

Seismic bracing products

for mechanical, electrical & plumbing systems





We make what matters work.*



At Eaton, we believe that power is a fundamental part of just about everything people do. That's why we're dedicated to helping our customers find new ways to manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. To improve people's lives, the communities where we live and work, and the planet our future generations depend upon. Because this what really matters. And we're here to make sure it works.

EATON

Powering Business Worldwide

To learn more go to: [Eaton.com/whatmatters](https://www.eaton.com/whatmatters)

We make what matters work.

Introduction to Eaton's seismic bracing for mechanical, electrical and plumbing (MEP) systems

Known for innovation, time-saving solutions, Eaton's TOLCO seismic bracing solutions have served the commercial and fire protection markets for over 50 years. Combined with the Eaton B-Line series pipe hangers, strut systems, cable tray and other support solutions, Eaton offers a comprehensive line to support electrical, mechanical and plumbing applications in new and retrofit commercial buildings, health care facilities, hospitals, schools and universities and local and federal government facilities.

Along with quality and reliable products, Eaton also offers Seismic Engineering Services to help customers from pre-bid to final inspection.

Within this catalog, you will find a full list of products and engineering services designed to help derisk your next seismic project.

For additional information, you can contact our SeismicSupport@Eaton.com team or review our site at Eaton.com/tolco. To obtain a quote, contact SeismicQuotes@Eaton.com.

TOLCO seismic bracing solutions features

- Time-saving solutions – quicker installs
- Visual verification – many in products, for example break-off bolts or nuts, to help ensure proper installation
- Universal Applications – multi-solution products, such as the Fig. 981 or Fig. 828

Product in this catalog

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)
- **Vibration isolation solutions:**

Additional products are featured on Eaton.com/supportsystems and in our other product catalogs.

Product certifications

Many of the products shown in this catalog are certified with the following: See product page information for additional details.

- 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 OPM-0052-13 Seismic Restraint Systems Guidelines



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



ISO 9001:2008



NOTICE

Eaton's B-Line Division 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.

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WARNING

All hanger products in this catalog should be installed and serviced only as illustrated or described. Do not use them for any purpose other than those described in this catalog. Products that are used for unintended purposes could fail, resulting in severe personal injury or death.

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

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

Eaton B-Line series pipe hanger and support products are manufactured in accordance with industry standards. Our customers should exercise care in using these products properly as to avoid potential damage or injury. Contact us if you have any questions about proper installation and use of the products in this catalog.

Eaton's B-Line Business

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Eaton.com/tolco

OSHPD Pre-Approved
Seismic Restraints
Systems Guidelines

SEG-17

B-LINE
SERIES

Seismic Systems
Information

Seismic engineering guidelines

OPM-0052-13

For mechanical, electrical, plumbing and
fire sprinkler systems

Seismic bracing in compliance with
requirements of

International Building Code (IBC) 2012 & 2015
California Building Code (CBC) 2013 & 2016



Many TOLCO brand products are included in our OSHPD pre-approved seismic guidelines.
For specific information please visit www.eaton.com/OSHPD to view the OSHPD OPM-0052-13 catalog.

Trust your seismic engineering needs to Eaton's seismic engineering experts

"Codes and requirements change, and it can be difficult to keep up with federal and local requirements. I need to be able to easily determine whether or not my project requires seismic bracing."

Codes and seismic requirements can differ by location and project.

Our seismic experts understand these codes and can help you reduce risk and meet your project requirements.

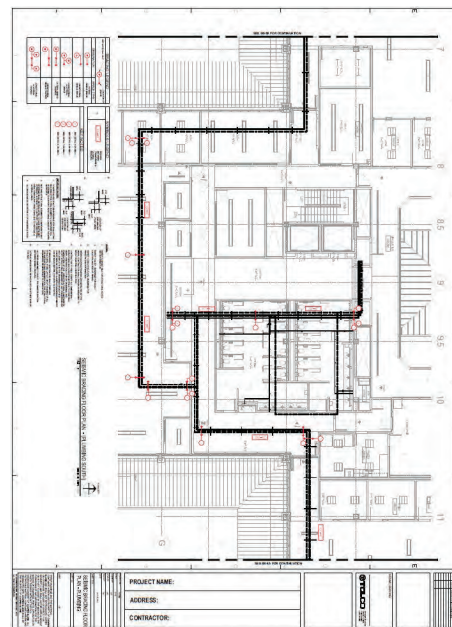
"I need a vendor that can provide engineering support"

How to get started?

Just contact blineseismicsupport@Eaton.com and provide your project specifications and drawings. You can rely on our quoted number from estimation to execution.

Don't have a project drawing or need assistance in reviewing project details. We can help!

- We can arrange a site visit to complete a review of the project requirements
- We provide detailed seismic layouts for your project on the drawings
 - We add the minimum number of brace locations to meet local codes and specifications
 - Drawings are stamped by a Professional structural engineer
 - We allow up to 15% of brace location changes and one layout revision at no charge



"I need a vendor that can provide product"

- Upon approval of the layout drawings
 - Products are delivered to the job site through your preferred distributor
 - No need for kits and laying out the braces - each type of brace assembly is the same, making job-site installation even easier
 - Products ship as full upper and lower attachment assemblies

"Inspection is critical to completing the project on time and correctly."

- Inspection and post-sale support
 - We make inspection easier, all products feature visual verification break away bolts to help ensure correct torque
 - If requested, we can assist with on-site inspection support
 - Returns are easy - only use what you need; return unused material to your distributor, or keep for the next project and reduce your material costs

"Eaton makes it easy to get started with your project, supports you during the project and through inspection."



Seismic structural attachments



Figure 69
Retaining Strap
Page 11



Figure 69R
Retrofit
Retaining Strap
Page 12

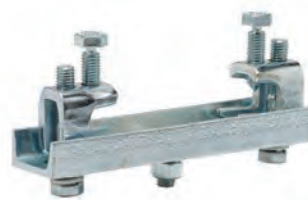


Figure 800
Adjustable Sway
Brace Attachment
To Steel
Page 13



Figure 825
Bar Joist Sway
Brace Attachment
Page 14



Figure 825A
Bar Joist Sway
Brace Attachment
Page 15



Figure 828
Universal Sway
Brace Attachment
Page 16



Figure 906
Sway Brace
Multi-Fastener Adaptor
Page 17



B3085
Rod Attachment Concrete Plate
Page 18



B3083 & B3083WO
Welded Beam Attachment
with & without Pin
Page 19



Figure 75
Swivel Attachment
Page 20



B446 Series
Swivel Hanger
Female - Male
Page 21



Figure 109DD
DEWALT DDI+™
Concrete Deck Insert
Pages 22 & 23



ACPW Series
Woodknockers™ II
Anchors
Page 24



ACPD Series
Bang-It™ Anchors
Page 25



AWSD Series
Powers Stud+ SD2
Seismic Wedge Anchors
Page 26



ACB Series
Concrete Screw Bolts
Page 27



ATM Series
Self-Tapping Machine
Screw Anchors
Page 27

† Wood Knocker™, Bang-It™, and DEWALT DDI+™ are registered trademarks used by DEWALT®

Seismic transitional attachments



Figure 980 & 980H
Universal Swivel
Sway Brace
Attachment
Page 28



Figure 986
Mechanical
Fast Clamp
Page 29



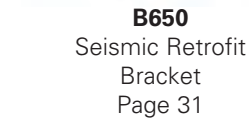
B335
Four Hole
Adjustable Hinge
Page 30



B633
Adjustable Seismic
Hinge Fitting
Page 30



B154
Two Hole 45°
Open Angle
Page 30



B650
Seismic Retrofit
Bracket
Page 31

Seismic system attachments



Figure 1CBS
Clevis Bolt Spacer
Page 31



Figure 98
Rod Stiffener
Page 32 & 45



Figure 98B
Rod Stiffener
with Break Off
Bolt Head
Page 32 & 45



SC228
Rod Stiffener
Page 32 & 45



Figure 4B
Pipe Clamp For
Sway Bracing
Page 33



Figure 4L
Sway Brace Attachment
Page 35/35a



Figure 981
Fast-Attach
Universal Swivel Sway
Brace Attachment
Page 38



Figure 985
Mechanical Fast Clamp
Page 39



B22, B22A, B24
Bracing Support
Channel
Page 40



B650C
Seismic Retrofit
Bracket
Page 31



ATR
All Threaded Rod
Page 44

Cable system attachments



Seismic Cable Kit
Pre-Stretched
Aircraft Cable Kit
Page 41



Figure BRC CABLE
Pre-Stretched Aircraft
Cable
Page 42



Figure 990 & 990H
Cable Sway Brace
Attachment
Page 43



Figure 991
Fast Attach Cable
Sway Brace Attachment
Page 44



B154
Two Hole 45°
Open Angle
Pages 30



Figure 98
Rod Stiffener
Page 32 & 45



Figure 98B
Rod Stiffener
with Break Off
Bolt Head
Page 32 & 45



SC228
Rod Stiffener
Page 32 & 45

Seismic accessories



B2400
Standard Pipe Hanger
Page 46



B2000
Pipe & Conduit
Clamps
Page 47



9ZN-1205 & 9ZN-1208
Cable Tray
Clamp/Guide
Page 48



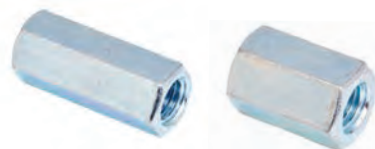
9ZN-1241
Heavy Duty Hold
Down Bracket
Page 48



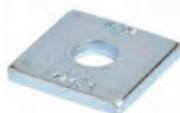
**N200WO
Series**
Channel Nut
Page 48



B3228
Hex Head Lag Bolt
Page 49



B655
Steel Rod Coupling
B656
Steel Reducing Rod Coupling
Page 49



B200 Series
Square Washer
Page 50



HN
Hex Nut - Page 50
FW
Flat Washer - Page 51



BVP
Vibra-Clamp™ Pipe sizes
Pages 51 & 77
BVT
Vibra-Clamp™ Tubing sizes
Pages 51 & 76

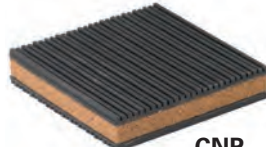


B1999
Vibra-Cushion™
Pages 51 & 78

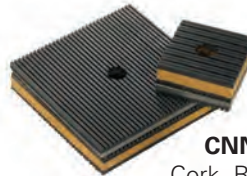
Vibration isolation (continued on page 10)



NNP
Ribbed Neoprene Pad
Page 54



CNP
Cork and Ribbed
Neoprene Pad
Page 54



CNNK
Cork, Ribbed
Neoprene and Steel
Page 55



VRP
Rubber Cube Pad
Page 55



BVS Type
1 5/8" Wide Vibra Strip™
Page 56



RM & RM-D Type
Neoprene Mounts
Page 57



OS Type
Steel Spring Isolator Restraints
1", 2", & 3" Deflection
Pages 58 & 59



JQ Type
Isolator Restraints w/OPA-0070
Pre-Approved Seismic Protection
1", 2", & 3" Deflection
Pages 60 & 61, 64



JQ-TQN Type
Neoprene Isolator Restraints w/
OPA-0070
Pre-Approved Seismic Protection
1/2" Deflection
Pages 62 & 63



RQ & RQD Type
Neoprene Mount w/Integrak
Seismic Restraints
1/4" & 1/2" Deflection
Page 65



RH & RHD Type
Neoprene Hanger
1/4" & 1/2" Deflection
Page 67



CHSCS Type
Spring Hanger
w/Seismic Cushion Stop
1" & 2" Deflection
Pages 68 & 69



CH30SCS Type
Deflection Combination Hanger
15° Tilt Spring & Neoprene w/ Seismic
Cushion Stop 1" & 2" Deflection
Pages 70 & 71



HHSCS Type
Combination Hanger
Spring & Neoprene w/
Seismic Cushion Stop
1 1/2" & 2 1/2" Deflection
Pages 72 & 73



HH30SCS Type
Deflection Combination
Hanger 15° Tilt Spring &
Neoprene w/
Seismic Cushion Stop
1 1/2" & 2 1/2" Deflection
Pages 74 & 75



Figure BVT
VibraClamp Tubing Sizes
Page 76

Figure BVP
VibraClamp Pipe Sizes
Page 77



Figure B1999
Vibra Cushion
Page 78



Figure ISO
ISO Pipe
Page 78

Other items - see pipe hangers & supports catalog and fire protection catalog



Figure 1001
Sway Brace
Attachment



Figure 1 / B3100
Clevis Hanger



B3373
Standard
Riser Clamp



B3140
Standard
Pipe Clamp



B3142
Heavy Duty
Pipe Clamp



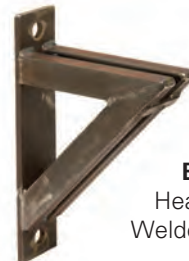
B3144
Double Bolt
Pipe Clamp



B3064
Adjustable Strut
Bracket



B3066
Medium Duty
Welded Bracket



B3067
Heavy Duty
Welded Bracket



B3088
Base Stand

B3088S
Seismic Base Stand



B3088T
Threaded Base Stand

B3088ST
Seismic Threaded Base
Stand



B3092
Adjustable Pipe Saddle
Support With Yoke



B3093
Adjustable Pipe
Saddle Support



B221, B321, B521 Series
Continuous Concrete
Inserts



B3086
Clevis Concrete
Plate



B3210 & B3211 Series
Eye Rods



Shields & Saddles

TOLCO Fig. 69 - beam clamp retaining strap

Size Range: $\frac{3}{8}$ "-16 thru $\frac{3}{4}$ "-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.

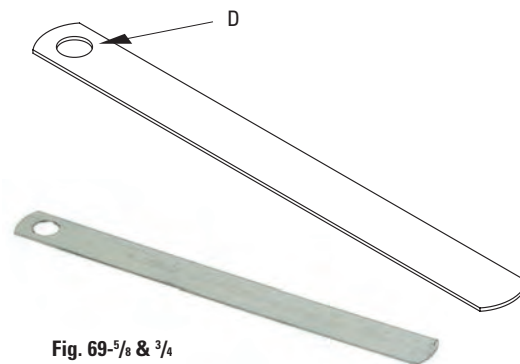
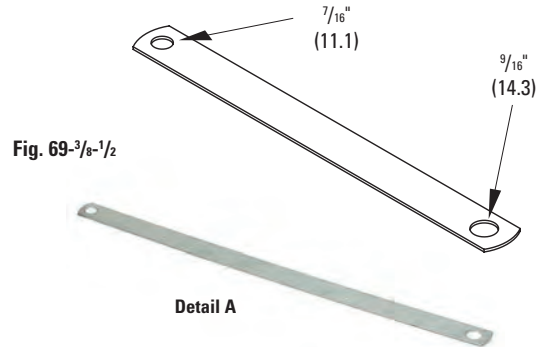
Important Note: Good installation practice of a retaining strap requires that the strap be held tightly and securely to all component parts of the assembly. Therefore a locking mechanism of some kind, such as a hex nut for the Fig. 69 or the beveled locking slot of the Fig. 69R will provide a more secure reliable installation.

Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus). Approved for use with any listed B-Line series or TOLCO beam clamp.

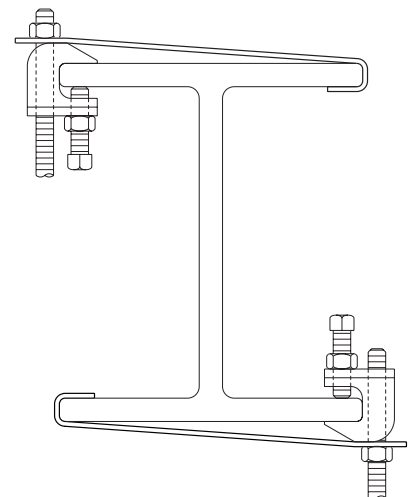
Finish: Pre-Galvanized

Order By: Part number, length, and finish.

Note: Minimum return on strap is 1" (25.4mm).
Lengths over 16" (406mm) are not UL Listed.



Part No.	Hole Diameter in. (mm)	For Use With	Length
69- $\frac{3}{8}$ -1/2-L	see Detail A	B3033- $\frac{3}{8}$, B3034- $\frac{3}{8}$, B3031- $\frac{3}{8}$, 65- $\frac{3}{8}$, 65XT- $\frac{3}{8}$, 66- $\frac{3}{8}$ B3033-1/2, B3034-1/2, 65-1/2, 66-1/2	Specify
69- $\frac{5}{8}$ -L	$\frac{11}{16}$ " (17.5)	B3033- $\frac{5}{8}$, 65- $\frac{5}{8}$, 66- $\frac{5}{8}$	Specify
69- $\frac{3}{4}$ -L	$\frac{13}{16}$ " (20.6)	B3033- $\frac{3}{4}$	Specify



Seismic Structural Attachments

TOLCO Fig. 69R - retrofit capable beam clamp retaining strap

Size Range: $\frac{3}{8}$ "-16 & $\frac{1}{2}$ "-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.

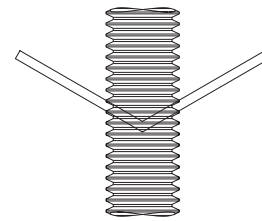
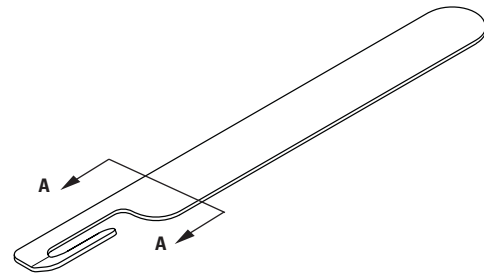
Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus). Approved for use with any B-Line series and TOLCO listed beam clamp.

Finish: Pre-Galvanized

Order By: Part number, length, and finish.

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

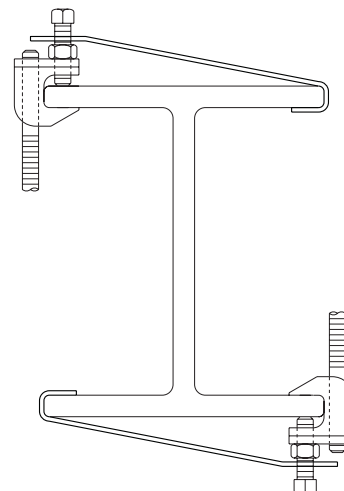
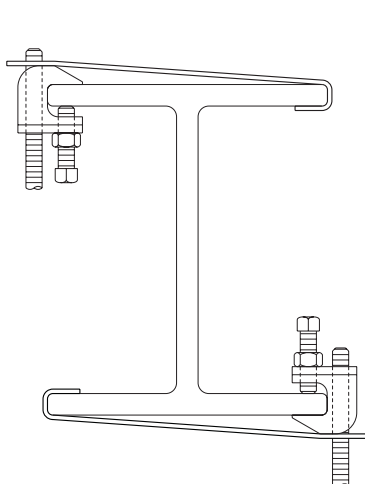
* US Patent #5,947,424



A - A



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



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

TOLCO Fig. 800 - adjustable sway brace attachment to steel

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.

Approvals: Underwriters Laboratories Listed in the USA and Canada (**cULus**). Approved by Factory Mutual Engineering (**FM**). Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Installation: 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.

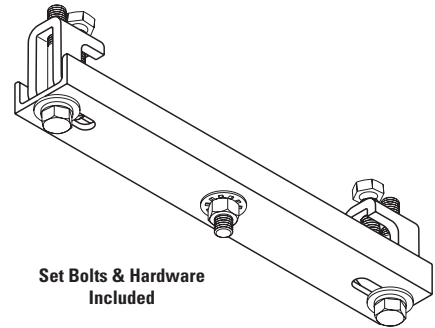
To Install: Place the Fig. 800 on the steel beam, tighten the cone point set screws on flange until the heads break off. Tighten hex head bolts into clamp body until lock washers are fully flat. Attach other TOLCO transitional attachment fitting, Fig. 909, 910, 980 or 986. Transitional fitting attachment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

Finish: Plain, Electro-Galvanized and Hot Dip Galvanized. Contact customer service for alternative finishes and materials.

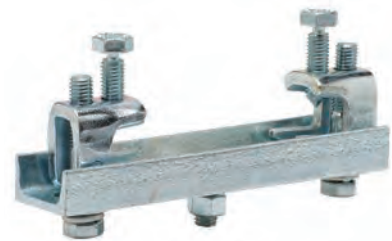
Order By: Part number type, flange width range and finish.



OPM



Set Bolts & Hardware Included

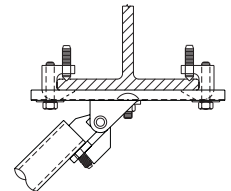


Seismic Structural Attachments

Part Number Example: FIG. 800 TYPE1X8-10

Type 1 (beam flange thickness)
8-10 (flange width range)

Type	Fits Beam Flange Thickness in. (mm)	Max.Design Loads (FM)*							
		Lateral - Parallel to Structural Member				Longitudinal - Perpendicular to Structural Member			
		30°-44° lbs./(kN)	45°-59° lbs./(kN)	60°-74° lbs./(kN)	75°-90° lbs./(kN)	30°-44° lbs./(kN)	45°-59° lbs./(kN)	60°-74° lbs./(kN)	75°-90° lbs./(kN)
800 TYPE1	Up to 3/4" (Up to 19.0)	1430 (6.36)	1970 (8.76)	1980 (8.81)	NR (NR)	930 (4.13)	1310 (5.82)	1610 (7.16)	1800 (8.00)
800 TYPE2	3/4" to 1 1/4" (19.0 to 31.7)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)	NR (NR)

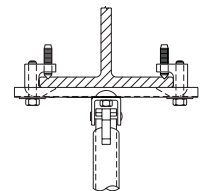


Shown with Fig. 980
brace fitting to pipe brace
(Lateral - Perpendicular to
Braced Pipe)

Fits Flange Width Range			Max.Design Loads (cULus) Along or Across Beam		
Part #	in.	(mm)	Fig. 909 lbs. (kN)	Fig. 910 lbs. (kN)	Fig. 980 lbs. (kN)
800-1	4"-6"	(101.6-152.4)	1270~ (5.65)	1400~ (6.23)	1400~ (6.23)
800-2	6"-8"	(152.4-203.2)			
800-3	8"-10"	(203.2-254.0)			
800-4	10"-12"	(254.0-304.8)	1270~ (5.65)	1300~ (5.78)	1300~ (5.78)
800-5	12"-14"	(304.8-355.6)			
800-6	14"-16"	(355.6-406.4)			
800-7	16"-18"	(406.4-457.2)	900~ (4.00)	900~ (4.00)	900~ (4.00)

* The loads listed are axial loads on the brace. The horizontal load capacity, H, of the brace is:
 $H = F \times \sin \theta$,
where θ is the installation angle measured from the vertical.

FM Approved design loads are based on ASD design method.



Shown with Fig. 980
brace fitting to pipe brace
(Longitudinal - Parallel to
Braced Pipe)

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

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

Seismic Structural Attachments

TOLCO Fig. 825 - bar joist sway brace attachment to steel

Size Range: Fits up to $\frac{3}{8}$ " (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.

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 lbs-ft (42.1N•m)).

Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus). Approved by Factory Mutual Engineering (FM). Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Installation: 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, 986, or 990. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized.

Weight: Approx. Wt./100 - 247.5 lbs. (112.2kg)

Order By: Figure number and finish

US Patent #6,098,942,

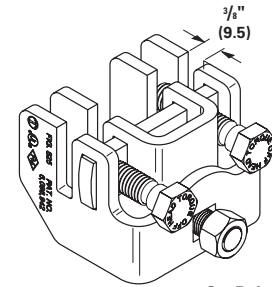
Canada Patent #2,286,659

Note: Retaining strap not required

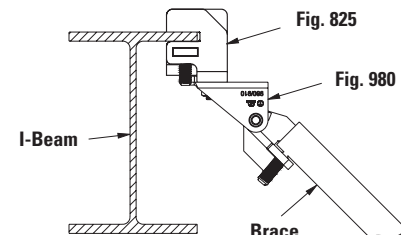
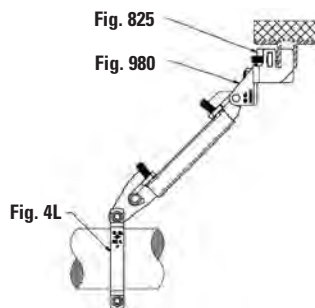
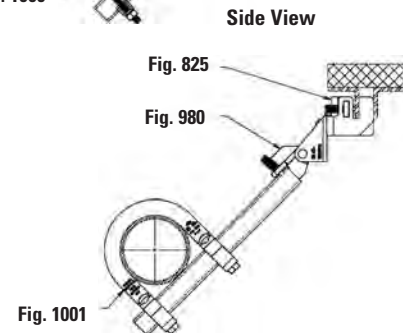
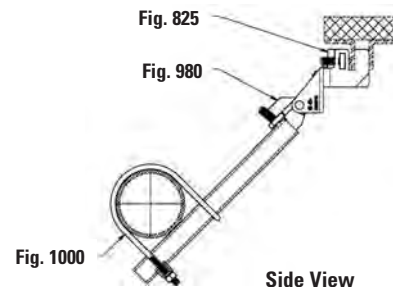
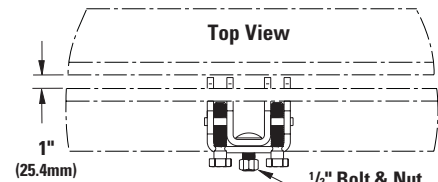
Maximum Design Load	
825W/909-1370 lbs	(5.78 kN)
825W/910-1500 lbs	(7.11 kN)
825W/980-1600 lbs	(8.45 kN)

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

FM Approved design loads are based on ASD design method.



Set Bolts & Hardware
Included



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

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

TOLCO Fig. 825A - bar joist sway brace attachment to steel

Size Range: Fits up to $\frac{3}{8}$ " (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.

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 and Canada (cULus). Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

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, 986, or 990. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized

Weight: Approx. Wt./100 - 154.5 lbs. (70.1kg)

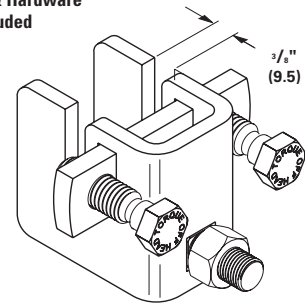
Order By: Figure number and finish

US Patent #6,098,942

Note: Retaining strap not required



Set Bolts & Hardware Included

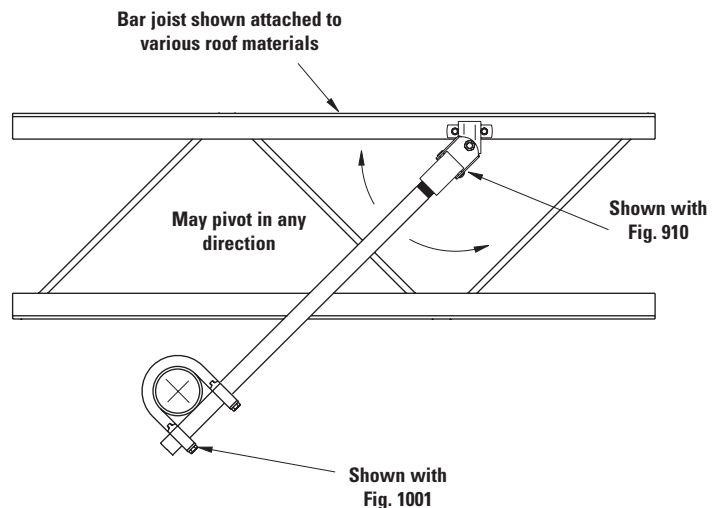


Maximum Design Load

825A 700 lbs. (3.55kN)

UL Listed as a hanger

up to 4" (3.55kN)



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

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

Seismic Structural Attachments

TOLCO Fig. 828 - universal sway brace attachment to steel

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 Fig. 825A.

Material: Steel

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

Features: Permits secure non-friction connection without drilling or welding. Unique design allows offset placement on wide flange 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 and Canada (cULus). Factory Mutual Approved (FM). Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Installation: 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 OSHPD guidelines should be followed.

To Install: Slide 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 screws until the heads break off. Remove the flange nut from the carriage bolt. Install a TOLCO swivel fitting (Fig. 909, 910, 980, *986). Use flange nut to secure the swivel fitting.

*Not UL listed when used in combination with Fig. 986

Finish: Plain or Electro-Galvanized

Weight: Approx. Wt./100 - 341 lbs. (154.7kg)

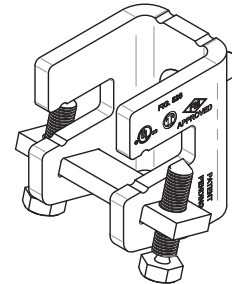
Order By: Figure number and finish

Patent Pending

Note: Retaining strap not required.

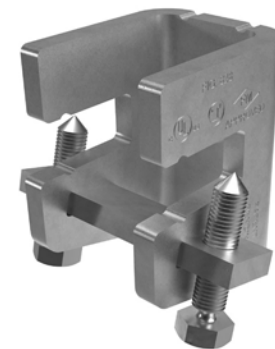


OPM



Set Screws
and
1/2" Attachment
Bolt and Nut
Included

Flange thickness	Maximum UL Rated load
.375" - .499"	1090 lbs. (4.84kN)
.500" - .875"	1370 lbs. (6.09kN)



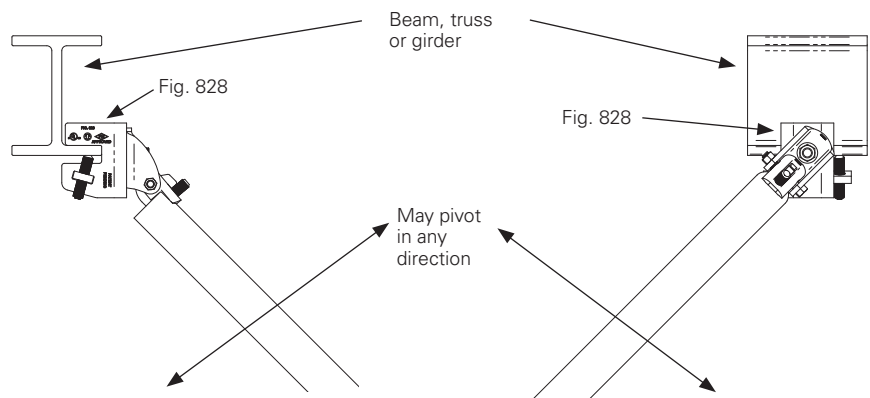
FM Approved Allowable Horizontal Load With Brace Perpendicular To Beam

Brace Angle (degrees from vertical)			
30°-44°	45°-59°	60°-74°	75°-90°
980	2220	3340	4040
(4.350kN)	(9.780kN)	(14.850kN)	(17.970kN)

FM Approved Allowable Horizontal Load With Brace Parallel To Beam

Brace Angle (degrees from vertical)			
30°-44°	45°-59°	60°-74°	75°-90°
820	1270	1490	1650
(3.640kN)	(5.640kN)	(6.620kN)	(7.330kN)

FM Approved design loads are based on ASD design method.



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

TOLCO Fig. 906 - sway brace multi-fastener adapter

Size Range: Use with Fig. 900 Series earthquake brace attachment.

Material: Steel

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

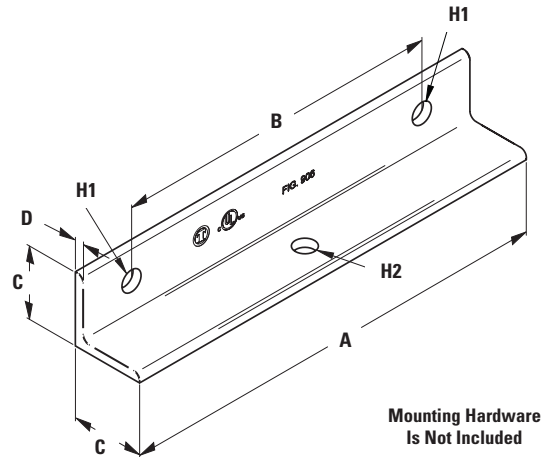
Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus) only when used with B-Line/TOLCO Fig. 900 Series Earthquake Brace Attachments. Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (OSHPD). For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Engineering Guidelines, OPM-0052-13.

Installation: 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, 986, or 990. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized.

Order By: Part number, specify dimensions H1 & H2, and finish.



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)	2.5" (63.5)	1/4" (6.3)	Specify	Specify	394 (178.7)
906-12	15" (381.0)	12" (304.8)	2.5" (63.5)	1/4" (6.3)	Specify	Specify	494 (224.1)

Load Note: Actual design load determined by anchor and concrete strength, not to exceed the UL Listed maximum load of 1200 lbs (5.33kN).

Load is for Fig. 906. If combined load of anchors is less, must reduce to anchor maximum capacity.

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

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

Seismic Structural Attachments

B3085 Series - rod attachment concrete plate

Size Range: 3/8"-16 thru 2"-4 1/2" rod

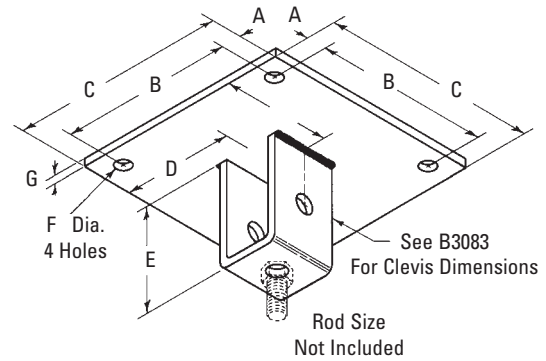
Material: Steel

Function: Structural attachment to concrete ceiling where vertical attachment is desired. Attach hanger rod directly to support bracket.

Finish: Plain. Contact customer service for alternative finishes and materials.

Order By: Part number and finish

Note: Design load is based off rod sizes. Before installation ensure that concrete and anchorage are sufficient to carry the load.



Part No.	Rod Size	A		B		C		D	
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
B3085-3/8	3/8"-16	1"	(25.4)	8"	(203.2)	10"	(254.0)	5"	(127.0)
B3085-1/2	1/2"-13	1"	(25.4)	8"	(203.2)	10"	(254.0)	5"	(127.0)
B3085-5/8	5/8"-11	1"	(25.4)	8"	(203.2)	10"	(254.0)	5"	(127.0)
B3085-3/4	3/4"-10	1"	(25.4)	8"	(203.2)	10"	(254.0)	5"	(127.0)
B3085-7/8	7/8"-9	1"	(25.4)	8"	(203.2)	10"	(254.0)	5"	(127.0)
B3085-1	1"-8	2"	(50.8)	8"	(203.2)	12"	(304.8)	6"	(152.4)
B3085-1 1/8	1 1/8"-7	2"	(50.8)	8"	(203.2)	12"	(304.8)	6"	(152.4)
B3085-1 1/4	1 1/4"-7	2"	(50.8)	8"	(203.2)	12"	(304.8)	6"	(152.4)
B3085-1 1/2	1 1/2"-6	2"	(50.8)	8"	(203.2)	12"	(304.8)	6"	(152.4)

Part No.	E		F		G		Max. Rec. Load*		Approx. Wt./100	
	in.	(mm)	in.	(mm)	in.	(mm)	lbf	(kN)	lbs.	(kg)
B3085-3/8	2 7/8"	(73.0)	9/16"	(14.3)	3/8"	(9.5)	730	(3.25)	1145	(519.4)
B3085-1/2	2 7/8"	(73.0)	9/16"	(14.3)	3/8"	(9.5)	1450	(6.00)	1143	(518.4)
B3085-5/8	2 7/8"	(73.0)	9/16"	(14.3)	1/2"	(12.7)	2160	(9.61)	1490	(675.8)
B3085-3/4	3 1/8"	(79.4)	1 1/16"	(17.5)	1/2"	(12.7)	3230	(14.37)	1574	(713.9)
B3085-7/8	4 1/4"	(107.7)	1 1/16"	(17.5)	1/2"	(12.7)	4480	(19.93)	1635	(741.6)
B3085-1	4 1/2"	(114.3)	1 3/16"	(20.6)	3/4"	(19.0)	5900	(26.24)	3420	(1551.3)
B3085-1 1/8	4 3/4"	(120.6)	1 5/16"	(23.8)	3/4"	(19.0)	7450	(33.14)	3413	(1548.1)
B3085-1 1/4	5"	(127.0)	1 5/16"	(23.8)	3/4"	(19.0)	9500	(42.25)	3747	(1699.6)
B3085-1 1/2	6 1/2"	(165.1)	1 1/8"	(28.6)	1"	(25.4)	13800	(61.38)	5438	(2466.7)

* Based on allowable stresses shown in the ANSI code for pressure piping.

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

B3083 Series - welded beam attachment

B3083WO Series - welded beam attachment without pin

Size Range: 3/8"-16 thru 2"-4 1/2 rod

Material: Steel (Stainless steel available)

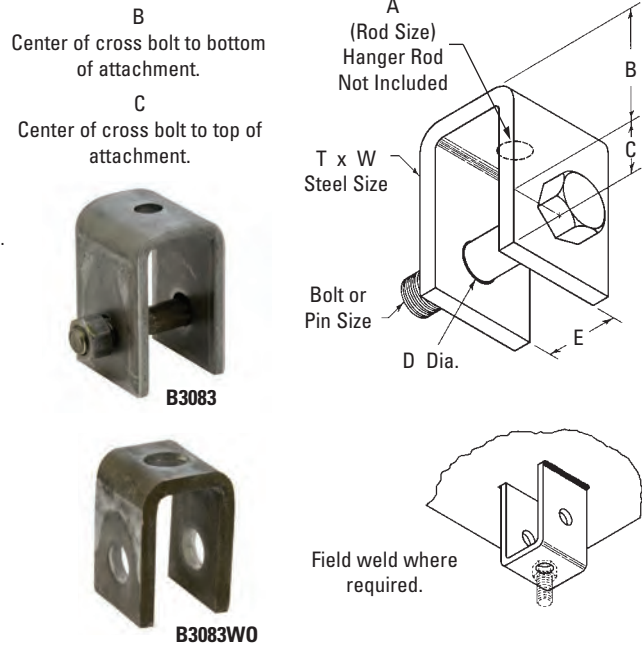
Function: Designed for attaching hanger rod to the bottom of structural steel where heavy loads and large hanger rod sizes are required. Can be welded in place in either the upright or inverted position. When using B3083WO, attach hanger rod to bolt or pin with a B3200 weldless eye nut or B3210 and B3211 series eye rods.

Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 22 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 22.

Finish: Plain or Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number (with or without hardware) and finish.

Note: When ordering with hardware for sizes 3/8 thru 1 1/8, hex head cap screws and hex nuts will be supplied. For 1 1/4 thru 2, clevis pin and cotter pins will be supplied. Must be specified with or without hardware.



Part No.	Rod Size A	Pin or Bolt Size in. (mm)	Design Load		Approx. Wt./100			
			650° F (349°C) lbf (kN)	750° F (399°C) lbf (kN)	W/O Hardware lbs. (kg)	With Hardware lbs. (kg)		
B3083-3/8	3/8"-16	1/2" (12.7)	730 (3.25)	572 (2.54)	89 (40.3)	110 (49.9)		
B3083-1/2	1/2"-13	5/8" (15.9)	1350 (6.00)	1057 (4.70)	87 (39.4)	123 (55.8)		
B3083-5/8	5/8"-11	3/4" (19.0)	2160 (9.61)	1692 (7.52)	84 (38.1)	140 (63.5)		
B3083-3/4	3/4"-10	7/8" (22.2)	3230 (14.37)	2530 (11.25)	173 (78.4)	268 (121.5)		
B3083-7/8	7/8"-9	1" (25.4)	4480 (19.93)	3508 (15.60)	234 (106.1)	376 (170.4)		
B3083-1	1"-8	1 1/8" (28.6)	5900 (26.24)	4620 (20.55)	394 (178.6)	596 (270.2)		
B3083-1 1/8	1 1/8"-7	1 1/4" (31.7)	7450 (33.14)	5830 (25.93)	402 (182.2)	680 (308.3)		
B3083-1 1/4	1 1/4"-7	1 3/8" (34.9)	9500 (42.25)	7440 (33.09)	734 (332.7)	955 (432.9)		
B3083-1 1/2	1 1/2"-6	1 5/8" (41.3)	13800 (61.38)	10807 (48.07)	1460 (661.8)	1817 (823.7)		
B3083-1 3/4	1 3/4"-5	1 7/8" (47.6)	18600 (82.73)	14566 (64.79)	1746 (791.5)	2310 (1047.1)		
B3083-2	2"-4 1/2	2 1/4" (57.1)	24600 (109.42)	19625 (87.29)	2190 (992.7)	2996 (1358.1)		

Part No.	B		C		Dia. D		E		T x W	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
B3083-3/8	2"	(50.8)	7/8"	(22.2)	9/16"	(14.3)	1 1/4"	(31.7)	1/4" x 2"	(6.3 x 50.8)
B3083-1/2	2"	(50.8)	7/8"	(22.2)	1 1/16"	(17.5)	1 1/4"	(31.7)	1/4" x 2"	(6.3 x 50.8)
B3083-5/8	2"	(50.8)	7/8"	(22.2)	13/16"	(20.6)	1 1/4"	(31.7)	1/4" x 2"	(6.3 x 50.8)
B3083-3/4	2"	(50.8)	1 1/8"	(28.6)	15/16"	(23.8)	1 1/2"	(38.1)	3/8" x 2 1/2"	(9.5 x 63.5)
B3083-7/8	3"	(76.2)	1 1/4"	(31.7)	1 1/8"	(28.6)	2"	(50.8)	3/8" x 2 1/2"	(9.5 x 63.5)
B3083-1	3"	(76.2)	1 1/2"	(38.1)	1 1/4"	(31.7)	2"	(50.8)	1/2" x 3"	(12.7 x 76.2)
B3083-1 1/8	3"	(76.2)	1 1/2"	(38.1)	1 3/8"	(34.9)	2 3/4"	(69.8)	1/2" x 3"	(12.7 x 76.2)
B3083-1 1/4	3"	(76.2)	2"	(50.8)	1 1/2"	(38.1)	3"	(76.2)	5/8" x 4"	(15.9 x 101.6)
B3083-1 1/2	4"	(101.6)	2 1/2"	(63.5)	1 3/4"	(44.4)	3 1/2"	(88.9)	3/4" x 5"	(19.0 x 127.0)
B3083-1 3/4	5"	(127.0)	2 3/4"	(69.8)	2"	(50.8)	3 3/4"	(95.2)	3/4" x 5"	(19.0 x 127.0)
B3083-2	5"	(127.0)	3 1/4"	(82.5)	2 3/8"	(60.3)	3 3/4"	(95.2)	3/4" x 6"	(19.0 x 152.4)

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

Seismic Structural Attachments

TOLCO 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 - 9.1.2.6.

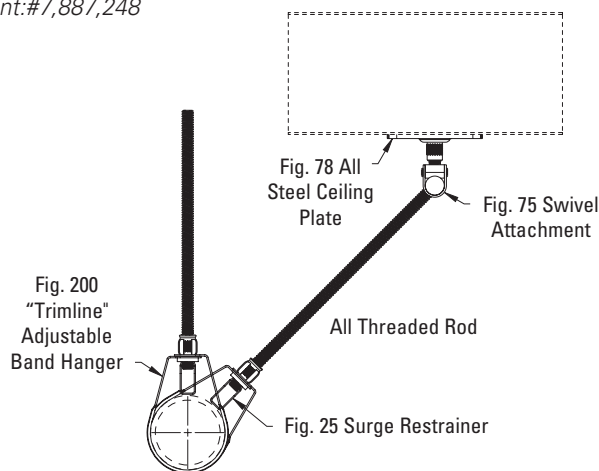
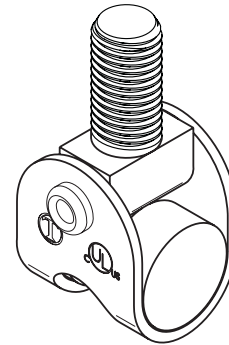
Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus) to support up to 4" (100mm) pipe.

Finish: Electro-Galvanized

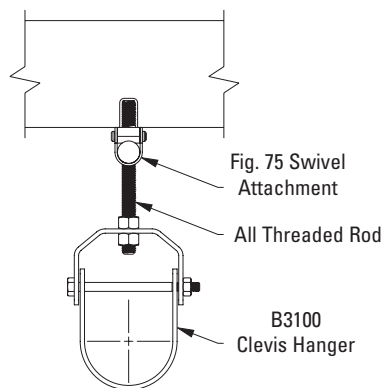
Weight: Approx. Wt./100 - 13.3 lbs. (6.0kg)

Order By: Figure number and finish

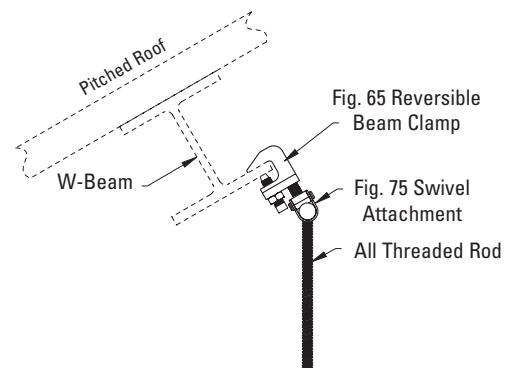
US Patent:#7,887,248



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



May be used as an upper attachment with short hanger rod to omit seismic bracing



May be used with a pitched roof application, to meet requirements of NFPA 13 (2016) Sec. 9.1.2.6.

B446 Series - swivel hanger (female-male)

Size Range: $\frac{3}{8}$ "-16 & $\frac{1}{2}$ "-13 thread sizes

Material: Steel

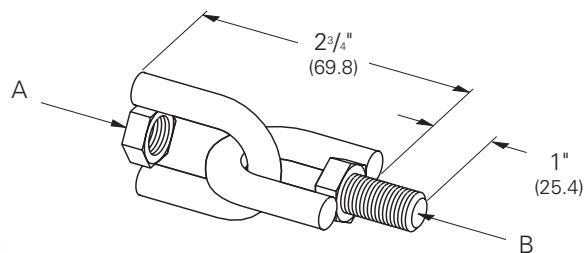
Function: Designed for hanging rod and allowing swivel.

- May be used as an upper attachment with short hanger rod to omit seismic bracing.

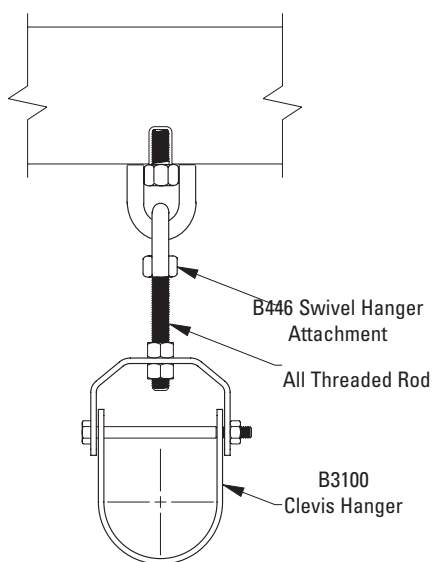
Design Load: ($\frac{3}{8}$ "-16) 610 lbf (2.71kN)
($\frac{1}{2}$ "-13) 1130 lbf (5.02kN)

Finish: Electro-Galvanized

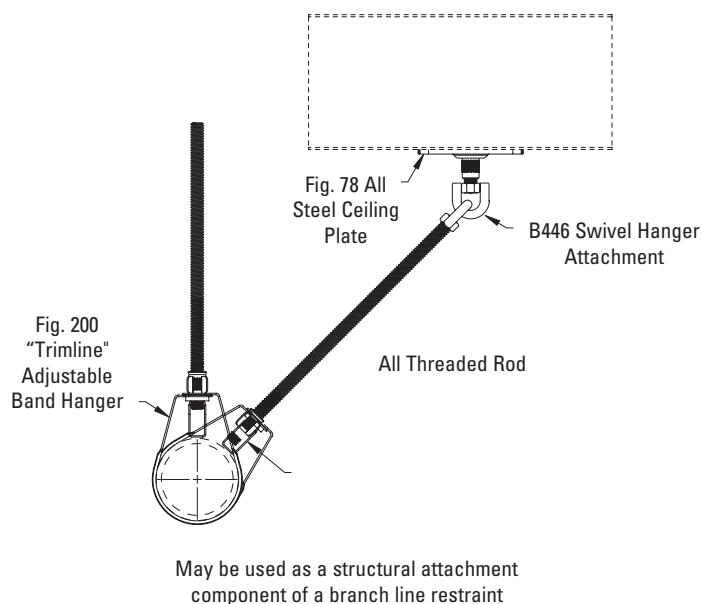
Order By: Part number and finish.



Part No.	A	B	Wt./100	
			lbs.	(kg)
B446- $\frac{3}{8}$	$\frac{3}{8}$ "-16 HN	$\frac{3}{8}$ "-16 HHCS	28	(12.7)
B446- $\frac{1}{2}$	$\frac{1}{2}$ "-13 HN	$\frac{1}{2}$ "-13 HHCS	36	(16.3)



May be used as an upper attachment with short hanger rod to omit seismic bracing



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

Seismic Structural Attachments

TOLCO Fig. 109DD - DDI+™† - concrete deck insert - hanger application

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

Material: Steel

Function: For use in concrete filled metal deck (20 GA. min.) assemblies (i.e. pan deck, Q-deck) applications. After installation, the threaded male hanger of the insert protrudes below the surface of the deck. The threaded bolt offers adjustability for precise height requirements and guarantees the minimum embedment depth. The longer plate enables a variety of installation locations across the deck. Pre-mounted drill screws included for installation.

Applications: Per NFPA 13 - UL Listed as a component of a hanger assembly per Section 9.1.1.4.1

See dimensions and installation detail below.

Approvals: International Code Council, Evaluation Service (ICC-ES), ESR-3958 for concrete, for 3/8"-16 thru 5/8"-11 anchor sizes.

Approved for seismic and wind loading.

UL (Underwriters Laboratories) Listed

FM (Factory Mutual) Approved

Finish: Plate: Plain Steel. Rod: Electro-Galvanized.

Order By: Part number and finish.

Note: Fig. 109DD replaces Fig. 109A which has been discontinued.

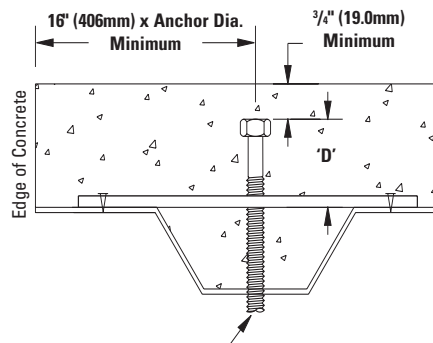
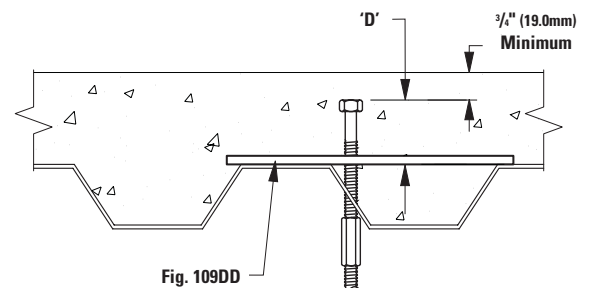
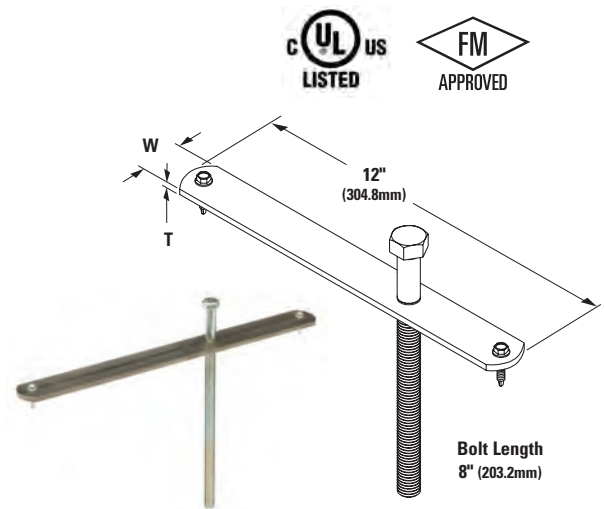


Fig. 109DD

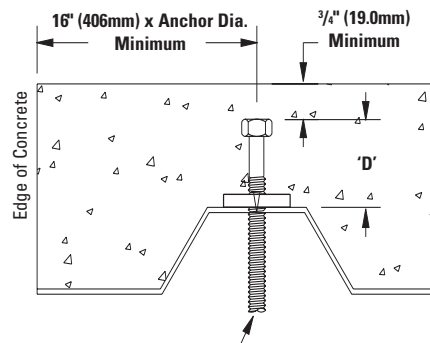


Fig. 109DD

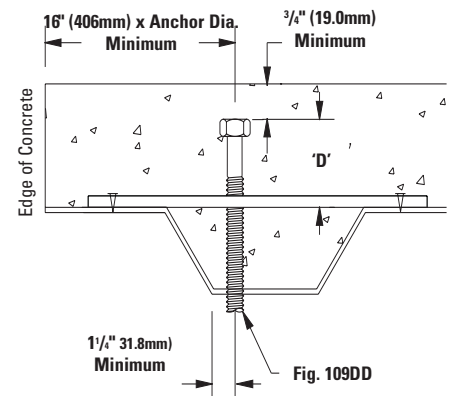


Fig. 109DD

Part No.	Rod Size	T in. (mm)	W in. (mm)	Max. Vertical Load lbf (kn)	'D' Min. Anchor Embedment Depth in. (mm)	Approx. Wt./100 lbs. (kg)
109DD-3/8	3/8"-16	3/16" (4.7)	1 1/4" (31.7)	467 (2.08)	2 1/2" (63.5)	98.1 (44.5)
109DD-1/2	1/2"-13	3/16" (4.7)	1 1/4" (31.7)	680 (3.02)	2 1/2" (63.5)	112.8 (51.1)
109DD-5/8	5/8"-11	3/16" (4.7)	1 1/4" (31.7)	647 (2.88)	2 1/2" (63.5)	139.3 (63.2)
109DD-3/4	3/4"-10	3/8" (9.5)	2" (50.8)	612 (2.72)	2 1/2" (63.5)	112.8 (51.1)
109DD-7/8	7/8"-9	3/8" (9.5)	2" (50.8)	577 (2.56)	2 1/2" (63.5)	381.2 (172.9)

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 3 times the embedment depth or 12 times the anchor diameter (whichever is greater)

† DDI+™ is a registered trademark used by DEWALT®

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

TOLCO Fig. 109DD-DDI+™† - concrete deck insert - brace application

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

Material: Steel

Function: For use in concrete filled metal deck (20 GA. min.) assemblies (i.e. pan deck, Q-deck) applications. After installation, the threaded male hanger of the insert protrudes below the surface of the deck. The threaded bolt offers adjustability for precise height requirements and guarantees the minimum embedment depth. The longer plate enables a variety of installation locations across the deck. Pre-mounted drill screws included for installation.

Applications: Per NFPA 13 - UL Listed as a component of a hanger assembly per Section 9.1.1.4.1

See dimensions and installation detail below.

Approvals: International Code Council, Evaluation Service (ICC-ES), ESR-3958 for concrete, for 3/8"-16 thru 5/8"-11 anchor sizes.

Approved for seismic and wind loading.

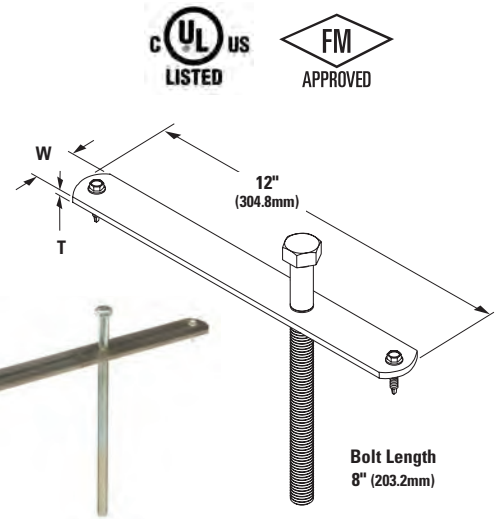
UL (Underwriters Laboratories) Listed

FM (Factory Mutual) Approved

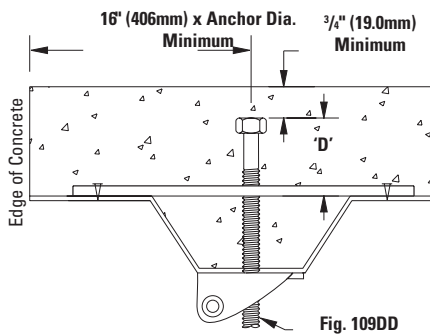
Finish: Plate: Plain Steel. Rod: Electro-Galvanized.

Order By: Part number and finish.

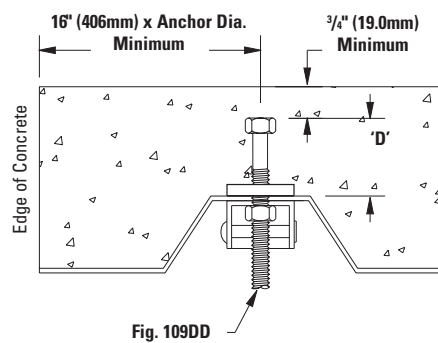
Note: Fig. 109DD replaces Fig. 109A which has been discontinued.



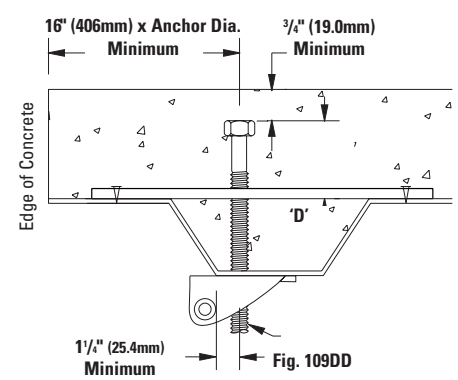
Seismic Structural Attachments



Detail 1



Detail 2



Detail 3

Part No.	Rod Size	T in. (mm)	W in. (mm)	Details 1 & 2 Max. Horizontal Load Brace At 45° lbf (kN)	Detail 3 Max. Horizontal Load Brace At 45° lbf (kN)	'D' Min. Anchor Embedment Depth in. (mm)	Approx. Wt./100 lbs. (kg)
109DD-3/8	3/8"-16	3/16" (4.7)	1 1/4" (31.7)	311 (1.38)	257 (1.14)	2 1/2" (63.5)	98.1 (44.5)
109DD-1/2	1/2"-13	3/16" (4.7)	1 1/4" (31.7)	424 (1.89)	332 (1.48)	2 1/2" (63.5)	112.8 (51.1)
109DD-5/8	5/8"-11	3/16" (4.7)	1 1/4" (31.7)	482 (2.14)	363 (1.61)	2 1/2" (63.5)	139.3 (63.2)
109DD-3/4	3/4"-10	3/8" (9.5)	2" (50.8)	482 (2.14)	363 (1.61)	2 1/2" (63.5)	338.7 (153.6)
109DD-7/8	7/8"-9	3/8" (9.5)	2" (50.8)	482 (2.14)	363 (1.61)	2 1/2" (63.5)	381.2 (172.9)

Seismic bracing design load calculated in compliance with the requirements of IBC 2015 / CBC 2016.

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 3 times the embedment depth or 12 times the anchor diameter (whichever is greater)

† DDi+™ is a registered trademark used by DEWALT®

Seismic Structural Attachments

ACPW series - Wood-Knocker™ II

Features:

- Wood-Knocker™ concrete inserts are installed onto wooden forms used to support newly poured concrete floor slabs, roof slabs or walls.
- When the forms are stripped, the color-coded flange is visibly embedded in the concrete surface.
- The unique, six sided impact plate offers resistance to rotation within the concrete as threaded rod is being installed.
- Suitable for overhead installations such as suspending cable tray, pipe hangers, strut and conduit.
- Color coded by size for all trades.
- UL and FM approved.
- Lowest installation cost.

Approvals: Qualified for static, wind, and seismic loading in concrete.

Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

ICC-ES Certified. See ICC-ESR-3657

UL (Underwriters Laboratories) Listed

FM (Factory Mutual) Approved

Refer to pages 11-26 through 11-27 in Seismic Engineering Guidelines OPM-0052-13 for approval OSHPD structural attachment data.

Order By: Part number



OPM



**ACPW-50
shown**



Part No.	Rod Diameter	Color	Wt./100 lbs. (kg)
ACPW-25-2	1/4"	Brown	29 (13.1)
ACPW-37-2	3/8"	Green	29 (13.1)
ACPW-3750-2	3/8"-1/2"	Gray	24 (10.9)
ACPW-50-2	1/2"	Yellow	29 (13.1)
ACPW-62-2	5/8"	Red	36 (16.3)
ACPW-75-2	3/4"	Purple	36 (16.3)

Wood Knocker™ - Data	1/4"	3/8"	1/2"	5/8"	3/4"
Insert Thread Length - in.	3/8	5/8	11/16	15/16	1 1/8
Plastic Flange Diameter - in.	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8
Thread Size - UNC	1/4"-20	3/8"-16	1/2"-13	5/8"-11	3/4"-10
Overall Length - in.	1 7/8	1 7/8	1 7/8	1 7/8	1 7/8
Min. Insert Spacing - in.	9	9	9	12	12
Min. End Distance - in.	6	6	6	9	9
Load Capacity Tension - lbf *	930	1200	1200	1160	1160
Load Capacity Shear - lbf *	370	1330	1840	2800	2800

* Based on normal weight concrete with minimum compression strength of 3000 psi. Allowable load capacities are calculated using applied safety factor of 4.0. For additional loading information contact factory.
Minimum embedment depth is 2".

† Wood-Knocker™ is a registered trademark used by DeWalt.

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

ACPD series - Bang-It[†] anchors

Features:

- Bang-It[™] concrete inserts are designed for installation in and through metal composite deck used to support newly poured concrete floors or roof slabs.
- After installation, the protective sleeve of the insert protrudes below the surface of the deck, allowing overhead attachment of threaded rod.
- The unique, six sided impact plate offers resistance to rotation within the concrete as threaded rod is being installed.
- Suitable for overhead installations such as suspending cable tray, pipe hangers, strut and conduit.
- Color coded by size for all trades.
- Lowest installation cost.

Approvals: Qualified for static, wind, and seismic loading in concrete. Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

ICC-ES Certified. See ICC-ESR-3657

UL (Underwriters Laboratories) Listed

FM (Factory Mutual) Approved

Refer to pages 11-28 through 11-32 in Seismic Engineering Guidelines OPM-0052-13 for approval OSHPD structural attachment data.

Order By: Part number



OPM



Seismic Structural Attachments

Part No.	Rod Diameter	Color	Wt./100 lbs. (kg)
ACPD-25	1/4"	Brown	43 (19.5)
ACPD-37	3/8"	Green	42 (19.0)
ACPD-3750-2	3/8"-1/2"	Gray	41 (18.6)
ACPD-50	1/2"	Yellow	38 (17.2)
ACPD-62	5/8"	Red	76 (34.4)
ACPD-75	3/4"	Purple	70 (31.7)



Part No.	Description
ACPD-HS813-2	13/16" Carbide Hole Saw for 1/4", 3/8", 1/2"
ACPD-HS1188-2	1 3/16" Carbide Hole Saw for 5/8", 3/4"

Bang-It [™] - Data	1/4"	3/8"	1/2"	5/8"	3/4"
Metal Hole Saw Diameter - in.	13/16	13/16	13/16	1 1/16	1 3/16
Drilling Speed - rpm	700-900	700-900	700-900	500-700	500-700
Insert Thread Length - in.	3/8	5/8	1 1/16	1 5/16	1 7/8
Length of Sleeve (in.)	3 3/8	3 3/8	3 3/8	3 3/8	3 3/8
Thread Size - UNC	1/4"-20	3/8"-16	1/2"-13	5/8"-11	3/4"-10
Embedment Depth - in.	2	2	2	2	2
Upper Deck Tension Load - lbf *	1115	1915	2370	2935	2935
Lower Deck Tension Load - lbf *	830	830	830	930	990
Upper Deck Shear Load - lbf *	835	1115	1115	1115	1115
Lower Deck Shear Load - lbf *	625	840	840	840	840

- * Based on sand lightweight and normal weight concrete with minimum compression strength of 3000 psi over steel deck. Allowable load capacities are calculated using applied safety factor of 4.0. For additional loading information contact factory. Minimum insert spacing of 6", minimum end spacing 6".
- [†] Bang-It[™] is a registered trademark used by DeWalt

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

Seismic Structural Attachments

AWSD series - Power Stud+^{®†} SD2 seismic wedge anchors

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.



OPM



Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

ICC-ES Certified. See ICC-ESR-2502

UL (Underwriters Laboratories) Listed

FM (Factory Mutual) Approved

Refer to pages 11-20 through 11-23 in Seismic Engineering Guidelines OPM-0052-13 for approval OSHPD structural attachment data.

Order By: Part number

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.

Part No.	Anchor Size		Length in. (mm)	Thread Length in. (mm)	Wt./100 lbs. (kg)	
	Diameter in. (mm)					
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)

[†] Power Stud+[®] SD2 is a registered trademark used by DeWalt.

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

ATM series - self-tapping machine screw anchors

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.
- Made of Zinc Plated carbon steel.
- Setting tool included.

Approvals: ICC-ES certified. See ICC-ESR-2272.

FM (Factory Mutual) Approved

Order By: Part number



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 3/8" - (41.3mm)
Load Capacity Tension (lbf - kN)	540 lbf - (2.40kN)
Load Capacity Shear (lbf - kN)	825 lbf - (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.	Thread Size	Thread Length in. (mm)	Wt./100 lbs. (kg)
ATM-37	3/8" - 16	1 1/16" (17.6)	5.2 (2.3)

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.

Order By: Part number



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 (lbf - kN) *	335 lbf - (1.49kN)	630 lbf - (2.80kN)
Load Capacity Shear (lbf - kN) *	520 lbf - (2.31kN)	1170 lbf - (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-3889 evaluation report.

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

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

Seismic Transitional Attachments

TOLCO Fig. 980 - Universal swivel sway brace attachment - 3/8" to 3/4" mounting hardware

TOLCO Fig. 980H - Universal swivel sway brace attachment - 7/8" to 1 1/4" mounting hardware

Size Range: One size fits bracing pipe 1" (25mm) thru 2" (50mm), B-Line series 12 gauge (2.6mm) channel.

Material: Carbon 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 and in accordance with NFPA 13, 2019 Section 18.5.11.5. The Fig. 980 mounts to any surface angle and the 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 TOLCO™ "braced pipe" attachment, Fig. 1001, 2002, 3000, 4L or approved attachment to pipe to form a complete bracing assembly. NFPA 13 guidelines should be followed.

To Install: Place the Fig. 980 onto the "bracing pipe". Tighten the set bolt 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). UL Listed for the following brace member type pipes: Sch. 40, KSD 3562. Ask the factory for additional information as it may vary by product size. Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13. For FM Approval information refer to FM Approved page 61.

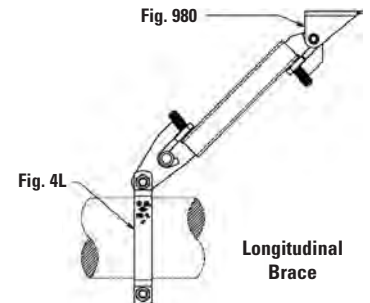
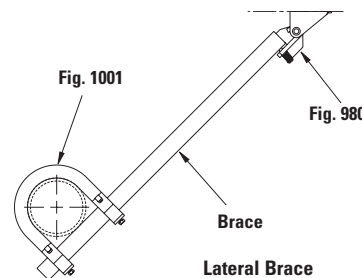
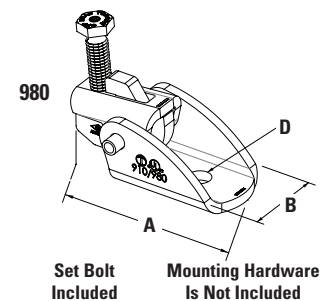
Note: Fig. 980 Swivel Attachment and Fig. 1001, 2002, 3000, 4L, or approved attachment to pipe make up a sway brace system of UL Listed attachments and bracing materials which satisfies the requirements of Underwriters Laboratories and the National Fire Protection Association (NFPA)

Finish: Plain, Electro-Galvanized or Stainless Steel.

Contact customer service 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



Catalog #	A		B		D**		Max. Design Load (cULus) lbs./(kN)	Max. Design Load*** (FM)				Approx.Wt./100 lbs. (kg)	
	in.	(mm)	in.	(mm)	in.	(mm)		30°-44° lbs./(kN)	45°-59° lbs./(kN)	60°-74° lbs./(kN)	75°-90° lbs./(kN)		
980-3/8					7/16	(11.1)	1600 (7.12)					149	(67.6)
980-1/2					9/16	(14.3)	2100 (9.34)					148	(67.1)
980-5/8					11/16	(17.5)	2100 (9.34)					147	(66.7)
980-3/4					13/16	(20.6)	2100 (9.34)					146	(66.2)
980H-7/8					15/16	(23.8)	Fig. 980H is not UL Listed or FM Approved					402	(182.3)
980H-1					1 1/16	(27.0)		Fig. 980H is not UL Listed or FM Approved				400	(181.4)
980H-1 1/8					1 3/16	(30.2)						397	(180.1)
980H-1 1/4					1 5/16	(33.3)						390	(176.9)

* Sizes available in stainless steel (980S-3/8, 980S-1/2, 980S-5/8, and 980S-3/4) and have the same UL rating as what is listed.

** Mounting attachment hole size.

*** Installed with 1" or 1 1/4" schedule 40 brace pipe.

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

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

TOLCO Fig. 986 - mechanical fast clamp

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

Material: Steel

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

Features:

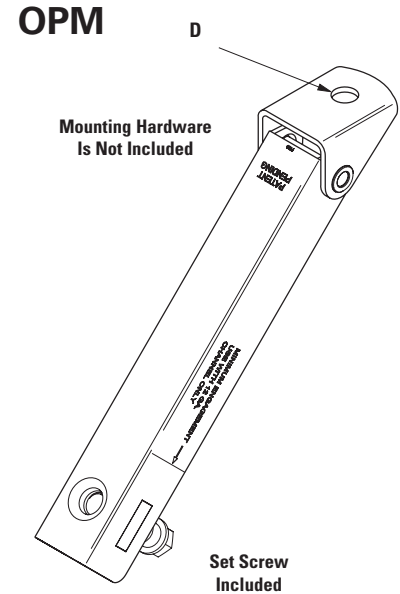
- Allows up to 6" (152.4mm) of adjustability when used with Fig. 900 series
- Allows up to 12" (304.8mm) of adjustability in brace length, when used with Fig. 985
- Break-off set screw heads visually verify required installation torque
- Swivel allows adjustment to various surface angles

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Electro-Galvanized

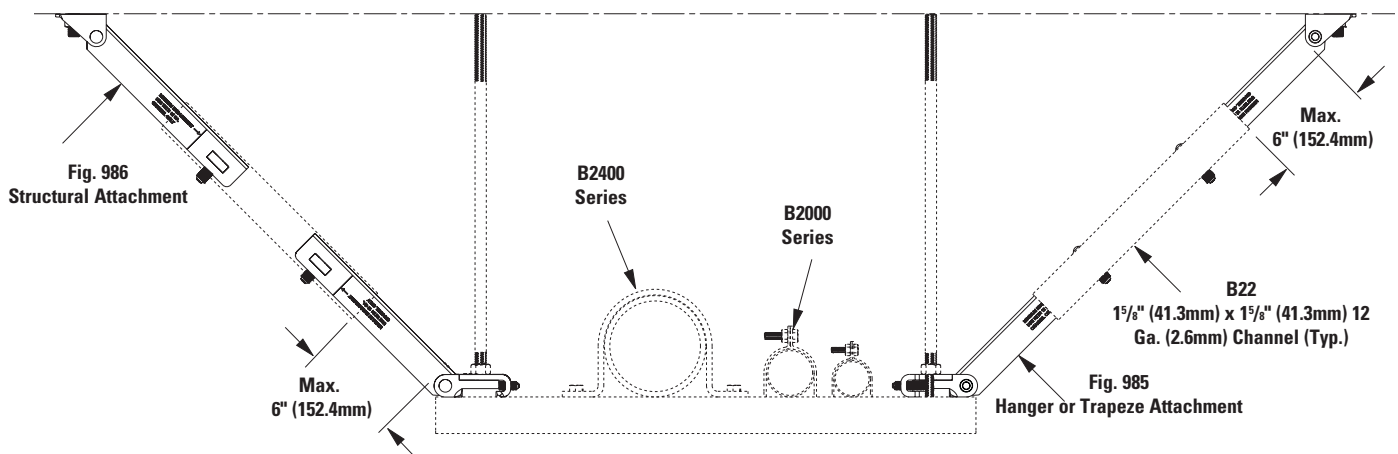
Order By: Part number and finish

Patent Pending



Part No.	Rod Size	Hole Dia. D in. (mm)	Max. Horizontal Design Load* lbf (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 B22 channel 1 5/8" (41.3mm) x 1 5/8" (41.3mm) 12 Ga. (2.6mm) Internal testing loads. Refer to OPM-0052-13 for OPM approved loads.



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

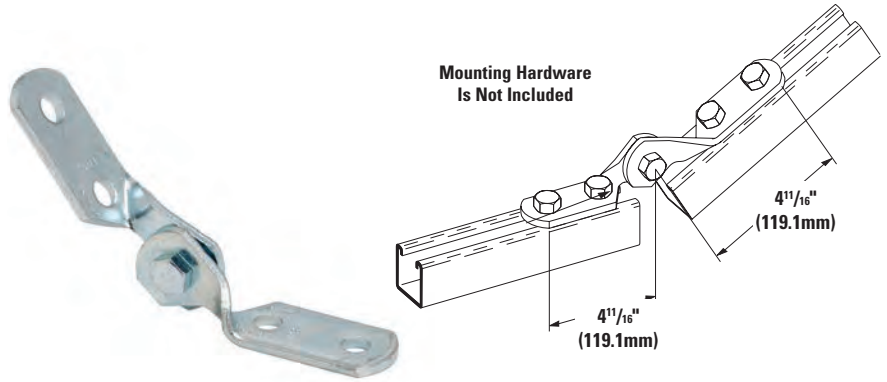
B335 - Four hole adjustable hinge

Function: For bracing strut channel trapeze supports. Torque to 50 lbs•ft (68N•m)

Finish: Zinc Plated or Dura-Green™ paint.

Weight: Approx. Wt./100 - 110 lbs. (49.9kg)

Order By: Part number and finish.



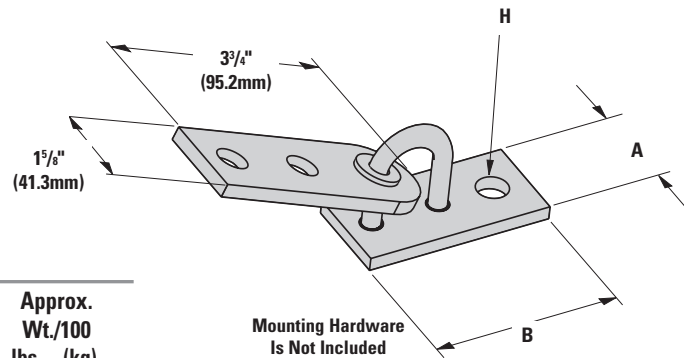
B633 Series - adjustable seismic hinge fitting

Function: Allows for bracing swivel in two planes.

Application: Use 1/2" bolts & channel nuts on the two hole side of the fitting. Torque to 50 lbs•ft (68N•m)

Finish: Zinc Plated

Order By: Part number and finish.



Part No.	A in. (mm)	B in. (mm)	Hole Size H in. (mm)	Approx. Wt./100 lbs. (kg)
B633-1/2	31 1/2" (88.9)	15 5/8" (41.3)	9/16" (14.3)	92 (41.7)
B633-5/8	31 1/2" (88.9)	15 5/8" (41.3)	11/16" (17.4)	97 (44.0)
B633-3/4	31 1/2" (88.9)	15 5/8" (41.3)	13/16" (20.6)	95 (43.1)
B633-7/8	31 1/2" (88.9)	15 5/8" (41.3)	15/16" (23.8)	107 (48.5)
B633-1	31 1/2" (88.9)	15 5/8" (41.3)	11/16" (27.0)	120 (54.4)
B633-11/8	39 1/16" (90.5)	2" (50.8)	13/16" (30.2)	104 (47.1)
B633-11/4	37 7/8" (98.4)	21 1/4" (57.1)	15/16" (33.3)	114 (51.7)



B154 - Two Hole 45° Open Angle

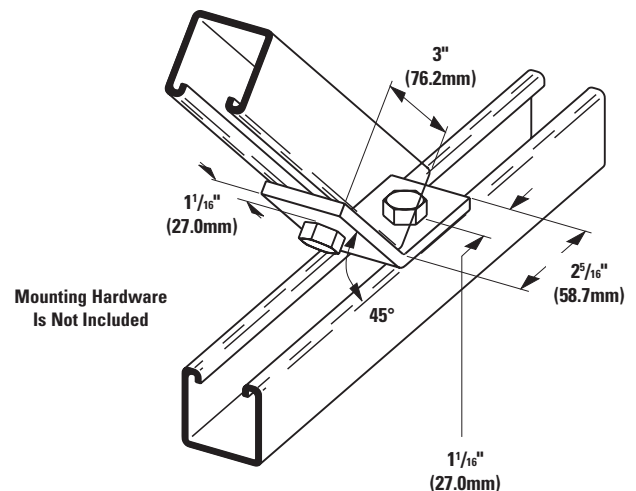
Function: Can be used for cable bracing.

Application: Uses 1/2" bolts & channel nuts. Torque to 50 lbs•ft (68N•m)

Finishes: Zinc Plated, Dura-Green™, SS4

Weight: Approx. Wt./100 - 58 lbs. (26.3kg)

Order By: Part number and finish.



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

Seismic Transitional Attachments

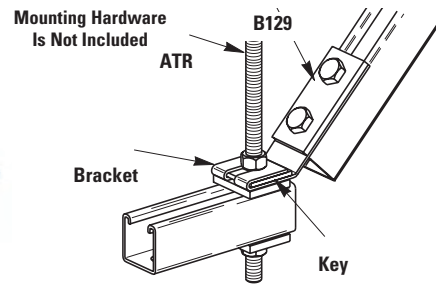
B650 Series - seismic retrofit bracket

Function: Allows for bracing swivel in two planes.

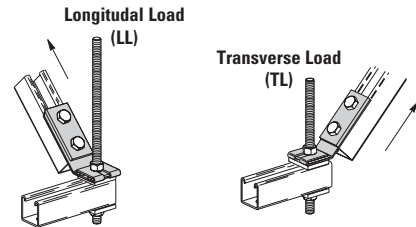
Application: Use 1/2" bolts & channel nuts on the two hole side of the fitting. Torque to 50 lbs•ft (68N•m)

Finish: Zinc Plated

Order By: Part number



Part No.	Rod Size	TL in. (kN)	LL in. (kN)	Approx. Wt./100 lbs. (kg)
B650-3/8	3/8"	1100 (4.89)	1100 (4.89)	92 (41.4)
B650-1/2	1/2"	1500 (6.67)	1500 (6.67)	97 (43.6)
B650-5/8	5/8"	1500 (6.67)	1500 (6.67)	95 (42.7)
B650-3/4	3/4"	1500 (6.67)	1500 (6.67)	107 (48.5)



TOLCO Fig. 1CBS - Clevis Bolt Spacer

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.

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

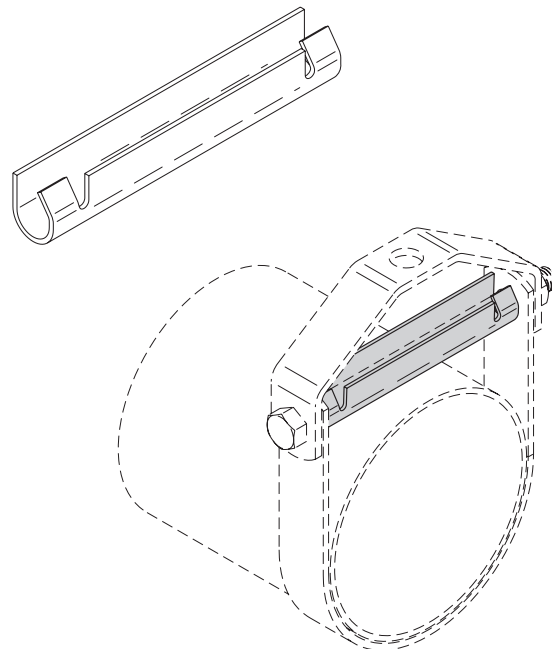
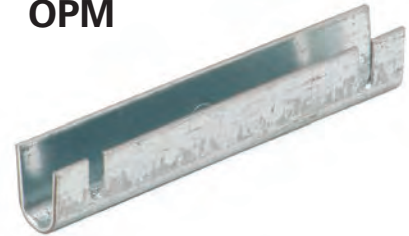
Approvals: Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (OSHPD). For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Engineering Guidelines OPM-0052-13 for 2 1/2" - 8" (B3100) only.

Finish: Pre-Galvanized.

Order By: Part number

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)

OPM



Seismic Transitional
Attachments

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

TOLCO Fig. 98 - rod stiffener

TOLCO Fig. 98B - rod stiffener with break-off bolt head

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 Engineering Guidelines 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 Engineering Guidelines OPM-0052-13.

Finishes: 304 stainless steel, 316 stainless steel and HDG.

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

Order By: Figure number and finish

OPM



Fig. 98

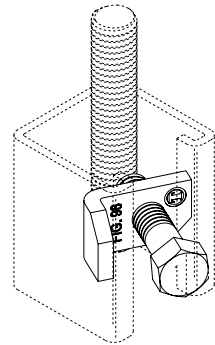
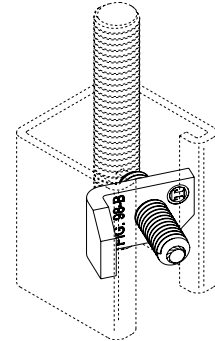


Fig. 98B



SC228 - Hanger rod stiffener

Size Range: Secures 3/8"-16 thru 7/8"-11 hanger rod

Material: Steel

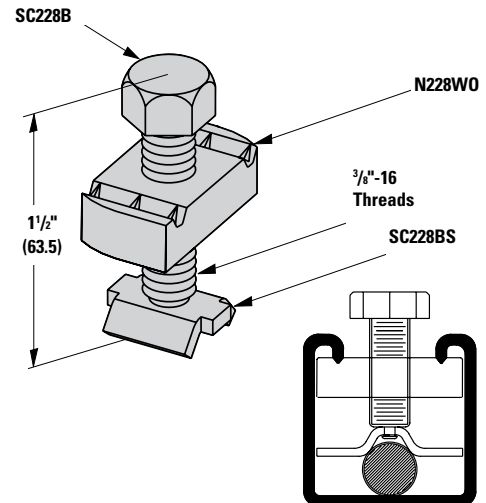
Function: Secures channel to hanger rod for vertical seismic bracing. Slight distortion of the channel (strut) may occur upon installation of rod stiffeners.

Finish: Electro-Galvanized. Contact customer service for alternative finishes and materials.

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

Order By: Part number and finish

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 6" (152.4mm) of the rod. A minimum of two rod stiffeners (Fig. 98, Fig. 98B or SC228) must be installed.
- 2.) Recommended torque on Fig. 98 and SC228 is 8 lbs•ft (10.8N•m) or finger tight and one full turn with a wrench. Fig. 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.

TOLCO Fig. 4B pipe clamp for sway bracing

Size Range: ¾" (20mm) thru 8" (200mm) pipe

Material: Steel

Function: For bracing pipe against sway and seismic disturbance

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

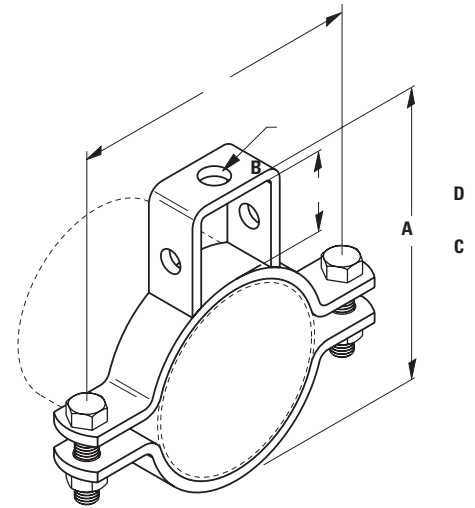
Installation Instructions: Fig. 4B is the "braced pipe" attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and transitional and structural attachment component(s) to form a complete bracing assembly. OSHPD guidelines should be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

To Install: Place the Fig. 4B over the pipe to be braced. Attach other transitional fitting, Fig. 909, 910, 980, or 990. Tighten bolts and nuts. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Standard Finish: Plain or Electro-Plated

Order By: Part number and finish.

OPM



Part No.	Pipe Size in. (mm)	Rod Size A	B in. (mm)	C in. (mm)	D in. (mm)	Bolt Size	Approx. Wt./100 lbs. (kg)
4B-¾	¾" (20)	¾"-16	1" (25.4)	2 ⁷ / ₈ " (73.0)	2 ⁵ / ₈ " (66.7)	5/16"-18	56 (25.4)
4B-1	1" (25)	¾"-16	1" (25.4)	3 ¹ / ₄ " (82.5)	2 ¹⁵ / ₁₆ " (74.6)	5/16"-18	60 (27.2)
4B-1¼	1¼" (32)	¾"-16	1" (25.4)	3 ⁹ / ₁₆ " (90.6)	3 ¹ / ₄ " (82.5)	5/16"-18	74 (33.5)
4B-1½	1½" (40)	¾"-16	1" (25.4)	3 ¹³ / ₁₆ " (96.8)	3 ⁷ / ₁₆ " (87.3)	5/16"-18	79 (35.8)
4B-2	2" (50)	¾"-16	1½" (38.1)	5 ¹ / ₈ " (130.2)	4 ⁵ / ₈ " (117.5)	5/16"-18	156 (70.7)
4B-2½	2½" (65)	½"-13	1¾" (44.4)	5 ⁵ / ₈ " (142.9)	5 ³ / ₈ " (136.5)	¾"-16	176 (79.8)
4B-3	3" (80)	½"-13	1 ⁷ / ₈ " (47.6)	6 ³ / ₄ " (171.4)	6 ¹ / ₈ " (155.5)	¾"-16	198 (89.9)
4B-3½	3½" (90)	½"-13	2" (50.8)	7 ¹ / ₄ " (184.1)	6 ³ / ₄ " (171.4)	¾"-16	219 (99.3)
4B-4	4" (100)	5/8"-11	2" (50.8)	8 ⁵ / ₈ " (219.1)	7 ¹ / ₄ " (184.1)	½"-13	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	390 (176.9)
4B-6	6" (150)	¾"-10	2 ¹ / ₈ " (54.0)	10 ¹⁵ / ₁₆ " (277.8)	9 ¹ / ₂ " (241.3)	5/8"-11	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)	¾"-10	691 (313.4)

Refer to OPM-0052-13 for approved loads.

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

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

TOLCO Fig. 4A - pipe clamp for sway bracing

Size Range: 2 1/2" (65mm) thru 8" (200mm) pipe. For sizes smaller than 2 1/2" (65mm) use Fig. 4LA.

Material: Steel

Function: For bracing pipe against sway and seismic disturbance.

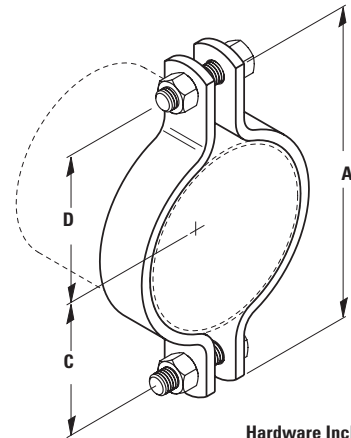
Approvals: Underwriters Laboratories Listed in the USA and Canada (cULus) 2 1/2" (65mm) thru 8" (200mm).

Installation: 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 guidelines should be followed.

To Install: Place the Fig. 4A over the pipe to be braced. Attach our transitional fitting, either Fig. 980, 910, 909, or 990 to the clamp ears. Tighten bolts and nuts; torque requirement is a minimum of 50 lbs•ft (68N•m) per MSS-SP-58 (2009). Transitional fitting attachment can pivot for adjustment to proper brace angle.

Finish: Plain or Electro-Galvanized

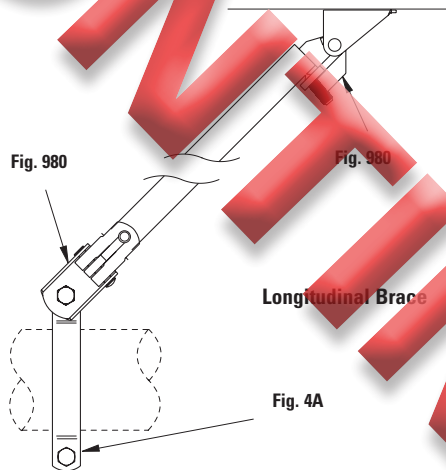
Order By: Part number and finish



Hardware Included



For
Lateral Brace
Refer to 4LA



Longitudinal Brace

Fig. 4A

Part No.	Pipe Size in. (mm)	A in. (mm)	C in. (mm)	D in. (mm)	Bolt Size	Max. Horizontal Design Load (cULus) lbf (kN)	Approx. Wt./100 lbs. (kg)
4A-2 1/2	2 1/2" (100)	7" (177.8)	2 1/16" (68.3)	3" (76.2)	1/2"-13	1000 (4.45)	134 (60.8)
4A-3	3" (80)	7 1/2" (190.5)	3" (76.2)	3 5/16" (84.1)	1/2"-13	1000 (4.45)	150 (69.0)
4A-4	4" (100)	8 1/2" (215.9)	3 3/8" (85.7)	3 11/16" (93.7)	1/2"-13	1600 (7.11)	221 (100.2)
4A-5	5" (125)	9 3/4" (247.6)	3 7/8" (98.4)	4 3/8" (111.1)	1/2"-13	1600 (7.11)	253 (114.7)
4A-6	6" (150)	11 1/2" (292.1)	5" (127.0)	5 1/8" (130.2)	1/2"-13	2015 (8.96)	513 (232.7)
4A-8	8" (200)	13 1/4" (336.5)	6 1/16" (169.9)	6 1/8" (155.6)	1/2"-13	2015 (8.96)	601 (272.6)

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

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

TOLCO Fig. 4L - sway brace attachment (UL listed)

Size Range: 1" (25mm) through 8" (200mm) IPS. 10" (250mm) and 12" (300mm) not UL listed

Material: Steel and stainless steel.

Function: For bracing pipe against sway and seismic disturbance.

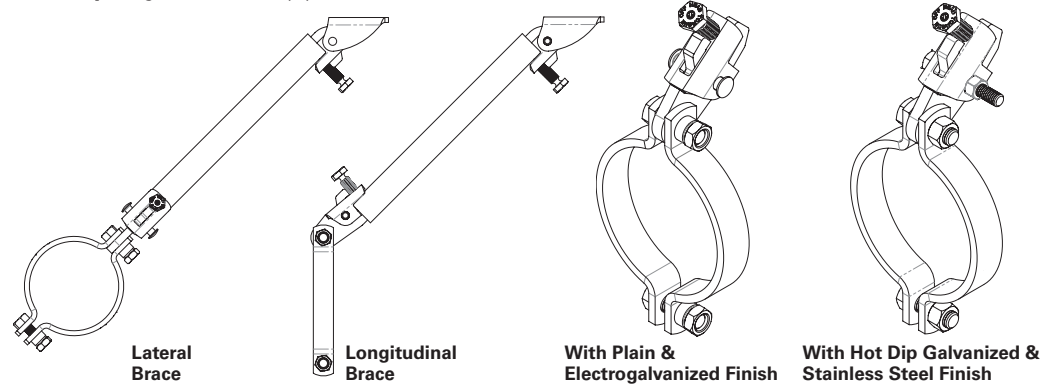
Approvals: Underwriters Laboratories Listed in the USA (UL) and Canada (cUL) 1" (25mm) through 8" (200mm) pipe. UL Listed for the following sprinkler type pipes: Sch. 40, Sch. 10, Bull Moose Eddy Flow, Wheatland Mega Flow, DIN 2448, KSD 3562, KSD 3507. Ask the factory for additional information as it may vary by product size. For FM Approval information refer to FM Approved page 35a. Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Installation Instructions: Fig. 4L is the "braced pipe" attachment component of a longitudinal and lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO structural attachment component to form a complete bracing assembly. NFPA 13 guidelines should be followed. (For complete detailed instructions see instruction sheet [IL309015EN](#)).

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 bolt until head snaps off. Jaw attachment can pivot for adjustment to proper brace angle.

Finish: Plain, Electrogalvanized, Hot Dip Galvanized or Stainless Steel (only for 4" & 6" sizes).

Order By: Figure number, pipe size and finish.



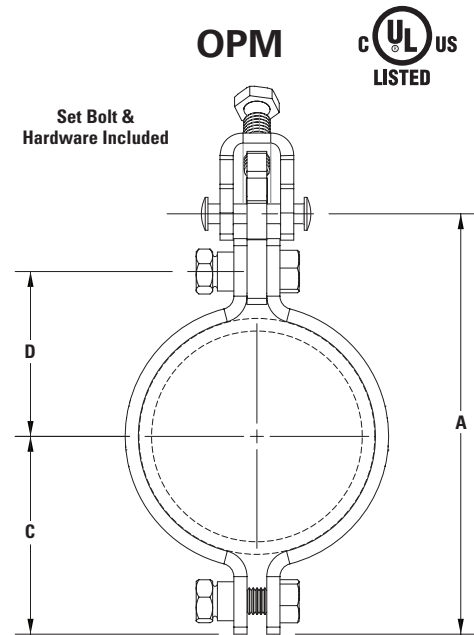
Part No.	Nom Pipe Size in.	(mm)	A (Max) in.	C in.	D in.	Bolt Size in.	UL Max. Rec. Load Logitudinal lbs.	Lateral lbs.	PLN & EG. Approx. Wt./100 lbs.
4L-1	1	(25)	5	2	1 ³ / ₈	1/2-13	1000	1000	176
4L-1 ¹ / ₄	1 ¹ / ₄	(32)	5 ² / ₇	2 ¹ / ₁₆	1 ⁵ / ₈	1/2-13	1000	1000	182
4L-1 ¹ / ₂	1 ¹ / ₂	(40)	5 ¹ / ₂	2 ¹ / ₃	1 ² / ₃	1/2-13	1000	1000	187
4L-2	2	(50)	6 ² / ₇	2 ² / ₃	2	1/2-13	1600	1000	204
4L-2 ¹ / ₂	2 ¹ / ₂	—	6 ⁷ / ₉	3	2 ¹ / ₃	1/2-13	2000	1000	217
4L-65mm	—	(65)	6 ⁷ / ₉	3	2 ¹ / ₃	1/2-13	700	1000	214
4L-3	3	(80)	7 ³ / ₇	3 ¹ / ₄	2 ⁵ / ₈	1/2-13	2000	1000	323
4L-3 ¹ / ₂	3 ¹ / ₂	(90)	8	3 ¹ / ₂	2 ⁷ / ₈	1/2-13	2000	1000	343
4L-4***	4	(100)	8 ³ / ₇	3 ³ / ₄	3 ¹ / ₈	1/2-13	2000**	1000	253
4L-5	5	—	9 ⁵ / ₉	4 ³ / ₈	3 ⁵ / ₈	1/2-13	2000**	1600*	314
4L-125mm	—	(125)	9 ⁵ / ₉	4 ³ / ₈	3 ⁵ / ₈	1/2-13	1200	1600*	314
4L-6***	6	—	11 ³ / ₇	5 ¹ / ₃	4 ⁴ / ₇	1/2-13	2000	1600*	540
4L-150mm	—	(150)	11 ³ / ₇	5 ¹ / ₃	4 ⁴ / ₇	1/2-13	1200	1600*	538
4L-8	8	—	13 ³ / ₅	6 ² / ₅	5 ² / ₃	1/2-13	2000	2100*	645
4L-200mm	—	(200)	13 ³ / ₅	6 ² / ₅	5 ² / ₃	1/2-13	1400	2100*	643
4L-10****	10	(254)	17 ³ / ₅	8 ¹ / ₄	7 ¹ / ₄	1/2-13	NA	NA	1349
4L-12****	12	(300)	19 ³ / ₅	9 ¹ / ₄	8 ¹ / ₄	1/2-13	NA	NA	1526

* Only UL listed as a lateral brace for use with a 1" (25mm) pipe as the brace member.

** Only UL listed as a longitudinal brace for use with a 1" (25mm) thru 1¹/₂" (40mm) pipe as the brace member.

*** Fig 4L-4 and Fig 4L-6 are only sizes available in stainless steel 316.

**** FM approved not UL listed.



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

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

Seismic System Attachments

TOLCO Fig. 4L - sway brace attachment (FM approved)

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. For UL Listed information refer to UL Listed page 35. Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

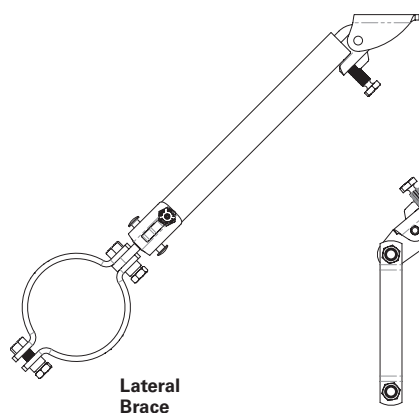
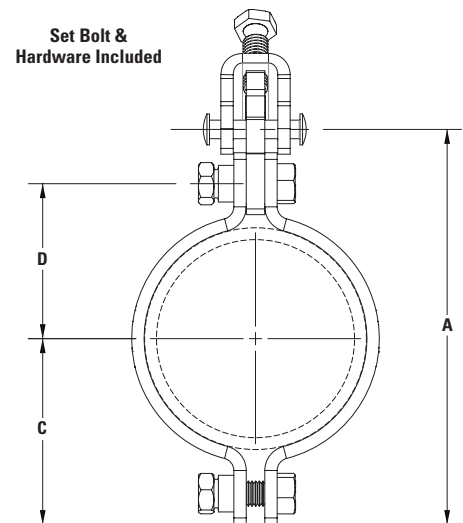
Installation Instructions: Fig. 4L is the "braced pipe" attachment component of a longitudinal and lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO™ structural attachment component to form a complete bracing assembly. NFPA 13 and/or FM guidelines should be 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 bolt until head snaps off. Jaw attachment can pivot for adjustment to proper brace angle. (For complete detailed instructions see instruction sheet [IL309015EN](#)).

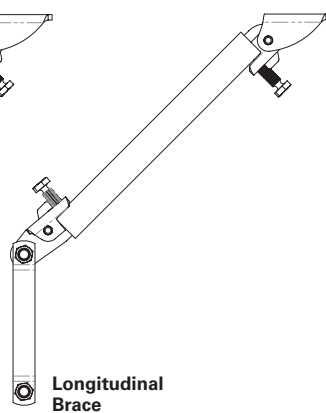
Finish: Plain, Electrogalvanized.

Order By: Figure number, pipe size and finish.

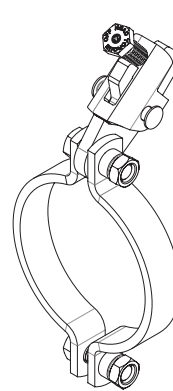
Designed to meet or exceed requirements of FM DS 2-8.



Lateral Brace



Longitudinal Brace



With Plain & Electrogalvanized Finish



Part No.	Nom Pipe Size in. (mm)	A (Max) in.	C in.	D in.	Bolt Size in.	FM Max. Rec. Load Longitudinal				FM Max. Rec. Load Lateral				Approx. Wt./100 lbs.
						30°-44° lbs. (kN)	45°-59° lbs. (kN)	60°-74° lbs. (kN)	75°-90° lbs. (kN)	30°-44° lbs. (kN)	45°-59° lbs. (kN)	60°-74° lbs. (kN)	75°-90° lbs. (kN)	
4L-1	1 (25)	5	2	1 3/8	1/2-13	1060 (4.72)	1160 (5.16)	1400 (6.23)	1500 (6.68)	1370 (6.10)	1940 (8.63)	2380 (10.59)	2650 (11.79)	176
4L-1 1/4	1 1/4 (32)	5 7/8	2 1/16	1 5/8	1/2-13	1060 (4.72)	1160 (5.16)	1400 (6.23)	1500 (6.68)	1370 (6.10)	1940 (8.63)	2380 (10.59)	2650 (11.79)	182
4L-1 1/2	1 1/2 (40)	5 1/2	2 1/8	1 3/4	1/2-13	740 (3.30)	1020 (4.54)	1250 (5.57)	920 (4.10)	1370 (6.10)	1940 (8.63)	2380 (10.59)	2650 (11.79)	187
4L-2	2 (50)	6 7/8	2 3/8	2	1/2-13	740 (3.30)	1020 (4.54)	1250 (5.57)	920 (4.10)	1420 (6.32)	1990 (8.86)	2440 (10.86)	2720 (12.10)	204
4L-2 1/2	2 1/2 —	6 7/8	3	2 1/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	220
4L-65mm	— (65)	6 7/8	3	2 1/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	218
4L-3	3 (80)	7 3/8	3 1/4	2 5/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	323
4L-3 1/2	3 1/2 (90)	8	3 1/2	2 7/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	343
4L-4	4 (100)	8 3/8	3 3/4	3 1/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	253
4L-5	5 —	9 5/8	4 3/8	3 5/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	313
4L-125mm	— (125)	9 5/8	4 3/8	3 5/8	1/2-13	520 (2.32)	650 (2.90)	790 (3.52)	1040 (4.63)	1410 (6.28)	1990 (8.86)	2440 (10.86)	2720 (12.10)	312
4L-6	6 —	11 3/8	5 1/8	4 7/8	1/2-13	870 (3.87)	1200 (5.34)	1460 (6.50)	1630 (7.26)	1560 (6.94)	2210 (9.84)	2710 (12.06)	3020 (13.44)	540
4L-150mm	— (150)	11 3/8	5 1/8	4 7/8	1/2-13	870 (3.87)	1200 (5.34)	1460 (6.50)	1630 (7.26)	1560 (6.94)	2210 (9.84)	2710 (12.06)	3020 (13.44)	538
4L-8	8 —	13 3/8	6 1/8	5 3/8	1/2-13	1190 (5.30)	1440 (6.41)	1580 (7.03)	1750 (7.79)	1560 (6.94)	2210 (9.84)	2710 (12.06)	3020 (13.44)	645
4L-200mm	— (200)	13 3/8	6 1/8	5 3/8	1/2-13	1190 (5.30)	1440 (6.41)	1580 (7.03)	1750 (7.79)	1560 (6.94)	2210 (9.84)	2710 (12.06)	3020 (13.44)	643
4L-10	10 (254)	17 3/8	8 1/4	7 1/4	1/2-13	1620 (7.21)	1660 (7.38)	1570 (6.98)	1740 (7.74)	1620 (7.21)	2300 (10.23)	2820 (12.54)	3140 (13.97)	1349
4L-12	12 (300)	19 3/8	9 1/4	8 1/4	1/2-13	1620 (7.21)	1660 (7.38)	1570 (6.98)	1740 (7.74)	1620 (7.21)	2300 (10.23)	2820 (12.54)	3140 (13.97)	1526

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

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

Updated 4-7-21

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

Size Range: 1" (25mm) thru 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. Underwriters Laboratories Listed in the USA and Canada (cULus). Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13. See loads in charts on page 37.

Installation: 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.

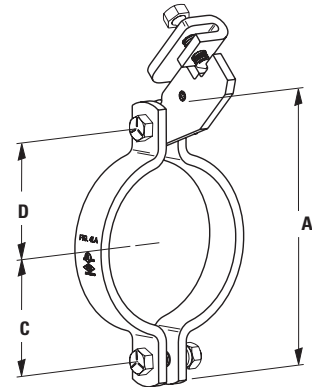
Order By: Part number and finish.



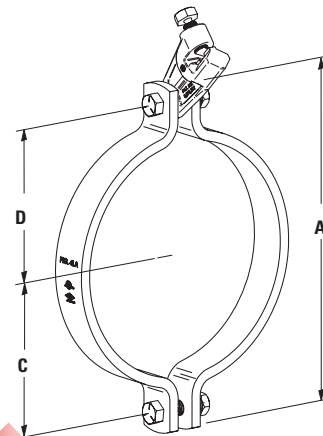
OPM



4LA-1 thru 4LA-4



4LA-6 thru 4LA-12



Part No.	Pipe Size		A		C		D		Bolt Size	Approx. Wt./100 lbs. (kg)
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)		
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-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 series seismic bracing components are designed to be compatible only with other B-Line series bracing components, resulting in a listed seismic bracing assembly. Eaton B-Line Division warranty for seismic bracing components will be the warranty provided in Eaton B-Line Division standard terms and conditions of sale made available by Eaton, except that, in addition to the other exclusions from Eaton B-Line Division warranty, Eaton makes no warranty relating to B-Line series seismic bracing components that are combined with products not provided by Eaton.

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

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

OPM

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.

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

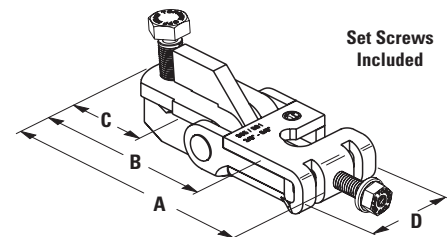
Installation: Fig. 981 is the "braced pipe" attachment component of a lateral or longitudinal brace assembly. It is intended to be combined with the pipe hanger, all-thread rod, "bracing pipe" and our transitional and structural attachment component(s) to form a complete bracing assembly. NFPA 13 and/or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

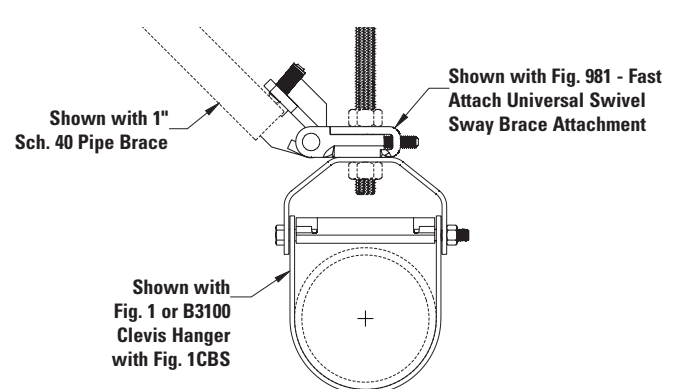
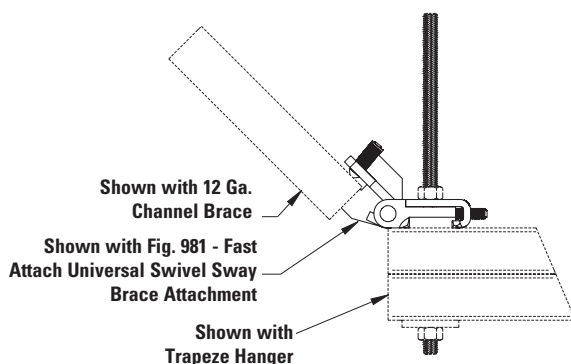
Finish: Electro-Galvanized

Order By: Part number and finish.

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



Part No.	Rod Size Range	A	B	C	D	Max. Horizontal Design Load		Approx. Wt./100	
		in. (mm)	in. (mm)	in. (mm)	in. (mm)				
981-S	3/8" thru 5/8"	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.

TOLCO Fig. 985 - Mechanical Fast Clamp

Size Range: Fig. 985-S fits rod sizes $\frac{3}{8}$ " thru $\frac{5}{8}$ "
Fig. 985-L fits rod sizes $\frac{3}{4}$ " thru $\frac{7}{8}$ " rod sizes

Material: Steel

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

Features:

- Allows up to 6" (152.4mm) of adjustability when used with Fig. 900 series
- 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 $\frac{3}{8}$ " thru $\frac{5}{8}$ " or $\frac{3}{4}$ " thru $\frac{7}{8}$ "

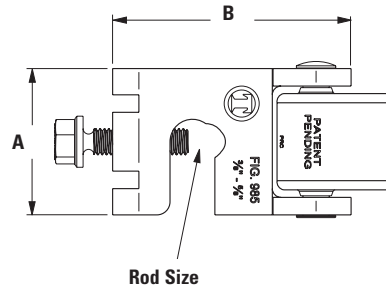
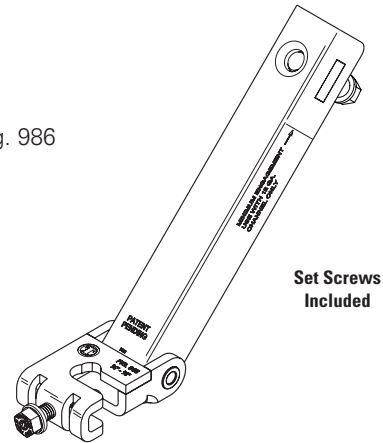
Approvals: Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (OSHPD). For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Engineering Guidelines, OPM-0052-13.

Finish: Electro-Galvanized

Order By: Part number and finish

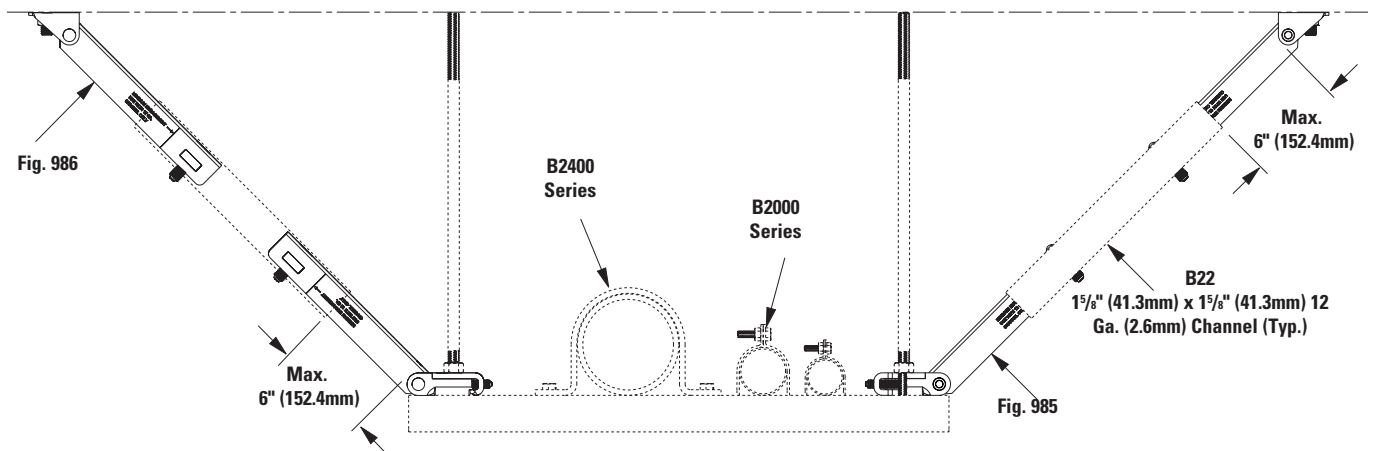
Patent Pending

OPM



Part No.	Rod Size	A in. (mm)	B in. (mm)	Max. Horizontal Design Load *	Approx. Wt./100
985-S	$\frac{3}{8}$ " thru $\frac{5}{8}$ "	2" (50.8)	1 $\frac{1}{2}$ " (38.1)	2015 (8.96)	204 (92.5)
985-L	$\frac{3}{4}$ " & $\frac{7}{8}$ "	2" (50.8)	1 $\frac{5}{8}$ " (41.3)	2015 (8.96)	198 (89.8)

* When used with B22 channel $1\frac{5}{8}$ " (41.3mm) x $1\frac{5}{8}$ " (41.3mm) 12 Ga. (2.6mm) Internal testing loads. Refer to OPM-0052-13 for OPM approved loads.



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

Seismic System Attachments

B22, B22A & B24 - Solid strut bracing materials

OPM

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

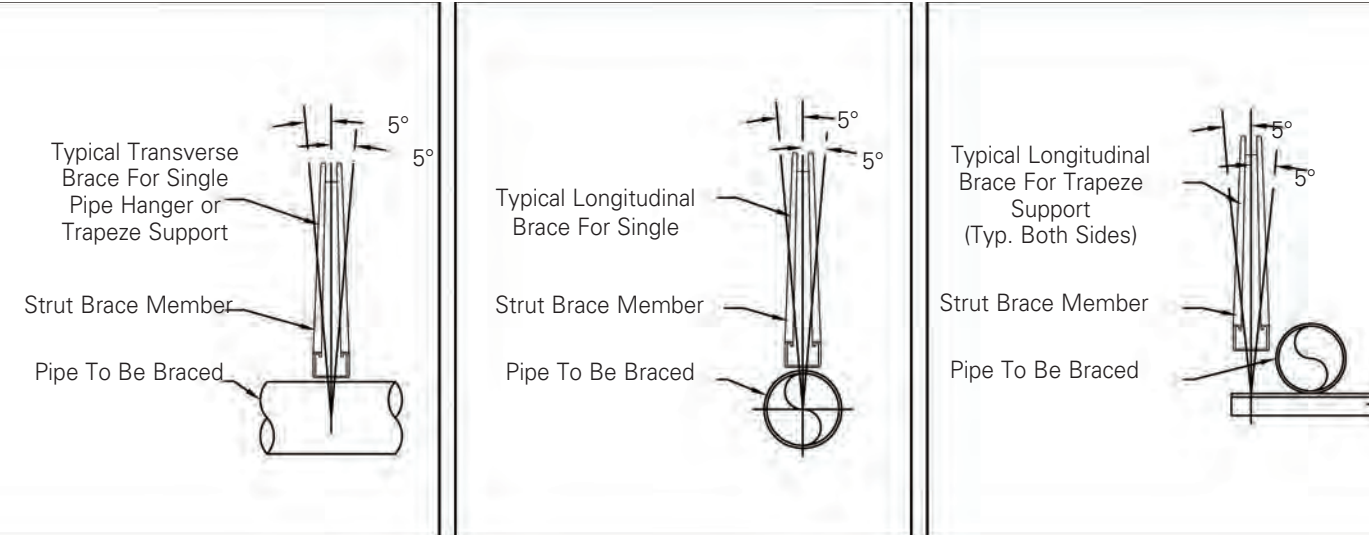
Material: Steel, Stainless 304 & 316, and Aluminum

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

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

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

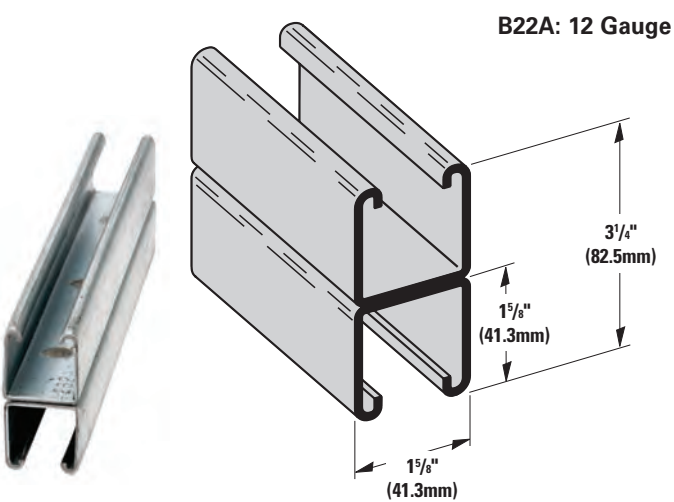
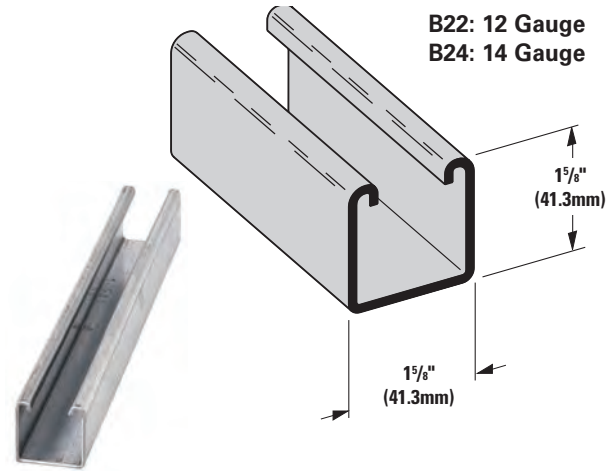
Order By: Part number and finish.



Strut Type Part No.	Maximum Brace Length		Allowable Horizontal Seismic Load w/Brace at 45°	
	ft.-in.	(m)	lbf	(kN)
B22	9'-6"	(2.89)	1552	(6.90)
B22A	14'-9"	(4.49)	1710	(7.60)
B24	9'-6"	(2.89)	1215	(5.40)

Notes:

- 1.) Maximum allowable lengths and concentric 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 Eaton's Strut Systems catalog.



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

ATR - All threaded rod - 120" (3.05m) lengths TOLCO Fig. 99 - all threaded rod cut to length

OPM

Size Range: 1/4"-20 thru 7/8"-9 rod in 120" lengths or cut to length

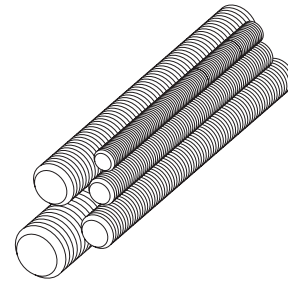
Material: Steel

Maximum Temperature: 750°F (399°C)

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Plain or Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number (with rod size and length) and finish



Part No. - Size x Length		Threads Per Inch	Recommended Load		Approx. Wt.	
ATR	Fig. 99		lbf	(kN)	lbs./100 ft	(kg/30m)
ATR 1/4" x 120	99-1/4" x length	20	240	(1.07)	12	(5.44)
ATR 3/8" x 120	99-3/8" x length	16	730	(3.24)	29	(13.15)
ATR 1/2" x 120	99-1/2" x length	13	1350	(6.00)	53	(24.04)
ATR 5/8" x 120	99-5/8" x length	11	2160	(9.60)	89	(40.37)
ATR 3/4" x 120	99-3/4" x length	10	3230	(14.37)	123	(55.79)
ATR 7/8" x 120	99-7/8" x length	9	4480	(19.93)	170	(77.11)

For larger sizes consult full line pipe hanger catalog.

Cable System Attachments

BRE series - seismic cable kit

Size Range: Available in cable diameters of 1/8" and 3/16"
Available in 10 foot (3.048m) and 20 foot (6.096m) lengths.

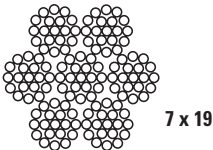
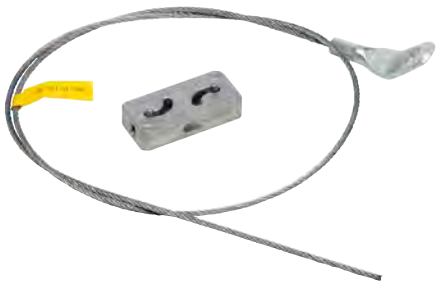
Material: Aircraft cable with pre-attached eyelet fitting on one end, KwikWire™ cable clamp and color coded tag.

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

Finish: Galvanized

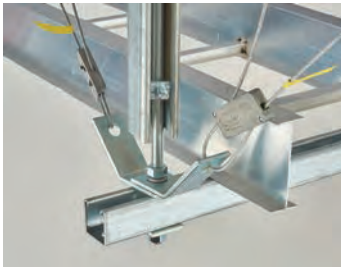
Order By: Part number

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 No.	Clamp No.	Cable Diameter in. (mm)	Cable Length in. (mm)	Eyelet Hole Size in. (mm)	Label Color	Max. Rec. Load* lbf (kN)	Approx. Wt./100 lbs. (kg)
BSE6-125-120K	BKC200-1	1/8" (3.2)	120" (3048)	3/8" (9.6)	Yellow	1100 (4.89)	59 (26.7)
BSE6-125-240K	BKC200-1	1/8" (3.2)	240" (6096)	3/8" (9.6)	Yellow	1100 (4.89)	87 (39.4)
BSE6-188-120K	BKC200-1	3/16" (4.7)	120" (3048)	3/8" (9.6)	White	2200 (9.78)	59 (26.7)
BSE6-188-240K	BKC200-1	3/16" (4.7)	240" (6096)	3/8" (9.6)	White	2200 (9.78)	87 (39.4)
BSE8-125-120K	BKC200-1	1/8" (3.2)	120" (3048)	1/2" (12.7)	Yellow	1100 (4.89)	103 (46.7)
BSE8-125-240K	BKC200-1	1/8" (3.2)	240" (6096)	1/2" (12.7)	Yellow	1100 (4.89)	168 (76.2)
BSE8-188-120K	BKC200-1	3/16" (4.7)	120" (3048)	1/2" (12.7)	White	2200 (9.78)	103 (46.7)
BSE8-188-240K	BKC200-1	3/16" (4.7)	240" (6096)	1/2" (12.7)	White	2200 (9.78)	168 (76.2)

* Load capacities are in terms of axial tension and listed in LRFD. Please refer to the project engineering submittals for the B-Line series seismic bracing cable kit selection.



Cable System Attachments

TOLCO Fig. BRC CABLE - pre-stretched 7 x 19 galvanized aircraft cable

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

Material: Steel

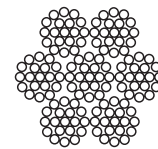
Function: Used for attachment of seismic bracing to structure or hanger.

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Galvanized

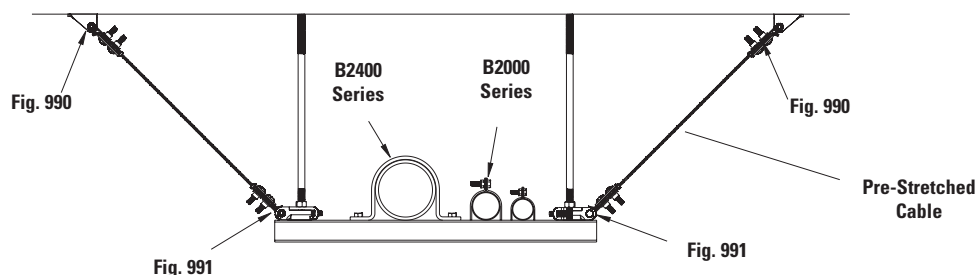
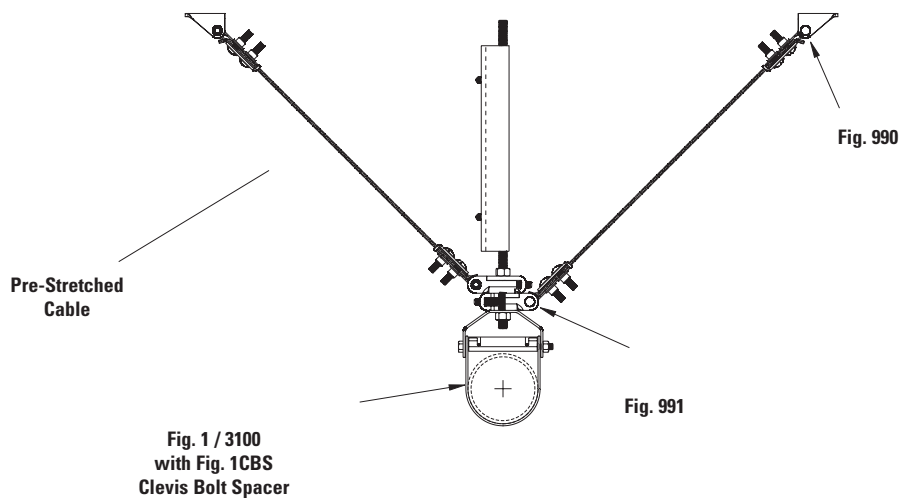
Order By: Part number

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 No.	Cable Diameter in. (mm)	Max. Rec. Load* lbf (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



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

TOLCO Fig. 990 - cable sway brace attachment - $\frac{3}{8}$ "-16 to $\frac{3}{4}$ "-10 rods

TOLCO Fig. 990H - cable sway brace attachment - $\frac{7}{8}$ "-9 to $1\frac{1}{4}$ "-7 rods

Size Range: $\frac{1}{8}$ ", $\frac{3}{16}$ " and $\frac{1}{4}$ " pre-stretched cable.

Fig. 990 for $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", or $\frac{3}{4}$ " hanger rod, bolt, or fastener.

Fig. 990H for $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ ", or $1\frac{1}{4}$ " 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 (OSHDP). For additional load, spacing and placement information relating to OSHDP projects, please refer to the TOLCO Seismic Restraint System Guidelines.

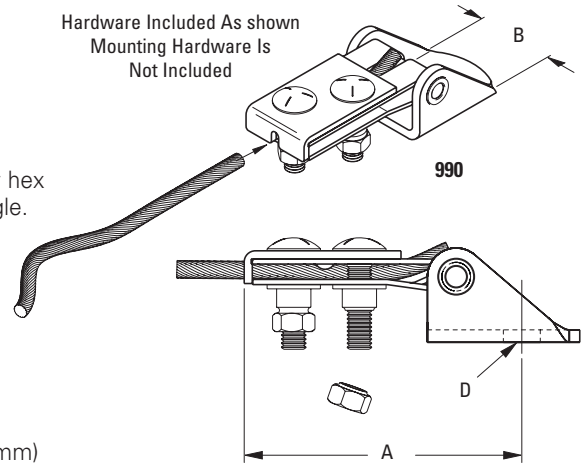
Finish: Electro-Galvanized

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

Note: Order 990H for hanger rod, bolt or fastener holes sized for $\frac{7}{8}$ " (22.2mm) thru $1\frac{1}{4}$ " (31.7mm) rods.

Component of State of California OSHDP Approved Seismic Restraints System

Hardware Included As shown
Mounting Hardware Is
Not Included

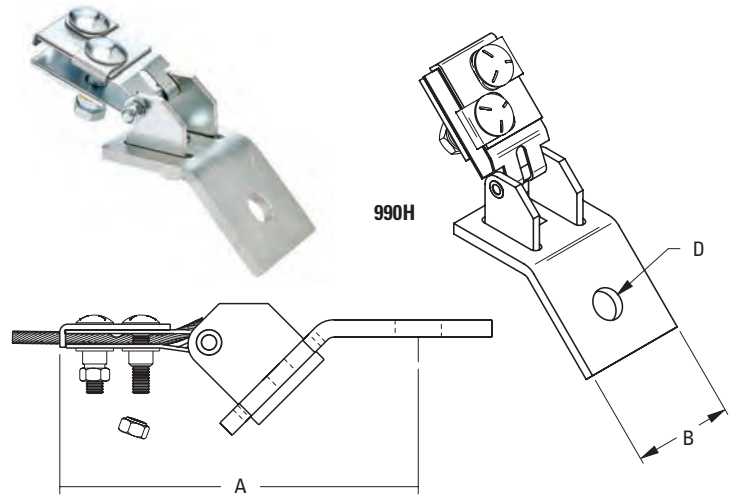


Cable ** Diameter in. (mm)	990 Dimensions		990H Dimensions		Max. Horizontal Design Load *
	A in. (mm)	B in. (mm)	A in. (mm)	B in. (mm)	lbs. (kN)
$\frac{1}{8}$ " (3.2)	4 $\frac{5}{16}$ " (14.3)	2" (50.8)	7 $\frac{3}{4}$ " (196.8)	3 $\frac{1}{2}$ " (88.9)	975 (4.33)
$\frac{3}{16}$ " (4.8)	5" (127.0)	2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

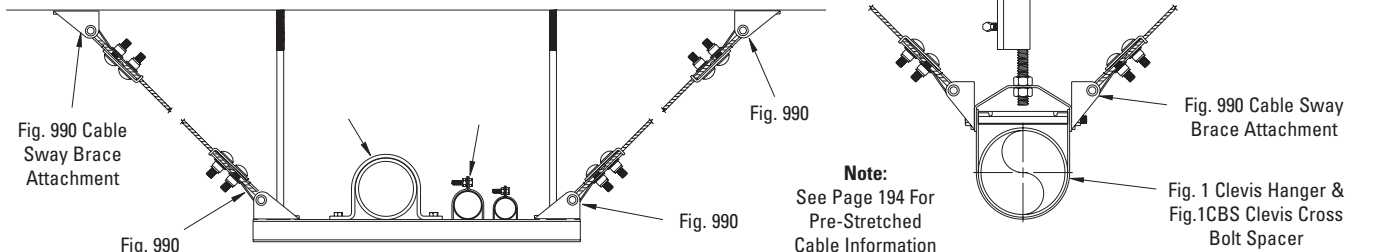
* Maximum load rating controlled by cable breaking strength.

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

** Insert cable diameter in part number.



Cable System
Attachments



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

Cable System Attachments

TOLCO Fig. 991 - Fast Attach – Cable Sway Brace Attachment

Size Range: 1/8", 3/16" and 1/4" pre-stretched cables.
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 Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

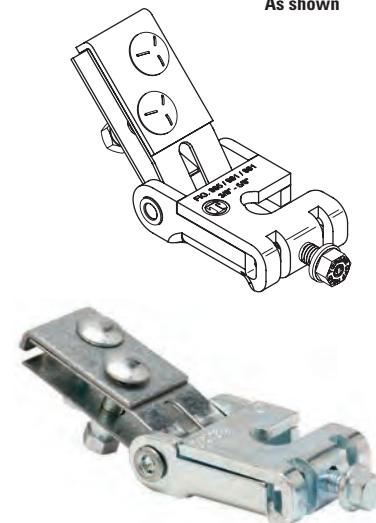
Finish: Electro-Galvanized

Order By: Part number (with rod size range and cable diameter) and finish

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

OPM

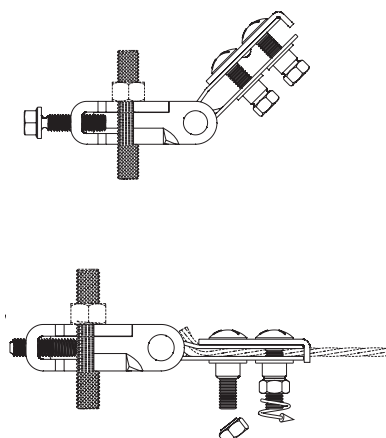
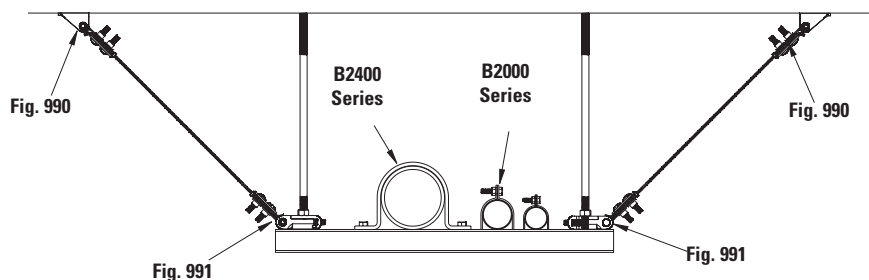
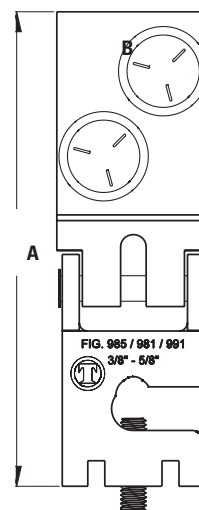
**Hardware Included
As shown**



Part No.	Rod Sizes	Cable Diameter in. (mm)	A in. (mm)	B in. (mm)	Max. Horizontal Design Load* lbf (kN)	Approx. Wt./100 lbs. (kg)
991-S-1/8	3/8"	1/8" (3.2)	4 5/16" (14.3)	2" (50.8)	975 (4.33)	128.3 (58.2)
991-S-3/16	thru	3/16" (4.8)	5" (127.0)	2 1/4" (57.1)	2050 (9.12)	182.1 (82.6)
991-S-1/4	5/8"	1/4" (6.3)	5" (127.0)	2 5/8" (66.7)	3150 (14.01)	221.1 (100.3)

Part No.	Rod Sizes	Cable Diameter in. (mm)	A in. (mm)	B in. (mm)	Max. Horizontal Design Load* lbf (kN)	Approx. Wt./100 lbs. (kg)
991-L-1/8	3/4"	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	7/8"	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.

Seismic Accessories

B2400 Series - Standard Pipe Strap

Size Range: 1/2" (15mm) thru 24" (600mm) pipe

Material: Steel

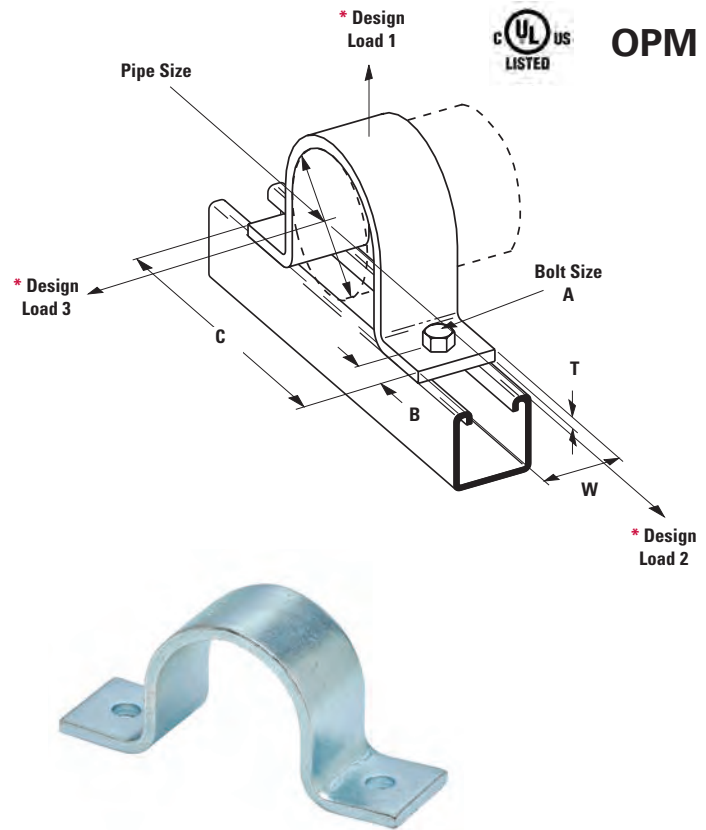
Function: Designed for supporting pipe runs from strut supports.

Approvals: Underwriters Laboratories Listed in the USA Canada (cULus) for B2400-3/4" thru B2400-8". Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 26 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 26. Included in our Seismic Engineering Guidelines 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 Engineering Guidelines OPM-0052-13

Finish: Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number and finish

Note: Ductile iron sizes available.
Special "B" dimensions available on request, consult factory.



Part No.	Pipe Size in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)	T in. (mm)	W in. (mm)	Approx. Wt./100 lbs. (kg)
B2400-1/2	1/2" (15)	5/16" (7.9)	7/16" (11.1)	2 13/16" (71.4)	10 Ga. (3.4)	1 5/8" (41.3)	23 (10.4)
B2400-3/4	3/4" (20)	5/16" (7.9)	7/16" (11.1)	3" (76.2)	10 Ga. (3.4)	1 5/8" (41.3)	26 (11.8)
B2400-1	1" (25)	5/16" (7.9)	7/16" (11.1)	3 17/32" (89.7)	10 Ga. (3.4)	1 5/8" (41.3)	31 (14.0)
B2400-1 1/4	1 1/4" (32)	5/16" (7.9)	7/16" (11.1)	3 3/4" (95.2)	10 Ga. (3.4)	1 5/8" (41.3)	36 (16.3)
B2400-1 1/2	1 1/2" (40)	5/16" (7.9)	7/16" (11.1)	4 1/16" (103.2)	10 Ga. (3.4)	1 5/8" (41.3)	39 (17.7)
B2400-2	2" (50)	7/16" (11.1)	1 1/16" (17.4)	5 21/32" (143.6)	1/4" (6.3)	1 5/8" (41.3)	93 (42.2)
B2400-2 1/2	2 1/2" (65)	7/16" (11.1)	1 1/16" (17.4)	6 5/32" (156.3)	1/4" (6.3)	1 5/8" (41.3)	106 (48.1)
B2400-3	3" (80)	7/16" (11.1)	1 1/16" (17.4)	6 25/32" (172.2)	1/4" (6.3)	1 5/8" (41.3)	132 (59.9)
B2400-3 1/2	3 1/2" (90)	7/16" (11.1)	1 1/16" (17.4)	7 9/32" (184.9)	1/4" (6.3)	1 5/8" (41.3)	151 (68.5)
B2400-4	4" (100)	9/16" (14.3)	1 1/16" (17.4)	7 25/32" (197.6)	1/4" (6.3)	1 5/8" (41.3)	160 (72.6)
B2400-5	5" (125)	9/16" (14.3)	1 1/16" (17.4)	8 7/8" (225.4)	1/4" (6.3)	1 5/8" (41.3)	192 (87.1)
B2400-6	6" (150)	9/16" (14.3)	1 1/16" (17.4)	9 15/16" (252.4)	1/4" (6.3)	1 5/8" (41.3)	219 (99.3)
B2400-8	8" (200)	9/16" (14.3)	1 1/16" (17.4)	11 31/32" (304.0)	1/4" (6.3)	1 5/8" (41.3)	297 (134.7)

For larger sizes, consult the full line pipe hanger catalog.

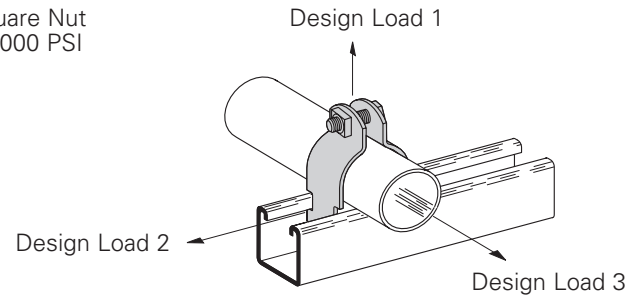
* See OPM-0052-13 for design loads.

B2000 Series Pipe and Conduit Clamps

- Safety Factor of 5
- Add PA to suffix for pre-assembled pipe clamps
- Includes Combination Recess Hex Head Machine Screw and Square Nut
- Material: 16 Ga. (1.5), 14 Ga. (1.9), 12 Ga. (2.6) ASTM A1011 33,000 PSI min. yield and 11 Ga. (3.0) ASTM A1011 HSLA Gr. 50
- Standard finishes: ZN, HDG, SS4, SS6, AL

Note: For EMT sizes 2 1/2" and larger use rigid conduit sizes.

OPM



Thinwall Conduit (EMT) Clamps

Part No.	Conduit Size In. (mm)	Material Thickness In. (mm)	Design Load 1 lbf (kN)	Design Load 2 lbf (kN)	Design Load 3 lbf (kN)	Wt./100 lbs. (kg)
B2000	3/8" (10)	16 Ga. (1.5)	400 (1.78)	50 (.22)	50 (.22)	10 (4.5)
B2001	1/2" (15)	16 Ga. (1.5)	400 (1.78)	50 (.22)	50 (.22)	10 (4.5)
B2002	3/4" (20)	16 Ga. (1.9)	400 (1.78)	50 (.22)	50 (.22)	11 (5.0)
B2003	1" (25)	14 Ga. (1.9)	600 (2.67)	75 (.33)	75 (.33)	16 (7.2)
B2004	1 1/4" (32)	14 Ga. (1.9)	600 (2.67)	75 (.33)	75 (.33)	19 (8.6)
B2005	1 1/2" (40)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	28 (12.7)
B2006	2" (50)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	33 (14.9)

Rigid or Conduit or Pipe Clamps

Part No.	Conduit Size In. (mm)	Material Thickness In. (mm)	Design Load 1 lbf (kN)	Design Load 2 lbf (kN)	Design Load 3 lbf (kN)	Wt./100 lbs. (kg)
B2001	3/8" (10)	16 Ga. (1.5)	400 (1.78)	50 (.22)	50 (.22)	10 (4.5)
B2008	1/2" (15)	16 Ga. (1.5)	400 (1.78)	50 (.22)	50 (.22)	11 (5.0)
B2009	3/4" (20)	14 Ga. (1.9)	600 (2.67)	75 (.33)	75 (.33)	15 (6.8)
B2010	1" (25)	14 Ga. (1.9)	600 (2.67)	75 (.33)	75 (.33)	16 (7.2)
B2011	1 1/4" (32)	14 Ga. (1.9)	600 (2.67)	75 (.33)	75 (.33)	20 (9.1)
B2012	1 1/2" (40)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	30 (13.6)
B2013	2" (50)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	34 (15.4)
B2014	2 1/2" (65)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	38 (17.2)
B2015	3" (80)	12 Ga. (2.6)	800 (3.56)	125 (.56)	125 (.56)	44 (19.9)
B2016	3 1/2" (90)	11 Ga. (3.0)	1000 (4.45)	200 (.89)	150 (.67)	61 (27.6)
B2017	4" (100)	11 Ga. (3.0)	1000 (4.45)	200 (.89)	150 (.67)	66 (29.9)
B2018	4 1/2" (115)	11 Ga. (3.0)	1000 (4.45)	200 (.89)	150 (.67)	70 (31.7)
B2019	5" (125)	11 Ga. (3.0)	1000 (4.45)	200 (.89)	150 (.67)	77 (34.9)
B2020	6" (150)	11 Ga. (3.0)	1000 (4.45)	200 (.89)	150 (.67)	100 (45.3)
B2021	7" (175)	11 Ga. (3.0)	1000 (4.45)	250 (1.11)	200 (.89)	115 (52.1)
B2022	8" (200)	11 Ga. (3.0)	1000 (4.45)	250 (1.11)	200 (.89)	128 (58.0)
B2030	10" (250)	11 Ga. (3.0)	1000 (4.45)	250 (1.11)	200 (.89)	160 (72.6)
B2032	12" (300)	11 Ga. (3.0)	1000 (4.45)	250 (1.11)	200 (.89)	185 (83.9)

For other sizes, consult the full line strut systems catalog.

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

Seismic Accessories

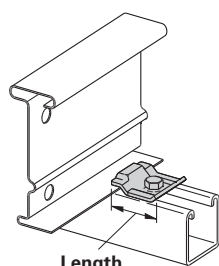
Cable Tray Clamp/Guide

Features:

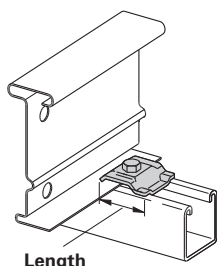
- No-twist design.
- Has four times the strength of the traditional design.
- Each side is labeled to ensure proper installation.
- Furnished in pairs, with or without hardware.
- Not recommended for vertical support.

Order By: Part number

US Patent #RE35479



Length
9ZN-1208 shown.
Installed as a guide.



Length
9ZN-1208 shown.
Installed as a clamp.



OPM

Note: For heavy duty or vertical applications see 9ZN-1241

Part No.		Overall Length in. (mm)	Hardware Size in.	Finish
Without Hardware	With Hardware			
9ZN-1208	9ZN-1208NB	2 1/4" (57)	3/8"	G90
9ZN-1205	--	2 1/4" (57)	1/2"	G90

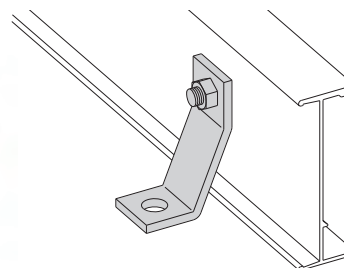
When installing this device as an expansion guide on the outside flange of *Steel Side Rail*, use the Catalog No. **B202** Square Washer in order to properly elevate the guide.

Heavy Duty Hold Down Bracket

Features:

- Design load is 2000 lbs (8.89kN) per pair.
- Two bolt design.
- Sold in pairs.
- 3/8" cable tray attachment hardware provided.
- 1/2" support attachment hardware **not** provided.
- Recommended for support of vertical trays.

Order By: Part number



OPM

Part No.
9ZN-1241

N___WO - Channel Nuts

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

Material: Steel

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number and finish



OPM

Part No.	Thread Size	Fits Channel Sizes	Nut Thickness		Slip		Pull-Out		Wt./100	
			in.	(mm)	lbf	(kN)	lbf	(kN)	lbs.	kg
N228WO	3/8"-16	B22I, B32I, B52I	3/8"	(9.5)	800	(3.56)	1100	(4.89)	9.3	(4.22)
N225WO	1/2"-13	B22I, B32I	1/2"	(12.7)	1500	(6.67)	2000	(8.90)	11.6	(5.26)
N525WO	1/2"-13	B22I, B32I, B52I	3/8"	(9.5)	1500	(6.67)	1500	(6.67)	8.8	(3.99)
N225WO	5/8"-11	B22I, B32I	1/2"	(12.7)	1500	(6.67)	2000	(8.90)	16.4	(7.44)
N555WO	5/8"-11	B22I, B32I, B52I	3/8"	(9.5)	1500	(6.67)	1500	(6.67)	10.2	(4.62)
N275WO	3/4"-10	B22I, B32I	1/2"	(12.7)	1500	(6.67)	2000	(8.90)	14.5	(6.58)
N575WO	3/4"-10	B22I, B32I, B52I	3/8"	(9.5)	1500	(6.67)	1500	(6.67)	8.8	(3.99)
N278WO	7/8"-9	B22I, B32I	1/2"	(12.7)	1500	(6.67)	1500	(6.67)	12.5	(5.67)

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

B3228 Series - Hex Head Lag Bolt

OPM

Material: Steel

Function: Designed to fasten metal to wood. Lag screws are made with hex heads in lengths of 6" (152.5mm) or shorter and square heads in lengths longer than 6" (152.5mm). Both types have coarse lag threads and gimlet points and are available in diameters of 1/4"(6.3mm) to 5/8"(15.9mm) inclusive. Square-head lag screws are also available in 3/4"(19.0mm), 7/8"(22.2mm) and 1"(25.4mm) diameters.

Approvals: Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (**OSHDP**). For additional load, spacing and placement information relating to OSHDP projects, please refer to our Seismic Engineering Guidelines, OPM-0052-13.

Finish: Plain or Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number, bolt size (1/4", 3/8", 1/2", 5/8", 3/4"), length and finish



Bolt Length	
in.	(mm)
1 1/2"	(38.1)
2"	(50.8)
2 1/2"	(63.5)
3"	(76.2)
3 1/2"	(88.9)
4"	(101.6)
4 1/2"	(114.3)
5"	(127.0)
5 1/2"	(139.7)
6"	(152.4)

B655 Series - Steel Rod Coupling

B656 Series - Steel Reducing Rod Coupling

OPM

Size Range: 1/4"-20 thru 1"-8 rod

Material: Steel

Function: Used for coupling two threaded rods together of equal or reduced rod sizes, with or without inspection hole.

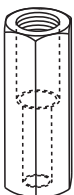
Approvals: Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (**OSHDP**). For additional load, spacing and placement information relating to OSHDP projects, please refer to our Seismic Engineering Guidelines, OPM-0052-13.

Finish: Electro-Galvanized. Contact customer service for alternative finishes and materials.

Order By: Part number and finish



B655



B656



Part No.	For Rod Size	Length		Design Load		Approx. Wt./100	
		in.	(mm)	lbf	(kN)	lbs.	(kg)
B655-1/4	1/4"-20	7/8"	(22.2)	300	(1.33)	1.9	(0.86)
B655-3/8	3/8"-16	1 1/8"	(28.6)	730	(3.25)	3.6	(1.63)
B655-1/2	1/2"-13	1 3/4"	(44.4)	1350	(6.00)	11.3	(5.12)
B655-5/8	5/8"-11	2 1/8"	(54.0)	2160	(9.61)	17.6	(7.98)
B655-3/4	3/4"-10	2 1/4"	(57.1)	3230	(14.37)	28.1	(12.74)
B655-7/8	7/8"-9	2 1/2"	(63.5)	4480	(19.93)	57.2	(25.94)
B655-1	1"-8	2 3/4"	(69.8)	5900	(26.24)	73.7	(33.43)

Part No.	For Rod Size	Length		Design Load		Approx. Wt./100	
		in.	(mm)	lbf	(kN)	lbs.	(kg)
B656-3/8 x 1/4	3/8"-16 & 1/4"-20	1"	(25.4)	300	(1.33)	3.7	(1.68)
B656-1/2 x 3/8	1/2"-13 & 3/8"-16	1 1/4"	(31.7)	730	(3.25)	6.6	(2.99)
B656-5/8 x 1/2	5/8"-11 & 1/2"-13	1 1/4"	(31.7)	1350	(6.00)	11.6	(5.26)
B656-3/4 x 5/8	3/4"-10 & 5/8"-11	1 1/2"	(38.1)	2160	(9.61)	20.6	(9.34)
B656-7/8 x 3/4	7/8"-9 & 3/4"-10	1 3/4"	(44.4)	3230	(14.37)	39.4	(17.87)

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

Seismic Accessories

B200 Series - Series Square Washer

Material: Steel

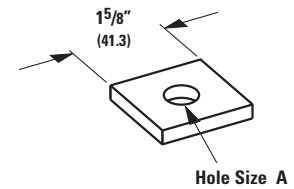
Approvals: Included in our Seismic Engineering Guidelines approved by the State of California Office of Statewide Health Planning and Development (**OSHPD**). For additional load, spacing and placement information relating to OSHPD projects, please refer to our Seismic Engineering Guidelines, OPM-0052-13.

Finish: Electro-Galvanized

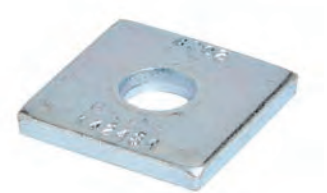
Service: Designed as a washer to suspend hanger rods.

Order by: Part number and finish.

OPM



Part No.	Hole Size A in. (mm)	Bolt Size	Thickness in. (mm)	Approx. Wt./100 lbs. (kg)
B200	3/8" (9.5)	5/16"-18	1/4" (6.3)	18 (8.1)
B201	7/16" (11.1)	3/8"-16	1/4" (6.3)	18 (8.1)
B202	9/16" (14.2)	1/2"-13	1/4" (6.3)	17 (7.7)
B202-1	1 1/16" (17.4)	5/8"-11	1/4" (6.3)	16 (7.2)
B202-2	1 3/16" (20.6)	3/4"-10	1/4" (6.3)	15 (6.8)



HN - Standard Hex Nut

Size Range: 1/4"-20 thru 7/8"-9

Material: Steel

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Plain or Electro-Galvanized.

Contact customer service for alternative finishes and materials.

Order By: Part number and finish

OPM



Part No.	For Rod Size	Width Across Flats in. (mm)	Width Across Points in. (mm)	Thickness in. (mm)	Approx. Wt./100 lbs. (kg)
HN-1/4	1/4"-20	7/16" (11.1)	1/2" (12.7)	7/32" (5.7)	0.7 (0.3)
HN-3/8	3/8"-16	9/16" (14.3)	21/32" (16.6)	21/64" (8.3)	1.6 (0.7)
HN-1/2	1/2"-13	3/4" (19.0)	55/64" (21.8)	7/16" (11.1)	3.7 (1.7)
HN-5/8	5/8"-11	15/16" (23.8)	13/32" (27.8)	35/64" (13.9)	7.3 (3.3)
HN-3/4	3/4"-10	1 1/8" (28.6)	15/16" (33.3)	41/64" (16.3)	12.0 (5.4)
HN-7/8	7/8"-9	1 5/16" (33.3)	1 33/64" (38.5)	3/4" (19.0)	19.0 (8.6)

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

FW Series - Flat Washer

OPM

Size Range: 1/4"-20 thru 1"-8 rods

Material: Steel

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Finish: Plain or Electro-Galvanized.

Contact customer service for alternative finishes and materials.

Order By: Part number and finish



Part No.	For Rod Size	Outside Diameter		Approx. Wt./100	
		in.	(mm)	lbs.	(kg)
FW-1/4	1/4"-20	3/4"	(19.0)	0.7	(0.3)
FW-3/8	3/8"-16	1"	(25.4)	3.9	(1.7)
FW-1/2	1/2"-13	1 3/8"	(34.9)	6.7	(3.0)
FW-5/8	5/8"-11	1 3/4"	(44.4)	7.3	(3.3)
FW-3/4	3/4"-10	2"	(50.8)	11.0	(5.0)
FW-7/8	7/8"-9	2 1/4"	(57.1)	19.0	(8.6)
FW-1	1"-8	2 1/2"	(69.8)	22.0	(10.0)

BVP Series - Vibra-Clamp™

Use: To firmly secure pipe to strut channel and dampen vibration and noise.

Refer to page 77 for more information and sizing



BVT Series - Vibra-Clamp™

Use: To firmly secure tubing to strut channel and dampen vibration and noise.

Refer to page 76 for more information and sizing

B1999 - Vibra-Cushion™

Use: 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.

OPM

Refer to page 78 for more information

Note: See Strut Catalog for sizing information.



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

Vibration Isolation

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.

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

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 f_n 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 in 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 lbf (90.7kg) piece of equipment, 4 support points, take $240 \times 1.25 = 300$ lbf (136.1kg) (safety measure), then take $300 \div 4 = 75$ lbf (34.0kg) Specify appropriate vibration device rated at 75 lbf (34.0kg) for each of the support points.

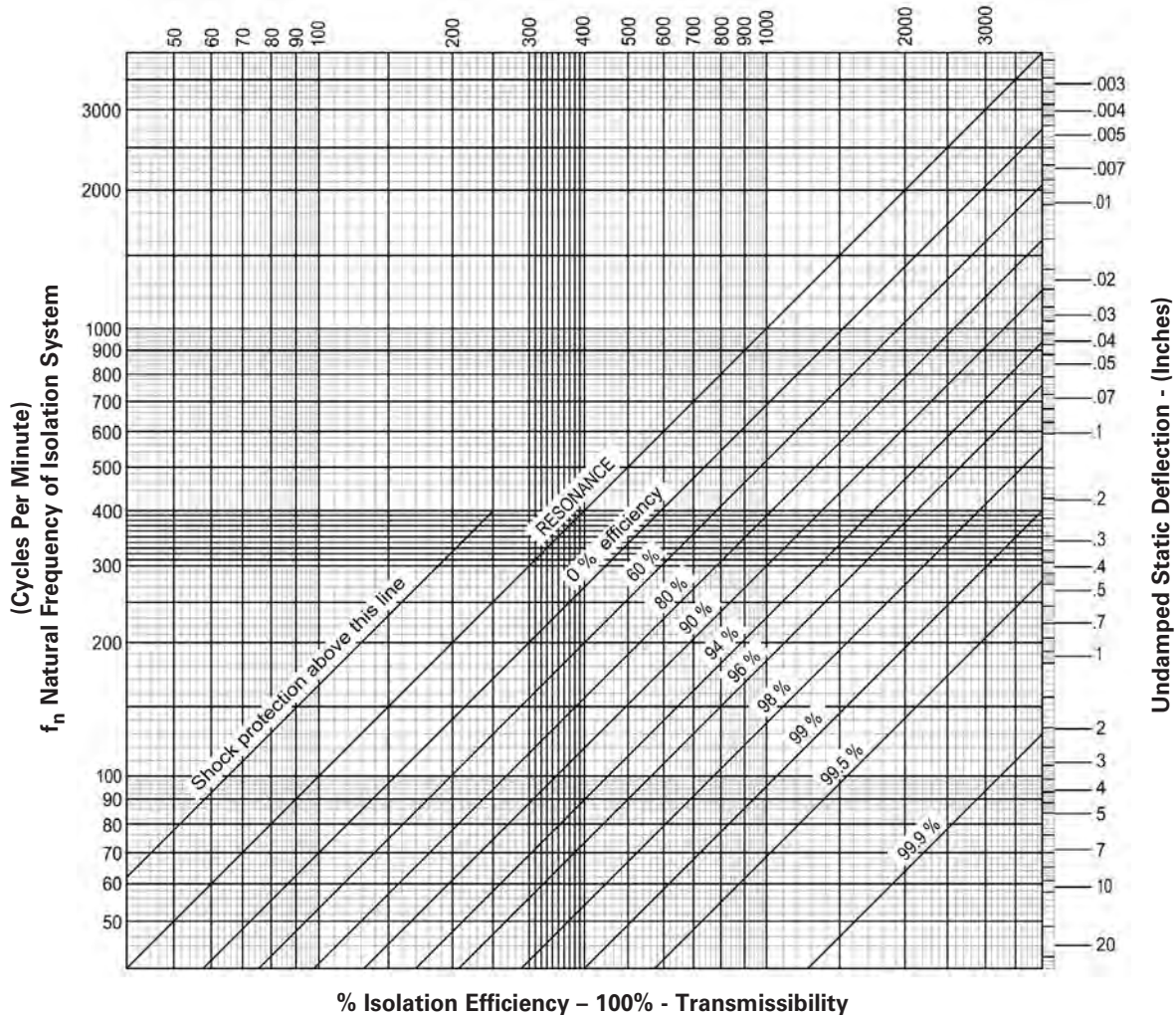
If weight of equipment is unequally proportionate, select mounts to satisfy the weight distribution.

IE Computer Isolation Efficiency

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

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.

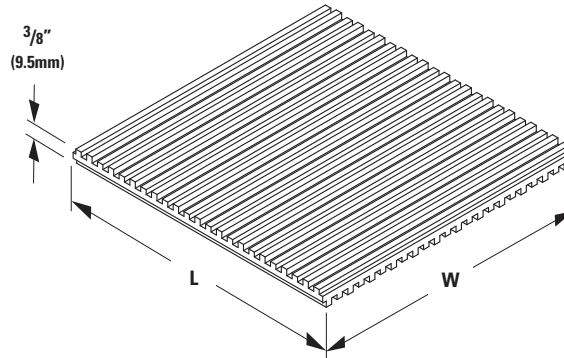
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 lbf/in² (0.035 kgf/mm²) with a range of
25 - 70 lbf/in² (0.017 - 0.049 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.

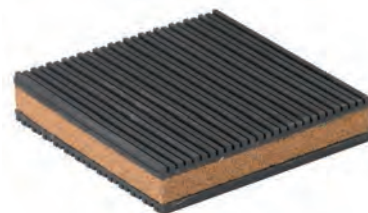
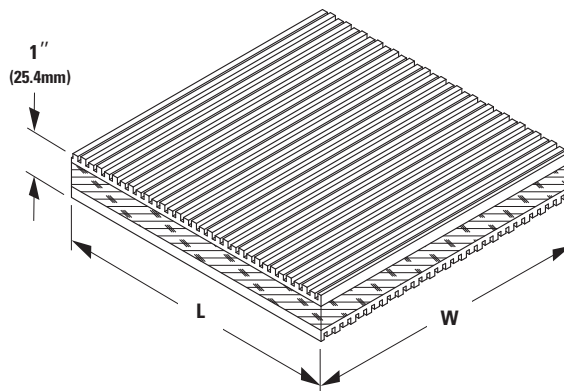


Part No.	Rated Load		Dimensions		Standard Pkg.	Wt. Each	
	lbf	(kN)	L in. (mm)	W in. (mm)		lbs. (kg)	
NNP-4	200	(.89)	2" (50.8)	2" (50.8)	48	.04	(.02)
NNP-9	450	(2.00)	3" (76.2)	3" (76.2)	36	.10	(.05)
NNP-16	800	(3.56)	4" (101.6)	4" (101.6)	24	.17	(.08)
NNP-36	1800	(8.00)	6" (152.4)	6" (152.4)	24	.39	(.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)

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 lbf/in² (0.035 kgf/mm²) with a range of
25 - 70 lbf/in² (0.017 - 0.049 kgf/mm²)
- Thickness: 1" (25.4mm)
- The CNP 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.



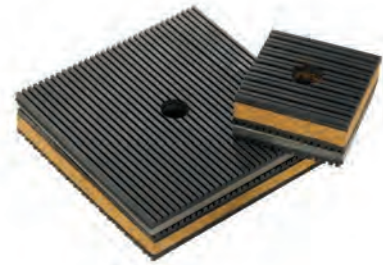
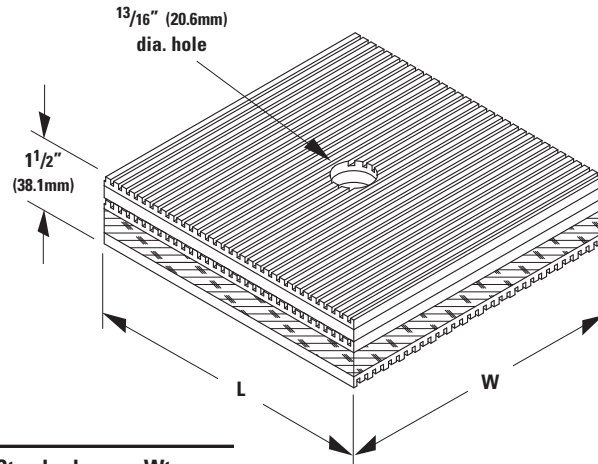
Part No.	Rated Load		Dimensions		Standard Pkg.	Wt. Each	
	lbf	(kN)	L in. (mm)	W in. (mm)		lbs. (kg)	
CNP-4	200	(.89)	2" (50.8)	2" (50.8)	48	.07	(.03)
CNP-9	450	(2.00)	3" (76.2)	3" (76.2)	36	.16	(.07)
CNP-16	800	(3.56)	4" (101.6)	4" (101.6)	24	.28	(.13)
CNP-25	1250	(5.56)	5" (127.0)	5" (127.0)	24	.44	(.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 lbf/in² (0.035 kgf/mm²) with a range of
25 - 70 lbf/in² (0.017 - 0.049 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.

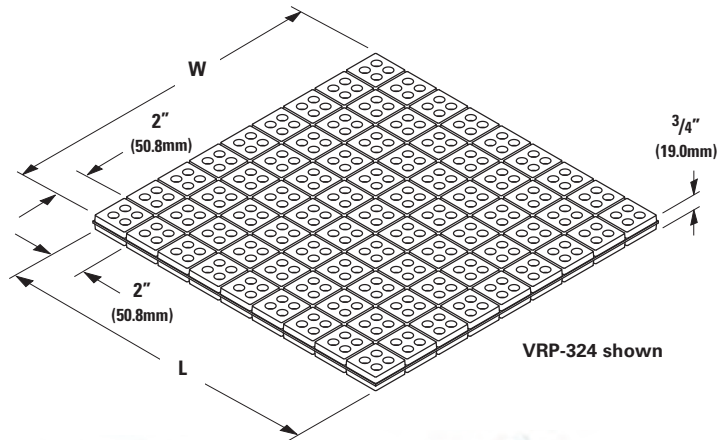


Part No.	Rated Load		Dimensions		Standard Pkg.	Wt. Each	
	lbf	(kN)	L in. (mm)	W in. (mm)		lbs. (kg)	
CNNK-4	200	(.89)	2" (50.8)	2" (50.8)	48	.40	(.18)
CNNK-9	450	(2.00)	3" (76.2)	3" (76.2)	36	.90	(.41)
CNNK-16	800	(3.56)	4" (101.6)	4" (101.6)	24	1.60	(.73)
CNNK-25	1250	(5.56)	5" (127.0)	5" (127.0)	24	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)

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 lbf/in² (0.031 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-36

Part No.	Rated Load		Dimensions		Standard Pkg.	Wt. Each	
	lbf	(kN)	L in. (mm)	W in. (mm)		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)



VRP-324

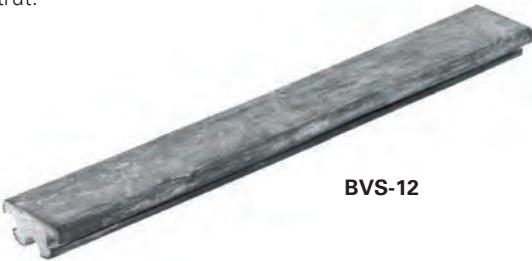
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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.

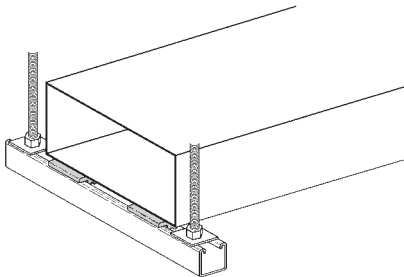
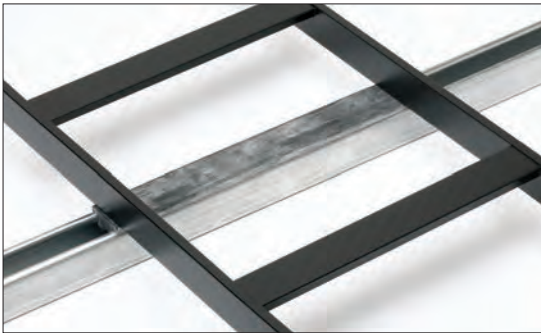
- When inserted in channel slot, provides an excellent isolation medium between equipment, duct, piping, etc., and the support channel.
- Vibra Strip is furnished in 12" (304.8mm) or 120" (3.05m) lengths, may be cut to satisfy specific requirement.
- Durable: 45 durometer Neoprene
- Temperature Range: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



BVS-12



BVS-120

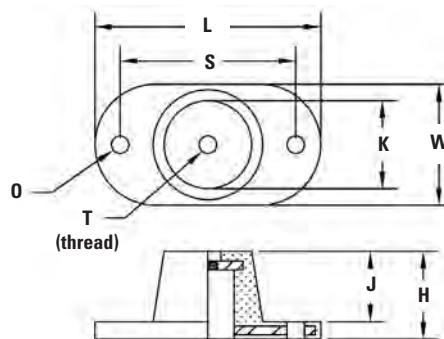


Part No.	Max. Load		Length	Standard Pkg.	Wt. Each	
	lbs. of force per					
	Lineal In.					
	lbf	(kg/25.4 mm)	in.	(mm)	lbs.	(kg)
BVS-12	40	(18.1)	12"	(304.8)	25	.46 (.21)
BVS-120	40	(18.1)	120"	(3048.0)	1	4.56 (2.07)

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.



Typical Part Numbering

RM - 80 A
 Type Load Mount Size

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

Part No.	Mount Size	Maximum Load		Color Code
		lbf	(kN)	
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		Color Code
		lbf	(kN)	
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	S	W	O	T	K	H		J	
	in. (mm)	in. (mm)	in. (mm)	in. (mm)		in. (mm)	RM in. (mm)	RM-D in. (mm)	RM in. (mm)	RM-D in. (mm)
A	3 ³ / ₁₆ " (81.0)	2 ³ / ₈ " (27.8)	1 ¹³ / ₁₆ " (47.5)	1 ¹ / ₃₂ " (8.7)	5 ¹ / ₁₆ "-18	1 ¹ / ₄ " (31.7)	1" (25.4)	1 ¹ / ₂ " (38.1)	1 ³ / ₁₆ " (20.6)	1 ⁵ / ₁₆ " (33.3)
B	3 ⁷ / ₈ " (98.4)	3" (76.2)	2 ³ / ₈ " (60.3)	1 ¹ / ₃₂ " (8.7)	3 ⁷ / ₈ "-16	1 ³ / ₄ " (44.4)	1 ¹ / ₄ " (31.7)	1 ¹³ / ₁₆ " (46.0)	1 ¹ / 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 ¹ / ₁₆ " (14.3)	1 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 ¹ / ₁₆ " (14.3)	5 ⁷ / 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)

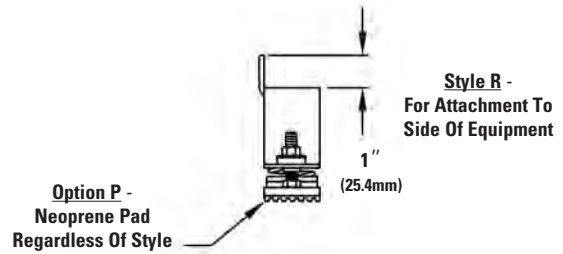
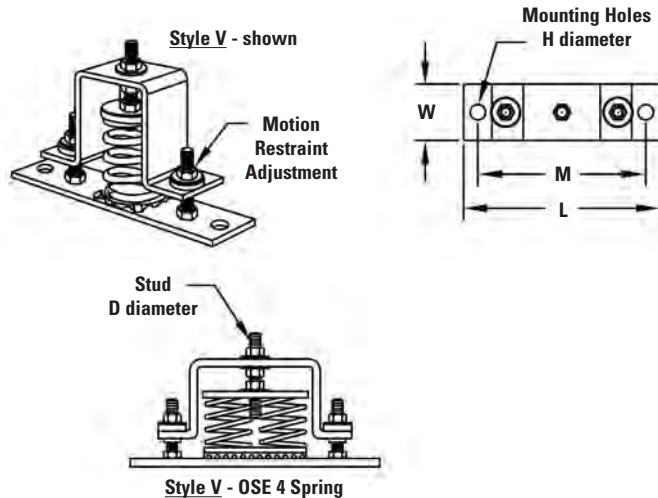
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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



Typical Part Numbering

OS A - R - E500 P
 Type _____
 Housing Size _____
 Style V or R _____
 Spring Number _____
 Neoprene Base Option _____

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

Housing Size		
A	B	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-(*)-E633(**)		
OSA-(*)-E801(**)		

(*) Insert Style V or R

(**) Insert Option P when required

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

Housing Size			
A	B	E	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

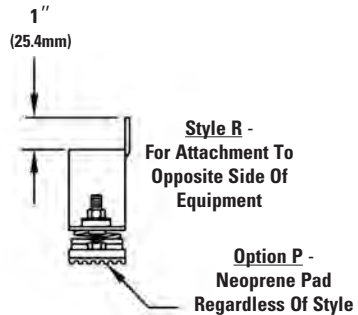
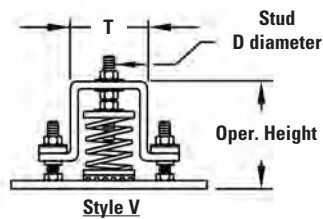
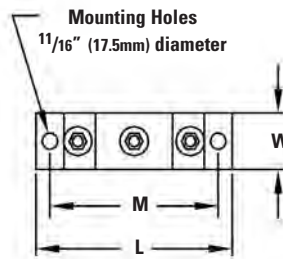
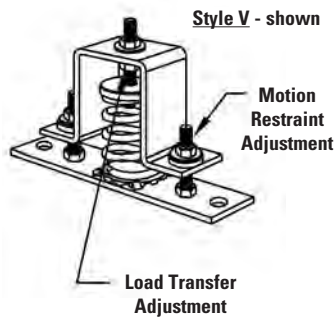
Housing Size	L	M	T	W	D	H	Approx. Oper. Height
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
A	7" (177.8)	6" (152.4)	2 3/4" (69.8)	2" (50.8)	3/8" (9.5)	9/16" (14.3)	4 1/2" (114.3)
B	10 1/2" (266.7)	9" (228.6)	4" (101.6)	3 1/2" (88.9)	1/2" (12.7)	1 1/16" (17.5)	5 1/2" (139.7)
E	14" (355.6)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

Type _____
Housing Size _____
Style V or R _____
Spring Number _____
Neoprene Base Option _____

Dimensions

Housing Size	L	W	M	T	D	Approx. Oper. Height
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	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)

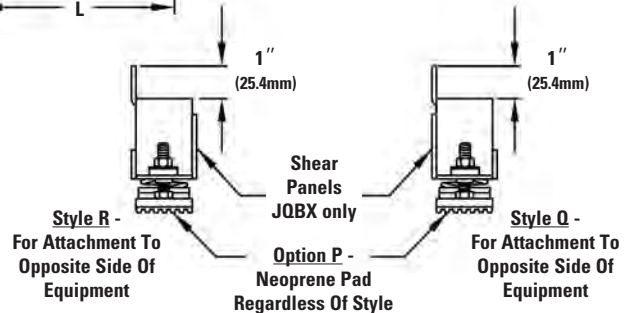
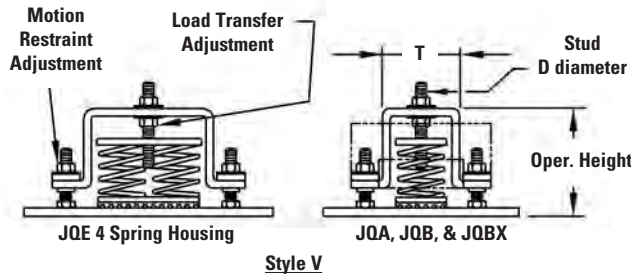
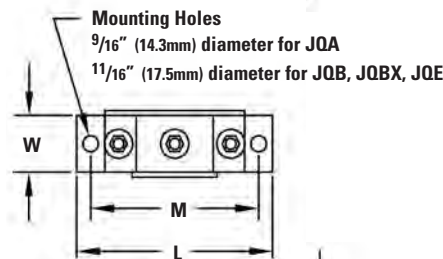
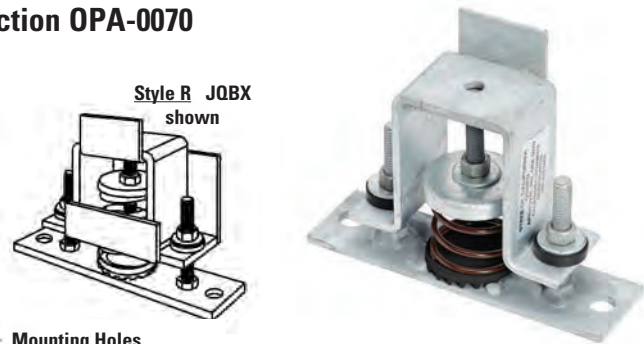
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 (OSHDP)

- 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-(*)-E633(**)			
JQA-(*)-E801(**)			

(*) Insert Style V, R, or Q

(**) Insert Option P when required

Typical Part Numbering

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

OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal lbf (kN)	Vertical lbf (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

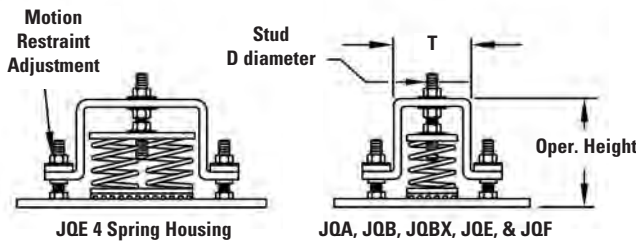
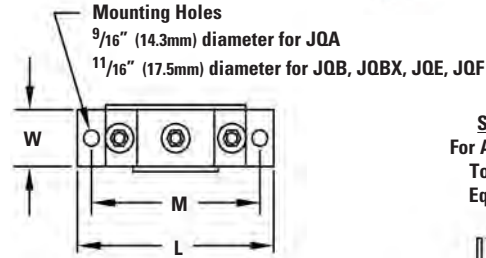
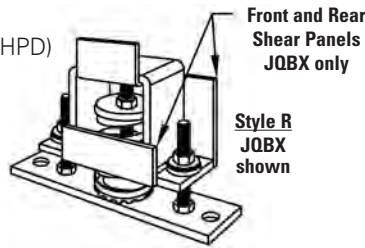
Housing Size	L in. (mm)	W in. (mm)	M in. (mm)	T in. (mm)	D in. (mm)	Approx. Oper. Height in. (mm)
JQA	7" (177.8)	2" (50.8)	6" (152.4)	2 3/4" (69.8)	3/8" (9.5)	4 1/2" (114.3)
JQB/JQBX	10 1/2" (266.7)	3 1/2" (88.9)	9" (228.6)	4" (101.6)	1/2" (12.7)	5 1/2" (139.7)
JQE	14" (355.6)	5" (127.0)	12" (304.8)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

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

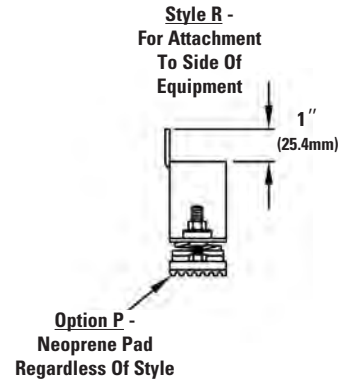
JQ Type - Isolator/Restraints - 2" (50.8mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

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

Type _____

Housing Size _____

Style V or R _____

Spring Number _____

Neoprene Base Option _____

OPA-0070 – Pre-Approved Maximum Allowable Loads

Housing Size	Horizontal lbf (kN)	Vertical lbf (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)

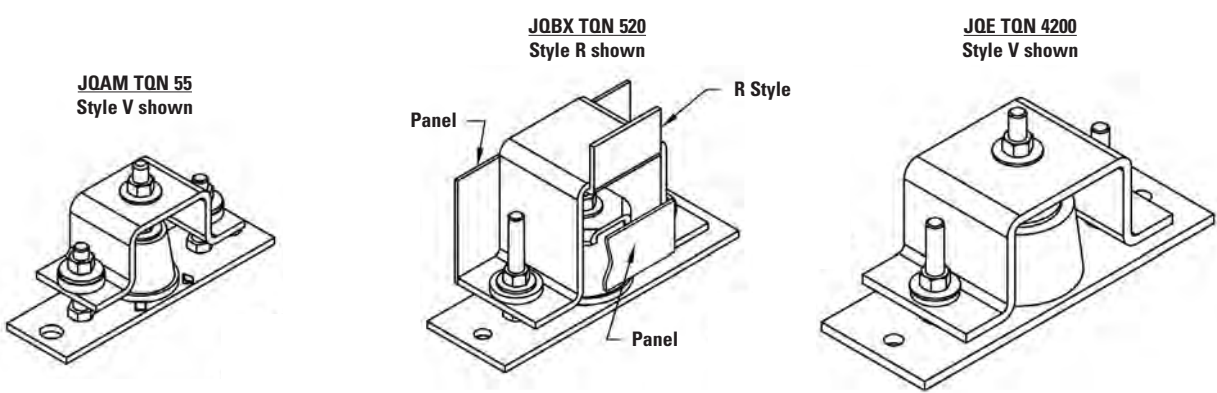
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

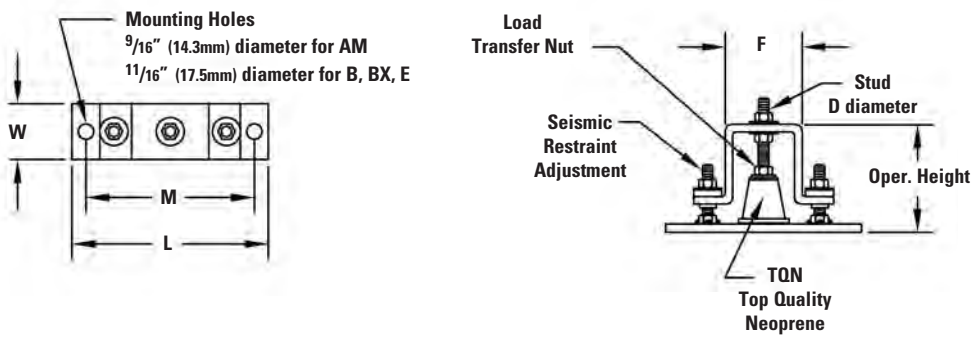
JQ-TQN Type - Top Quality Neoprene Isolator/Restrains - 1/2" (12.7mm) Deflection with California Pre-Approved Seismic Protection OPA-0070

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)

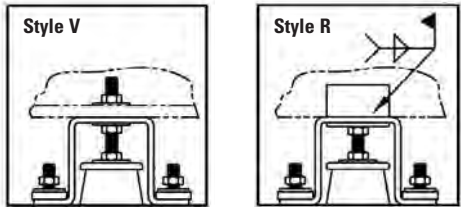
- Adjust load transfer while motion restraint adjustments are loose
- Housings are HDG with Zinc Plated hardware



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.

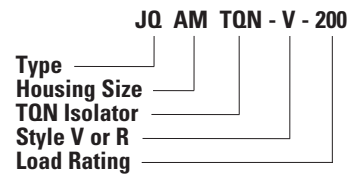
JQ-TQN Type - Top Quality Neoprene Isolator/Restrains - 1/2" (12.7mm) Deflection con't. with California Pre-Approved Seismic Protection OPA-0070

1/2" (12.7mm) Rated Static Deflection

Part No.	Maximum Load lbf (kN)	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
JQBXQN-(*)-300	300 (1.33)	Yellow
JQBXQN-(*)-520	520 (2.31)	Green
JQBXQN-(*)-750	750 (3.33)	Blue
JQBXQN-(*)-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 lbf (kN)	Vertical lbf (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 (19.13)

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)

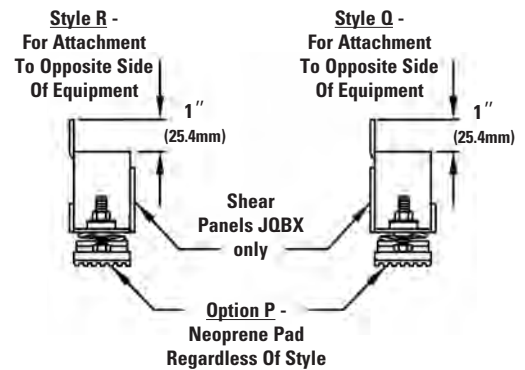
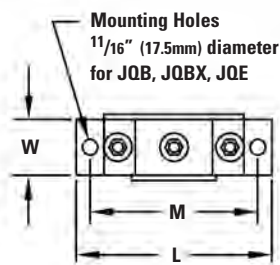
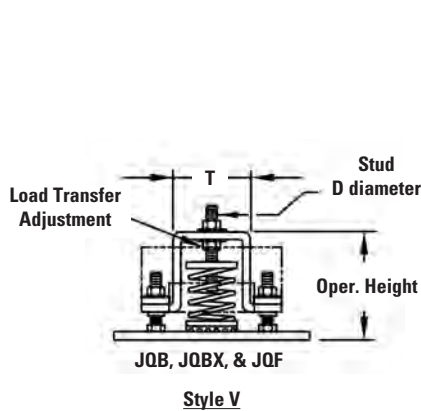
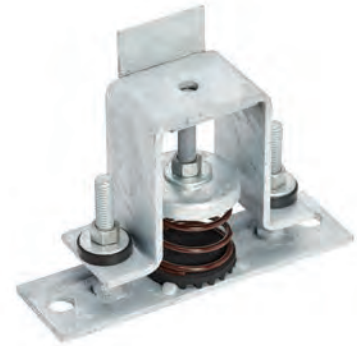
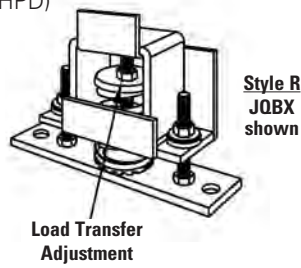
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 (OSHDP)

- Neoprene pad $\frac{1}{4}$ " (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

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

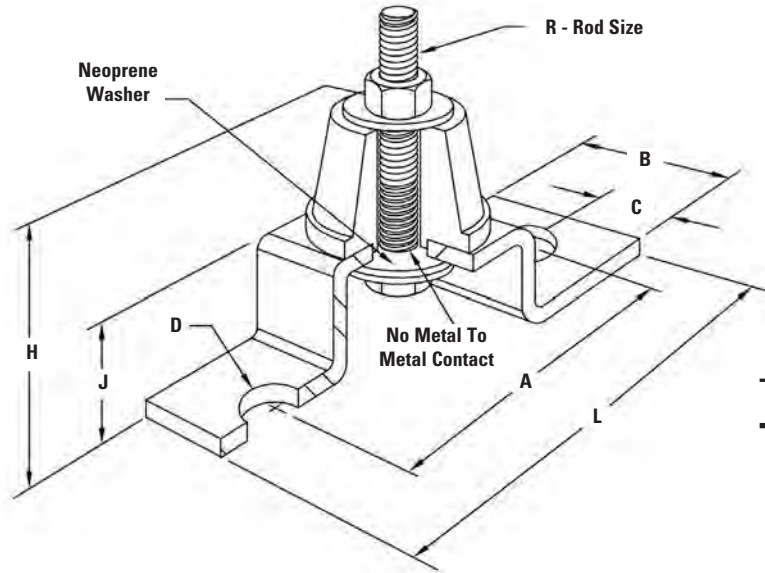
Dimensions

Housing Size	L	W	M	T	D	Approx. Oper. Height
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
JQB/JQBX	10 $\frac{1}{2}$ " (266.7)	3 $\frac{1}{2}$ " (88.9)	9" (228.6)	4" (101.6)	1 $\frac{1}{2}$ " (12.7)	5 $\frac{1}{2}$ " (139.7)
JQF	14" (355.6)	5" (127.0)	12" (304.8)	6" (152.4)	5 $\frac{7}{8}$ " (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.

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 lbf (kN)	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 (1.68)	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 lbf (kN)	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 (1.68)	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)	1 1/16" (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)	1 1/16" (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.

Vibration Isolation

Reference Tables

For use in selecting hangers for standard pipe

Nominal Pipe Size in. (mm)	Weight Per Foot (25.4mm) Standard Pipe		Hanger Selection Load 10' (3.05m) Spacing lbf (kN)
	Dry or Steam Filled lbs. (kg)	Water Filled lbs. (kg)	
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 (0.24)
1 1/4" (32)	2.28 (1.03)	2.93 (1.33)	55 (0.24)
1 1/2" (40)	2.73 (1.24)	3.62 (1.64)	55 (0.24)
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 (34.02)	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

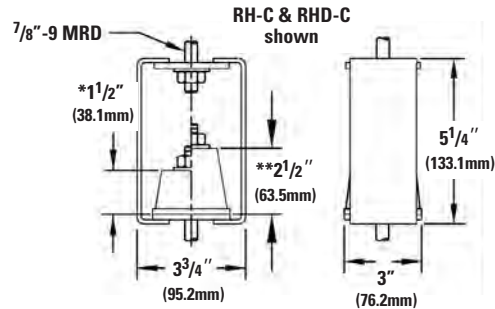
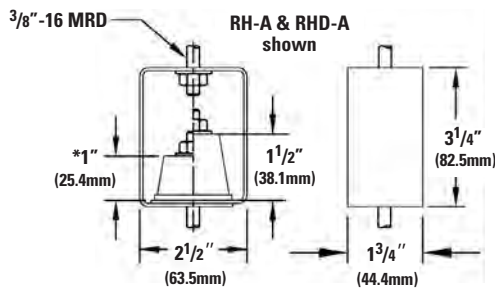
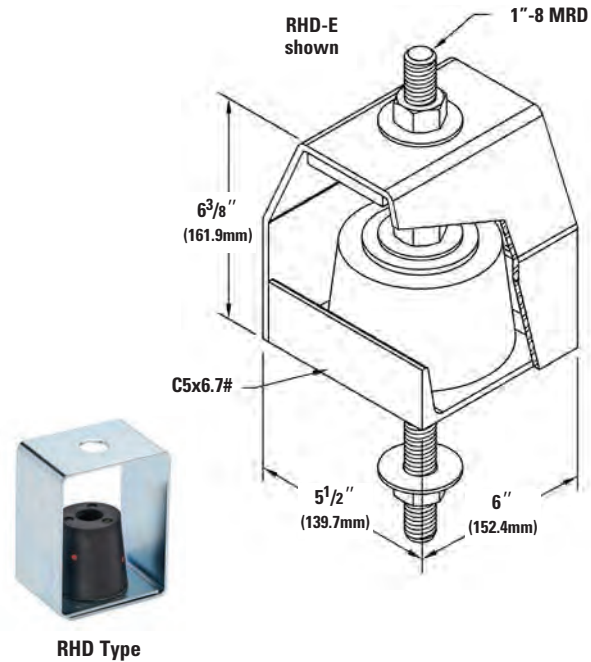
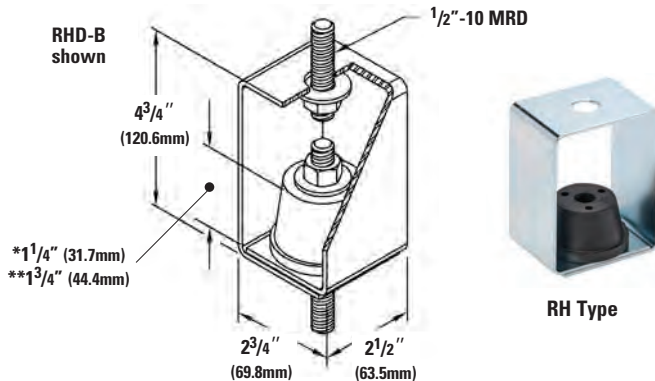
Nominal Pipe Size in. (mm)	Strainer lbs. (kg)	Check Valve lbs. (kg)	Gate Valve lbs. (kg)	Elbow lbs. (kg)	Tee lbs. (kg)	Flange lbs. (kg)
1 1/2" (40)	20 (9.1)	25 (11.3)	30 (13.6)	15 (6.8)	20 (9.1)	3.5 (1.6)
2" (50)	30 (13.6)	25 (11.3)	40 (18.1)	20 (9.1)	25 (11.3)	6 (2.7)
2 1/2" (65)	40 (18.1)	35 (15.9)	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)	178 (80.7)	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 (170.1)	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 threaded 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 No.	Maximum Load		Color Code
	lbf	(kN)	
RH-40-A	40	(0.18)	Yellow
RH-55-A	55	(0.25)	Green
RH-80-A	80	(0.35)	Blue
RH-130-A	130	(0.58)	White
RH-120-B	120	(0.53)	Orange
RH-200-B	200	(0.89)	Yellow
RH-280-B	280	(1.24)	Green
RH-400-B	400	(1.78)	Blue
RH-300-C	300	(1.33)	Yellow
RH-520-C	520	(2.31)	Green
RH-750-C	750	(3.33)	Blue
RH-1100-C	1100	(4.89)	White

Typical Part Numbering

Type _____
 Load Rating _____
 Size _____
 RH - 280 - B

1/2" (12.7mm) Maximum Double Deflection

Part No.	Maximum Load		Color Code
	lbf	(kN)	
RHD-40-A	40	(0.18)	Yellow
RHD-55-A	55	(0.25)	Green
RHD-80-A	80	(0.35)	Blue
RHD-130-A	130	(0.58)	White
RHD-120-B	120	(0.53)	Orange
RHD-200-B	200	(0.89)	Yellow
RHD-280-B	280	(1.24)	Green
RHD-400-B	400	(1.78)	Blue
RHD-300-C	300	(1.33)	Yellow
RHD-520-C	520	(2.31)	Green
RHD-750-C	750	(3.33)	Blue
RHD-1100-C	1100	(4.89)	White
RHD-1700-E	1700	(7.56)	Green
RHD-2700-E	2700	(12.01)	Blue
RHD-4200-E	4200	(18.68)	White

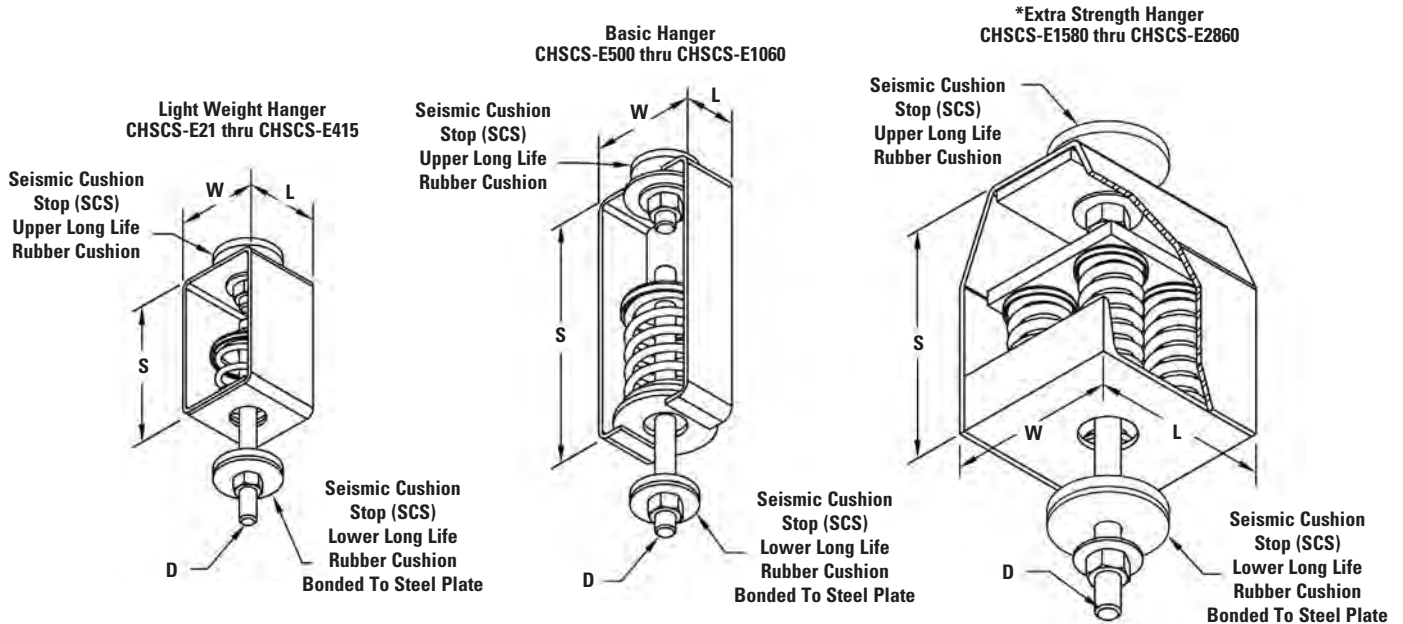
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 = Spring Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength



Dimensions

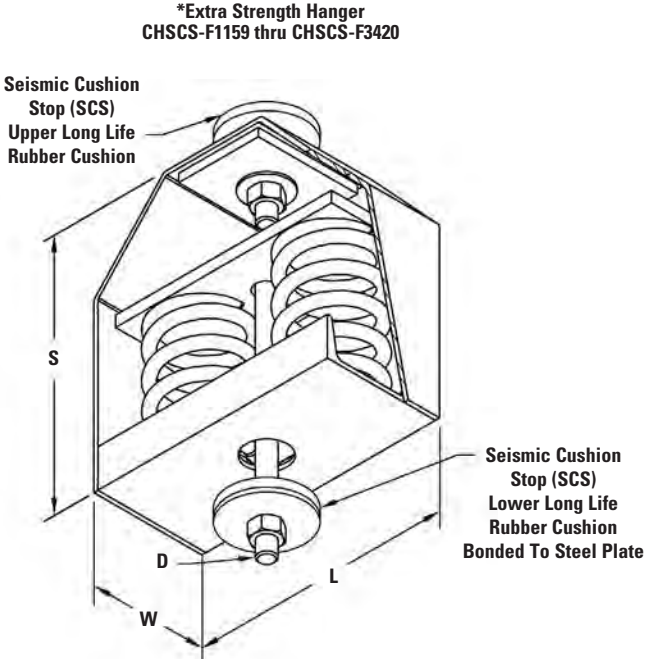
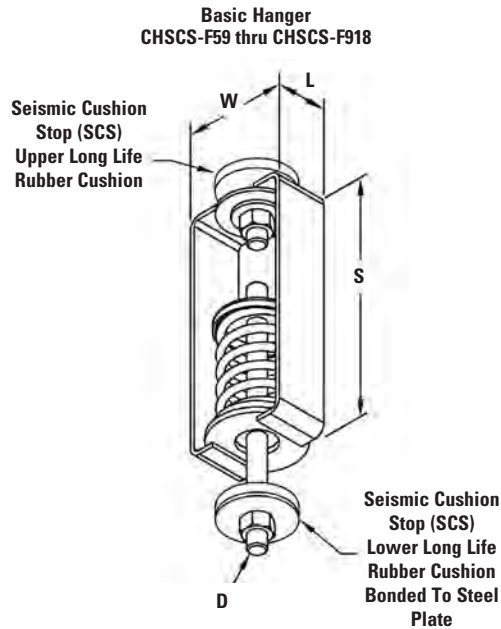
Typical Part Numbering								
CHSCS - E143								
Type	Load	Part No.	Maximum Load lbf (kN)	SFH in. (mm)	S in. (mm)	W in. (mm)	L in. (mm)	SCS Diameter in. (mm)
		CHSCS-E21	21 (0.09)	2 ⁵ / ₈ " (66.7)	4 ³ / ₄ " (120.6)	2 ³ / ₄ " (69.8)	2 ¹ / ₂ " (63.5)	2 ³ / ₈ " (60.3)
		CHSCS-E55	55 (0.24)	2 ³ / ₄ " (69.8)	4 ³ / ₄ " (120.6)	2 ³ / ₄ " (69.8)	2 ¹ / ₂ " (63.5)	2 ³ / ₈ " (60.3)
		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)
		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)
		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)
		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)
		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)
		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)
		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)
		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)
		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)
		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)
		CHSCS-1430 *	1430 (6.36)	4 ¹ / ₄ " (107.9)	8 ³ / ₈ " (212.7)	6" (152.4)	6" (152.4)	3" (76.2)
		CHSCS-2120 *	2120 (9.43)	4 ¹ / ₄ " (107.9)	8 ³ / ₈ " (212.7)	6" (152.4)	6" (152.4)	3" (76.2)
		CHSCS-2860 *	2860 (12.72)	4 ¹ / ₄ " (107.9)	8 ³ / ₈ " (212.7)	6" (152.4)	6" (152.4)	3" (76.2)

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 threaded 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 = Spring Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength



Dimensions

Typical Part Numbering								
Type	_____	CHSCS - F120						
Load	_____							

Part No.	Maximum Load lbf (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

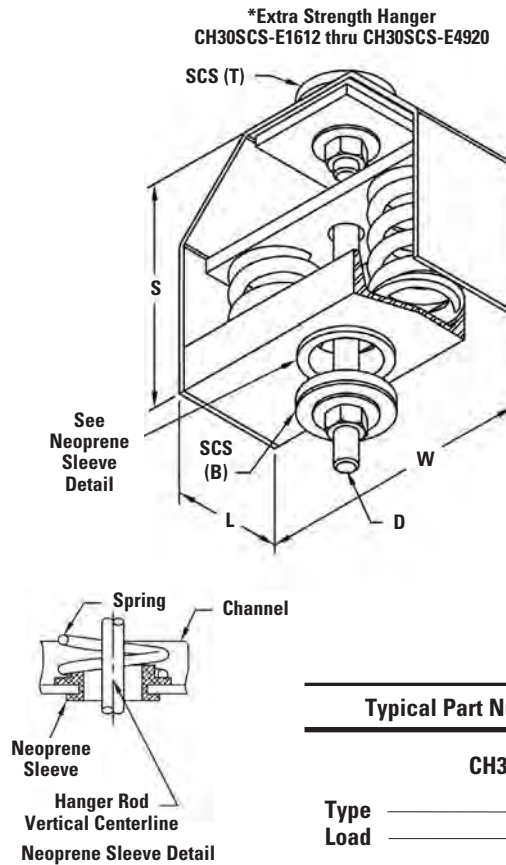
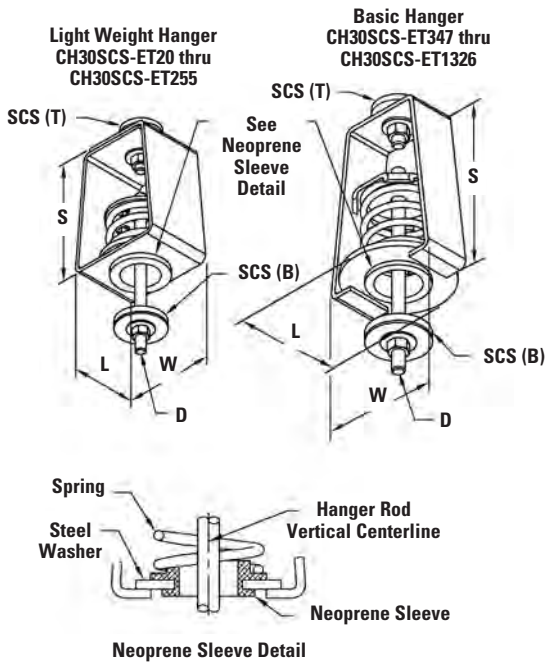
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 threaded 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 = Spring Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength



Typical Part Numbering

CH30SCS - ET129

Type _____
Load _____

Dimensions

Part No.	Maximum Load lbf (kN)	SFH in. (mm)	S in. (mm)	W in. (mm)	L in. (mm)	SCS Diameter in. (mm)	D Diameter
CH30SCS-ET20	20 (0.09)	17/8" (47.6)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET42	42 (0.18)	2" (50.8)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET80	80 (0.35)	21/8" (54.0)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET129	129 (0.57)	23/8" (60.3)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET194	194 (0.86)	23/8" (60.3)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET255	255 (1.13)	21/2" (63.5)	43/4" (120.6)	35/8" (92.1)	21/2" (63.5)	23/8" (60.3)	1/2"-13
CH30SCS-ET347	347 (1.54)	23/4" (69.8)	6" (152.9)	55/16" (134.9)	41/4" (107.9)	23/8" (60.3)	5/8"-11
CH30SCS-ET473	473 (2.10)	27/8" (73.0)	6" (152.9)	55/16" (134.9)	41/4" (107.9)	23/8" (60.3)	5/8"-11
CH30SCS-ET667	667 (2.96)	31/8" (79.4)	7" (177.8)	57/8" (149.2)	43/4" (120.6)	3" (76.2)	3/4"-10
CH30SCS-ET940	940 (4.18)	33/8" (85.7)	7" (177.8)	57/8" (149.2)	43/4" (120.6)	3" (76.2)	3/4"-10
CH30SCS-ET1326	1326 (5.90)	35/8" (92.1)	7" (177.8)	57/8" (149.2)	43/4" (120.6)	3" (76.2)	7/8"-9
CH30SCS-E1612 *	1612 (7.17)	35/8" (92.1)	81/4" (209.5)	10" (254.0)	4" (101.6)	3" (76.2)	7/8"-9
CH30SCS-E2060 *	2060 (9.16)	37/8" (98.4)	81/4" (209.5)	10" (254.0)	4" (101.6)	3" (76.2)	1"-8
CH30SCS-E2460 *	2460 (10.94)	41/8" (104.8)	81/4" (209.5)	10" (254.0)	4" (101.6)	3" (76.2)	1"-8
CH30SCS-E2980 *	2980 (13.25)	41/8" (104.8)	81/4" (209.5)	10" (254.0)	4" (101.6)	3" (76.2)	1"-8
CH30SCS-E4120 *	4120 (18.32)	37/8" (98.4)	81/2" (215.9)	91/2" (241.3)	7" (177.8)	4" (101.6)	11/8"-7
CH30SCS-E4920 *	4920 (21.88)	41/8" (104.8)	81/2" (215.9)	91/2" (241.3)	7" (177.8)	4" (101.6)	11/8"-7

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

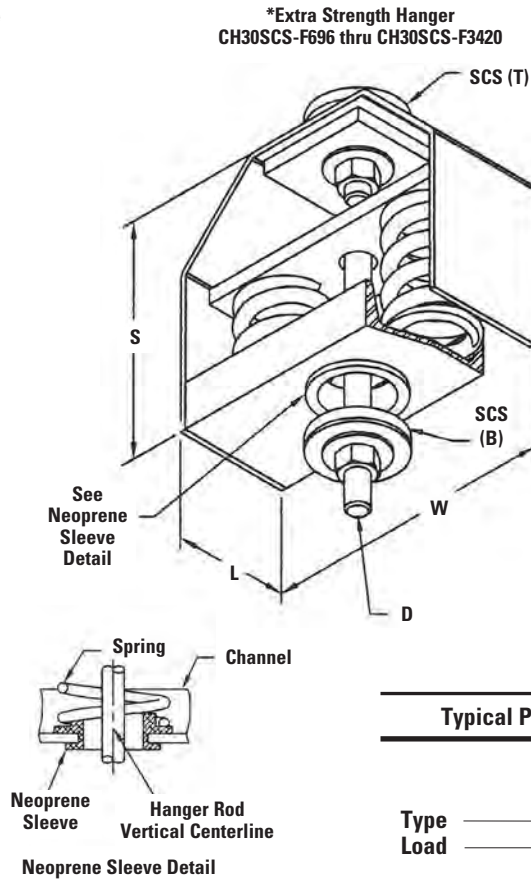
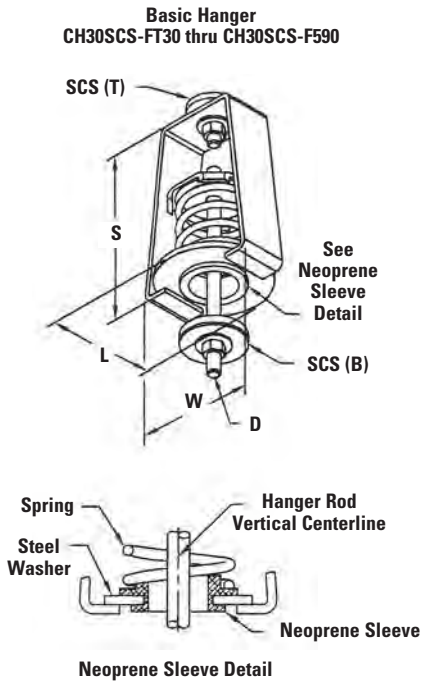
SCS (B) =
Seismic Cushion Stop (SCS)
Lower Long Life Rubber
Cushion
Bonded To Steel Plate

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

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 threaded 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)
- SFH = Spring Free Height
- Threaded rod, nuts, and washers supplied separately
- * Housings are specially reinforced for extra strength



Typical Part Numbering

CH30SCS - FT121

Type _____

Load _____

Dimensions

Part No.	Maximum Load lbf (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

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

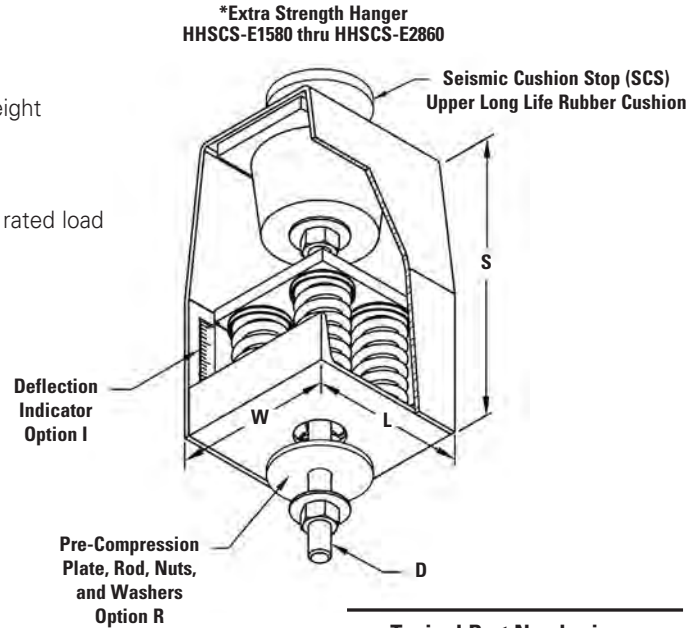
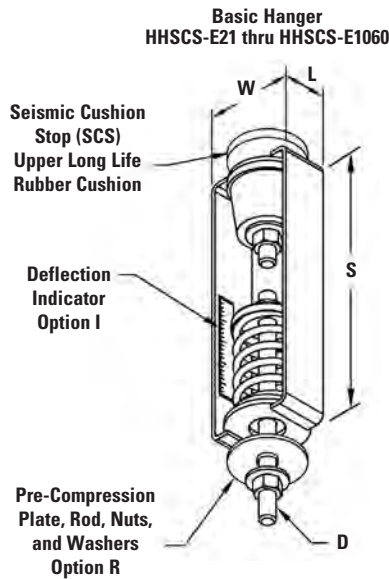
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 threaded 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 = Spring 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



Typical Part Numbering

HHSCS E106 R I

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

Dimensions

Part No.	Maximum Load		SFH		NFH		S		W		L		SCS		D
	lbf	(kN)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	
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

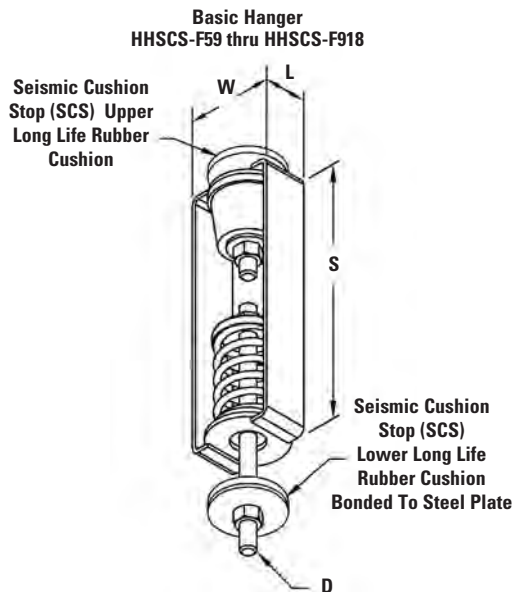
Insert **R** for Option R (Pre-Compression Hardware) when required and **I** for Option I (deflection indicator) when required

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

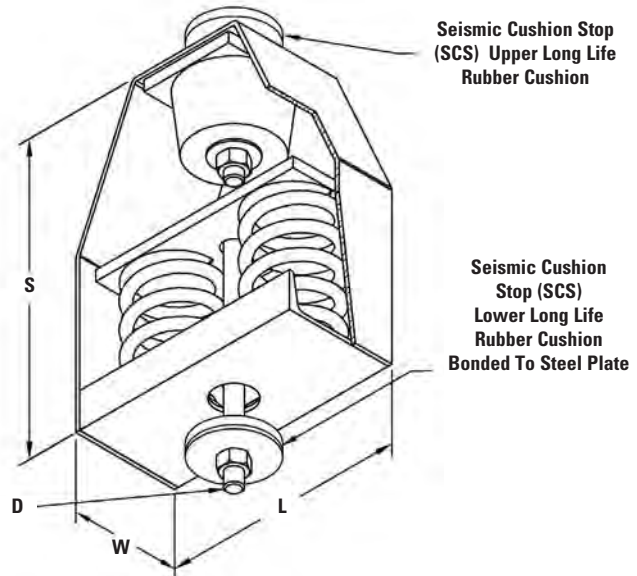
HHSCS Type - Combination Hanger Spring & Neoprene with Seismic Cushion Stop - 2 1/2" (63.5mm) Deflection

Use: Used to dampen noise and minor vibration from suspended high speed equipment. To be used with all threaded 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 = Spring 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



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



Typical Part Numbering

HHSCS - F120
Type _____
Load _____

Dimensions

Part No.	Maximum Load		SFH		NFH		S		W		L		SCS Diameter		D Diameter
	lbf	(kN)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	
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

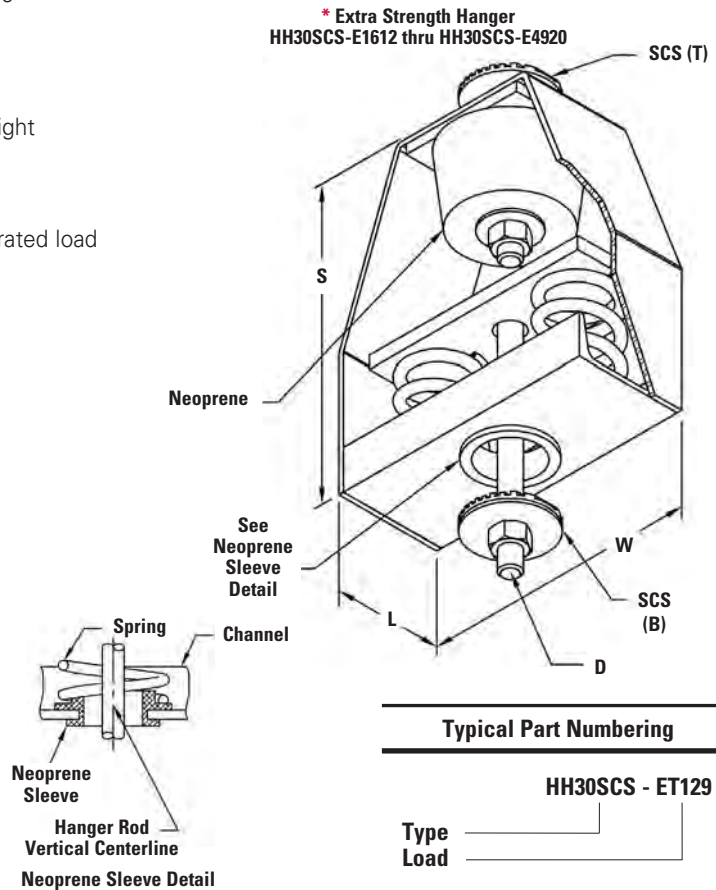
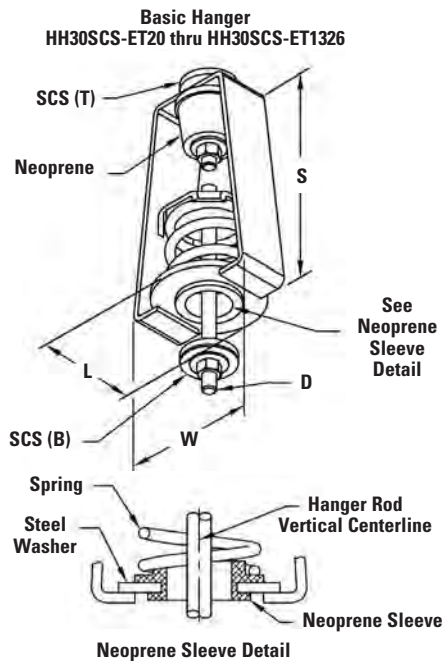
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Vibration Isolation

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 threaded 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 = Spring 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



Dimensions

Part No.	Maximum Load		SFH		NFH		S		W		L		SCS Diameter		D Diameter	
	lbf	(kN)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
SCS (T) = Seismic Cushion Stop (SCS) Upper Long Life Rubber Cushion	HH30SCS-ET20	20 (0.09)	17/8"	(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
SCS (B) = Seismic Cushion Stop (SCS) Lower Long Life Rubber Cushion Bonded To Steel Plate	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 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 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

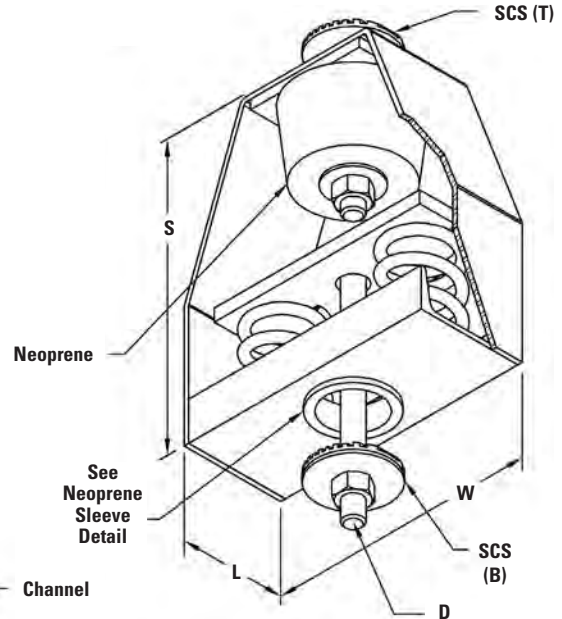
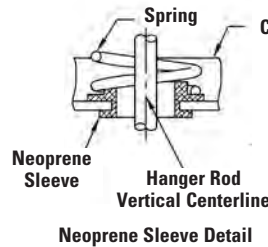
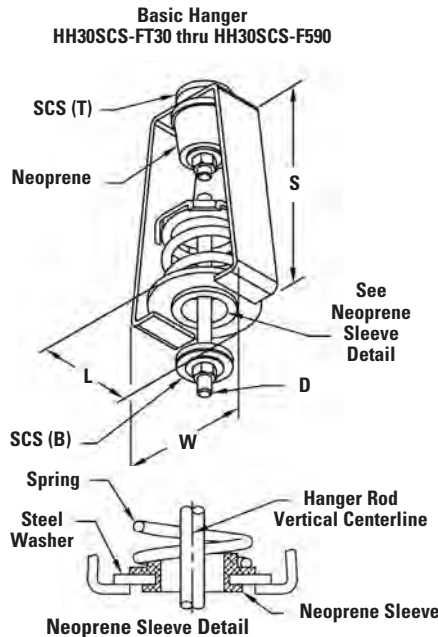
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

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 threaded 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 = Spring 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

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



Typical Part Numbering

HH30SCS - FT121

Type _____
Load _____

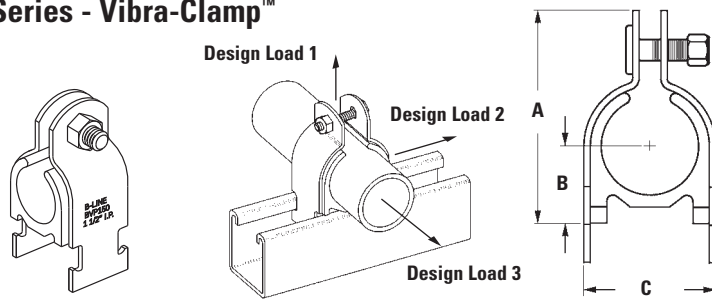
Dimensions

Part No.	Maximum Load		SFH		NFH		S		W		L		SCS Diameter		D	
	lbf	(kN)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
SCS (T) = Seismic Cushion Stop (SCS) Upper Long Life Rubber Cushion																
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 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 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 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 1/2"-13	
SCS (B) = Seismic Cushion Stop (SCS) Lower Long Life Rubber Cushion Bonded To Steel Plate																
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 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 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 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	

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

Vibration Isolation

BVT Series - Vibra-Clamp™



- 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		A		Dimensions B		C		Wt./100	
	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	(5.0)
BVT037	3/8"	(9.5)	1/4"	(6)	1.36"	(34.5)	0.25"	(6.3)	0.61"	(15.5)	12	(5.4)
BVT050	1/2"	(12.7)	3/8"	(10)	1.49"	(37.8)	0.31"	(7.8)	0.74"	(18.8)	14	(6.3)
BVT062	5/8"	(15.9)	1/2"	(15)	1.62"	(41.1)	0.38"	(9.6)	0.86"	(21.8)	15	(6.8)
BVT075	3/4"	(19.0)	5/8"	(17)	1.87"	(47.4)	0.50"	(12.7)	1.15"	(29.2)	19	(8.2)
BVT087	7/8"	(22.2)	3/4"	(20)	2.00"	(50.8)	0.56"	(14.2)	1.27"	(32.2)	21	(9.5)
BVT112	1 1/8"	(28.6)	1"	(25)	2.25"	(57.1)	0.69"	(17.5)	1.52"	(38.6)	26	(11.8)
BVT137	1 3/8"	(34.9)	1 1/4"	(32)	2.51"	(63.7)	0.81"	(20.6)	1.78"	(45.2)	38	(17.2)
BVT162	1 5/8"	(41.3)	1 1/2"	(40)	3.00"	(76.2)	1.00"	(25.4)	2.20"	(55.9)	40	(18.1)
BVT212	2 1/8"	(54.0)	2"	(50)	3.52"	(89.4)	1.25"	(31.7)	2.70"	(68.6)	55	(24.9)
BVT262	2 5/8"	(66.6)	2 1/2"	(65)	4.02"	(102.1)	1.50"	(38.1)	3.20"	(81.3)	55	(24.9)
BVT312	3 1/8"	(79.4)	3"	(80)	4.53"	(115.0)	1.75"	(44.4)	3.70"	(93.9)	64	(29.0)
BVT362	3 5/8"	(92.1)	3 1/2"	(90)	5.05"	(128.2)	2.00"	(50.8)	4.23"	(107.4)	76	(34.4)
BVT412	4 1/8"	(104.8)	4"	(100)	5.55"	(140.9)	2.25"	(57.1)	4.73"	(120.1)	93	(42.2)
BVT612	6 1/8"	(155.5)	6"	(150)	7.62"	(193.5)	3.25"	(82.5)	6.74"	(171.1)	136	(61.7)

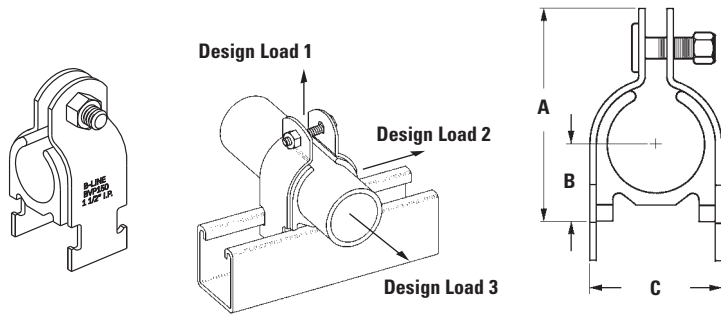
Part No.	Design Load 1		Design Load 2		Design Load 3	
	Lbf	(kN)	Lbf	(kN)	Lbf	(kN)
BVT025	400	(1.78)	50	(0.22)	50	(0.22)
BVT037	400	(1.78)	50	(0.22)	50	(0.22)
BVT050	400	(1.78)	50	(0.22)	50	(0.22)
BVT062	400	(1.78)	50	(0.22)	50	(0.22)
BVT075	600	(2.67)	75	(0.33)	75	(0.33)
BVT087	600	(2.67)	75	(0.33)	75	(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	(0.89)	150	(0.67)
BVT412	1000	(4.45)	200	(0.89)	150	(0.67)
BVT612	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.

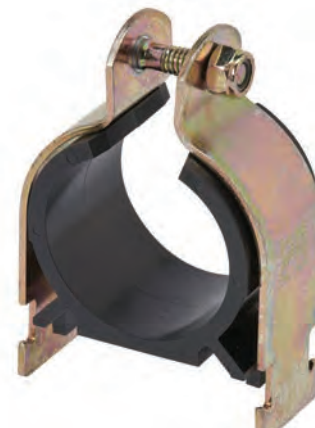
BVP Series - Vibra-Clamp™

- 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		A		Dimensions 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	(6.8)
BVP037	0.675"	(17.1)	3/8"	(10)	1.86"	(47.2)	0.50"	(12.7)	1.15"	(29.2)	18	(8.1)
BVP050	0.875"	(22.2)	1/2"	(15)	1.99"	(50.5)	0.56"	(14.2)	1.27"	(32.3)	20	(9.0)
BVP075	1.050"	(26.7)	3/4"	(20)	2.25"	(57.1)	0.69"	(17.5)	1.52"	(38.6)	21	(9.5)
BVP100	1.312"	(33.3)	1"	(25)	2.51"	(63.8)	0.81"	(20.6)	1.77"	(45.0)	20	(9.0)
BVP125	1.660"	(42.2)	1 1/4"	(32)	3.00"	(76.2)	1.00"	(25.4)	2.21"	(56.1)	36	(16.3)
BVP150	1.900"	(48.3)	1 1/2"	(40)	3.21"	(81.5)	1.12"	(28.4)	2.41"	(61.2)	40	(18.1)
BVP200	2.375"	(60.3)	2"	(50)	3.77"	(95.8)	1.37"	(34.8)	2.96"	(75.2)	45	(20.4)
BVP250	2.875"	(73.0)	2 1/2"	(65)	4.28"	(108.7)	1.62"	(41.1)	3.46"	(87.9)	54	(24.5)
BVP300	3.500"	(88.9)	3"	(80)	5.05"	(128.3)	2.00"	(50.8)	4.24"	(107.7)	81	(36.7)
BVP350	4.000"	(101.6)	3 1/2"	(90)	5.55"	(140.9)	2.25"	(57.1)	4.74"	(120.3)	87	(39.4)
BVP400	4.500"	(114.3)	4"	(100)	6.05"	(153.7)	2.50"	(63.5)	5.24"	(133.1)	109	(49.4)
BVP500	5.563"	(141.3)	5"	(125)	6.84"	(173.7)	3.00"	(76.2)	6.24"	(158.4)	136	(61.9)
BVP600	6.625"	(168.3)	6"	(150)	8.24"	(209.3)	3.56"	(90.4)	7.36"	(186.9)	163	(73.9)

Part No.	Design Load 1		Design Load 2		Design Load 3	
	lbf	(kN)	lbf	(kN)	lbf	(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.

Vibration Isolation

B1999 - Vibra-Cushion™

OPM

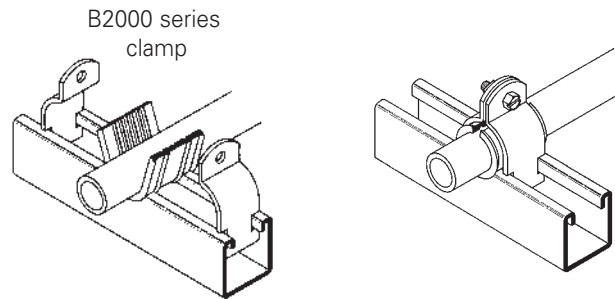
- Ideal Isolation Material
- Inhibits Galvanic Corrosion
- Dampens Sound and Vibration
- Service Temperature Range
-75° F (-60°C) to +375°F (+190°C)
- Packaged - 20 ft. (6.09m) per carton

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.

Approvals: Included in our Seismic Engineering Guidelines 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 Engineering Guidelines, OPM-0052-13.

Use with B2000 series clamps as shown



Note: See Strut Catalog for sizing information.

ISO - ISO-PIPE™

- 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)
- 1" (25.4mm) wide x 0.02" (0.5mm) thick
- Packaged - 36 ft. (10.97m) per carton



Reference Data - Metric Conversion Charts

To Convert From			To	Multiply By	
Angle					
degree	radian (rad)	1.745329 x 10 ⁻²			
radian (rad)	degree	5.729578 x 10 ⁺¹			
Area					
foot ²	square meter (m ²)	9.290304 x 10 ⁻²			
inch ²	square meter (m ²)	6.451600 x 10 ⁻⁴			
circular mil	square meter (m ²)	5.067075 x 10 ⁻¹⁰			
sq. centimeter (cm ²)	square inch (in ²)	1.550003 x 10 ⁻¹			
square meter (m ²)	foot ²	1.076391 x 10 ⁺¹			
square meter (m ²)	inch ²	1.550003 x 10 ⁺³			
square meter (m ²)	circular mil	1.973525 x 10 ⁺⁹			
Temperature					
degree Fahrenheit	degree Celsius	t ^{°C} = (t ^{°F} - 32) / 1.8			
degree Celsius	degree Fahrenheit	t ^{°F} = 1.8 t ^{°C} + 32			
Force					
pounds-force (lbf)	newtons (N)	4.448222			
Section Properties					
section modulus S (in ³)	S (m ³)	1.638706 x 10 ⁻⁵			
moment of inertia I (in ⁴)	I (m ⁴)	4.162314 x 10 ⁻⁷			
modulus of elasticity E (psi)	E (Pa)	6.894757 x 10 ⁺³			

Reference Data

Schedule 40 Steel Pipe Data

Nominal Pipe Size		Pipe O.D.		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water		Maximum Span*		Recommended Hanger Rod Sizes
in.	(mm)	in.	(mm)	in.	(mm)	lbs./ft.	(kg/m)	lbs./ft.	(kg/m)	ft.	(m)	
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		Pipe O.D.		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water		Maximum Span*		Recommended Hanger Rod Sizes
in.	(mm)	in.	(mm)	in.	(mm)	lbs./ft.	(kg/m)	lbs./ft.	(kg/m)	ft.	(m)	
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	(677.4)	32	(9.75)	1 1/4"-7

Based on ASTM A53.

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		Wall Thickness		Weight of Pipe		Weight of Pipe Filled With Water	
		in.	(mm)	in.	(mm)	lbs./ft.	(kg/m)	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, 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

Reference Data

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, 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.

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.

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 Pipe Size		Maximum Span		Recommended Hanger Rod Size
in.	(mm)	ft.	(m)	
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	(9.4)	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

Reference Data

Spacing Of Hangers For Schedule 40 PVC Plastic Pipe

Temperature	Support Spacing in ft. (m) For Pipe Sizes of									
	1/2"-3/4" (15-20mm)	1"-1 1/4" (25-32mm)	1 1/2"-2" (40-50mm)	2 1/2" (65mm)	3" (80mm)	4" (100mm)	6" (150mm)			
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. (m) For Pipe Sizes of									
	1/2"-3/4" (15-20mm)	1" (25mm)	1 1/4"-1 1/2" (32-40mm)	2" (50mm)	2 1/2" (65mm)	3" (80mm)	4" (100mm)	6" (150mm)		
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/m³)] 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

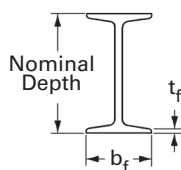
Copper Tubing Size		Maximum Span		Rod Size
in.	(mm)	ft.	(m)	
3/4"-1"	(20-35)	8	(2.44)	3/8"-16
1 1/4"-1 1/2"	(32-40)	15	(3.05)	3/8"-16
2"-3"	(50-80)	15	(3.66)	3/8"-16
3 1/4"-4"	(90-100)	15	(4.57)	3/8"-16
5"-8"	(125-200)	15	(4.57)	1/2"-13

Based on NFPA 13.

Load Chart For All Threaded Rod (ATR)

Rod Size	Root Area Thread		Maximum Safe Loads			
	in. ²	(cm ²)	650°F (349°C)	750°F (399°C)		
			lbf	(kN)	lbf	(kN)
3/8"-16	0.678	(.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)

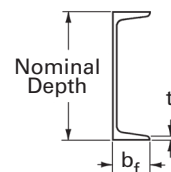
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American Standard 'S' Shape I-Beams

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 ¹ / 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)

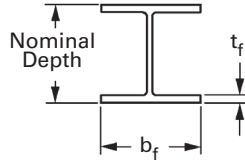
Dimensions taken from ASTM A6.



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)

Reference Data



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)

Dimensions taken from ASTM A6.

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)

(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.

Reference Data

MSS To B-Line & Federal Specification Cross Reference

Reference Data

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	B221, B321, B521	--
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	--

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.

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

A-A-1192A WW-H-171E	B-Line Part No.	MSS SP-69 MSS SP-58
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

Reference Data

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	--	--	--	--
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	--
109DD	--	--	Yes	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	--

Part No.	ANSI/MSS SP-69 ANSI/MSS SP-58	A-A-1192A WW-H-171E	UL Listed	FM Approved
910	--	--	Yes	--
975	--	--	Yes	--
980	--	--	Yes	Yes
980H	--	--	--	--
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	--
B2501	Type 18	--	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.

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.

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	--	--

[illegible]

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

Trapeze Hangers Using B-Line Strut Or Angle Iron

Reference Data

Trapeze Length		Nominal Pipe Size			
in.	(mm)	2 1/2" (65mm) or less	3" (80mm)	3 1/2" (90mm)	4" (100mm)
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

Trapeze Length		Nominal Pipe Size			
in.	(mm)	5" (125mm)	6" (150mm)	8" (200mm)	10" (250mm)
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, Table 6-1.1.3 (a) & Table 6-1.1.3 (b).

TOLCO	B-Line	TOLCO	B-Line	TOLCO	B-Line	TOLCO	B-Line
1 (Disc.)	B3100	33 (Disc.)	B3084	116 (Disc.)	B3234	325 (Disc.)	B3120
1A (Disc.)	B3108	34 (Disc.)	B3086	117 (Disc.)	LW	326 (Disc.)	B3122
1CBS	B3100PS (Disc.)	35 (Disc.)	B3085	118 (Disc.)	B3248	327 (Disc.)	B3117SL
1CI (Disc.)	B3102	40 (Disc.)	B3190	119 (Disc.)	FFW	328 (Disc.)	B3118SL
1F (Disc.)	B3100F	41 (Disc.)	B3191	120	120	329 (Disc.)	B3054
1LD (Disc.)	B3104	42 (Disc.)	B3061	120MJ	120MJ	330 (Disc.)	B3200
1NFPA	1NFPA	50	50	120RWA	120RWA	331 (Disc.)	B3202
1PVC (Disc.)	B3100C	51	51	120W	120W	332 (Disc.)	B3201
1U (Disc.)	1U (Disc.)	52 (Disc.)	B3070	122 (Disc.)	N/A	333 (Disc.)	B3203
1V (Disc.)	B3106	56	56	123 (Disc.)	Toggle Bolts	335 (Disc.)	B3045
1VT (Disc.)	B3106V	58	58	124 (Disc.)	Toggle Bolt Head	336 (Disc.)	B3040
2	B3170 (Disc.)	60 (Disc.)	N/A	125 (Disc.)	DS15x2	337 (Disc.)	B3082
2F	B3170F (Disc.)	61 (Disc.)	B3042	126 (Disc.)	N/A	343 (Disc.)	B3080 L & S
2FWON (Disc.)	N/A	61T (Disc.)	B3042T	130	B3052 (Disc.)	405 (Disc.)	B3256
2WON	N/A	62 (Disc.)	B3050	150 (Disc.)	N/A	406 (Disc.)	B3257
3 (Disc.)	B3690	64 (Disc.)	B351L	200	B3170NF (Disc.)	420 (Disc.)	B3281 - B3287
3F (Disc.)	B3690F	65	65	200C	B3170NFC (Disc.)	421 (Disc.)	B3281 - B3287
3PVC (Disc.)	B3690C	65XT	65XT	200F	B3170NFF (Disc.)	422 (Disc.)	B3281 - B3287
4 (Disc.)	B3140	66	66	200H	200H	422C (Disc.)	B3281 - B3287
4A (Disc.)	4A	67SS	67SS	200R (Disc.)	B3170NF (Disc.)	425 (Disc.)	B3891
4B	B386 (Disc.)	68S	B3034	200WON (Disc.)	N/A	426 (Disc.)	B3891
4CI (Disc.)	B3141	68SS	68SS	202 (Disc.)	B3170CT	426A (Disc.)	N/A
4F (Disc.)	B3140F	68W	B3033	203 (Disc.)	B3170NFC (Disc.)	426AC (Disc.)	N/A
4H (Disc.)	B3142	69	B3367 (Disc.)	207 (Disc.)	N/A	426AG (Disc.)	N/A
4L	4L	69R	69R	209 (Disc.)	AWA	426C (Disc.)	N/A
4LA (Disc.)	4LA	70 (Disc.)	B655	219 (Disc.)	B3153	426G (Disc.)	N/A
4PVC (Disc.)	B3140C	70R (Disc.)	B656	219 (Disc.)	B3155	427 (Disc.)	N/A
5 (Disc.)	B3144	70S (Disc.)	B655	220 (Disc.)	B3151	428 (Disc.)	B3993-10
5H (Disc.)	B3146	71 (Disc.)	B3220	220 (Disc.)	B3154	429 (Disc.)	B3891
6 (Disc.)	B3373	75	75	260 (Disc.)	B3160	430 (Disc.)	
6F (Disc.)	B3373F	76	76	261 (Disc.)	B3161	B3892	
6PVC (Disc.)	B3373C	77	77	262 (Disc.)	B3162	431 (Disc.)	B3993-10
7 (Disc.)	B3148	78	78 & B3199	263 (Disc.)	B3163		/B3993-10B
8 (Disc.)	B3149	81 (Disc.)	B3104CT	264 (Disc.)	B3164	432 (Disc.)	N/A
9 (Disc.)	B3132	81PVC (Disc.)	B3104CTC	265 (Disc.)	B3165	433 (Disc.)	N/A
9X (Disc.)	B3132W-1 & 1 1/2	82 (Disc.)	B3373CT	301CT (Disc.)	B3198HCT	434 (Disc.)	N/A
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14X (Disc.)	B3134W	83 (Disc.)	B3195CT	304 (Disc.)	B3083WO	506 (Disc.)	B3262
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21 (Disc.)	N/A	98B	98B	307 (Disc.)	B3222	825A	825A
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28M	28M	104 (Disc.)	B3212	314 (Disc.)	B3094	981	981
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