Pipe hangers & supports
Eaton and Cooper united.
Energizing a world that demands more.

Discover today’s Eaton.

Powering business worldwide
As a global diversified power management company, we help customers worldwide manage the power needed for buildings, aircraft, trucks, cars, machinery and businesses.

Eaton’s innovative technologies help customers manage electrical, hydraulic and mechanical power more reliably, efficiently, safely and sustainably.
We deliver:

- **Electrical solutions** that use less energy, improve power reliability and make the places we live and work safer and more comfortable.

- **Hydraulic and electrical solutions** that enable machines to deliver more productivity without wasting power.

- **Aerospace solutions** that make aircraft lighter, safer and less costly to operate, and help airports operate more efficiently.

- **Vehicle drivetrain and powertrain solutions** that deliver more power to cars, trucks and buses, while reducing fuel consumption and emissions.

We provide integrated solutions that help make energy, in all its forms, more practical and accessible.

With 2012 sales of $16.3 billion, Eaton has approximately 103,000 employees around the world and sells products in more than 175 countries.

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**Eaton’s electrical business**

**Eaton is a global leader with expertise in:**

- Power distribution and circuit protection
- Backup power protection
- Solutions for harsh and hazardous environments
- Lighting and security
- Structural solutions and wiring devices
- Control and automation
- Engineering services

Eaton is positioned through its global solutions to answer today’s most critical electrical power management challenges. With 100 years of electrical experience behind us, we’re energized by the challenge of powering up a world that demands twice as much energy as today. We’re anticipating needs, engineering products, and creating solutions to energize our markets today and in the future.

We are dedicated to ensuring that reliable, efficient and safe power is available when it’s needed most.

[**Eaton.com**](http://www.eaton.com)
B-Line is a leading manufacturer and fabricator of metal products used in the support of pipe and equipment for industrial, residential, commercial, utility, and OEM installations. B-Line is proud of the exacting standards of research, design, engineering, and manufacturing that go into each and every product that comprise our pipe hanger product line. Our customers have access to the most complete support systems offered in the industry, including pipe hangers, metal framing, cable tray, slotted angle, seismic bracing, fasteners, telecom, enclosures and anchors.

Many of B-Line’s products are listed by Underwriters' Laboratories, Inc. and FM Global approved for fire sprinkler system installations. All B-Line products are manufactured to meet or exceed industry standards set for their design and manufacture.

B-Line products are produced in five modern plants consisting of over 1,000,000 square feet. These facilities are located in Highland, Illinois; Troy, Illinois; Reno, Nevada; Corona, California and Sherman, Texas. Regional sales and distribution centers are located throughout the United States stocking standard B-Line products for quick service and delivery.

This catalog is designed to be helpful to engineers and contractors in the application and selection of pipe hangers, supports and seismic bracing for construction and maintenance.

If a unique application requires a special product not included in this catalog, B-Line engineering personnel are ready to furnish design consultation and realistic material estimates. In addition, sales representatives with engineering expertise are located throughout the United States and abroad for your convenience.

WARNING

All hanger products in this catalog are intended for installation and service as illustrated or described. Do not use them for any purposes other than those described in this catalog. Products that are used for unintended purposes could fail, resulting in severe personal injury or death.

Examples of misapplications which could cause severe personal injury or death include, but are not limited to:

- Using a beam clamp on a beam other than those described in the catalog;
- Using concrete inserts as anchors for pulling pipe up to the required elevation;
- Suspending clevis hangers, one under another, which could result in an accumulative load that is greater than that which the pipe hanger will support.

B-Line pipe hanger and support products are manufactured in accordance with industry standards. Our customers should exercise care to use these products properly so as to avoid potential accidents. Contact B-Line for assistance with proper installation and use of the products in this catalog.

NOTICE

Cooper B-Line reserves the right to change the specifications, materials, equipment, prices or the availability of products at any time without prior notice. While every effort has been made to assure the accuracy of information contained in this catalog at the time of publication, Cooper B-Line is not responsible for inaccuracies resulting from undetected errors or omissions.
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<td>139</td>
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---

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Page 234

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---

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B-Line’s metal framing support system is designed with many time-saving features. Fully adjustable and reusable, with a complete line of channels, fittings, and accessories for multi-purpose applications.

## SELECTION CHART
for Channels, Materials and Hole Patterns

<table>
<thead>
<tr>
<th>Channel Type</th>
<th>Channel Dimensions</th>
<th>Material &amp; Thickness*</th>
<th>Channel Hole Pattern **</th>
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<tr>
<td></td>
<td>Height</td>
<td>Width</td>
<td>Steel</td>
</tr>
<tr>
<td>B11</td>
<td>3 1/4”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
</tr>
<tr>
<td>B12</td>
<td>2 7/16”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
</tr>
<tr>
<td>B22</td>
<td>1 5/8”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
</tr>
<tr>
<td>B24</td>
<td>1 5/8”</td>
<td>1 5/8”</td>
<td>14 Ga.</td>
</tr>
<tr>
<td>B26</td>
<td>1 5/8”</td>
<td>1 5/8”</td>
<td>16 Ga.</td>
</tr>
<tr>
<td>B32</td>
<td>1 3/8”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
</tr>
<tr>
<td>B42</td>
<td>1”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
</tr>
<tr>
<td>B52</td>
<td>1 3/16”</td>
<td>1 5/8”</td>
<td>12 Ga.</td>
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<td>B54</td>
<td>1 3/16”</td>
<td>1 5/8”</td>
<td>14 Ga.</td>
</tr>
<tr>
<td>B56</td>
<td>1 3/16”</td>
<td>1 5/8”</td>
<td>16 Ga.</td>
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### Copper Tubing Clamps
DURA-COPPER™

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<td>16</td>
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<tr>
<td>B2030DCU</td>
<td>3/4” (20)</td>
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</tr>
<tr>
<td>B2032DCU</td>
<td>1” (25)</td>
<td>14</td>
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<tr>
<td>B2033DCU</td>
<td>1 1/4” (32)</td>
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<tr>
<td>B2034DCU</td>
<td>2” (50)</td>
<td>12</td>
</tr>
<tr>
<td>B2042DCU</td>
<td>2 1/2” (60)</td>
<td>12</td>
</tr>
<tr>
<td>B2046DCU</td>
<td>3” (80)</td>
<td>12</td>
</tr>
<tr>
<td>B2050DCU</td>
<td>3 1/2” (90)</td>
<td>12</td>
</tr>
<tr>
<td>B2054DCU</td>
<td>4” (100)</td>
<td>11</td>
</tr>
</tbody>
</table>


Nut and bolts are included with all two-piece clamps.

** Add “PA” to Part No. for Pre-assembled

---

### Schedule 40 Pipe Clamps

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<td>B2018</td>
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<td>B2019</td>
<td>5” (125)</td>
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<td>B2020</td>
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<td>B2022</td>
<td>8” (200)</td>
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</table>

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** Add “PA” to Part No. for Pre-assembled
Below are some basic clamp and cushions to be used with a strut system. For the industry's most complete line of strut and strut fittings, refer to B-Line's Strut Systems Engineering Catalog.

### O.D. Pipe Clamps

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**For Copper Tubing & OD Sizes**

- **Catalog No.**
- **Copper & Steel OD Tubing Size**
- **Nominal Copper Size**

| BVT025 | 1/4" | 6.3 |
| BVT037 | 3/8" | 8.5 |
| BVT050 | 5/16" | 12.7 |
| BVT062 | 5/32" | 15.9 |
| BVT075 | 5/32" | 19.0 |
| BVT087 | 7/32" | 22.2 |
| BVT100 | 1" | 25.4 |
| BVT112 | 1 1/8" | 28.6 |
| BVT125 | 1 5/32" | 31.7 |
| BVT137 | 1 1/16" | 34.9 |
| BVT150 | 1 1/16" | 38.1 |
| BVT162 | 1 7/32" | 41.3 |
| BVT175 | 1 7/32" | 44.4 |
| BVT187 | 1 7/32" | 47.6 |
| BVT200 | 2" | 50.8 |
| BVT212 | 2 1/8" | 54.0 |
| BVT225 | 2 1/8" | 57.1 |
| BVT250 | 2 1/8" | 63.5 |
| BVT262 | 2 7/32" | 66.7 |
| BVT300 | 3" | 76.2 |
| BVT312 | 3 1/32" | 79.4 |
| BVT362 | 3 1/16" | 89.2 |
| BVT400 | 4" | 91.4 |
| BVT412 | 4 1/8" | 97.6 |
| BVT612 | 6 1/8" | 104.8 |

All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

### For Copper Tubing Type L & K

- **Catalog No.**
- **Nominal Pipe Size**

| BVP025 | 1/4" | 6 |
| BVP037 | 3/8" | 10 |
| BVP050 | 1/2" | 15 |
| BVP075 | 5/16" | 20 |
| BVP100 | 1" | 25 |
| BVP125 | 1 1/4" | 32 |
| BVP150 | 1 1/4" | 40 |
| BVP200 | 2" | 50 |
| BVP250 | 2 1/2" | 65 |
| BVP300 | 3" | 80 |
| BVP350 | 3 1/4" | 90 |
| BVP400 | 4" | 100 |
| BVP500 | 5" | 125 |
| BVP600 | 6" | 150 |

Available for tubing and pipe sizes 1/4" to 6", OD sizes 5/32" to 25/32".

- Easy one tool installation, dampens vibration and noise, secures tubing firmly, and protects against galvanic reaction.

Stainless Steel available

### Strut Systems

- Inhibits Galvanic Reaction
- Reduces Sound & Vibration
- Used on refrigeration, HVAC, copper tubing, glass pipes & hydraulic lines

Available in 20 Ft. rolls.

**For Rigid Conduit or Iron Pipe**

<table>
<thead>
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<th>Nominal Size</th>
<th>Length of Use</th>
<th>Use Clamp No.</th>
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<td>7/16&quot;</td>
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<td>B2009</td>
</tr>
<tr>
<td>5/16&quot;</td>
<td>3/32&quot;</td>
<td>B2067</td>
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</table>

**For Thimwall (EMT) Conduit**

<table>
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<th>Nominal Size</th>
<th>Length of Use</th>
<th>Use Clamp No.</th>
</tr>
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<tbody>
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<td>1/4&quot;</td>
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**For Copper Tubing Type L & K**

<table>
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</tr>
<tr>
<td>5/32&quot;</td>
<td>1/32&quot;</td>
<td>B2027</td>
</tr>
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</table>

All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.
MATERIALS

Carbon Steel
Carbon steel is used in the manufacture of B-Line pipe hangers and supports. Excellent strength characteristics and adaptability to cold forming provide a well engineered design. By cold forming the steel, mechanical properties are increased, adding to the structural integrity of the fabricated hanger.

Stainless Steel
AISI Type 304 and Type 316 are non-magnetic members of the austenitic stainless steel group. Several conditions make the use of stainless steel ideal. These include reducing long term maintenance costs, high ambient temperatures, appearance, and stable structural properties such as yield strength, and high creep resistance.

CORROSION
All metal surfaces exposed to the environment are affected by corrosion. Depending on the physical properties of the metal and its proximity to other dissimilar metals, an electrochemical reaction may occur which causes an attack on the metal itself, resulting in corrosion. Chemical corrosion is limited to highly corrosive environments, high temperatures, or a combination of both.

FINISHES
Zinc Coatings
Protective zinc coatings are available on a number of pipe hangers and accessories in three basic forms:

- Electro-galvanized, pre-galvanized, and hot-dip galvanized after fabrication. In all cases, the zinc protects the steel first as a sacrificial anode to repair bare areas on cut edges and gouges.
- When exposed to air and moisture, zinc forms a tough, adherent protective film consisting of a mixture of zinc oxides, hydroxides, and carbonates. The corrosion resistance of zinc is directly related to its thickness and the environment. For example a 0.2 mil (5 μm) coating will last twice as long as a 0.1 mil (2.5 μm) coating in the same environment.
- Electro-Galvanized (ASTM B633 SC1 or SC3)
  An electro-galvanized process deposits a coating of zinc on the steel by electrolysis from a bath of zinc salts. This coating is pure zinc and adheres to the steel with a molecular bond. A maximum of 0.5 mils (12.7 μm) of zinc can be applied by this method. This coating is recommended for in-door use in relatively dry areas.
- Pre-Galvanized Zinc (ASTM A653 Coating Designation G90)
  Pre-galvanized zinc is produced by continuously rolling the steel coils or sheets through molten zinc at the steel mills. This is also known as “mill-galvanized” or “hot-dipped mill galvanized”. Coils are then slit to size for fabrication of pipe hangers. Coating thicknesses of G90, is 0.90 ounces per square foot (0.27 kg/m²) of steel surface.
- Plastic Coating
  Some products offered by B-Line are plastic or vinyl coated for prevention of galvanic reaction between materials or for noise reduction. These coated products can also be used where contact between glass pipe and hanger is not desirable. Felt lined hangers may be substituted for same purpose.
- Red Primer
  A corrosion resistant metal primer containing rust inhibitive pigments.

but is suitable for extended exposure in dry or mildly corrosive atmospheres.

Hot-Dip Galvanized After Fabrication (ASTM A123)
After a pipe hanger or fitting has been fabricated, it is completely immersed in a bath of molten zinc. A metallurgical bond is formed, resulting in a zinc coating that completely coats all surfaces, including edges. Zinc coatings of this specification have a minimum thickness of 1.50 ounces per square foot (0.45 kg/m²) on each side or a total of 3.0 ounces per square foot (0.9 kg/m²) of steel.

Hot-dip galvanized after fabrication is recommended for outdoor exposure. For best results, a zinc rich paint (available from B-Line) should be applied to field cuts. The zinc rich paint will provide immediate protection for field cuts and eliminate the short time period for galvanic action to “heal” the damaged coating.

Protection of cut edges with zinc coatings.
DURA-COPPER™ and DURA-GREEN™ Epoxy Coatings

DURA-COPPER and DURA-GREEN are water borne epoxy coatings applied to B-Line products by a precisely controlled cathodic electro-deposition process. This process is accomplished using a conveyor to transport parts through several cleaning, phosphatizing and application stages prior to being baked (see diagram below).

This custom designed paint system is used for painting all copper painted hanger parts and all green channel, slotted angle and fittings.

Samples are selected on a routine basis for Salt Spray (fog) testing to verify the quality of the finish. These tests are performed in accordance with ASTM B117-73 and evaluated and rated according to ASTM D1654-79 (Tables 1 & 2). The DURA-COPPER and DURA-GREEN Epoxy coatings have been tested and listed by Underwriters Laboratories in accordance with “Standard for Pipe Hanger Equipment for Fire Protection Service, UL 203” and meet or exceed all requirements of Federal Specification TT-C-490B Paragraph 3.

Quality Assurance

B-Line’s Quality Assurance Program has been developed and implemented for compliance to various industry standards and specifications.

DURA-COPPER™ & DURA-GREEN™ EPOXY COATING PROCESS

<table>
<thead>
<tr>
<th>TANK 1</th>
<th>TANK 2</th>
<th>TANK 3</th>
<th>TANK 4</th>
<th>TANK 5</th>
<th>TANK 6</th>
<th>TANK 7</th>
<th>TANK 8</th>
<th>BAKE OVEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts are thoroughly cleaned and phosphatized.</td>
<td>Rinse is applied to remove insoluble salts and unreacted phosphates.</td>
<td>Phosphatized sealer is applied to insure corrosion resistance and paint adhesion.</td>
<td>The material moves through clear water rinse to remove excess phosphates.</td>
<td>Deionized rinse prepares the metal for the cathodic electro-coating.</td>
<td>The electro-coating tank applies a uniform coat of epoxy paint to the entire surface.</td>
<td>The first post rinse removes any unelectrically attracted solids.</td>
<td>The final rinse insures a smooth, nonblemish finish.</td>
<td>The curing process takes 20 minutes at a baking temperature of 375°F (199°C).</td>
</tr>
</tbody>
</table>

SALT SPRAY TEST RESULTS

<table>
<thead>
<tr>
<th>DURA-COPPER Epoxy</th>
<th>Copper Plating</th>
</tr>
</thead>
</table>

DURA-COPPER out performs Copper Plating 4 to 1

Elapsed Time

(1) All salt spray (fog) tests conducted in accordance with ASTM B117-73 and evaluated and rated according to ASTM D1654-79 Tables 1 & 2. Tests were performed and certified by an independent testing laboratory.

General Information

Torque

The torque values in this catalog are to be used as a guide only. The relationship between the applied torque or torque wrench reading and the actual tension created in the bolt may be substantially different. Important factors affecting torque-tension relationships include friction under the bolt head or nut, hole tolerances, and torque wrench tolerances. Accuracy of many commercial torque wrenches may vary as much as plus or minus 25%.

Charts and Tables

Charts and tables in this section are compiled from information published by nationally recognized organizations and are intended for use as a guide only. B-Line recommends that users of this information determine the validity of such information as applied to their own applications.

Eaton’s B-Line reserves the right to make specification changes without notice.
SECTION 15140 - PIPE HANGERS AND SUPPORTS

Part I - GENERAL

1.01 SECTION INCLUDES

A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the pipe hanger and supports as described in this specification.

1.02 REFERENCES

C. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
G. NFPA 13 - Installation of Sprinkler Systems.

1.03 QUALITY ASSURANCE

A. Hangers and supports used in fire protection piping systems shall be listed and labeled by Underwriters Laboratories.
B. Steel pipe hangers and supports shall have the manufacturers name, part number, and applicable size stamped in the part itself for identification.
C. Hangers and supports shall be designed and manufactured in conformance with ANSI/MSS SP-58.
D. Supports for sprinkler piping shall be in conformance with NFPA 13.

1.04 SUBMITTALS

A. Submit product data on all hanger and support devices, including shields and attachment methods. Product data to include, but not limited to materials, finishes, approvals, load ratings, and dimensional information.

Part II - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, pipe hanger and support systems shall be as manufactured by B-Line, Inc.

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers

1. Uninsulated pipes 2 inch and smaller:
   a. Adjustable steel swivel ring (band type) hanger, B-Line Fig. 200.
   c. Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
   d. Adjustable steel clevis hanger, B-Line B3104 or B3100.
2. Uninsulated pipes 2½ inch and larger:
   a. Adjustable steel clevis hanger, B-Line B3100.
   b. Pipe roll with sockets, B-Line B3114.
   c. Adjustable steel yoke pipe roll, B-Line B3110.

3. Insulated pipe - Hot or steam piping:
   a. 2 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield, B-Line B3100 with B3151 or B3153 series.
   b. 2½ inch and larger pipes:
      i. Adjustable steel yoke pipe roll with pipe covering protection saddle, B-Line B3110 with B3160 - B3165 series.
      ii. Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160 - B3165 series.

4. Insulated pipe - Cold or chilled water piping:
   a. 5 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield, B-Line B3100 with B3151 or B3153 series.
   b. 6 inch and larger pipes:
      i. Adjustable steel yoke pipe, B-Line B3110, with B3380CW - B3384CW calcium silicate shield.
      ii. Pipe roll with sockets, B-Line B3114, with B3380CW - B3384CW calcium silicate shield.

B. PIPE CLAMPS
   1. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weldless eye nuts, B-Line B3140 or B3142 with B3200. For insulated lines use double bolted pipe clamps, B-Line B3144 or B3146 with B3200.

C. MULTIPLE OR TRAPEZE HANGERS
   1. Trapeze hangers shall be constructed from 12 gauge roll formed ASTM A1011 SS Gr. 33 structural steel channel, 1½” x 1½” minimum, B-Line B22 strut or stronger as required.
   3. For pipes subjected to axial movement:
      a. Strut mounted roller support, B-Line B3126. Use pipe protection shield or saddles on insulated lines.
      b. Strut mounted pipe guide, B-Line B2417.

D. WALL SUPPORTS
   1. Pipes 4 inch and smaller:
   2. Pipes larger than 4 inch:
      b. Welded steel brackets, B-Line B3066 or B3067, with roller chair or adjustable steel yoke pipe roll. B-Line B3120 or B3110. Use pipe protection shield or saddles on insulated lines.
E. FLOOR SUPPORTS
   1. Hot piping under 6 inch and all cold piping:
      a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized
         for pipe elevation, B-Line B3093 and B3088T or B3090 and B3088. Pipe saddle
         shall be screwed or welded to appropriate base stand.
   2. Hot piping 6 inch and larger:
      a. (Adjustable) Roller stand with base plate, B-Line B3117SL (or B3118SL).
      b. Adjustable roller support and steel support sized for elevation, B-Line B3124

F. VERTICAL SUPPORTS
   1. Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.

G. COPPER TUBING SUPPORTS
   1. Hangers shall be sized to fit copper tubing outside diameters.
      a. Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
      b. Malleable iron ring hanger, B-Line B3198CT or hinged ring hanger B3198HCT.
      c. Adjustable steel clevis hanger, B-Line B3104CT.

H. PLASTIC PIPE SUPPORTS
   1. V-bottom clevis hanger with galvanized 18 gauge continuous support channel,
      B-Line B3106 and B3106V, to form a continuous support system for plastic pipe or flexible
      tubing.

I. SUPPLEMENTARY STRUCTURAL SUPPORTS
   1. Design and fabricate supports using structural quality steel bolted framing materials
      as manufactured by B-Line. Channels shall be roll formed, 12 gauge ASTM
      A1011 SS Grade 33 steel, 15/8" x 15/8" or greater as required by loading conditions.
      Submit designs for pipe tunnels, pipe galleries, etc., to engineer for approval. Use
      clamps and fittings designed for use with the strut system.

2.04 UPPER ATTACHMENTS
A. BEAM CLAMPS
   1. Beam clamps shall be used where piping is to be suspended from building steel.
      Clamp type shall be selected on the basis of load to be supported, and load configuration.
   2. C-Clamps shall have locknuts and cup point set screws, B-Line B351L, B3036L or Fig.
      65XT Top flange C-clamps shall be used when attaching a hanger rod to the top flange of
      structural shapes, B-Line B3034 or B3033. Refer to manufacturers’ recommendation
      for setscrew torque. Retaining straps shall be used to maintain the clamp’s position
      on the beam where required (Fig. 69, Fig. 69R).
   3. Center loaded beam clamps shall be used where specified. Steel clamps shall be
      B-Line B3050 or B3055. Malleable iron or forged steel beam clamps with cross bolt shall
      be B-Line B3054 or B3291 - B3297 series as required to fit beams.

B. CONCRETE INSERTS
   1. Cast in place spot concrete inserts shall be used where applicable, either steel or
      malleable iron body, B-Line B2500 or B3014. Spot inserts shall allow for lateral
      adjustment and have means for attachment to forms. Select insert nuts to suit
      threaded hanger rod sizes, B-Line N2500 or B3014N series.
2. Continuous concrete inserts shall be used where applicable. Channels shall be 12 gauge, ASTM A 1011 SS Grade 33 structural quality carbon steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of 2,000 lbs/ft. in concrete, B-Line B22I, B32I, or B52I (B52I is limited to 1,500 lbs/ft.). Select channel nuts suitable for strut and rod sizes.

2.05 VIBRATION ISOLATION AND SUPPORTS

A. For refrigeration, air conditioning, hydraulic, pneumatic, and other vibrating system applications, use a clamp that has a vibration dampening insert and a nylon inserted locknut. For copper and steel tubing use B-Line BVT series VibraClamps, for pipe sizes use BVP series.

B. For larger tubing or piping subjected to vibration, use neoprene or spring hangers as required.

C. For base mounted equipment use vibration pads, molded neoprene mounts, or spring mounts as required.

D. Vibration isolation products as manufactured by B-Line, VibraTrol systems.

2.06 ACCESSORIES

A. Hanger rods shall be threaded both ends, B-Line B3205, or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

B. Shields shall be 180° galvanized sheet metal, 12 inch minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151.

C. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

2.07 FINISHES

INDOOR FINISHES

A. Hangers and clamps for support of bare copper piping shall be coated with copper colored epoxy paint, B-Line DURA-COPPER™. Additionally a plastic coating or a felt lining in hanger can be used.

B. Hangers for other than bare copper pipe shall be zinc plated in accordance with ASTM B633 - SC3 or shall have an electro-deposited green epoxy finish, B-Line DURA-GREEN™.

C. Strut channels shall be pre-galvanized in accordance with ASTM A653 G90 or have an electro-deposited green epoxy finish, B-Line DURA-GREEN.

OUTDOOR AND CORROSIVE AREA FINISHES

D. Hangers and strut located outdoors shall be hot dip galvanized after fabrication in accordance with ASTM A123. All hanger hardware shall be hot-dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.

E. Hangers and strut located in corrosive areas shall be Type 304 (316) stainless steel with stainless steel hardware.
Part III - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

A. Pipe shall be adequately supported by pipe hanger and supports specified in PART II - PRODUCTS. Hangers for insulated pipes shall be sized to accommodate insulation thickness.

B. Horizontal steel piping shall be supported in accordance with ANSI/MSS SP-69 & SP-58 Tables 3 and 4, excerpts of which follow below:

<table>
<thead>
<tr>
<th>NOMINAL PIPE SIZE</th>
<th>ROD DIAMETER</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; - 1 1/4&quot;</td>
<td>3/8&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>3/8&quot;</td>
<td>9'-0&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td>3/8&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>1/2&quot;</td>
<td>11'-0&quot;</td>
</tr>
<tr>
<td>3&quot;</td>
<td>1/2&quot;</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
<td>1/2&quot;</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>5/8&quot;</td>
<td>14'-0&quot;</td>
</tr>
<tr>
<td>5&quot;</td>
<td>5/8&quot;</td>
<td>16'-0&quot;</td>
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<tr>
<td>6&quot;</td>
<td>3/4&quot;</td>
<td>17'-0&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>3/4&quot;</td>
<td>19'-0&quot;</td>
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<tr>
<td>10&quot;</td>
<td>7/8&quot;</td>
<td>22'-0&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>7/8&quot;</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>14&quot;</td>
<td>1&quot;</td>
<td>25'-0&quot;</td>
</tr>
<tr>
<td>16&quot;</td>
<td>1&quot;</td>
<td>27'-0&quot;</td>
</tr>
</tbody>
</table>

C. Horizontal copper tubing shall be supported in accordance with ANSI/MSS SP-69 & SP-58 Tables 3 and 4, excerpts of which follow below:

<table>
<thead>
<tr>
<th>NOMINAL TUBING SIZE</th>
<th>ROD DIAMETER</th>
<th>MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; - 3/4&quot;</td>
<td>3/8&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
<td>3/8&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>3/8&quot;</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>3/8&quot;</td>
<td>8'-0&quot;</td>
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<tr>
<td>2&quot;</td>
<td>3/8&quot;</td>
<td>8'-0&quot;</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>1/2&quot;</td>
<td>9'-0&quot;</td>
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<tr>
<td>3&quot;</td>
<td>1/2&quot;</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>3 1/2&quot;</td>
<td>1/2&quot;</td>
<td>11'-0&quot;</td>
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<tr>
<td>4&quot;</td>
<td>1/2&quot;</td>
<td>12'-0&quot;</td>
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<td>5&quot;</td>
<td>1/2&quot;</td>
<td>13'-0&quot;</td>
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<td>6&quot;</td>
<td>5/8&quot;</td>
<td>14'-0&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>3/4&quot;</td>
<td>16'-0&quot;</td>
</tr>
</tbody>
</table>

D. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored B-Line DURA-COPPER™ epoxy paint, or non-adhesive isolation tape (B-Line Iso-Pipe™). Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.
E. Support horizontal cast iron pipe adjacent to each hub, with 10 feet maximum spacing between hangers.

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

G. Place a hanger within 12 inches of each horizontal elbow.

H. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every (other) floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

I. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in Section 2.02 C. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to schedule in Section 3.01 B.

J. Do not support piping from other pipes, ductwork or other equipment which is not building structure.

3.02 CONCRETE INSERTS
A. Provide inserts for placement in formwork before concrete is poured.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.

D. For inserts carrying 5” nominal pipe and larger, provide hooked rod to concrete reinforcement.