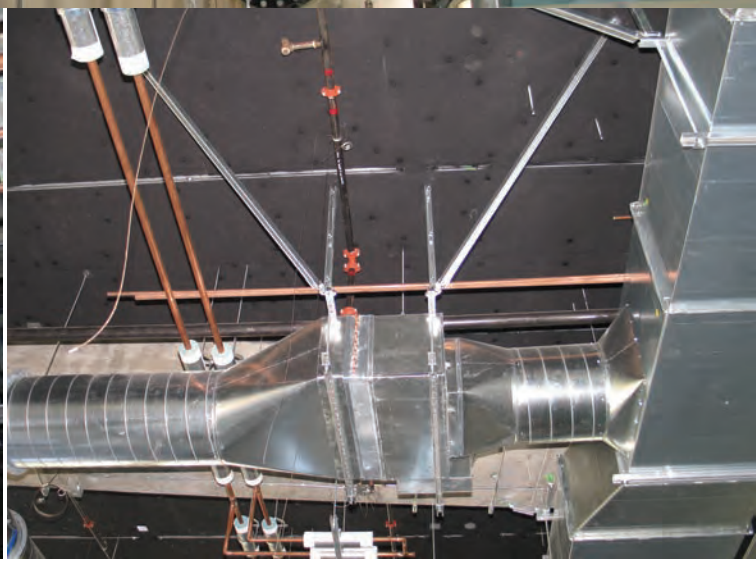
Seismic bracing products

for mechanical, electrical & plumbing systems



B-Line by 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.

EATON

Powering Business Worldwide



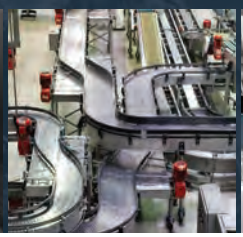

We deliver:

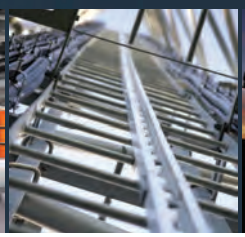
- **Electrical solutions** that use less energy, improve power reliability and make the places we live and work safer and more comfortable
- **Hydraulic and electrical solutions** that enable machines to deliver more productivity without wasting power
- **Aerospace solutions** that make aircraft lighter, 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.







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

Introduction

For over 45 years, the TOLCO™ brand has been synonymous with innovative, labor saving pipe hanger and seismic bracing solutions. And now together, as a brand of Eaton's B-LineBusiness, we deliver a comprehensive seismic bracing product offering.

TOLCO Seismic Bracing products are designed with three key features in mind, labor savings, visual verification and universal applications.

TOLCO Seismic Bracing Key Features

- **Labor Savings**
  TOLCO seismic products help customers save time and cost during installation.
- **Visual Verification**
  Many TOLCO products designed with features such as break-off bolts or nuts, to signal to the installer that required installation torques has been achieved. Without this type of visual feedback, an installer would need a torque wrench or other means to ensure proper installation torque has been acheived. This feature also aides in the inspection and certification of products once installed, to sign off on completion of a project.
- **Universal Applications**
  We strive to continue to provide solutions that serve universal applications. For example, our Fig. 981 is designed to fit multiple rod sizes; and our Fig. 828 which is designed to fit a variety of structural steel shapes and sizes.

Product Offering

To assist our customers, this catalog is laid out by type of seismic bracing products and their function.

- **Structural Attachments**
  Provide anchorage for a seismic brace assembly to various types of structures including steel beams, concrete or wood
- **Transitional Attachments**
  Connect the structural attachment to the brace member, either strut or pipe
- **System Attachments**
  Attach the brace member to the system being braced (mechanical, electrical or plumbing) along with various components used to increase the rigidity of the system itself (for example: spacers and rod stiffeners)
- **KwikWire™ Systems**
  Effective brace or restraint product for light loads
- **VIBRA-TROL™ Isolation Products**

Product Certifications

Many of the products shown in this catalog are certified with the following:

- Listed by Underwriters Laboratories (UL) in U.S. and Canada
- Factory Mutual Engineering Approved (FM)
- Pre-approved by the State of California, Office of Statewide Health, Planning and Development (OSHPD) as shown in our OPA-0300 and OPA-0300-10 Seismic Bracing Guidelines

For more information on our pipe hangers, supports and seismic bracing solutions utilized in other applications, such as mechanical or plumbing systems, please refer to our Pipe Hangers & Supports and Strut Systems catalogs, and the State of California OSHPD Pre-Approved Seismic Restraint Guidelines OPA-0300. These resources and other valuable information can be found online at www.cooperbline.com/tolco.

Manufacturers Standardization Society of the Valve and Fitting Industry, Inc.

ISO 9001:2008

NOTICE

Eaton's B-Line Business 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, we are not responsible for inaccuracies resulting from undetected errors or omissions.

Table of Contents

* C & P is Carpenter & Paterson

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www.cooperbline.com/tolco

Building Codes, Standards and Guidelines

TOLCO Seismic Restraint Guidelines* are designed to meet or exceed the requirements of the following:

2013 California Building Code (CBC 2013)

2010 California Building Code (CBC 2010)

2007 California Building Code (CBC 2007)

2001 California Building Code (CBC 2001)

1998 California Building Code (CBC 1998)

1997 Uniform Building Code (UBC 1997)

2012 International Building Code (IBC 2012)

2009 International Building Code (IBC 2009)

2006 International Building Code (IBC 2006)

2003 International Building Code (IBC 2003)

2000 International Building Code (IBC 2000)

1999 National Building Code (NBC 1999)

1999 Standard Building Code (SBC 1999)

American Society of Civil Engineers (ASCE7) 2010

American Society of Civil Engineers (ASCE7) 2005

2010 National Fire Protection Association Pamphlet 13 (NFPA-13 2010)

2007 National Fire Protection Association Pamphlet 13 (NFPA-13 2007)

2002 National Fire Protection Association Pamphlet 13 (NFPA-13 2002) w/TIA

1999 National Fire Protection Association Pamphlet 13 (NFPA-13 1999)

1998 Seismic Restraint Manual Guidelines for Mechanical Systems (SMACNA) w/Addendum No. 1, 2000

* Where there is a conflict in requirements between these guidelines and above mentioned codes, the more stringent requirements shall prevail.

Seismic Restraints System SRSG-13

Seismic restraints system guidelines

OPA-0300-10
for mechanical, electrical, plumbing and fire sprinkler systems

B-Line by EATON

Many TOLCO brand products are included in our OSHPD pre-approved seismic guidelines.
For specific information please visit www.cooperbline.com/tolco to view the OSHPD OPA - 300 catalog.

General Information

TOLCO

3.0 SEISMIC BRACING GENERAL REQUIREMENTS - MECHANICAL-PLUMBING PIPING

I. Seismic restraints are required for the following piping installations

a) All piping 1 1/4" diameter and larger where Seismic Design Category is D or F and Ip is equal to 1.5

b) All piping and trapeze supported piping weighing more than 10 lbs/ft with Ip of equal to 1.5 in Seismic Design Category D or F.

c) Trapeze supported piping that would require seismic bracing if supported individually

Exceptions

All piping suspended by individual hanger rods 12 inches or less in length from the top of pipe to the bottom of the support structure where hanger is connected.

Trapeze supported systems suspended 12 inches or less from the top of the trapeze to the bottom of the support structure where trapeze is connected.

In both exceptions above, all of the hangers of a run must comply with the 12 inch rule or bracing is required.

The 12 inch rod rule exception has additional requirements, they are as follows:

a) Lateral motion of the piping will not cause impact with other systems (e.g. other pipe, duct, or electrical systems, equipment, structural members etc., or fragile appurtenances such as sprinkler heads or lighting fixtures) or loss of system vertical support.

b) Piping must be made of ductile material with ductile connections (e.g. welded steel pipe, brazed copper pipe etc.)

c) Vertical rod hanger top connections to the building structure cannot develop moments

II. Transverse bracing shall be provided at 40 ft. maximum spacing for welded steel pipe, brazed copper pipe or grooved piping with UL 213 listed connections. Rigid grooved coupling listed for UL Standard 213 shall be permitted in horizontal run of pipe. Flexible grooved coupling listed for UL Standard 213 shall be permitted in vertical risers (to accommodate drift) and other locations (e.g. seismic separation, equipment nozzle, etc.) to accommodate small movement and/or rotation. Non-UL listed grooved couplings shall not be used unless approved on project specific basis.

III. Longitudinal bracing shall be provided at 80 ft. maximum spacing for welded steel pipe, brazed copper pipe or grooved piping with UL 213 listed connections. Rigid grooved coupling listed for UL Standard 213 shall be permitted in horizontal run of pipe. Flexible grooved coupling listed for UL Standard 213 shall be permitted in vertical risers (to accommodate drift) and other locations (e.g. seismic separation, equipment nozzle, etc.) to accommodate small movement and/or rotation. Non-UL listed grooved couplings shall not be used unless approved on project specific basis.

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Seismic Restraint Systems OPA-0300-10

General Information

TOLCO

IV. Cast iron, No-Hub, Plastic, FRP, and other pipe or constructed of non-ductile material, shall have the maximum brace spacing reduced to one-half of the maximum brace spacing for welded steel or brazed copper pipe. Due to differences in pipe manufacturing and pipe connection types, maximum spacing may vary depending on pipe manufacturers' requirements.

V. Brace No-Hub piping each side of 90 degree horizontal change in direction.

VI. When determining horizontal load requirements, consider all pipes full of water unless calculated for other substances.

VII. Seismic bracing shall not limit the expansion and contraction of the piping system. When thermal expansion or contraction is involved, longitudinal bracing shall be designed at the anchor point of the piping system. The longitudinal bracing and the connections must be capable of resisting the additional force induced by expansion and contraction designed by a Registered Design Professional (RDP), since it is outside the scope of this OPA.

VIII. Single Rigid Braces shall be located at or within 6" of the vertical pipe support, which may require a rod stiffener (See page 5-7).

IX. When bracing trapeze supports, the bracing shall be attached directly to the trapeze with piping secured to the trapeze with pipe straps or 2-pc clamps. A minimum of two transverse braces and one longitudinal brace is required.

X. Stacked trapezes supported by the same rods shall be braced independently from one another. The rod supports in each section may require stiffening (See page 3-21 and 3-22, 3-23, and 5-7).

XI. Bracing installed on smaller piping shall not be used to brace larger piping.

XII. A piping system shall not be braced to different parts of the building that may respond differently during seismic activity.

XIII. See page 5-10 for Maximum Brace Member Lengths.

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Seismic Restraint Systems OPA-0300-10

General Information

TOLCO

XIV. The following Tolco products were engineered with torque indicators to ensure proper installation:

Fig. 980 Universal Swivel Sway Brace Attachments have a break-off bolt head. (Page 5-1)

Fig. 1000 Sway Brace Attachments have material that flattens out or comes together to ensure proper engagement. (Page 5-4)

Fig. 1001 Sway Brace Attachment has bolt heads that bottom out. (Page 5-5)

Fig. 800, Fig. 825 & Fig. 828 Adjustable Sway Brace Attachment to Steel and Bar Joist have break-off head bolts. (Page 4-35, 4-34, 4-33)

Fig. 4L and 4LA Brace Pipe Attachments have break-off bolt heads. (Page 5-3)

XV. Refer to the appropriate codes and standards for additional information and requirements.

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Seismic Restraint Systems OPA-0300-10

General Information

TOLCO

5.0 SEISMIC BRACING GENERAL REQUIREMENTS - DUCTS

I. Seismic restraints are required for the following duct installations

a) All ducts having a cross-sectional area in excess of 6 sq. ft. or round duct with diameter 33" or larger where Seismic Design Category D or F and Ip is equal to 1.5.

b) Equipment installed independently of the duct system or is within a run of duct weighing 75 lbs or more where Seismic Design Category D or F and Ip is equal to or greater than 1.5.

c) Duct designed to carry toxic, highly toxic, or explosive gases, or used for smoke control shall be designed and braced without exceptions.

Exceptions

All ducts suspended by hanger straps 12 inches or less in length from the duct support point to the bottom of the support structure where the hanger is connected. The strap hangers must be attached within 2 inches of the top of the duct with a minimum of two #10 sheet metal screws.

Trapeze supported systems suspended 12 inches or less from the duct support point to the bottom of the support structure where trapeze is connected.

In both exceptions above, all of the hangers in a run must comply with the 12 inch rule or bracing is required.

The 12 inch rod rule exception has additional requirements, they are as follows:

a) Lateral motion of duct will not cause impact with other systems (e.g. other duct, pipes or electrical systems, equipment, structural members etc., or fragile appurtenances such as sprinkler heads or lighting fixtures) or loss of system vertical support.

b) Duct must be made of ductile material with ductile connections.

c) Vertical rod hanger top connections to the building structure cannot develop moments.

II. Transverse bracing shall be provided at 30 ft. maximum spacing. Duct containing hazardous gases shall not exceed 15 ft. maximum.

III. Longitudinal bracing shall be provided at 60 ft. maximum spacing. Ducts containing hazardous gases shall not exceed 30 ft. maximum.

IV. Fiberglass, Plastic or other duct constructed of non-ductile material, shall have the brace spacing reduced to one-half of the maximum spacing for transverse and longitudinal braces listed above.

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TOLCO

V. Duct bracing for square, rectangle or oval duct consists of a trapeze support with two support rods to carry the gravity dead load. The trapeze must have a support member connected to the top of the duct and to the bottom of duct. Both trapeze members are connected to the duct with #10 sheet metal screws spaced at maximum 12" O.C. Support rods may need to be stiffened. (See pages 3-21, 3-22, 3-23, and 5-7) Transverse and/or longitudinal bracing may then be attached to the top of the upper trapeze member.

VI. Wall penetrations may be considered transverse bracing where duct is framed tight and secure.

VII. Ducts may be combined on a single support and braced based on their combined weight.

VIII. Floor penetrations may be considered transverse and longitudinal bracing when duct is framed tight and secure and change in direction does not exceed the maximum allowable offset length of two times the duct width as measured from the floor penetration to the inside of a 90 degree turn.

IX. See page 5-10 for Maximum Brace Member Lengths.

X. The following Tolco products were engineered with torque indicators to ensure proper installation:

Fig. 980 Universal Swivel Sway Brace Attachments have a break-off bolt head. (Page 5-1)

Fig. 1000 Sway Brace Attachments have material that flattens out or comes together to ensure proper engagement. (Page 5-4)

Fig. 1001 Sway Brace Attachment has bolt heads that bottom out. (Page 5-5)

Fig. 800, Fig. 825 & Fig. 828 Adjustable Sway Brace Attachment to Steel and Bar Joist have break-off head bolts. (Page 4-33, 4-34, 4-35)

Fig 4L and 4LA Brace Pipe Attachments have break-off bolt heads. (Page 5-3)

XI. Refer to the appropriate codes and standards for additional information and requirements.

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Seismic Restraint Systems OPA-0300-10

General Information

TOLCO

6.0 SEISMIC BRACING GENERAL REQUIREMENTS - ELECTRICAL SYSTEMS

I. Seismic restraints are required for the following electrical installations:

a) All conduits 2 1/2" diameter and larger where Seismic Design Category is D or F and Ip is equal to 1.5.

b) All conduits, cable trays and trapeze assemblies weighing 10 lbs./ft. or more where Seismic Design Category is D or F and Ip is equal to 1.5.

c) Trapeze supported conduit that would require seismic bracing if supported individually.

Exceptions

All conduit or cable trays suspended by individual hanger rods 12 inches or less in length from the top of the support point to the bottom of the support structure where hanger is connected.

Trapeze supported systems suspended 12 inches or less from the top of the trapeze support point to the bottom of the support structure where trapeze is connected.

In both exceptions above, all of the hangers of a run must comply with the 12 inch rule or bracing is required.

The 12 inch rod rule exception has additional requirements, they are as follows:

a) Lateral motion of the electrical system will not cause impact with other systems (e.g. other electrical systems, piping, duct, equipment, structural members etc., or fragile appurtenances such as sprinkler heads or lighting fixtures) or loss of system vertical support.

b) Electrical system must be made of ductile material with ductile connections.

c) Vertical hanger top connection to the building structure cannot develop moments.

II. Transverse bracing shall be provided at 40 ft. maximum spacing.

III. Longitudinal bracing shall be provided at 80 ft. maximum spacing.

IV. Conduits constructed of non-ductile materials shall have the brace spacing reduced to one half of the maximum spacing for transverse and longitudinal braces listed above.

V. All braces shall be located at or within 6" of a vertical support, which may require a rod stiffener.

VI. When bracing trapeze supports, the bracing shall be attached directly to the trapeze, with conduits or cable trays secured to the trapeze with straps, conduit clamps, or cable tray clips bolted to B-Line strut. A minimum of one transverse brace and/or two longitudinal braces is required.

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VII. Stacked trapezes supported by the same rods shall be braced independently from one another. The rod supports in each section may require stiffening.

VIII. See page 5-10 for Maximum Brace Member Lengths.

IX. The following Tolco products were engineered with torque indicators to ensure proper installation:

Fig. 980 Universal Swivel Sway Brace Attachments have a break-off bolt head. (Page 5-1)

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Seismic Restraint Systems OPA-0300-10

General Information

TOLCO

7.0 SEISMIC BRACING LAYOUT - GENERAL REQUIREMENTS

I. The TOLCO Seismic Restraint Guidelines provides for the protection of suspended pipe, ducts and electrical systems and equipment against excessive movement due to seismic forces.

II. The seismic restraint assemblies in this guideline are designed to simultaneously resist vertical loads due to the weight of the component and its contents and both horizontal and vertical seismic loads.

III. Horizontal loads are braced with two types of seismic restraints;

a) Transverse Brace to protect pipe, duct, or electrical conduit and cable tray against movement perpendicular to its run.

b) Longitudinal Brace to protect pipe, duct, or electrical conduit and cable tray against movement parallel to its run.

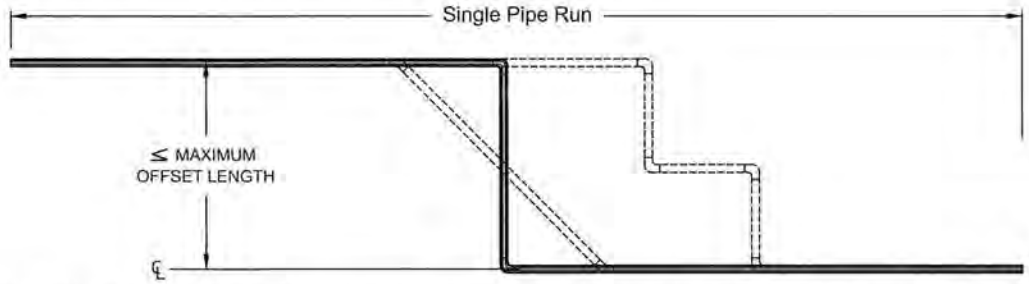
IV. A run of pipe, duct or electrical system is defined as a straight length, or one with allowable offsets, that is 10' or greater in length. An allowable offset length for pipe or conduit is the allowable transverse brace spacing divided by 16 or as noted below. Ductwork allowable offset length is two times the duct width.

STEEL PIPE OR CONDUIT

PIPE SIZE	MAX. OFFSET LENGTH		
	0.25g	0.5g	1.0g
1 1/4" - 2"	4' - 0"	2' - 0"	1' - 0"
2 1/2" - 3"	8' - 0"	4' - 0"	2' - 0"
4" - 5"	10' - 0"	6' - 0"	3' - 0"
6"	10' - 0"	10' - 0"	5' - 0"
8"	10' - 0"	10' - 0"	7' - 0"
10" - 12"	10' - 0"	10' - 0"	9' - 0"
14" - 24"	10' - 0"	10' - 0"	10' - 0"

COPPER PIPE

PIPE SIZE	MAX. OFFSET LENGTH		
	0.25g	0.5g	1.0g
2 1/2" - 3"	2' - 0"	1' - 0"	0' - 0"
4" - 5"	4' - 0"	2' - 0"	1' - 0"
6"	8' - 0"	4' - 0"	2' - 0"
8"	10' - 0"	8' - 0"	4' - 0"
10"	10' - 0"	10' - 0"	5' - 0"
12"	10' - 0"	10' - 0"	6' - 0"



NOTE: When a run of pipe, duct or electrical system that requires bracing transitions down to a size that does not, the point of transition is considered the end of the run and will require a transverse brace.

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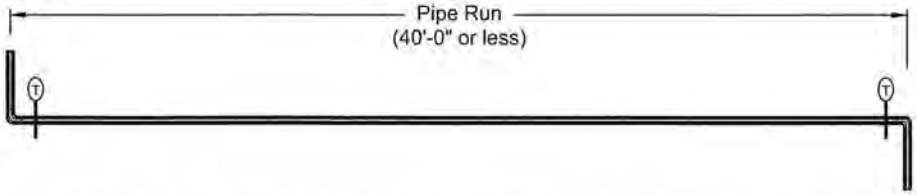
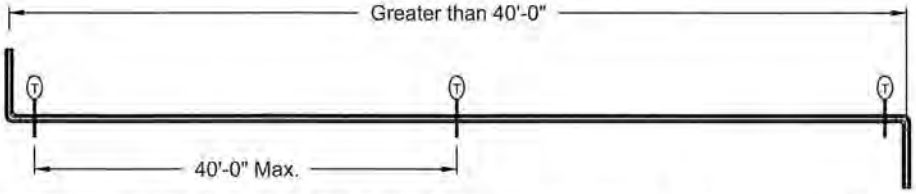
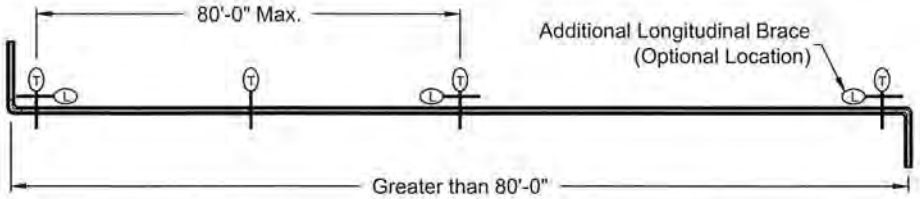
V. Each run of pipe, duct, electrical conduit, or cable tray requires a minimum of two transverse braces, one at each end of the run.



VI. If the distance between the two transverse braces exceeds the maximum allowable spacing, add transverse braces as needed.

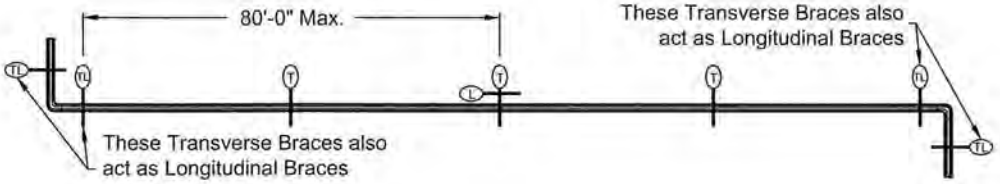


VII. Each pipe run must have at least one longitudinal brace. If the maximum allowable longitudinal spacing is exceeded then add longitudinal braces to meet the spacing requirement.



VIII. Each run of pipe, duct, electrical system, or cable tray requires a minimum of one longitudinal brace. However, a transverse brace placed on the run section at the opposite side of an elbow or tee within 24" may act as a longitudinal brace, and is labeled a "DUAL USE" brace. See layout example below.

a) Longitudinal and Longitudinal "DUAL USE" braces on single supported pipe or conduit shall be attached directly to the pipe or conduit.
b) Bracing installed to smaller piping shall not be used to brace larger piping.



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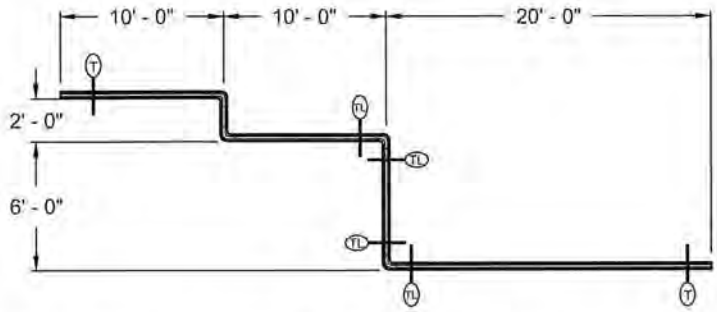
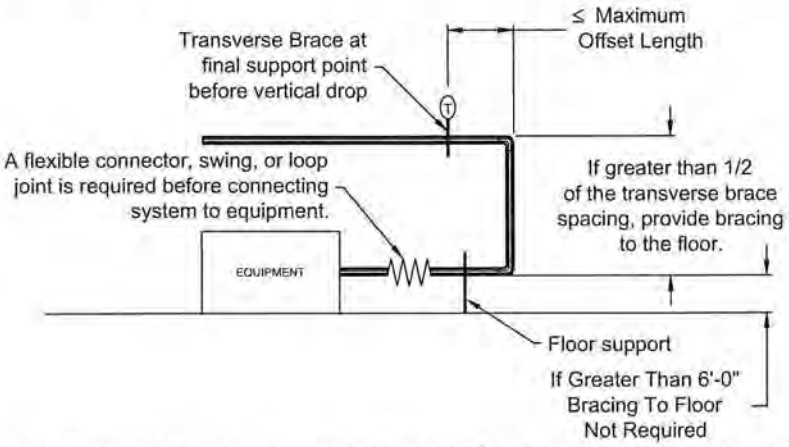
IX. In some cases several short runs may occur in close proximity. By following the preceding guidelines each run should have longitudinal and transverse bracing. Transverse bracing may be used as longitudinal bracing and vice versa on runs adjacent to each other as long as the total length of pipe tributary to the brace does not exceed the maximum allowable spacing. In cases where it does, additional braces are required.



X. At vertical pipe or conduit drop to equipment, where pipe or conduit is connected to the equipment using a flexible connection, provide transverse bracing before the vertical drop. The total length from the transverse brace to the vertical drop should not be more than the allowable offset previously determined. Provide transverse bracing at the floor after the vertical drop if the total length of the pipe from the transverse brace before the vertical drop to the flexible connection is greater than ½ of the maximum transverse brace spacing.



XI. When pipe, duct or electrical systems cross a building seismic separation or seismic joint they must be capable of accommodating the joint displacements as specified by the engineer of record.

XII. A rigid pipe, duct or electrical system shall not be braced to dissimilar parts of a building structure or two dissimilar building systems that may move different from one another during an earthquake. Bracing should be attached to the part of the building structure that is supporting the pipe, duct or electrical system.

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XIII. Transverse and longitudinal braces shall be installed as shown in this guideline up to 60° from horizontal. However, the recommended brace ratio is 45° from horizontal, or 1 (vert.):1 (horiz.) brace ratio. Spacing for additional brace angles may be achieved by the following:

For up to 1.5 (vert.):1 (horiz.), divide brace spacing by 1.67. For up to 2 (vert.):1 (horiz.), divide brace spacing by 2.33. (Example: A 45° or 1 (vert.):1 (horiz.) brace angle ratio maximum allowable transverse spacing of 40 ft. divided by 1.67 = 23 ft. for a 1.5 (vert.):1 (horiz.) brace angle ratio.)

XIV. All transverse and longitudinal braces utilizing strut or steel pipe with Tolco Fig. 900 series fittings on both ends have an alignment tolerance of 5° from center without adversely affecting the given loads. This applies to single hanger pipe, duct or electrical conduit supports as well as trapeze hanger support. See page 5-10 for more information.

XV. The seismic brace assemblies in this guideline consist of three important components; Anchorage and connections to building structure, brace member such as strut, pipe or angle iron, and seismic brace attachments. For details and load information of structural attachments see Section 4, for details of brace assemblies see applicable "Brace Details" section(s).

XVI. Single Rigid Brace locations are required to be at or within 6 inches of a vertical hanger assembly to protect against vertical movement. When the vertical hanger assembly consists of threaded rod for support it may be necessary to provide a stiffener (see page 5-7). An exception to this would be the use of two opposing rigid braces at the same location. In this case no additional vertical support is necessary.

XVII. At a rigid brace location, threaded rod and their building attachment components used in a vertical hanger assembly may need to be increased in size due to the additional seismic tension loads placed upon them. To determine if the vertical hanger assembly is adequate, make sure that the maximum allowable load of its components is greater than or equal to the pipe, duct or electrical system gravity load plus any additional seismic loads.

XVIII. Steel bolt connections to steel structure or components shall not have a diameter less than 1/16" less than the mounting hole. Steel bolt connections to concrete structure shall not have a diameter less that 1/8" less than the mounting hole.

XIX. Bracing shall be omitted on runs less than 10ft. in total length.

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8.0 GENERAL DESIGN PROCEDURE - SINGLE HANGER AND TRAPEZE BRACING

The following presents a general procedure for design of seismic bracing for single rod hangers and trapeze supports. The following assumes that a piping, duct, or electrical system design layout has been provided, and that gravity hanger supports have been designed by others. The following also assumes that seismic bracing has been determined to be required. Refer to the appropriate codes and standards for additional information and requirements.

I. Seismic Force Coefficient

Determine the total design lateral seismic force coefficient based on the applicable code, project drawings, and specifications. This coefficient is commonly referred to as the "G-factor"; i.e. Fp = .5G. In case of a conflict, use the more stringent criteria. The total design horizontal seismic force coefficient, when multiplied by the weight of the piping, duct, or electrical system, represents the total design lateral seismic force.

According to CBC 2010 the total design lateral seismic force, Fp, and the total vertical seismic force, Fv, shall be determined from the following formulas. The final Fp, Fv shall be divided by 1.4 to convert the strength based seismic force to the allowable stress based seismic force. This is necessary because the loads and brace spacing in this manual are based on the allowable stress design.

Horizontal Seismic Force

$$Fp = \frac{\frac{0.4\ ap\ Sds}{\frac{Rp}{Ip}}\left(1+2\frac{z}{h}\right)}{1.4}\ Wp$$

Except that:

Fp shall not be less than 0.3 Sds Ip Wp and
Need not be more than 1.6 Sds Ip Wp

Vertical Seismic Force
Fv = 0.2 Sds Wp

Sds - Design spectral acceleration for short periods

ap - Component amplification factor

Ip - Component importance factor

Wp - Component operating weight

Rp - Component response modification factor

z - Height of structure at point of attachment with respect to the base

h - Average roof height of structure with respect to the base

Refer to CBC 2010 codes for additional information & requirements.

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II. Seismic Bracing Detail

Select a seismic bracing detail. For example, if a rigid transverse brace is required for installation, go to page 2-1 through 2-6 in Section 2 "Single Hanger Rigid Brace Details" for all applicable transverse brace details corresponding to various hanger support types.

III. Structural Attachment Detail

Select a structural attachment detail. For example, if a wedge anchor into normal weight concrete slab is required for installation at a seismic brace location, go to page 4-1, 4-14 or 4-20 in Section 4 "Structural Attachment" for all applicable seismic brace attachment details corresponding to various wedge anchor types.

IV. Brace Spacing

Determine the maximum transverse and longitudinal brace spacing from the section "Structural Attachments". This brace spacing is based on the allowable loads for the specific structural attachment detail previously selected.

The brace spacing shall not exceed the maximum allowable brace spacing requirements listed in section 1 general notes.

V. Attachment to Strut (Trapeze Supported Systems Only)

Verify the adequacy of the pipe, duct or electrical system attachment to the strut. The attachment must be adequate to transfer transverse, longitudinal and vertical seismic loads to strut.

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VI. Trapeze Support Member (Trapeze Supported Systems Only)

Determine the adequacy of the trapeze to carry the seismic loads in addition to the gravity loads. The trapeze has been designed previously to carry the gravity loads and vertical seismic loads. The transverse seismic loads will apply an axial load and an additional bending. The longitudinal seismic loads are often much larger than the vertical gravity and seismic loads, and will apply loads about the weak axis causing additional bending. The trapeze support member may need to be increased in size in order to satisfy the design criteria described above.

VII. Brace Member

Select a brace member and determine its total length. A brace member may be B-Line strut channel or steel pipe. Maximum allowable horizontal seismic loads and maximum allowable lengths for the different brace members are listed on page 5-10. The maximum applied horizontal seismic load shall be equal to or less than the maximum allowable horizontal seismic loads.

VIII. Rod Stiffener

Determine if rod stiffeners are required. Maximum rod lengths for various rod diameters are listed in the section "Seismic Bracing Components" (See Page 5-7). Rod stiffener may not be required when using double brace rigid bracing.

IX. Bracing Layout

Layout the seismic bracing as explained in the previous section "Seismic Bracing Layout Procedure".

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9.0 GENERAL INSTALLATION NOTES:

I. Single Hanger Rigid Brace Installation Guideline

a) The design of all hangers is not in the scope of this pre-approval. SEOR to verify the hanger within 6" of the diagonal brace member are designed for gravity load plus vertical seismic loads. The design of the hangers to be approved on a project specific basis by OSHPD.

b) All vertical hangers must be plumbed to the support structure.

c) When the vertical hanger assembly consists of threaded rod for support, it may be necessary to provide a stiffener. See page 5-7 for information.

d) The recommended brace angle is 45°, or 1 (Vert.) to 1 (Horiz.) brace ratio. However, the brace can be installed between 0°-60° degrees from horizontal.

e) All transverse and longitudinal braces utilizing strut or steel pipe with Tolco Fig. 900 series fittings on both ends have an alignment tolerance of 5° from center without adversely affecting the giving loads. This applies to single hanger pipe, duct or electrical conduit supports. See page 5-10 for more information.

f) The design of all thread rod (ATR), rod coupling nut, and pipe clamp is not in the scope of this pre-approval unless noted otherwise. The design of the components mentioned above is to be approved on a project specific basis by OSHPD.

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II. Trapeze Rigid Brace Installation Guideline

a) The design of all hangers is not in the scope of this pre-approval. SEOR to verify the hanger within 6" of the diagonal brace member are designed for gravity load plus vertical seismic loads. The design of the hangers to be approved on a project specific basis by OSHPD.

b) All vertical hangers must be plumbed to the support structure.

c) When the vertical hanger assembly consists of threaded rod for support, it may be necessary to provide a stiffener. See page 5-7 for information.

d) The recommended brace angle is 45°, or 1 (Vert.) to 1 (Horiz.) brace ratio. However, the brace can be installed between 0°-60° degrees from horizontal.

e) All transverse and longitudinal braces utilizing strut or steel pipe with Tolco Fig. 900 series fittings on both ends have an alignment tolerance of 5° from center without adversely affecting the giving loads. This applies to single hanger pipe, duct or electrical conduit supports. See page 5-10 for more information.

f) The center of gravity of the combined loads must occur within the middle 1/3 of the trapeze support span.

g) For pipe or electrical conduit systems, the design of the thread rod (ATR), rod coupling nut, channel strut, pipe clamp and pipe strap is not in the scope of this pre-approval unless noted otherwise. The design of the components mentioned above is to be approved on a project specific basis by OSHPD.

h) For pipe or electrical conduit systems, the design of the thread rod (ATR), rod coupling nut, channel strut, and hold down clamp is not in the scope of this pre-approval unless noted otherwise. The design of the components mentioned above is to be approved on a project specific basis by OSHPD.

i) For rectangular or round duct systems, the design of the thread rod (ATR), rod coupling nut, channel strut, and duct strap is not in the scope of this pre-approval unless noted otherwise. The design of the components mentioned above is to be approved on a project specific basis by OSHPD.

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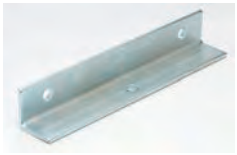

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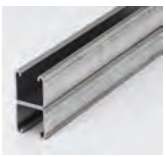

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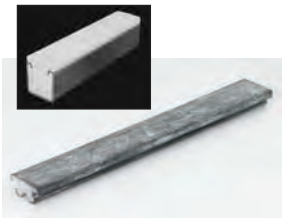

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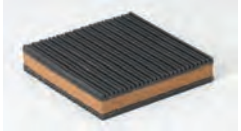

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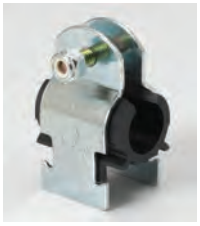

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Fig. 69 - Beam Clamp Retaining Strap (B-Line B3367)

TOLCO

c UL us LISTED

Size Range: 3/8"-16 thru 3/4"-10 rod
4" (101.6mm) thru 16" (406.4mm) lengths
Note: longer lengths are available consult factory

Material: Pre-Galvanized Steel

Function: To offer more secure fastening of various types of beam clamps to beam where danger of movement might be expected. NFPA 13 requires the use of retaining straps with all beam clamps installed in earthquake areas. Satisfies requirements of NFPA 13.

Important Note: Good installation practice of a retaining strap requires that the strap be held tightly and securely to all component parts of the assembly. Therefore a locking mechanism of some kind, such as a hex nut will provide a more secure reliable installation.

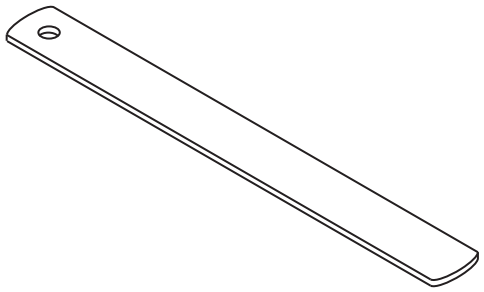
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL).** Approved for use with any listed beam clamp. Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines.

Finish: Pre-Galvanized

Order By: Figure number, length (L), and finish.

Note: Minimum return on strap is 1" (25.4mm)

For Use With: See chart.



Part No.	Hole Diameter in.	(mm)	For Use With	Length
69-3/8-L	7/16"	(11.1)	B3033-3/8, B3034-3/8, B3031-3/8, 65-3/8, 65XT-3/8, 66-3/8	Specify
69-1/2-L	9/16"	(14.3)	B3033-1/2, B3034-1/2, 65-1/2, 66-1/2	Specify
69-5/8-L	11/16"	(17.5)	B3033-5/8, 65-5/8, 66-5/8	Specify
69-3/4-L	13/16"	(20.6)	B3033-3/4	Specify

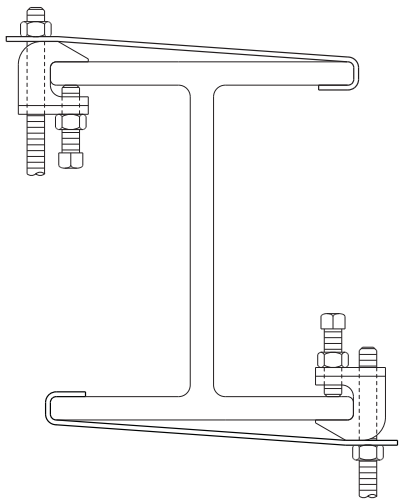


Fig. 69R - Retrofit Capable Beam Clamp Retaining Strap

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 3/8"-16 & 1/2"-13 rod
4" (101,6mm) thru 16" (406.4mm) lengths
Note: longer lengths are available consult factory

Material: Pre-Galvanized Steel

Function: To offer more secure fastening of various types of beam clamps to beam where danger of movement might be expected. NFPA 13 requires the use of retaining straps with all beam clamps installed in earthquake areas. Satisfies requirements of NFPA 13.

Features: Beveled locking slot* is precisely formed to align with the threaded section of a hanger rod or set screw and engage the unit securely. May be used as shown in Section "A-A" or inverted. Allows easy installation for new construction or retrofit applications.

Important Note: Good installation practice of a retaining strap requires that the strap be held tightly and securely to all component parts of the assembly. Therefore the beveled locking slot of the Fig. 69R will provide a secure reliable installation.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL).** Approved for use with any listed beam clamp. Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines.

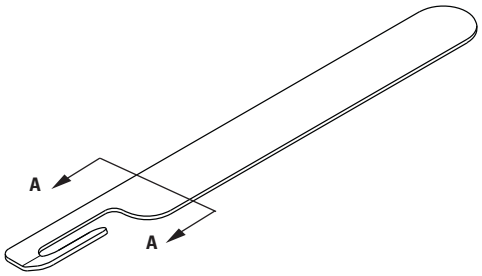
Finish: Pre-Galvanized

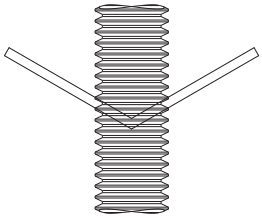
Order By: Figure number, length, and finish.

Note: Minimum return on strap is 1" (25.4mm)

For Use With: See chart.

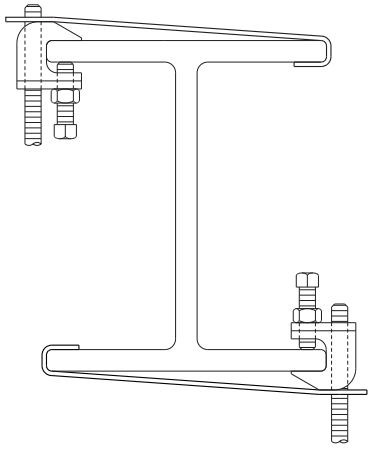
*** Patent #5,947,424**

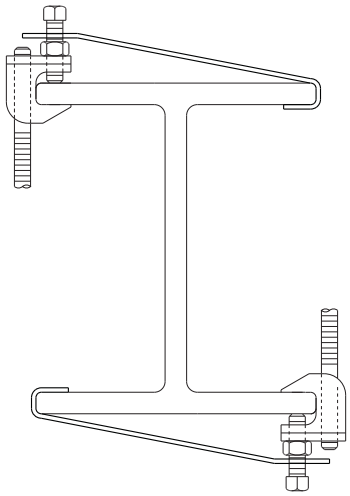




A - A

Part No.	Slot Width in.	(mm)	For Use With	Length
69R-3/8-L	7/16"	(30.1)	B3033-3/8, B3034-3/8, B3031-3/8, 65-3/8, 65XT-3/8, 66-3/8	Specify
69R-1/2-L	9/16"	(30.1)	B3033-1/2, B3034-1/2, 65-1/2, 66-1/2	Specify





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

Fig. 109A - Concrete Deck Insert - Hanger Application

Component of State of California OSHPD Approved Seismic Restraints System

TOLCO

c UL us LISTED

Size Range: 3/8"-16 thru 7/8"-9 rod

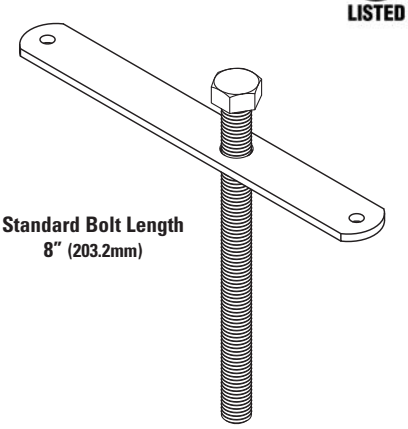
Material: Steel

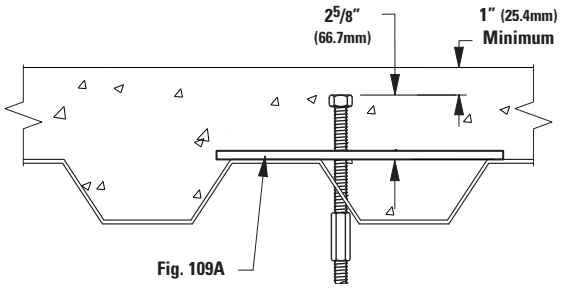
Function: For use in metal deck formed concrete to attach hanger rods. Allows for pre-positioning of hanger rods in poured concrete decks.

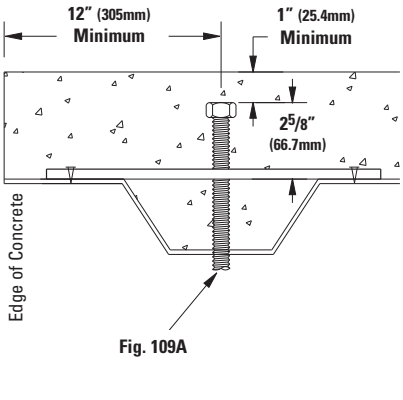
Approvals: 3/8" - 5/8" rod size is Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines.

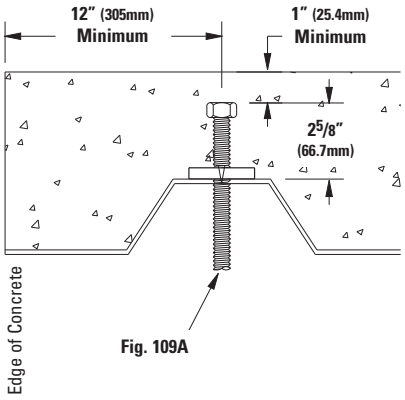
Finish: Plate: Plain Steel. Rod: Electro-Galvanized. Contact B-Line for alternative finishes and materials.

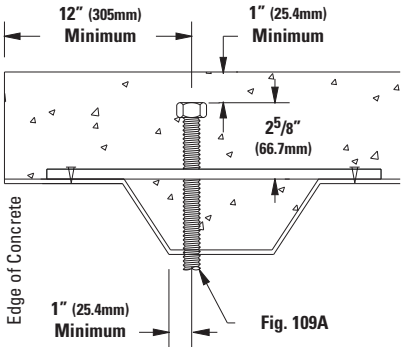
Order By: Figure number, rod size and finish. Contact B-Line for custom rod lengths.











Part No.	Rod Size	Max. Pipe Size in.	(mm)	Max. Hanger Spacing in.	(m)	Max. Recommended Load lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
109A-3/8	3/8"-16	4"	(101.6)	15'-0"	(4.57)	572	(2.54)	67.0	(30.4)
109A-1/2	1/2"-13	8"	(203.2)	15'-0"	(4.57)	579	(2.57)	69.0	(31.3)
109A-5/8	5/8"-11	Contact B-Line				715	(3.18)	71.0	(32.2)
109A-3/4	3/4"-10	Contact B-Line				1000	(4.45)	213.0	(96.6)
109A-7/8	7/8"-9	Contact B-Line				1000	(4.45)	217.0	(98.4)

Max. Recommended Loads shown include safety factor of 5.
Weight is based on the standard bolt length.

NOTES:

1. Mounting holes are standard. If the plate is not mechanically secured to the deck ribs, a jam nut is required to prevent the anchor bolt from laying over when concrete is poured. There is no structural strength added from the use of a mechanical fastener to hold the product in place before the pour.
2. Minimum spacing between inserts shall be not less than 4 1/2" (114.3mm) for 3/8" and 6" (1152.4mm) for 1/2"

Fig. 109A - Concrete Deck Insert - Brace Application

Component of State of California OSHPD Approved Seismic Restraints System

TOLCO

Size Range: 3/8"-16 thru 7/8"-9 rod

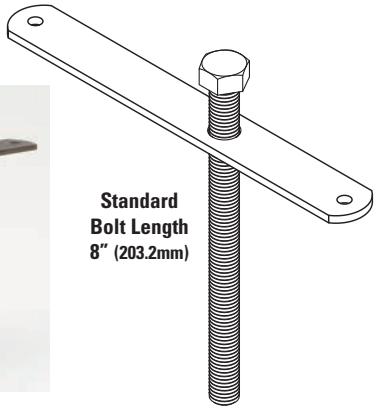
Material: Steel

Function: For use in metal deck formed concrete to attach hanger rods. Allows for pre-positioning of hanger rods in poured concrete decks.

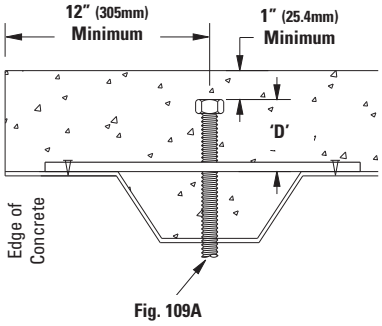
Approvals: Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines. Hangers certified by a registered professional engineer to Section 6-1.1 of NFPA #13 (1999) and Section 9.1.1.2. of NFPA 13 (2002).

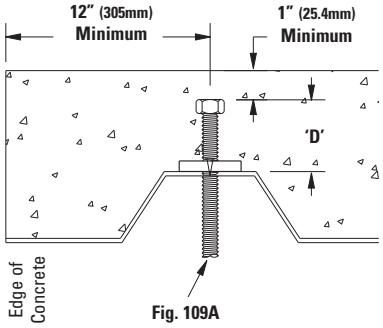
Finish: Plate: Plain Steel. Rod: Electro-Galvanized. Contact B-Line for alternative finishes and materials.

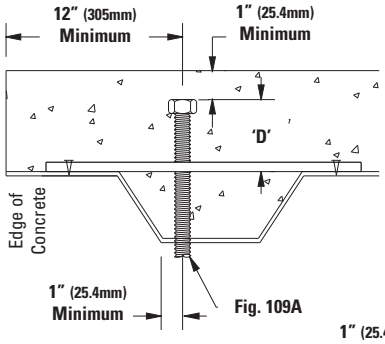
Order By: Figure number, rod size and finish. Contact B-Line for custom rod lengths.

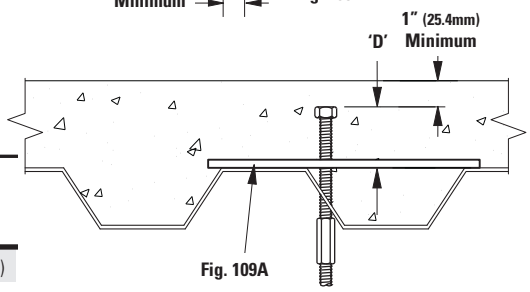


Qualifies as an acceptable alternate seismic brace fastener per Section 9.3.5.9.6 Certification calculations for this application are available upon request. See dimensions and installation Detail below.









Part No.	Rod Size	Max. Horizontal Load Brace At 45° lbs.	(kN)	'D' Min. Anchor Embedment Depth in.	(mm)	Approx. Wt./100 lbs.	(kg)
109A-3/8	3/8"-16	560	(2.49)	2 5/8"	(66.7)	67.0	(30.4)
109A-1/2	1/2"-13	660	(2.93)	2 5/8"	(66.7)	69.0	(31.3)
109A-5/8	5/8"-11	680	(3.02)	2 5/8"	(66.7)	71.0	(32.2)
109A-3/4	3/4"-10	700	(3.11)	2 5/8"	(66.7)	213.0	(96.6)
109A-7/8	7/8"-9	700	(3.11)	2 5/8"	(66.7)	217.0	(98.4)

Seismic bracing design load calculated in compliance with the requirements of IBC 2009 / CBC 2010.

Part No.	Rod Size	Max. Horizontal Load Brace At 45° lbs.	(kN)	'D' Min. Anchor Embedment Depth in.	(mm)	Approx. Wt./100 lbs.	(kg)
109A-3/8	3/8"-16	337	(1.50)	2 5/8"	(66.7)	67.0	(30.4)
109A-1/2	1/2"-13	395	(1.75)	2 5/8"	(66.7)	69.0	(31.3)
109A-5/8	5/8"-11	395	(1.75)	2 5/8"	(66.7)	71.0	(32.2)
109A-3/4	3/4"-10	395	(1.75)	2 5/8"	(66.7)	213.0	(96.6)
109A-7/8	7/8"-9	395	(1.75)	2 5/8"	(66.7)	217.0	(98.4)

Seismic bracing design load calculated in compliance with the requirements of IBC 2012 / CBC 2013.

NOTES:

1. Mounting holes are standard. If the plate is not mechanically secured to the deck ribs, a jam nut is required to prevent the anchor bolt from laying over when concrete is poured. There is no structural strength added from the use of a mechanical fastener to hold the product in place before the pour.
2. Minimum spacing between inserts shall be not less than 4 1/2" (114.3mm) for 3/8" and 6" (1152.4mm) for 1/2"

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

Fig. 109AF - Concrete Spot Insert - Hanger Application (B-Line B2501)

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

c UL us LISTED

Size Range: 3/8"-16 thru 7/8"-9 rod

Material: Steel

Function: Designed to be embedded in concrete to provide a point of support.

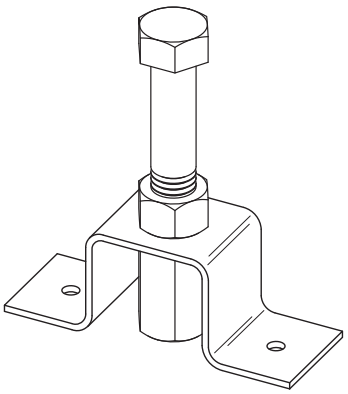
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)** for 3/8" and 1/2". Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines.

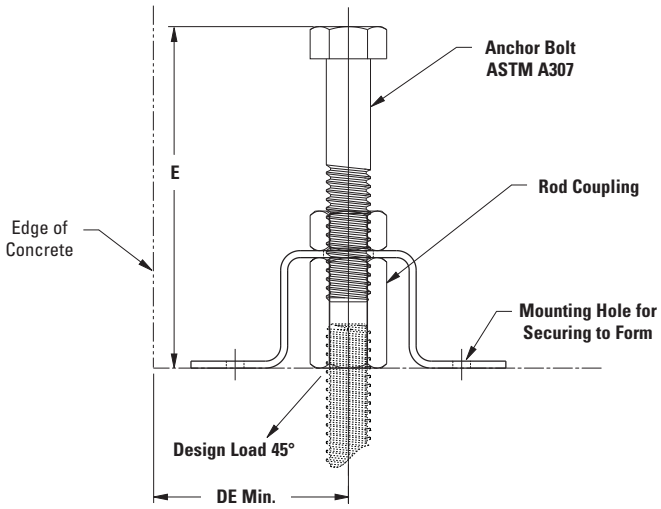
Finish: Electro-Galvanized anchor bolt with Electro-Galvanized hardware and plate.

Order By: Figure number, rod size and finish.

Note: The hex or jam nut has NO value in determining the loads. Their function is to assist in locking the coupling snug to the bottom of the deck form preventing the concrete from leaking into the coupling threads. Any other suitable locking device may be substituted if desired.

Qualifies as an acceptable alternate seismic brace fastener per Section 9.3.5.9.6 Certification calculations for this application are available upon request. See dimensions and installation Detail below.





Part No.	Embedment Depth E in.	(mm)	DE Min. in.	(mm)	Approx. Wt./100 lbs.	(kg)
109AF-3/8	3 1/2"	(88.9)	2"	(50.8)	38.1	(17.3)
109AF-1/2	3 1/2"	(88.9)	2"	(50.8)	54.7	(24.8)
109AF-5/8	4"	(101.6)	2"	(50.8)	82.2	(37.3)
109AF-3/4	4"	(101.6)	2 1/2"	(63.6)	113.8	(51.6)
109AF-7/8	4"	(101.6)	6"	(152.4)	130.6	(59.2)

Part No.	Rod Size	Design Load Vertical Hard Rock lbs.	(kN)	Light Wt. lbs.	(kN)	Design Load Shear Hard Rock lbs.	(kN)	Light Wt. lbs.	(kN)	Design Load 45° Hard Rock lbs.	(kN)	Light Wt. lbs.	(kN)
109AF-3/8	3/8"-16	1255	(55.82)	735	(3.28)	978	(4.35)	733	(3.26)	777	(3.45)	525	(2.33)
109AF-1/2	1/2"-13	2321	(10.32)	1392	(6.19)	978	(4.35)	733	(3.26)	980	(4.36)	679	(3.02)
109AF-5/8	5/8"-11	780	(3.47)	468	(2.08)	1278	(5.68)	958	(4.26)	688	(3.06)	445	(1,98)
109AF-3/4	3/4"-10	1346	(5.99)	806	(3.58)	1278	(5.68)	958	(4.26)	927	(4.12)	619	(2,75)
109AF-7/8	7/8"-9	2321	(10.32)	1391	(6.19)	1278	(5.68)	958	(4.26)	1166	(5.18)	803	(3,57)

Max. Recommended Loads shown include safety factor of 5.

Fig. 109AF - Concrete Insert - Brace Application (B-Line B2501)

TOLCO

Size Range: 3/8"-16 thru 7/8"-9 rod

Material: Steel

Function: Designed to be embedded in concrete to provide a point of support.

Approvals: Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines. Hangers certified by a registered professional engineer to Section 6-1.1 of NFPA #13 (1999) and Section 9.1.1.2. of NFPA 13 (2002).

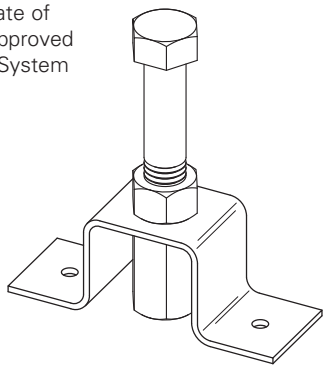
Finish: Electro-Galvanized anchor bolt with Electro-Galvanized hardware and plate.

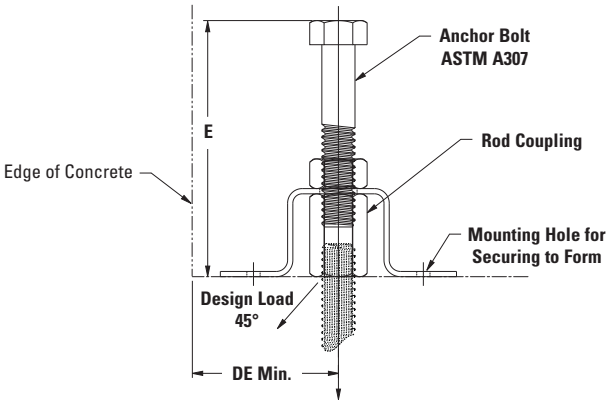
Order By: Figure number, rod size and finish.

Note: The hex or jam nut has NO value in determining the loads. Their function is to assist in locking the coupling snug to the bottom of the deck form preventing the concrete from leaking into the coupling threads. Any other suitable locking device may be substituted if desired.

Qualifies as an acceptable alternate seismic brace fastener per Section 9.3.5.9.6 Certification calculations for this application are available upon request. See dimensions and installation Detail below.

Component of State of California OSHPD Approved Seismic Restraints System





Part No.	Rod Size	Max. Horizontal Seismic Load With Brace At 45° in.	(mm)	Embedment Depth E in.	(mm)	DE Min. in.	(mm)	Approx. Wt./100 Lbs.	(kg)
109AF-3/8	3/8"-16	925	(4.11)	3 1/2"	(88.9)	2"	(50.8)	38.1	(17.3)
109AF-1/2	1/2"-13	925	(4.11)	3 1/2"	(88.9)	2"	(50.8)	54.7	(24.8)
109AF-1/2	1/2"-13	950	(4.22)	4"	(101.6)	2"	(50.8)	54.7	(24.8)
109AF-5/8	5/8"-11	1250	(5.56)	4"	(101.6)	2"	(50.8)	82.2	(37.3)
109AF-5/8	5/8"-11	1424	(6.33)	5"	(127.0)	2"	(50.8)	82.2	(37.3)
109AF-3/4	3/4"-10	1275	(5.67)	4"	(101.6)	2"	(50.8)	113.8	(51.6)
109AF-3/4	3/4"-10	1424	(6.33)	6"	(152.4)	2"	(50.8)	113.8	(51.6)
109AF-7/8	7/8"-9	1330	(5.91)	4"	(101.6)	2"	(50.8)	130.6	(59.2)
109AF-7/8	7/8"-9	1424	(6.33)	7"	(177.8)	2"	(50.8)	130.6	(59.2)

Seismic bracing design load calculated in compliance with the requirements of IBC 2009 / CBC 2010.

Part No.	Rod Size	Max. Horizontal Seismic Load With Brace At 45° in.	(mm)	Embedment Depth E in.	(mm)	DE Min. in.	(mm)	Approx. Wt./100 Lbs.	(kg)
109AF-3/8	3/8"-16	781	(3.47)	3 1/2"	(88.9)	2"	(50.8)	38.1	(17.3)
109AF-1/2	1/2"-13	781	(3.47)	3 1/2"	(88.9)	2"	(50.8)	54.7	(24.8)
109AF-1/2	1/2"-13	807	(3.59)	4"	(101.6)	2"	(50.8)	54.7	(24.8)
109AF-5/8	5/8"-11	999	(4.44)	4"	(101.6)	2"	(50.8)	82.2	(37.3)
109AF-5/8	5/8"-11	1275	(5.67)	5"	(127.0)	2"	(50.8)	82.2	(37.3)
109AF-3/4	3/4"-10	1029	(4.57)	4"	(101.6)	2"	(50.8)	113.8	(51.6)
109AF-3/4	3/4"-10	1424	(6.33)	6"	(152.4)	2"	(50.8)	113.8	(51.6)
109AF-7/8	7/8"-9	1074	(4.78)	4"	(101.6)	2"	(50.8)	130.6	(59.2)
109AF-7/8	7/8"-9	1424	(6.33)	7"	(177.8)	2"	(50.8)	130.6	(59.2)

Seismic bracing design load calculated in compliance with the requirements of IBC 2012 / CBC 2013.

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

B2505 thru B2508 - Spot Insert

Material: Steel (Stainless steel available on B2505 only)

Standard Finish: Plain or Pre-Galvanized

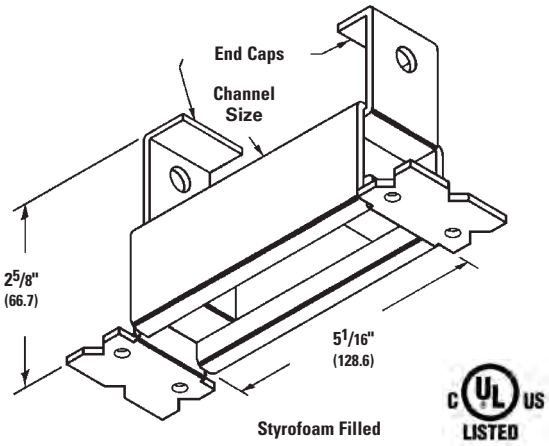
Function: Designed to be embedded in concrete to attach 1/4"-20 to 7/8"-9 hanger rods.

How to Install: Attach concrete insert to forms and install reinforcing rods as required. After forms are dismantled, the channel nut can be installed and the rod fastened to the nut. The rod should touch the inside top of the insert.

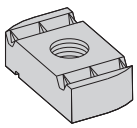
Approvals: Underwriters Laboratories Listed. Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 18 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 18.

Order By: Figure number and finish. When supporting 10" (254mm) pipe, order B2505 Insert with 5/8"-11 channel nuts.

Note: For appropriate channel nut selection, see bottom of page. Before installation ensure that concrete is sufficient to carry the load.



Part No.	Channel Size	End Cap Part No.	Design Load Lbs.	(kN)	Max. Pipe Size in.	(mm)	Approx. Wt./100 Lbs.	(kg)
B2505	B22	B3322	1200	(5.34)	10"	(250)	96	(43.5)
B2506	B32	B3332	1000	(4.45)	8"	(200)	88	(39.9)
B2507	B42	B3342	1000	(4.45)	8"	(200)	77	(34.9)
B2508	B52	B3352	1000	(4.45)	8"	(200)	69	(31.3)



Channel Nuts
For B2505 thru B2508, B2503, B22I, B32I, & B52I

Part No.	Thread Size	Fits Channel Sizes	Nut Thickness in.	(mm)	Slip Lbs.	(N)	Pull-Out Lbs	(N)	Wt./C Lbs.	kg
N228WO	3/8"-16	B22I, B32I, B52I	3/8"	(9.5)	800	(3560)	1100	(4890)	9.3	(4.22)
N225WO	1/2"-13	B22I, B32I	1/2"	(12.7)	1500	(6670)	2000	(8900)	11.6	(5.26)
N525WO	1/2"-13	B22I, B32I, B52I	3/8"	(9.5)	1500	(6670)	1500	(6670)	8.8	(3.99)
N255WO	5/8"-11	B22I, B32I	1/2"	(12.7)	1500	(6670)	2000	(8900)	16.4	(7.44)
N555WO	5/8"-11	B22I, B32I, B52I	3/8"	(9.5)	1500	(6670)	1500	(6670)	10.2	(4.62)
N275WO	3/4"-10	B22I, B32I	1/2"	(12.7)	1500	(6670)	2000	(8900)	14.5	(6.58)
N575WO	3/4"-10	B22I, B32I, B52I	3/8"	(9.5)	1500	(6670)	1500	(6670)	8.8	(3.99)
N278WO	7/8"-9	B22I, B32I	1/2"	(12.7)	1500	(6670)	1500	(6670)	12.5	(5.67)

Fig. B2503 - Heavy Duty Spot Insert

Material: Steel

Standard Finish: Electro-Galvanized

Function: Designed to be embedded in concrete where heavy loads are required in curtain wall applications. Styrofoam end caps prevent concrete seepage into the channel.

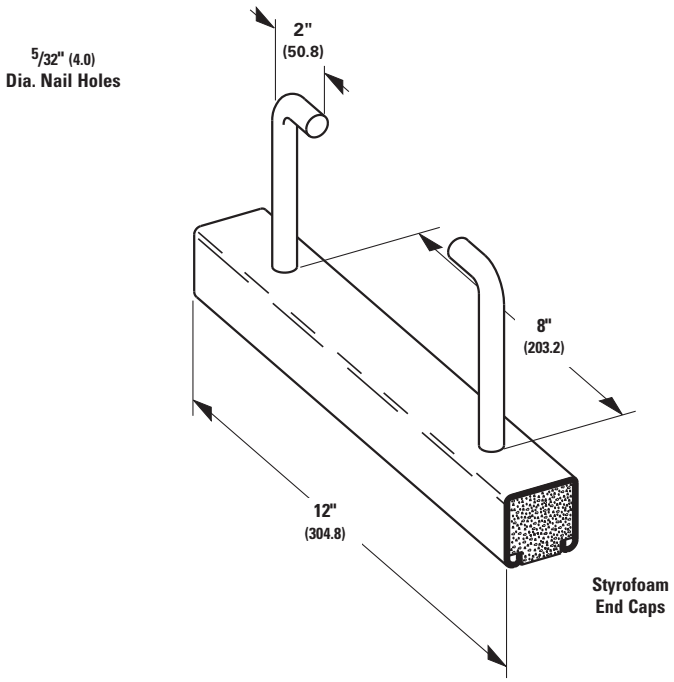
How to Install: Attach concrete insert to forms and install reinforcing rods as required. After forms are dismantled, the channel nut can be installed and the rod fastened to the nut. The rod should touch the inside top of the insert.

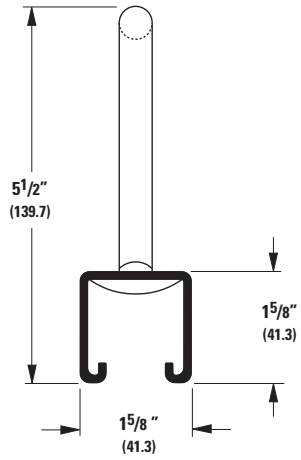
Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 18 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 18.

Design Load: 5000 Lbs. (22.2kN).
Loading based on two N225 channel nuts spaced 3" (76.2mm) on center and a minimum of 2" (50.8mm) from the end of the insert.

Weight: Approx. Wt./100 - 42 Lbs. (19.0kg)

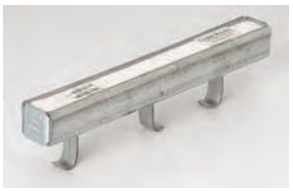
Order By: Figure number and finish. Channel nuts are sold separately, see page 31 for appropriate selection.





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

Fig. B22I - Continuous Concrete Insert



Material: Steel

Standard Finish: Plain, Pre-Galvanized, or Hot-Dip Galvanized

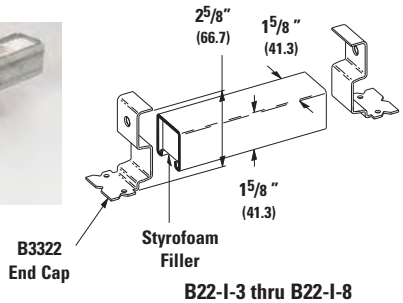
Function: Concrete insert should be secured to forms on 16″ (406.4mm) to 24″ (609.6mm) intervals.

How to Install: Attach concrete insert to forms and install reinforcing rods as required. After forms are dismantled, the channel nut can be installed and the rod fastened to the nut. The rod should touch the inside top of the insert.

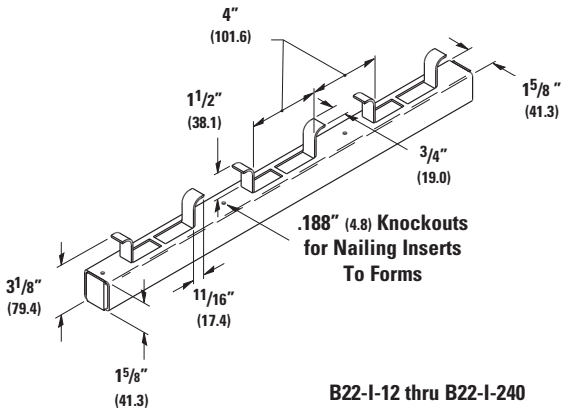
Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 18 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 18.

Design Load: 2000 Lbs. (8.89kN) per foot for B22-I-12 thru B22-I-240 in 3000 psi concrete. Loads concentrated within the last 2″ (50.8mm) of inserts 8″ (203.2mm) and longer should not exceed 1000 Lbs. (4.45kN).

Order By: Figure number and finish. Channel nuts are sold separately, see page 31 for appropriate selection.
To order inserts without styrofoam and end caps add insert only to the part number.



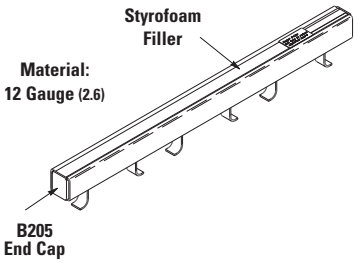
B22-I-3 thru B22-I-8



B22-I-12 thru B22-I-240

Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)	Design Load Lbs.	Design Load (kN)
B22-I-3	3″	(76)	72	(32.6)	500	(2.22)
B22-I-4	4″	(101)	88	(39.9)	800	(3.56)
B22-I-6	6″	(152)	120	(54.4)	1000	(4.45)
B22-I-8	8″	(203)	152	(68.9)	1200	(5.34)

Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)
B22-I-12	12″	(305)	224	(101.6)
B22-I-16	16″	(406)	289	(131.1)
B22-I-20	20″	(508)	353	(160.1)
B22-I-24	24″	(609)	420	(190.5)
B22-I-32	32″	(813)	553	(250.8)
B22-I-36	36″	(914)	620	(281.2)
B22-I-40	40″	(1016)	686	(311.1)
B22-I-48	48″	(1219)	820	(371.9)
B22-I-60	60″	(1524)	1018	(461.7)
B22-I-72	72″	(1829)	1218	(552.5)
B22-I-84	84″	(2133)	1417	(642.7)
B22-I-96	96″	(2438)	1616	(733.0)
B22-I-108	108″	(2743)	1816	(823.7)
B22-I-120	120″	(3048)	2016	(914.4)
B22-I-144	144″	(3657)	2416	(1095.9)
B22-I-168	168″	(4267)	2816	(1277.3)
B22-I-192	192″	(4877)	3216	(1458.7)
B22-I-216	216″	(5486)	3616	(1640.2)
B22-I-240	240″	(6096)	4016	(1821.6)



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

Fig. B32I - Continuous Concrete Insert

Material: Steel

Standard Finish: Plain, Pre-Galvanized, or Hot-Dip Galvanized

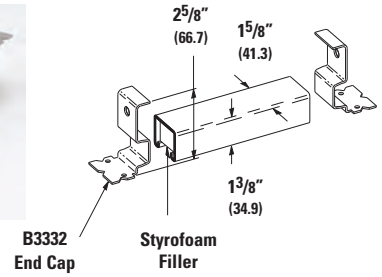
Function: Concrete insert should be secured to forms on 16″ (406.4mm) to 24″ (609.6mm) intervals.

How to Install: Attach concrete insert to forms and install reinforcing rods as required. After forms are dismantled, the channel nut can be installed and the rod fastened to the nut. The rod should touch the inside top of the insert.

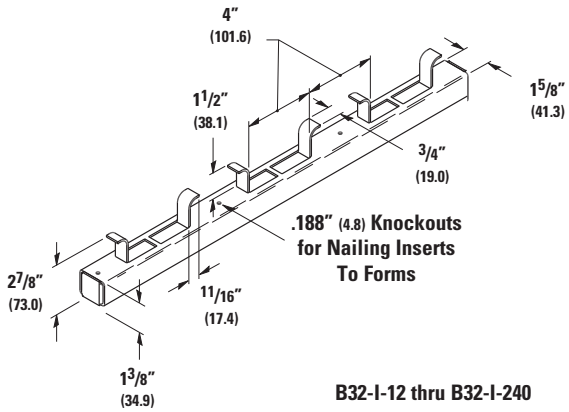
Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 18 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 18.

Design Load: 2000 Lbs. (8.89kN) per foot for B32-I-12 thru B32-I-240 in 3000 psi concrete. Loads concentrated within the last 2″ (50.8mm) of inserts 8″ (203.2mm) and longer should not exceed 1000 Lbs. (4.45kN).

Order By: Figure number and finish. Channel nuts are sold separately, see page 31 for appropriate selection.
To order inserts without styrofoam and end caps add insert only to the part number.



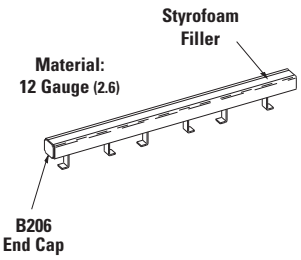
B32-I-3 thru B32-I-8



B32-I-12 thru B32-I-240

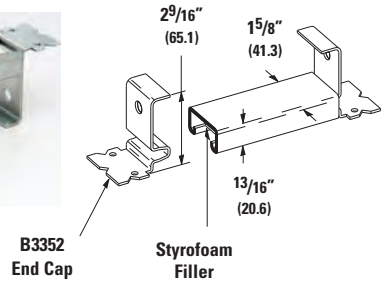
Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)	Design Load Lbs.	Design Load (kN)
B32-I-3	3″	(76)	65	(29.5)	500	(2.22)
B32-I-4	4″	(101)	80	(36.3)	800	(3.56)
B32-I-6	6″	(152)	108	(49.0)	1000	(4.45)
B32-I-8	8″	(203)	137	(62.1)	1200	(5.34)

Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)
B32-I-12	12″	(305)	202	(91.6)
B32-I-16	16″	(406)	262	(118.8)
B32-I-20	20″	(508)	316	(143.3)
B32-I-24	24″	(609)	376	(170.5)
B32-I-32	32″	(813)	496	(225.0)
B32-I-36	36″	(914)	556	(252.2)
B32-I-40	40″	(1016)	616	(279.4)
B32-I-48	48″	(1219)	736	(333.8)
B32-I-60	60″	(1524)	915	(415.0)
B32-I-72	72″	(1829)	1095	(496.7)
B32-I-84	84″	(2133)	1274	(577.9)
B32-I-96	96″	(2438)	1453	(659.0)
B32-I-108	108″	(2743)	1633	(740.7)
B32-I-120	120″	(3048)	1813	(822.3)
B32-I-144	144″	(3657)	2173	(985.6)
B32-I-168	168″	(4267)	2533	(1148.9)
B32-I-192	192″	(4877)	2893	(1312.2)
B32-I-216	216″	(5486)	3253	(1475.5)
B32-I-240	240″	(6096)	3613	(1638.8)

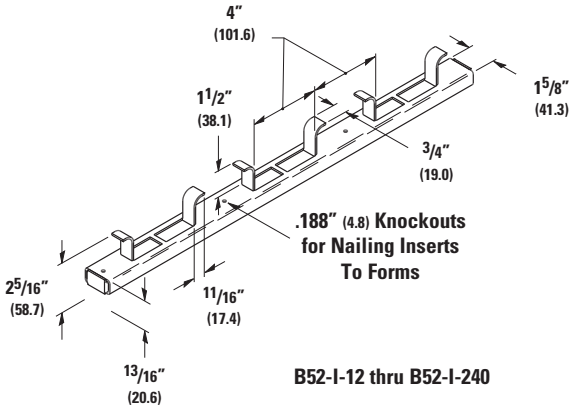


All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Fig. B52I - Continuous Concrete Insert



B52-I-3 thru B52-I-8



B52-I-12 thru B52-I-240

Material: Steel

Standard Finish: Plain, Pre-Galvanized, or Hot-Dip Galvanized

Function: Concrete insert should be secured to forms on 16" (406.4mm) to 24" (609.6mm) intervals.

How to Install: Attach concrete insert to forms and install reinforcing rods as required. After forms are dismantled, the channel nut can be installed and the rod fastened to the nut. The rod should touch the inside top of the insert.

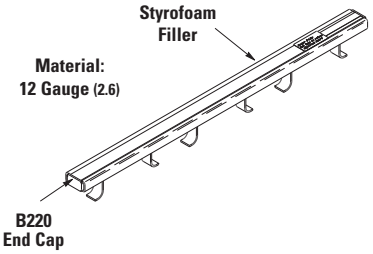
Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 18 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 18.

Design Load: 1500 Lbs. (6.67kN) per foot for B52-I-12 thru B52-I-240 in 3000 psi concrete. Loads concentrated within the last 2" (50.8mm) of inserts 8" (203.2mm) and longer should not exceed 750 Lbs. (3.33kN).

Order By: Figure number and finish. Channel nuts are sold separately, see page 31 for appropriate selection.
To order inserts without styrofoam and end caps add insert only to the part number.

Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)	Design Load Lbs.	Design Load (kN)
B52-I-3	3"	(76)	53	(24.0)	400	(1.78)
B52-I-4	4"	(101)	63	(28.6)	500	(2.22)
B52-I-6	6"	(152)	85	(38.5)	750	(3.33)
B52-I-8	8"	(203)	106	(48.1)	1000	(4.45)

Part No.	Length in.	Length (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)
B52-I-12	12"	(305)	157	(71.2)
B52-I-16	16"	(406)	202	(91.6)
B52-I-20	20"	(508)	237	(107.5)
B52-I-24	24"	(609)	282	(127.9)
B52-I-32	32"	(813)	373	(169.2)
B52-I-36	36"	(914)	419	(190.0)
B52-I-40	40"	(1016)	464	(210.4)
B52-I-48	48"	(1219)	556	(252.2)
B52-I-60	60"	(1524)	692	(313.9)
B52-I-72	72"	(1829)	829	(376.0)
B52-I-84	84"	(2133)	965	(437.7)
B52-I-96	96"	(2438)	1107	(502.1)
B52-I-108	108"	(2743)	1237	(561.1)
B52-I-120	120"	(3048)	1374	(623.2)
B52-I-144	144"	(3657)	1648	(747.5)
B52-I-168	168"	(4267)	1922	(871.8)
B52-I-192	192"	(4877)	2196	(996.1)
B52-I-216	216"	(5486)	2470	(1120.4)
B52-I-240	240"	(6096)	2744	(1244.6)



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

Fig. 75 - Swivel Attachment

Size Range: — 3/8"-16 Rod Attachment

Material: Steel

Function: Three recommended applications for this product:

- May be used as a Branch Line Restraint for structural attachment to anchor bolt, beam clamp, etc.
- May be used as an upper attachment with short hanger rod to omit seismic bracing.
- May be used in a pitched or sloped roof application, to meet requirements of NFPA 13 (2013) 9.1.2.6.

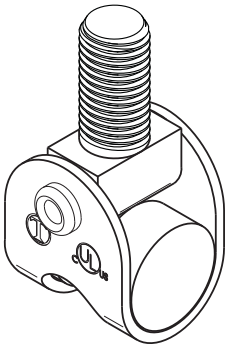
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)** to support up to 4" (100mm) pipe.

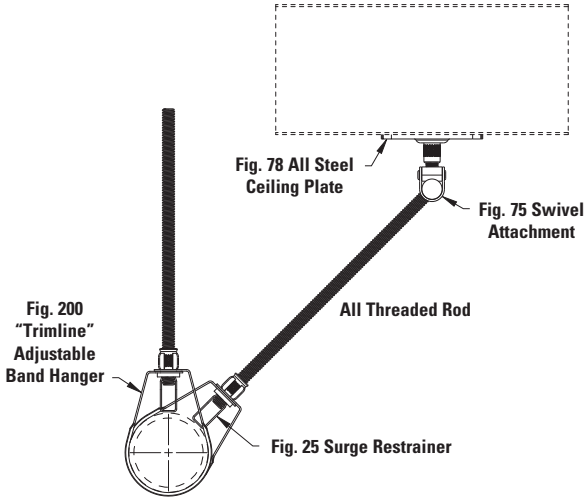
Finish: Electro-Galvanized

Weight: Approx. Wt./100 - 13.3 Lbs. (6.0kg)

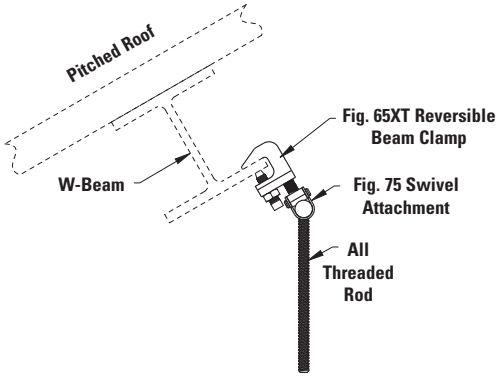
Order By: Figure number

Patent: #7,887,248





May be used as a structural attachment component of a branch line restraint



May be used with a pitched roof application, to meet requirements of NFPA 13 (2010) Sec. 9.1.2.5.

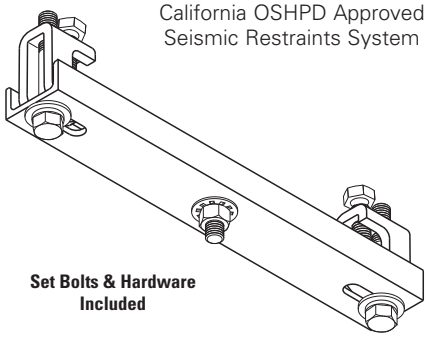
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Fig. 800 - Adjustable Sway Brace Attachment to Steel

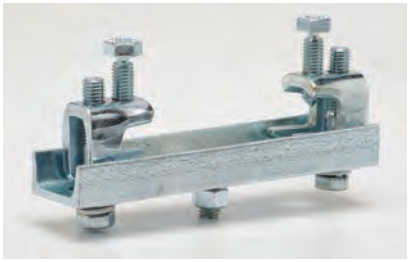
TOLCO

c UL us LISTED FM APPROVED

Component of State of California OSHPD Approved Seismic Restraints System



Set Bolts & Hardware Included



Size Range: 4" (100mm) thru 18" (450mm) beam width

Material: Steel

Function: Seismic brace attachment to steel.

Features: This product's design incorporates a concentric attachment point which is critical to the performance of structural seismic connections. NFPA 13 indicates the importance of concentric loading of connections and fasteners. Permits secure connection to steel where drilling and/or welding of brace connection could present structural issues.

Installation Instructions: Fig. 800 is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with our transitional attachment, "bracing pipe" and our "braced pipe" attachment to form a complete bracing assembly.
NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

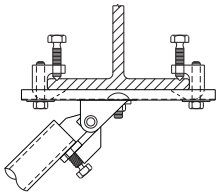
To Install: Place the Fig. 800 on the steel beam, tighten the cone point set bolts on flange until the heads break off. Tighten hex head bolts into clamp body until lock washers are fully flat. Attach other transitional attachment fitting, Fig. 909, 910, 980, or 986. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

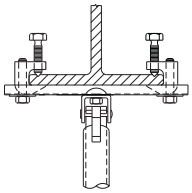
Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number, type number and size number.

Part No.	Fits Beam Flange Width	
	in.	(mm)
800-1	4"-6"	(101.6-152.4)
800-2	6"-8"	(152.4-203.2)
800-3	8"-10"	(203.2-254.0)
800-4	10"-12"	(254.0-304.8)
800-5	12"-14"	(304.8-355.6)
800-6	14"-16"	(355.6-406.4)
800-7	16"-18"	(406.4-457.2)



Shown with Fig. 980 brace fitting to pipe brace (Along Beam)



Shown with Fig. 980 brace fitting to pipe brace (Across Beam)

Type	Fits Beam Flange Thickness		Max. Horizontal Design Loads (cULus) Along Beam	Max. Horizontal Design Loads (cULus) Across Beam	Max. Horizontal Design Loads (FM) Lateral - Parallel to Structural Member 30°-44°	45°-59°	60°-74°	75°-90°	Longitudinal - Perpendicular to Structural Member 30°-44°	45°-59°	60°-74°	75°-90°
	in.	(mm)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)	lbs./(kN)
1	Up to 3/4"	(Up to 19.0)	1265 (5.62)	2015 (8.96)	1430 (6.36)	1970 (8.76)	1980 (8.81)	NR (NR)	930 (4.13)	1310 (5.82)	1610 (7.16)	1800 (8.00)
2	3/4" to 1 1/4"	(19.0 to 31.7)	1265 (5.62)	2015 (8.96)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)

FM Approved design loads are based on ASD design method.

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

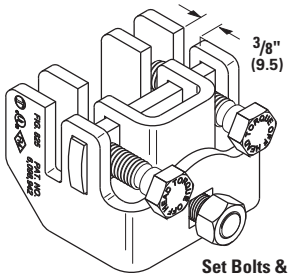
Fig. 825 - Bar Joist Sway Brace Attachment To Steel

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Fits up to 3/8" (9.5mm) thick structural steel member. Accommodates all Fig. 900 Series sway brace attachments.

Material: Steel

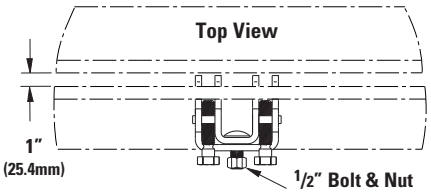
Function: To attach sway brace assemblies and/or hanger assemblies to structural steel members.



Set Bolts & Hardware Included

Features: This product's design incorporates a concentric attachment point which is critical to the performance of structural seismic connections. NFPA 13 indicates the importance of concentric loading of connections and fasteners. Permits secure non-friction connection without drilling or welding. Unique design reinforces point of connection to joist. Break off head set bolt design assures verification of proper installation torque (min. 31 ft.-lbs.).

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.



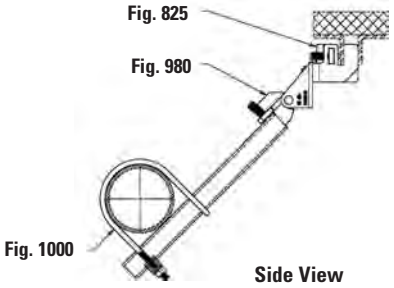
Installation Instructions: Fig. 825 is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment, to form a complete bracing assembly.
NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

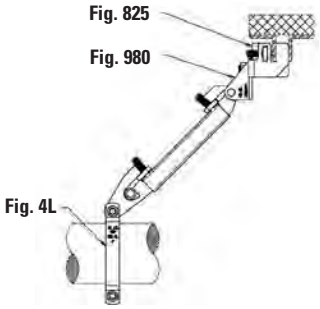
To Install: Place the Fig. 825 on the steel beam, tighten the cone point set bolts until heads break off. Attach other TOLCO transitional attachment fitting, Fig. 909, 910, 980, or 986. Transitional fitting attachment can pivot for adjustment to proper brace angle.

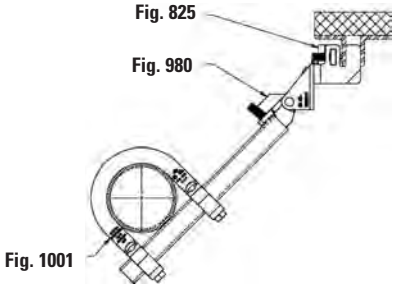
Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Approx. Wt./100: 247.5 Lbs. (112.2kg)

Order By: Figure number and finish
US Patent #6,098,942,
Canada Patent #2,286,659

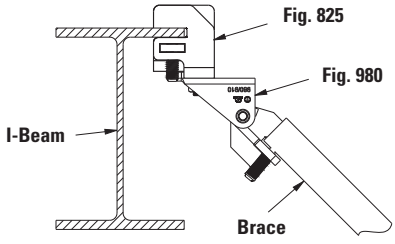






Max. Horizontal Design Load (UL)
2015 lbs. (8.96kN)
UL Listed as Hanger Attachment for 6" (150mm) Pipe at Maximum Spacing

		Max. Horizontal Design Loads (FM)			
		30°-44° lbs. / (kN)	45°-59° lbs. / (kN)	60°-74° lbs. / (kN)	75°-90° lbs. / (kN)
Maximum 3/8" Thick Flange	Lateral - Parallel to Structural Member	990 (4.40)	1360 (6.05)	1670 (7.43)	1860 (8.27)
Maximum 3/8" Thick Flange	Longitudinal - Perpendicular to Structural Member	460 (2.04)	630 (2.80)	770 (3.42)	860 (3.82)



Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 825A - Bar Joist Sway Brace Attachment To Steel

TOLCO

c UL us LISTED

Size Range: Fits up to 3/8" (9.5mm) thick structural steel member. Accommodates all Fig. 900 Series sway brace attachments.

Material: Steel

Function: To attach sway bracing to steel open web structural members.

Features: This product's design incorporates a concentric attachment point which is critical to the performance of structural seismic connections. NFPA 13 indicates the importance of concentric loading of connections and fasteners. Permits secure non-friction connection without drilling or welding. Unique design reinforces point of connection to joist. Break off head bolt design assures verification of proper installation.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Installation Instructions: Fig. 825A is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment to form a complete bracing assembly. NFPA 13 guidelines should be followed.

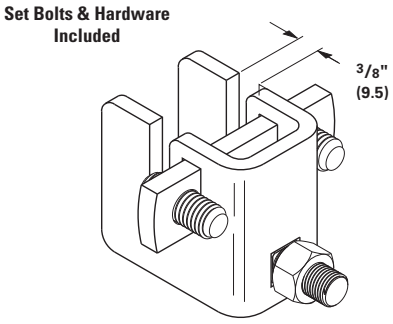
To Install: Place the Fig. 825A on the steel beam, tighten the cone point set bolts until heads break off. Attach other TOLCO transitional attachment fitting, Fig. 909, 910, 980, or 986. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized

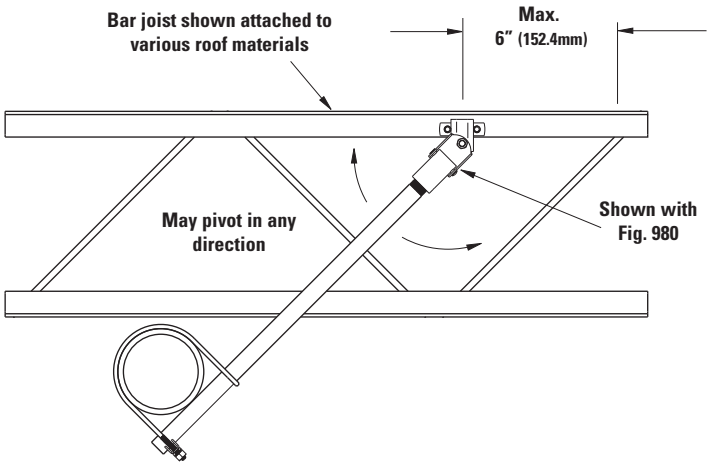
Approx. Wt./100: 154.5 Lbs. (70.1kg)

Order By: Figure number and finish

Patent #6,098,942



Max. Horizontal Design Load (UL)
1600 lbs. (7.11kN) with brace perpendicular to bar joist / steel truss



Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

Fig. 828 - Universal Sway Brace Attachment to Steel

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: One size accommodates all Fig. 900 Series sway brace attachments. Fits from 3/8" (9.4mm) to 7/8" (22.2mm) thick steel structure. For thicknesses less than 3/8" (9.4mm) refer to Fig. 825 and Fif. 825A.

Material: Steel

Function: To attach sway bracing to various types of steel structural members.

Features: Permits secure non-friction connection without drilling or welding. Unique design allows offset placement on wide flange beam, I-beam, C-channel, open web, welded steel trusses, etc.. Secures brace to structure either across or along the beam. Break-off set bolts allow for visual verification of proper installation torque.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Factory Mutual Approved **(FM)**

Installation Instructions: The Fig. 828 is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment to form a complete bracing assembly.
NFPA 13, FM DS 2-8, and/or OSPHD guidelines should be followed.

To Install: Place the Fig. 828 on the flange of the beam, truss, or girder. Be sure the attachment is fully engaged to the rear of the opening. Tighten the cone point set bolts (A) until the heads break off. Tighten the cone point set bolt (B) until the head breaks off. Remove the flange nut from set bolt (B). Install a TOLCO swivel fitting Fig. 909, 910, 980, or 986. Use flange nut to secure the swivel fitting.

Finish: Plain or Electro-Galvanized

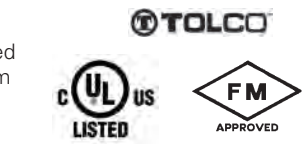
Approx. Weight/100: 275 Lbs. (124.7kg)

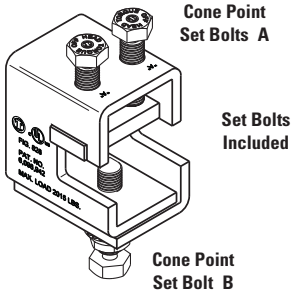
Order By: Figure number and finish

Patent #6,098,942, #8,534,625

Canada Patent #2,286,659

Patent Pending



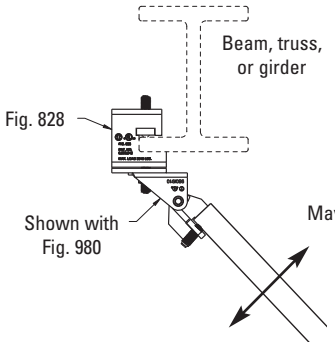


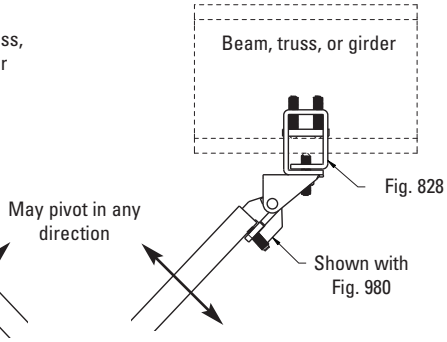
Max. Horizontal Design Load (UL)
Max. Horizontal Design Load Across Beam 2015 lbs. (8.96kN)
Max. Horizontal Design Load Along Beam 2015 lbs. (8.96kN)

Max. Horizontal Design Load (FM) With Brace Perpendicular To The Beam			
Brace Angle (degrees from vertical)			
30°-44°	45°-59°	60°-74°	75°-90°
1570 (6.98kN)	2220 (9.87kN)	1210 (5.38kN)	700 (3.11kN)

Max. Horizontal Design Load (FM) With Brace Parallel To The Beam			
Brace Angle (degrees from vertical)			
30°-44°	45°-59°	60°-74°	75°-90°
690 (3.07kN)	970 (4.31kN)	1210 (5.38kN)	1330 (5.91kN)

FM Approved design loads are based on ASD design method.





Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 906 - Sway Brace Multi-Fastener Adapter

Size Range: Use with 1" (25.4mm) and 1 1/4" (31.7mm) UL listed Fig. 900 Series Earthquake Brace Attachment.

Material: Steel

Application: Allows sway brace fittings to develop greater load carrying ability by providing multiple fastener attachments. The National Fire Protection (NFPA) provides information on fastener loads to various structures. Refer to NFPA 13 (2010) 9.3.5.9.1.

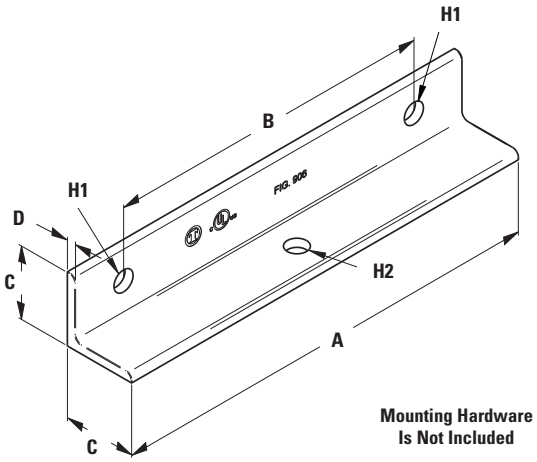
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)** only when used with B-Line/TOLCO Fig. 900 Series Earthquake Brace Attachments. Included in our Seismic Restraints Catalog approved by the state of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraints System Guidelines 0300PA-10.

Installation Instructions: Fig. 906 is a multiple fastener structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment to form a complete bracing assembly. NFPA 13 guidelines should be followed.

To Install: Attach the Fig. 906 to the structural surface as per fastener design guidelines. Attach other TOLCO transitional attachment fitting, Fig. 909, 910, 980, or 986. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number and specify dimensions H1 and H2.



Part Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	H1	H2	Approx. Wt./100 Lbs. (kg)
906	12" (305.0)	9" (228.6)	2" (50.8)	1/4" (6.3)	Specify	Specify	307 (139.3)

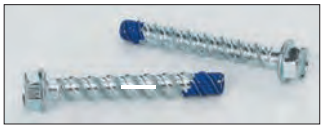
Load Note: Actual design load determined by anchor and concrete strength, not to exceed the UL Listed maximum horizontal load of 2015 lbs. (8.96kN).

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

ACB Series - Concrete Screw Bolts

Features:

- For use in racking, shelving, material handling, structural anchorage, masonry and food & beverage facilities.
- One piece heavy-duty anchor with a finished hex-head.
- Fits standard fixture hole dimensions in fabricated steel.
- Fast installation and immediate loading reduces downtime.
- For proper performance, screw anchors must be installed with the corresponding bits. The bits have a matched tolerance range designed to provide optimum performance.



Concrete Screw Bolts - Data	1/4"	3/8"
ACB Drill Bit Size (in. - mm)	1/4" - (6.3mm)	3/8" - (9.5mm)
Concrete Screw Tolerance Range (in. - mm)	0.255" - 0.259" - (6.5mm - 6.6mm)	0.385" - 0.389" - (9.8mm - 9.9mm)
Min. Embedment Depth (in. - mm)	1" - (25.4mm)	1 1/2" - (38.1mm)
Load Capacity Tension (lbs - kN) *	335 lbs. - (1.49kN)	630 lbs. - (2.80kN)
Load Capacity Shear (lbs - kN) *	520 lbs. - (2.31kN)	1170 lbs. - (5.20kN)

* Based on concrete compression strength of 4000 psi in uncracked concrete using applied safety factor of 4.0. For additional loading information contact factory.

For ultimate strength design data in cracked and uncracked concrete, refer to ICC-ES ESR-2526 evaluation report.

Concrete Bolt Part No.	Bolt Size Diameter in.	(mm)	Length in.	(mm)	Thread Length in.	(mm)	Wt./100 Lbs.	(kg)
ACB-25-175	1/4"	(6.3)	1 3/4"	(44.4)	1 5/8"	(41.3)	3.5	(1.6)
ACB-25-225	1/4"	(6.3)	2 1/4"	(57.1)	2"	(50.8)	4.2	(1.9)
ACB-25-300	1/4"	(6.3)	3"	(76.2)	2 3/4"	(69.8)	5.0	(2.3)
ACB-37-175	3/8"	(9.5)	1 3/4"	(44.4)	1 1/2"	(38.1)	7.8	(3.5)
ACB-37-250	3/8"	(9.5)	2 1/2"	(63.5)	2 1/4"	(57.1)	10.2	(4.6)
ACB-37-300	3/8"	(9.5)	3"	(76.2)	2 3/4"	(69.8)	11.6	(5.3)
ACB-37-400	3/8"	(9.5)	4"	(101.6)	3 3/4"	(95.2)	14.8	(6.7)

Drill Bit Part No.	Type	Drill Diameter in.	(mm)	Usable Length in.	(mm)	Overall Length in.	(mm)
1372	Straight Shank	1/4"	(6.4)	1 3/4"	(44.4)	1 5/8"	(41.3)
1380	Straight Shank	1/4"	(6.4)	2 1/4"	(57.1)	2"	(50.8)
1314	SDS	1/4"	(6.4)	3"	(76.2)	2 3/4"	(69.8)
1316	SDS	3/8"	(9.5)	1 3/4"	(44.4)	1 1/2"	(38.1)

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

AWSD Series - Seismic Wedge Anchors

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Features:

- Fully threaded, torque-controlled, wedge anchor which is designed for consistent performance in cracked and uncracked concrete.
- For use in concrete, structural sand lightweight concrete, and concrete over metal deck.
- Nominal drill bit size is the same as the anchor diameter.
- ICC-ES listed, ESR-2502, Category 1
- Zinc plated carbon steel body with stainless steel expansion clip from premium performance.
- Qualified for seismic and wind loading.

Seismic Wedge Anchor - Data	3/8"-16	1/2"-13	5/8"-11	3/4"-10
ANSI Drill Bit Size (in. - mm)	3/8" - (9.5mm)	1/2" - (12.7mm)	5/8" - (15.9mm)	3/4" - (19.0mm)
Fixture Clearance Hole (in. - mm)	7/16" - (11.1mm)	9/16" - (14.3mm)	11/16" - (17.5mm)	13/16" - (20.6mm)
Minimum Hole Depth (in. - mm)	2 5/8" - (66.7mm)	2 3/4" - (69.8mm)	4 1/4" - (107.9mm)	5" - (127.0mm)
Minimum Concrete Thickness (in. - mm)	4" - (101.6mm)	4 1/2" - (114.3mm)	5 3/4" - (146.0mm)	7" - (177.8mm)
Max. Tightening Torque (lbs-ft - N•m)	20 lbs-ft - (27.1N•m)	40 lbs-ft - (54.2N•m)	60 lbs-ft - (81.3N•m)	110 lbs-ft - (149.1N•m)
Min. Embedment Depth (in. - mm)	2 3/8" - (60.3mm)	2 1/2" - (63.5mm)	3 7/8" - (98.4mm)	4 1/2" - (114.3mm)

For loading information, refer to the ICC-ES ESR-2502 evaluation report.

Wedge Anchor Part No.	Anchor Size Diameter in.	(mm)	Length in.	(mm)	Thread Length in.	(mm)	Wt./100 Lbs.	(kg)
AWSD-37-300	3/8"	(9.5)	3"	(76.2)	1 3/4"	(44.4)	11.4	(5.2)
AWSD-37-350	3/8"	(9.5)	3 1/2"	(88.9)	2 1/4"	(57.1)	12.2	(5.5)
AWSD-37-375	3/8"	(9.5)	3 3/4"	(95.2)	2 1/2"	(63.5)	13.2	(6.0)
AWSD-37-500	3/8"	(9.5)	5"	(127.0)	3 3/4"	(95.2)	16.0	(7.2)
AWSD-50-375	1/2"	(12.7)	3 3/4"	(95.2)	2 1/8"	(54.0)	23.0	(10.4)
AWSD-50-450	1/2"	(12.7)	4 1/2"	(114.3)	2 7/8"	(73.0)	26.6	(12.0)
AWSD-50-550	1/2"	(12.7)	5 1/2"	(139.7)	3 7/8"	(98.4)	34.0	(15.4)
AWSD-50-700	1/2"	(12.7)	7"	(177.8)	5 3/8"	(136.5)	38.0	(17.2)
AWSD-62-475	5/8"	(15.9)	4 3/4"	(120.6)	2 7/8"	(73.0)	50.3	(22.8)
AWSD-62-500	5/8"	(15.9)	5"	(127.0)	3 1/8"	(79.4)	52.0	(23.6)
AWSD-62-600	5/8"	(15.9)	6"	(152.4)	4 1/8"	(104.8)	58.8	(26.7)
AWSD-62-700	5/8"	(15.9)	7"	(177.8)	5 1/8"	(130.2)	65.2	(29.6)
AWSD-75-550	3/4"	(19.0)	5 1/2"	(139.7)	3 1/4"	(82.5)	81.5	(36.9)
AWSD-75-625	3/4"	(19.0)	6 1/4"	(158.7)	4"	(101.6)	94.0	(42.6)
AWSD-75-700	3/4"	(19.0)	7"	(177.8)	4 3/4"	(120.6)	106.5	(48.3)

ATM Series - Self-Tapping Machine Screw Anchors

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Features:

- For use in normal-weight concrete, structural sand lightweight concrete and concrete over metal deck.
- Anchor design allows for shallow embedment and mechanically interlocks with base material.
- Internally threaded anchor for easy adjustment and removability of threaded rod or bolt.
- Fast anchor installation with a powered impact wrench.
- Suitable for overhead applications such as suspending cable tray, strut, pipe hangers and conduit.
- FM Approved.
- ICC-ES listed, ESR-2272
- Made of Zinc Plated carbon steel.
- Setting tool included.

Self-Tapping Machine Screw Anchor - Data	3/8"
ANSI Drill Bit Size (in. - mm)	1/2" - (12.7mm)
Minimum Concrete Thickness (in. - mm)	4" - (101.6mm)
Max. Tightening Torque (lbs-ft - N•m)	8 lbs-ft - (10.8N•m)
Min. Embedment Depth (in. - mm)	1 5/8" - (41.3mm)
Load Capacity Tension (lbs - kN)	540 lbs - (2.40kN)
Load Capacity Shear (lbs - kN)	825 lbs - (3.67kN)

* Based on concrete compression strength of 4000 psi in uncracked concrete using applied safety factor of 4.0. For additional loading information contact factory.

For ultimate strength design data in cracked and uncracked concrete, refer to ICC-ES ESR-2526 evaluation report.

Part No.	Anchor Thread Size	Thread Length in.	Thread Length (mm)	Wt./100 lbs.	Wt./100 (kg)
ATM-37	3/8"-16	11/16"	(17.6)	5.2	(2.3)

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

Fig. 909 - No-Thread Swivel Sway Brace Attachment

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

c UL us LISTED

Size Range: 1" (25mm) bracing pipe. For brace pipe sizes larger than 1" (25mm), use Fig. 980. Available with holes for 3⁄8"-16 thru 3⁄4"-10 fastener attachment.

Material: Steel, hardened cone point set screw

Function: The structural component of a sway and seismic bracing system.

Features: This product's design incorporates a concentric attachment opening which is critical to the performance of structural seismic connections. NFPA 13 (2010) 9.3.5.8.4 indicates clearly that fastener table load values are based only on concentric loading. No threading of the bracing pipe is required. Open design allows for easy inspection of pipe engagement.

Application Note: Fig. 909 is used in conjunction with the Fig. 1000, Fig. 1001, Fig. 4 (A) or Fig. 4L pipe clamp, and joined together with bracing pipe. Sway brace assemblies are intended to be installed in accordance with NFPA 13 (or our State of California OSHPD Approved Seismic Restraint Manual) and the manufacturer's installation instructions. The required type, number and size of fasteners used for the structure attachment fitting shall be in accordance with NFPA 13 and/or OSHPD.

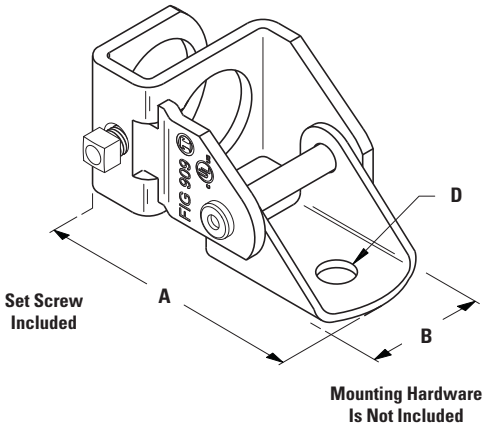
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Installation Instructions: Fig. 909 is the structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and our "braced pipe" attachment, Fig. 1000, 1001, 4A, 4B or 4L to form a complete bracing assembly.
NFPA 13 and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 909 onto the bracing pipe. Tighten the set screw until the head bottoms out on surface. Attachment can pivot for adjustment to proper brace angle.

Finish: Plain. Contact B-Line for alternative finishes and materials.

Order By: Figure number, fastener attachment size and finish.



Part Number	Hole Size D* in.	(mm)	A in.	(mm)	B in.	(mm)	Max. Horizontal Design Load (UL) lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
909-3/8	13/32"	(10.3)	6"	(152.4)	1 5/8"	(41.3)	2015	(8.96)	92	(41.7)
909-1/2	17/32"	(13.5)	6"	(152.4)	1 5/8"	(41.3)	2015	(8.96)	91	(41.3)
909-5/8	11/16"	(17.5)	6"	(152.4)	1 5/8"	(41.3)	2015	(8.96)	90	(40.8)
909-3/4	13/16"	(20.6)	6"	(152.4)	1 5/8"	(41.3)	2015	(8.96)	89	(40.4)

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

Fig. 910 - Swivel Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 1" (25mm) bracing pipe. For brace pipe sizes larger than 1" (25mm), use Fig. 980. Available with holes for 3⁄8"-16 thru 3⁄4"-10 fastener attachment.

Material: Steel

Function: For bracing pipe against sway and seismic disturbances. The building attachment component of a sway brace system; the Fig. 910 is used in conjunction with the Fig. 1001, Fig. 1000 or with a Fig. 4A, Fig. 4L, or Fig. 4LA pipe clamp and joined together with a brace pipe per NFPA 13.

Features: This product's design incorporates a concentric attachment opening which is critical to the performance of structural seismic connections. NFPA 13 (2010) 9.3.5.8.4 indicates that fastener table load values are based only on concentric loading. Universal swivel design allows Fig. 910 to be attached at any surface angle.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD, OPA-0300)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the our Seismic Restraint Systems Guidelines.

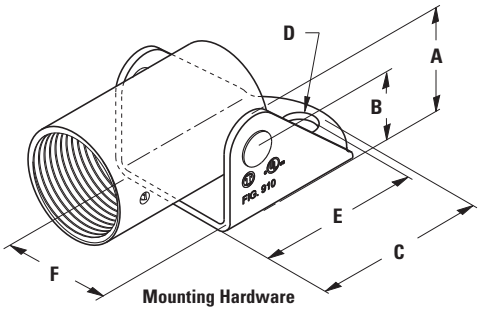
Installation Instructions: Fig. 910 is a structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe", and our "braced pipe" attachment, Fig. 1000, Fig. 1001, Fig. 4A, Fig. 4L or Fig. 4LA to form a complete bracing assembly.
NFPA 13 and/or OSHPD guidelines should be followed.

To Install: Thread the pipe into the Fig. 910 until pipe threads are visible through inspection site hole. Attachment can pivot for adjustment to proper brace angle.

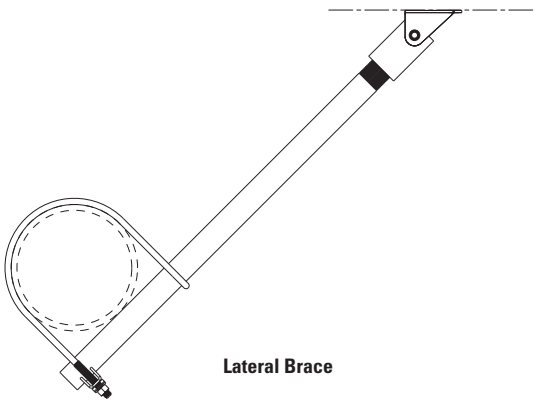
Note: Fig. 910 swivel attachment and Fig. 1001, Fig. 1000, Fig. 4A Fig. 4L, or Fig. 4LA pipe clamps make up a sway brace system of (UL) Listed attachments and bracing materials which satisfies the requirements of Underwriters Laboratories and the National Fire Protection Association (NFPA).

Finish: Pre-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number, pipe size, fastener attachment size, and finish.



Mounting Hardware Is Not Included



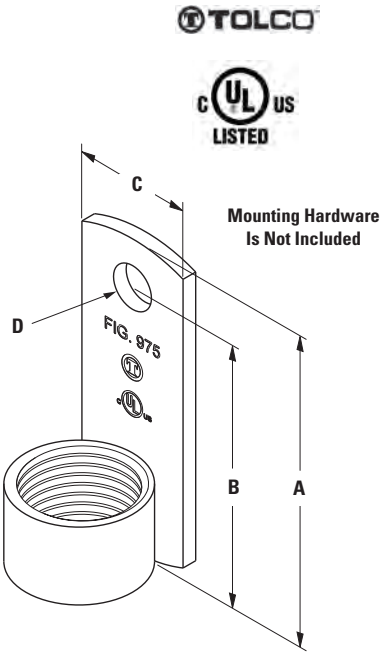
Lateral Brace

Part Number	A in. (mm)	B in. (mm)	C in. (mm)	Hole Size D in. (mm)	E in. (mm)	F in. (mm)	Max. Horizontal Design Load (UL) lbs. (kN)	Approx. Wt./100 lbs. (kg)
910-1 X 1/2	2" (50.8)	1 1/2" (38.1)	3" (76.2)	9/16" (14.3)	2 5/16" (58.7)	2" (50.8)	1600 (7.11)	88 (39.9)
910-1 X 5/8	2" (50.8)	1 1/2" (38.1)	3" (76.2)	11/16" (17.5)	2 5/16" (58.7)	2" (50.8)	1600 (7.11)	87 (39.4)
910-1 X 3/4	2" (50.8)	1 1/2" (38.1)	3" (76.2)	13/16" (20.6)	2 5/16" (58.7)	2" (50.8)	1600 (7.11)	86 (39.0)

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 975 - Straight Sway Brace Fitting



Size Range: 1" (25mm) bracing pipe. For brace pipe sizes larger than 1" (25mm), use Fig. 980. Available with holes for ½"-13 thru ¾"-10 fastener attachment.

Material: Steel

Function: For bracing pipe against sway and seismic disturbances. The building attachment component of a sway brace system; the Fig. 975 is used in conjunction with the Fig. 1000, Fig. 1001 or with a Fig. 4A pipe clamp and joined together with a brace pipe per NFPA 13.

Features: Open design allows for easy checking of thread engagement.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**.

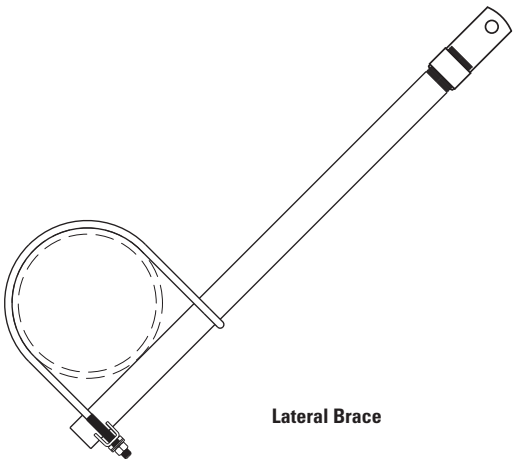
Installation: Fig. 975 is the structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and our "braced pipe" attachment, Fig. 1000, 1001, 4A, 4B or 4L to form a complete bracing assembly.
NFPA 13 guidelines should be followed.

To Install: Thread the Fig. 975 onto the threaded bracing pipe. Attachment can pivot for adjustment to proper brace angle. (Bending of plate not permitted.)

Finish: Plain. Contact B-Line for alternative finishes and materials.

Order By: Figure number and finish.

Note: Bending of this fitting alters the material strength. Use Fig. 909 or Fig. 910 when angle fitting is required.



Lateral Brace

Part Number	A in. (mm)	B in. (mm)	C in. (mm)	Hole Size D in. (mm)	Max. Horizontal Design Load (UL) lbs. (kN)	Approx. Wt./100 lbs. (kg)
975-1/2	4" (101.6)	3 1/2" (88.9)	1 1/2" (38.1)	9/16" (14.3)	2015 (8.96)	88 (39.9)
975-5/8	4" (101.6)	3 1/2" (88.9)	1 1/2" (38.1)	11/16" (17.5)	2015 (8.96)	87 (39.4)
975-3/4	4" (101.6)	3 1/2" (88.9)	1 1/2" (38.1)	13/16" (20.6)	2015 (8.96)	86 (39.0)

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Fig. 980 - Universal Swivel Sway Brace Attachment - 3/8"-16 to 3/4"-10 rods
Fig. 980H - Universal Swivel Sway Brace Attachment - 7/8"-9 to 1 1/4"-7 rods

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: One size fits bracing pipe 1" (25mm) thru 2" (50mm), B-Line 12 gauge (2.6mm) channel, and all structural steel up to 1/4" (6.3mm) thick.

Material: Steel

Function: Multi-functional attachment to structure or braced pipe fitting.

Features: This product's design incorporates a concentric attachment opening which is critical to the performance of structural seismic connections. NFPA 13 (2010) 9.3.5.8.4 indicates clearly that fastener table load values are based only on concentric loading. Mounts to any surface angle. Break off bolt head assures verification of proper installation.

Installation: Fig.980 is the structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and our "braced pipe" attachment, Fig. 1000, 1001, 2002, 4L, 4A or 4B to form a complete bracing assembly.
NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 980 onto the "bracing pipe". Tighten the set screw until the head breaks off. Attachment can pivot for adjustment to proper brace angle.

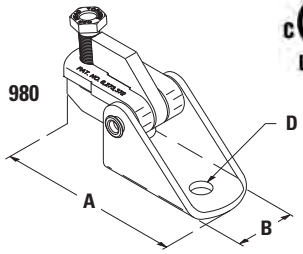
Approvals: —Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Note: Fig. 980 Swivel Attachment and Fig. 1001, Fig. 1000, Fig. 2002, Fig. 4A, Fig. 4B or Fig. 4L pipe clamps make up a sway brace system of UL Listed attachments and bracing materials which satisfies the requirements of Underwriters Laboratories and the National Fire Protection Association (NFPA)

Finish: Plain, Electro-Galvanized or Stainless Steel. Contact B-Line for alternative finishes.

Order By: Figure number and finish.

Pat. #6,273,372, Pat. #6,517,030, Pat. #6,953,174, Pat. #6,708,930, Pat. #7,191,987, Pat. #7,441,730, Pat. #7,669,806

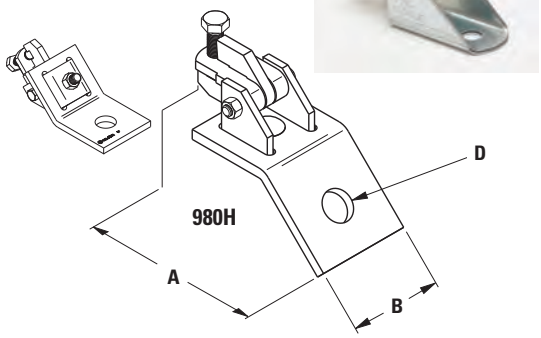


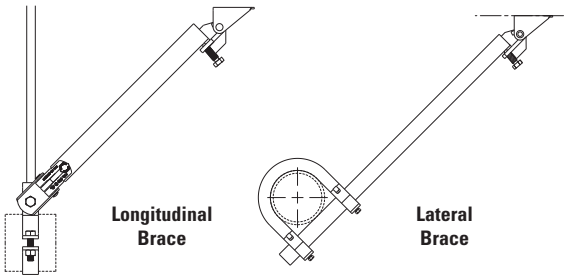
c UL us LISTED

FM APPROVED

Set Screw Included

Mounting Hardware Is Not Included





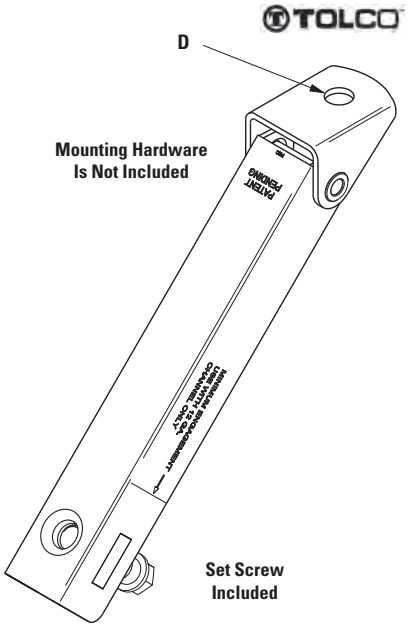
Part Number	A in.	A (mm)	B in.	B (mm)	D* in.	D* (mm)	Max. Horizontal Design Load (cULus) lbs./(kN)	Max. Horizontal Design Load** (FM) 30°-44° lbs./(kN)	45°-59° lbs./(kN)	60°-74° lbs./(kN)	75°-90° lbs./(kN)	Approx. Wt./100 lbs.	(kg)
980-3/8	5 1/4"	(133.3)	1 7/8"	(47.6)	13/32"	(10.3)	2015 (8.96)	1320 (5.87)	1970 (8.76)	2310 (10.27)	2550 (11.34)	149	(67.6)
980-1/2	5 1/4"	(133.3)	1 7/8"	(47.6)	17/32"	(13.5)						148	(67.1)
980-5/8	5 1/4"	(133.3)	1 7/8"	(47.6)	11/16"	(17.5)						147	(66.7)
980-3/4	5 1/4"	(133.3)	1 7/8"	(47.6)	13/16"	(20.5)						146	(66.2)
980H-7/8	6 3/4"	(171.4)	3 1/2"	(88.9)	15/16"	(23.8)						402	(182.3)
980H-1	6 3/4"	(171.4)	3 1/2"	(88.9)	1 1/16"	(27.0)						400	(181.4)
980H-1 1/8	6 3/4"	(171.4)	3 1/2"	(88.9)	1 3/16"	(30.2)						397	(180.1)
980H-1 1/4	6 3/4"	(171.4)	3 1/2"	(88.9)	1 5/16"	(33.3)						390	(176.9)

* Mounting attachment hole size.
** Installed with 1" or 1 1/4" Schedule 40 brace pipe.

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 986 - Mechanical Fast Clamp



Size Range: Available with holes for 1/2"-13 thru 3/4"-10 fastener attachment.

Material: Steel

Function: Used for attachment of seismic bracing to structure or hanger.

Features:

- Allows up to 12" (304.8mm) of adjustability in brace length, when used with Fig. 985
- Break-off set screw heads visually verify required installation torque
- Swivel allows adjustment to various surface angles

Finish: Electro-galvanized

Order By: Figure number, rod size & finish

Patent Pending

Part Number	Rod Size	Hole Dia. D in.	(mm)	Max. Horizontal Design Load* lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
986-1/2	1/2"	9/16"	(14.3)	2015	(8.96)	204	(92.5)
986-5/8	5/8"	11/16"	(17.5)	2015	(8.96)	203	(92.1)
986-3/4	3/4"	13/16"	(20.6)	2015	(8.96)	202	(91.6)

* When used with 1 5/8" (41.3mm) x 1 5/8" (41.3mm) 12 Ga. (2.6mm) channel

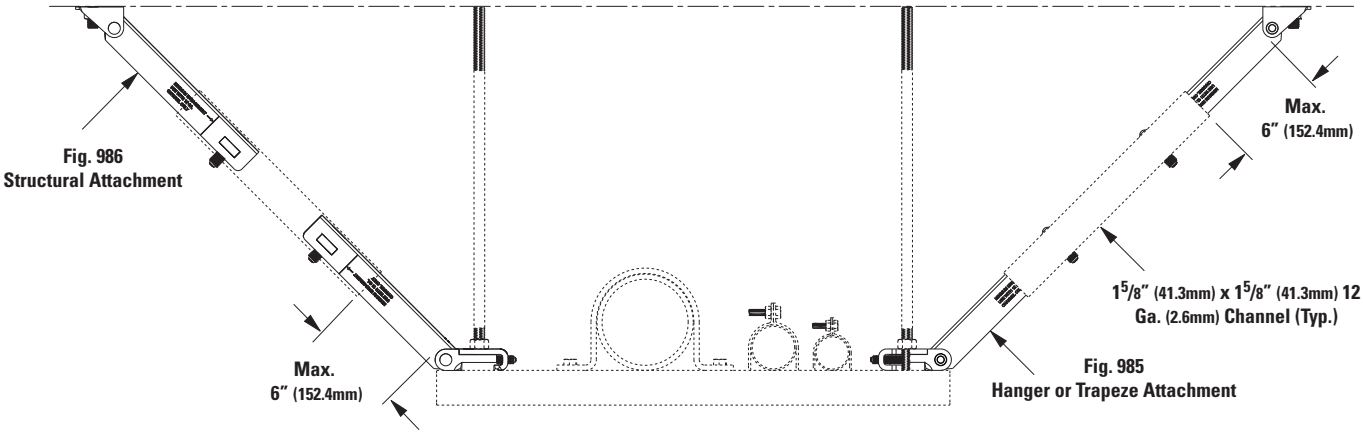


Fig. 990 - Cable Sway Brace Attachment - 3/8"-16 to 7/8"-9 rods
Fig. 990H - Cable Sway Brace Attachment - 1"-8 to 1 1/4"-7 rods

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: — 1/8", 3/16" and 1/4" pre-stretched cable.
Fig. 990 for 3/8", 1/2", 5/8", or 3/4" hanger rod, bolt, or fastener.
Fig. 990H for 3/4" or 7/8" hanger rod, bolt, or fastener.

Material: — Steel

Function: — Cable attachment for sway bracing. Attaches sway brace to structure or to hanger. To be used with 7 x 19 strand core pre-stretched galvanized aircraft cable.

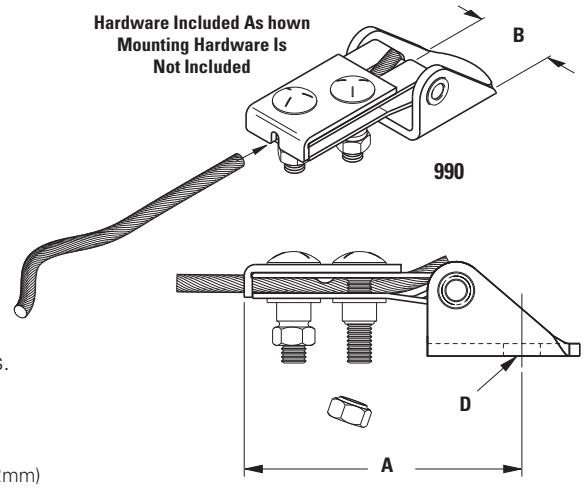
Features: — Cable easily slides into oversized front arch opening. Breakaway hex nuts assure verification of proper installation. Will mount to any surface angle.

Approvals: — Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint System Guidelines.

Finish: — Electro-Galvanized

Order By: — Figure number, cable size and mounting hole size.

Note: — Order 990H for hanger rod, bolt or fastener holes sized for 7/8" (22.2mm) thru 1 1/4" (31.7mm) rods.

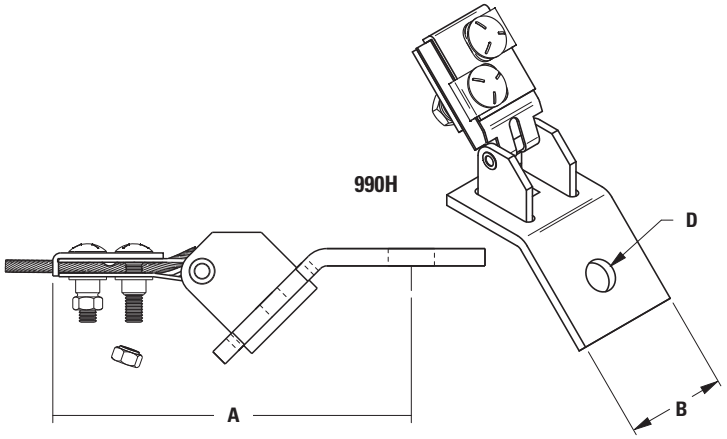


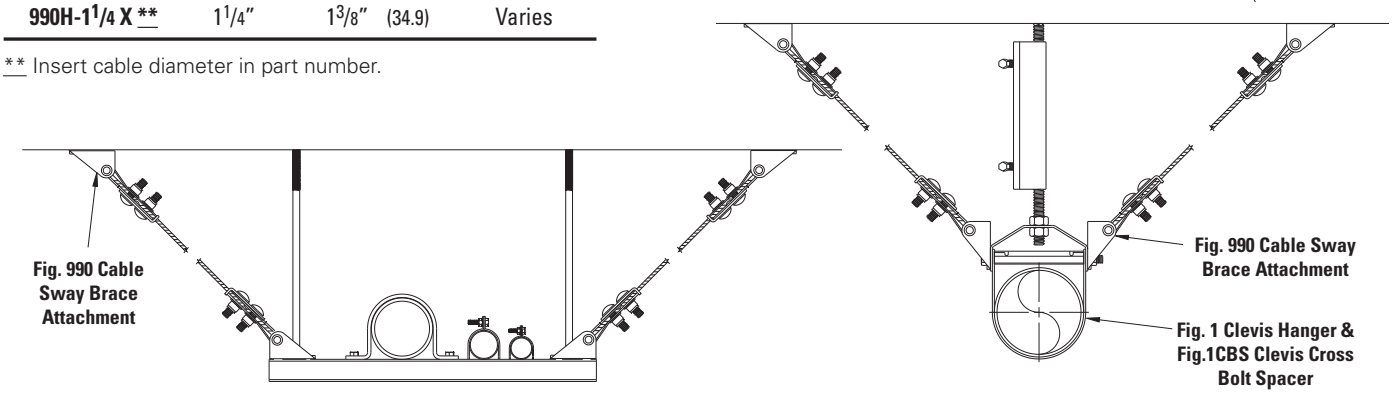
Cable ** Diameter	990 Dimensions A	990 Dimensions B	990H Dimensions A	990H Dimensions B	Max. Horizontal Design Load *
in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	lbs. (kN)
1/8" (3.2)	4 5/16" (14.3)	2" (50.8)	7 3/4" (196.8)	3 1/2" 88.9)	975 (4.33)
3/16" (4.8)	5" (127.0)	2 1/4" (57.1)	8 1/2" (215.9)	3 1/2" 88.9)	2050 (9.12)
1/4" (6.3)	5" (127.0)	2 5/8" (66.7)	8 1/2" (215.9)	3 1/2" 88.9)	3150 (14.01)

* Maximum load rating controlled by cable breaking strength.

Part Number	Rod Sizes	D Dia. in. (mm)	Approx. Wt./100
990-3/8 X **	3/8"	13/32" (10.3)	Varies
990-1/2 X **	1/2"	17/32" (13.5)	Varies
990-5/8 X **	5/8"	11/16" (17.4)	Varies
990-3/4 X **	3/4"	13/16" (20.6)	Varies
990H-7/8 X **	7/8"	15/16" (23.8)	Varies
990H-1 X **	1"	1 1/8" (28.6)	Varies
990H-1 1/8 X **	1 1/8"	1 1/4" (31.7)	Varies
990H-1 1/4 X **	1 1/4"	1 3/8" (34.9)	Varies

** Insert cable diameter in part number.





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

Fig. 1CBS - Clevis Bolt Spacer (Cooper B-Line B3100PS)

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Size 1" (25mm) thru 20" (500mm) clevis hanger

Material: Steel

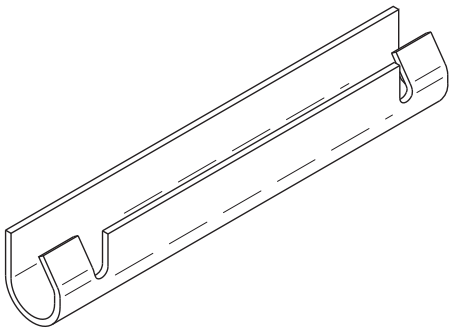
Function: Used as a spacer at a seismic brace location to keep clevis hanger from collapsing during seismic event.

Approvals: Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Installation Note: Fig. 1CBS fits easily over the cross bolt and attaches by pinching tabs down.

Finish: Pre-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number and finish.



Part No.	Pipe Size in.	(mm)	Approx. Wt./100 lbs.	(kg)
1CBS-1	1″	(25)	3.2	(1.4)
1CBS-1 1/4	1 1/4″	(32)	4.1	(1.8)
1CBS-1 1/2	1 1/2″	(40)	4.8	(2.2)
1CBS-2	2″	(50)	9.4	(4.2)
1CBS-2 1/2	2 1/2″	(65)	11.4	(5.2)
1CBS-3	3″	(75)	13.9	(6.8)
1CBS-3 1/2	3 1/2″	(90)	16.0	(7.2)
1CBS-4	4″	(100)	18.0	(8.1)
1CBS-5	5″	(125)	27.3	(12.4)
1CBS-6	6″	(150)	32.5	(14.7)
1CBS-8	8″	(200)	42.5	(19.2)
1CBS-10	10″	(250)	72.7	(32.9)
1CBS-12	12″	(300)	86.3	(39.1)
1CBS-14	14″	(350)	157.6	(71.5)
1CBS-16	16″	(400)	183.7	(83.3)
1CBS-18	18″	(450)	224.6	(101.9)
1CBS-20	20″	(500)	254.0	(115.2)

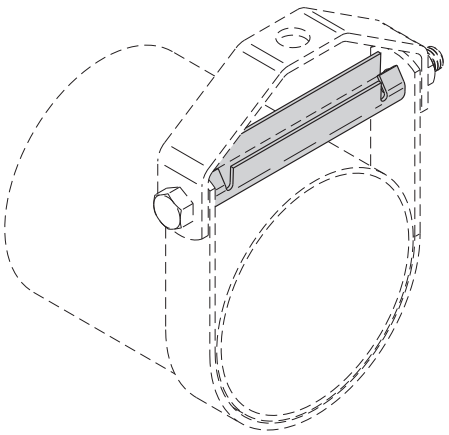


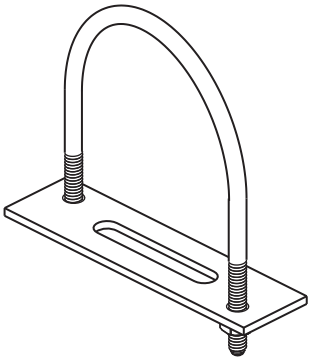
Fig. 120RWA - (Model B) Retrofit Wrap Around "U" Hanger Clamp

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 1" (25mm) thru 8" (200mm) pipe

Material: Steel

Function: Designed to restrain movement of the pipe within standard U-hangers as required by NFPA 13. Where retrofit capability is crucial, the Fig. 120RWA is a labor efficient alternative to the standard B-Line Fig. 120W wrap around U-hanger.



Features Installs easily by tightening two hex nuts. Features a unique bracing slot that locks onto a standard U-hanger to become a solid unit that will stabilize the pipe during seismic activity or sprinkler head activation. Designed to be used in retrofit or new construction applications. Will clamp to existing U-Hangers without restriction to leg angle.

Approvals: Underwriters Laboratories listed in the USA **(UL)** and Canada **(cUL)** as a restrainer. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines. NFPA 13 (2010) 9.3.6.3.

Finish: Plain and Galvanized. Contact B-Line for alternative finishes and materials.

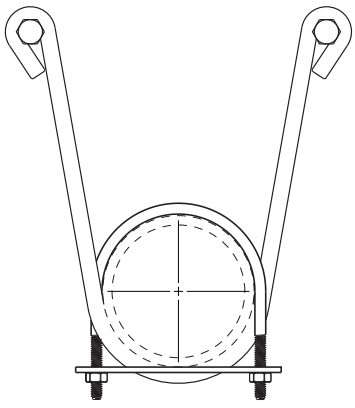
Order By: Figure number, type numbers and pipe size

Ordering Note: Order by the following type and pipe size:
Type 1 — (1" (25mm) and 1¼" (32mm) pipe size)
Type 2 — (1½" (40mm) and 2" (50mm) pipe size)
Type 3 — (2½" (65mm) and 3" (80mm) pipe size)
Type 4 — (4" (100mm) pipe size)
Type 6 — (5" (125mm) and 6" (150mm) pipe size)
Type 8 — (8" (200mm) pipe size)

Important Note: The bracing slot feature is sized to fit the U-Hanger rod schedule as required by NFPA 13 as follows:

5/16" (7.9mm) rod for up to 2" (50mm) pipe
3/8" (9.5mm) rod for 2 1/2" (65mm) - 6" (160mm) pipe
1/2" (12.7mm) rod for 8" (200mm) pipe
For other rod size requirements consult factory.

Part No.	Type	Pipe Size in.	(mm)
120RWA-TYPE1-1	1	1"	(20)
120RWA-TYPE1-1 1/4	1	1 1/4"	(25)
120RWA-TYPE2-1 1/2	2	1 1/2"	(40)
120RWA-TYPE2-2	2	2"	(50)
120RWA-TYPE3-2 1/2	3	2 1/2"	(65)
120RWA-TYPE3-3	3	3"	(80)
120RWA-TYPE4-3 1/2	4	3 1/2"	(90)
120RWA-TYPE4-4	4	4"	(100)
120RWA-TYPE6-5	6	5"	(125)
120RWA-TYPE6-6	6	6"	(150)
120RWA-TYPE8-8	8	8"	(200)



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

Fig. 25 - Surge Restrainer

Size Range: — One size fits 3/4" (20mm) thru 2" (40mm) pipe.

Material: — Pre-Galvanized Steel

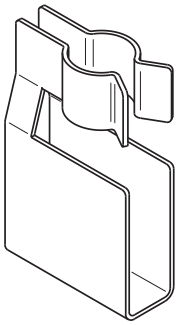
Function: — Designed to be used in conjunction with Fig. 200 band hangers to restrict the upward movement of piping as it occurs during sprinkler head activation or earthquake type activity. The surge restrainer is easily and efficiently installed by snapping into a locking position on the band hanger. This product is intended to satisfy the requirements as indicated in the National Fire Protection Association NFPA 13, 2010 edition, 9.2.3.4.4.1 and 9.2.3.4.4.4 Can be used to restrain either steel pipe or CPVC plastic Pipe.

Approvals: — Underwriters Laboratories Listed only when used with band hanger Fig. 200, in the USA **(UL)** and Canada **(cUL)**.

Finish: Pre-Galvanized

Order By: Figure number and band hanger, size from 3/4" (20mm) thru 2" (40mm).

Patent #5,344,108



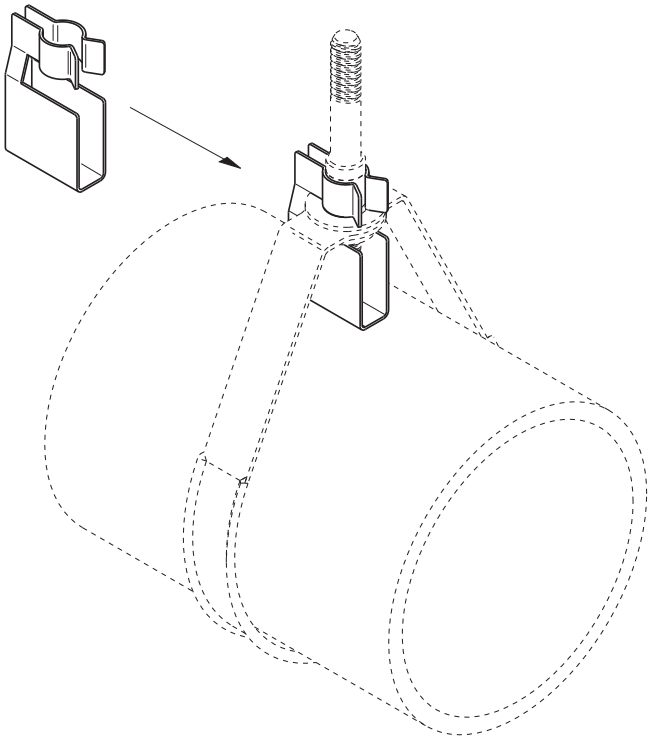


Fig. 98 - Rod Stiffener
Fig. 98B - Rod Stiffener with Break-Off Bolt Head

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Secures 3⁄8"-16 thru 7⁄8"-9 hanger rod

Material: Steel

Function: Secures channel to hanger rod for vertical seismic bracing.

Approvals: Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines

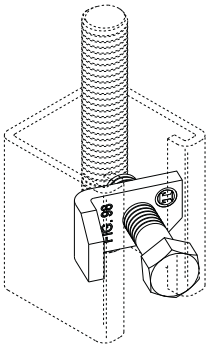
Finish: Electro Galvanized. Contact B-Line for alternative finishes and materials.

Weight: Approx. Wt./100: Fig. 98 - 11.8 Lbs. (5.3kg)
Fig. 98B - 12.7 Lbs. (5.7kg)

Order By: Figure number

Fig. 98

Fig. 98B



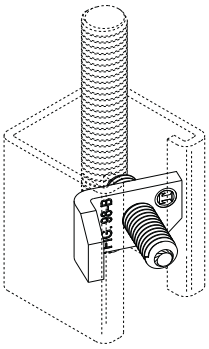


Fig. SC228 - Hanger Rod Stiffener

Size Range: Secures 3⁄8"-16 thru 5⁄8"-11 hanger rod

Material: Steel

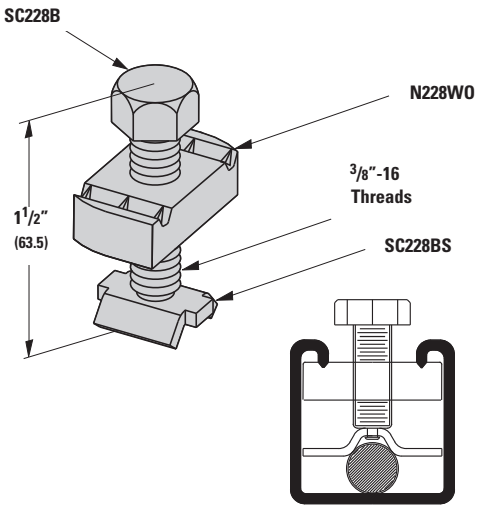
Function: Secures channel to hanger rod for vertical seismic bracing. Slight distortion of the channel (strut) may occur upon installation of rod stiffeners.

Finish: Electro Galvanized. B-Line for alternative finishes and materials.

Weight: Approx. Wt./100: 21.0 Lbs. (9.5kg)

Order By: Figure part number

Note: Order channel separately



Rod Stiffener Requirements

Rod Size	Maximum Rod Length Without Rod Stiffener	Maximum Spacing Between Rod Stiffeners
3/8"	19" (482mm)	13" (330mm)
1/2"	25" (635mm)	18" (457mm)
5/8"	31" (787mm)	23" (584mm)
3/4"	37" (940mm)	28" (711mm)
7/8"	43" (1092mm)	33" (838mm)
1"*	50" (1270mm)	38" (965mm)
1 1/4"*	60" (1524mm)	43" (1092mm)

* Use with SC228 only.

Notes:

1.) Rod stiffeners are required only on hanger and trapeze assemblies that have seismic bracing attached at or within 4" (101.6mm) of the rod. A minimum of two rod stiffeners (Figure 98, 98B, or SC228) must be installed.

2.) Recommended torque on Figure 98 and SC228 is 8 ft-lbs. (10.8Nm) or finger tight and one full turn with a wrench.
Figure 98B has the break off bolt head.

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

Fig. 4A - Pipe Clamp for Sway Bracing

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 4" (100mm) thru 8" (200mm) pipe. For sizes smaller than 4" (100mm) use B3140.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance.

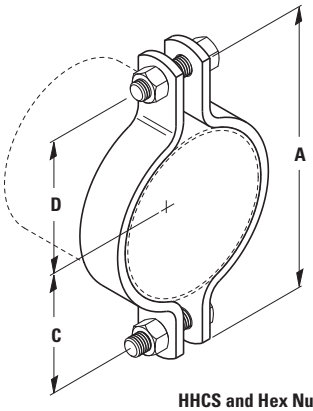
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)** 4" (100mm) thru 8" (200mm). Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**.

Installation Instructions: Fig. 4A is the "braced pipe" attachment component of a longitudinal or riser brace assembly. It is intended to be combined with the "bracing pipe" and our transitional and structural attachment component(s) to form a complete bracing assembly.
NFPA 13 and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 4A over the pipe to be braced. Attach our transitional fitting, either Fig. 980, 910 or 909, to the clamp ears. Tighten bolts and nuts; torque requirement is a minimum of 50 ft./lbs. (68Nm) per MSS-SP-58 (2009). Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number, pipe size and finish



HHCS and Hex Nuts Included

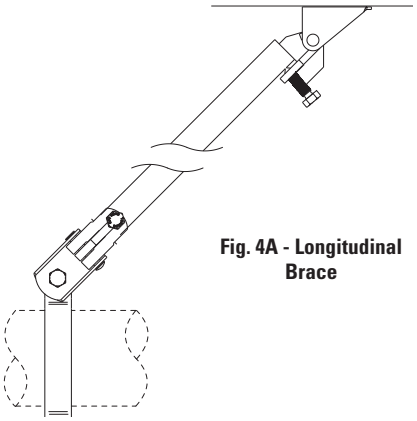


Fig. 4A - Longitudinal Brace

Part No.	Pipe Size in.	(mm)	A in.	(mm)	C in.	(mm)	D in.	(mm)	Bolt Size	Max. Horizontal Design Load (UL) lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
4A-4	4"	(100)	$8\frac{1}{2}$"	(215.9)	$3\frac{3}{8}$"	(85.7)	$3\frac{11}{16}$"	(93.7)	$\frac{1}{2}$"-13	1600	(7.11)	221	(100.2)
4A-5	5"	(125)	$9\frac{3}{4}$"	(247.6)	$3\frac{7}{8}$"	(98.4)	$4\frac{3}{8}$"	(111.1)	$\frac{1}{2}$"-13	1600	(7.11)	253	(114.7)
4A-6	6"	(150)	$11\frac{1}{2}$"	(292.1)	5"	(127.0)	$5\frac{1}{8}$"	(130.2)	$\frac{1}{2}$"-13	2015	(8.96)	513	(232.7)
4A-8	8"	(200)	$13\frac{1}{4}$"	(336.5)	$6\frac{11}{16}$"	(169.9)	$6\frac{1}{8}$"	(155.6)	$\frac{1}{2}$"-13	2015	(8.96)	601	(272.6)

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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Component of State of California OSHPD Approved Seismic Restraints System

Figure 4B Pipe Clamp for Sway Bracing (Cooper B-Line B386)

Size Range: 3/4" (20mm) to 8" (200mm) pipe

Material: Steel

Function: For bracing pipe against sway and seismic disturbance

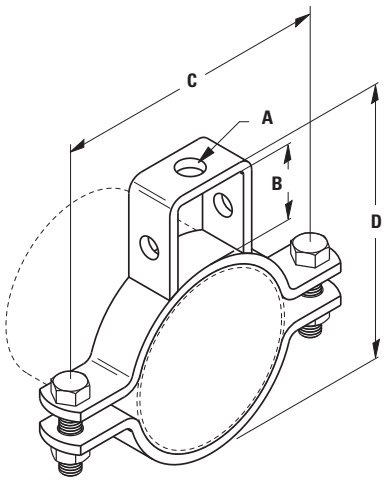
Approvals: Included in the Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**.

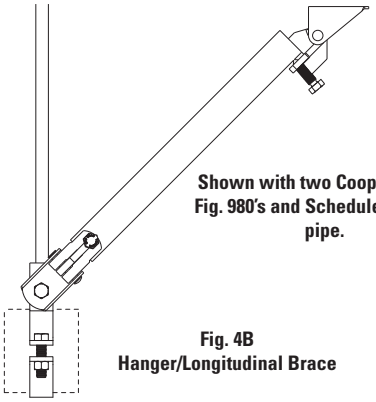
Standard Finish: Plain or Electro-Plated**,** Contact B-Line for alternative finishes and materials.

Ordering: Specify part number and finish.

Installation Instructions: Fig. 4B is the "braced pipe" attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and transitional and structural attachment component(s) to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 4B over the pipe to be braced. Attach other transitional fitting, Fig. 909, 910, or 980. Tighten bolts and nuts. Transitional fitting attachment can pivot for adjustment to proper brace angle.





Shown with two Cooper B-Line Fig. 980's and Schedule 40 brace pipe.

Fig. 4B
Hanger/Longitudinal Brace

Part No.	Pipe Size in.	(mm)	Rod Size A	B in.	(mm)	C in.	(mm)	D in.	(mm)	Bolt Size	Design Load Lbs.	(kN)	Approx. Wt./100 Lbs.	(kg)
4B-3/4	3/4"	(20)	3/8"-16	1"	(25.4)	2 7/8"	(73.0)	2 5/8"	(66.7)	5/16"-18	330	(1.47)	56	(25.4)
4B-1	1"	(25)	3/8"-16	1"	(25.4)	3 1/4"	(82.5)	2 15/16"	(74.6)	5/16"-18	330	(1.47)	60	(27.2)
4B-1 1/4	1 1/4"	(32)	3/8"-16	1"	(25.4)	3 9/16"	(90.6)	3 1/4"	(82.5)	5/16"-18	330	(1.47)	74	(33.5)
4B-1 1/2	1 1/2"	(40)	3/8"-16	1"	(25.4)	3 13/16"	(96.8)	3 7/16"	(87.3)	5/16"-18	330	(1.47)	79	(35.8)
4B-2	2"	(50)	3/8"-16	1 1/2"	(38.1)	5 1/8"	(130.2)	4 5/8"	(117.5)	5/16"-18	440	(1.78)	156	(70.7)
4B-2 1/2	2 1/2"	(65)	1/2"-13	1 3/4"	(44.4)	5 5/8"	(142.9)	5 3/8"	(136.5)	3/8"-16	440	(1.78)	176	(79.8)
4B-3	3"	(80)	1/2"-13	1 7/8"	(47.6)	6 3/4"	(171.4)	6 1/8"	(155.5)	3/8"-16	660	(2.93)	198	(89.9)
4B-3 1/2	3 1/2"	(90)	1/2"-13	2"	(50.8)	7 1/4"	(184.1)	6 3/4"	(171.4)	3/8"-16	660	(2.93)	219	(99.3)
4B-4	4"	(100)	5/8"-11	2"	(50.8)	8 5/8"	(219.1)	7 1/4"	(184.1)	1/2"-13	800	(3.56)	288	(130.6)
4B-5	5"	(125)	5/8"-11	2"	(50.8)	9 7/8"	(250.8)	8 5/16"	(211.1)	5/8"-11	980	(4.36)	390	(176.9)
4B-6	6"	(150)	3/4"-10	2 1/8"	(54.0)	10 15/16"	(277.8)	9 1/2"	(241.3)	5/8"-11	980	(4.36)	448	(203.2)
4B-8	8"	(200)	7/8"-9	2 1/8"	(54.0)	13 7/16"	(341.2)	11 1/2"	(292.1)	3/4"-10	1200	(5.34)	691	(313.4)

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 4LA - "In-Line" Sway Brace Attachment

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Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 1" (25mm) through 12" (300mm) IPS.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance.

Approvals: Approved by Factory Mutual Engineering **(FM)**, 1" (25mm) through 12" (300mm) pipe.

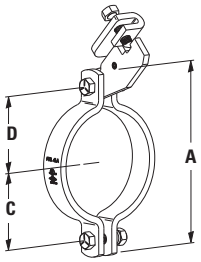
Installation Instructions: Fig. 4LA can be used as the system attachment component of a longitudinal or lateral brace assembly. It is intended to be combined with the "bracing member" and our transitional attachment and structural attachment to form a complete bracing assembly. NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 4LA pipe clamp component over the pipe to be braced and tighten down the break-off nuts until the hex head portion breaks off to verify correct installation torque. Next engage brace member (pipe or strut) with jaw component and tighten break-off head bolt until the hex head breaks off to verify correct installation torque. Pivot jaw for correct angle and attach to structure using our brand transitional attachment and structural attachment.

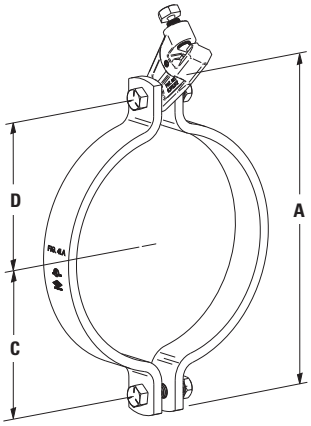
Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number, pipe size and finish.

4LA-1 thru 4LA-4



4LA-5 thru 4LA-12



Part No.	Pipe Size in.	(mm)	A in.	(mm)	C in.	(mm)	D in.	(mm)	Bolt Size	Approx. Wt./100 lbs.	(kg)
4LA-1	1"	(25)	3 19/32"	(91.2)	1 5/16"	(33.5)	1 5/16"	(33.5)	3/8"-16	119	(54.0)
4LA-1 1/4	1 1/4"	(32)	3 29/32"	(99.3)	1 3/8"	(35.3)	1 3/8"	(35.3)	3/8"-16	123	(55.8)
4LA-1 1/2	1 1/2"	(40)	4 5/32"	(105.7)	1 1/2"	(38.5)	1 1/2"	(38.5)	3/8"-16	127	(57.6)
4LA-2	2"	(50)	5 11/32"	(135.6)	2 1/32"	(51.9)	2 1/16"	(51.9)	3/8"-16	142	(64.4)
4LA-2 1/2	2 1/2"	(65)	5 27/32"	(148.7)	2 5/16"	(58.5)	2 5/16"	(58.5)	3/8"-16	173	(78.5)
4LA-3	3"	(80)	6 1/2"	(164.9)	2 5/8"	(66.6)	2 5/8"	(66.6)	3/8"-16	187	(84.8)
4LA-3 1/2	3 1/2"	(90)	7 13/32"	(188.1)	2 7/8"	(73.1)	2 7/8"	(73.1)	3/8"-16	198	(89.8)
4LA-4	4"	(100)	7 17/32"	(191.3)	3 1/8"	(79.5)	3 1/8"	(79.5)	3/8"-16	209	(94.8)
4LA-5	5"	(125)	8 1/4"	(222.3)	3 5/8"	(92.1)	3 5/8"	(92.1)	1/2"-13	298	(135.2)
4LA-6	6"	(150)	10 5/8"	(269.9)	4 9/16"	(115.9)	4 9/16"	(115.9)	1/2"-13	521	(236.3)
4LA-8	8"	(200)	12 13/16"	(325.5)	5 9/16"	(143.7)	5 21/32"	(143.7)	1/2"-13	629	(285.3)
4LA-10	10"	(250)	16 1/2"	(419.1)	7 1/4"	(184.2)	7 1/4"	(184.2)	1/2"-13	1320	(598.7)
4LA-12	12"	(300)	18 1/2"	(469.9)	8 1/4"	(209.6)	8 1/4"	(209.6)	1/2"-13	1496	(678.6)

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

Fig. 4LA - "In-Line" Sway Brace Attachment cont.

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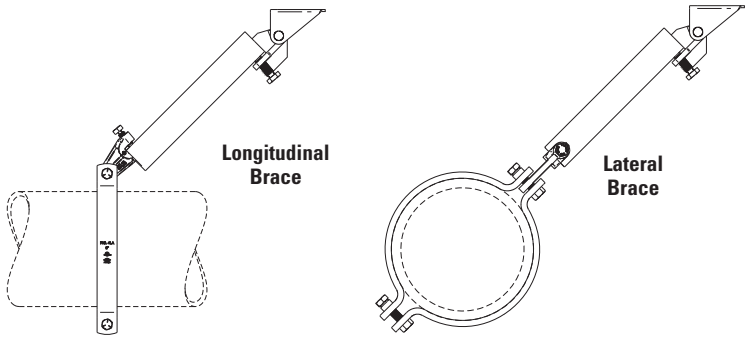
Component of State of California OSHPD Approved Seismic Restraints System



Longitudinal Loads			Max. Horizontal Design Load (FM)								Max. Horizontal	
Part No.	Pipe Size in.	(mm)	30°-44° lbs.	(kN)	45°-59° lbs.	(kN)	60°-74° lbs.	(kN)	75°-90° lbs.	(kN)	Design Load lbs.	(kN)
4LA-1	1"	(25)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-1 1/4	1 1/4"	(32)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-1 1/2	1 1/2"	(40)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-2	2"	(50)	680	(3.02)	860	(3.82)	1030	(4.58)	1150	(5.11)	1000	(4.45)
4LA-2 1/2	2 1/2"	(65)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-3	3"	(80)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-3 1/2	3 1/2"	(90)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-4	4"	(100)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-5	5"	(125)	-	-	-	-	-	-	-	-	1600	(7.11)
4LA-6	6"	(150)	1620	(7.20)	2,260	(10.05)	2010	(8.94)	2220	(9.87)	1600	(7.11)
4LA-8	8"	(200)	1620	(7.20)	1,660	(7.38)	1570	(6.98)	1740	(7.74)	2015	(8.96)
4LA-10	10"	(250)	1620	(7.20)	1,660	(7.38)	1570	(6.98)	1740	(7.74)	2765	(12.30)
4LA-12	12"	(300)	1620	(7.20)	1,660	(7.38)	1570	(6.98)	1740	(7.74)	-	-

Lateral Loads			Max. Horizontal Design Load (FM)								Max. Horizontal	
Part No.	Pipe Size in.	(mm)	30°-44° lbs.	(kN)	45°-59° lbs.	(kN)	60°-74° lbs.	(kN)	75°-90° lbs.	(kN)	Design Load lbs.	(kN)
4LA-1	1"	(25)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-1 1/4	1 1/4"	(32)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-1 1/2	1 1/2"	(40)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-2	2"	(50)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-2 1/2	2 1/2"	(65)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-3	3"	(80)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-3 1/2	3 1/2"	(90)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-4	4"	(100)	680	(3.02)	970	(4.31)	1190	(5.29)	1320	(5.87)	1000	(4.45)
4LA-5	5"	(125)	-	-	-	-	-	-	-	-	1600	(7.11)
4LA-6	6"	(150)	1620	(7.20)	2,300	(10.23)	2820	(12.54)	3140	(13.96)	1600	(7.11)
4LA-8	8"	(200)	1620	(7.20)	2,300	(10.23)	2820	(12.54)	3140	(13.96)	2015	(8.96)
4LA-10	10"	(250)	1620	(7.20)	2,300	(10.23)	2820	(12.54)	3140	(13.96)	2765	(12.30)
4LA-12	12"	(300)	1620	(7.20)	2,300	(10.23)	2820	(12.54)	3140	(13.96)	-	-

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 4L - "In-Line" Sway Brace Attachment

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Component of State of California OSHPD Approved Seismic Restraints System

Size Range: 2 1/2" (65mm) through 8" (200mm) ips.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance.

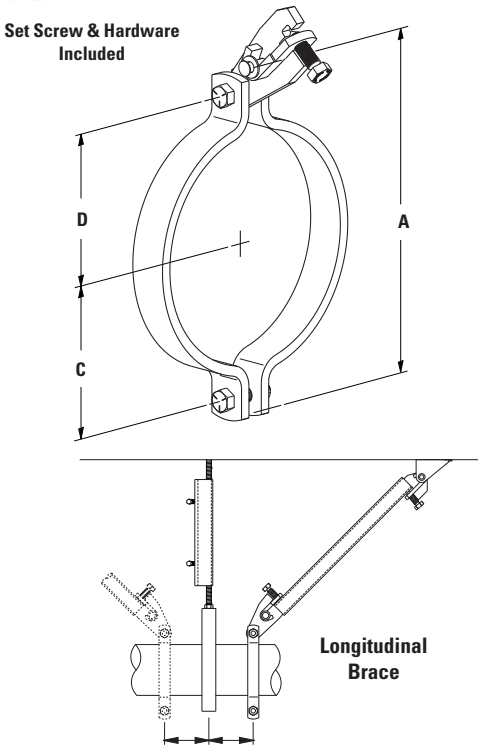
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)** 2 1/2" (65mm) through 8" (200mm) pipe. Approved by Factory Mutual Engineering **(FM)**, 2 1/2" (65mm) through 8" (200mm) pipe.

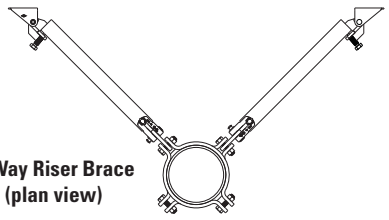
Installation Instructions: Fig. 4L is the "braced pipe" attachment component of a longitudinal or 4-way sway brace assembly. It is intended to be combined with the "bracing pipe" and our structural attachment component to form a complete bracing assembly.
NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 4L over the pipe to be braced and tighten bolts. Then engage "bracing pipe" into jaw opening and tighten set screw until head snaps off. Jaw attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Figure number, pipe size and finish.





Part No.	Pipe Size in.	(mm)	A in.	(mm)	C in.	(mm)	D in.	(mm)	Bolt Size	Max. Horizontal Design Load (cULuc) lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
4L-2 1/2	2 1/2"	(65)	6 7/16"	(163.5)	2 1/2"	(63.5)	2 3/4"	(69.8)	1/2"-13	2015	(8.96)	253	(114.7)
4L-3	3"	(80)	7"	(177.8)	2 3/4"	(69.8)	3 1/16"	(77.8)	1/2"-13	2015	(8.96)	268	(121.5)
4L-4	4"	(100)	8 1/2"	(215.9)	3 3/8"	(85.7)	3 11/16"	(93.7)	1/2"-13	2015	(8.96)	348	(157.8)
4L-5	5"	(125)	9 3/4"	(247.6)	3 7/8"	(98.4)	4 3/8"	(111.1)	1/2"-13	2015	(8.96)	380	(172.3)
4L-6	6"	(150)	11 1/2"	(292.1)	5"	(127.0)	5 1/8"	(130.2)	1/2"-13	2015	(8.96)	640	(290.3)
4L-8	8"	(200)	13 1/4"	(336.5)	5 5/8"	(142.8)	5 5/8"	(142.8)	1/2"-13	2015	(8.96)	728	(330.2)

Part No.	Pipe Size in.	(mm)	Max. Horizontal Design Load (cULuc) lbs./(kN)	Max. Horizontal Design Load (FM) 30-44° lbs./(kN)	45-59° lbs./(kN	60°-74° lbs./(kN)	75°-90° lbs./(kN)
4L-2 1/2	2 1/2"	(65)	2015 (8.96)	1030 (4.58)	1180 (5.24)	1420 (6.31)	1590 (7.07)
4L-3	3"	(80)	2015 (8.96)	1030 (4.58)	1180 (5.24)	1420 (6.31)	1590 (7.07)
4L-4	4"	(100)	2015 (8.96)	530 (2.36)	730 (3.25)	890 (3.96)	990 (4.40)
4L-5	5"	(125)	2015 (8.96)	530 (2.36)	730 (3.25)	890 (3.96)	990 (4.40)
4L-6	6"	(150)	2015 (8.96)	530 (2.36)	730 (3.25)	890 (3.96)	990 (4.40)
4L-8	8"	(200)	2015 (8.96)	490 (2.18)	680 (3.02)	830 (3.69)	930 (4.13)

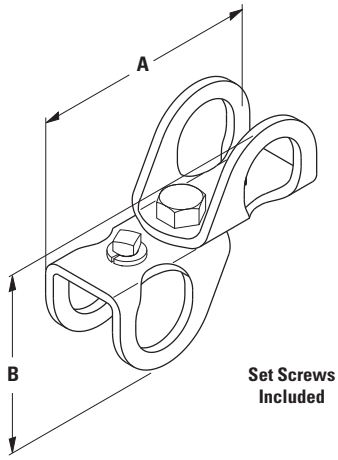
Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 907 - 4-Way Sway Brace Attachment

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System



Size Range: 1" (25.4mm) x 1" (25.4mm), 1" (25.4mm) x 1 1/4" (31.7mm) and 1 1/4" (25.4mm) x 1 1/4" (25.4mm) bracing pipe.

Material: Steel, hardened cone (or cup) point set screw

Function: For bracing pipe against sway and seismic disturbances, Functions as a longitudinal brace connection when attached to a lateral brace pipe. Bracing connection must be positioned as close as physically possible to the braced pipe (No more than 3" (76.2mm) away). Must be used only with B-Line/TOLCO bracing components. When used in conjunction with Fig. 1000, this combination bracing restricts piping movement in tension and compression both laterally and longitudinally.

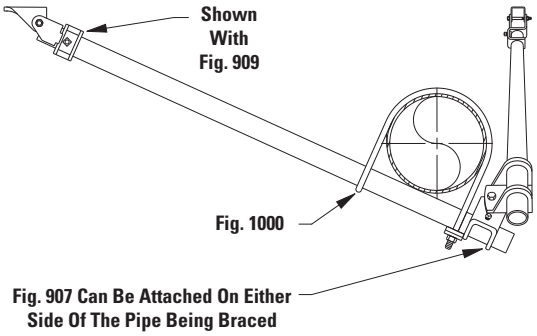
Approvals: Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

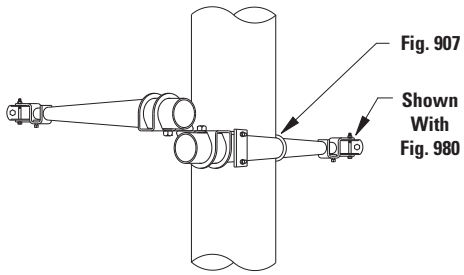
Installation Instructions: Fig. 907 is a transitional component of a longitudinal 4-way sway brace assembly. It is intended to be installed with the longitudinal and lateral "bracing pipes", our structural attachment fittings, Fig. 909, 910 and 980 and the Fig. 1000 our "braced pipe" fitting, to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

To Install: Attach the Fig. 907 over the lateral "bracing pipe" to within 3" (76.2mm) of its position relative to the "braced pipe" connection. Adjust brace angle and tighten set screws until the heads bottom out on surface.

Finish: Plain. Contact B-Line for alternative finishes and materials.

Order By: Figure number, bracing pipe sizes and finish.





4-Way Riser Brace

Part Number	Brace Pipe Size in.	(mm)	A in.	(mm)	B in.	(mm)	Max. Design Load lbs.	(kN)	Approx. Wt./100 lbs.	(kg)
907-1 X 1	1" x 1"	(25 x 25)	4 3/4"	(120.6)	4 3/4"	(120.6)	655*	(2.91)	103	(46.7)
907-1 X 1 1/4	1" x 1 1/4"	(25 x 32)	5 3/16"	(128.6)	4 13/16"	(122.2)	655*	(2.91)	107	(48.5)
907-1 1/4 X 1 1/4	1 1/4" x 1 1/4"	(32 x 32)	5 3/8"	(136.5)	5 1/4"	(133.1)	655*	(2.91)	109	(49.4)

* Load will accommodate up to 4" (100mm) pipe at maximum spacing.

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 981 - Fast Attach – Universal Swivel Sway Brace Attachment

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Fits bracing pipe 1" (25mm) thru 2" (50mm), 12 gauge (2.6mm) channel and all structural steel up to 1/4" (6.3mm) thick.
Fig. 981-S fits rod sizes 3/8" thru 5/8".
Fig. 981-L fits rod sizes 3/4" thru 7/8".

Material: Steel

Function: Multi-functional attachment to hanger rod, trapeze rod, structure or braced pipe fitting.

Features: Fits multiple sizes of bracing pipe, strut or structural steel. Swivel allows adjustment to various surface angles. Breakaway bolt heads assure verification of proper installation torque. Unique "fast attach" yoke design fits multiple rod sizes; 3/8" thru 5/8" and 3/4" thru 7/8". "Stackable" design allows installation of both lateral and longitudinal braces to be easily installed on a single hanger rod, with no disassembly.

Installation: Fig. 981 is the "braced pipe" attachment component of a lateral or longitudinal brace assembly. It is intended to be combined with the pipe hanger, all-thread rod, "bracing pipe" and our transitional and structural attachment component(s) to form a complete bracing assembly.
NFPA 13 and/or OSHPD guidelines should be followed.

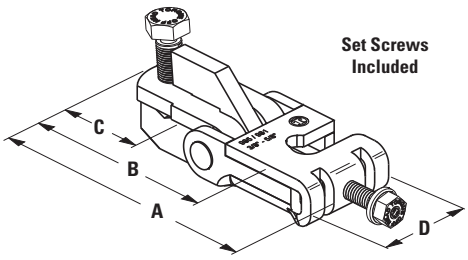
To Install: Spin nut on top of hanger counterclockwise to loosen the nut and raise it above the top of the hanger. Attach Fig. 981 by slipping the open side of the 981 yoke onto the all thread rod above the top of the hanger. Tighten 3/8" cone point set screw on yoke until head breaks-off to ensure proper installation torque. Spin the hex nut clockwise and tighten securely. Insert brace pipe into the jaw of the 981 and tighten the cone point set screw until the head breaks off ensuring proper installation torque. Pivot brace pipe to proper angle and attach to structure using our swivel structural attachment.

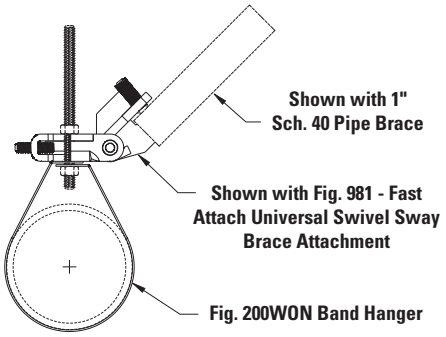
Approvals: Included in our Seismic Restraint Systems Guidelines, approved by the California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Finish: Electro-Galvanized

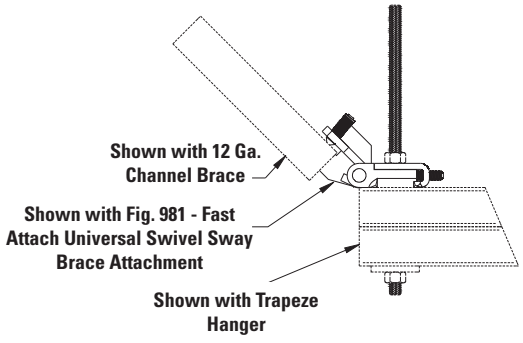
Order By: Figure number, rod size

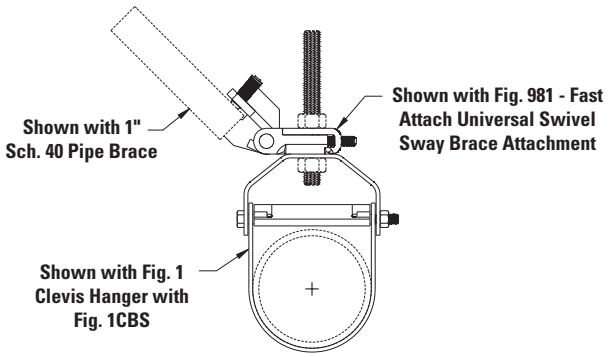
Pat. # 6,273,372, Pat. # 7,097,141, Pat. # 7,654,043, Pat. # 7,654,043 B2





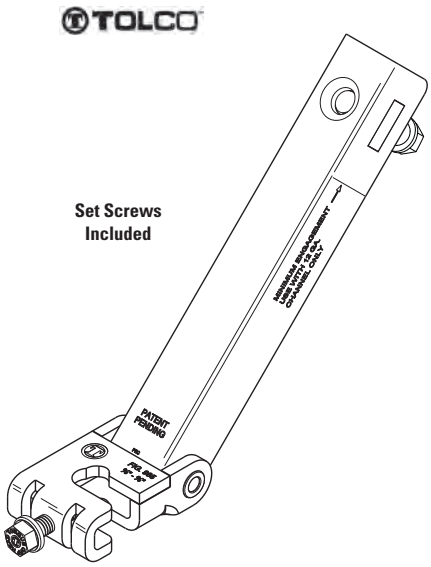
Part Number	Rod Size Range	A in.	A (mm)	B in.	B (mm)	C in.	C (mm)	D in.	D (mm)	Max. Horizontal Design Load lbs.	Max. Horizontal Design Load (kN)	Approx. Wt./100 lbs.	Approx. Wt./100 (kg)
981-S	3/8" thru 35/8"	5 1/8"	(130.2)	4 1/8"	(104.8)	1 1/4"	(31.7)	2 1/4"	(57.1)	2015	(8.96)	88	(39.9)
981-L	3/4" & 7/8"	5 1/8"	(130.2)	4 1/8"	(104.8)	1 1/4"	(31.7)	2 1/4"	(57.1)	2015	(8.96)	82	(37.2)





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

Fig. 985 - Mechanical Fast Clamp



Size Range: Fig. 985-S fits rod sizes 3/8" thru 5/8"
Fig. 985-L fits rod sizes 3/4" thru 7/8" rod sizes

Material: Steel

Function: Used for attachment of seismic bracing to pipe hanger or trapeze

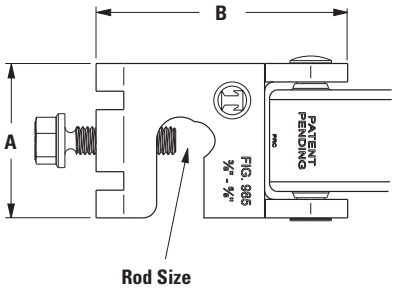
Features:

- Allows up to 12" (304.8mm) of adjustability in brace length, when used with Fig. 986
- Break-off set screw heads visually verify required installation torque
- Unique "Fast Attach" yoke design allows Fig. 985 to be installed to hanger rods 3/8" thru 5/8" or 3/4" thru 7/8"

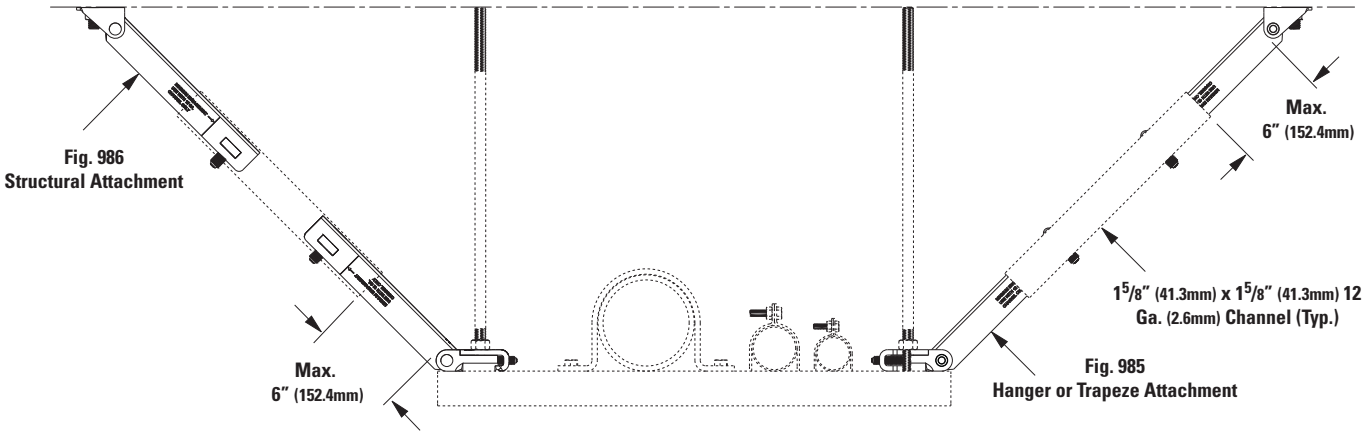
Finish: Electro-galvanized

Order By: Figure number, rod size & finish

Patent Pending



Part Number	Rod Size	A in.	A (mm)	B in.	B (mm)	Max. Horizontal Design Load lbs.	Max. Horizontal Design Load (kN)	Approx. Wt./100 lbs.	Approx. Wt./100 (kg)
985-S	3/8" thru 5/8"	2"	(50.8)	1 1/2"	(38.1)	2015	(8.96)	204	(92.5)
985-L	3/4" & 7/8"	2"	(50.8)	1 5/8"	(41.3)	2015	(8.96)	198	(89.8)



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

Fig. 991 - Fast Attach – Cable Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System

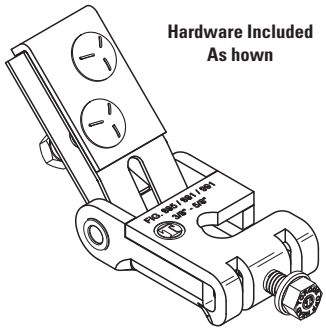
TOLCO

Size Range: 1/8", 3/16" and 1/4" pre-stretched cable.
Fig. 991S fits rod sizes 3/8" thru 5/8".
Fig. 991L fits rod sizes 3/4" thru 7/8".

Material: Steel

Function: Cable attachment for sway bracing. Attaches sway brace to hanger rod. To be used with 7 x 19 strand core pre-stretched galvanized aircraft cable.

Features: Cable easily slides into oversized front arch opening. Swivel allows adjustment to various surface angles. Break-away hex nuts assure verification of proper installation torque. Unique "Fast-Attach" yoke design fits multiple rod sizes; 3/8" thru 5/8" or 3/4" thru 7/8". To verify proper installation to hanger rod, simply install yoke to hanger rod and tighten 3/8" cone point set screw until head breaks off. "Stackable" design allows installation of both lateral and longitudinal braces, as well as opposing braces, to be easily installed on a single hanger rod, with no disassembly. The retrofit yoke has a visual verification of proper installation torque. Tighten existing hex nut down until the slight gap in the yoke assembly closes completely.



Approvals: Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint System Guidelines.

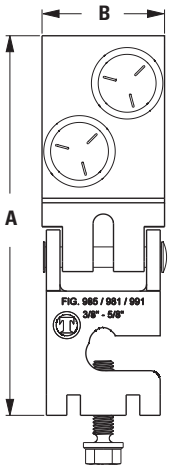
Finish: Electro-Galvanized

Order By: — Figure number, rod size range 3/8" thru 5/8" or 3/4" thru 7/8"

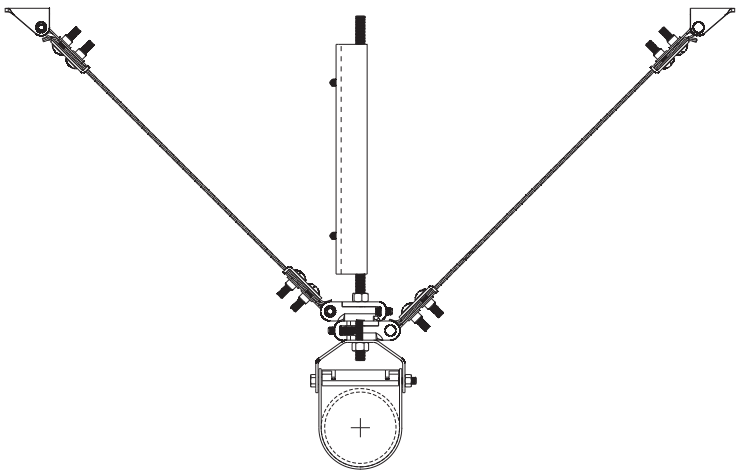
Pat. # 7,097,141, Pat. # 7,654,043, Pat. # 7,654,043 B2

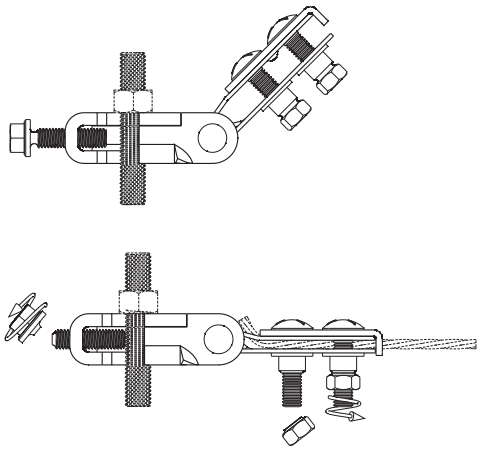
Part Number	Rod Sizes	Cable Diameter in.	Cable Diameter (mm)	A in.	A (mm)	B in.	B (mm)	Max. Horizontal Design Load* lbs.	Max. Horizontal Design Load* (kN)	Approx. Wt./100 lbs.	Approx. Wt./100 (kg)
991-S-1/8	3/8" thru 5/8"	1/8"	(3.2)	4 5/16"	(14.3)	2"	(50.8)	975	(4.33)	128.3	(58.2)
991-S-3/16		3/16"	(4.8)	5"	(127.0)	2 1/4"	(57.1)	2050	(9.12)	182.1	(82.6)
991-S-1/4		1/4"	(6.3)	5"	(127.0)	2 5/8"	(66.7)	3150	(14.01)	221.1	(100.3)

Part Number	Rod Sizes	Cable Diameter in.	Cable Diameter (mm)	A in.	A (mm)	B in.	B (mm)	Max. Horizontal Design Load* lbs.	Max. Horizontal Design Load* (kN)	Approx. Wt./100 lbs.	Approx. Wt./100 (kg)
991-L-1/8	3/4" & 7/8"	1/8"	(3.2)	4 5/16"	(14.3)	2"	(50.8)	975	(4.33)	122.3	(55.5)
991-L-3/16		3/16"	(4.8)	5"	(127.0)	2 1/4"	(57.1)	2050	(9.12)	176.1	(79.9)
991-L-1/4		1/4"	(6.3)	5"	(127.0)	2 5/8"	(66.7)	3150	(14.01)	215.1	(97.5)



* Maximum load rating controlled by cable breaking strength.





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

Fig. 1000 - "Fast Clamp" Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System

TOLCO

UL LISTED US

FM APPROVED

Size Range: Pipe size to be braced: 1" (25mm) thru 6" (150mm) Schedule 10 thru 40 IPS.
Pipe size used for bracing: 1" (25mm) and 1¼" (32mm) Schedule 40 IPS.

Material: Steel

Function: A restraint device intended for lateral bracing.

Features: Field adjustable, making critical pre-engineering of bracing pipe unnecessary. Unique design requires no threading of bracing pipe. Can be used as a component of a 4-way riser brace. Can be used as longitudinal brace with Fig. 907. Steel leaf spring insert provided to assure installer and inspector necessary minimum torque has been achieved.

Installation: Fig. 1000 is the "braced pipe" attachment component of a lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and our structural attachment component, Fig. 980, 910 or 909 to form a complete bracing assembly. NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

To Install: Place the Fig. 1000 over the pipe to be braced, insert bracing pipe through opening leaving a minimum of 1" extension. Brace pipe can be installed on top or bottom of pipe to be braced. Tighten hex nuts until leaf spring is flat. It is recommended that the brace angle be adjusted before hex nuts are fully tightened.

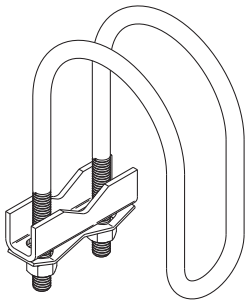
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved for use with Allied Dyna Flow sprinkler pipe up to 2" as a restraint device. Maximum horizontal design load is 655 lbs. (2.91kN) Torque requirement is 6-8 ft./lbs. (8-10Nm).
Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

Application Note: Position Fast Clamp and tighten two hex nuts until leaf spring flattens. A minimum of 1" pipe extension beyond the Fig. 1000 is recommended.

Finish: Plain. Contact B-Line for alternative finishes and materials.

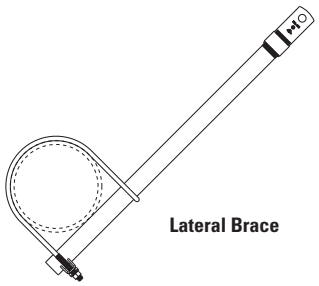
Order By: Order first by pipe size to be braced, followed by pipe size used for bracing, figure number and finish.

Hardware Included



Max. Horizontal Design Load (UL)

1" (25mm) thru 2" (50mm) pipe size 655 lbs. (2.91kN)



Lateral Brace

Pipe Size		Part Number & Approx. Wt./100						Max. Horizontal Design Load (FM) [1,2]							
		1" (24mm) Brace Pipe			1¼" (32mm) Brace Pipe			30°-44°		45°-59°		60°-74°		75°-90°	
in.	(mm)		Lbs.	(kg)		Lbs.	(kg)	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)
1"	(25)	**1000-1 X 1**	71.6	(32.5)	**1000-1 X 1¼**	75.8	(34.4)	200	(0.89)	280	(1.24)	340	(1.51)	380	(1.69)
1¼"	(32)	**1000-1¼ X 1**	74.8	(33.9)	**1000-1¼ X 1¼**	79.1	(35.9)	200	(0.89)	280	(1.24)	340	(1.51)	380	(1.69)
1½"	(40)	**1000-1½ X 1**	77.8	(35.3)	**1000-1½ X 1¼**	82.1	(37.2)	200	(0.89)	280	(1.24)	340	(1.51)	380	(1.69)
2"	(50)	**1000-2 X 1**	84.1	(38.1)	**1000-2 X 1¼**	88.4	(40.1)	200	(0.89)	280	(1.24)	340	(1.51)	380	(1.69)
2½"	(65)	**1000-2½ X 1**	90.2	(40.9)	**1000-2½ X 1¼**	94.6	(42.9)	200	(0.89)	280	(1.24)	340	(1.51)	380	(1.69)
3"	(80)	**1000-3 X 1**	97.3	(44.1)	**1000-3 X 1¼**	101.7	(46.1)	230	(1.02)	320	(1.42)	400	(1.78)	450	(2.00)
3½"	(90)	**1000-3½ X 1**	104.0	(47.2)	**1000-3½ X 1¼**	108.4	(49.2)	230	(1.02)	320	(1.42)	400	(1.78)	450	(2.00)
4"	(100)	**1000-4 X 1**	110.3	(50.0)	**1000-4 X 1¼**	114.6	(52.0)	230	(1.02)	320	(1.42)	400	(1.78)	450	(2.00)
5"	(125)	**1000-5 X 1**	123.1	(55.8)	**1000-5 X 1¼**	127.4	(57.8)	--	--	--	--	--	--	--	--
6"	(150)	**1000-6 X 1**	136.5	(61.9)	**1000-6 X 1¼**	140.8	(63.8)	--	--	--	--	--	--	--	--

[1] Load rating for LW above refers to FM Approved Lightwall Pipe commonly referred to as "Schedule 7". These ratings may also be applied with EN 10220 and GB/T 8163 steel pipe.
[2] Load rating for Schedule 10 above may be applied to GB/T 3092, EN 10255M and H, or JIS G3454, FM Approved Thinwall, or Schedule 40 steel pipes.

Note: See UL load ratings in UL Listed Design Load chart shown under drawing.

Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. 1001 - Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Pipe size to be braced: 1" (25mm) thru 8" (200mm) IPS.
* Pipe size used for bracing: 1" (25mm) and 1¼" (32mm) Schedule 40 IPS.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance.
The pipe attachment component of a sway brace system:
Fig. 1001 is used in conjunction with a Fig. 900 Series fitting and joined together with bracing pipe per NFPA 13, forming a complete sway brace assembly.

Features: Can be used to brace schedules 7 through 40 IPS. Field adjustable, making critical pre-engineering of bracing pipe length unnecessary. Unique design requires no threading of bracing pipe. Can be used as a component of a four-way riser brace. Comes assembled and ready for installation. Fig. 1001 has built-in visual verification of correct installation. See installation note below.

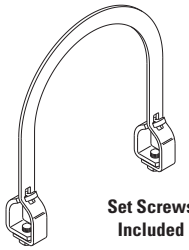
Installation Note: Position Fig. 1001 over the pipe to be braced and tighten two hex head cone point set screws until heads bottom out. A minimum of 1" (25mm) pipe extension is recommended. Brace pipe can be installed on top or bottom of pipe to be braced.
NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines, OPA-0300-10.

Finish: Plain or Electro-Galvanized. Contact B-Line for alternative finishes and materials.

Order By: Indicate pipe size to be braced followed by pipe size used for bracing, figure number and finish.

Important Note: Fig. 1001 is precision manufactured to perform its function as a critical component of a complete bracing assembly. To ensure performance, the UL Listing requires that Fig. 1001 must be used only with other TOLCO bracing products.

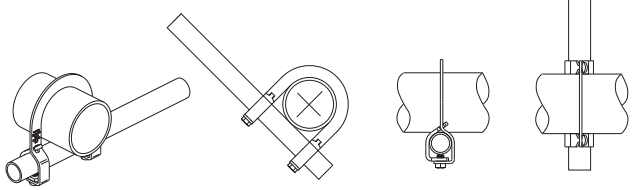


Pipe Size		Max. Horizontal Design Load (UL) - Lbs. For Brace Pipe Size 1" / 1¼"		
		Sch. 7	Sch. 10	Sch. 40
in.	(mm)	1" / 1¼"	1" / 1¼"	1" / 1¼"
1"	(25)	-- / --	1000 / 1000	1000 / 1000
1¼"	(32)	1000 / 1000	1000 / 1000	1000 / 1000
1½"	(40)	1000 / 1000	1500 / 1500	1500 / 1500
2"	(50)	1000 / 1000	2015 / 2015	2015 / 2015
2½"	(65)	1600 / 1600	2015 / 2765	2015 / 2765
3"	(80)	1600 / 1600	2015 / 2765	2015 / 2765
4"	(100)	1600 / 1600	2015 / 2765	2015 / 2765
6"	(150)	1600 / 1600	2015 / 2765	2015 / 2765
8"	(200)	1600 / 1600	2015 / 2765	2015 / 2765

Pipe Size		Part Number & Approx. Wt./100						Max. Horizontal Design Load (FM) For Sch. 7, Sch. 10, & Sch. 40 Pipe [1,2,3]							
		1" (24mm) Brace Pipe			1¼" (32mm) Brace Pipe			30°-44°		45°-59°		60°-74°		75°-90°	
in.	(mm)		Lbs.	(kg)		Lbs.	(kg)	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)
1"	(25)	**1001-1 X 1**	100.0	(45.3)	**1001-1 X 1¼**	118.0	(53.5)	1800	(8.00)	2550	(11.34)	3120	(13.88)	3490	(25.52)
1¼"	(32)	**1001-1¼ X 1**	100.0	(45.3)	**1001-1¼ X 1¼**	114.0	(51,7)	1230	(5.47)	1740	(7.74)	2140	(9.52)	2380	(10.58)
1½"	(40)	**1001-1½ X 1**	100.0	(45.3)	**1001-1½ X 1¼**	115.0	(52.1)	1230	(5.47)	1740	(7.74)	2140	(9.52)	2380	(10.58)
2"	(50)	**1001-2 X 1**	108.0	(49.0)	**1001-2 X 1¼**	121.0	(54.9)	1230	(5.47)	1740	(7.74)	2140	(9.52)	2380	(10.58)
2½"	(65)	**1001-2½ X 1**	138.6	(62.8)	**1001-2½ X 1¼**	160.4	(72.7)	800	(3.56)	1130	(5.02)	1380	(6.14)	1540	(6.85)
3"	(80)	**1001-3 X 1**	147.2	(66.7)	**1001-3 X 1¼**	168.7	(76,5)	850	(3.78)	1200	(5.34)	1470	(6.54)	1640	(7.29)
4"	(100)	**1001-4 X 1**	160.9	(73.0)	**1001-4 X 1¼**	182.4	(82.7)	850	(3.78)	1200	(5.34)	1470	(6.54)	1640	(7.29)
6"	(150)	**1001-6 X 1**	190.0	(86.2)	**1001-6 X 1¼**	211.4	(95.9)	510	(2.27)	730	(3.25)	890	(3.96)	990	(4.40)
8"	(200)	**1001-8 X 1**	217.4	(98.6)	**1001-8 X 1¼**	238.8	(108.3)	510	(2.27)	730	(3.25)	890	(3.96)	990	(4.40)

[1] FM Approved when used with 1 or 1¼ inch NPS Schedule 40 GB/T 3091,EN 10255H, or JIS G3451 steel pipe as the brace member.
[2] Load rating for LW above refers to FM Approved Lightwall Pipe commonly referred to as "Schedule 7". These ratings may also be applied with EN 10220 and GB/T 8163 steel pipe.
[3] Load rating for Schedule 10 above may be applied to GB/T 3092,EN 10255M and H, or JIS G3454, FM Approved Thinwall, or Schedule 40 steel pipes.

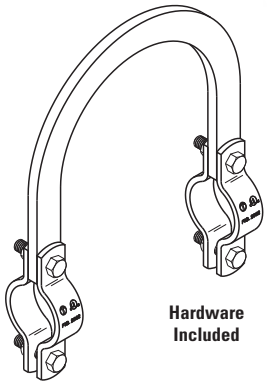
Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.



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

Fig. 2002 - Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System



Size Range: Pipe size to be braced: 2½" (65mm) thru 8" (200mm) all steel schedules, copper, plastic, FRP, cast iron and ductile iron. Consult factory when bracing other than steel. The Fig. 2002 accepts brace pipes sizes 1½" (40mm) and 2" (50mm) steel schedule 100 through schedule 40.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance. The pipe attachment component of a sway brace system: Fig. 2002 is used in conjunction with a TOLCO 900 Series sway brace attachments and joined together with bracing pipe. Install per NFPA 13 and/or our State of California OSHPD Approved Seismic Restrain Manual.

Features: Unique design will not damage thin wall, plastic, copper or ductile iron pipe. Easy verification of proper installation by tightening bolts until ears touch.

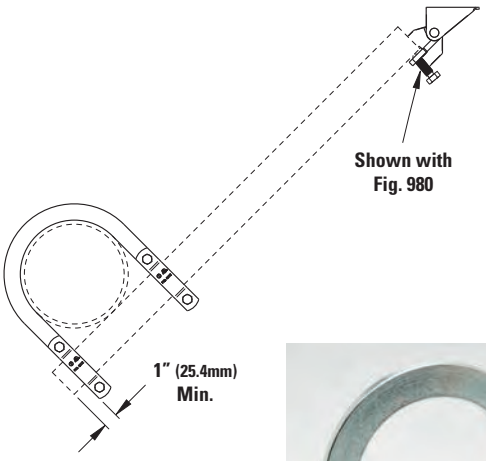
Installation: Place Fig. 2002 over pipe to be braced. Slide bracing pipe through attachment and tighten hex nuts until ears touch. NFPA 13, FM DS 2-8, and/or OSHPD guidelines should be followed.

Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Restraint Systems Guidelines.

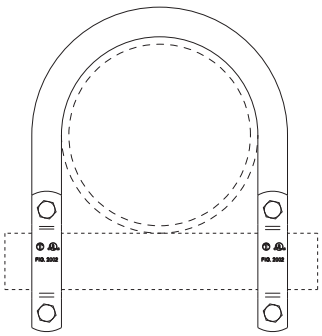
Finish: Plain. Contact B-Line for alternative finishes and materials.

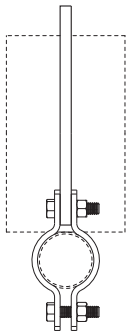
Order By: Figure number, pipe size to be braced, pipe size used for bracing (1½" (40mm) or 2" (50mm)) and finish.

Important Note: Fig. 2002 is precision manufactured to perform its function as a critical component of a complete bracing assembly. To ensure performance, the UL Listing requires that the Fig. 2002 must be used only with our other bracing products.



Pipe Size in.	(mm)	Part Number & Approx. Wt./100 1½" (32mm) Brace Pipe	Lbs.	(kg)	2" (50mm) Brace Pipe	Lbs.	(kg)	Max. Horizontal Design Load (UL) Lbs.	(kg)
2½"	(65)	**2002-2½ X 1½**	224.9	(102.0)	**2002-2½ X 2**	283.3	(128.6)	2015	(8.96)
3"	(80)	**2002-3 X 1½**	241.0	(109.3)	**2002-3 X 2**	299.4	(135.8)	2015	(8.96)
4"	(100)	**2002-4 X 1½**	268.4	(121.7)	**2002-4 X 2**	326.8	(148.2)	2015	(8.96)
6"	(150)	**2002-6 X 1½**	326.6	(148.1)	**2002-6 X 2**	385.0	(174.6)	2015	(8.96)
8"	(200)	**2002-8 X 1½**	381.3	(172.9)	**2002-8 X 2**	439.7	(199.4)	2015	(8.96)





Eaton's B-Line Business seismic bracing components are designed to be compatible only with other B-Line bracing components, resulting in a listed seismic bracing assembly. B-Line's warranty for seismic bracing components will be the warranty provided in B-Line's standard terms and conditions of sale made available by B-Line, except that, in addition to the other exclusions from B-Line's warranty, Eaton's B-line Business makes no warranty relating to B-Line's seismic bracing components that are combined with products not provided by Eaton's B-Line Business.

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

Fig. BRC CABLE - Pre-Stretched 7 x 19 Galvanized Aircraft Cable

TOLCO

Component of State of California OSHPD Approved Seismic Restraints System

Size Range: Available in cable diameters of 1/8", 3/16", and 1/4" Cables spooled in 300 foot (91.4m) lengths.

Material: Steel

Function: Used for attachment of seismic bracing to structure or hanger.

Features: Meets requirements of IBC 2009 and ASCE 7-05 for seismic bracing.

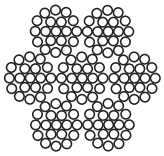
Finish: Galvanized

Order By: Figure number and size

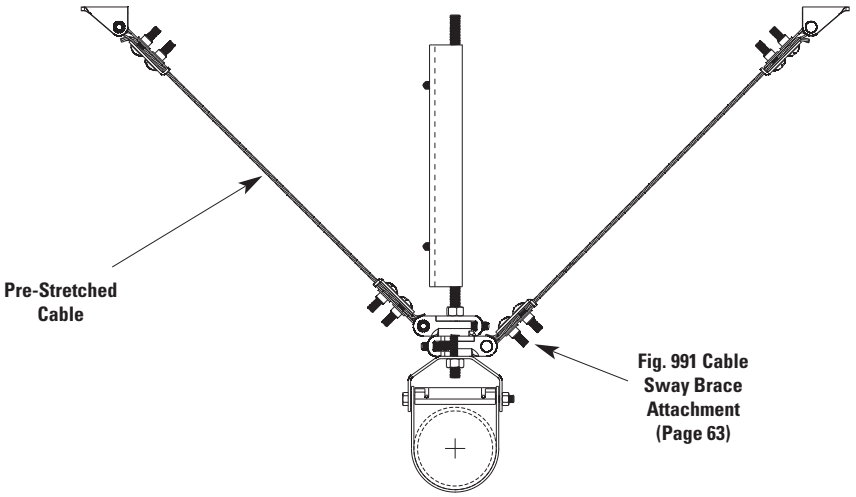
Note: Only pre-stretched aircraft cable should be used in seismic bracing installations where cable is used as the bracing component. Use of other types of cable will, over time, begin to sag and deform, thus rendering the bracing system to not perform properly.

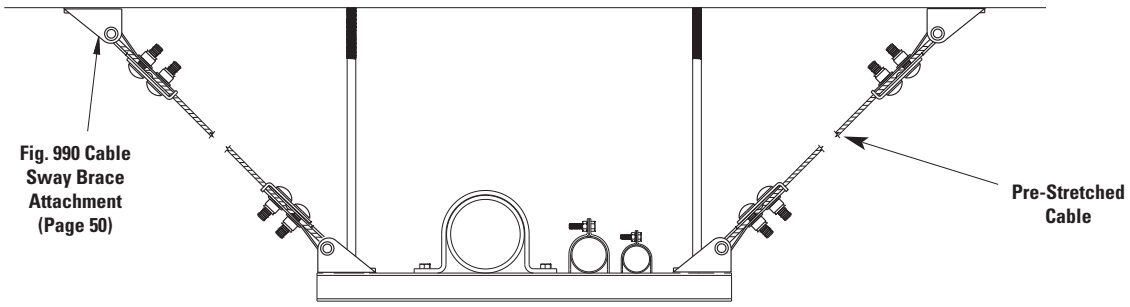
Part Number	Cable Diameter in.	(mm)	Max. Rec. Load* lbs.	(kN)	Approx. Wt./100 Ft. lbs.	(kg)
BRC CABLE-1/8	1/8"	(3.2)	975	(4.33)	2.9	(1.31)
BRC CABLE-3/16	3/16"	(4.8)	2050	(9.12)	6.5	(2.95)
BRC CABLE-1/4	1/4"	(6.3)	3150	(14.01)	11.0	(4.99)

* Cable breaking strength



7 x 19





B22, B22A & B24 - Solid Strut Bracing Materials

Component of State of California OSHPD Approved Seismic Restraints System

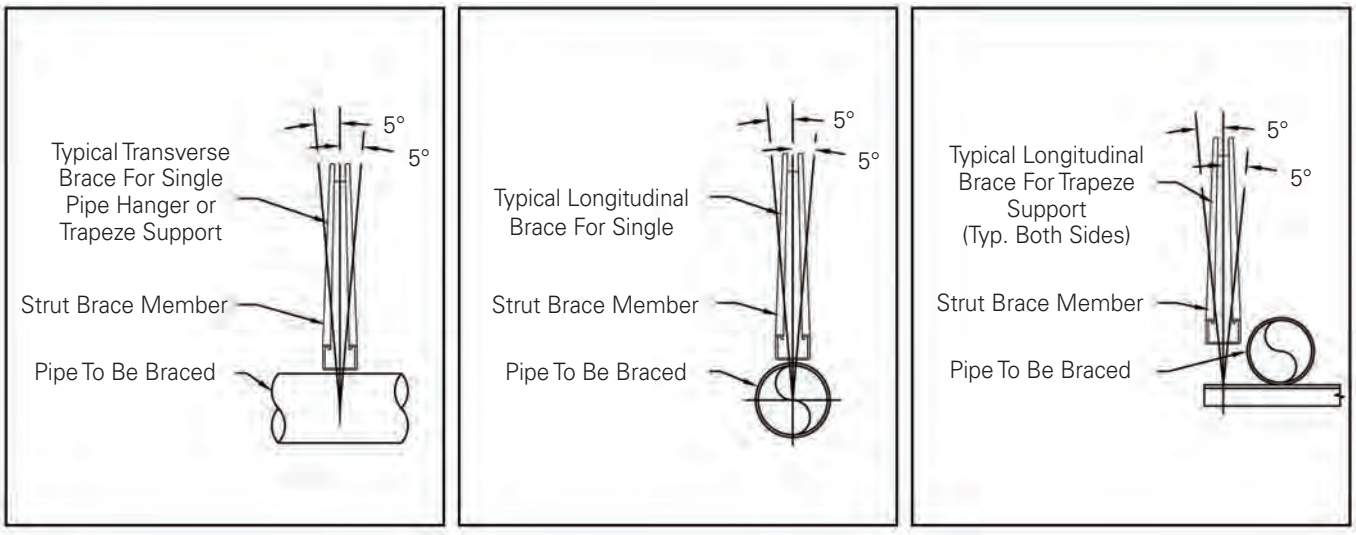
Size Range: Available in 10 ft (3.05m) and 20 ft. (6.1m) lengths

Material: Steel, Stainless 304 & 316, and Aluminum

Function: Designed to be used as the bracing member for a rigid bracing system.

Finish: Plain, Dura-Green™, Pre-Galvanized, and Hot-Dipped Galvanized Steel.

Order By: Figure number and finish.



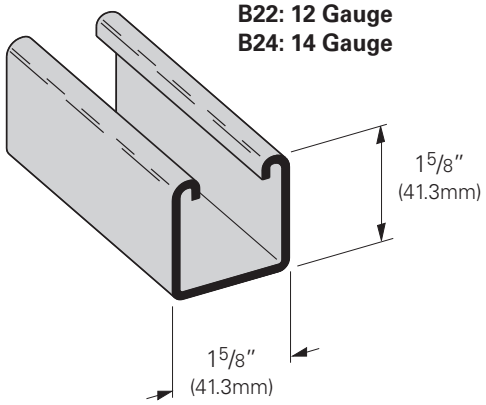
Strut Type Part No.	Maximum Length		Allowable Horizontal Seismic Load w/Brace at 45°	
	in.	(m)	lbs.	(kN)
B22	9′-6″	(2.89)	2043	(9.08)
B22A	10′-10″	(3.30)	3000	(13.3)
B24	8′-0″	(2.44)	1078	(4.79)

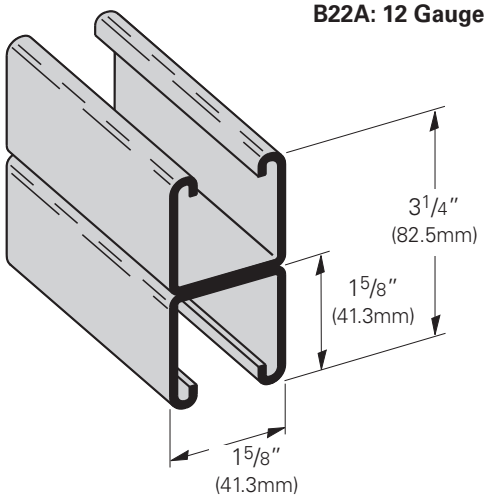
Notes:

1.) Maximum allowable lengths and concenrric loads when L/R = 200

2.) When using strut as a brace material, it must be solid strut. Slotted or punched are not acceptable.

3.) For more details on B-Line strut, please refer to the B-Line Strut Systems catalog.





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

KwikWire™ Accessories

KwikWire Clamps

Part No.	For Use With Wire Rope Diameters	Box Qty.
BKC100	1/16" (1.6mm) & 1/32" (2.3mm)	100
BKC200	1/8" (3.2mm) & 3/16" (4.8mm)	50

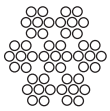
See table below for KwikWire Clamp Working Loads

KwikWire Clamp Working Loads*

Clamp Part No.	Wire Rope Dia.	Lbs. Safety Factor 5
BKC100	1/16"	0-75
BKC100	3/32"	25-150
BKC200	1/8"	25-250
BKC200	3/16"	50-640

**** Working loads shown are for hanging vertically. For suspending at 15°, 30°, 45° or 60° angles from vertical, use the following percentage of the working loads from the chart:***

15° = 96%
30° = 86%
45° = 70%
60° = 50%



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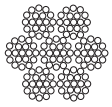


7 x 19

KwikWire Wire Rope (Uncoated Galvanized Wire)

Part No.	Rope Dia. in.	Rope Dia. (mm)	Working Load Lbs.	Working Load (kg)	Spool
BKW063 (1)	1/16"	(1.6)	96	(43.5)	500 ft.
BKW094 (1)	3/32"	(2.3)	184	(83.4)	500 ft.
BKW125 (1)	1/8"	(3.2)	340	(154.2)	500 ft.
BKW188 (2)	3/16"	(4.8)	840	(381.0)	250 ft.

(1) Wire Rope Construction Type 7 x 7
(2) Wire Rope Construction Type 7 x 19

Instructions for installing the wire rope in the clamp - No tools are required.

Pass the wire rope through the KwikWire Clamp

Loop wire rope through/around support

Pass wire rope back through KwikWire Clamp

Push wire rope through clamp leaving 2" to 3" tail, then apply tension on wire rope

To adjust, remove tension and pull wire rope slightly to disengage teeth, slide adjustment pin in direction shown by arrow to release wire rope.

KwikPak™ Wire Rope & Clamps

Part No.	For Use With Wire Rope Diameters	Box Qty.
BKP10063	BKC100 (100 pcs.) 1/16"Ø Wire Rope (500 ft.)	1
BKP10094	BKC100 (100 pcs.) 3/32"Ø Wire Rope (500 ft.)	1
BKP20125	BKC200 (50 pcs.) 1/8"Ø Wire Rope (500 ft.)	1
BKP20188	BKC200 (50 pcs.) 3/16"Ø Wire Rope (250 ft.)	1

KwikPak makes handling KwikWire a breeze!

- KwikPak includes KwikWire clamps and a spool of wire rope.
- KwikPak is shipped in a specially designed dispenser box to ease field cutting of wire.

KwikWire System Recommendations:

- *Do not exceed the safe working load of the products*
- *KwikWire Clamp load ratings are guaranteed only when used in combination with B-Line supplied wire rope*
- *Do not use for overhead lifting or hoisting*
- *Do not use if cable or components are visibly distorted or worn. Remove damaged cable end prior to inserting in KwikWire Clamp*
- *Do not paint cable near working area of KwikWire Clamp*
- *Do not apply lubricant*
- *Keep product clean and free of dirt*
- *Do not use clamp on coated wire rope*
- *Do not use in chlorinated or caustic atmospheres*
- *For use in dry locations*
- *BKCC tool is recommended for cutting wire rope to prevent fraying*

KwikWire Cable Cutter **

Part No.	Box Qty.
BKCC	1

- Wire rope cutter for cutting all wire rope sizes

*** Danger: Never use cutters on energized circuits, wire, or cable.*

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

KwikWire™ Accessories

KwikWire Hanger

Part No.	Thread Size	Wire Rope Dia. in.	(mm)	Loading* SF5 Lbs.	(kg)
BKF100-4	1/4"-20	1/16"	(1.6)	45	(20.4)
		3/32"	(2.3)	90	(40.8)
BKF100-6	3/8"-16	1/16"	(1.6)	45	(20.4)
		3/32"	(2.3)	90	(40.8)

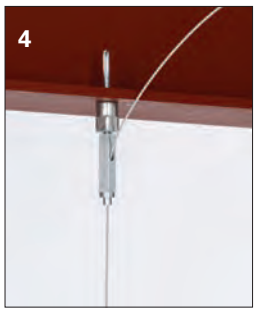
- KwikWire hanger combines the versatility of a bolt with an adjustable wire rope solution.
- Can be quickly installed in existing anchors or metal brackets with a nut.
- ARS, ARC, and ARW anchors are ideal for use with KwikWire Hangers.
- Ideal for supporting light fixtures, wire basket cable tray, HVAC ducts, and sign/banner supports.
- Allows for tool-less adjustment of wire rope.

KwikWire Hanger installation

Screw KwikWire Hanger into installed hanger support (ARS anchor pictured)

Push cable wire up through the bottom of KwikWire Hanger

Continue pushing through until 1/4" minimum is extending out the side of the KwikWire Hanger



To adjust up – pull or push more cable wire through KwikWire Hanger

To adjust down – push up on bottom of KwikWire Hanger and allow cable wire to feed down

When hanging the cable wire is complete, cut off any excess cable wire if desired

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

KwikWire Accessory Features

- Reduces on the job installation time
- Can be installed quickly without drilling into existing structure
- Increases versatility in the field
- KwikWire accessory system reduces inventory and shipping costs
- No more sawing, filing, or fixing nuts
- Designed for use with cable tray, lighting, and HVAC
- Eliminates the need for all threaded rod
- Cost effective solution for jack chain
- "Y" style accessories require 50% less drilling

KwikWire Accessory Numbering System

Product Line	Assembly Configuration	Leg Termination	Leg Length	Wire Rope Diameter	Straight Length	Assembly or Kit
BK = KwikWire	Blank = Single Leg	A = Angle Bracket w/Pin	Blank = See Straight Length	063 = 1/16"	Blank = Loop w/ Plastic Tube	Blank = Assembly Only
	Y = 2 Legs	H = Hook	18 = 18" Leg	094 = 3/32"	18 = 18"	K = Kit (Assembly & BKC100 Clamp)
	3 - 3 Legs	L = Loop	30 = 30" Leg		30 = 30"	
		T = Toggle			40 = 40"	
		W = Fuse Cut			80 = 80"	
		B25 = Bolt w/ 1/4"-20 Thread			120 = 120"	
		B38 = Bolt w/ 3/8"-16 Thread			180 = 180"	
		BM6 = Bolt w/ M6 Thread			240 = 240"	
		BM8 = Bolt w/ M8 Thread			360 = 360"	
		BM10 = Bolt w/ M10 Thread				

Examples

BKYT18-094-120K

BK Y T 18 - 094 - 120 K

B-Line KwikWire Accessory
2 legs - toggle leg termination - 18" legs - 3/32" diameter wire - 120" straight length - kit with clamp

BKL-063-120K

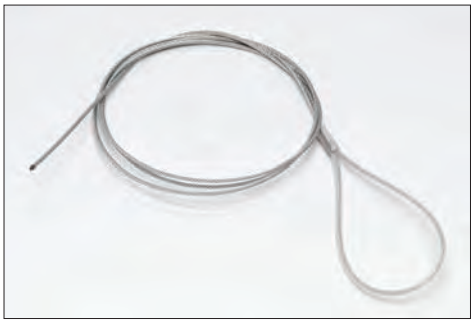
BK L - 063 - 120 K

B-Line KwikWire Accessory
single leg - looped leg termination - 1/16" diameter wire - 120" straight length - kit with clamp

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

KwikWire™ Loop Termination

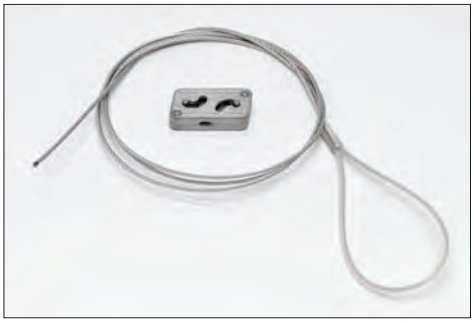
Part No.	Wire Rope Dia. in.	Wire Rope Dia. (mm)	Length in.	Length (mm)
BKL-063-40	1/16″	(1.6)	40″	(1016)
BKL-063-80	1/16″	(1.6)	80″	(2032)
BKL-063-120	1/16″	(1.6)	120″	(3048)
BKL-063-180	1/16″	(1.6)	180″	(4572)
BKL-063-240	1/16″	(1.6)	240″	(6096)
BKL-063-360	1/16″	(1.6)	360″	(9144)
BKL-094-40	3/32″	(2.3)	40″	(1016)
BKL-094-80	3/32″	(2.3)	80″	(2032)
BKL-094-120	3/32″	(2.3)	120″	(3048)
BKL-094-180	3/32″	(2.3)	180″	(4572)
BKL-094-240	3/32″	(2.3)	240″	(6096)
BKL-094-360	3/32″	(2.3)	360″	(9144)



Box Quantity - 20
5 bags containing 4 pieces per bag

KwikWire™ Loop Termination Kits

Part No.	Wire Rope Dia. in.	Wire Rope Dia. (mm)	Length in.	Length (mm)
BKL-063-40K	1/16″	(1.6)	40″	(1016)
BKL-063-80K	1/16″	(1.6)	80″	(2032)
BKL-063-120K	1/16″	(1.6)	120″	(3048)
BKL-063-180K	1/16″	(1.6)	180″	(4572)
BKL-063-240K	1/16″	(1.6)	240″	(6096)
BKL-063-360K	1/16″	(1.6)	360″	(9144)
BKL-094-40K	3/32″	(2.3)	40″	(1016)
BKL-094-80K	3/32″	(2.3)	80″	(2032)
BKL-094-120K	3/32″	(2.3)	120″	(3048)
BKL-094-180K	3/32″	(2.3)	180″	(4572)
BKL-094-240K	3/32″	(2.3)	240″	(6096)
BKL-094-360K	3/32″	(2.3)	360″	(9144)

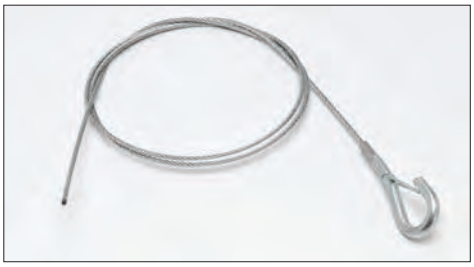


Box Quantity - 20
5 bags containing 4 pieces per bag

- Available as a wire rope with loop termination only or as a ready-to-use kit with a BKC100 clamp.
- Available in lengths of 40″, 80″, 120″, 180″, 240″, and 360″.

KwikWire™ Single Style Hook Termination

Part No.	Wire Rope Dia. in.	Wire Rope Dia. (mm)	Length in.	Length (mm)
BKH-094-40	3/32″	(2.3)	40″	(1016)
BKH-094-80	3/32″	(2.3)	80″	(2032)
BKH-094-120	3/32″	(2.3)	120″	(3048)
BKH-094-180	3/32″	(2.3)	180″	(4572)
BKH-094-240	3/32″	(2.3)	240″	(6096)
BKH-094-360	3/32″	(2.3)	360″	(9144)



Box Quantity - 20
5 bags containing 4 pieces per bag

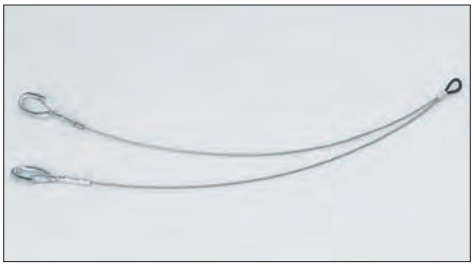
KwikWire™ Single Style Hook Termination Kits

Part No.	Wire Rope Dia. in.	Wire Rope Dia. (mm)	Length in.	Length (mm)
BKH-094-40K	3/32″	(2.3)	40″	(1016)
BKH-094-80K	3/32″	(2.3)	80″	(2032)
BKH-094-120K	3/32″	(2.3)	120″	(3048)
BKH-094-180K	3/32″	(2.3)	180″	(4572)
BKH-094-240K	3/32″	(2.3)	240″	(6096)
BKH-094-360K	3/32″	(2.3)	360″	(9144)

Box Quantity - 20
5 bags containing 4 pieces per bag

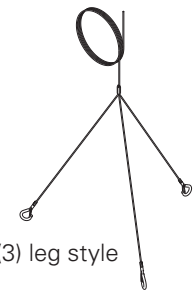
KwikWire™ 'Y' Style Hook Termination With Loop

Part No.	Wire Rope Dia. in.	Wire Rope Dia. (mm)	Length in.	Length (mm)
BKYH18-094	3/32″	(2.3)	18″	(457)
BKYH30-094	3/32″	(2.3)	30″	(762)



Box Quantity - 10
5 bags containing 2 pieces per bag

- Hook designed to accept up to 3/8″ diameter wire.
- Available as a wire rope with hook termination only or as a ready-to-use kit with a BKC100 clamp.
- Available in lengths of 40″, 80″, 120″, 180″, 240″, and 360″.
- Available in single, double (Y), and triple (3) leg styles



Triple (3) leg style

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

KwikWire™ 'Y' Style Hook Termination

Part No.	Leg Length in.	(mm)	Wire Rope Dia. in.	(mm)	Length in.	(mm)
BKYH18-094-40	18″	(457)	3/32″	(2.3)	40″	(1016)
BKYH18-094-80	18″	(457)	3/32″	(2.3)	80″	(2032)
BKYH18-094-120	18″	(457)	3/32″	(2.3)	120″	(3048)
BKYH18-094-180	18″	(457)	3/32″	(2.3)	180″	(4572)
BKYH18-094-240	18″	(457)	3/32″	(2.3)	240″	(6096)
BKYH18-094-360	18″	(457)	3/32″	(2.3)	360″	(9144)
BKYH30-094-40	30″	(762)	3/32″	(2.3)	40″	(1016)
BKYH30-094-80	30″	(762)	3/32″	(2.3)	80″	(2032)
BKYH30-094-120	30″	(762)	3/32″	(2.3)	120″	(3048)
BKYH30-094-180	30″	(762)	3/32″	(2.3)	180″	(4572)
BKYH30-094-240	30″	(762)	3/32″	(2.3)	240″	(6096)
BKYH30-094-360	30″	(762)	3/32″	(2.3)	360″	(9144)

Box Quantity - 10

5 bags containing 2 pieces per bag

KwikWire™ 'Y' Style Hook Termination Kits

Part No.	Leg Length in.	(mm)	Wire Rope Dia. in.	(mm)	Length in.	(mm)
BKYH18-094-40K	18″	(457)	3/32″	(2.3)	40″	(1016)
BKYH18-094-80K	18″	(457)	3/32″	(2.3)	80″	(2032)
BKYH18-094-120K	18″	(457)	3/32″	(2.3)	120″	(3048)
BKYH18-094-180K	18″	(457)	3/32″	(2.3)	180″	(4572)
BKYH18-094-240K	18″	(457)	3/32″	(2.3)	240″	(6096)
BKYH18-094-360K	18″	(457)	3/32″	(2.3)	360″	(9144)
BKYH30-094-40K	30″	(762)	3/32″	(2.3)	40″	(1016)
BKYH30-094-80K	30″	(762)	3/32″	(2.3)	80″	(2032)
BKYH30-094-120K	30″	(762)	3/32″	(2.3)	120″	(3048)
BKYH30-094-180K	30″	(762)	3/32″	(2.3)	180″	(4572)
BKYH30-094-240K	30″	(762)	3/32″	(2.3)	240″	(6096)
BKYH30-094-360K	30″	(762)	3/32″	(2.3)	360″	(9144)

Box Quantity - 10

5 bags containing 2 pieces per bag

- Hook designed to accept up to 3/8″ diameter wire.
- Available as a wire rope with loop termination only or as a ready-to-use kit with a BKC100 clamp.
- Available in lengths of 40″, 80″, 120″, 180″, 240″, and 360″.

KwikWire™ Angle Bracket Termination

Part No.	Wire Rope Dia. in.	(mm)	Length in.	(mm)
BKA-063-40	1/16″	(1.6)	40″	(1016)
BKA-063-80	1/16″	(1.6)	80″	(2032)
BKA-063-120	1/16″	(1.6)	120″	(3048)
BKA-063-180	1/16″	(1.6)	180″	(4572)
BKA-063-240	1/16″	(1.6)	240″	(6096)
BKA-063-360	1/16″	(1.6)	360″	(9144)

Box Quantity - 20
5 bags containing 4 pieces per bag

KwikWire™ Angle Bracket Termination Kits

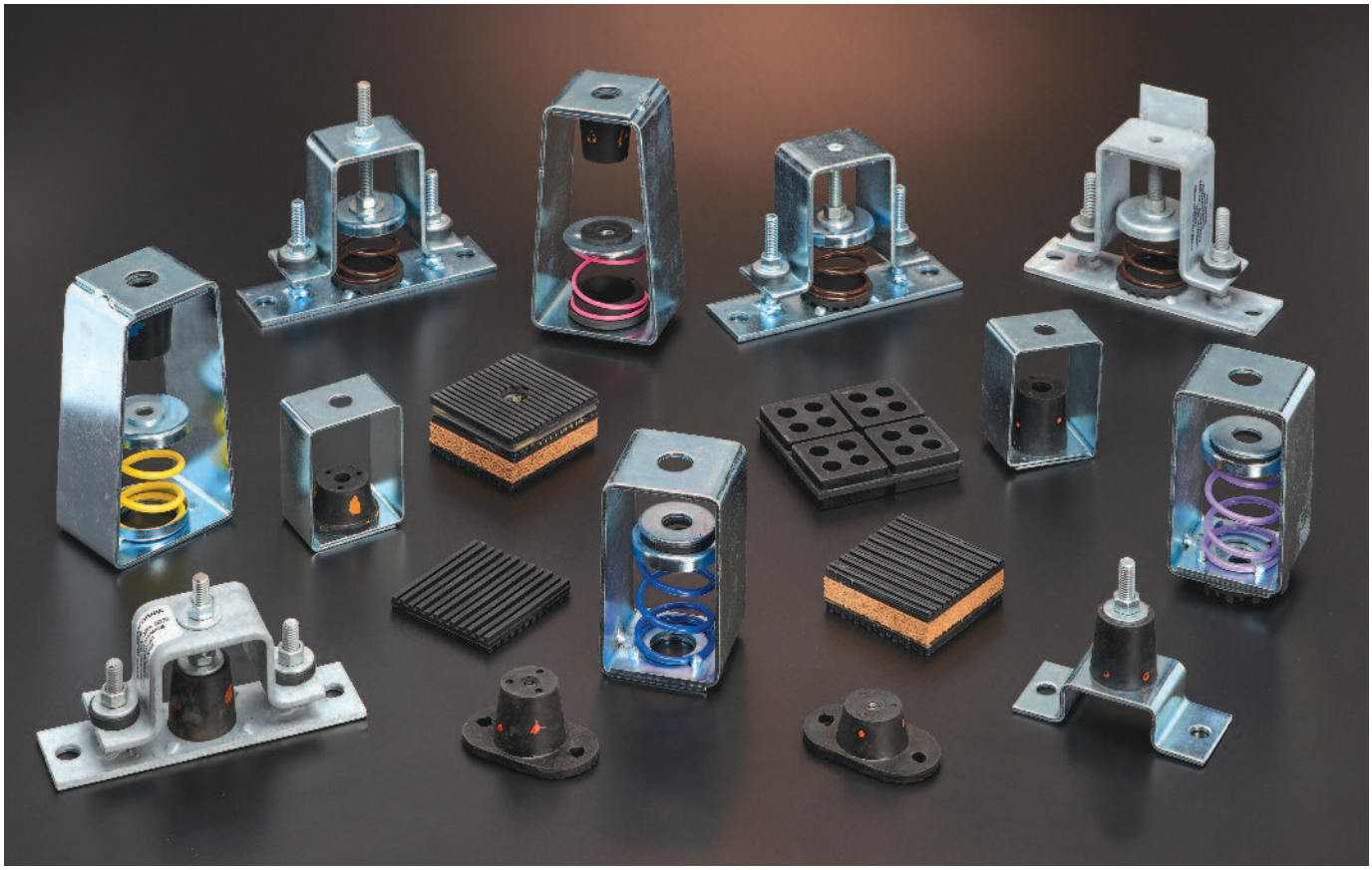
Part No.	Wire Rope Dia. in.	(mm)	Length in.	(mm)
BKA-063-40K	1/16″	(1.6)	40″	(1016)
BKA-063-80K	1/16″	(1.6)	80″	(2032)
BKA-063-120K	1/16″	(1.6)	120″	(3048)
BKA-063-180K	1/16″	(1.6)	180″	(4572)
BKA-063-240K	1/16″	(1.6)	240″	(6096)
BKA-063-360K	1/16″	(1.6)	360″	(9144)

Box Quantity - 20
5 bags containing 4 pieces per bag

- Available as a wire rope with angle bracket termination only or as a ready-to-use kit with a BKC100 clamp.
- Available in lengths of 40″, 80″, 120″, 180″, 240″, and 360″.

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

Vibration Isolation



To help address the issues of vibration and noise control/dampening vibration in mechanical, refrigeration, HVAC and electrical installations, Eaton offers the following B-Line series vibration isolation products. It is our continuing effort to offer the industry quality support system products that meet the demands of today's construction environment.

The following pages depict vibration isolation and noise control products that are commonly specified and required on piping, duct and equipment, but not limited to mechanical rooms. As an aid in choosing the proper vibration control device, the chart shown on the following page is a reference for obtaining Vibration Isolation Efficiency.

Considerations must be given to the desired deflection and the frequency (R.P.M.).

The Theory of Vibration Isolation

Background

Soils, floors, ceilings, walls, etc. deflect as the result of applied forces. Cyclical forces generated by machines result in work done on the floors, etc. Under steady state conditions, this work is stored as potential energy in the floor each cycle and returned as work in forcing the machine back to its equilibrium position. Disturbance is transmitted during this flexing.

Vibration Isolation is needed when disturbing force magnitudes are expected to be great enough to cause damage or annoyance.

Assumption	Fact
1. We know the effects of vibration isolation (efficiency)	Formula for calculation shown below.
2. We know the magnitude of the disturbing forces created by the machines	Equipment manufacturers rarely provide these data. These forces are seldom known except in generalities.
3. We know the magnitude of disturbing forces beyond	Detailed calculations require so many simplifying assumptions that the resulting answers have questionable value in addition to being prohibitively expensive. Reliance is placed on brief calculations, general rules, and past experience.

Consideration of items 1. and 2. is essential to determine acceptable isolation efficiency. Unfortunately manifold complexities prevent inclusion of steps for determination of these efficiencies in this document.

Natural frequency of isolation system f_n (cycles per minute)

Visualize a machine suspended barely above 4 springs (one on each corner). Now release the suspension. The machine will deflect the springs and be pushed up and return a number of times with diminishing deflection until it comes to rest. The spring deflection at rest is called the static deflection. The number of cycles per unit time is the natural frequency of the isolation system. Unlike multi-degree of freedom floors with limitless natural frequencies, springs essentially have only one natural frequency.

$$f_n = 188 \sqrt{\frac{1}{\text{static deflection (inches)}}}$$

$$\text{Vibration isolation efficiency \%} = 100\% \times \left[1 - \frac{1}{(f_d \div f_n)^2 - 1}\right]$$

Transmitted force f_t (pounds) $f_t = f_d$ (100% - isolation efficiency)

Note that fn must be compared to f_d for satisfactory isolation efficiency. Also note that the force transmitted can be greater than the disturbing force when f_n is close to or equals f_d. This condition is called resonance and is avoided in vibration isolation.

Natural frequency of floor or soil

Visualize the effect of dropping a load on the floor. This floor will deflect and spring back diminishingly a number of cycles until it comes to rest. The number of these cycles per unit time is a natural frequency of the floor. It is essentially independent of the magnitude of deflection and hence is a characteristic of a given floor if given a light tap or a hard jolt at the same location. The floor has many natural frequencies. The lowest natural frequency is called the fundamental. It is characterized by maximum deflection at mid span. The higher natural frequencies are generally less bothersome than the fundamental since they are less likely to be excited by machines in common use and are more quickly damped. The greater a floor deflects under a given load, the lower the fundamental frequency of that floor. Soft, springy floors have low fundamentals. Hard, solid floors have high fundamentals.

Disturbing frequency f_d (cycles per minute)

With few exceptions, the speed (RPM) of the machine will be most representative of the frequency of the disturbance. Disturbances are more readily transmitted when the disturbing frequency is close to a natural frequency of the floor or soil. For this reason, these characteristics are important considerations i designing a trouble-free installation.

Disturbing force f_d (pounds)

The disturbing force causes the problem. It is constantly changing from maximum positive through zero to maximum negative through zero to maximum positive each cycle. It results from unbalanced reciprocating and rotating masses. Its peak magnitude varies from ounces to tons. From less than 1% to over 60% of the weight of some types of machines. Generally this force will increase with time in a given machine as bearings wear, deposits form and moving parts get out of balance with each other.

Proper Sizing

Once it is determined as to what type of vibration dampening device is needed, weight loading is the next crucial step. As a built in safety measure, take the actual weight of supported pipe or equipment (consider all accessories - i.e. valves, insulation, brackets, etc...) and multiply by 1.25. Then refer to the sizing chart for the selected product to determine part number.

Sizing: Divide weight of equipment by points of support to determine load requirement per support.

Example: 240 Lb. (90.7 kg) piece of equipment, 4 support points, take 240 x 1.25 = 300 Lbs. (136.1kg) (safety measure), then take 300 ÷ 4 = 75 Lbs. (34.0 kg) Specify appropriate vibration device rated at 75 Lbs. (34.0 kg) for each of the support points.

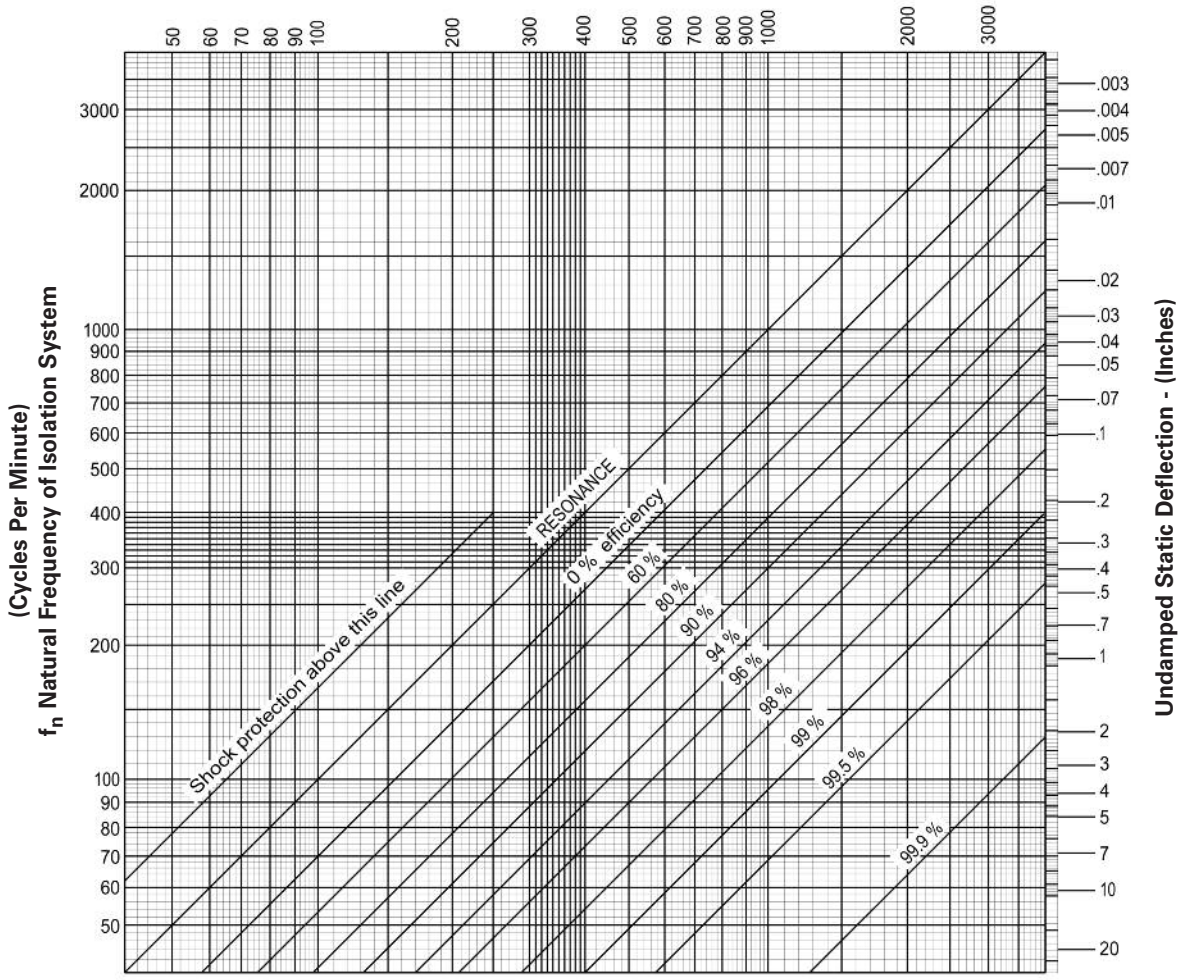
If weight of equipment is unequally proportionate, select mounts to satisfy the weight distribution.

IE Computer Isolation Efficiency

$$f_n = 188 \sqrt{\frac{1}{\text{static deflection (inches)}}} \qquad \text{Transmissibility} = \frac{1}{(f_d \div f_n)^2 - 1}$$

3 HX = 180 cpm = 1.1" Deflection

f_d Disturbing Frequency - (cycles per minute)



Critical Installations
96% to 99% Vibration Isolation Efficiency recommended (only 1% to 4% of disturbing vibration transmitted).

Standard Installations
90% to 95% Vibration Isolation Efficiency recommended (only 5% to 10% of disturbing vibration transmitted).

Non-Critical Installations
75% to 89% Vibration Isolation Efficiency recommended (only 11% to 24% of disturbing vibration transmitted).

For 1/4" (6.3mm) deflection: Specify B-Line series RM and RQ Neoprene Mountings or B-Line series RH Neoprene Hangers.

For 1/2" (12.7mm) deflection: Specify B-Line series RMD and RQD, (or JQTN fo OSHPD pre-approved) Neoprene Mountings or B-Line series RHD Neoprene Hangers.

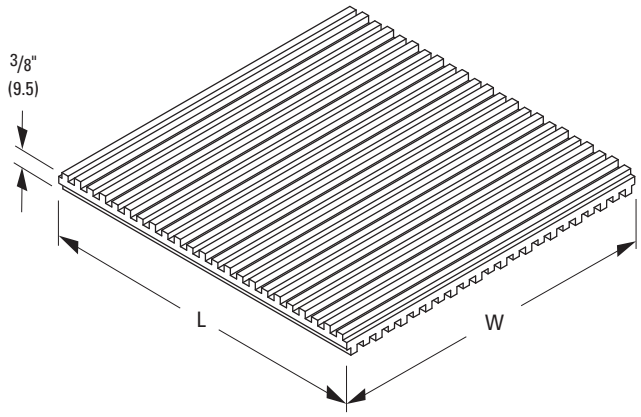
For 1"-2" (25.4mm-50.8mm) deflection: Specify B-Line series CHSCS, CH30SCS, HHSCS, and HH30SCS Housed Spring Mountings.

For larger deflection requirements, consult factory.

NNP Type - Ribbed Neoprene Vibration Pad

Use: Is used under equipment to dampen noise and vibration in floor caused by medium and high speed equipment.

- Recommended load capacity:
  Up to 50 lbs./sq.in. (0.042 kgf/mm²) with a range of
  25-70 lbs./sq.in. (0.021-0.059 kgf/mm²)
- Thickness: 3/8" (9.5mm)
- The NNP type has a deflection of 1/8" (3.1mm).
  For greater deflection, use multiple pads in layers
- Non-skid: The pad has an alternating height rib pattern to minimize slip
- Durable: Material is oil-resistant Neoprene
- Typical Applications: Air conditioners, cooling towers, compressors, fans, generators, pumps, piping, process equipment, transformers, etc.



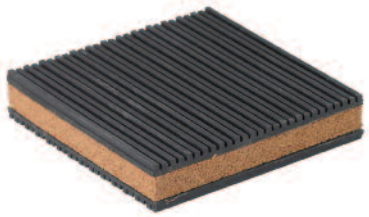
Part No.	Rated Load Lbs.	(kN)	Dimensions L in.	(mm)	W in.	(mm)	Std. Pkg.	Wt. Each Lbs.	(kg)
NNP-4	200	(.89)	2"	(50.8)	2"	(50.8)	48	.04	(.02)
NNP-9	450	(2.00)	3"	(76.2)	3"	(76.2)	36	.10	(.05)
NNP-16	800	(3.56)	4"	(101.6)	4"	(101.6)	24	.17	(.08)
NNP-36	1800	(8.00)	6"	(152.4)	6"	(152.4)	24	.39	(.18)
NNP-81	4050	(18.01)	9"	(228.6)	9"	(228.6)	Bulk	.87	(.39)
NNP-324	16200	(72.06)	18"	(457.2)	18"	(457.2)	6	3.50	(1.59)

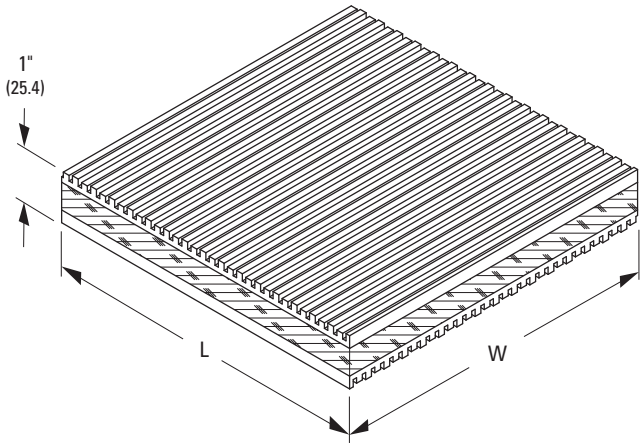
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

CNP Type - Cork and Ribbed Neoprene Vibration Pad

Use: Is used under equipment to dampen noise and vibration in floor caused by medium and high speed equipment.

- Recommended load capacity:
  Up to 50 lbs./sq.in. (0.042 kgf/mm²) with a range of
  25-70 lbs./sq.in. (0.021-0.059 kgf/mm²)
- Thickness: 1" (25.4mm)
- The NNP type has a deflection of 3/16" (4.7mm).
  For greater deflection, use multiple pads in layers
- Non-skid: The pad has an alternating height rib pattern to minimize slip
- Durable: Material is oil-resistant Neoprene
- Typical Applications: Air conditioners, cooling towers, compressors, fans, generators, pumps, piping, process equipment, transformers, etc.





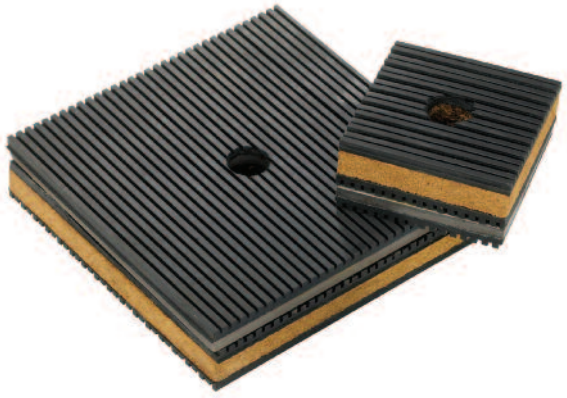
Part No.	Rated Load Lbs.	(kN)	Dimensions L in.	(mm)	W in.	(mm)	Std. Pkg.	Wt. Each Lbs.	(kg)
CNP-4	200	(.89)	2"	(50.8)	2"	(50.8)	48	.07	(.03)
CNP-9	450	(2.00)	3"	(76.2)	3"	(76.2)	36	.16	(.07)
CNP-16	800	(3.56)	4"	(101.6)	4"	(101.6)	24	.28	(.13)
CNP-25	1250	(5.56)	5"	(127.0)	5"	(127.0)	24	.44	(.20)
CNP-36	1800	(8.00)	6"	(152.4)	6"	(152.4)	24	.63	(.29)
CNP-81	4050	(18.01)	9"	(228.6)	9"	(228.6)	Bulk	1.40	(.64)
CNP-324	16200	(72.06)	18"	(457.2)	18"	(457.2)	6	5.60	(2.54)
CNP-3x36	5400	(24.02)	3"	(76.2)	36"	(914.4)	6	1.89	(.86)
CNP-4x36	7200	(32.02)	4"	(101.6)	36"	(914.4)	6	2.52	(1.14)

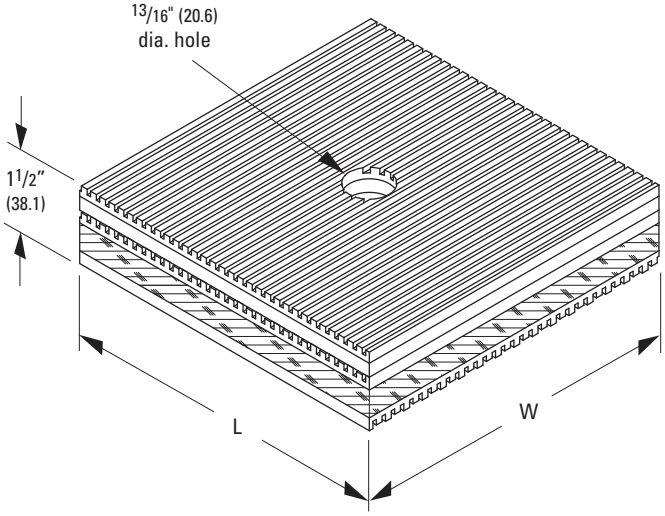
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

CNNK Type - Cork, Ribbed Neoprene and Steel Vibration Pad

Use: Is used to dampen noise and vibration in floor caused by medium and high speed equipment.

- Recommended load capacity:
  Up to 50 lbs./sq.in. (0.042 kgf/mm²) with a range of
  25-70 lbs./sq.in. (0.021-0.059 kgf/mm²)
- Overall thickness: 1 1/2" (38.1mm)
  Has 1/4" (6.3mm) steel plate for even weight distribution.
  Hole in center will accept up to 3/4" bolt
- The CNNK type has a deflection of 3/16" (4.7mm).
  For greater deflection, use multiple pads in layers
- Non-skid: The pad has an alternating height rib pattern to minimize slip
- Durable: Material is oil-resistant Neoprene
- Typical Applications: Air conditioners, cooling towers, compressors, fans, generators, pumps, piping, process equipment, transformers, etc.





Part No.	Rated Load Lbs.	Rated Load (kN)	Dimensions L in.	Dimensions L (mm)	Dimensions W in.	Dimensions W (mm)	Std. Pkg.	Wt. Each Lbs.	Wt. Each (kg)
CNNK-4	200	(.89)	2"	(50.8)	2"	(50.8)	48	.40	(.18)
CNNK-9	450	(2.00)	3"	(76.2)	3"	(76.2)	36	.90	(.41)
CNNK-16	800	(3.56)	4"	(101.6)	4"	(101.6)	24	1.60	(.73)
CNNK-25	1250	(5.56)	5"	(127.0)	5"	(127.0)	24	2.50	(1.13)
CNNK-36	1800	(8.00)	6"	(152.4)	6"	(152.4)	Bulk	3.50	(1.59)
CNNK-64	3200	(14.23)	8"	(203.2)	8"	(203.2)	6	6.20	(2.81)

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

VRP Type - Rubber Cube Vibration Pad

Use: Is used to dampen noise and vibration in floor caused by medium and high speed equipment.

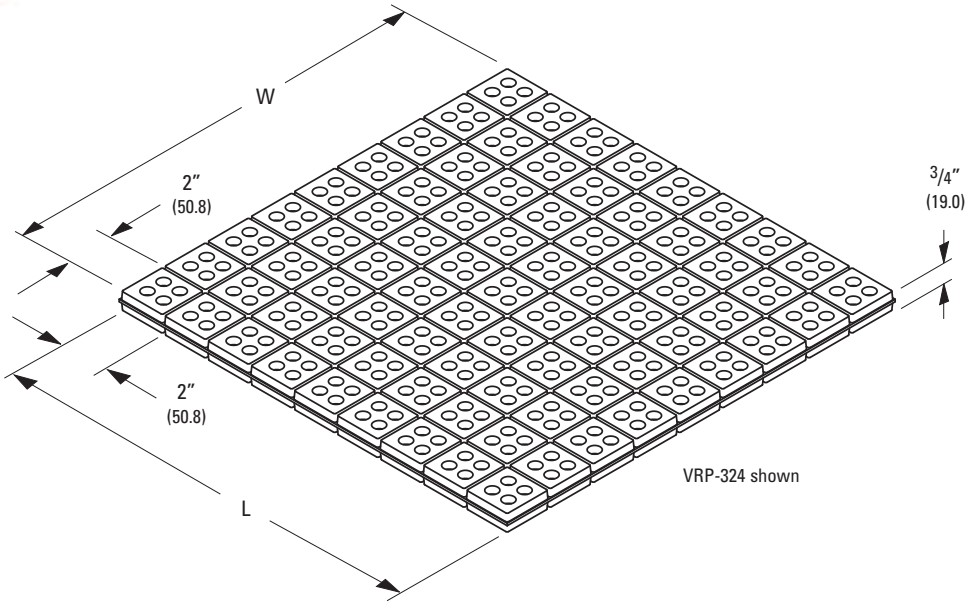
- Recommended load capacity:
  Up to 45 lbs./sq.in. (0.038 kgf/mm²) per 1 square inch
- Overall thickness: 3/4" (19.0mm)
- Rated deflection is 3/16" (4.7mm).
- Durable: Material is natural rubber composition
- Each square has 4 suction holes (1/2" (12.7mm) diameter) to provide a non-skid effect. The standard VRP pad has 81 squares that are 2" x 2" (50.8mm x 50.8mm) making the pad itself 18" x 18" (457.2mm x 457.2mm). These squares are easily cut or torn to desired sizes.

VRP-4

VRP-16

VRP-324

VRP-36



VRP-324 shown

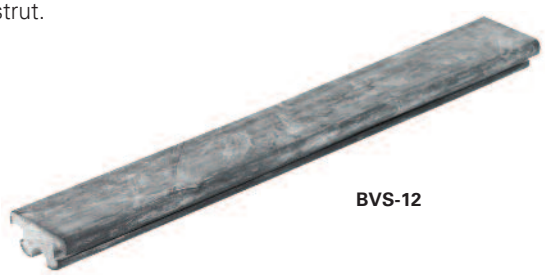
Part No.	Rated Load Lbs.	(kN)	Dimensions L in.	(mm)	W in.	(mm)	Std. Pkg.	Wt. Each Lbs.	(kg)
VRP-4	180	(.80)	2"	(50.8)	2"	(50.8)	Bulk	.10	(.05)
VRP-16	720	(3.20)	4"	(101.6)	4"	(101.6)	Bulk	.41	(.19)
VRP-36	1620	(7.20)	6"	(152.4)	6"	(152.4)	Bulk	.90	(.41)
VRP-324	14580	(64.85)	18"	(457.2)	18"	(457.2)	3	8.15	(3.70)

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

BVS Type - Vibra Strip™ for 1 5/8" (41.3mm) wide Eaton B-Line series channel

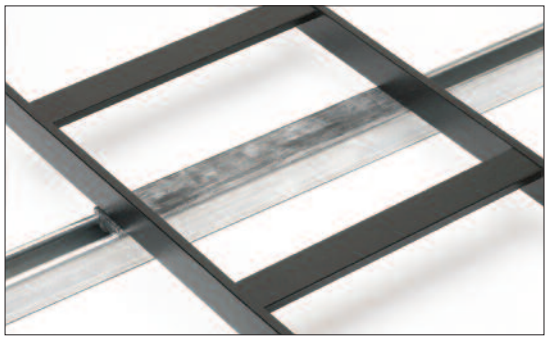
Use: Dampen noise and vibration of equipment when mounted on strut.

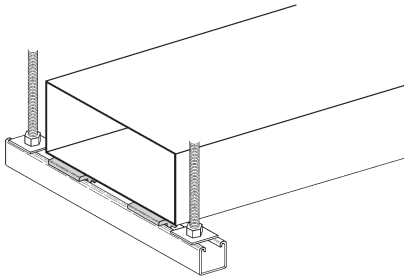
- When inserted in channel slot, provides an excellent isolation medium between equipment, duct, piping, etc., and the support channel.
- Vibra Strip is furnished in 12" (304.8mm) or 120" (3.05m) lengths, may be cut to satisfy specific requirement.
- Durable: 45 durometer Neoprene
- Temperature Range: -20°F (-28.9°C) to 212°F (100°C) (continuous)



BVS-12

BVS-120





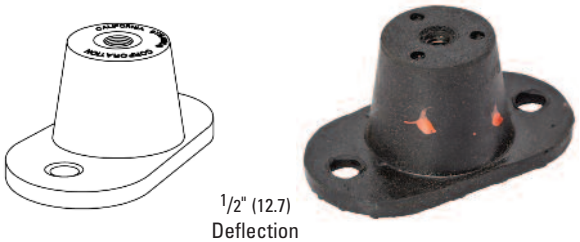
Part No.	Max. Load Lbs. per Lineal In. Lbs.	(kg/25.4 mm)	Length in.	(mm)	Std. Pkg.	Wt. Each Lbs.	(kg)
BVS-12	40	(18.1)	12"	(304.8)	25	.46	(.21)
BVS-120	40	(18.1)	120"	(3048.0)	1	4.56	(2.07)

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

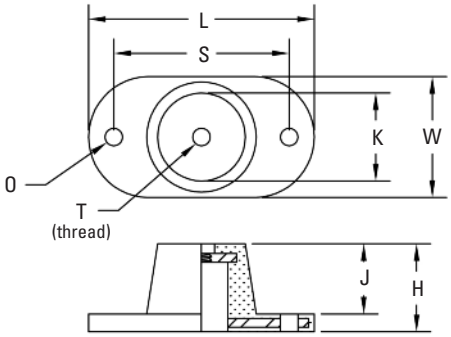
RM & RM-D Type - Neoprene Mount

Use: To minimize or prevent noise and vibration from transferring between equipment and floor or solid support structure. Typical applications include air handling units, air conditioners, compressors, pumps, machine tools, motors, business machines, transformers, furnaces, etc.

1/4" (6.3) Deflection



1/2" (12.7) Deflection



Typical Part Numbering

RM - 80 A

Type Load Mount Size

RM Series for 1/4" (6.3mm) Deflection

Part No.	Mount Size	Maximum Load in.	(mm)	Color Code
RM-40A	A	40	(0.18)	Orange
RM-55A	A	55	(.0.25)	Yellow
RM-80A	A	80	(0.35)	Green
RM-130A	A	130	(0.58)	Blue
RM-120B	B	120	(0.53)	Orange
RM-200B	B	200	(.0.89)	Yellow
RM-280B	B	280	(1.24)	Green
RM-400B	B	400	(1.78)	Blue
RM-300C	C	300	(.1.33)	Yellow
RM-520C	C	520	(2.31)	Green
RM-750C	C	750	(3.33)	Blue
RM-1100C	C	1100	(4.89)	White
RM-1800F	F	1800	(8.00)	Green
RM-3000F	F	3000	(13.3)	Blue
RM-5000F	F	5000	(22.2)	Green

RM-D Series for 1/2" (12.7mm) Deflection

Part No.	Mount Size	Maximum Load in.	(mm)	Color Code
RM-D-40A	A	40	(0.18)	Orange
RM-D-55A	A	55	(.0.25)	Yellow
RM-D-80A	A	80	(0.35)	Green
RM-D-130A	A	130	(0.58)	Blue
RM-D-120B	B	120	(0.53)	Orange
RM-D-200B	B	200	(.0.89)	Yellow
RM-D-280B	B	280	(1.24)	Green
RM-D-400B	B	400	(1.78)	Blue
RM-D-300C	C	300	(.1.33)	Yellow
RM-D-520C	C	520	(2.31)	Green
RM-D-750C	C	750	(3.33)	Blue
RM-D-1100C	C	1100	(4.89)	White
RM-D-1800F	F	1800	(8.00)	Green
RM-D-3000F	F	3000	(13.3)	Blue
RM-D-5000F	F	5000	(22.2)	Green

Dimensions

Mount Size	L in.	(mm)	S in.	(mm)	W in.	(mm)	O in.	(mm)	T	K in.	(mm)	H RM in.	(mm)	H RM-D in.	(mm)	J RM in.	(mm)	J RM-D in.	(mm)
A	3 3/16	(81.0)	2 3/8	(27.8)	1 13/16	(47.5)	11/32	(8.7)	5/16"-18	1 1/4	(31.7)	1	(25.4)	1 1/2	(38.1)	13/16	(20.6)	1 5/16	(33.3)
B	3 7/8	(98.4)	3	(76.2)	2 3/8	(60.3)	11/32	(8.7)	3/8"-16	1 3/4	(44.4)	1 1/4	(31.7)	1 13/16	(46.0)	11/32	(26.2)	1 9/16	(39.7)
C	5 1/2	(134.7)	4 1/8	(104.8)	3 1/4	(82.5)	9/16	(14.3)	1/2"-13	2 1/2	(63.5)	1 1/2	(38.1)	2 1/2	(63.5)	1 1/4	(31.7)	2 1/4	(57.1)
F	7 1/2	(190.5)	6 1/8	(155.6)	4 7/8	(123.8)	9/16	(14.3)	5/8"-11	4 3/8	(111.1)	1 5/8	(41.3)	2 3/4	(69.8)	1 3/8	(34.9)	2 1/2	(63.5)

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

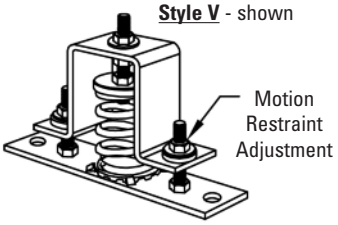
OS Type - Steel Spring Isolator/Restraint - 1" (25.4mm) & 2" (50.8mm) Deflection

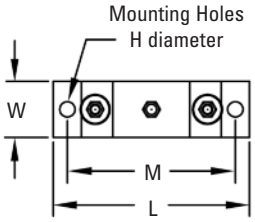
Use: To support and isolation of vibrations between equipment or frame mounted equipment and the floor or supporting structure

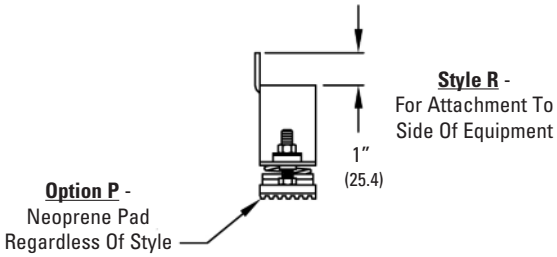
- Neoprene pad 1/4" (6.3mm) thick under spring regardless of style
- All OS Type isolator/restraints feature large diameter springs with O.D. not less than 80% of rated deflection height
- Adjust load transfer while motion restraint adjustments are loose
- For compact support of heavy loads, some OS's include inner springs. For lower profile support of heavy loads when required, OSE's have clustered springs

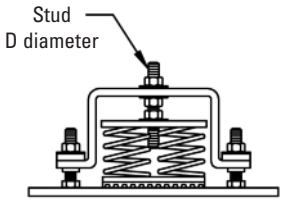
Style V

Style R



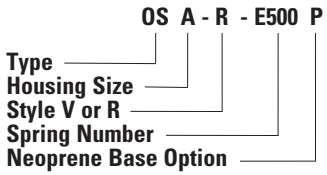






Style V - OSE 4 Spring

Typical Part Numbering



Part Numbers - E Springs - 1" (25.4mm) Deflection

Housing Size A	Housing Size B	Housing Size E
OSA-(*)-E21(**)	OSB-(*)-ET255(**)	OSE-(*)-E976(**)
OSA-(*)-E55(**)	OSB-(*)-ET347(**)	OSE-(*)-E1272(**)
OSA-(*)-E79(**)	OSB-(*)-ET473(**)	OSE-(*)-E1660(**)
OSA-(*)-E106(**)	OSB-(*)-E630(**)	OSE-(*)-E2000(**)
OSA-(*)-E143(**)	OSB-(*)-E806(**)	OSE-(*)-E2532(**)
OSA-(*)-E187(**)	OSB-(*)-E1030(**)	OSE-(*)-E3204(**)
OSA-(*)-E244(**)	OSB-(*)-E1230(**)	OSE-(*)-E4128(**)
OSA-(*)-E318(**)	OSB-(*)-E1430(**)	
OSA-(*)-E415(**)	OSB-(*)-E1810(**)	
OSA-(*)-E500(**)	OSB-(*)-E2210(**)	
OSA-(*)-E630(**)		
OSA-(*)-E801(**)		

(*) Insert Style V or R
(**) Insert Option P when required

Part Numbers - F Springs - 2" (50.8mm) Deflection

Housing Size A	Housing Size B	Housing Size E	Housing Size F
OSA-(*)-F33(**)	OSB-(*)-FT121(**)	OSE-(*)-F332(**)	OSF-(*)-F1159(**)
OSA-(*)-F43(**)	OSB-(*)-FT171(**)	OSE-(*)-F480(**)	OSF-(*)-F1408(**)
OSA-(*)-F59(**)	OSB-(*)-FT241(**)	OSE-(*)-F620(**)	OSF-(*)-F1710(**)
OSA-(*)-F83(**)	OSB-(*)-F348(**)	OSE-(*)-F780(**)	OSF-(*)-F2149(**)
OSA-(*)-F120(**)	OSB-(*)-F453(**)	OSE-(*)-F944(**)	OSF-(*)-F2700(**)
OSA-(*)-F155(**)	OSB-(*)-F590(**)	OSE-(*)-F1200(**)	
OSA-(*)-F195(**)	OSB-(*)-F676(**)		
OSA-(*)-F236(**)	OSB-(*)-F787(**)		
OSA-(*)-F300(**)	OSB-(*)-F918(**)		

(*) Insert Style V or R
(**) Insert Option P when required

Dimensions

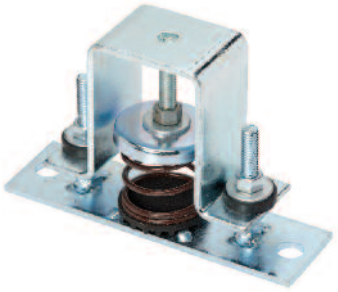
Housing Size	L in.	L (mm)	M in.	M (mm)	T in.	T (mm)	W in.	W (mm)	D in.	D (mm)	H in.	H (mm)	Approx. Oper. Height in.	Approx. Oper. Height (mm)
A	7	(177.8)	6	(152.4)	2 3/4	(69.8)	2	(50.8)	3/8	(9.5)	9/16	(14.3)	4 1/2	(114.3)
B	10 1/2	(266.7)	9	(228.6)	4	(101.6)	3 1/2	(88.9)	1/2	(12.7)	11/16	(17.5)	5 1/2	(139.7)
E	14	(355.6)	12	(304.8)	6	(152.4)	5	(127.0)	5/8	(15.9)	11/16	(17.5)	5	(127.0)
F	14	(355.6)	12	(304.8)	6	(152.4)	5	(127.0)	5/8	(15.9)	11/16	(17.5)	8	(203.3)

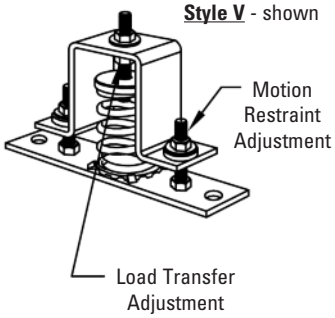
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

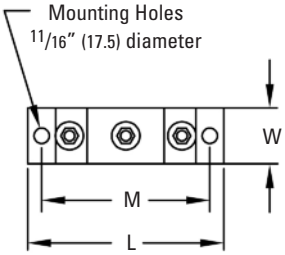
OS Type - Steel Spring Isolator/Restraint - 3" (76.2mm) Deflection

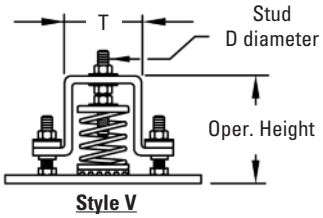
Use: To support and isolation of vibrations between equipment or frame mounted equipment and the floor or supporting structure.

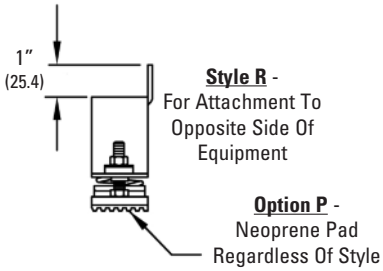
- Neoprene pad 1/4" (6.3mm) thick under spring regardless of style
- All OS Type isolator/restraints feature large diameter springs with O.D. not less than 80% of rated deflection height
- Adjust load transfer while motion restraint adjustments are loose
- For compact support of heavy loads, some OS's include inner springs. For lower profile support of heavy loads when required, OSE's have clustered springs











Part Numbers - G Springs - 3" (76.2mm) Deflection

Housing Size	
OSB	OSF
OSB-(*)-3YW162(**)	OSF-(*)-G853(**)
OSB-(*)-G213(**)	OSF-(*)-3YW1036(**)
OSB-(*)-G303(**)	OSF-(*)-G1223(**)
OSB-(*)-3YW325(**)	
OSB-(*)-3YW496(**)	

(*) Insert Style V or R
(**) Insert Option P when required

Typical Part Numbering

OS B - V - G213 P

- OS: Type
- B: Housing Size
- V: Style V or R
- G213: Spring Number
- P: Neoprene Base Option

Dimensions

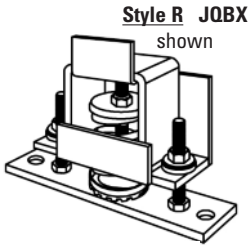
Housing Size	L in. (mm)	W in. (mm)	M in. (mm)	T in. (mm)	D in. (mm)	Approx. Oper. Height in. (mm)
OSB	10 1/2 (266.7)	3 1/2 (88.9)	9 (228.6)	4 (101.6)	1/2 (12.7)	5 1/2 (139.7)
OSF	14 (355.6)	5 (127.0)	12 (304.8)	6 (152.4)	5/8 (15.9)	8 (203.2)

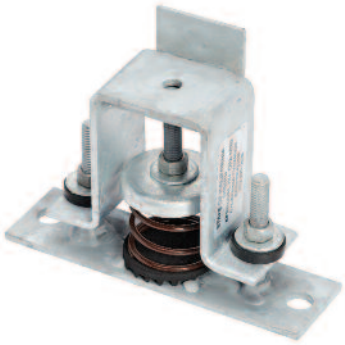
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

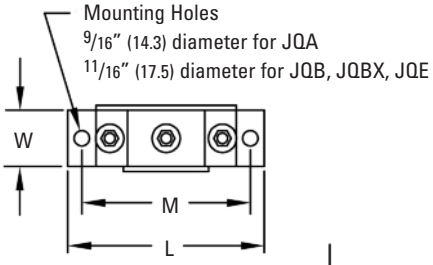
JQ Type - Isolator/Restraints - 1" (25.4mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

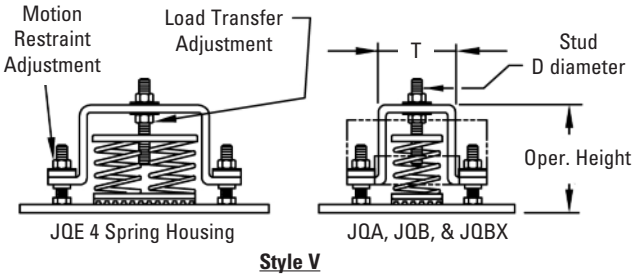
Use: To support and isolation of vibrations between equipment or frame mounted equipment and the floor or supporting structure. Pre-approved for state of California health care projects (OSHPD)

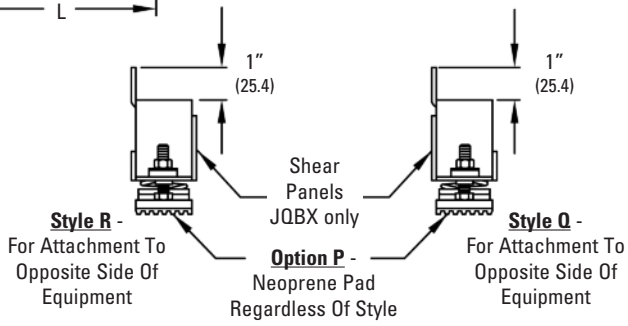
- Neoprene pad 1/4" (6.3mm) thick under spring regardless of style
- All JQ Type isolator/restraints feature large diameter springs with O.D. not less than 80% of rated deflection height
- Adjust load transfer while motion restraint adjustments are loose
- For compact support of heavy loads, some JQ include inner springs. For lower profile support of heavy loads when required, JQE's have clustered springs
- Housings are HDG with Zinc Plated hardware Springs are Zinc Plated or Powder Coated











Part Numbers - E Springs - 1" (25.4mm) Deflection

Housing Size			
JQA	JQB	JQBX	JQE
JQA-(*)-E21(**)	JQB-(*)-ET255(**)	JQBX-ET255(*)(**)	JQE-(*)-E976(**)
JQA-(*)-E55(**)	JQB-(*)-ET347(**)	JQBX-ET347(*)(**)	JQE-(*)-E1272(**)
JQA-(*)-E79(**)	JQB-(*)-ET473(**)	JQBX-ET473(*)(**)	JQE-(*)-E1660(**)
JQA-(*)-E106(**)	JQB-(*)-E630(**)	JQBX-E630(*)(**)	JQE-(*)-E2000(**)
JQA-(*)-E143(**)	JQB-(*)-E806(**)	JQBX-E806(*)(**)	JQE-(*)-E2532(**)
JQA-(*)-E187(**)	JQB-(*)-E1030(**)	JQBX-E1030(*)(**)	JQE-(*)-E3204(**)
JQA-(*)-E244(**)	JQB-(*)-E1230(**)	JQBX-E1230(*)(**)	JQE-(*)-E4128(**)
JQA-(*)-E318(**)	JQB-(*)-E1430(**)	JQBX-E1430(*)(**)	
JQA-(*)-E415(**)	JQB-(*)-E1810(**)	JQBX-E1810(*)(**)	
JQA-(*)-E500(**)	JQB-(*)-E2210(**)	JQBX-E2210(*)(**)	
JQA-(*)-E630(**)			
JQA-(*)-E801(**)			

(*) Insert Style V, R, or Q
(**) Insert Option P when required

Typical Part Numbering

JQ A - R - E500 P

- JQ — Type
- A — Housing Size
- R — Style V, R, or Q
- E500 — Spring Number
- P — Neoprene Base Option

OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal in.	Horizontal (kN)	Vertical in.	Vertical (kN)
JQA	800	(3.56)	1660	(7.38)
JQB	1000	(4.45)	1600	(7.11)
JQBX	1500	(6.67)	2000	(8.89)
JQE	3200	(14.23)	4300	(19.12)

Dimensions

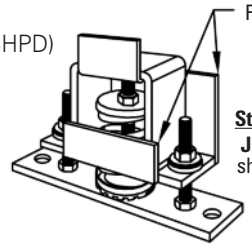
Housing Size	L in.	L (mm)	W in.	W (mm)	M in.	M (mm)	T in.	T (mm)	D in.	D (mm)	Approx. Oper. Height in.	Approx. Oper. Height (mm)
JQA	7	(177.8)	2	(50.8)	6	(152.4)	2 3/4	(69.8)	3/8	(9.5)	4 1/2	(114.3)
JQB/JQBX	10 1/2	(266.7)	3 1/2	(88.9)	9	(228.6)	4	(101.6)	1/2	(12.7)	5 1/2	(139.7)
JQE	14	(355.6)	5	(127.0)	12	(304.8)	6	(152.4)	5/8	(15.9)	5	(127.0)

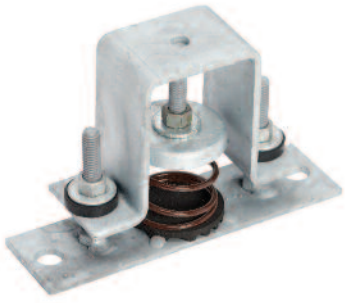
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

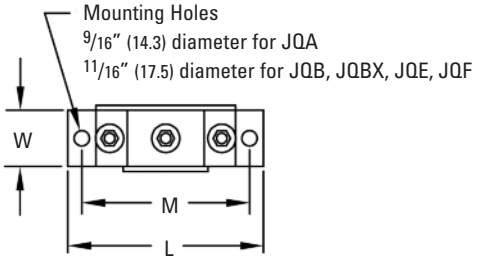
JQ Type - Isolator/Restraints - 2" (50.8mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

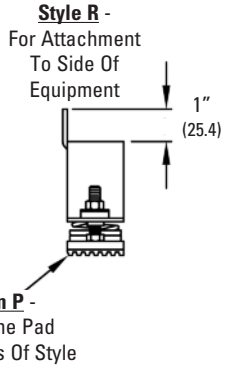
Use: To support and isolation of vibrations between equipment or frame mounted equipment and the floor or supporting structure.
Pre-approved for state of California health care projects (OSHPD)

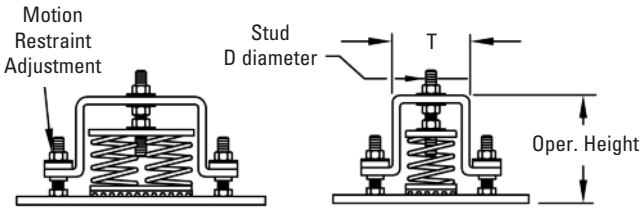
- Neoprene pad 1/4" (6.3mm) thick under spring regardless of style
- All JQ Type isolator/restraints feature large diameter springs with O.D. not less than 80% of rated deflection height
- Adjust load transfer while motion restraint adjustments are loose
- For compact support of heavy loads, some JQ include inner springs. For lower profile support of heavy loads when required, JQE's have clustered springs
- Housings are HDG with Zinc Plated hardware Springs are Zinc Plated or Powder Coated











Style V

Part Numbers - F Springs - 2" (50.8mm) Deflection

Housing Size			
JQA	JQB***	JQE	JQF
JQA-(*)-F33(**)	JQB_-(*)-FT121(**)	JQE_-(*)-F332(**)	JQF-(*)-F1159(**)
JQA-(*)-F43(**)	JQB_-(*)-FT171(**)	JQE_-(*)-F480(**)	JQF-(*)-F1408(**)
JQA-(*)-F59(**)	JQB_-(*)-FT241(**)	JQE_-(*)-F620(**)	JQF-(*)-F1710(**)
JQA-(*)-F83(**)	JQB_-(*)-F348(**)	JQE_-(*)-F780(**)	JQF-(*)-F2149(**)
JQA-(*)-F120(**)	JQB_-(*)-F453(**)	JQE_-(*)-F944(**)	JQF-(*)-F2700(**)
JQA-(*)-F155(**)	JQB_-(*)-F590(**)	JQE_-(*)-F1200(**)	
JQA-(*)-F195(**)	JQB_-(*)-F676(**)		
JQA-(*)-F236(**)	JQB_-(*)-F787(**)		
JQA-(*)-F300(**)	JQB_-(*)-F918(**)		

(*) Insert Style V or R
(**) Insert Option P when required
*** Leave blank for JQB style or insert X in part number for JQBX style

Typical Part Numbering

JQ A - R - F236 P

- JQ — Type
- A — Housing Size
- R — Style V or R
- F236 — Spring Number
- P — Neoprene Base Option

OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal in.	(kN)	Vertical in.	(kN)
JQA	800	(3.56)	1660	(7.38)
JQB	1000	(4.45)	1600	(7.11)
JQBX	1500	(6.67)	2000	(8.89)
JQE	3200	(14.23)	4300	(19.12)
JQF	2900	(12.90)	4000	(17.79)

Dimensions

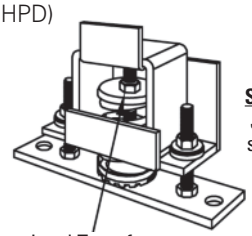
Housing Size	L in.	(mm)	W in.	(mm)	M in.	(mm)	T in.	(mm)	D in.	(mm)	Approx. Oper. Height in.	(mm)
JQA	7	(177.8)	2	(50.8)	6	(152.4)	2 3/4	(69.8)	3/8	(9.5)	4 1/2	(114.3)
JQB/JQBX	10 1/2	(266.7)	3 1/2	(88.9)	9	(228.6)	4	(101.6)	1/2	(12.7)	5 1/2	(139.7)
JQE	14	(355.6)	5	(127.0)	12	(304.8)	6	(152.4)	5/8	(15.9)	5	(127.0)
JQF	14	(355.6)	5	(127.0)	12	(304.8)	6	(152.4)	5/8	(15.9)	8	(203.2)

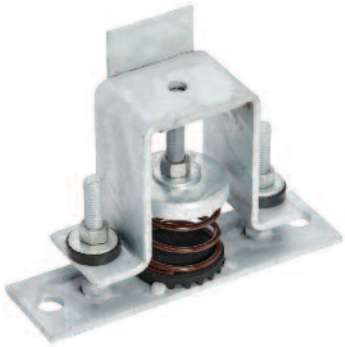
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

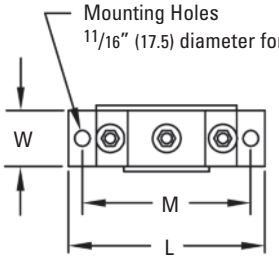
JQ Type - Isolator/Restraints - 3" (76.2mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

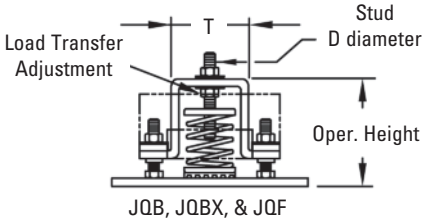
Use: For compact support or low profile support of heavy loads.
Pre-approved for state of California health care projects (OSHPD)

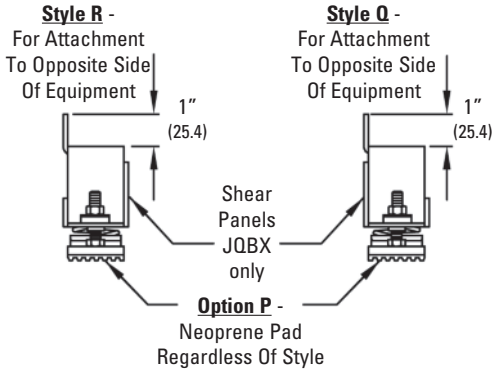
- Neoprene pad 1/4" (6.3mm) thick under spring regardless of style
- All JQ Type isolator/restraints feature large diameter springs with O.D. not less than 80% of rated deflection height
- Adjust load transfer while motion restraint adjustments are loose
- Housings are HDG with Zinc Plated hardware Springs are Zinc Plated or Powder Coated











Part Numbers - G Springs - 3" (76.2mm) Deflection

Housing Size		
JQB	JQBX	JQF
JQB-(*)-3YW162(**)	JQBX-(*)-3YW162(**)	JQF-(*)-G853(**)
JQB-(*)-G213(**)	JQBX-(*)-G213(**)	JQF-(*)-3YW1036(**)
JQB-(*)-G303(**)	JQBX-(*)-G303(**)	JQF-(*)-G1223(**)
JQB-(*)-3YW325(**)	JQBX-(*)-3YW325(**)	
JQB-(*)-3YW496(**)	JQBX-(*)-3YW496(**)	

(*) Insert Style V, R, or Q
(**) Insert Option P when required

Typical Part Numbering

JQ B - V - G213 P

- Type
- Housing Size
- Style V, R, or Q
- Spring Number
- Neoprene Base Option

OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal in. (kN)	Vertical in. (kN)
JQB	1000 (4.45)	1600 (7.11)
JQBX	1500 (6.67)	2000 (8.89)
JQF	2900 (12.90)	4000 (17.79)

Dimensions

Housing Size	L in. (mm)	W in. (mm)	M in. (mm)	T in. (mm)	D in. (mm)	Approx. Oper. Height in. (mm)
JQB/JQBX	10 1/2 (266.7)	3 1/2 (88.9)	9 (228.6)	4 (101.6)	1/2 (12.7)	5 1/2 (139.7)
JQF	14 (355.6)	5 (127.0)	12 (304.8)	6 (152.4)	5/8 (15.9)	8 (203.2)

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

JQ-TQN Type - Top Quality Neoprene Isolator/Restraints - 1/2" (12.7mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

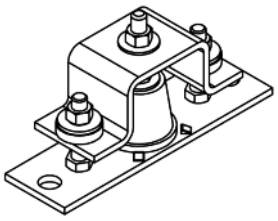
Use: For support of light equipment or framed equipment and isolation with a cushion to prevent vibration transference to structure. Pre-approved for state of California health care projects (OSHPD)

- Adjust load transfer while motion restraint adjustments are loose
- Housings are HDG with Zinc Plated hardware

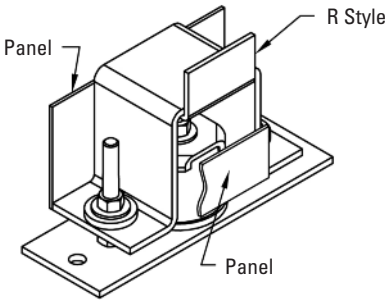
Style V

Style R

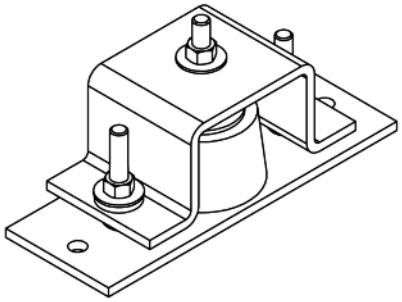
JQAM TQN 55
Style V shown



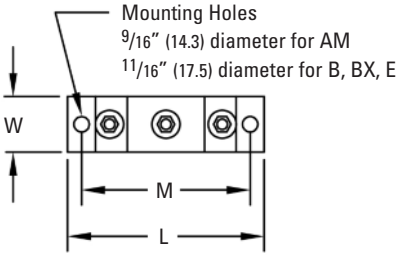
JQBX TQN 520
Style R shown

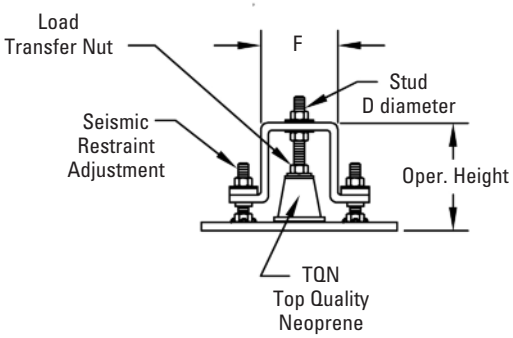


JQE TQN 4200
Style V shown

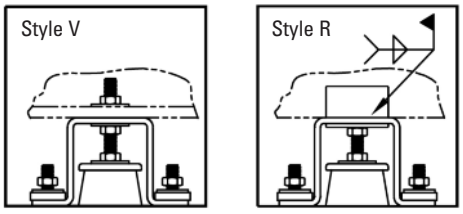


Panels	
JQB	No
JQBX	Yes





Load Transfer Styles



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

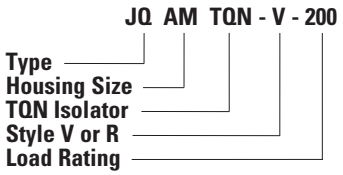
JQ-TQN Type - Top Quality Neoprene Isolator/Restraints - 1/2" (12.7mm) Deflection con't. with California Pre-Approved Seismic Protection OPA-0070

1/2" (12.7mm) Rated Static Deflection

Part No.	Maximum Load in.	(mm)	Color Code
JQAMTQN-(*)-40	40	(0.18)	Yellow
JQAMTQN-(*)-55	55	(.0.25)	Green
JQAMTQN-(*)-80	80	(0.35)	Blue
JQAMTQN-(*)-120	120	(0.53)	Orange
JQAMTQN-(*)-200	200	(.0.89)	Yellow
JQAMTQN-(*)-280	280	(1.24)	Green
JQAMTQN-(*)-400	400	(1.78)	Blue
JQBTQN-(*)-300	300	(1.33)	Yellow
JQBTQN-(*)-520	520	(2.31)	Green
JQBTQN-(*)-750	750	(3.33)	Blue
JQBTQN-(*)-1100	1100	(4.89)	White
JQBXTQN-(*)-300	300	(1.33)	Yellow
JQBXTQN-(*)-520	520	(2.31)	Green
JQBXTQN-(*)-750	750	(3.33)	Blue
JQBXTQN-(*)-1100	1100	(4.89)	White
JQETQN-(*)-1800	1800	(8.00)	Green
JQETQN-(*)-3000	3000	(13.34)	Blue
JQETQN-(*)-5000	5000	(22.24)	White

(*) Insert Style V or R

Typical Part Numbering



OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal in.	(kN)	Vertical in.	(kN)
AM	600	(2.67)	900	(4.00)
B	1000	(4.45)	1600	(7.11)
BX	1500	(6.67)	2000	(8.89)
E	3200	(14.23)	4300	(109.22)

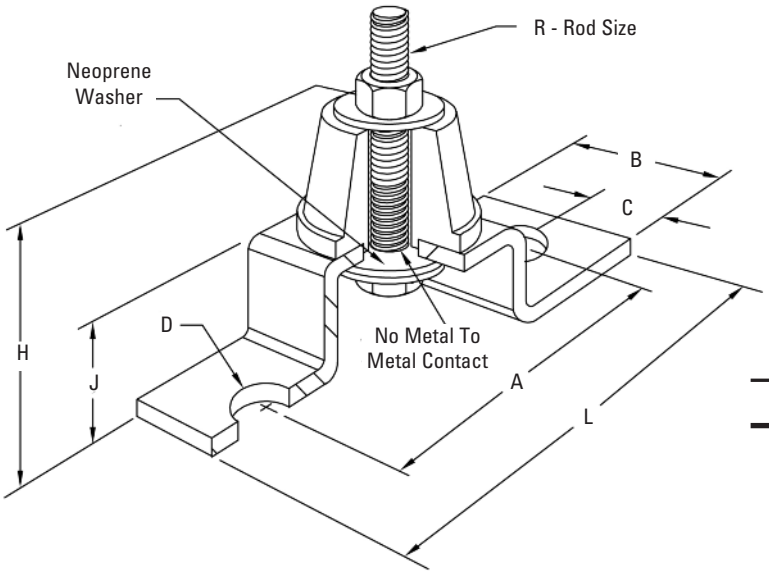
Dimensions

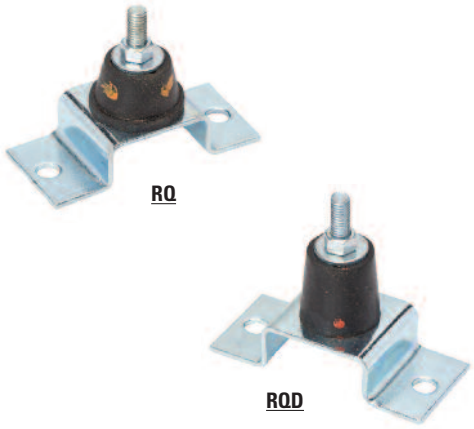
Housing Size	L in.	(mm)	W in.	(mm)	M in.	(mm)	F in.	(mm)	D in.	(mm)	Approx. Oper. Height in.	(mm)
AM	7	(177.8)	2	(50.8)	6	(152.4)	2 3/4	(69.8)	3/8	(9.5)	2 3/4	(69.8)
B / BX	10 1/2	(266.7)	3 1/2	(88.9)	9	(228.6)	4	(101.6)	1/2	(12.7)	5	(127.0)
E	14	(355.6)	5	(127.0)	12	(304.8)	6	(152.4)	5/8	(15.9)	5	(127.0)

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

RQ & RQD Type - Neoprene Mount with Integrak Seismic Restraints

Use: For support of light equipment or framed light equipment while preventing transfer of vibration to structure





Typical Part Numbering

RQ - A130

Type

Mount Number

1/4" (6.3mm) Maximum Deflection

Part No.	Maximum Load in.	(mm)	Color Code
RQ-A40	40	(0.18)	Orange
RQ-A55	55	(.0.25)	Yellow
RQ-A80	80	(0.35)	Green
RQ-A130	130	(0.58)	Blue
RQ-B120	120	(0.53)	Orange
RQ-B200	200	(0.89)	Yellow
RQ-B280	280	(1.24)	Green
RQ-B400	400	(1.678)	Blue
RQ-C300	300	(1.33)	Yellow
RQ-C520	520	(2.31)	Green
RQ-C750	750	(3.33)	Blue
RQ-C1100	1100	(4.89)	White

1/2" (12.7mm) Maximum Deflection

Part No.	Maximum Load in.	(mm)	Color Code
RQD-A40	40	(0.18)	Orange
RQD-A55	55	(.0.25)	Yellow
RQD-A80	80	(0.35)	Green
RQD-A130	130	(0.58)	Blue
RQD-B120	120	(0.53)	Orange
RQD-B200	200	(0.89)	Yellow
RQD-B280	280	(1.24)	Green
RQD-B400	400	(1.678)	Blue
RQD-C300	300	(1.33)	Yellow
RQD-C520	520	(2.31)	Green
RQD-C750	750	(3.33)	Blue
RQD-C1100	1100	(4.89)	White

Dimensions

Neoprene Type	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	L in. (mm)	J in. (mm)	R	H in. (mm)
RQ-A	3 1/2 (88.9)	2 (50.8)	1 (25.4)	7/16 (11.1)	4 1/2 (114.3)	1 (25.4)	3/8"-16	2 (50.8)
RQ-B	4 5/16 (109.5)	2 1/2 (63.5)	1 1/4 (31.7)	9/16 (14.3)	5 3/8 (136.5)	1 1/2 (38.1)	5/8"-11	2 3/4 (69.8)
RQ-C	5 (127.0)	3 1/4 (82.5)	1 5/8 (41.3)	11/16 (17.5)	6 3/16 (157.2)	1 7/8 (47.6)	3/4"-10	3 3/8 (85.7)
RQD-A	3 1/2 (88.9)	2 (50.8)	1 (25.4)	7/16 (11.1)	4 1/2 (114.3)	1 (25.4)	3/8"-16	2 (50.8)
RQD-B	4 5/16 (109.5)	2 1/2 (63.5)	1 1/4 (31.7)	9/16 (14.3)	5 3/8 (136.5)	1 1/2 (38.1)	5/8"-11	2 3/4 (69.8)
RQD-C	5 (127.0)	3 1/4 (82.5)	1 5/8 (41.3)	11/16 (17.5)	6 3/16 (157.2)	1 7/8 (47.6)	3/4"-10	3 3/8 (85.7)

Type RQ: Single Deflection (1/4" (6.3mm) Maximum)

Type RQD: Double Deflection (1/2" (12.7mm) Maximum)

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

Reference Tables

For use in selecting hangers for standard pipe

Nominal Pipe Size		Weight Per Foot (25.4mm) Standard Pipe				Hanger Selection Load 10' (3.05m) Spacing	
		Dry or Steam Filled		Water Filled			
in.	(mm)	lbs.	(kg)	lbs.	(kg)	lbs	(kN)
3/4	(20)	1.13	(0.51)	1.36	(0.61)	21	(0.09)
1	(25)	1.68	(0.76)	2.06	(0.93)	55	(024)
1 1/4	(32)	2.28	(1.03)	2.93	(1.33)	55	(024)
1 1/2	(40)	2.73	(1.24)	3.62	(1.64)	55	(024)
2	(50)	3.68	(1.67)	5.15	(2.33)	79	(0.35)
2 1/2	(65)	5.82	(2.64)	7.91	(3.59)	143	(0.63)
3	(80)	7.62	(3.45)	10.85	(4.92)	143	(0.63)
3 1/2	(90)	9.20	(4.17)	13.52	(6.13)	187	(0.83)
4	(100)	10.89	(4.94)	16.45	(7.46)	244	(1.08)
4 1/2	(115)	12.64	(5.73)	19.50	(8.84)	244	(1.08)
5	(125)	14.81	(6.72)	23.55	(10.68)	318	(1.41)
6	(150)	19.18	(8.70)	31.80	(14.42)	415	(1.84)
7	(175)	24.05	(10.91)	40.85	(18.53)	500	(2.22)
8	(200)	28.60	(12.97)	50.50	(22.90)	715	(3.18)
9	(225)	33.90	(15.38)	61.10	(27.71)	1060	(4.71)
10	(250)	40.50	(18.37)	75.00	(24.02)	1060	(4.71)
12	(300)	49.60	(22.50)	99.00	(44.90)	1430	(6.36)

Selection based on water filled pipe only. Add weight of fittings if any and reselect.

125# Cast Iron pipe fitting approximate weights

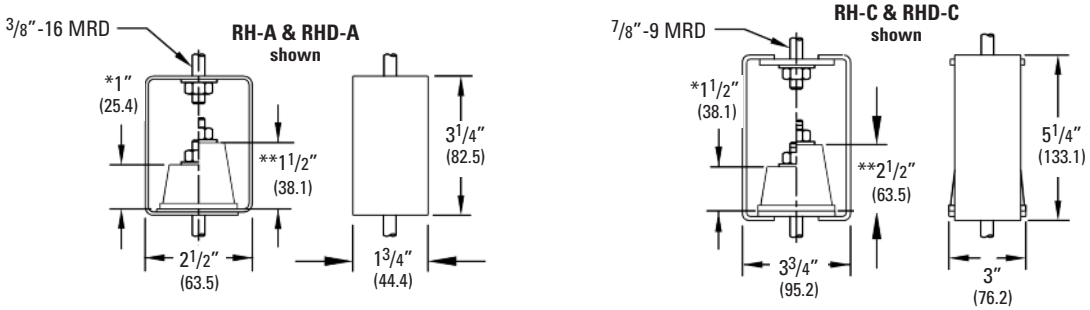
Nominal Pipe Size		Strainer		Check Valve		Gate Valve		Elbow		Tee		Flange	
in.	(mm)	lbs.	(kg)	lbs.	(kg)	lbs	(kg)	lbs	(kg)	lbs	(kg)	lbs	(kg)
1 1/2	(40)	20	(9.1)	25	(11.3)	30	(13.6)	15	(6.8)	20	(9.1)	3.5	(1.6)
2	(50)	30	(13.6)	25	(11.3)	40	(18.1)	20	(9.1)	25	(11.3)	6	(2.7)
2 1/2	(65)	40	(18.1)	35	(15.9)	50	(22.7)	25	(11.3)	35	(15.9)	8	(3.6)
3	(80)	50	(22.7)	45	(20.4)	70	(31.7)	30	(13.6)	40	(18.1)	9	(4.1)
4	(100)	85	(38.5)	80	(36.3)	110	(49.9)	55	(24.9)	70	(31.7)	16	(7.2)
5	(125)	110	(49.9)	120	(54.4)	140	(63.5)	70	(31.7)	90	(40.8)	20	(9.1)
6	(150)	140	(63.5)	155	(70.3)	415	(1.84)	90	(40.8)	115	(52.1)	25	(11.3)
8	(200)	205	(93.0)	305	(138.3)	250	(113.4)	120	(54.4)	175	(79.4)	34	(15.4)
10	(250)	330	(149.7)	455	(206.4)	475	(215.4)	245	(111.1)	295	(133.8)	53	(24.0)
12	(300)	440	(199.6)	675	(306.2)	690	(313.0)	375	(54.4)	405	(183.7)	71	(32.2)

For 250# fittings, multiply above values by 1.8.

RH & RHD Type - Neoprene Hanger

Use: Used to dampen noise and vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.

- *Type RH: Single deflection - 1/4" (6.3mm) maximum
- **Type RHD: Double deflection - 1/2" (12.7mm) maximum
- MRD is maximum rod diameter
- Housing finish: Zinc Plated
- Threaded rods, nuts, and washers are furnished separately



1/4" (6.3mm) Maximum Single Deflection

Part Number	Maximum Load lbs.	(kN)	Color Code
RH-40-A	40	(0.09)	Yellow
RH-55-A	55	(0.24)	Green
RH-80-A	80	(0.35)	Blue
RH-130-A	130	(0.47)	White
RH-120-B	120	(0.53)	Orange
RH-200-B	200	(0.69)	Yellow
RH-280-B	280	(0.83)	Green
RH-400-B	400	(1.08)	Blue
RH-300-C	300	(1.41)	Yellow
RH-520-C	520	(1.75)	Green
RH-750-C	750	(2.27)	Blue
RH-1100-C	1100	(31.8)	White

Typical Part Numbering

RH - 280 - B

Type
Load Rating
Size

1/2" (12.7mm) Maximum Double Deflection

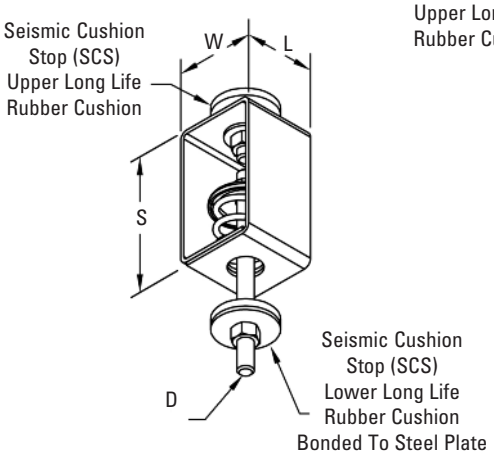
Part Number	Maximum Load lbs.	(kN)	Color Code
RHD-40-A	40	(0.09)	Yellow
RHD-55-A	55	(0.24)	Green
RHD-80-A	80	(0.35)	Blue
RHD-130-A	130	(0.47)	White
RHD-120-B	120	(0.53)	Orange
RHD-200-B	200	(0.69)	Yellow
RHD-280-B	280	(0.83)	Green
RHD-400-B	400	(1.08)	Blue
RHD-300-C	300	(1.41)	Yellow
RHD-520-C	520	(1.75)	Green
RHD-750-C	750	(2.27)	Blue
RHD-1100-C	1100	(31.8)	White
RHD-1700-E	1700	(4.71)	Green
RHD-2700-E	2700	(6.76)	Blue
RHD-4200-E	4200	(8.72)	White

CHSCS Type - Spring Hanger with Seismic Cushion Stop - 1" (25.4mm) Deflection

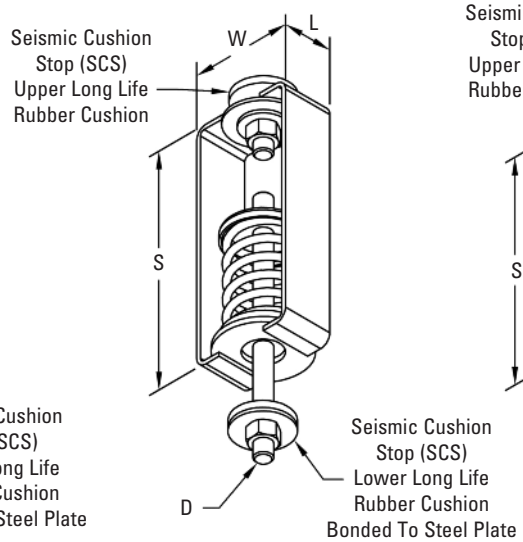
Use: Used to dampen noise and vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.

- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 1" (25.4mm)
- SFH = Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength

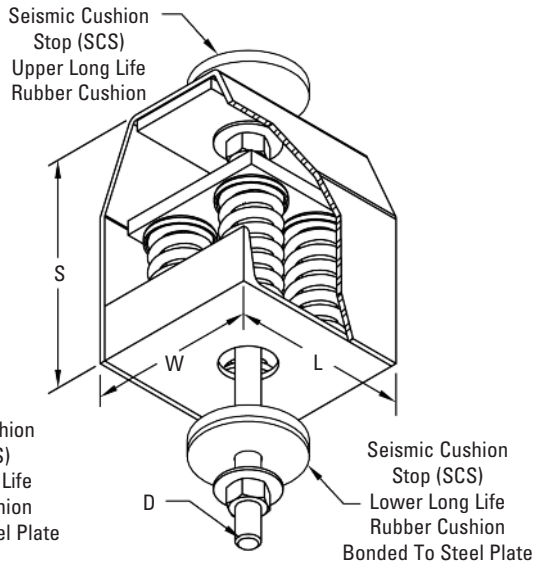
Light Weight Hanger
CHSCS-E21 thru CHSCS-E415



Basic Hanger
CHSCS-E500 thru CHSCS-E1060



***Extra Strength Hanger**
CHSCS-E1580 thru CHSCS-E2860



Typical Part Numbering

CHSCS - E143

Type
Load

Dimensions

Part Number	Maximum Load lbs.	(kN)	SFH in.	(mm)	S in.	(mm)	W in.	(mm)	L in.	(mm)	SCS Diameter in.	(mm)	D Diameter
CHSCS-E21	21	(0.09)	2 5/8	(66.7)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	3/8"-16
CHSCS-E55	55	(0.24)	2 3/4	(69.8)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	3/8"-16
CHSCS-E79	79	(0.35)	2 5/8	(66.7)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	3/8"-16
CHSCS-E106	106	(0.47)	2 5/8	(66.7)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	3/8"-16
CHSCS-E143	143	(0.63)	2 5/8	(66.7)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-E187	187	(0.83)	2 5/8	(66.7)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-E244	244	(1.08)	2 3/4	(69.8)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-E318	318	(1.41)	3 1/8	(79.4)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	5/8"-11
CHSCS-E415	415	(1.84)	3 1/16	(77.8)	4 3/4	(120.6)	2 3/4	(69.8)	2 1/2	(63.5)	2 3/8	(60.3)	5/8"-11
CHSCS-E500	500	(2.22)	3 1/4	(82.5)	7 1/2	(190.5)	3 1/4	(82.5)	2 3/4	(69.8)	3	(76.2)	3/4"-10
CHSCS-715	715	(3.18)	4 1/4	(107.9)	7 1/2	(190.5)	3 1/4	(82.5)	2 3/4	(69.8)	3	(76.2)	3/4"-10
CHSCS-1060	1060	(4.71)	4 1/4	(107.9)	7 1/2	(190.5)	3 1/4	(82.5)	2 3/4	(69.8)	3	(76.2)	3/4"-10
CHSCS-1430 *	1430	(6.36)	4 1/4	(107.9)	8 3/8	(212.7)	6	(152.4)	6	(152.4)	3	(76.2)	7/8"-9
CHSCS-2120 *	2120	(9.43)	4 1/4	(107.9)	8 3/8	(212.7)	6	(152.4)	6	(152.4)	3	(76.2)	7/8"-9
CHSCS-2860 *	2860	(12.72)	4 1/4	(107.9)	8 3/8	(212.7)	6	(152.4)	6	(152.4)	3	(76.2)	7/8"-9

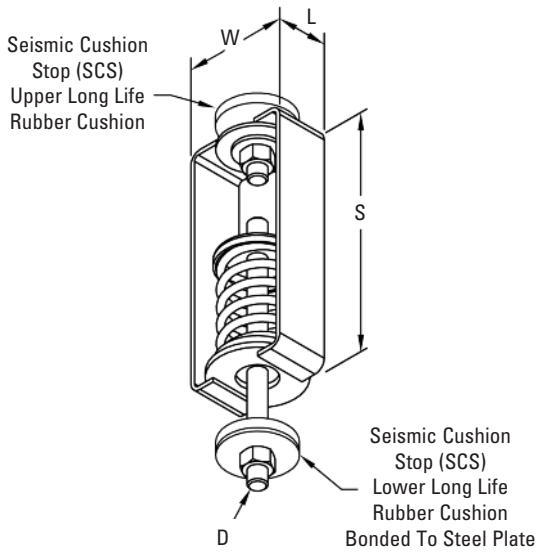
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

CHSCS Type - Spring Hanger with Seismic Cushion Stop - 2" (50.8mm) Deflection

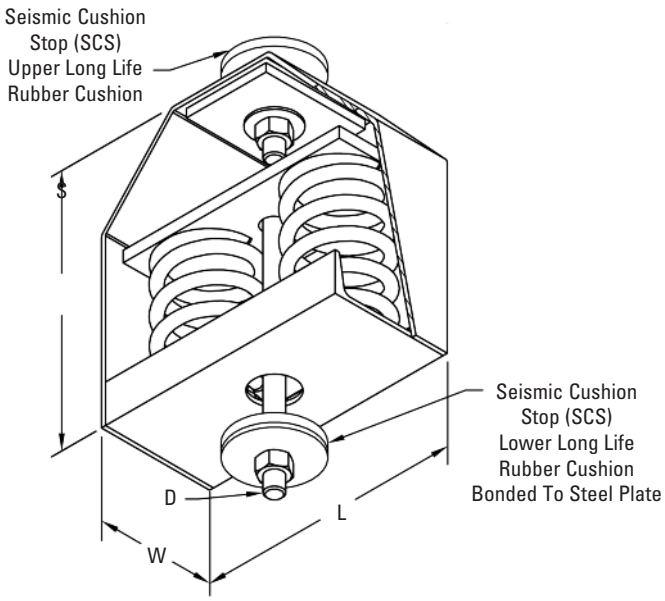
Use: Used to dampen noise and vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.

- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 2" (50.8mm)
- SFH = Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength

Basic Hanger
CHSCS-F59 thru CHSCS-F918



***Extra Strength Hanger**
CHSCS-F1159 thru CHSCS-F3420



Typical Part Numbering

CHSCS - F120
Type
Load

Dimensions

Part Number	Maximum Load lbs.	(kN)	SFH in.	(mm)	S in.	(mm)	W in.	(mm)	L in.	(mm)	SCS Diameter in.	(mm)	D Diameter
CHSCS-F59	59	(0.26)	4 1/4	(107.9)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-F83	83	(0.37)	4 1/4	(107.9)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-F120	120	(0.53)	4 1/4	(107.9)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-F155	155	(0.69)	4 1/4	(107.9)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-F195	195	(0.87)	4 9/16	(115.9)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CHSCS-F241	241	(1.07)	4 1/2	(114.3)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	1/2"-13
CHSCS-F348	348	(1.55)	5	(127.0)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	5/8"-11
CHSCS-F453	453	(2.01)	5	(127.0)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	5/8"-11
CHSCS-F590	590	(2.62)	5	(127.0)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	2 3/8	(60.3)	3/4"-10
CHSCS-F676	676	(3.00)	5	(127.0)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	2 3/8	(60.3)	3/4"-10
CHSCS-F787	787	(3.50)	5	(127.0)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	2 3/8	(60.3)	3/4"-10
CHSCS-F918	918	(4.08)	5	(127.0)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	2 3/8	(60.3)	3/4"-10
CHSCS-F1159 *	1159	(5.15)	6 7/16	(163.5)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	3/4"-10
CHSCS-F1408 *	1408	(6.26)	6 7/16	(163.5)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	7/8"-9
CHSCS-F1710 *	1710	(7.60)	6 7/16	(163.5)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	7/8"-9
CHSCS-F2318 *	2318	(10.31)	6 7/16	(163.5)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9
CHSCS-F2816 *	2816	(12.52)	6 7/16	(163.5)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9
CHSCS-F3420 *	3420	(15.21)	6 7/16	(163.5)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9

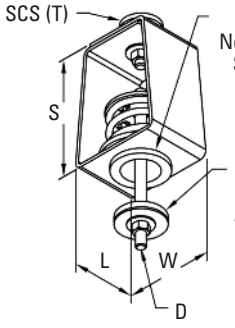
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

CH30SCS Type - 15° Tilt, 1" (25.4mm) Deflection Combination Hanger - Spring & Neoprene with Seismic Cushion Stop

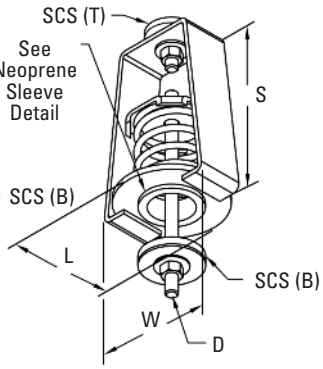
Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

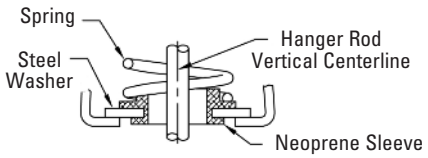
- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 1" (25.4mm)
- SFH = Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength

Light Weight Hanger
CH30SCS-ET20 thru CH30SCS-ET255



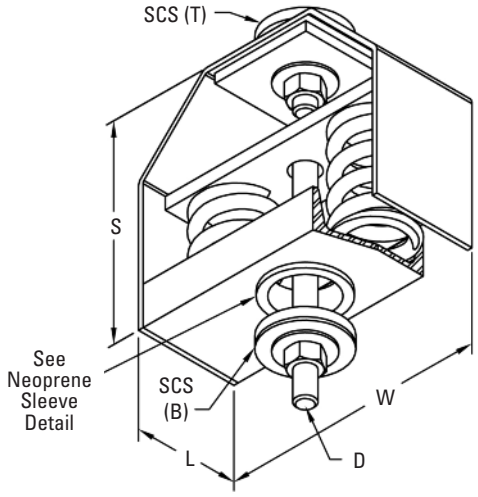
Basic Hanger
CH30SCS-ET347 thru CH30SCS-ET1326

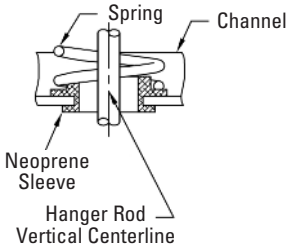




Neoprene Sleeve Detail

***Extra Strength Hanger**
CH30SCS-E1612 thru CH30SCS-E4920





Neoprene Sleeve Detail

Typical Part Numbering

CH30SCS - ET129

Type
Load

SCS (T) = Seismic Cushion Stop (SCS) Upper Long Life Rubber Cushion

SCS (B) = Seismic Cushion Stop (SCS) Lower Long Life Rubber Cushion Bonded To Steel Plate

Dimensions

Part Number	Maximum Load lbs.	(kN)	SFH in.	(mm)	S in.	(mm)	W in.	(mm)	L in.	(mm)	SCS Diameter in.	(mm)	D Diameter
CH30SCS-ET20	20	(0.09)	1 7/8	(47.6)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET42	42	(0.18)	2	(50.8)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET80	80	(0.35)	2 1/8	(54.0)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET129	129	(0.57)	2 3/8	(60.3)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET194	194	(0.86)	2 3/8	(60.3)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET255	255	(1.13)	2 1/2	(63.5)	4 3/4	(120.6)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-ET347	347	(1.54)	2 3/4	(69.8)	6	(152.9)	5 5/16	(134.9)	4 1/4	(107.9)	2 3/8	(60.3)	5/8"-11
CH30SCS-ET473	473	(2.10)	2 7/8	(73.0)	6	(152.9)	5 5/16	(134.9)	4 1/4	(107.9)	2 3/8	(60.3)	5/8"-11
CH30SCS-ET667	667	(2.96)	3 1/8	(79.4)	7	(177.8)	5 7/8	(149.2)	4 3/4	(120.6)	3	(76.2)	3/4"-10
CH30SCS-ET940	940	(4.18)	3 3/8	(85.7)	7	(177.8)	5 7/8	(149.2)	4 3/4	(120.6)	3	(76.2)	3/4"-10
CH30SCS-ET1326	1326	(5.90)	3 5/8	(92.1)	7	(177.8)	5 7/8	(149.2)	4 3/4	(120.6)	3	(76.2)	7/8"-9
CH30SCS-E1612 *	1612	(7.17)	3 5/8	(92.1)	8 1/4	(209.5)	10	(254.0)	4	(101.6)	3	(76.2)	7/8"-9
CH30SCS-E2060 *	2060	(9.16)	3 7/8	(98.4)	8 1/4	(209.5)	10	(254.0)	4	(101.6)	3	(76.2)	1"-8
CH30SCS-E2460 *	2460	(10.94)	4 1/8	(104.8)	8 1/4	(209.5)	10	(254.0)	4	(101.6)	3	(76.2)	1"-8
CH30SCS-E2980 *	2980	(13.25)	4 1/8	(104.8)	8 1/4	(209.5)	10	(254.0)	4	(101.6)	3	(76.2)	1"-8
CH30SCS-E4120 *	4120	(18.32)	3 7/8	(98.4)	8 1/2	(215.9)	9 1/2	(241.3)	7	(177.8)	4	(101.6)	1 1/8"-7
CH30SCS-E4920 *	4920	(21.88)	4 1/8	(104.8)	8 1/2	(215.9)	9 1/2	(241.3)	7	(177.8)	4	(101.6)	1 1/8"-7

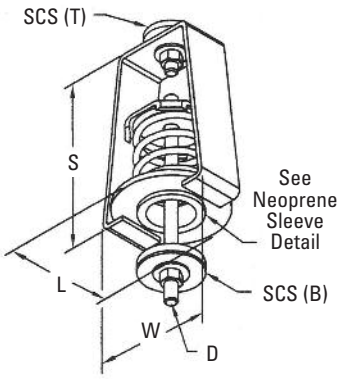
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

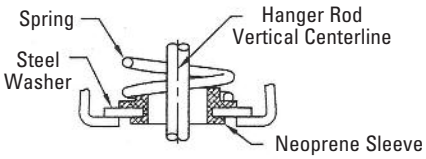
CH30SCS Type - 15° Tilt, 2" (50.8mm) Deflection Spring Hanger with Seismic Cushion Stop

Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 1" (25.4mm)
- SFH = Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength

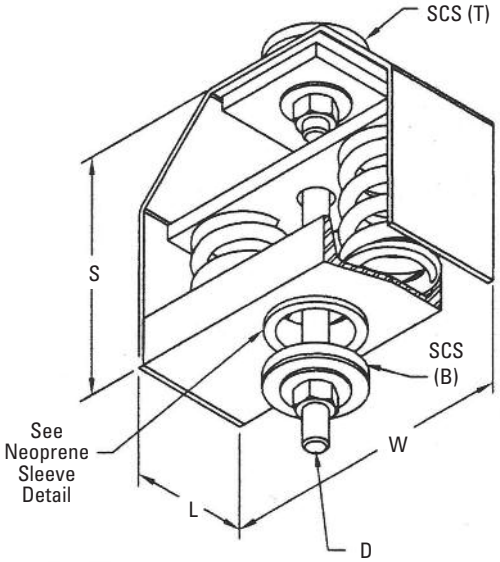
Basic Hanger
CH30SCS-FT30 thru CH30SCS-F590

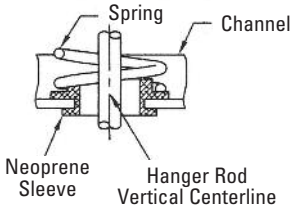




Neoprene Sleeve Detail

***Extra Strength Hanger**
CH30SCS-F696 thru CH30SCS-F3420





Neoprene Sleeve Detail

Typical Part Numbering

CH30SCS - FT121

Type
Load

SCS (T) =
Seismic Cushion Stop (SCS)
Upper Long Life Rubber Cushion

SCS (B) =
Seismic Cushion Stop (SCS)
Lower Long Life Rubber Cushion
Bonded To Steel Plate

Dimensions

Part Number	Maximum Load lbs.	(kN)	SFH in.	(mm)	S in.	(mm)	W in.	(mm)	L in.	(mm)	SCS Diameter in.	(mm)	D Diameter
CH30SCS-FT30	30	(0.13)	3 1/2	(88.9)	6 1/2	(165.1)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-FT41	41	(0.18)	3 1/2	(88.9)	6 1/2	(165.1)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-FT60	60	(0.26)	3 3/4	(95.2)	6 1/2	(165.1)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-FT85	85	(0.38)	3 3/4	(95.2)	6 1/2	(165.1)	3 5/8	(92.1)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
CH30SCS-FT121	121	(0.54)	4	(101.6)	8	(203.2)	5	(127.0)	4	(101.6)	2 3/8	(60.3)	1/2"-13
CH30SCS-FT171	171	(0.76)	4 1/4	(107.9)	8	(203.2)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	1/2"-13
CH30SCS-FT241	241	(1.07)	4 1/2	(114.3)	8	(203.2)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	1/2"-13
CH30SCS-F348	348	(1.55)	5	(127.0)	8	(203.2)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	5/8"-11
CH30SCS-F453	453	(2.01)	5	(127.0)	8	(203.2)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	5/8"-11
CH30SCS-F590	590	(2.62)	5	(127.0)	8	(203.2)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	3/4"-10
CH30SCS-F696 *	696	(3.09)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	3/4"-10
CH30SCS-F906 *	906	(4.03)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	3/4"-10
CH30SCS-F1180 *	1180	(5.25)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	3/4"-10
CH30SCS-F1352 *	1352	(6.01)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	7/8"-9
CH30SCS-F1574 *	1574	(7.00)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	7/8"-9
CH30SCS-F1836 *	1836	(8.16)	5	(127.0)	9	(228.6)	10 3/8	(263.5)	4	(101.6)	3	(76.2)	7/8"-9
CH30SCS-F2318 *	2318	(10.31)	6 1/2	(165.1)	11 1/2	(292.1)	12 3/8	(314.3)	5	(127.0)	4	(101.6)	7/8"-9
CH30SCS-F2816 *	2816	(12.52)	6 1/2	(165.1)	11 1/2	(292.1)	12 3/8	(314.3)	5	(127.0)	4	(101.6)	7/8"-9
CH30SCS-F3420 *	3420	(15.21)	6 1/2	(165.1)	11 1/2	(292.1)	12 3/8	(314.3)	5	(127.0)	4	(101.6)	7/8"-9

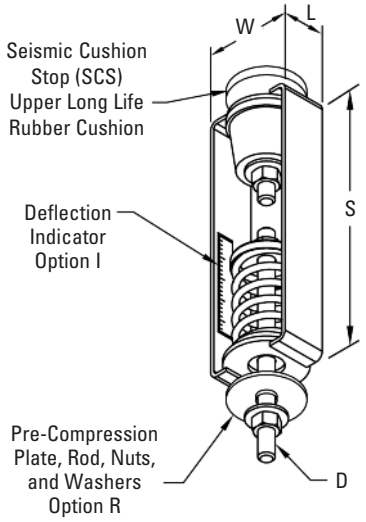
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

HHSCS Type - Combination Hanger Spring & Neoprene with Seismic Cushion Stop - 1 1/2" (38.1mm) Deflection

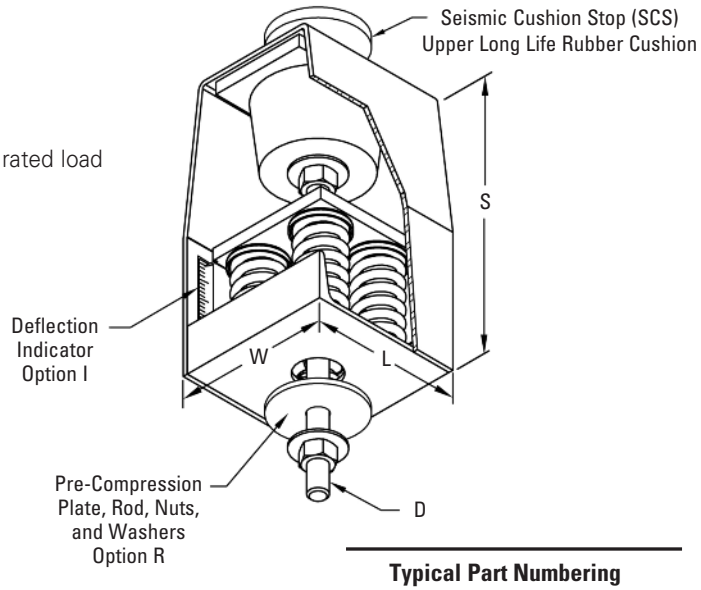
Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 2" (50.8mm) + neoprene rated deflection is 1/2" (12.7mm) = 2 1/2" (63.5mm)
- SFH = Free Height NFH = Neoprene Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength
- Minimum additional travel is 50% of rated deflection at rated load

Basic Hanger
HHSCS-E21 thru HHSCS-E1060



***Extra Strength Hanger**
HHSCS-E1580 thru HHSCS-E2860



Typical Part Numbering

HHSCS E106 R I

- Type
- Spring Load
- Pre-Compression Option
- Deflector Indicator Option

Dimensions

Part Number	Maximum Load lbs. (kN)	SFH in. (mm)	NFH in. (mm)	S in. (mm)	W in. (mm)	L in. (mm)	SCS Diameter	D Diameter
HHSCS-E21-R I	21 (0.09)	2 5/8 (66.7)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HHSCS-E55-R I	55 (0.24)	2 3/4 (69.8)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HHSCS-E79-R I	79 (0.35)	2 5/8 (66.7)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HHSCS-E106-R I	106 (0.47)	2 5/8 (66.7)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HHSCS-E143-R I	143 (0.63)	2 5/8 (66.7)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	1/2"-13
HHSCS-E187-R I	187 (0.83)	2 5/8 (66.7)	1 3/4 (44.4)	7 1/2 (190.5)	3 1/4 (82.5)	2 3/4 (69.8)	2 3/8 (60.3)	1/2"-13
HHSCS-E244-R I	244 (1.08)	2 3/4 (69.8)	1 3/4 (44.4)	7 1/2 (190.5)	3 1/4 (82.5)	2 3/4 (69.8)	2 3/8 (60.3)	1/2"-13
HHSCS-E318-R I	318 (1.41)	3 1/8 (79.4)	1 3/4 (44.4)	7 1/2 (190.5)	3 1/4 (82.5)	2 3/4 (69.8)	2 3/8 (60.3)	5/8"-11
HHSCS-E415-R I	415 (1.84)	3 1/16 (77.8)	1 3/4 (44.4)	7 1/2 (190.5)	3 1/4 (82.5)	2 3/4 (69.8)	2 3/8 (60.3)	5/8"-11
HHSCS-E500-R I	500 (2.22)	3 1/4 (82.5)	2 1/2 (63.5)	9 3/4 (247.6)	3 7/8 (98.4)	3 1/4 (82.5)	2 3/8 (60.3)	3/4"-10
HHSCS-715-R I	715 (3.18)	4 1/4 (107.9)	2 1/2 (63.5)	9 3/4 (247.6)	3 7/8 (98.4)	3 1/4 (82.5)	2 3/8 (60.3)	3/4"-10
HHSCS-1060-R I	1060 (4.71)	4 1/4 (107.9)	2 1/2 (63.5)	9 3/4 (247.6)	3 7/8 (98.4)	3 1/4 (82.5)	2 3/8 (60.3)	3/4"-10
HHSCS-1430-R I *	1430 (6.36)	4 1/4 (107.9)	2 3/4 (69.8)	11 3/8 (289.9)	6 1/2 (165.1)	6 (152.4)	3 (76.2)	7/8"-9
HHSCS-2120-R I *	2120 (9.43)	4 1/4 (107.9)	2 3/4 (69.8)	11 3/8 (289.9)	6 1/2 (165.1)	6 (152.4)	3 (76.2)	7/8"-9
HHSCS-2860-R I *	2860 (12.72)	4 1/4 (107.9)	2 3/4 (69.8)	11 3/8 (289.9)	6 1/2 (165.1)	6 (152.4)	3 (76.2)	7/8"-9

Insert R for Option R (Pre-Compression Hardware) when required and
I for Option I (deflection indicator) when required

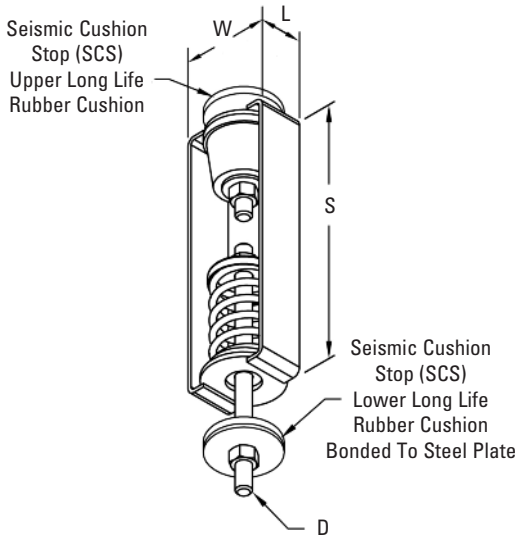
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

HHSCS Type - Combination Hanger Spring & Neoprene with Seismic Cushion Stop - 2 1/2" (63.5mm) Deflection

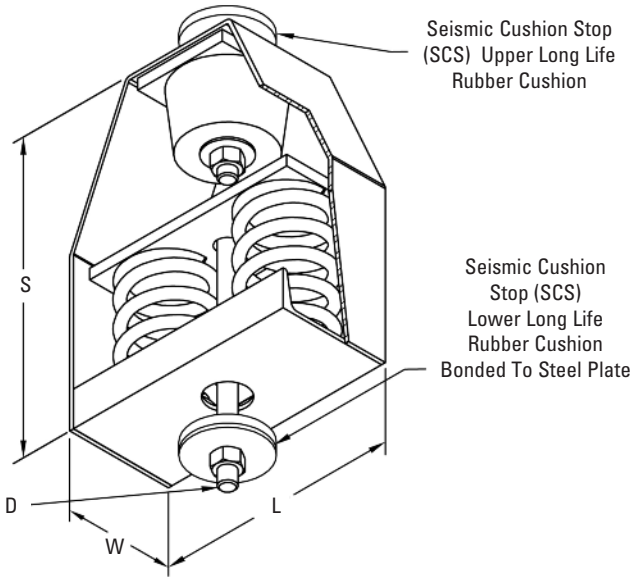
Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 2" (50.8mm) + neoprene rated deflection is 1/2" (12.7mm) = 2 1/2" (63.5mm)
- SFH = Free Height NFH = Neoprene Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength
- Minimum additional travel is 50% of rated deflection at rated load

Basic Hanger
HHSCS-F59 thru HHSCS-F918



***Extra Strength Hanger**
HHSCS-F1159 thru HHSCS-F3420



Typical Part Numbering

HHSCS - F120
Type
Load

Dimensions

Part Number	Maximum Load lbs.	(kN)	SFH in.	(mm)	NFH in.	(mm)	S in.	(mm)	W in.	(mm)	L in.	(mm)	SCS Diameter in.	(mm)	D Diameter
HHSCS-F59	59	(0.26)	4 1/4	(107.9)	1 1/2	(38.1)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
HHSCS-F83	83	(0.37)	4 1/4	(107.9)	1 1/2	(38.1)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
HHSCS-F120	120	(0.53)	4 1/4	(107.9)	1 1/2	(38.1)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
HHSCS-F155	155	(0.69)	4 1/4	(107.9)	1 3/4	(44.4)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
HHSCS-F195	195	(0.87)	4 1/2	(114.3)	1 3/4	(44.4)	9	(228.6)	3	(76.2)	2 1/2	(63.5)	2 3/8	(60.3)	1/2"-13
HHSCS-F241	241	(1.07)	4 1/2	(114.3)	1 3/4	(44.4)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	1/2"-13
HHSCS-F348	348	(1.55)	5	(127.0)	1 3/4	(44.4)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	5/8"-11
HHSCS-F453	453	(2.01)	5	(127.0)	1 3/4	(44.4)	10	(254.0)	5 1/2	(139.7)	4 1/2	(114.3)	2 3/8	(60.3)	5/8"-11
HHSCS-F590	590	(2.62)	5	(127.0)	2 1/2	(63.5)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	3/4"-10
HHSCS-F676	676	(3.00)	5	(127.0)	2 1/2	(63.5)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	3/4"-10
HHSCS-F787	787	(3.50)	5	(127.0)	2 1/2	(63.5)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	3/4"-10
HHSCS-F918	918	(4.08)	5	(127.0)	2 1/2	(63.5)	11	(279.4)	5 1/4	(133.3)	4 1/2	(114.3)	3	(76.2)	3/4"-10
HHSCS-F1159 *	1159	(5.15)	6 3/8	(161.9)	2 3/4	(69.8)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	3/4"-10
HHSCS-F1408 *	1408	(6.26)	6 3/8	(161.9)	2 3/4	(69.8)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	7/8"-9
HHSCS-F1710 *	1710	(7.60)	6 3/8	(161.9)	2 3/4	(69.8)	11	(279.4)	6	(152.9)	5	(127.0)	3	(76.2)	7/8"-9
HHSCS-F2318 *	2318	(10.31)	6 3/8	(161.9)	2 3/4	(69.8)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9
HHSCS-F2816 *	2816	(12.52)	6 3/8	(161.9)	2 3/4	(69.8)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9
HHSCS-F3420 *	3420	(15.21)	6 3/8	(161.9)	2 3/4	(69.8)	11 1/4	(285.7)	11	(279.4)	5	(127.0)	3	(76.2)	7/8"-9

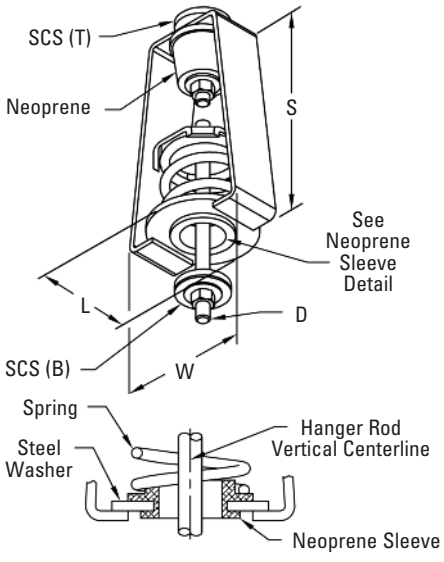
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

HH30SCS Type - 15° Tilt, 1 1/2" (38.1mm) Deflection Combination Hanger - Spring & Neoprene with Seismic Cushion Stop

Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

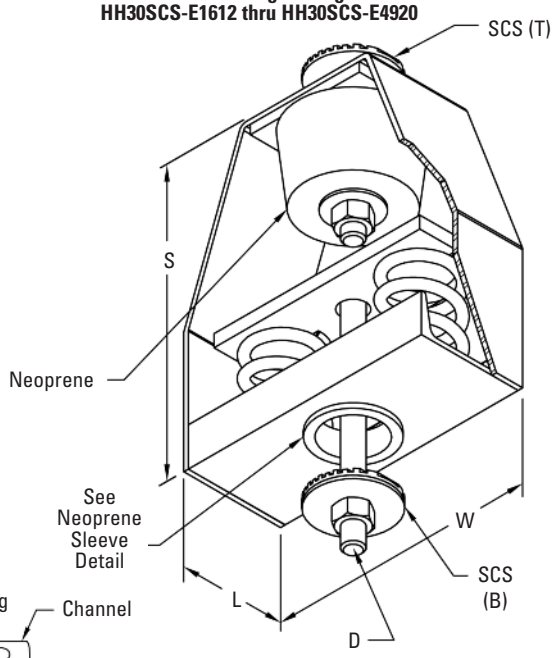
- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 1" (25.4mm) + neoprene rated deflection is 1/2" (12.7mm) = 1 1/2" (38.1mm)
- SFH = Free Height NFH = Neoprene Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength
- Minimum additional travel is 50% of rated deflection at rated load

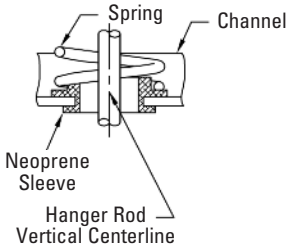
Basic Hanger
HH30SCS-ET20 thru HH30SCS-ET1326



Neoprene Sleeve Detail

*** Extra Strength Hanger**
HH30SCS-E1612 thru HH30SCS-E4920





Neoprene Sleeve Detail

Typical Part Numbering

HH30SCS - ET129

Type
Load

Dimensions

Part Number	Maximum Load lbs. (kN)	SFH in. (mm)	NFH in. (mm)	S in. (mm)	W in. (mm)	L in. (mm)	SCS Diameter in. (mm)	D Diameter
HH30SCS-ET20	20 (0.09)	1 7/8 (47.6)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HH30SCS-ET42	42 (0.18)	2 (50.8)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HH30SCS-ET80	80 (0.35)	2 1/8 (54.0)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HH30SCS-ET129	129 (0.57)	2 3/8 (60.3)	1 1/2 (38.1)	6 1/2 (165.1)	3 5/8 (92.1)	2 1/2 (63.5)	2 3/8 (60.3)	3/8"-16
HH30SCS-ET194	194 (0.86)	2 3/8 (60.3)	1 3/4 (44.4)	7 1/2 (190.5)	4 (101.6)	3 (76.2)	2 3/8 (60.3)	1/2"-13
HH30SCS-ET255	255 (1.13)	2 1/2 (63.5)	1 3/4 (44.4)	7 1/2 (190.5)	4 (101.6)	3 (76.2)	2 3/8 (60.3)	1/2"-13
HH30SCS-ET347	347 (1.54)	2 3/4 (69.8)	1 3/4 (44.4)	8 1/2 (215.9)	5 5/16 (134.9)	4 1/4 (107.9)	2 3/8 (60.3)	5/8"-11
HH30SCS-ET473	473 (2.10)	2 7/8 (73.0)	2 1/2 (63.5)	8 1/2 (215.9)	5 5/16 (134.9)	4 1/4 (107.9)	2 3/8 (60.3)	5/8"-11
HH30SCS-ET667	667 (2.96)	3 1/8 (79.4)	2 1/2 (63.5)	10 (254.0)	5 7/8 (149.2)	4 3/4 (120.6)	3 (76.2)	3/4"-10
HH30SCS-ET940	940 (4.18)	3 3/8 (85.7)	2 1/2 (63.5)	10 (254.0)	5 7/8 (149.2)	4 3/4 (120.6)	3 (76.2)	3/4"-10
HH30SCS-ET1326	1326 (5.90)	3 5/8 (92.1)	2 3/4 (69.8)	10 (254.0)	5 7/8 (149.2)	4 3/4 (120.6)	3 (76.2)	7/8"-9
HH30SCS-E1612 *	1612 (7.17)	3 5/8 (92.1)	2 3/4 (69.8)	11 1/4 (285.7)	10 (254.0)	4 (101.6)	3 (76.2)	7/8"-9
HH30SCS-E2060 *	2060 (9.16)	3 7/8 (98.4)	2 3/4 (69.8)	11 1/4 (285.7)	10 (254.0)	4 (101.6)	3 (76.2)	1"-8
HH30SCS-E2460 *	2460 (10.94)	4 1/8 (104.8)	2 3/4 (69.8)	11 1/4 (285.7)	10 (254.0)	4 (101.6)	3 (76.2)	1"-8
HH30SCS-E2980 *	2980 (13.25)	4 1/8 (104.8)	2 3/4 (69.8)	11 1/4 (285.7)	10 (254.0)	4 (101.6)	3 (76.2)	1"-8
HH30SCS-E4120 *	4120 (18.32)	3 7/8 (98.4)	2 3/4 (69.8)	12 (304.8)	9 1/2 (241.3)	7 (177.8)	4 (101.6)	1"-8
HH30SCS-E4920 *	4920 (21.88)	4 1/8 (104.8)	2 3/4 (69.8)	12 (304.8)	9 1/2 (241.3)	7 (177.8)	4 (101.6)	1"-8

SCS (T) = Seismic Cushion Stop (SCS) Upper Long Life Rubber Cushion

SCS (B) = Seismic Cushion Stop (SCS) Lower Long Life Rubber Cushion Bonded To Steel Plate

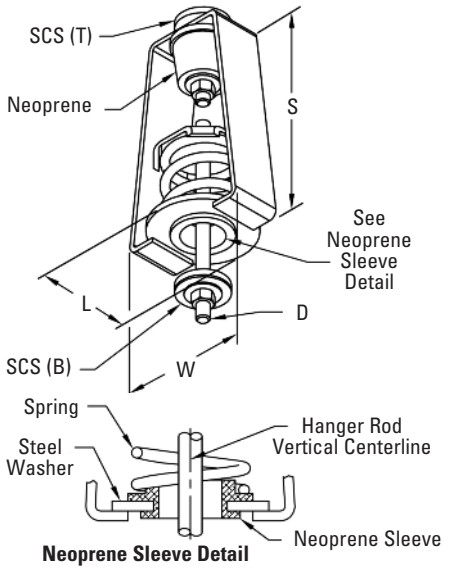
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

HH30SCS Type - 15° Tilt, 2 1/2" (63.5mm) Deflection Combination Hanger - Spring & Neoprene with Seismic Cushion Stop

Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all thread rod for single and trapeze type support systems.Used where uncertain alignment is anticipated during installation. At rated load the hanger rod will operate to a full 15° tilt in any direction from vertical centerline.

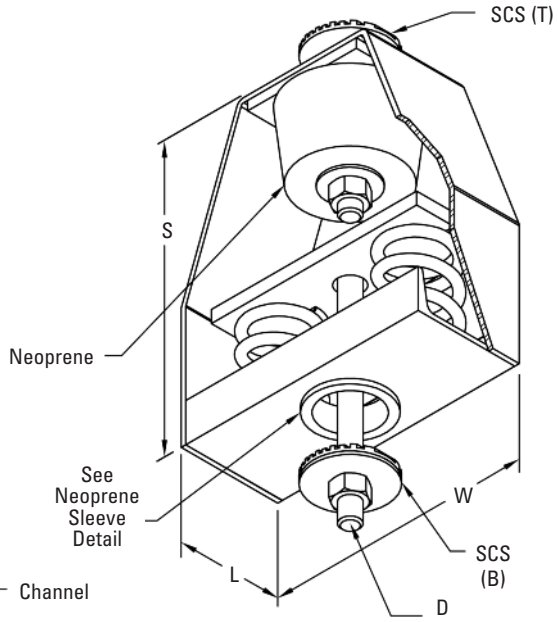
- All housing sizes have been tested to carry five times the maximum load without failure
- Spring rated deflection is 2" (50.8mm) + neoprene rated deflection is 1/2" (12.7mm) = 2 1/2" (63.5mm)
- SFH = Free Height NFH = Neoprene Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength
- Minimum additional travel is 50% of rated deflection at rated load

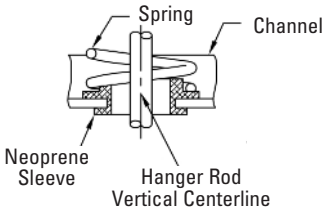
Basic Hanger
HH30SCS-FT30 thru HH30SCS-F590



Neoprene Sleeve Detail

*** Extra Strength Hanger**
HH30SCS-F696 thru HH30SCS-F3420





Neoprene Sleeve Detail

Typical Part Numbering

HH30SCS - FT121
Type
Load

Dimensions

Part Number	Maximum Load lbs. (kN)	SFH in. (mm)	NFH in. (mm)	S in. (mm)	W in. (mm)	L in. (mm)	SCS Diameter in. (mm)	D Diameter
HH30SCS-FT30	30 (0.13)	3 1/2 (88.9)	1 1/2 (38.1)	8 (203.2)	5 (127.0)	4 (101.6)	2 3/8 (63.5)	1/2"-13
HH30SCS-FT41	41 (0.18)	3 1/2 (88.9)	1 1/2 (38.1)	8 (203.2)	5 (127.0)	4 (101.6)	2 3/8 (63.5)	1/2"-13
HH30SCS-FT60	60 (0.26)	3 3/4 (95.2)	1 1/2 (38.1)	8 (203.2)	5 (127.0)	4 (101.6)	2 3/8 (63.5)	1/2"-13
HH30SCS-FT85	85 (0.38)	3 3/4 (95.2)	1 1/2 (38.1)	8 (203.2)	5 (127.0)	4 (101.6)	2 3/8 (63.5)	1/2"-13
HH30SCS-FT121	121 (0.54)	4 (101.6)	1 1/2 (38.1)	8 (203.2)	5 (127.0)	4 (101.6)	2 3/8 (63.5)	1/2"-13
HH30SCS-FT171	171 (0.76)	4 1/4 (107.9)	1 3/4 (44.4)	10 (254.0)	5 1/4 (133.3)	4 1/2 (114.3)	3 (76.2)	1/2"-13
HH30SCS-FT241	241 (1.07)	4 1/2 (114.3)	1 3/4 (44.4)	10 (254.0)	5 1/4 (133.3)	4 1/2 (114.3)	3 (76.2)	1/2"-13
HH30SCS-F348	348 (1.55)	5 (127.0)	1 3/4 (44.4)	10 (254.0)	5 1/4 (133.3)	4 1/2 (114.3)	3 (76.2)	5/8"-11
HH30SCS-F453	453 (2.01)	5 (127.0)	1 3/4 (44.4)	11 (279.4)	5 1/4 (133.3)	4 1/2 (114.3)	3 (76.2)	5/8"-11
HH30SCS-F590	590 (2.62)	5 (127.0)	2 1/2 (63.5)	11 (279.4)	5 1/4 (133.3)	4 1/2 (114.3)	3 (76.2)	3/4"-10
HH30SCS-F696 *	696 (3.09)	5 (127.0)	2 1/2 (63.5)	11 (279.4)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	3/4"-10
HH30SCS-F906 *	906 (4.03)	5 (127.0)	2 1/2 (63.5)	12 (304.8)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	3/4"-10
HH30SCS-F1180 *	1180 (5.25)	5 (127.0)	2 1/2 (63.5)	12 (304.8)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	3/4"-10
HH30SCS-F1352 *	1352 (6.01)	5 (127.0)	2 3/4 (69.8)	12 (304.8)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	7/8"-9
HH30SCS-F1574 *	1574 (7.00)	5 (127.0)	2 3/4 (69.8)	12 (304.8)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	7/8"-9
HH30SCS-F1836 *	1836 (8.16)	5 (127.0)	2 3/4 (69.8)	12 (304.8)	10 3/8 (263.5)	4 (101.6)	3 (76.2)	7/8"-9
HH30SCS-F2318 *	2318 (10.31)	6 1/2 (165.1)	2 3/4 (69.8)	14 1/4 (361.9)	12 3/8 (314.3)	5 (127.0)	4 (101.6)	7/8"-9
HH30SCS-F2816 *	2816 (12.52)	6 1/2 (165.1)	2 3/4 (69.8)	14 1/4 (361.9)	12 3/8 (314.3)	5 (127.0)	4 (101.6)	7/8"-9
HH30SCS-F3420 *	3420 (15.21)	6 1/2 (165.1)	2 3/4 (69.8)	14 1/4 (361.9)	12 3/8 (314.3)	5 (127.0)	4 (101.6)	7/8"-9

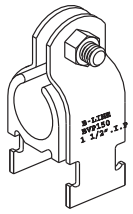
SCS (T) = Seismic Cushion Stop (SCS) Upper Long Life Rubber Cushion

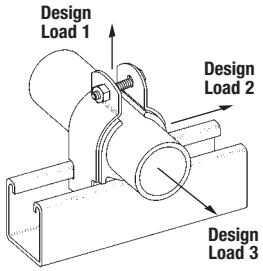
SCS (B) = Seismic Cushion Stop (SCS) Lower Long Life Rubber Cushion Bonded To Steel Plate

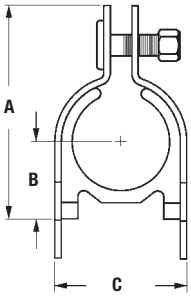
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

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

BVT Series - VibraClamp™







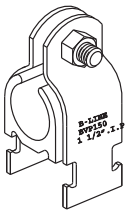
- Easy one tool installation.
- Temperature Range: -40°F (-40°C) to +300°F (148.9°C)
- Dampens vibration and noise.
- Eliminates galvanic corrosion due to metal to metal contact.
- Resists most industrial oils and solvents.
- Secures tubing firmly to strut channel.

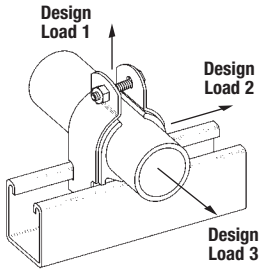
Part No.	O.D. Size		Pipe Size		Dimensions A		B		C		Wt. Each	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	Lbs.	(kg)
BVT025	1/4"	(6.3)	1/8"	(3)	1.22"	(30.9)	0.19"	(4.8)	0.49"	(12.4)	.11	(.05)
BVT037	3/8"	(9.5)	1/4"	(6)	1.36"	(34.5)	0.25"	(6.3)	0.61"	(15.5)	.12	(.05)
BVT050	1/2"	(12.7)	3/8"	(10)	1.49"	(37.8)	0.31"	(7.8)	0.74"	(18.8)	.14	(.06)
BVT062	5/8"	(15.9)	1/2"	(15)	1.62"	(41.1)	0.38"	(9.6)	0.86"	(21.8)	.15	(.07)
BVT075	3/4"	(19.0)	5/8"	(17)	1.87"	(47.4)	0.50"	(12.7)	1.15"	(29.2)	.19	(.08)
BVT087	7/8"	(22.2)	3/4"	(20)	2.00"	(50.8)	0.56"	(14.2)	1.27"	(32.2)	.21	(.09)
BVT112	1 1/8"	(28.6)	1"	(25)	2.25"	(57.1)	0.69"	(17.5)	1.52"	(38.6)	.26	(.12)
BVT137	1 3/8"	(34.9)	1 1/4"	(32)	2.51"	(63.7)	0.81"	(20.6)	1.78"	(45.2)	.38	(.17)
BVT162	1 5/8"	(41.3)	1 1/2"	(40)	3.00"	(76.2)	1.00"	(25.4)	2.20"	(55.9)	.40	(.18)
BVT212	2 1/8"	(54.0)	2"	(50)	3.52"	(89.4)	1.25"	(31.7)	2.70"	(68.6)	.55	(.25)
BVT262	2 5/8"	(66.6)	2 1/2"	(65)	4.02"	(102.1)	1.50"	(38.1)	3.20"	(81.3)	.55	(.25)
BVT312	3 1/8"	(79.4)	3"	(80)	4.53"	(115.0)	1.75"	(44.4)	3.70"	(93.9)	.64	(.29)
BVT362	3 5/8"	(92.1)	3 1/2"	(90)	5.05"	(128.2)	2.00"	(50.8)	4.23"	(107.4)	.76	(.34)
BVT412	4 1/8"	(104.8)	4"	(100)	5.55"	(140.9)	2.25"	(57.1)	4.73"	(120.1)	.93	(.42)
BVT612	6 1/8"	(155.5)	6"	(150)	7.62"	(193.5)	3.25"	(82.5)	6.74"	(171.1)	1.36	(.61)

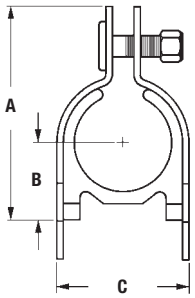
Part No.	Design Load 1		Design Load 2		Design Load 3	
	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)
BVT025	400	(1.78)	50	(0.22)	50	(0.22)
BVT037	400	(1.78)	50	(0.22)	50	(0.22)
BVT050	400	(1.78)	50	(0.22)	50	(0.22)
BVT062	400	(1.78)	50	(0.22)	50	(0.22)
BVT075	600	(2.67)	75	(0.33)	75	(0.33)
BVT087	600	(2.67)	75	(0.33)	75	(0.33)
BVT112	600	(2.67)	75	(0.33)	75	(0.33)
BVT137	600	(2.67)	75	(0.33)	75	(0.33)
BVT162	800	(3.56)	125	(0.55)	125	(0.55)
BVT212	800	(3.56)	125	(0.55)	125	(0.55)
BVT262	800	(3.56)	125	(0.55)	125	(0.55)
BVT312	800	(3.56)	125	(0.55)	125	(0.55)
BVT362	1000	(4.45)	200	(0.67)	150	(0.67)
BVT412	1000	(4.45)	200	(0.67)	150	(0.67)
BVT612	1000	(4.45)	200	(0.67)	150	(0.67)

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

BVP Series - VibraClamp™







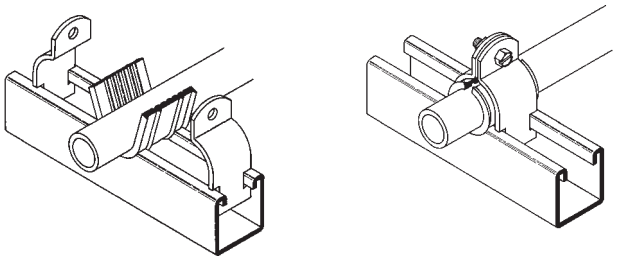
- Easy one tool installation.
- Temperature Range:
  -40°F (-40°C) to +300°F (148.9°C)
- Dampens vibration and noise.
- Eliminates galvanic corrosion due to metal to metal contact.
- Resists most industrial oils and solvents.
- Secures pipe firmly to strut channel.

Part No.	O.D. Size		Pipe Size		Dimensions A		B		C		Wt. Each	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	Lbs.	(kg)
BVP025	0.540"	(13.7)	1/4"	(6)	1.61"	(39.9)	0.37"	(9.4)	0.87"	(22.1)	.15	(.07)
BVP037	0.675"	(17.1)	3/8"	(10)	1.86"	(47.2)	0.50"	(12.7)	1.15"	(29.2)	.18	(.08)
BVP050	0.875"	(22.2)	1/2"	(15)	1.99"	(50.5)	0.56"	(14.2)	1.27"	(32.3)	.20	(.09)
BVP075	1.050"	(26.7)	3/4"	(20)	2.25"	(57.1)	0.69"	(17.5)	1.52"	(38.6)	.21	(.09)
BVP100	1.312"	(33.3)	1"	(25)	2.51"	(63.8)	0.81"	(20.6)	1.77"	(45.0)	.20	(.09)
BVP125	1.660"	(42.2)	1 1/4"	(32)	3.00"	(76.2)	1.00"	(25.4)	2.21"	(56.1)	.36	(.16)
BVP150	1.900"	(48.3)	1 1/2"	(40)	3.21"	(81.5)	1.12"	(28.4)	2.41"	(61.2)	.40	(.18)
BVP200	2.375"	(60.3)	2"	(50)	3.77"	(95.8)	1.37"	(34.8)	2.96"	(75.2)	.45	(.20)
BVP250	2.875"	(73.0)	2 1/2"	(65)	4.28"	(108.7)	1.62"	(41.1)	3.46"	(87.9)	.54	(.24)
BVP300	3.500"	(88.9)	3"	(80)	5.05"	(128.3)	2.00"	(50.8)	4.24"	(107.7)	.81	(.37)
BVP350	4.000"	(101.6)	3 1/2"	(90)	5.55"	(140.9)	2.25"	(57.1)	4.74"	(120.3)	.87	(.39)
BVP400	4.500"	(114.3)	4"	(100)	6.05"	(153.7)	2.50"	(63.5)	5.24"	(133.1)	1.09	(.49)
BVP500	5.563"	(141.3)	5"	(125)	6.84"	(173.7)	3.00"	(76.2)	6.24"	(158.4)	1.36	(.61)
BVP600	6.625"	(168.3)	6"	(150)	8.24"	(209.3)	3.56"	(90.4)	7.36"	(186.9)	1.63	(.74)

Part No.	Design Load 1		Design Load 2		Design Load 3	
	Lbs.	(kN)	Lbs.	(kN)	Lbs.	(kN)
BVP025	400	(1.78)	50	(0.22)	50	(0.22)
BVP037	600	(2.67)	75	(0.33)	75	(0.33)
BVP050	600	(2.67)	75	(0.33)	75	(0.33)
BVP075	600	(2.67)	75	(0.33)	75	(0.33)
BVP100	600	(2.67)	75	(0.33)	75	(0.33)
BVP125	800	(3.56)	125	(0.55)	125	(0.55)
BVP150	800	(3.56)	125	(0.55)	125	(0.55)
BVP200	800	(3.56)	125	(0.55)	125	(0.55)
BVP250	800	(3.56)	125	(0.55)	125	(0.55)
BVP300	1000	(4.45)	200	(0.89)	150	(0.67)
BVP350	1000	(4.45)	200	(0.89)	150	(0.67)
BVP400	1000	(4.45)	200	(0.89)	150	(0.67)
BVP500	1000	(4.45)	200	(0.89)	150	(0.67)
BVP600	1000	(4.45)	200	(0.89)	150	(0.67)

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

B1999
Vibra Cushion™



Packaged 20 Ft.
per carton.

Note: See Strut Catalog for sizing information.

- Ideal Isolation Material
- Inhibits Galvanic Corrosion
- Dampens Sound and Vibration
- Service Temperature Range
  -75° F (-60°C) to +375°F (+190°C)

Vibra Cushion is designed for use with refrigeration lines, HVAC, copper tubing, glass pipe and hydraulic lines. It provides an energy-absorption barrier between the lines and the mounting material and remains flexible thru its entire service range of -75°F (-60°C) to +375°F (+190°C).

This elastomer allows for expansion and contraction within the mounting system and prevents galvanic reaction between dissimilar metals.

ISO
Iso Pipe

Packaged 36 Ft. (11 M)
per carton.

1" (25.4) wide
.020" (0.5) thick

- Non-adhesive rubber tape
- Fuses to itself
- Water resistant
- Prevents galvanic reaction caused by dissimilar metal contact
- Service Temperature Range
  -140° F (-95°C) to +395°F (+200°C)

Reference Data - Metric Conversion Chart

To Convert From	To	Multiply By
Angle		
degree	radian (rad)	1.745329×10^{-2}
radian (rad)	degree	$5.729578 \times 10^{+1}$
Area		
foot^2	square meter (m^2)	9.290304×10^{-2}
inch^2	square meter (m^2)	6.451600×10^{-4}
circular mil	square meter (m^2)	5.067075×10^{-10}
sq. centimeter (cm^2)	square inch (in^2)	1.550003×10^{-1}
square meter (m^2)	foot^2	$1.076391 \times 10^{+1}$
square meter (m^2)	inch^2	$1.550003 \times 10^{+3}$
square meter (m^2)	circular mil	$1.973525 \times 10^{+9}$
Temperature		
degree Fahrenheit	degree Celsius	$t^{oC} = (t^{oF} - 32) / 1.8$
degree Celsius	degree Fahrenheit	$t^{oF} = 1.8\ t^{oC} + 32$
Force		
pounds-force (lbf)	newtons (N)	4.448222

To Convert From	To	Multiply By
Length		
foot (ft)	meter (m)	3.048000×10^{-1}
inch (in)	meter (m)	2.540000×10^{-2}
mil	meter (m)	2.540000×10^{-5}
inch (in)	micrometer (µm)	$2.540000 \times 10^{+4}$
meter (m)	foot (ft)	3.280840
meter (m)	inch (in)	$3.937008 \times 10^{+1}$
meter (m)	mil	$3.937008 \times 10^{+4}$
micrometer (µm)	inch (in)	3.937008×10^{-5}
Volume		
foot^3	cubic meter (m^3)	2.831685×10^{-2}
inch^3	cubic meter (m^3)	1.638706×10^{-5}
cubic centimeter (cm^3)	cubic inch (in^3)	6.102374×10^{-2}
cubic meter (m^3)	foot^3	$3.531466 \times 10^{+1}$
cubic meter (m^3)	inch^3	$6.102376 \times 10^{+4}$
gallon (U.S. liquid)	cubic meter (m^3)	3.785412×10^{-3}

Section Properties		
section modulus S (in^3)	S (m^3)	1.638706×10^{-5}
moment of inertia I (in^4)	I (m^4)	4.162314×10^{-7}
modulus of elasticity E (psi)	E (Pa)	$6.894757 \times 10^{+3}$
section modulus S (m^3)	S (in^3)	$6.102374 \times 10^{+4}$
moment of inertia I (m^4)	I (in^4)	$2.402510 \times 10^{+6}$
modulus of elasticity E (Pa)	E (psi)	1.450377×10^{-4}

To Convert From	To	Multiply By
Bending Moment or Torque		
lbf•ft	newton meter (N•m)	1.355818
lbf•in	newton meter (N•m)	1.129848×10^{-1}
N•m	lbf•ft	7.375621×10^{-1}
N•m	lbf•in	8.850748
Mass		
ounce (avoirdupois)	kilogram (kg)	2.834952×10^{-2}
pound (avoirdupois)	kilogram (kg)	4.535924×10^{-1}
ton (short, 2000 lb)	kilogram (kg)	$9.071847 \times 10^{+2}$
ton (long, 2240 lb)	kilogram (kg)	$1.016047 \times 10^{+3}$
kilogram (kg)	ounce (avoirdupois)	$3.527396 \times 10^{+1}$
kilogram (kg)	pound (avoirdupois)	2.204622
kilogram (kg)	ton (short 2000 lb)	1.102311×10^{-3}
kilogram (kg)	ton (long 2240 lb)	9.842064×10^{-4}
Mass Per Unit Length		
lb/ft	kilogram per meter (kg/m)	1.488164
lb/in	kilogram per meter (kg/m)	$1.785797 \times 10^{+1}$
kg/m	lb/ft	6.719689×10^{-1}
kg/m	lb/in	5.599741×10^{-2}
Mass Per Unit Volume		
lb/ft^3	kilogram per cubic meter (kg/m^3)	$1.601846 \times 10^{+1}$
lb/in^3	kilogram per cubic meter (kg/m^3)	$2.767990 \times 10^{+4}$
kg/m^3	lb/ft^3	6.242797×10^{-2}
kg/m^3	lb/in^3	3.612730×10^{-5}
lbs/ft^3	lbs/in^3	$1.728000 \times 10^{+3}$
Mass Per Area Unit		
lb/ft^2	kilogram per square meter (kg/m^2)	4.882428
kg/m^2	pound per square foot (lb/ft^2)	2.048161×10^{-1}
Pressure or Stress		
lbf/in^2 (psi)	pascal (Pa)	$6.894757 \times 10^{+3}$
kip/in^2 (ksi)	pascal (Pa)	$6.894757 \times 10^{+6}$
lbf/in^2 (psi)	megapascals (MPa)	6.894757×10^{-3}
pascal (Pa)	pound force per sq. inch (psi)	1.450377×10^{-4}
pascal (Pa)	kip per sq. inch (ksi)	1.450377×10^{-7}
megapascals (MPa)	lbf/in^2 (psi)	$1.450377 \times 10^{+2}$

Abbreviations

AISC	= American Institute of Steel Construction
AISI	= American Iron & Steel Institute
ANSI	= American National Standards Institute
ASTM	= American Society for Testing & Materials
AWWA	= American Water Works Association
Dia.	= Diameter
Ft.	= Feet
Ga.	= Gauge
I.D.	= Inside Diameter
In.	= Inch
Lbs.	= Pounds
Max.	= Maximum
Min.	= Minimum
MSS	= Manufacturers Standardization Society
NFPA	= National Fire Protection Association
O.D.	= Outside Diameter
Oz.	= Ounces
Pre-Galv.	= Pre-galvanized
psi	= Pounds Per Square Inch
PVC	= Polyvinyl Chloride
UL	= Underwriters' Laboratories, Inc.
UNC	= Unified Coarse Threads
UNCR	= Unified Coarse Threads (Rounded Root)
Wt./C	= Weight per 100

Metric Symbols

cm	= centimeter
kg	= kilogram
kN	= kilonewton
m	= meter
µm	= micrometer
mm	= millimeter
MPa	= megapascal
N	= newton
Nm	= newton-meter
Pa	= pascal

Decimals of a Foot

Inch	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0	.0000	.0833	.1667	.2500	.3330	.4167	.5000	.5833	.6667	.7500	.8333	.9167
1/16	.0052	.0085	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
1/8	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271
3/16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
5/16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
3/8	.0313	.1146	.1979	.2812	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479
7/16	.0365	.1198	.2031	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557
1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583
9/16	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635
5/8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
11/16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740
3/4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
13/16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
7/8	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896
15/16	.0781	.1615	.2448	.3281	.4118	.4948	.5781	.6615	.7448	.8221	.9115	.9948

Decimals of a Foot

Fraction	Decimal	Fraction	Decimal
1/32	.0312	17/32	.5312
1/16	.0625	9/16	.5625
3/32	.0937	19/32	.5937
1/8	.1250	5/8	.6250
5/32	.1562	21/32	.6562
3/16	.1875	11/16	.6875
7/32	.2187	23/32	.7187
1/4	.2500	3/4	.7500
9/32	.2812	25/32	.7812
5/16	.3125	13/16	.8125
11/32	.3437	27/32	.8437
3/8	.3750	7/8	.8750
13/32	.4062	29/32	.9062
7/16	.4375	15/16	.9375
15/32	.4687	31/32	.9687
1/2	.500		

Reference Data

Schedule 40 Steel Pipe Data

Nominal Pipe Size In.	mm	Pipe O.D. In.	mm	Wall Thickness In.	mm	Weight of Pipe Lbs./Ft.	kg/m	Weight of Pipe Filled With Water Lbs./Ft.	kg/m	Maximum Span* Ft.	Meter	Recommended Hanger Rod Sizes
3/8"	(10)	.675	(17.1)	.091	(2.3)	.6	(.9)	.7	(1.0)	7	(2.13)	3/8"-16
1/2"	(15)	.840	(21.3)	.109	(2.7)	.8	(1.2)	.9	(1.3)	7	(2.13)	3/8"-16
3/4"	(20)	1.050	(26.7)	.113	(2.9)	1.1	(1.7)	1.3	(2.0)	7	(2.13)	3/8"-16
1"	(25)	1.315	(33.4)	.133	(3.4)	1.7	(2.5)	2.1	(3.0)	7	(2.13)	3/8"-16
1 1/4"	(32)	1.660	(42.1)	.140	(3.5)	2.3	(3.4)	2.9	(4.3)	7	(2.13)	3/8"-16
1 1/2"	(40)	1.900	(48.2)	.145	(3.7)	2.7	(4.0)	3.6	(5.3)	9	(2.74)	3/8"-16
2"	(50)	2.375	(60.3)	.154	(3.9)	3.6	(5.4)	5.0	(7.5)	10	(3.05)	3/8"-16
2 1/2"	(65)	2.875	(73.0)	.203	(5.1)	5.8	(8.6)	7.9	(11.7)	11	(3.35)	1/2"-13
3"	(80)	3.500	(88.9)	.216	(5.5)	7.6	(11.2)	10.8	(15.9)	12	(3.66)	1/2"-13
3 1/2"	(90)	4.000	(101.6)	.226	(5.7)	9.1	(13.5)	13.4	(19.8)	13	(3.96)	1/2"-13
4"	(100)	4.500	(114.3)	.237	(6.0)	10.8	(16.0)	16.3	(24.2)	14	(4.27)	5/8"-11
5"	(125)	5.563	(141.3)	.258	(6.5)	14.6	(21.7)	23.2	(34.6)	16	(4.87)	5/8"-11
6"	(150)	6.625	(168.3)	.280	(7.1)	19.0	(28.2)	31.5	(46.8)	17	(5.18)	3/4"-10
8"	(200)	8.625	(219.1)	.322	(8.2)	28.5	(42.5)	50.1	(74.6)	19	(5.79)	3/4"-10
10"	(250)	10.750	(273.0)	.365	(9.3)	40.5	(60.2)	74.6	(110.9)	22	(6.69)	7/8"-9
12"	(300)	12.750	(323.8)	.406	(10.3)	51.1	(75.9)	102.1	(151.9)	23	(7.01)	7/8"-9
14"	(350)	14.000	(355.6)	.437	(11.1)	63.0	(93.7)	121.5	(180.7)	25	(7.62)	1"-8
16"	(400)	16.000	(406.4)	.500	(12.7)	83.0	(123.5)	159.5	(237.3)	27	(8.23)	1"-8
18"	(450)	18.000	(457.2)	.563	(14.3)	105.0	(156.2)	202.2	(300.8)	28	(8.53)	1"-8
20"	(500)	20.000	(508.0)	.593	(15.1)	123.0	(183.0)	243.4	(361.8)	30	(9.14)	1 1/4"-7
24"	(600)	24.000	(609.6)	.687	(17.4)	171.0	(254.5)	345.2	(513.7)	32	(9.75)	1 1/4"-7

Schedule 80 Steel Pipe Data

Nominal Pipe Size In.	mm	Pipe O.D. In.	mm	Wall Thickness In.	mm	Weight of Pipe Lbs./Ft.	kg/m	Weight of Pipe Filled With Water Lbs./Ft.	kg/m	Maximum Span* Ft.	Meter	Recommended Hanger Rod Sizes
3/8"	(10)	.675	(17.1)	.126	(3.2)	.7	(1.1)	.8	(1.2)	7	(2.13)	3/8"-16
1/2"	(15)	.840	(21.3)	.147	(3.7)	1.1	(1.6)	1.2	(1.7)	7	(2.13)	3/8"-16
3/4"	(20)	1.050	(26.7)	.154	(3.9)	1.5	(2.2)	1.7	(2.5)	7	(2.13)	3/8"-16
1"	(25)	1.315	(33.4)	.179	(4.5)	2.2	(3.2)	2.5	(3.6)	7	(2.13)	3/8"-16
1 1/4"	(32)	1.660	(42.1)	.191	(4.8)	3.0	(4.4)	3.5	(5.2)	7	(2.13)	3/8"-16
1 1/2"	(40)	1.900	(48.2)	.200	(5.1)	3.6	(5.4)	4.3	(6.5)	9	(2.74)	3/8"-16
2"	(50)	2.375	(60.3)	.218	(5.5)	5.0	(7.5)	6.3	(9.4)	10	(3.05)	3/8"-16
2 1/2"	(65)	2.875	(73.0)	.276	(7.0)	7.6	(11.4)	9.4	(14.1)	11	(3.35)	1/2"-13
3"	(80)	3.500	(88.9)	.300	(7.6)	10.2	(15.2)	13.0	(19.4)	12	(3.66)	1/2"-13
3 1/2"	(90)	4.000	(101.6)	.318	(8.1)	12.5	(18.6)	16.3	(24.3)	13	(3.96)	1/2"-13
4"	(100)	4.500	(114.3)	.337	(8.5)	15.0	(22.3)	20.0	(29.7)	14	(4.27)	5/8"-11
5"	(125)	5.563	(141.3)	.375	(9.5)	20.8	(30.9)	28.7	(42.6)	16	(4.87)	5/8"-11
6"	(150)	6.625	(168.3)	.432	(11.0)	28.6	(42.5)	39.9	(59.3)	17	(5.18)	3/4"-10
8"	(200)	8.625	(219.1)	.500	(12.7)	43.4	(64.5)	63.1	(93.9)	19	(5.79)	3/4"-10
10"	(250)	10.750	(273.0)	.593	(15.0)	64.5	(95.8)	95.5	(142.1)	22	(6.69)	7/8"-9
12"	(300)	12.750	(323.8)	.687	(17.4)	88.6	(131.8)	132.6	(197.3)	23	(7.01)	7/8"-9
14"	(350)	14.000	(355.6)	.750	(19.0)	107.0	(159.2)	158.2	(235.4)	25	(7.62)	1"-8
16"	(400)	16.000	(406.4)	.853	(21.4)	137.0	(203.9)	206.7	(306.6)	27	(8.23)	1"-8
18"	(450)	18.000	(457.2)	.937	(23.8)	171.0	(254.5)	259.5	(386.2)	28	(8.53)	1"-8
20"	(500)	20.000	(508.0)	1.031	(26.2)	209.0	(311.0)	318.4	(473.8)	30	(9.14)	1 1/4"-7
24"	(600)	24.000	(609.6)	1.218	(30.9)	297.0	(442.0)	455.2	(577.4)	32	(9.75)	1 1/4"-7

Based on ASTM A53-86.
1 cubic ft. of water weighs 62.41 lbs.
1 gallon (U.S.) weighs 8.335 lbs.
1 cubic meter of water weighs 999.97 kg.
1 liter weighs .999 kg.

Based on MSS SP-69 Table 3 & 4.
*Many codes require pipe hangers to be spaced every 10' (3.048 meters) regardless of size. Check local codes.
Spacing and capacities are based on water filled pipe. Closer hanger spacing may be required where additional valves and fittings increase the load.

AWWA Ductile Iron Pipe Data

Nominal Pipe Size In.	mm	Class	O.D. of Ductile Iron Pipe In.	mm	Wall Thickness In.	mm	Weight of Pipe Lbs./Ft.	kg/m	Weight of Pipe Filled With Water Lbs./Ft.	kg/m
3"	(80)	53	3.96	(100.6)	.31	(7.9)	11.2	(16.6)	15.0	(22.2)
4"	(100)	53	4.80	(121.9)	.32	(8.1)	14.2	(21.1)	20.1	(29.9)
6"	(150)	53	6.90	(175.2)	.34	(8.6)	22.0	(32.7)	35.1	(52.2)
8"	(200)	53	9.05	(229.9)	.36	(9.1)	31.0	(46.1)	54.0	(80.3)
10"	(250)	53	11.10	(281.9)	.38	(9.6)	40.4	(60.1)	76.8	(114.2)
12"	(300)	53	13.20	(335.3)	.40	(10.1)	50.7	(75.4)	103.0	(153.2)
14"	(350)	53	15.30	(388.6)	.42	(10.6)	62.4	(92.8)	133.5	(198.6)
16"	(400)	53	17.40	(441.9)	.43	(10.9)	72.8	(108.3)	165.9	(246.8)
18"	(450)	53	19.50	(495.3)	.44	(11.1)	83.6	(124.4)	201.5	(299.8)
20"	(500)	53	21.60	(548.6)	.45	(11.4)	95.2	(141.7)	241.0	(358.7)
24"	(600)	53	25.80	(655.3)	.47	(11.9)	119.2	(177.4)	329.4	(490.2)
30"	(750)	53	32.00	(812.8)	.51	(12.9)	161.3	(240.0)	487.8	(597.1)
36"	(900)	53	38.30	(972.8)	.58	(14.7)	219.5	(326.6)	688.8	(1025.0)
42"	(1050)	53	44.50	(1130.3)	.65	(16.5)	285.2	(424.4)	920.1	(1369.2)
48"	(1200)	53	50.80	(1290.3)	.72	(18.3)	360.3	(536.2)	1189.2	(1769.7)
54"	(1350)	53	57.10	(1450.3)	.81	(20.6)	455.0	(677.1)	1502.2	(2135.5)

Based on AWWA C108-70, Table 8.2.
Add flange weight for flanged cast iron pipe.

Ductile Iron Pipe Size

Ductile Iron Pipe Size In.	mm	B3110	B3114	B3120	B3122	B3122A	B3124	B3126	B3117SL
3"	(80)	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	2 to 3 1/2	2 to 3 1/2	2 to 3 1/2
4"	(100)	4	4	4	4	4	4 to 6	4 to 6	4 to 6
6"	(150)	6	6	6	6	6	4 to 6	4 to 6	4 to 6
8"	(200)	10	8	8	8	8	8 to 10	8 to 10	8 to 10
10"	(250)	12	10	10	10	10	8 to 10	8 to 10	8 to 10
12"	(300)	12	12	12	12	12	12 to 14	12 to 14	12 to 14
14"	(350)	16	14	14	14	14	12 to 14	12 to 14	12 to 14
16"	(400)	18	16	16	16	16	16 to 20	16 to 20	16 to 20
18"	(450)	20	18	18	18	18	16 to 20	16 to 20	16 to 20
20"	(500)	24	20	20	20	20	16 to 20	16 to 20	16 to 20
24"	(600)	30	24	24	24	24	---	---	24

Ductile Iron Pipe Size In.	mm	B3118SL	B3119SL	B218	B219	B379	B479	B3114R	B3117R
3"	(80)	2 to 3 1/2	2 to 3 1/2	B218	B219-1	---	---	3 1/2	2 to 3 1/2
4"	(100)	4 to 6	4 to 6	B218	B219-2	---	---	4	4 to 6
6"	(150)	4 to 6	4 to 6	B218	B219-3	B379	---	6	4 to 6
8"	(200)	8 to 10	8 to 10	---	B219-4	B379	---	8	8 to 10
10"	(250)	8 to 10	8 to 10	---	B219-4	B379	---	10	8 to 10
12"	(300)	12 to 14	12 to 14	---	B219-5	B379	---	12	12 to 14
14"	(350)	12 to 14	12 to 14	---	---	B379	---	14	12 to 14
16"	(400)	16 to 20	16 to 20	---	---	B379	B479	16	16 to 20
18"	(450)	16 to 20	16 to 20	---	---	---	B479	18	16 to 20
20"	(500)	16 to 20	16 to 20	---	---	---	B479	20	16 to 20
24"	(600)	24	24	---	---	---	B479	24	24

Service Weight Cast Iron Soil Pipe Data - Bell and Spigot Type

Nominal Pipe Size		O.D. of Cast Iron Pipe		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
2"	(50)	2.25	(57.1)	.17	(4.3)	4.0	(5.9)	5.5	(8.1)
3"	(80)	3.25	(82.5)	.17	(4.3)	6.0	(8.9)	9.4	(13.9)
4"	(100)	4.25	(107.9)	.18	(4.6)	8.0	(11.9)	14.2	(21.1)
5"	(125)	5.25	(133.3)	.18	(4.6)	10.4	(15.5)	22.7	(33.8)
6"	(150)	6.25	(158.7)	.18	(4.6)	13.0	(19.3)	26.9	(40.0)
8"	(200)	8.38	(212.8)	.23	(5.8)	20.0	(29.7)	45.7	(67.9)
10"	(250)	10.50	(266.7)	.28	(7.1)	29.0	(43.1)	69.6	(103.5)
12"	(300)	12.50	(317.5)	.28	(7.1)	38.0	(56.5)	96.2	(143.1)
15"	(380)	15.62	(396.7)	.31	(7.9)	51.0	(75.9)	147.6	(219.6)

Based on ASTM A74 - Table 2.

Extra Weight Cast Iron Soil Pipe Data - Bell and Spigot Type

Nominal Pipe Size		O.D. of Cast Iron Pipe		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
2"	(50)	2.38	(60.4)	.190	(4.8)	5.0	(7.2)	6.6	(9.5)
3"	(80)	3.50	(88.9)	.250	(6.3)	9.0	(13.0)	12.7	(18.3)
4"	(100)	4.50	(114.3)	.250	(6.3)	12.0	(17.4)	18.5	(26.8)
5"	(125)	5.50	(139.7)	.250	(6.3)	15.0	(21.7)	25.2	(36.5)
6"	(150)	6.50	(165.1)	.250	(6.3)	19.0	(27.5)	33.7	(48.8)
8"	(200)	8.62	(218.9)	.310	(7.9)	30.0	(43.4)	56.1	(81.2)
10"	(250)	10.75	(273.0)	.375	(9.5)	43.0	(62.3)	83.8	(121.4)
12"	(300)	12.75	(323.8)	.375	(9.5)	54.0	(78.2)	112.8	(163.3)
15"	(380)	15.88	(403.3)	.440	(11.2)	75.0	(108.6)	166.8	(241.5)

Based on ASTM A74 - Table 1.

No Hub Cast Iron Soil Pipe Data

Nominal Pipe Size		O.D. of Cast Iron Pipe		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1 1/2"	(40)	1.90	(48.2)	.16	(4.0)	2.7	(4.0)	6.2	(9.2)
2"	(50)	2.35	(59.7)	.16	(4.0)	3.6	(5.3)	8.6	(12.5)
3"	(80)	3.35	(85.1)	.16	(4.0)	5.2	(7.7)	13.5	(20.0)
4"	(100)	4.38	(111.2)	.19	(4.8)	7.4	(11.0)	20.2	(30.0)
5"	(125)	5.30	(134.6)	.19	(4.8)	9.6	(14.3)	27.5	(41.0)
6"	(150)	6.30	(160.0)	.19	(4.8)	11.0	(16.3)	34.0	(50.5)
8"	(200)	8.38	(212.8)	.23	(5.8)	18.0	(26.8)	57.5	(85.6)

Based on Cast Iron Soil Pipe Institute Standards 301-72, Table 1.

Copper Tubing (Type L) Data

Nominal Tubing Size		O.D. Size		Wall Thickness		Weight of Tubing		Weight of Tubing Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1/4"	(6)	.375	(9.5)	.030	(.7)	.12	(.17)	.15	(.21)
3/8"	(10)	.500	(12.7)	.035	(.9)	.20	(.30)	.26	(.39)
1/2"	(15)	.625	(15.9)	.040	(1.0)	.28	(.41)	.38	(.56)
5/8"	(17)	.750	(19.0)	.042	(1.0)	.36	(.53)	.51	(.75)
3/4"	(20)	.875	(22.2)	.045	(1.1)	.45	(.67)	.66	(.98)
1"	(25)	1.125	(28.6)	.050	(1.3)	.65	(.97)	1.01	(1.50)
1 1/4"	(32)	1.375	(34.9)	.055	(1.4)	.88	(1.31)	1.42	(2.11)
1 1/2"	(40)	1.625	(41.3)	.060	(1.5)	1.14	(1.69)	1.91	(2.83)
2"	(50)	2.125	(54.0)	.070	(1.8)	1.75	(2.60)	3.09	(4.59)
2 1/2"	(65)	2.625	(66.7)	.080	(2.0)	2.48	(3.69)	4.54	(6.75)
3"	(80)	3.125	(79.4)	.090	(2.3)	3.33	(4.95)	6.28	(9.34)
3 1/2"	(90)	3.625	(92.1)	.100	(2.5)	4.29	(6.38)	8.28	(12.32)
4"	(100)	4.125	(104.8)	.110	(2.8)	5.38	(8.00)	10.57	(15.72)
5"	(125)	5.125	(130.2)	.125	(3.2)	7.61	(11.32)	15.69	(23.34)
6"	(150)	6.125	(155.6)	.140	(3.5)	10.20	(15.18)	21.81	(32.46)
8"	(200)	8.125	(206.4)	.200	(5.1)	19.29	(28.70)	39.49	(58.89)

Dimensions taken from ASTM B88-83.

Copper Tubing (Type K) Data

Nominal Tubing Size		O.D. Size		Wall Thickness		Weight of Tubing		Weight of Tubing Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1/4"	(6)	.375	(9.5)	.035	(.9)	.14	(.21)	.17	(.25)
3/8"	(10)	.500	(12.7)	.049	(1.2)	.27	(.40)	.32	(.47)
1/2"	(15)	.625	(15.9)	.049	(1.2)	.34	(.50)	.43	(.63)
5/8"	(17)	.750	(19.0)	.049	(1.2)	.42	(.62)	.56	(.83)
3/4"	(20)	.875	(22.2)	.065	(1.6)	.64	(.95)	.83	(1.23)
1"	(25)	1.125	(28.6)	.065	(1.6)	.84	(1.25)	1.18	(1.75)
1 1/4"	(32)	1.375	(34.9)	.065	(1.6)	1.04	(1.55)	1.57	(2.34)
1 1/2"	(40)	1.625	(41.3)	.072	(1.8)	1.36	(2.02)	2.10	(3.12)
2"	(50)	2.125	(54.0)	.083	(2.1)	2.06	(3.06)	3.37	(5.01)
2 1/2"	(65)	2.625	(66.7)	.095	(2.4)	2.92	(4.34)	4.92	(7.31)
3"	(80)	3.125	(79.4)	.109	(2.8)	4.00	(5.95)	6.96	(10.35)
3 1/2"	(90)	3.625	(92.1)	.120	(3.0)	5.12	(7.62)	9.02	(13.42)
4"	(100)	4.125	(104.8)	.134	(3.4)	6.51	(9.69)	11.57	(17.22)
5"	(125)	5.125	(130.2)	.160	(4.0)	9.67	(14.39)	17.67	(26.29)
6"	(150)	6.125	(155.6)	.192	(4.9)	13.87	(20.60)	25.07	(37.27)
8"	(200)	8.125	(206.4)	.271	(6.9)	25.90	(38.50)	45.40	(67.52)

Dimensions taken from ASTM B88-83.
1 cubic ft. of water weighs 62.41 lbs.
1 cubic meter of water weighs 999.97 kg.
1 gallon (U.S.) weighs 8.335 lbs.
1 liter weighs .999 kg.

Reference Data

Rod Size As Determined By Steel Pipe Size For Fire Protection

Nominal Tubing Size		Maximum Span		Recommended
In.	mm	Ft.	m	Hanger Rod Size
1/2"	(15)	5	(1.52)	3/8"-16
3/4"	(20)	5	(1.52)	3/8"-16
1"	(25)	6	(1.83)	3/8"-16
1 1/4"	(32)	7	(2.13)	3/8"-16
1 1/2"	(40)	8	(2.44)	3/8"-16
2"	(50)	8	(2.44)	3/8"-16
2 1/2"	(65)	9	(2.74)	1/2"-13
3"	(80)	10	(3.03)	1/2"-13
3 1/2"	(90)	11	(3.35)	1/2"-13
4"	(100)	12	(3.66)	1/2"-13
5"	(125)	13	(3.96)	1/2"-13
6"	(150)	14	(4.27)	5/8"-11
8"	(200)	16	(4.87)	3/4"-10

Based on MSS-SP-69, Table 3 & 4.

Glass Pipe Data - Regular Schedule

Nominal Pipe Size		O.D. Size		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1 1/2"	(40)	1.84	(46.7)	.12	(3.0)	0.6	(0.9)	1.5	(2.2)
2"	(50)	2.34	(59.4)	.14	(3.5)	0.9	(1.4)	2.3	(3.5)
3"	(80)	3.41	(86.6)	.17	(4.3)	1.6	(2.4)	4.8	(7.1)
4"	(100)	4.53	(115.0)	.20	(5.1)	2.6	(3.8)	8.4	(12.4)
6"	(150)	6.66	(169.1)	.24	(6.1)	4.7	(7.0)	17.5	(26.0)

Consult manufacturer for support spacing requirements.

Glass Pipe Data - Heavy Schedule

Nominal Pipe Size		O.D. Size		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1"	(25)	1.31	(33.3)	.16	(4.0)	0.6	(0.9)	0.9	(1.4)
1 1/2"	(40)	1.84	(46.7)	.17	(4.3)	0.8	(1.3)	1.5	(2.4)
2"	(50)	2.34	(59.4)	.17	(4.3)	1.1	(1.6)	2.4	(3.6)
3"	(80)	3.41	(86.6)	.20	(5.1)	2.0	(3.0)	5.0	(7.5)
4"	(100)	4.53	(115.0)	.26	(6.6)	3.4	(5.0)	8.8	(13.1)
6"	(150)	6.66	(169.1)	.33	(8.4)	6.3	(94)	18.7	(27.9)

Consult manufacturer for support spacing requirements.

Schedule 40 PVC Plastic Pipe Data

Nominal Pipe Size		Pipe O.D.		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1/8"	(3)	.405	(10.3)	.068	(1.7)	.04	(.06)	.06	(.09)
1/4"	(6)	.540	(13.7)	.088	(2.2)	.07	(.11)	.11	(.17)
3/8"	(10)	.675	(17.1)	.091	(2.3)	.10	(.14)	.18	(.26)
1/2"	(15)	.840	(21.3)	.109	(2.7)	.15	(.20)	.25	(.40)
3/4"	(20)	1.050	(26.7)	.113	(2.9)	.20	(.30)	.40	(.60)
1"	(25)	1.315	(33.4)	.133	(3.4)	.30	(.40)	.70	(.90)
1 1/4"	(32)	1.660	(42.1)	.140	(3.5)	.40	(.60)	1.00	(1.50)
1 1/2"	(40)	1.900	(48.2)	.145	(3.7)	.50	(.70)	1.40	(2.00)
2"	(50)	2.375	(60.3)	.154	(3.9)	.60	(.90)	2.00	(3.00)
2 1/2"	(65)	2.875	(73.0)	.203	(5.1)	1.00	(1.50)	3.10	(4.51)
3"	(80)	3.500	(88.9)	.216	(5.5)	1.30	(2.00)	4.50	(6.70)
3 1/2"	(90)	4.000	(101.6)	.226	(5.7)	1.60	(2.40)	5.90	(8.70)
4"	(100)	4.500	(114.3)	.237	(6.0)	1.90	(2.80)	7.40	(11.00)
5"	(125)	5.563	(141.3)	.258	(6.5)	2.80	(4.10)	11.40	(17.00)
6"	(150)	6.625	(168.3)	.280	(7.1)	3.30	(4.90)	15.40	(23.00)
8"	(200)	8.625	(219.1)	.322	(8.2)	5.30	(7.80)	26.90	(39.90)
10"	(250)	10.750	(273.0)	.366	(9.3)	7.50	(11.10)	41.60	(61.80)
12"	(300)	12.750	(323.8)	.406	(10.3)	10.00	(14.90)	58.50	(87.00)

Schedule 80 PVC Plastic Pipe Data

Nominal Pipe Size		Pipe O.D.		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
In.	mm	In.	mm	In.	mm	Lbs./Ft.	kg/m	Lbs./Ft.	kg/m
1/8"	(3)	.405	(10.3)	.095	(2.4)	.05	(.08)	.06	(.10)
1/4"	(6)	.540	(13.7)	.119	(3.0)	.09	(.14)	.12	(.18)
3/8"	(10)	.675	(17.1)	.126	(3.2)	.10	(.19)	.16	(.28)
1/2"	(15)	.840	(21.3)	.147	(3.7)	.10	(.20)	.20	(.30)
3/4"	(20)	1.050	(26.7)	.154	(3.9)	.20	(.40)	.40	(.70)
1"	(25)	1.315	(33.4)	.179	(4.5)	.40	(.50)	.70	(.90)
1 1/4"	(32)	1.660	(42.1)	.191	(4.8)	.50	(.80)	1.00	(1.60)
1 1/2"	(40)	1.900	(48.2)	.200	(5.1)	.60	(.90)	1.30	(2.00)
2"	(50)	2.375	(60.3)	.218	(5.5)	.90	(1.30)	2.20	(3.20)
2 1/2"	(65)	2.875	(73.0)	.276	(7.0)	1.30	(2.00)	3.10	(4.70)
3"	(80)	3.500	(88.9)	.300	(7.6)	1.80	(2.70)	4.60	(6.90)
3 1/2"	(90)	4.000	(101.6)	.318	(8.1)	2.20	(3.20)	6.00	(8.90)
4"	(100)	4.500	(114.3)	.337	(8.5)	2.60	(3.90)	7.60	(11.30)
5"	(125)	5.563	(141.3)	.375	(9.5)	4.10	(6.10)	12.00	(17.80)
6"	(150)	6.625	(168.3)	.432	(11.0)	5.00	(7.50)	16.30	(24.30)
8"	(200)	8.625	(219.1)	.500	(12.7)	8.00	(11.90)	27.80	(41.30)
10"	(250)	10.750	(273.0)	.593	(15.0)	11.90	(17.70)	43.20	(77.60)
12"	(300)	12.750	(323.8)	.687	(17.4)	16.30	(24.30)	60.30	(89.80)

1 cubic ft. of water weighs 62.41 lbs.
1 cubic meter of water weighs 999.97 kg.
1 gallon (U.S.) weighs 8.335 lbs.
1 liter weighs .999 kg.

Reference Data

Spacing Of Hangers For Schedule 40 PVC Plastic Pipe

Temperature	Support Spacing in Ft. (Meter) For Pipe Sizes of													
	1/2"-3/4"	(15-20)	1"-1 1/4"	(25-32)	1 1/2"-2"	(40-50)	2 1/2"	(65)	3"	(80)	4"	(100)	6"	(150)
20°F (-6.6°C)	5.00	(1.52)	5.50	(1.67)	5.80	(1.77)	6.66	(2.03)	6.80	(2.07)	7.33	(2.23)	7.80	(2.38)
40°F (4.4°C)	4.75	(1.45)	5.25	(1.60)	5.50	(1.67)	6.33	(1.93)	6.50	(1.98)	7.00	(2.13)	7.50	(2.28)
60°F (15.5°C)	4.50	(1.37)	5.00	(1.52)	5.25	(1.60)	6.00	(1.83)	6.25	(1.90)	6.50	(1.98)	7.00	(2.13)
80°F (26.6°C)	4.25	(1.29)	4.66	(1.42)	5.00	(1.52)	5.50	(1.67)	5.80	(1.77)	6.25	(1.90)	6.80	(2.07)
100°F (37.8°C)	4.00	(1.22)	4.33	(1.32)	4.66	(1.42)	5.25	(1.60)	5.50	(1.67)	5.80	(1.77)	6.33	(1.93)
110°F (43.3°C)	3.75	(1.14)	4.00	(1.22)	4.33	(1.32)	4.80	(1.46)	5.25	(1.60)	5.50	(1.67)	5.80	(1.77)
120°F (48.9°C)	3.33	(1.01)	3.75	(1.14)	3.80	(1.16)	4.50	(1.37)	4.75	(1.45)	5.00	(1.52)	5.33	(1.62)
130°F (54.4°C)	3.00	(.91)	3.33	(1.01)	3.50	(1.06)	4.00	(1.22)	4.25	(1.29)	4.50	(1.37)	4.80	(1.46)
140°F (60.0°C)	2.66	(.81)	2.80	(.85)	3.00	(.91)	3.50	(1.06)	3.66	(1.11)	3.80	(1.16)	4.25	(1.29)
150°F (65.5°C)	2.00	(.61)	2.25	(.68)	2.50	(.76)	2.80	(.85)	3.00	(.91)	3.25	(.99)	3.50	(1.06)

Spacing Of Hangers For Schedule 80 PVC Plastic Pipe

Temperature	Support Spacing in Ft. (Meter) For Pipe Sizes of													
	1/2"-3/4"	(15-20)	1"	(25)	1 1/4"-1 1/2"	(32-40)	2"	(50)	2 1/2"	(65)	3"	(80)	4"	(100)	6"	(150)
20°F (-6.6°C)	5.75	(1.75)	6.33	(1.93)	6.66	(2.03)	7.00	(2.13)	7.80	(2.38)	8.20	(2.50)	8.66	(2.64)	9.80	(2.99)
40°F (4.4°C)	5.50	(1.67)	6.00	(1.83)	6.33	(1.93)	6.50	(1.98)	7.50	(2.28)	7.75	(2.36)	8.25	(2.51)	9.33	(2.84)
60°F (15.5°C)	5.25	(1.60)	5.75	(1.75)	6.00	(1.83)	6.25	(1.90)	7.00	(2.13)	7.33	(2.23)	7.80	(2.38)	8.80	(2.68)
80°F (26.6°C)	4.80	(1.46)	5.33	(1.62)	5.66	(1.72)	6.00	(1.83)	6.66	(2.03)	7.00	(2.13)	7.33	(2.23)	8.33	(2.54)
100°F (37.8°C)	4.50	(1.37)	5.00	(1.52)	5.25	(1.60)	5.50	(1.67)	6.33	(1.93)	6.50	(1.98)	6.80	(2.07)	7.80	(2.38)
110°F (43.3°C)	4.33	(1.32)	4.60	(1.40)	4.80	(1.46)	5.12	(1.56)	5.80	(1.77)	6.00	(1.83)	6.33	(1.93)	7.33	(2.23)
120°F (48.9°C)	3.80	(1.16)	4.33	(1.32)	4.50	(1.37)	4.75	(1.45)	5.33	(1.62)	5.50	(1.67)	5.80	(1.77)	6.50	(1.98)
130°F (54.4°C)	3.50	(1.06)	3.80	(1.16)	4.00	(1.22)	4.33	(1.32)	4.75	(1.45)	5.00	(1.52)	5.25	(1.60)	6.00	(1.83)
140°F (60.0°C)	3.00	(.91)	3.33	(1.01)	3.50	(1.06)	3.66	(1.11)	4.25	(1.29)	4.33	(1.32)	4.66	(1.42)	5.12	(1.56)
150°F (65.5°C)	2.50	(.76)	2.75	(.84)	3.00	(.91)	3.12	(.95)	3.33	(1.01)	3.50	(1.06)	3.75	(1.14)	4.25	(1.29)

Hanger spacing for PVC plastic Pipe assumes fluid loads up to 1.35 specific gravity [85 Lbs./Ft.^{3} (136.5 kg/m^3)] but not concentrated heavy loads.

Rod Size As Determined By Steel Pipe Size For Fire Protection

Steel Pipe Size		Maximum Span		Rod Size
In.	mm	Ft.	m	
1"-1 1/4"	(25-30)	12	(3.66)	3/8"-16
1 1/2"-4"	(40-100)	15	(4.57)	3/8"-16
5"-8"	(125-200)	15	(4.57)	1/2"-13
10"-12"	(250-300)	15	(4.57)	5/8"-11

Based on NFPA 13.

Rod Size As Determined By Copper Tubing Size For Fire Protection

Copper Tubing Size		Maximum Span		Rod Size
In.	mm	Ft.	m	
3/4"-1"	(20-35)	8	(2.44)	3/8"-16
1 1/4"-1 1/2"	(32-40)	15	(3.05)	3/8"-16
2"-3"	(50-80)	15	(3.66)	3/8"-16
3 1/4"-4"	(90-100)	15	(4.57)	3/8"-16
5"-8"	(125-200)	15	(4.57)	1/2"-13

Based on NFPA 13.

Load Chart For Threaded Rod (ATR)

Rod Size	Root Area Thread		Maximum Safe Loads 650°F (349°C)		750°F (399°C)	
	In.^{2}	cm^2	Lbs.	kN	Lbs.	kN
3/8"-16	0.0678	(.43)	730	(3.24)	572	(2.54)
1/2"-13	0.126	(.81)	1350	(6.00)	1057	(4.70)
5/8"-11	0.202	(1.30)	2160	(9.60)	1692	(7.52)
3/4"-10	0.302	(1.95)	3230	(14.37)	2530	(11.25)
7/8"-9	0.419	(2.70)	4480	(19.93)	3508	(15.60)
1"-8	0.551	(3.55)	5900	(26.24)	4620	(20.55)
1 1/8"-7	0.693	(4.47)	7450	(33.14)	5830	(25.93)
1 1/4"-7	0.890	(5.74)	9500	(42.25)	7440	(33.09)
1 1/2"-6	1.290	(8.32)	13800	(61.38)	10807	(48.07)
1 3/4"-5	1.740	(11.22)	18600	(82.73)	14566	(64.79)
2"-4 1/2	2.300	(14.84)	24600	(109.42)	19625	(87.29)
2 1/4"-4 1/2	3.020	(19.48)	32300	(143.67)	25295	(112.51)
2 1/2"-4	3.720	(24.00)	39800	(177.03)	31169	(138.64)
2 3/4"-4	4.620	(29.80)	49400	(219.73)	38687	(172.08)
3"-4	5.620	(36.26)	60100	(267.32)	47066	(209.35)
3 1/4"-8UN	6.720	(43.35)	71900	(319.81)	56307	(250.45)
3 1/2"-8UN	7.920	(51.09)	84700	(376.74)	66331	(295.04)
3 3/4"-8UN	9,210	(59.42)	98500	(438.13)	77139	(343.11)

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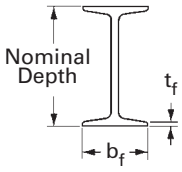
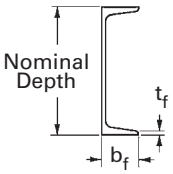




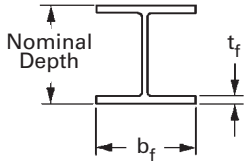
American Standard 'S' Shape I-Beams

Designation Nominal Depth & Weight		Flange Width b_f		Flange thickness t_f	
In. x Lbs./Ft.	(mm x kg/m)	in.	mm	in.	mm
S3 x 5.7	(S75 x 8.5)	2 3/8"	(59)	0.260	(6.6)
S3 x 7.5	(S75 x 11.2)	2 1/2"	(63)	0.260	(6.6)
S4 x 7.7	(S100 x 11.5)	2 5/8"	(68)	0.293	(7.4)
S4 x 9.5	(S100 x 14.1)	2 3/4"	(71)	0.293	(7.4)
S5 x 10	(S130 x 15)	3"	(76)	0.326	(8.3)
S5 x 14.75	(S130 x 22)	3 1/4"	(83)	0.326	(8.3)
S6 x 12.5	(S150 x 18.6)	3 3/8"	(85)	0.359	(9.1)
S6 x 17.25	(S150 x 25.7)	3 11/16"	(91)	0.359	(9.1)
S7 x 15.3	(S180 x 22.8)	3 5/8"	(93)	0.392	(10.0)
S7 x 20	(S180 x 29.8)	3 7/8"	(98)	0.392	(10.0)
S8 x 18.4	(S200 x 27.4)	4"	(102)	0.425	(10.8)
S8 x 23	(S200 x 34)	4 1/8"	(106)	0.425	(10.8)
S10 x 25.4	(S250 x 37.8)	4 5/8"	(118)	0.491	(12.5)
S10 x 35	(S250 x 52)	4 15/16"	(126)	0.491	(12.5)
S12 x 31.8	(S310 x 47.3)	5"	(127)	0.544	(13.8)
S12 x 35	(S310 x 52)	5 1/16"	(129)	0.544	(13.8)
S12 x 40.8	(S310 x 60.7)	5 1/4"	(133)	0.659	(16.7)
S12 x 50	(S310 x 74)	5 1/2"	(139)	0.659	(16.7)
S15 x 42.9	(S380 x 64)	5 1/2"	(140)	0.622	(15.8)
S15 x 50	(S380 x 74)	5 5/8"	(143)	0.622	(15.8)
S18 x 54.7	(S460 x 81.4)	6"	(152)	0.691	(17.6)
S18 x 70	(S460 x 104)	6 1/4"	(159)	0.691	(17.6)
S20 x 66	(S510 x 98.2)	6 1/4"	(159)	0.795	(20.2)
S20 x 75	(S510 x 112)	6 3/8"	(162)	0.795	(20.2)
S20 x 86	(S510 x 128)	7 1/16"	(179)	0.920	(23.4)
S20 x 96	(S510 x 143)	7 3/16"	(183)	0.920	(23.4)
S24 x 80	(S610 x 119)	7"	(178)	0.870	(22.1)
S24 x 90	(S610 x 134)	7 1/8"	(181)	0.870	(22.1)
S24 x 100	(S610 x 149)	7 1/4"	(184)	0.870	(22.1)
S24 x 106	(S610 x 158)	7 7/8"	(200)	1.090	(27.7)
S24 x 121	(S610 x 180)	8 1/16"	(204)	1.090	(27.7)

Dimensions taken from ASTM A6-86.

American Standard 'C' Shape I-Beams

Designation Nominal Depth & Weight		Flange Width b_f		Flange thickness t_f	
In. x Lbs./Ft.	(mm x kg/m)	in.	mm	in.	mm
C3 x 4.1	(C75 x 6.1)	1 3/8"	(35)	0.273	(6.9)
C3 x 5	(C75 x 7.4)	1 1/2"	(37)	0.273	(6.9)
C3 x 6	(C75 x 8.9)	1 5/8"	(40)	0.273	(6.9)
C4 x 5.4	(C100 x 8)	1 9/16"	(40)	0.296	(7.5)
C4 x 7.25	(C100 x 10.8)	1 3/4"	(44)	0.296	(7.5)
C5 x 6.7	(C130 x 10)	1 3/4"	(44)	0.320	(8.1)
C5 x 9	(C130 x 13.4)	1 7/8"	(47)	0.320	(8.1)
C6 x 8.2	(C150 x 12.2)	1 15/16"	(48)	0.343	(8.7)
C6 x 10.5	(C150 x 15.6)	2"	(51)	0.343	(8.7)
C6 x 13	(C150 x 19.3)	2 1/8"	(54)	0.343	(8.7)
C7 x 9.8	(C180 x 14.6)	2 1/16"	(53)	0.366	(9.3)
C7 x 12.25	(C180 x 18.2)	2 3/16"	(55)	0.366	(9.3)
C7 x 14.75	(C180 x 22)	2 1/4"	(57)	0.366	(9.3)
C8 x 11.5	(C200 x 17.1)	2 1/4"	(57)	0.390	(9.9)
C8 x 13.75	(C200 x 20.5)	2 3/8"	(59)	0.390	(9.9)
C8 x 18.75	(C200 x 27.9)	2 1/2"	(63)	0.390	(9.9)
C9 x 13.4	(C230 x 19.9)	2 7/16"	(61)	0.413	(10.5)
C9 x 15	(C230 x 22)	2 1/2"	(63)	0.413	(10.5)
C9 x 20	(C230 x 30)	2 5/8"	(67)	0.413	(10.5)
C10 x 15.3	(C250 x 22.8)	2 5/8"	(67)	0.436	(11.1)
C10 x 20	(C250 x 30)	2 3/4"	(69)	0.436	(11.1)
C10 x 25	(C250 x 37)	2 7/8"	(73)	0.436	(11.1)
C10 x 30	(C250 x 45)	3"	(76)	0.436	(11.1)
C12 x 20.7	(C310 x 30.8)	2 15/16"	(74)	0.501	(12.7)
C12 x 25	(C310 x 37)	3"	(76)	0.501	(12.7)
C12 x 30	(C310 x 45)	3 1/8"	(80)	0.501	(12.7)
C15 x 33.9	(C380 x 50.4)	3 3/8"	(86)	0.650	(16.5)
C15 x 40	(C380 x 60)	3 1/2"	(89)	0.650	(16.5)
C15 x 50	(C380 x 74)	3 3/4"	(94)	0.650	(16.5)
C18 x 42.7	(C460 x 63.5)	4"	(102)	0.625	(15.8)
C18 x 45.8	(C460 x 68.1)	4"	(102)	0.625	(15.8)
C18 x 51.9	(C460 x 77.2)	4 1/8"	(106)	0.625	(15.8)
C18 x 58	(C460 x 86.3)	4 1/4"	(112)	0.625	(15.8)



Wide Flange I-Beams

Designation Nominal Depth & Weight		Flange Width b_f		Flange thickness t_f	
In. x Lbs./Ft.	(mm x kg/m)	in.	mm	in.	mm
W4 x 13	(W100 x 19.3)	4 1/16"	(103)	0.345	(8.8)
W5 x 16	(W130 x 23.8)	5"	(127)	0.360	(9.1)
W5 x 19	(W130 x 28.1)	5"	(128)	0.430	(10.9)
W6 x 9	(W150 x 13.5)	3 15/16"	(100)	0.215	(5.5)
W6 x 12	(W150 x 18.0)	4"	(101)	0.280	(7.1)
W6 x 16	(W150 x 24.0)	4"	(101)	0.405	(10.3)
W6 x 20	(W150 x 29.8)	6"	(153)	0.365	(9.3)
W6 x 25	(W150 x 37.1)	6 1/16"	(154)	0.455	(11.6)
W8 x 10	(W200 x 15.0)	3 15/16"	(100)	0.205	(5.2)
W8 x 13	(W200 x 19.3)	4"	(101)	0.255	(6.5)
W8 x 15	(W200 x 22.5)	4"	(101)	0.315	(8.0)
W8 x 18	(W200 x 26.6)	5 1/4"	(133)	0.330	(8.4)
W8 x 21	(W200 x 31.3)	5 1/4"	(133)	0.400	(10.2)
W8 x 24	(W200 x 35.9)	6 1/2"	(165)	0.400	(10.2)
W8 x 28	(W200 x 41.7)	6 1/2"	(166)	0.465	(11.8)
W8 x 31	(W200 x 46.1)	8"	(203)	0.435	(11.0)
W8 x 35	(W200 x 52)	8"	(203)	0.495	(12.6)
W8 x 40	(W200 x 59)	8 1/16"	(205)	0.560	(14.2)
W8 x 48	(W200 x 71)	8 1/8"	(206)	0.685	(17.4)
W8 x 58	(W200 x 86)	8 1/4"	(209)	0.810	(20.6)
W8 x 67	(W200 x 100)	8 1/4"	(210)	0.935	(23.7)
W10 x 12	(W250 x 17.9)	4"	(101)	0.210	(5.3)
W10 x 15	(W250 x 22.3)	4"	(101)	0.270	(6.9)
W10 x 17	(W250 x 25.3)	4"	(101)	0.330	(8.4)
W10 x 19	(W250 x 28.4)	4"	(101)	0.395	(10.0)
W10 x 22	(W250 x 32.7)	5 3/4"	(146)	0.360	(9.1)
W10 x 26	(W250 x 38.5)	5 3/4"	(147)	0.440	(11.2)
W10 x 30	(W250 x 44.8)	5 13/16"	(148)	0.510	(13.0)
W10 x 33	(W250 x 49.1)	7 15/16"	(202)	0.435	(11.0)
W10 x 39	(W250 x 58)	8"	(203)	0.530	(13.5)
W10 x 45	(W250 x 67)	8"	(203)	0.620	(15.7)
W10 x 49	(W250 x 73)	10"	(254)	0.560	(14.2)
W10 x 54	(W250 x 80)	10 1/16"	(255)	0.615	(15.6)
W10 x 60	(W250 x 89)	10 1/16"	(256)	0.680	(17.3)
W10 x 68	(W250 x 101)	10 1/8"	(257)	0.770	(19.6)
W10 x 77	(W250 x 115)	10 3/16"	(259)	0.870	(22.1)
W10 x 88	(W250 x 131)	10 1/4"	(261)	0.990	(25.1)
W10 x 100	(W250 x 149)	10 3/8"	(263)	1.120	(28.4)
W10 x 112	(W250 x 167)	10 7/16"	(265)	1.250	(31.8)

Designation Nominal Depth & Weight		Flange Width b_f		Flange thickness t_f	
In. x Lbs./Ft.	(mm x kg/m)	in.	mm	in.	mm
W12 x 14	(W310 x 21.0)	4"	(101)	0.225	(5.7)
W12 x 16	(W310 x 23.8)	4"	(101)	0.265	(6.7)
W12 x 19	(W310 x 28.3)	4"	(101)	0.350	(8.9)
W12 x 22	(W310 x 32.7)	4"	(101)	0.425	(10.8)
W12 x 26	(W310 x 38.7)	6 1/2"	(165)	0.380	(9.7)
W12 x 30	(W310 x 44.5)	6 1/2"	(165)	0.440	(11.2)
W12 x 35	(W310 x 52)	6 9/16"	(167)	0.520	(13.2)
W12 x 40	(W310 x 60)	8"	(203)	0.515	(13.1)
W12 x 45	(W310 x 67)	8 1/16"	(205)	0.575	(14.6)
W12 x 50	(W310 x 74)	8 1/16"	(205)	0.640	(16.3)
W12 x 53	(W310 x 79)	10"	(254)	0.575	(14.6)
W12 x 58	(W310 x 86)	10"	(254)	0.640	(16.3)
W12 x 65	(W310 x 97)	12"	(306)	0.605	(15.4)
W12 x 72	(W310 x 107)	12"	(306)	0.670	(17.0)
W12 x 79	(W310 x 117)	12 1/16"	(307)	0.735	(18.7)
W12 x 87	(W310 x 129)	12 1/8"	(308)	0.810	(20.6)
W12 x 96	(W310 x 143)	12 1/8"	(308)	0.900	(22.9)
W12 x 106	(W310 x 158)	12 1/4"	(310)	0.990	(25.1)
W12 x 120	(W310 x 179)	12 5/16"	(313)	1.105	(28.1)
W12 x 136	(W310 x 202)	12 3/8"	(315)	1.250	(31.8)
W12 x 152	(W310 x 226)	12 1/2"	(317)	1.400	(35.6)
W12 x 170	(W310 x 253)	12 9/16"	(319)	1.560	(39.6)
W12 x 190	(W310 x 283)	12 11/16"	(322)	1.735	(44.1)
W12 x 210	(W310 x 313)	12 3/4"	(325)	1.900	(48.3)
W12 x 230	(W310 x 342)	12 7/8"	(328)	2.070	(52.6)
W12 x 252	(W310 x 375)	13"	(330)	2.250	(57.2)
W14 x 22	(W360 x 32.9)	5"	(127)	0.335	(8.5)
W14 x 26	(W360 x 39.0)	5"	(127)	0.420	(10.7)
W14 x 30	(W360 x 44.8)	6 3/4"	(172)	0.385	(9.8)
W14 x 34	(W360 x 51)	6 3/4"	(172)	0.455	(11.6)
W14 x 38	(W360 x 57)	6 3/4"	(172)	0.515	(13.1)
W14 x 43	(W360 x 64)	8"	(203)	0.530	(13.5)
W14 x 48	(W360 x 72)	8"	(203)	0.595	(15.1)
W14 x 53	(W360 x 79)	8 1/16"	(205)	0.660	(16.8)
W14 x 61	(W360 x 91)	10"	(254)	0.645	(16.4)
W14 x 68	(W360 x 101)	10"	(254)	0.720	(18.3)
W14 x 74	(W360 x 110)	10 1/16"	(256)	0.785	(19.9)
W14 x 82	(W360 x 122)	10 1/8"	(257)	0.855	(21.7)
W14 x 90	(W360 x 134)	14 1/2"	(369)	0.710	(18.0)

Dimensions taken from ASTM A6-86.

(Continued on next page)

Wide Flange I-Beams (Continued)

Designation Nominal Depth & Weight		Flange Width b_f		Flange thickness t_f	
In. x Lbs./Ft.	(mm x kg/m)	In.	mm	In.	mm
W14 x 99	(W360 x 147)	14 9/16"	(370)	0.780	(19.8)
W14 x 109	(W360 x 162)	14 5/8"	(371)	0.860	(21.8)
W14 x 120	(W360 x 179)	14 11/16"	(373)	0.940	(23.9)
W14 x 132	(W360 x 196)	14 3/4"	(374)	1.030	(26.2)
W14 x 145	(W360 x 216)	15 1/2"	(394)	1.090	(27.7)
W14 x 159	(W360 x 237)	15 9/16"	(395)	1.190	(30.2)
W14 x 176	(W360 x 262)	15 5/8"	(397)	1.310	(33.3)
W14 x 193	(W360 x 287)	15 3/4"	(400)	1.440	(36.6)
W14 x 211	(W360 x 314)	15 3/4"	(400)	1.560	(39.6)
W14 x 233	(W360 x 347)	15 7/8"	(403)	1.720	(43.7)
W14 x 257	(W360 x 382)	16"	(406)	1.890	(48.0)
W14 x 283	(W360 x 421)	16 1/8"	(409)	2.070	(52.6)
W14 x 311	(W360 x 463)	16 1/4"	(413)	2.260	(57.4)
W14 x 342	(W360 x 509)	16 3/8"	(416)	2.470	(62.7)
W14 x 370	(W360 x 551)	16 1/2"	(419)	2.660	(67.6)
W14 x 398	(W360 x 592)	16 9/16"	(421)	2.845	(72.3)
W14 x 426	(W360 x 634)	16 11/16"	(424)	3.035	(77.1)
W16 x 26	(W410 x 38.8)	5 1/2"	(140)	0.345	(8.8)
W16 x 31	(W410 x 46.1)	5 1/2"	(140)	0.440	(11.2)
W16 x 36	(W410 x 53)	7"	(178)	0.430	(10.9)
W16 x 40	(W410 x 60)	7"	(178)	0.505	(12.8)
W16 x 45	(W410 x 67)	7"	(178)	0.565	(14.4)
W16 x 50	(W410 x 75)	7 1/16"	(179)	0.630	(16.0)
W16 x 57	(W410 x 85)	7 1/8"	(181)	0.715	(18.2)
W16 x 67	(W410 x 100)	10 1/4"	(260)	0.665	(16.9)
W16 x 77	(W410 x 114)	10 5/16"	(262)	0.760	(19.3)
W16 x 89	(W410 x 132)	10 3/8"	(263)	0.875	(22.2)
W16 x 100	(W410 x 149)	10 7/16"	(265)	0.985	(25.0)
W18 x 35	(W460 x 52)	6"	(152)	0.425	(10.8)
W18 x 40	(W460 x 60)	6"	(152)	0.525	(13.3)
W18 x 46	(W460 x 68)	6 1/16"	(154)	0.605	(15.4)
W18 x 50	(W460 x 74)	7 1/2"	(190)	0.570	(14.5)
W18 x 55	(W460 x 82)	7 1/2"	(190)	0.630	(16.0)
W18 x 60	(W460 x 89)	7 9/16"	(192)	0.695	(17.7)
W18 x 65	(W460 x 97)	7 9/16"	(192)	0.750	(19.0)
W18 x 71	(W460 x 106)	7 5/8"	(193)	0.810	(20.6)
W18 x 76	(W460 x 113)	11"	(279)	0.680	(17.3)
W18 x 86	(W460 x 128)	11 1/16"	(281)	0.770	(19.6)
W18 x 97	(W460 x 144)	11 1/8"	(282)	0.870	(22.1)
W18 x 106	(W460 x 158)	11 3/16"	(284)	0.940	(23.9)
W18 x 119	(W460 x 177)	11 1/4"	(286)	1.060	(26.9)
W21 x 44	(W530 x 66)	6 1/2"	(165)	0.450	(11.4)
W21 x 50	(W530 x 74)	6 1/2"	(165)	0.535	(13.6)
W21 x 57	(W530 x 85)	6 9/16"	(167)	0.650	(16.5)
W21 x 62	(W530 x 92)	8 1/4"	(209)	0.615	(15.6)
W21 x 68	(W530 x 101)	8 1/4"	(209)	0.685	(17.4)
W21 x 73	(W530 x 109)	8 1/4"	(209)	0.740	(18.8)
W21 x 83	(W530 x 123)	8 7/8"	(213)	0.835	(21.2)
W21 x 93	(W530 x 138)	8 7/16"	(214)	0.930	(23.6)
W21 x 101	(W530 x 150)	12 1/4"	(311)	0.800	(20.3)
W21 x 111	(W530 x 165)	12 3/8"	(314)	0.875	(22.2)
W21 x 122	(W530 x 182)	12 3/8"	(314)	0.960	(24.4)
W21 x 132	(W530 x 196)	12 7/16"	(316)	0.035	(26.3)
W21 x 147	(W530 x 219)	12 1/2"	(317)	0.150	(29.2)
W24 x 55	(W610 x 82)	7"	(178)	0.505	(12.8)
W24 x 62	(W610 x 92)	7 1/16"	(179)	0.590	(15.0)
W24 x 68	(W610 x 101)	8 15/16"	(227)	0.585	(14.9)
W24 x 76	(W610 x 113)	9"	(228)	0.680	(17.3)
W24 x 84	(W610 x 125)	9"	(228)	0.770	(19.6)
W24 x 94	(W610 x 140)	9 1/16"	(230)	1.875	(22.2)
W24 x 104	(W610 x 155)	12 3/4"	(324)	1.750	(19.0)
W24 x 117	(W610 x 174)	12 3/4"	(324)	0.850	(21.6)
W24 x 131	(W610 x 195)	12 7/8"	(327)	0.960	(24.4)
W24 x 146	(W610 x 217)	12 7/8"	(327)	1.090	(27.7)
W24 x 162	(W610 x 241)	12 15/16"	(328)	1.220	(31.0)
W27 x 84	(W690 x 125)	9 15/16"	(252)	0.640	(16.3)
W27 x 94	(W690 x 140)	10"	(254)	0.745	(18.9)
W27 x 102	(W690 x 152)	10"	(254)	0.830	(21.1)
W27 x 114	(W690 x 170)	10 1/16"	(255)	0.930	(23.6)
W27 x 146	(W690 x 217)	13 15/16"	(354)	0.975	(24.8)
W27 x 161	(W690 x 240)	14"	(355)	1.080	(27.4)
W27 x 178	(W690 x 265)	14 1/16"	(357)	1.190	(30.2)
W30 x 99	(W760 x 147)	10 7/16"	(265)	0.670	(17.0)
W30 x 108	(W760 x 161)	10 1/2"	(267)	0.760	(19.3)
W30 x 116	(W760 x 173)	10 1/2"	(267)	0.850	(21.6)
W30 x 124	(W760 x 185)	10 1/2"	(267)	0.930	(23.6)
W30 x 132	(W760 x 196)	10 9/16"	(268)	1.000	(25.4)
W30 x 173	(W760 x 257)	15"	(381)	1.065	(27.1)
W30 x 191	(W760 x 284)	15"	(381)	1.185	(30.1)
W30 x 211	(W760 x 314)	15 1/8"	(384)	1.315	(33.4)
W33 x 118	(W840 x 176)	11 1/2"	(292)	0.740	(18.8)
W33 x 130	(W840 x 193)	11 1/2"	(292)	0.855	(21.7)
W33 x 141	(W840 x 210)	11 1/2"	(292)	0.960	(24.4)
W33 x 152	(W840 x 226)	11 9/16"	(294)	1.055	(26.8)
W33 x 201	(W840 x 299)	15 3/4"	(400)	1.150	(29.2)
W36 x 135	(W920 x 201)	11 15/16"	(303)	0.790	(20.1)
W36 x 150	(W920 x 223)	12"	(305)	0.940	(23.9)
W36 x 160	(W920 x 238)	12"	(305)	1.020	(25.9)
W36 x 170	(W920 x 253)	12"	(305)	1.100	(27.9)
W36 x 182	(W920 x 271)	12 1/16"	(306)	1.180	(30.0)
W36 x 194	(W920 x 289)	12 1/8"	(308)	1.260	(32.0)
W36 x 210	(W920 x 313)	12 3/16"	(309)	1.360	(34.5)

Dimensions taken from ASTM A6-86.

Reference Data

MSS To B-Line & Federal Specification Cross Reference

MSS SP-69 MSS SP-58	B-Line Part No.	A-A-1192A WW-H-171E
Type 1	B3100	Type 1
Type 1	B3100C	Type 1
Type 1	B3100F	Type 1
Type 1	B3102	Type 1
Type 1*	B3104	Type 12
Type 1	B3104CT	Type 12
Type 1	B3106	–
Type 1	B3108	Type 1
Type 1	B3109	–
Type 3	B3144	Type 3
Type 3	B3146	Type 3
Type 4	B3140	Type 4
Type 4	B3141	Type 4
Type 4	B3142	Type 4
Type 5	B3690	–
Type 5	B3690C	–
Type 5	B3690F	–
Type 6	B3171	Type 6
Type 8	B3373	Type 8
Type 8	B3373C	Type 8
Type 8	B3373CT	Type 8
Type 8	B3373CTC	Type 8
Type 10	200	Type 10
Type 10	200C	Type 10
Type 10	200F	Type 10
Type 10	200H	Type 10
Type 10	2	Type 10
Type 10	B3170CT	Type 10
Type 10	B3170CTC	Type 10
Type 10	2F	Type 10
Type 12	B3198H	Type 25
Type 12	B3198HCT	Type 25
Type 12	B3198R	Type 25
Type 12	B3198RCT	Type 25
Type 13	B3202	Type 13
Type 14	B3201	Type 14
Type 15	B3224	Type 15
Type 15	B3224CT	Type 15
Type 16	B3222	Type 16
Type 17	B3200	Type 17
Type 18	B22I, B32I, B52I	–
Type 18	B2500	Type 19
Type 18	B2503	–
Type 18	B2505-B2508	–
Type 18	B3014	Type 18
Type 19	65	Type 23
Type 19	65XT	Type 23
Type 19	66	Type 23
Type 19	67SS	–
Type 19	68S	Type 23
Type 19	68SS	–
Type 19	68W	Type 23
Type 19	B303-B309	Type 19

* For all finishes excluding plain.

MSS SP-69 MSS SP-58	B-Line Part No.	A-A-1192A WW-H-171E
Type 19	B321	Type 19
Type 19	B3031	Type 19
Type 19 & 23	B3033	Type 19 & 23
Type 19 & 23	B3034	Type 19 & 23
Type 21	B3050	Type 21
Type 21	B3055	Type 21
Type 22	B3083	Type 22
Type 23	B351L	Type 23
Type 23	B3036L	Type 23
Type 23	B3037	Type 23
Type 24	B3188	Type 24
Type 24	B3188C	Type 24
Type 25	B3045	Type 53
Type 26	B2400	Type 26
Type 26	B3180	Type 26
Type 26	B3180FL	Type 26
Type 27	B3040	Type 54
Type 28	B3291, B3292 B3294, B3296 B3298	Type 28
Type 29	B3293, B3295 B3297	Type 29
Type 30	B3054	Type 30
Type 31	B3065	Type 32
Type 31	B3068	Type 32
Type 32	B3066	Type 33
Type 33	B3067	Type 34
Type 34	B3058	Type 35
Type 34	B3060	Type 35
Type 34	B3060L	Type 35
Type 34	B3062	Type 35
Type 34	B3070	Type 35
Type 35	B3891-B3897	Type 35
Type 35	B3991 & B3993	Type 35
Type 36	B3095	Type 37
Type 37	B3090	Type 38
Type 37	B3092	Type 38
Type 37	B3094	Type 38
Type 37	B3097	Type 38
Type 38	B3093	Type 39
Type 38	B3096	Type 39
Type 39A & 39B	B3160-B3165	Type 40A & 40B
Type 40	B3151	Type 41
Type 41	B3114	Type 42
Type 41	B3122	Type 42
Type 41	B3122A	Type 42
Type 43	B3110	Type 44
Type 44	B3117SL	Type 45
Type 44	B3120	Type 45
Type 45	B3119SL	Type 46
Type 46	B3118SL	Type 47
Type 48	B3262	Type 49
Type 49	B3264	Type 50
Type 57	B3080S & L	–

Federal Specification To B-Line & MSS Cross Reference

A-A-1192A WW-H-171E	B-Line Part No.	MSS SP-69 MSS SP-58
–	B3106	Type 1
–	B3109	Type 1
–	B3690	Type 5
–	B3690C	Type 5
–	B3690F	Type 5
–	B22I, B32I, B52I	Type 18
–	B2503	Type 18
–	B2505-B2508	Type 18
–	67SS	Type 19
–	68SS	Type 19
–	B3080 S & L	Type 57
Type 1	1NFPA	Type 1
Type 1	B3100	Type 1
Type 1	B3100C	Type 1
Type 1	B3100F	Type 1
Type 1	B3102	Type 1
Type 1	B3104	Type 1
Type 1	B3108	Type 1
Type 3	B3144	Type 3
Type 3	B3146	Type 3
Type 4	B3140	Type 4
Type 4	B3141	Type 4
Type 4	B3142	Type 4
Type 6	B3171	Type 6
Type 8	B3373	Type 8
Type 8	B3373C	Type 8
Type 8	B3373CT	Type 8
Type 8	B3373CTC	Type 8
Type 10	200	Type 10
Type 10	200C	Type 10
Type 10	200F	Type 10
Type 10	200H	Type 10
Type 10	2 & 2F	Type 10
Type 10	B3170CT	Type 10
Type 10	B3170CTC	Type 10
Type 12	B3104	Type 1*
Type 12	B3104C	Type 1*
Type 12	B3104CT	Type 1
Type 13	B3202	Type 13
Type 14	B3201	Type 14
Type 15	B3224	Type 15
Type 15	B3224CT	Type 15
Type 16	B3222	Type 16
Type 17	B3200	Type 17
Type 18	B3014	Type 18
Type 19	B303-B309	Type 19
Type 19	B321	Type 19
Type 19	B2500	Type 18
Type 19	B3031	Type 19
Type 19 & 23	B3033	Type 19 & 23
Type 19 & 23	B3034	Type 19 & 23
Type 21	B3050	Type 21
Type 21	B3055	Type 21
Type 22	B3083	Type 22
Type 23	65 & 65XT	Type 19
Type 23	66	Type 19
Type 23	68S & 68W	Type 19
Type 23	B351L	Type 23
Type 23	B3036L	Type 23
Type 23	B3037	Type 23
Type 24	B3188	Type 24
Type 24	B3188C	Type 24
Type 25	B3198H	Type 12
Type 25	B3198HCT	Type 12
Type 25	B3198R	Type 12
Type 25	B3198RCT	Type 12
Type 26	B2400	Type 26
Type 26	B3180	Type 26
Type 26	B3180FL	Type 26
Type 28	B3291, B3292 B3294, B3296 B3298	Type 28
Type 29	B3293, B3295 B3297	Type 29
Type 30	B3054	Type 30
Type 32	B3065	Type 31
Type 32	B3068	Type 31
Type 33	B3066	Type 32
Type 34	B3067	Type 33
Type 35	B3058	Type 34
Type 35	B3060	Type 34
Type 35	B3060L	Type 34
Type 35	B3062	Type 34
Type 35	B3070	Type 34
Type 35	B3891-B3897	Type 35
Type 35	B3991 & B3993	Type 35
Type 37	B3095	Type 36
Type 38	B3090	Type 37
Type 38	B3092	Type 37
Type 38	B3094	Type 37
Type 38	B3097	Type 37
Type 39	B3093	Type 38
Type 39	B3096	Type 38
Type 40A & 40B	B3160-3165	Type 39A & 39B
Type 41	B3151	Type 40
Type 42	B3114	Type 41
Type 42	B3122	Type 41
Type 42	B3122A	Type 41
Type 44	B3110	Type 43
Type 45	B3117SL	Type 44
Type 45	B3120	Type 44
Type 46	B3119SL	Type 45
Type 47	B3118SL	Type 46
Type 49	B3262	Type 48
Type 50	B3264	Type 49
Type 53	B3045	Type 25
Type 54	B3040	Type 27

* For all finishes excluding plain.

Items in these tables are inclusive of the entire B-Line Pipe Hanger catalog line. Many of these items are not included elsewhere in this catalog. They can be found in the current pipe hanger catalog.

Reference Data

B-Line Compliances & Approvals

Part No.	ANSI/MSS SP-69 ANSI/MSS SP-58	A-A-1192A WW-H-171E	UL Listed	FM Approved
1NFPA	Type 1	Type 1	Yes	Yes
2	Type 10	Type 10	Yes	Yes
2F	Type 10	Type 10	Yes	Yes
4A	--	--	Yes	--
4B	--	--	Yes	--
4L	--	--	Yes	Yes
4LA	--	--	Yes	Yes
22	--	--	Yes	--
22L2	--	--	Yes	--
23	--	--	Yes	--
24	--	--	Yes	--
25	--	--	Yes	--
28	--	--	Yes	--
28M	--	--	Yes	--
29	--	--	Yes	--
50	--	--	Yes	Yes
51	--	--	Yes	Yes
56	--	--	Yes	Yes
58	--	--	Yes	Yes
65	--	--	Yes	--
65XT	--	--	Yes	Yes
66	--	--	Yes	--
67SS	--	--	Yes	--
68S	Type 19 & 23	Type 19 & 23	Yes	Yes
68SS	--	--	Yes	--
68W	Type 19 & 23	Type 19 & 23	Yes	Yes
69	--	--	Yes	--
69R	--	--	Yes	--
75	--	--	Yes	--
78	--	--	Yes	--
109A	--	--	Yes	--
109AF	--	--	Yes	--
120RWA	--	--	Yes	--
130	--	--	Yes	Yes
200	Type 10	Type 10	Yes	Yes
200C	Type 10	Type 10	--	--
200F	Type 10	Type 10	--	--
200H	Type 10	Type 10	Yes	--
200M	Type 10	Type 10	Yes	Yes
800	--	--	Yes	Yes
825	--	--	Yes	Yes
825A	--	--	Yes	--
828	--	--	Yes	Yes
906	--	--	Yes	--
909	--	--	Yes	--
910	--	--	Yes	--
975	--	--	Yes	--
980	--	--	Yes	Yes
980H	--	--	Yes	Yes
1000	--	--	Yes	Yes
1001	--	--	Yes	Yes
2002	--	--	Yes	--
B22I	Type 18	--	--	--
B32I	Type 18	--	--	--
B52I	Type 18	--	--	--
B351L	Type 23	Type 23	Yes	--
B2400	Type 26	Type 26	Yes	--
B2500	Type 18	Type 19	Yes	--
B2503	Type 18	--	--	--
B2505-B2508	Type 18	--	Yes	--
B3014	Type 18	Type 18	Yes	--
B3031	Type 19	Type 19	Yes	--
B3033	Type 19 & 23	Type 19 & 23	Yes	Yes
B3034	Type 19 & 23	Type 19 & 23	Yes	Yes
B3036L	Type 23	Type 23	Yes	--
B3037	Type 23	Type 23	Yes	--
B3040	Type 27	Type 27	--	--
B3042T	--	--	Yes	--
B3045	Type 25	Type 53	--	--
B3050	Type 21	Type 21	--	--
B3054	Type 30	Type 30	Yes	--
B3055	Type 21	Type 21	--	--
B3058	Type 34	Type 35	--	--
B3060	Type 34	Type 35	--	--
B3060L	Type 34	Type 35	--	--
B3062	Type 34	Type 35	--	--
B3065	Type 31	Type 32	--	--
B3066	Type 32	Type 33	--	--
B3067	Type 33	Type 34	--	--
B3068	Type 31	Type 32	--	--
B3070	Type 34	Type 35	--	--
B3080S & L	Type 57	--	--	--
B3083	Type 22	Type 22	--	--
B3090	Type 37	Type 38	--	--
B3092	Type 37	Type 38	--	--
B3093	Type 38	Type 39	--	--
B3094	Type 37	Type 38	--	--
B3095	Type 36	Type 37	--	--

Note: Refer to the catalog page for specific sizes that are UL Listed and/or FM Approved.

B-Line Compliances & Approvals

Part No.	ANSI/MSS SP-69 ANSI/MSS SP-58	A-A-1192A WW-H-171E	UL Listed	FM Approved
B3096	Type 38	Type 39	--	--
B3097	Type 37	Type 38	--	--
B3100	Type 1	Type 1	Yes	Yes
B3100C	Type 1	Type 1	--	--
B3100F	Type 1	Type 1	--	--
B3102	Type 1	--	--	--
B3104	Type 1*	Type 12	Yes	--
B3104C	Type 1*	Type 12	--	--
B3104CT	Type 1	Type 12	--	--
B3104CTC	Type 1	Type 12	--	--
B3104F	Type 1*	Type 12	--	--
B3106	Type 1	--	--	--
B3108	Type 1	Type 1	--	--
B3109	Type 1	--	--	--
B3110	Type 43	Type 44	--	--
B3114	Type 41	Type 42	--	--
B3117SL	Type 44	Type 45	--	--
B3118SL	Type 46	Type 47	--	--
B3119SL	Type 45	Type 46	--	--
B3120	Type 44	Type 45	--	--
B3122	Type 41	Type 42	--	--
B3122A	Type 41	Type 42	--	--
B3140	Type 4	Type 4	Yes	Yes
B3141	Type 4	Type 4	--	--
B3142	Type 4	Type 4	--	--
B3144	Type 3	Type 3	--	--
B3146	Type 3	Type 3	--	--
B3151	Type 40	Type 41	--	--
B3160-B3165	Type 39A & 39B	Type 40A & 40B	--	--
B3170CT	Type 10	Type 10	--	--
B3170CTC	Type 10	Type 10	--	--
B3180	Type 26	Type 26	--	--
B3180FL	Type 26	Type 26	--	--
B3184	--	--	Yes	--
B3188	Type 24	Type 24	Yes	--
B3188C	Type 24	Type 24	--	--
B3198H	Type 12	Type 25	--	--
B3198HCT	Type 12	Type 25	--	--
B3198R	Type 12	Type 25	--	--
B3198RCT	Type 12	Type 25	--	--
B3200	Type 17	Type 17	--	--
B3201	Type 14	Type 14	--	--
B3202	Type 13	Type 13	--	--
B3203	--	--	Yes	--
B3222	Type 16	Type 16	Yes	--
B3223	--	--	Yes	--
B3224	Type 15	Type 15	--	--
B3224CT	Type 15	Type 15	--	--
B3262	Type 48	Type 49	--	--
B3264	Type 49	Type 50	--	--
B3291, B3292 B3294, B3296 B3298	Type 28	Type 28	--	--
B3293, B3295 B3297	Type 29	Type 29	--	--
B3373	Type 8	Type 8	Yes	Yes
B3373C	Type 8	Type 8	--	--
B3373CT	Type 8	Type 8	--	--
B3373CTC	Type 8	Type 8	--	--
B3373F	Type 8	Type 8	--	--
B3690	Type 5	Type 5	--	--
B3690C	Type 5	Type 5	--	--
B3690F	Type 5	Type 5	--	--
B3891-B3897	Type 35	Type 35	--	--
B3991	Type 35	Type 35	--	--
B3993	Type 35	Type 35	--	--
B3993A	Type 35	Type 35	--	--

Note: Refer to the catalog page for specific sizes that are UL Listed and/or FM Approved.

Trapeze Hangers Using B-Line Strut Or Angle Iron

Trapeze Length		Nominal Pipe Size			
in.	mm	2 1/2" (65) or less	3" (80)	3 1/2" (90)	4" (100)
18"	(457.2)	1 1/2" x 1 1/2" x 3/16" B26SH	1 1/2" x 1 1/2" x 3/16" B26SH	1 1/2" x 1 1/2" x 3/16" B26SH	2" x 1 1/2" x 3/16" B22SH
24"	(609.6)	1 1/2" x 1 1/2" x 3/16" B26SH	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH
30"	(762.0)	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH
36"	(914.4)	2" x 1 1/2" x 3/16" B22SH	2" x 1 1/2" x 3/16" B22SH	2 1/2" x 1 1/2" x 3/16" B12SH	2 1/2" x 1 1/2" x 3/16" B12SH
48"	(1219.2)	2 1/2" x 1 1/2" x 3/16" B12SH	2 1/2" x 1 1/2" x 3/16" B12SH	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH
60"	(1524.0)	2 1/2" x 1 1/2" x 3/16" B12SH	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH	3" x 2" x 3/16" B11SH
72"	(1828.8)	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH
84"	(2133.6)	3" x 2" x 3/16" B11SH	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH	3" x 2" x 1/4" B11SH
96"	(2438.4)	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH	3" x 2" x 1/4" B11SH	3 1/2" x 2 1/2" x 5/16" B12SHA
108"	(2743.2)	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH	3 1/2" x 2 1/2" x 5/16" B12SHA	3 1/2" x 2 1/2" x 5/16" B12SHA
120"	(3048.0)	3" x 2" x 1/4" B11SH	3" x 2" x 1/4" B11SH	3 1/2" x 2 1/2" x 5/16" B12SHA	3 1/2" x 2 1/2" x 5/16" B12SHA

Based on NFPA 13-1999, Table 6-1..1.3 (a) & Table 6-1.1.3 (b).

Trapeze Hangers Using B-Line Strut Or Angle Iron

Trapeze Length		Nominal Pipe Size			
in.	mm	5" (125)	6" (150)	8" (200)	10" (250)
18"	(457.2)	2" x 1 1/2" x 3/16" B22SH	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH
24"	(609.6)	2 1/2" x 1 1/2" x 3/16" B12SH	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH
30"	(762.0)	2 1/2" x 1 1/2" x 3/16" B12SH	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH	3" x 2" x 1/4" B11SH
36"	(914.4)	3" x 2" x 3/16" B11SH	3" x 2" x 3/16" B11SH	3 1/2" x 2 1/2" x 1/4" B12SHA	3 1/2" x 2 1/2" x 5/16" B12SHA
48"	(1219.2)	3" x 2" x 3/16" B11SH	3" x 2" x 1/4" B11SH	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA
60"	(1524.0)	3" x 2" x 1/4" B11SH	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA
72"	(1828.8)	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA
84"	(2133.6)	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA	6" x 4" x 1/4" B12SHA4
96"	(2438.4)	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA	6" x 4" x 1/4" B12SHA4
108"	(2743.2)	3 1/2" x 2 1/2" x 5/16" B12SHA	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA	6" x 4" x 3/8" B11SHA4
120"	(3048.0)	4" x 3" x 5/16" B12SHA	5" x 3 1/2" x 5/16" B11SHA	6" x 4" x 1/4" B12SHA4	6" x 4" x 3/8" B11SHA4

Based on NFPA 13-1999, Table 6-1..1.3 (a) & Table 6-1.1.3 (b).

Reference Data - Crosses

TOLCO	B-Line
1 (Disc.)	B3100
1A (Disc.)	B3108
1CBS	B3100PS (Disc.)
1CI (Disc.)	B3102
1F (Disc.)	B3100F
1LD (Disc.)	B3104
1NFPA	1NFPA
1PVC (Disc.)	B3100C
1U (Disc.)	1U (Disc.)
1V (Disc.)	B3106
1VT (Disc.)	B3106V
2	B3170 (Disc.)
2F	B3170F (Disc.)
2FWON (Disc.)	N/A
2WON	N/A
3 (Disc.)	B3690
3F (Disc.)	B3690F
3PVC (Disc.)	B3690C
4 (Disc.)	B3140
4A	4A
4B	B386 (Disc.)
4CI (Disc.)	B3141
4F (Disc.)	B3140F
4H (Disc.)	B3142
4L	4L
4LA	4LA
4PVC (Disc.)	B3140C
5 (Disc.)	B3144
5H (Disc.)	B3146
6 (Disc.)	B3373
6F (Disc.)	B3373F
6PVC (Disc.)	B3373C
7 (Disc.)	B3148
8 (Disc.)	B3149
9 (Disc.)	B3132
9X (Disc.)	B3132W-1 &1½
14 (Disc.)	B3134
14X (Disc.)	B3134W
20 (Disc.)	B3180
20S (Disc.)	B3180FL
21 (Disc.)	N/A
22	B3181 (Disc.)
22L2	22L2
23	B3182 (Disc.)
24	B3183 (Disc.)
25	25
27B	27B
28	28
28M	28M
29	29
30 (Disc.)	B3068
30H (Disc.)	B3067
30L (Disc.)	B3065
30M (Disc.)	B3066
31-M (Disc.)	B3069W
31-O (Disc.)	B3069E
32-½ thru 4 (Disc.)	B3147A-½ thru 4
32-5 thru 34 (Disc.)	B3147B 5 thru 24
33 (Disc.)	B3084
34 (Disc.)	B3086
35 (Disc.)	B3085
40 (Disc.)	B3190
41 (Disc.)	B3191
42 (Disc.)	B3061
50	50
51	51
52 (Disc.)	B3070
56	56
58	58
60 (Disc.)	N/A
61 (Disc.)	B3042
61T (Disc.)	B3042T
62 (Disc.)	B3050
64 (Disc.)	B351L
65	65
65XT	65XT
66	66
67SS	67SS
68S	B3034
68SS	68SS
68W	B3033
69	B3367 (Disc.)
69R	69R
70 (Disc.)	B655
70R (Disc.)	B656
70S (Disc.)	B655
71 (Disc.)	B3220
75	75
78	78 & B3199
81 (Disc.)	B3104CT
81PVC (Disc.)	B3104CTC
82 (Disc.)	B3373CT
82PVC (Disc.)	B3373CTC
83 (Disc.)	B3195CT
84 (Disc.)	B3195
98	98
98B	98B
99	ATR
100 (Disc.)	ATR
101 (Disc.)	B3211
101L (Disc.)	B3211X
102 (Disc.)	B3210
102L (Disc.)	B3210X
103 (Disc.)	B3205
104 (Disc.)	B3212
105 (Disc.)	B3213
106 (Disc.)	B3214
107F (Disc.)	B2499
109A	B3019
109AF	B2501
110 (Disc.)	B3188
111 (Disc.)	B501
113 (Disc.)	HN
114 (Disc.)	HHN
115 (Disc.)	FW
116 (Disc.)	B3234
117 (Disc.)	LW
118 (Disc.)	B3248
119 (Disc.)	FFW
120	120
120MJ	120MJ
120RWA	120RWA
120W	120W
122 (Disc.)	N/A
123 (Disc.)	Toggle Bolts
124 (Disc.)	Toggle Bolt Head
125 (Disc.)	DS15x2
126 (Disc.)	N/A
130	B3052 (Disc.)
150 (Disc.)	N/A
200	B3170NF (Disc.)
200C	B3170NFC (Disc.)
200F	B3170NFF (Disc.)
200H	200H
200R (Disc.)	B3170NF (Disc.)
200WON (Disc.)	N/A
202 (Disc.)	B3170CT
203 (Disc.)	B3170NFC (Disc.)
207 (Disc.)	N/A
209 (Disc.)	AWA
219 (Disc.)	B3153
219 (Disc.)	B3155
220 (Disc.)	B3151
220 (Disc.)	B3154
260 (Disc.)	B3160
261 (Disc.)	B3161
262 (Disc.)	B3162
263 (Disc.)	B3163
264 (Disc.)	B3164
265 (Disc.)	B3165
301CT (Disc.)	B3198HCT
302 (Disc.)	B3198H
304 (Disc.)	B3083WO
305 (Disc.)	B3083
306 (Disc.)	B3224
307 (Disc.)	B3222
309 (Disc.)	B3014
309N (Disc.)	B3014N
310 (Disc.)	B2500
310N (Disc.)	N2500
311 (Disc.)	B3097
312 (Disc.)	B3096
313 (Disc.)	B3098

TOLCO	B-Line
314 (Disc.)	B3094
315 (Disc.)	N/A
316 (Disc.)	B3088
316T (Disc.)	B3088T
317 (Disc.)	B3095
317A (Disc.)	B3093
318 (Disc.)	B3090
318A (Disc.)	B3092
319 (Disc.)	B3089
322 (Disc.)	B3114
323 (Disc.)	N/A
324 (Disc.)	B3110
325 (Disc.)	B3120
326 (Disc.)	B3122
327 (Disc.)	B3117SL
328 (Disc.)	B3118SL
329 (Disc.)	B3054
330 (Disc.)	B3200
331 (Disc.)	B3202
332 (Disc.)	B3201
333 (Disc.)	B3203
335 (Disc.)	B3045
336 (Disc.)	B3040
337 (Disc.)	B3082
343 (Disc.)	B3080 L & S
405 (Disc.)	B3256
406 (Disc.)	B3257
420 (Disc.)	B3281 - B3287
421 (Disc.)	B3281 - B3287
422 (Disc.)	B3281 - B3287
422C (Disc.)	B3281 - B3287
425 (Disc.)	B3891
426 (Disc.)	B3891
426A (Disc.)	N/A
426AC (Disc.)	N/A
426AG (Disc.)	N/A
426C (Disc.)	N/A
426G (Disc.)	N/A
427 (Disc.)	N/A
428 (Disc.)	B3993-10
429 (Disc.)	B3891
430 (Disc.)	B3892
431 (Disc.)	B3393-10 /B3393-10B
432 (Disc.)	N/A
433 (Disc.)	N/A
434 (Disc.)	N/A
500 (Disc.)	B3264
506 (Disc.)	B3262
800	800
825	825
825A	825A
828	828
906	906

TOLCO	B-Line
907	907
909	909
910	910
975	975
980	980
981	981
985	985
986	986
990	990
991	991
1000	1000
1001	1001
2002	2002
Pipe Pier (Disc.)	DURA-BLOK™

(Disc.) = Discontinued Item

Items in these tables are inclusive of the entire B-Line Pipe Hanger catalog line. Many of these items are not included elsewhere in this catalog. They can be found in the current pipe hanger catalog.

B-Line	TOLCO
1CBS	1CBS
1U (Disc.)	1U (Disc.)
4A	4A
4B	4B
4L	4L
4LA	4LA
22	22
22L2	22L2
23	23
24	24
25	25
27B	27B
28	28
28M	28M
29	29
50	60
51	51
56	56
58	58
65	65
65XT	65XT
66	66
67S	67S
67SS	67SS
68SS	68SS
68W	68W
69	69
69R	69R
75	75
78	78
98	98
98B	98B
109A	109A
109AF	109AF
120	120
120MJ	120MJ
120RWA	120RWA
120W	120W
200	200
200C	200C
200F	200H
200H	200H
800	800
825	825
825A	825A
828	828
906	906
907	907
909	909
910	910
975	975
980	980
980H	980H
981	981
985	985
986	986
990	990
990H	990H
991	991
1000	1000
1001	1001
2002	2002
ATR	99
ATR	100 (Disc.)
AWA	209 (Disc.)
B22I	N/A
B32I	N/A
B52I	N/A
B200	F13
B201	F14
B202	F15
B202-1	F16
B202-2	F17
B218	ROL-12
B219	ROL-13
B303 - B309	N/A
B312 Series	N/A
B321 Series	N/A
B351L	64 (Disc.)
B379	ROL-14
B386 (Disc.)	4B
B479	ROL-14
B501	111 (Disc.)
B655	70 (Disc.)
B656	70R (Disc.)
B1999	N/A
B2400	2STR
B2417	N/A
B2499	107F (Disc.)
B2500	310 (Disc.)
B2501 (Disc.)	109AF
B2503	N/A
B2505 - B2508	N/A
B3014	309 (Disc.)
B3014N	309N (Disc.)
B3019	109A
B3031	N/A
B3033	68, 68W
B3034	68S
B3036L	N/A
B3037	N/A
B3040	336 (Disc.)
B3042	61 (Disc.)
B3042T	61T (Disc.)
B3045	335 (Disc.)
B3050	62 (Disc.)
B3052 (Disc.)	130
B3054	329 (Disc.)
B3055	N/A
B3058	N/A
B3060	50
B3060L	N/A
B3061	42 (Disc.)
B3062	N/A
B3064	N/A
B3065	30L (Disc.)
B3066	30M (Disc.)
B3067	30H (Disc.)
B3068	30 (Disc.)
B3069E	31-O (Disc.)
B3069W	31-M (Disc.)
B3070	52 (Disc.)
B3080 L & S	343 (Disc.)
B3082	337 (Disc.)
B3083	305 (Disc.)
B3083WO	304 (Disc.)
B3084	33 (Disc.)
B3085	35 (Disc.)
B3086	34 (Disc.)
B3088	316 (Disc.)
B3088S	N/A
B3088ST	N/A
B3088T	316T (Disc.)
B3089	319 (Disc.)
B3090	318 (Disc.)
B3092	318A (Disc.)
B3093	317A (Disc.)
B3094	314 (Disc.)
B3095	317 (Disc.)
B3096	312 (Disc.)
B3097	311 (Disc.)

(Disc.) = Discontinued Item

B-Line	TOLCO
B3098	313 (Disc.)
B3100	1 (Disc.)
B3100C	1PVC (Disc.)
B3100F	1F (Disc.)
B3100PS (Disc.)	1CBS
B3102	1CI (Disc.)
B3104	1LD (Disc.)
B3104C	N/A
B3104CT	81 (Disc.)
B3104CTC	81PVC (Disc.)
B3104F	N/A
B3106	1V (Disc.)
B3106V	1VT (Disc.)
B3108	1A (Disc.)
B3109	N/A
B3110	324 (Disc.)
B3114	322 (Disc.)
B3114R	N/A
B3117R	N/A
B3117SL	327 (Disc.)
B3118SL	328 (Disc.)
B3119SL	N/A
B3120	325 (Disc.)
B3122	326 (Disc.)
B3122A	N/A
B3124	N/A
B3126	ROL-16
B3132	9 (Disc.)
B3132W-1 &11/2	9X (Disc.)
B3134	14 (Disc.)
B3134W	14X (Disc.)
B3140	4 (Disc.)
B3140C	4PVC (Disc.)
B3140F	4F (Disc.)
B3141	4CI (Disc.)
B3142	4H (Disc.)
B3144	5 (Disc.)
B3146	5H (Disc.)
B3147A-1/2 thru 4	32-1/2 thru 4 (Disc.)
B3147B 4 thru 24	32-5 thru 34 (Disc.)
B3148	7 (Disc.)
B3149	8 (Disc.)
B3151	220 (Disc.)
B3153	219 (Disc.)
B3154	220 (Disc.)
B3155	219 (Disc.)
B3160	260 (Disc.)
B3161	261 (Disc.)
B3162	262 (Disc.)
B3163	263 (Disc.)
B3164	264 (Disc.)
B3165	265 (Disc.)
B3170 (Disc.)	2
B3170CT	202 (Disc.)
B3170CTC	N/A
B3170F (Disc.)	2F
B3170NF (Disc.)	200
B3170NF (Disc.)	200R (Disc.)
B3170NFC (Disc.)	200C
B3170NFF (Disc.)	200F
B3171	N/A
B3175	N/A
B3175CT	N/A
B3180	20 (Disc.)
B3180FL	20S (Disc.)
B3181 (Disc.)	22
B3182 (Disc.)	23
B3183 (Disc.)	24
B3184	N/A
B3188	110 (Disc.)
B3188C	N/A
B3190	40 (Disc.)
B3191	41 (Disc.)
B3195	84 (Disc.)
B3195CT	83 (Disc.)
B3198H	302 (Disc.)
B3198HCT	301CT (Disc.)
B3199R	78
B3199RCT	N/A
B3200	330 (Disc.)
B3201	332 (Disc.)
B3202	331 (Disc.)
B3203	333 (Disc.)
B3205	103 (Disc.)
B3210	102 (Disc.)
B3210X	102L (Disc.)
B3211	101 (Disc.)
B3211X	101L (Disc.)
B3212	104 (Disc.)
B3213	105 (Disc.)
B3214	106 (Disc.)
B3220	71 (Disc.)
B3222	307 (Disc.)
B3223	N/A
B3224	306 (Disc.)
B3227 (Disc.)	N/A
B3234	116 (Disc.)
B3248	118 (Disc.)
B3256	405 (Disc.)
B3257	406 (Disc.)
B3262	506 (Disc.)
B3264	500 (Disc.)
B3281 - B3287	420 (Disc.)
B3281 - B3287	421 (Disc.)
B3281 - B3287	422 (Disc.)
B3281 - B3287	422C (Disc.)
B3291 - B3298	N/A
B3362 - B3365	N/A
B3367 (Disc.)	69
B3373	6 (Disc.)
B3373C	6PVC (Disc.)
B3373CT	82 (Disc.)
B3373CTC	82PVC (Disc.)
B3373F	6F (Disc.)
B3380 - B3387	N/A
B3690	3 (Disc.)
B3690C	3PVC (Disc.)
B3690F	3F (Disc.)
B3891	425 (Disc.)
B3891	426 (Disc.)
B3891	429 (Disc.)
B3892	430 (Disc.)
B3894	N/A
B3895	N/A
B3993-10	428 (Disc.)
B3393-10/B3393-10B	431 (Disc.)
DS15x2	125 (Disc.)
DURA-BLOK™	Pipe Pier (Disc.)
FFW	119 (Disc.)
FW	115 (Disc.)
HHN	114 (Disc.)
HN	113 (Disc.)
ISO	N/A
KwikClip™	N/A
LW	117 (Disc.)
N2500	310N (Disc.)
Snap 'N Shield™ Clevis Hangers	N/A
Snap 'N Shield™	N/A
Toggle Bolts	123 (Disc.)

(Disc.) = Discontinued Item

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Reference Data - Crosses

Anvil/Grinnell®†	B-Line/TOLCO
14	B3040 (Fig. 336)
40	Consult Factory
47	B3084 (Fig. 33)
49	B3086 (Fig. 34)
51	B422
52	B3085 (Fig. 35)
54	Consult Factory
55	B3080 L & S (Fig. 343 LONG & FG 343 SHORT)
60	B3248 (Fig. 118)
62	Consult Factory
63	Consult Factory
CT65	B3104CT (Fig. 81)
66	B3083 (Fig.305)/ B3083WO (Fig. 304)
67	B3690 (Fig. 3)
68	Consult Factory
69	Fig. 200 (B3170NF)
69C	Fig. 200C (B3170NFC)
89, 87	B3367 (Fig. 69)
92	Fig. 65/Fig. 65XT
93	Fig. 66
95	B351L (Fig. 64)
100	B3149 (Fig. 8)
103	B3148 (Fig. 7)
110R	B3222 (Fig. 307)
112	Fig. 910
114	B3224 (Fig. 306)
CT121	B3373CT (Fig. 82)
CT138R	B3198HCT (Fig. 301CT)
128R	B3199 (Fig. 78)
133-134	B3050 (Fig. 62)
135	B655 (Fig. 70) & B3220 (Fig. 71)
136R	B656 (Fig. 70R)
137	B3188 (Fig. 110)
138R	B3198H (Fig. 302)
140	B3205 (Fig. 103)
142	B3213 (Fig. 105)
146	ATR (Fig. 99 & Fig. 100)
157	B3203 (Fig. 333)
160	B3160 (Fig. 260)
161	B3161 (Fig. 261)
162	B3162 (Fig. 262)
163	B3163 (Fig. 263)
164	B3164 (Fig. 264)
165	B3165 (Fig. 265)
167	B3151 (Fig. 220)
168	B3153 (Fig. 219)
171	B3114 (Fig. 322)
175	B3120 (Fig. 325)
177	B3122 (Fig. 326)
178	B3264 (Fig. 500)
181	B3110 (Fig. 324)
191	B3098 (Fig. 313)
192	B3096 (Fig. 312)
194	B3068 (Fig. 30)
195	B3066 (Fig. 30M)
199	B3067 (Fig. 30H)
202	B3060 (Fig. 50)
206	Fig. 51
212	B3140 (Fig. 4)
212FP	Fig. 4A
216	B3142 (Fig. 4H)
217	B3045 (Fig. 335)
227	B3042 (Fig. 61)
230	B3202 (Fig. 331)
247	B3262 (Fig. 506)
248	B3210 (Fig. 102)
248X	B3210X (Fig. 102L)
255	B3281 - B3287 (Fig. 422)
256	B3281 - B3287 (Fig. 421)
257	B3891 (Fig. 426)
259	B3090 (Fig. 318)
260	B3100 (Fig. 1)
261	B3373 (Fig. 6)
262	B3180 (Fig. 20)
264	B3093 (Fig. 317A)
271	B3117SL (Fig. 327)
274	B3118SL (Fig. 328)
278	B3211 (Fig. 101)
278X	B3211X (Fig. 101L)
280	B3891 (Fig. 426)
282	B3014 (FG 309) & B3014N (Fig. 309N)
285N	N2500 (Fig. 310N)
290	B3200 (Fig. 330)
295	B3144 (Fig. 5)
299	B3201 (Fig. 332)
300	B3108(Fig. 1A)
436	Consult Factory
437	Consult Factory
438-1	Consult Factory
438-2	Consult Factory
438-3	Consult Factory
590	B3102 (Fig. 1CI)
594	B3134W (Fig. 14X)
595	B3134 (Fig. 14)
599	B3132W-1 & 1½ (Fig. 9X)
600	B3132 (Fig. 9)
218, 229	B3054 (Fig. 329)

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Chart provides a cross reference to help determine equivalent products.

Erico®†	B-Line/TOLCO
10	HN (Fig. 113)
10H	HHN (Fig. 114)
11	FW (Fig. 115)
12	FFW (Fig. 119)
13	LW (Fig. 117)
25	B655 (Fig. 70)
25R	B656 (Fig. 70R)
25S	B655S (Fig. 70S)
26	B3203 (Fig. 333)
30	B3202 (Fig. 331)
31	B3201 (Fig. 332)
35	B3200 (Fig. 330)
40	B3210 (Fig. 102)
40W	B3211 (Fig. 101)
43	DS15x2 (Fig. 125)
46	B3214 (Fig. 106)
47	B3222 (Fig. 307)
50	ATR (Fig. 99 & 100)
51	ATR (Fig. 99 & 100)
100	B3170 (Fig. 2)
125	B3151 (Fig. 220)
130	Fig. 200
150	B3188 (Fig. 110)
200	B351L (Fig. 64)
255C	B3367 (Fig. 69)
282	B3014 (Fig. 309)
282N	B3014N (Fig. 309N)
300	B351L (Fig. 64)
310	Fig. 66
319	B3061 (Fig. 42)
320L	B3083WO (Fig. 304)
320W	B3083 (Fig. 305)
321	B3082 (Fig. 337)
325	B3060 (Fig. 50)
326	B3070 (Fig. 52)
335A	Fig. 975
335AB	Fig. 910
340	B3248 (Fig. 118)
348	B3068 (Fig. 30)
351	B3065 (Fig. 30L)
352	B3066 (Fig. 30M)
353	B3067 (Fig. 30H)
355	B2500 (Fig. 310)
355N	N2500 (Fig. 310N)
356	Fig. 130
359	B3042 (Fig. 61)
360	B3054 (Fig. 329)
361	B3050 (Fig. 62)
363	B3040 (Fig. 336)
367	B3045 (Fig. 335)
370A	Fig. 109A (B3019)
371	B3080 L & S (Fig. 343 LONG & Fig. 343 SHORT)
373	B3084 (Fig. 33)
374	B3086 (Fig. 34)
374A	B3085 (Fig. 35)
400	B3100 (Fig. 1)
400FL	B3100F (Fig. 1F)
402	B3104CT (Fig. 81)
40	B3102 (Fig. 1CI)
410	B3104
41	B3108 (Fig. 1A)
418	B3690 (Fig. 3)
418FL	B3690F (Fig. 3F)
450	B3140 (Fig. 4)
451	B3142 (Fig. 4H)
452	B3144 (Fig. 5)
455	B3198H (Fig. 302)
456	B3198HCT (Fig. 301CT)
457	B3190 (FFig. 40)
458	B3191 (Fig. 41)
470	B3180 (Fig. 20)
510	B3373 (Fig. 6)
511	B3373CT (FFig. 82)
516	B3132W-1 &1½ (FFig. 9X)
517	B3132 (Fig. 9)
605	B3114 (FFig. 322)
610	B3110 (Fig. 324)
615	B3120 (Fig. 325)
617	B3117SL (Fig. 327)
619	B3118SL (Fig. 328)
620	B3122 (Fig. 326)
625	B3264 (Fig. 500)
630	B3160 (Fig. 260)
631	B3161 (Fig. 261)
632	B3162 (Fig. 262)
633	B3163 (Fig. 263)
634	B3164 (Fig. 264)
635	B3165 (Fig. 265)
640	B3891 (Fig. 426)
640-1	B3891
640-2	B3892
640-3	B3393-10/B3393-10B
651	B3281 - B3287 (Fig. 421)
651	B3281 - B3287 (Fig. 421)
700	B3148 (Fig. 7)
705	B3149 (Fig. 8)
720	B3095 (Fig. 317)
721	B3090 (Fig. 318)
724	B3098 (Fig. 313)
420	B3100C (Fig. 1PVC)
520	B3373C (Fig. 6PVC)
107	Fig. 22
108	Fig. 23
109	Fig. 24

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Reference Data - Crosses

PHD®†	B-Line/TOLCO
10	ATR (Fig. 99 & 100)
15	B3205 (Fig. 103)
20	ATR (Fig. 99 & 100)
25	B3203 (Fig. 333)
32	B3222 (Fig. 307)
35	B3200 (Fig. 330)
38	B3201 (Fig. 332)
40	B3213 (Fig. 105)
44	B3224 (Fig. 306)
47W	AWA (Fig. 209)
48	DS15x2 (Fig. 125)
50	B3210 (Fig. 102)
55	B3211 (Fig. 101)
60	B3212 (Fig. 104)
70	B2499 (Fig. 107F)
80	Fig. 120
90	B3188 (Fig. 110)
95, 110	B501 (Fig. 111)
100	B655 (Fig. 70)
104	B655S (Fig. 70S)
105	B656 (Fig. 70R)
110	HN (Fig. 113)
110H	HHN (Fig. 114)
130	FW (Fig. 115)
134	LW (Fig. 117)
135	B3234 (Fig. 116)
136	FFW (Fig. 119)
151	B3170 (Fig. 2)
160	B3153 (Fig. 219)
170	B3151 (Fig. 220)
250	B351L (Fig. 64)
350	Fig. 65
359	B3367 (Fig. 69)
360	B3367 (Fig. 69)
420	B3102 (Fig. 1CI)
430	B3108 (Fig. 1A)
440	B3104
450	B3100 (Fig. 1)
450F	B3100F (Fig. 1F)
450V	B3106 (Fig. 1V)
453	B3100C (Fig. 1PVC)
460	B3120 (Fig. 325)
470	B3110 (Fig. 324)
480	B3122 (Fig. 326)
486	B3117SL (Fig. 327)
487	B3118SL (Fig. 328)

PHD®†	B-Line/TOLCO
490	B3114 (Fig. 322)
508	B3198H (Fig. 302)
512H	B3198HCT (Fig. 301CT)
520	B3140 (Fig. 4)
522	B3142 (Fig. 4H)
525	B3144 (Fig. 5)
535	B3148 (Fig. 7)
545	B3149 (Fig. 8)
550	B3373 (Fig. 6)
552	B3373CT (Fig. 82)
553	B3373C (Fig. 6PVC)
554	B3373CTC (Fig. 82PVC)
580	B3132 (Fig. 9)
585	B3132W-1 &11/2 (Fig. 9X)
590	B3134 (Fig. 14)
595	B3134W (Fig. 14X)
610, 620	B3050 (Fig. 62)
630	B3054 (Fig. 329)
635	B3040 (Fig. 336)
651	B3160 (Fig. 260)
653	B3161 (Fig. 261)
654	B3162 (Fig. 262)
655	B3163 (Fig. 263)
656	B3164 (Fig. 264)
658	B3165 (Fig. 265)
670-678	B3281 - B3287 (Fig. 421)
690	B3891 (Fig. 426)
690-1	B3891
690-2	B3892
690-3	B3393-10/B3393-10B
810	B3191 (Fig. 41)
820	B3190 (Fig. 40)
825	B3180 (Fig. 20)
830	B3180FL (Fig. 20S)
840	B3147A-1/2 thru 4 (Fig. 32-1/2 thru 4)
840	B3147B 4 thru 24 (Fig. 32-5 thru 34)
850	B3065 (Fig. 30L)
855	B3066 (Fig. 30M)
860	B3067 (Fig. 30H)
871	B3088T (Fig. 316T)
875	B3093 (Fig. 317A)
876	B3092 (Fig. 318A)
880	B3095 (Fig. 317)
882	B3090 (Fig. 318)

PHD®†	B-Line/TOLCO
885	Fig 109A (B3019)
890	Fig. 975
900	B3083 (Fig. 305)
900-1	B3083WO (Fig. 304)
903	B3085 (Fig. 35)
904	B3086 (Fig. 34)
910	B3061 (Fig. 42)
925	B3070 (Fig. 52)
930	B3248 (Fig. 118)
936	B3080 L & S (Fig. 343 LONG & Fig. 343 SHORT)
940	B3199 (Fig. 78)
950	B3014 (Fig. 309)
950N	B3014N (Fig. 309N)
960	B3202 (Fig. 331)
970	B3690 (Fig. 3)
970F	B3690F (Fig. 3F)
980	B3195 (Fig. 84)
982	B3195CT (Fig. 83)

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Super Strut®†	B-Line/TOLCO
164	B3180 (Fig. 20)
452	B2500 (Fig. 310)
540	B3060 (Fig. 50)
542	B3070 (Fig. 52)
AB102	N2500 (Fig. 310N)
AB201	Fig. 51
C475	Fig 109A (B3019)
C704	B3191(Fig. 41)
C704A	B3190 (Fig. 40)
C710	B3100 (Fig. 1)
C710F	B3100F (Fig. 1F)
C710P	B3100C (Fig. 1PVC)
C720P	B3373C (Fig. 6PVC)
C724	B3132 (Fig. 9)
C725	B3140 (Fig. 4)
C726	B3144 (Fig. 5)
C727	B3170 (Fig. 2)
C729-2	B3110 (Fig. 324)
C730C	B3117SL (Fig. 327)
C730D	B3118SL (Fig. 328)
C736	B3068 (Fig. 30)
C739H	B3067 (Fig. 30H)
C739M	B3066 (Fig. 30M)
C747	B3082 (Fig. 337)
C755T-C757T	B3050 (Fig. 62)
C769	B3045 (Fig. 335)
C775L	B351L (Fig. 64)
C777	Fig. 65/Fig. 65XT
C778	Fig. 66
C711	B3690 (Fig. 3)
C711F	B3690F (Fig. 3F) B3690C (FG 3PVC)
C716	B3195CT (Fig. 83)
C720	B3373 (Fig. 6)
C720L	B3148 (Fig. 7)
C780W/HW	B3083 (Fig. 305)
C780W/O	B3083WO (Fig. 304)
C781	B3248 (Fig. 118)
C785	B3090 (Fig. 318)
C786	B3093 (Fig. 317A)
C789	B3160 (Fig. 260)
C789A	B3160 (Fig. 260)
C789B	B3162 (Fig. 262)
C789C	B3163 (Fig. 263)
C789D	B3164 (Fig. 264)
C789E	B3165 (Fig. 265)

Super Strut®†	B-Line/TOLCO
C790	B3151 (Fig. 220)
CF729A	B3120 (Fig. 325)
CI710	B3102 (Fig. 1CI)
CL710	B3104
CT720	B3373CT (Fig. 82)
CTL710	B3104CT (Fig. 81)
CX710	B3108 (Fig. 1A)
E120	B3222 (Fig. 307)
E120A	B3200 (Fig. 330)
E145	HN (Fig. 113)
E147	FW (Fig. 115)
EF147	FFW (Fig. 119)
E148	LW (Fig. 117)
E151	B3213 (Fig. 105)
E151D	DS15x2 (Fig. 125)
E156	B3210 (Fig. 102)
E157	B3211 (Fig. 101)
F111	B3201 (Fig. 332)
F112	B3202 (Fig. 331)
H104	ATR (Fig. 99 & 100)
H115	B3188 (Fig. 110)
H119	B655 (Fig. 70)
H119R	B656 (Fig. 70R)
HL115	B501 (Fig. 111)
M129	B3203 (Fig. 333)
M718	B3198H (Fig. 302)
M724R	B3199 (Fig. 78)
M732	B3054 (Fig. 329)
M778	B3034 (Fig. 68S) & B3033 (Fig. 68W)
PG794	B3281 - B3287 (Fig. 21)
RC729	B3122 (Fig. 326)
RCS	B3147A-1/2 thru 4 (Fig. 32-1/2 thru 4)
RCS	B3147B 4 thru 24 (Fig. 32-5 thru 34)
U568	B3367 (Fig. 69)
W724	B3132W-1 &1 1/2 (Fig. 9X)

Super Strut®†	B-Line/TOLCO

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Reference Data - Crosses

Carpenter & Paterson®†	B-Line/TOLCO
6	B3042 (Fig. 61)
12	B3222 (Fig. 307)
14	B3040 (Fig. 336)
15	B3050 (Fig. 62)
18	B3367 (Fig. 69)
28	B3213 (Fig. 105)
31	B3212 (Fig. 104)
33	B3210 (Fig. 102)
38	B3224 (Fig. 306)
39	B3120 (Fig. 325)
44	Fig. 120
53	B3118SL (Fig. 328)
59	Toggle Bolts (Fig. 123)
69	B3068 (Fig. 30)
84	B3066 (Fig. 30M)
85	B3199 (Fig. 78)
92	B3045 (Fig. 335)
93	B3211 (Fig. 101)
94	ATR (Fig. 99 & 100)
100	B3100 (Fig. 1)
102	B3248 (Fig. 118)
103	FW (Fig. 115)
109	B3122 (Fig. 326)
114	B3180 (Fig. 20)
123	B655 (Fig. 70)
125	B3090 (Fig. 318)
126	B3373 (Fig. 6)
132	B3202 (Fig. 331)
133	B3205 (Fig. 103)
137	B3096 (Fig. 312)
139	B3067 (Fig. 30H)
140	B3110 (Fig. 324)
152	B3061 (Fig. 42)
158	B3132 (Fig. 9)
165	HN (Fig. 113)
166	DS15x2 (Fig. 125)
175	B3140 (Fig. 4)
176	LW (Fig. 117)
179	B3148 (Fig. 7)
192	Fig. 65
200	B3104
220	B3080 L & S (Fig. 343 LONG & Fig. 343 SHORT)
222	B501 (Fig. 111)
227	B3190 (Fig. 40)

Carpenter & Paterson®†	B-Line/TOLCO
258	B3132W-1 &1½ (Fig. 9X)
260	B3134W (Fig. 14X)
267	B3149 (Fig. 8)
276	B3201 (Fig. 332)
283	B3188 (Fig. 110)
293	B3054 (Fig. 329)
298	B3142 (Fig. 4H)
303	B3060 (Fig. 50)
304	B3144 (Fig. 5)
306	B3210X (Fig. 102L)
341	B3211X (Fig. 101L)
351	B3160 (Fig. 260)
352	B3160 (Fig. 260)
353	B3162 (Fig. 262)
354	B3163 (Fig. 263)
355	B3164 (Fig. 264)
356	B3165 (Fig. 265)
478	B3264 (Fig. 500)
706	B3234 (Fig. 116)
800	B3170 (Fig. 2)
800	Fig. 200
100C.I.	B3102 (Fig. 1CI)
100CT	B3104CT (Fig. 81)
100EL	B3108 (Fig. 1A)
100PVC	B3100C (Fig. 1PVC)
100PVC	B3104CTC (Fig. 81PVC)
123R	B656 (Fig. 70R)
123W	B3220 (Fig. 71)
126CT	B3373CT (Fig. 82)
126PVC	B3373C (Fig. 6PVC)
158DB	B3134 (Fig. 14)
200VT	B3106 (Fig. 1V)
227S	B3191 (Fig. 41)
265P	B3151 (Fig. 220)
650-266-75	B3014N (Fig. 309N)
81CT	B3198HCT (Fig. 301CT)

Carpenter & Paterson®†	B-Line/TOLCO

† Mark shown is the property of its respective owner.
Chart provides a cross reference to help determine equivalent products.

Empire®†	B-Line/TOLCO
11	B3100 (Fig. 1)
11CI	B3102 (Fig. 1CI)
11V	B3106 (Fig. 1V)
11X	B3108 (Fig. 1A)
21L	B351L (Fig. 64)
22R	B3367 (Fig. 69)
26	B3210 (Fig. 102)
26W	B3211 (Fig. 101)
31	B3170 (Fig. 2)
31	Fig. 200
35	B3262 (Fig. 506)
41H	B3198H (Fig. 302)
41HCT	B3198HCT (Fig. 301CT)
47	B3222 (Fig. 307)
49PC	B3373C (Fig. 6PVC)
50	B3373 (Fig. 6)
50CT	B3373CT (Fig. 82)
50CTI or 49PC	B3373CTC (Fig. 82PVC)
51	B655 (Fig. 70)
51R	B656 (Fig. 70R)
52	FW (Fig. 115)
52F	FFW (Fig. 119)
52L	LW (Fig. 117)
53	B3061 (Fig. 42)
54	ATR (Fig. 99 & 100)
55	B3213 (Fig. 105)
56	HN (Fig. 113)
57	B3205 (Fig. 103)
59	DS15x2 (Fig. 125)
61	Fig. 66
62	Fig. 65/Fig. 65XT
67	B3086 (Fig. 34)
68	B3085 (Fig. 35)
69	B3080 L & S (Fig. 343 LONG & Fig. 343 SHORT)
72	B3234 (Fig. 116)
75	B3134W (Fig. 14X)
75	B3248 (Fig. 118)
77	B2499 (Fig. 107F)
80	AWA (Fig. 209)
81N	B3014N (Fig. 309N)
83	Toggle Bolts (Fig. 123)
95	B3148 (Fig. 7)
97	B3149 (Fig. 8)

Empire®†	B-Line/TOLCO
110	B3104
110CT	B3104CT (Fig. 81)
110PC	B3100C (Fig. 1PVC)
110PC	B3104CTC (Fig. 81PVC)
114	B3224 (Fig. 306)
131	B3200 (Fig. 330)
137	B3188 (Fig. 110)
145	B3191 (Fig. 41)
146	B3190 (Fig. 40)
150	Fig. 130
155	B3040 (Fig. 336)
156	B3045 (Fig. 335)
157	B3203 (Fig. 333)
158	B3042 (Fig. 61)
167	B3151 (Fig. 220)
180	B3180FL (Fig. 20S)
189	B3144 (Fig. 5)
202	B3060 (Fig. 50)
212	B3140 (Fig. 4)
216	B3142 (Fig. 4H)
218	B3050 (Fig. 62)
229	B3054 (Fig. 329)
231	B3180 (Fig. 20)
256	B3281 - B3287 (Fig. 421)
272	B3110 (Fig. 324)
273	B3122 (Fig. 326)
275	B3120 (Fig. 325)
277	B3114 (Fig. 322)
320	B3202 (Fig. 331)
420	B3095 (Fig. 317)
422	B3096 (Fig. 312)
426	B3093 (Fig. 317A)
427	B3092 (Fig. 318A)
427	B3090 (Fig. 318)
595	B3134 (Fig. 14)
599	B3132W-1 &1½ (Fig. 9X)
600	B3132 (Fig. 9)
801	B3066 (Fig. 30M)
802	B3067 (Fig. 30H)
820	B3068 (Fig. 30)
909	B3201 (Fig. 332)
279S	B3117SL (Fig. 327)
280S	B3118SL (Fig. 328)
425 or 427	B3098 (Fig. 313)
1900	B3160 (Fig. 260)
1901	B3160 (Fig. 260)

Empire®†	B-Line/TOLCO
1902	B3162 (Fig. 262)
1903	B3163 (Fig. 263)
1904	B3164 (Fig. 264)
1905	B3165 (Fig. 265)
4000 Series	B3891 (Fig. 426)

† Mark shown is the property of its respective owner.
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Items in these tables are inclusive of the entire B-Line Pipe Hanger catalog line. Many of these items are not included elsewhere in this catalog. They can be found in the current pipe hanger catalog.

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