength, as applicable, of material used.
9. Prime coat exposed steel hangers and supports:
   a. Hangers and supports located in crawl spaces, pipes shafts and suspended ceiling spaces are not considered exposed.

B. Horizontal piping, except as noted:
1. Adjustable clevis type and rod: All services.
2. Trapeze hangers:
   a. Not permitted for:
      1) Steam and condensate piping.
      2) Fire and sprinkler piping.
      3) Chemical waste drain piping.
   b. Guide individual pipes on trapezes with 1/4 in. U-bolt or Superstrut 702 pipe clamp.
      1) Install thermal hanger shield at each support point.
3. Galvanized sheet metal shields between hangers and PVC piping.
4. Threaded steel rods:
   a. 2 in. vertical adjustment with 2 nuts each end for positioning and locking.
   b. Size to 12 in. IPS.
Pipe, IPS Rod

- to 2 in. 3/8 in.
- 2-1/2 in. and 3 in. 1/2 in.
- 4 in. 5/8 in.
- 6 in. and 8 in. 3/4 in.
- 10 in. and 12 in. 7/8 in.

c. Size above 12 in. IPS and multiple pipe standards: safety factor of 5 on ultimate strength on area.
d. For double rod hangers: 1 size smaller than above.

5. For drainage piping buried below slab on grade see Section 15050: GENERAL PROVISIONS, MECHANICAL.

C. Vertical piping:

1. Base support:
   a. Base elbow or welded equivalent.
   b. Bearing plate on structural support.

2. Guides at every third floor but not to exceed:
   a. 25 ft. for piping to 2 in.
   b. 36 ft. for piping 2-1/2 in. to 12 in.
   c. 50 ft. for piping 14 in. and larger.

3. Top support:
   a. Special hanger or saddle in horizontal connection.
   b. Provisions for expansion.

4. Intermediate supports: steel pipe clamp at floor:
   a. Bolted and welded to pipe.
   b. Extension ends bearing on structural steel or bearing plates.

5. For multiple pipes: coordinate guides, bearing plates and accessory steel.

D. Install Pipe isolators between hangers and:

1. Pipe requiring sound and vibration isolation.

E. Plumbing Walls:

1. Small plumbing piping in walls may be supported from steel waste and vent piping with WEJ-IT “Adjusto-Spacer System” components in lieu of other hangers and isolators.

2. Steel support components shall be separated from copper piping with plastic tape.

F. Spring Supports for Piping:

1. See Section 15210: VIBRATION ISOLATION.

2. Minimum Static Deflection: 1 in.:
a. Unless otherwise indicated.

G. Miscellaneous Steel:

1. Provide miscellaneous steel members, beams, brackets, etc., for support of work in this division unless specifically included in other divisions.

3.02 PIPE SUPPORT SPACING

A. Maximum spacing for horizontal piping:

<table>
<thead>
<tr>
<th>Type of Pipe</th>
<th>Size</th>
<th>Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>1 in. to 1-1/4 in.</td>
<td>7 ft.</td>
</tr>
<tr>
<td></td>
<td>1-1/2 in. and smaller</td>
<td>6 ft.</td>
</tr>
<tr>
<td></td>
<td>1-1/2 in. to 2 in.</td>
<td>8 ft.</td>
</tr>
<tr>
<td></td>
<td>2 in. and larger</td>
<td>10 ft.</td>
</tr>
<tr>
<td></td>
<td>2-1/2 in. to 3 in.</td>
<td>10 ft.</td>
</tr>
<tr>
<td></td>
<td>4 in.</td>
<td>14 ft.</td>
</tr>
<tr>
<td></td>
<td>5 in. and larger</td>
<td>15 ft.</td>
</tr>
<tr>
<td>Copper</td>
<td>3/4 in. and smaller</td>
<td>5 ft.</td>
</tr>
<tr>
<td></td>
<td>1 - 1-1/4 in.</td>
<td>6 ft.</td>
</tr>
<tr>
<td></td>
<td>1-1/2 - 3 in.</td>
<td>8 ft.</td>
</tr>
<tr>
<td></td>
<td>4 in. and larger</td>
<td>10 ft.</td>
</tr>
<tr>
<td>Bell and Spigot</td>
<td>All</td>
<td>10 ft.</td>
</tr>
<tr>
<td>(Notes 1, 2, 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hubless C.I. All</td>
<td></td>
<td>10 ft.</td>
</tr>
<tr>
<td>(Notes 2,4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic</td>
<td>3/4 in. and smaller</td>
<td>3 ft.</td>
</tr>
<tr>
<td>(Note 2)</td>
<td>1 - 1-1/2 in.</td>
<td>4 ft.</td>
</tr>
<tr>
<td></td>
<td>2 - 3 in.</td>
<td>6 ft.</td>
</tr>
<tr>
<td></td>
<td>4 in. and larger</td>
<td>8 ft.</td>
</tr>
</tbody>
</table>

B. Spacing Notes:

1. Typical of cast iron.
2. Not less than one support per joint.
3. Support to be with 18 in. of hub or joint.
4. Support to be placed on or immediately adjacent to coupling.

Additional supports at:

5. Changes in direction.
6. Branch piping and runouts over 5 ft.
7. Concentrated loads due to valves, strainers and other similar items.
8. At valves 4 in. and larger in horizontal piping.

a. Support piping on each side of valve.
9. Brace hubless piping to prevent horizontal and/or vertical movement.

C. Parallel piping on trapezes:
   1. Maximum spacing to be that of pipe requiring closest spacing.

D. Support standpipes and fire sprinkler piping in accordance with NFPA.

3.03 ATTACHMENT TO STRUCTURE

A. Concrete:
   1. Use inserts for suspending hangers from reinforced concrete slabs and walls wherever practicable.
   2. Set inserts in position in advance of concrete work.
   3. Provide reinforcement rod in concrete for inserts carrying:
      a. Pipe over 4 in.
      b. Ducts over 60 in.

   4. Where rod size exceeds 7/8 in. diameter, or where load exceeds insert rating, use the inserts with a trapeze type member connecting member below concrete.
   5. Where concrete slabs form finished ceiling, finish inserts flush with slab surface.
   6. Where inserts are omitted install hangers with expansion shields.
   7. Poured-In-Place Concrete:
      a. With metal form or underdeck.
      b. Before concrete is poured:
         1) Field drill hole through metal deck.
         2) Install factory-made steel deck inserts specified hereinbefore.
      c. After concrete is poured:
         1) Install hangers with expansion shields.

B. Steel Beam Anchors:
   1. Approved beam or channel clamps.
   2. Do not cut or weld to structural steel without permission of structural engineer.

C. Steel Deck Anchors:
   1. Concrete filled: as specified above.
   2. Decking without concrete:
      a. Through rod Support:
         1) Weld to square plate, 1/4 in. thick.
         2) Plate to distribute load over minimum of two full cells.
         3) Coordinate with floor layouts to clear cells with wiring.
D. Side Wall Supports:
   1. Concrete walls:
      a. As specified for hangers.
   2. Stud Walls:
      a. Toggle bolts.
      b. Studs welded to structural studs.
      c. Lag screws into wood backing.
      d. Other methods:

E. Support Spreaders:
   1. Install spreaders spanning between structural members when hangers fall between
      them, and hanger load is too great for slab or deck attachment.
   2. Spreaders may be one of methods listed below, or combination of both as required:
      a. Fabricated from structural channel:
         1) End fittings bolted or welded.
         2) Secure to structural members:
            a) As required by construction.
            b) As approved by Structural Engineer.
      b. Formed channels with fittings, similar to Superstrut:
         1) Submit manufacturer's calculations for installation.

3.04 DUCT HANGERS & SUPPORTS
A. See Section 15840: DUCTWORK.

END OF SECTION