



"Your Green Heating & Cooling Professionals
Dedicated to Serving Your and Your Community"

Plumbing Submittals

**Asian Health & Service Center
9005 SE Foster Rd.
Portland, OR 97266**

**General Contractor
O'Neill / Walsh Community Builders
2905 SW First Avenue
Portland, OR 97201**

**Submitted By
Andersen Mechanical
16285 SW 85th Ave, Suite 410
Tigard, OR 97224**

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WA License ANDERH1936QL : OR CCB 168214 : OR Plumbing License PB1464
MBE Certification #8561*



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22_05_00

Common Materials and Methods

DW Series



Dry Wall Access Doors

Doors are ideally suited for new installations or for remodeling in masonry, tile, wood or other wall and ceiling surfaces. Door features rounded safety corners.

Door and Frame are fabricated from 16 gage, galvanized steel with a white prime coat finish.

Frame is one piece construction, 1" wide and provides perfect concealment of the rough wall opening. Wall frame is provided with 1/4" mounting holes for fastening within the furred spaces allowing faster installation and fixing maximum clearance.

Concealed Pivoting Rod Hinge prevents distortion and closes door squarely. Doors 24" or larger are provided with a continuous piano hinge.

Latch is screwdriver operated.

Finish is a white prime coat suitable for painting.

Guide Specification

Provide Elmdor[®] DW Series, Dry Wall Access Doors (Specify model number and options.) Access door and frame shall be fabricated from 16 gage, galvanized steel with a white prime coat finish. The door shall have rounded safety corners and a concealed pivoting rod hinge. Frame shall be one piece construction with no miters or welds on the face. Latch shall be screwdriver operated. Finish shall be a white prime coat suitable for painting.



MODEL NUMBER AND OPTIONS SELECTION

BASE MODEL NUMBER

- DW Dry Wall Access Door
(16 Gage Steel)

Suffix Options

- AKL Allen Key Latch
- CL Cylinder Lock (one per door)
- CLD Cylinder Lock with Dust Shutter
(one per door)
- MAS Masonry Anchor Straps
- MLP Mortise Cylinder Lock (Prep)
- SS Stainless Steel Construction
(Type 304 No. 4 Satin Finish)
- TH 'T' Handle

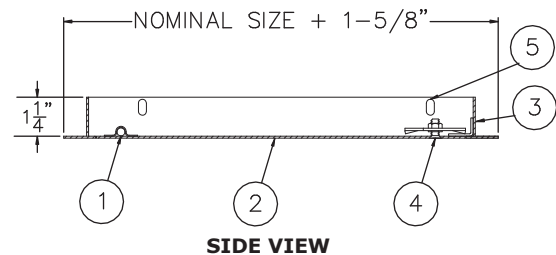
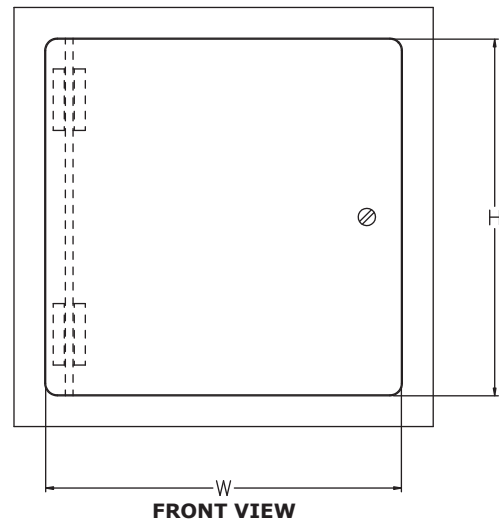
STANDARD AVAILABLE SIZES

Special sizes available upon request.

NOMINAL

DOOR SIZE

(WXH)	WALL OPENING	LATCHES	WEIGHT
DW 6" x 6"	6-1/2" x 6-1/2"	1	3 lbs.
DW 8" x 8"	8-1/2" x 8-1/2"	1	3 lbs.
DW 8" x 12"	8-1/2" x 12-1/2"	1	4 lbs.
DW 10" x 10"	10-1/2" x 10-1/2"	1	4 lbs.
DW 12" x 12"	12-1/2" x 12-1/2"	1	5.5 lbs.
DW 12" x 16"	12-1/2" x 16-1/2"	1	6 lbs.
DW 12" x 18"	12-1/2" x 18-1/2"	2	6.5 lbs.
DW 12" x 24"	12-1/2" x 24-1/2"	2	9.5 lbs.
DW 14" x 14"	14-1/2" x 14-1/2"	1	6 lbs.
DW 14" x 20"	14-1/2" x 20-1/2"	2	8 lbs.
DW 14" x 24"	14-1/2" x 24-1/2"	2	15 lbs.
DW 15" x 15"	15-1/2" x 15-1/2"	1	6.5 lbs.
DW 16" x 16"	16-1/2" x 16-1/2"	1	7.5 lbs.
DW 16" x 20"	16-1/2" x 20-1/2"	2	8.5 lbs.
DW 16" x 24"	16-1/2" x 24-1/2"	2	10 lbs.
DW 18" x 18"	18-1/2" x 18-1/2"	3	9 lbs.
DW 18" x 24"	18-1/2" x 24-1/2"	5	12 lbs.
DW 18" x 36"	18-1/2" x 36-1/2"	3	16 lbs.
DW 20" x 20"	20-1/2" x 20-1/2"	3	11 lbs.
DW 20" x 24"	20-1/2" x 24-1/2"	3	13 lbs.
DW 20" x 30"	20-1/2" x 30-1/2"	5	15 lbs.
DW 22" x 22"	22-1/2" x 22-1/2"	3	12 lbs.
DW 22" x 30"	22-1/2" x 30-1/2"	3	16 lbs.
DW 24" x 24"	24-1/2" x 24-1/2"	3	15 lbs.
DW 24" x 30"	24-1/2" x 30-1/2"	6	17 lbs.
DW 24" x 36"	24-1/2" x 36-1/2"	5	20.5 lbs.
DW 24" x 48"	24-1/2" x 48-1/2"	7	28 lbs.
DW 30" x 30"	30-1/2" x 30-1/2"	7	21.5 lbs.
DW 30" x 36"	30-1/2" x 36-1/2"	7	29 lbs.
DW 32" x 32"	32-1/2" x 32-1/2"	7	23 lbs.
DW 36" x 36"	36-1/2" x 36-1/2"	8	31.5 lbs.
DW 36" x 48"	36-1/2" x 48-1/2"	9	42 lbs.
DW 48" x 48"	48-1/2" x 48-1/2"	11	58 lbs.



NOTES:

1. CONCEALED PIVOTING ROD HINGE
2. DOOR
3. FRAME
4. SCREWDRIVER OPERATED LATCH
5. MOUNTING HOLES

Dimensions are subject to manufacturer's tolerance of plus or minus 1/4". Elmdor/Stoneman assumes no responsibility for use of void or suspended data. Please visit www.elmdorstoneman.com for most current specifications. © Copyright 2009 Elmdor/Stoneman, City of Industry, CA, A Division of Acorn Engineering Company.

SELECTION SUMMARY & APPROVAL FOR MANUFACTURING

Model Number & Options _____	Quantity _____
Company _____	Date _____
Contact _____	Title _____
Approval for Manufacturing/Signature _____	

DW

Revised: 12/06/16

CFR Series



Ceiling Fire Resistant Access Doors

Doors are designed for use in a suspended dry wall ceiling as part of a fire rated ceiling assembly. The CFR Series door, itself, **is not fire rated**. However, the combination of steel and fire rated tile maintains the fire resistant quality of the ceiling assembly. Door is recessed 1-1/2" to accommodate dual layered ceiling tile.

Door is fabricated from 16 gage, galvanized steel with a white prime coat finish.

Frame is fabricated from 18 gage, galvanized steel with a white prime coat finish.

Hinge is a continuous piano type.

Latch is screwdriver operated.

Guide Specification

Provide Elmdor[®] CFR Series, ceiling fire resistant access doors (specify model number and options). Access door frame shall be fabricated from 16 gage steel. Access door panel shall be fabricated from 18 gage steel. Door shall be recessed 1-1/2" to accept ceiling tile. Hinge shall be continuous piano type. Latch shall be screwdriver operated.



MODEL NUMBER AND OPTIONS SELECTION

BASE MODEL NUMBER

CFR Ceiling Fire Resistant Access Door

Suffix Options

- AKL Allen Key Latch
- CL Cylinder Lock (one per door)
- CLD Cylinder Lock with Dust Shutter (one per door)
- SS Stainless Steel Construction (Type 304 No. 4 Satin Finish)

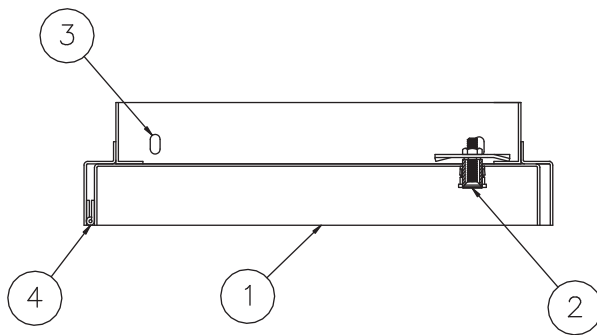
STANDARD AVAILABLE SIZES

Special sizes available upon request.

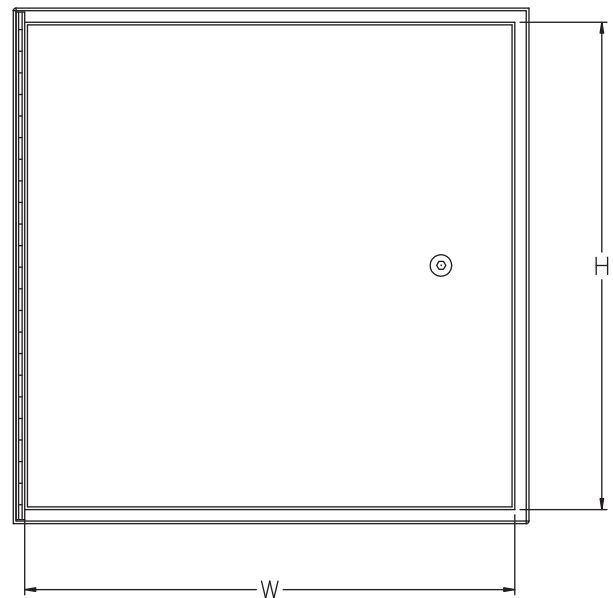
NOMINAL DOOR SIZE (W X H)	CEILING OPENING	LATCHES	WEIGHT
CFR 12" x 12"	10-1/2" x 10-1/2"	1	7.3 lbs.
CFR 18" x 18"	16-1/2" x 16-1/2"	2	12.5 lbs.
CFR 24" x 24"	22-1/2" x 22-1/2"	2	21.8 lbs.
CFR 22" x 30"	20-1/2" x 28-1/2"	4	26.0 lbs.

NOTES:

1. DOOR
2. SCREWDRIVER OPERATED LATCH
3. MOUNTING HOLES
4. CONCEALED HINGE



SIDE VIEW



FRONT VIEW

Dimensions are subject to manufacturer's tolerance of plus or minus 1/4". Elmdor/Stoneman assumes no responsibility for use of void or suspended data. Please visit www.elmdorstoneman.com for most current specifications. © Copyright 2009 Elmdor/Stoneman, City of Industry, CA, A Division of Acorn Engineering Company.

SELECTION SUMMARY & APPROVAL FOR MANUFACTURING	
Model Number & Options _____	Quantity _____
Company _____	Date _____
Contact _____	Title _____
Approval for Manufacturing/Signature _____	

CFR

Revised: 10/25/16

FR Series



Fire Rated Wall Access Doors

Doors are Fire Rated by Underwriters Laboratories Inc., for 1-1/2 hours, "B" Label, ANSI-UL 10B standard, and CAN/ULC S104 for 2 hours in walls. Door has a heavy duty spring closer to assure positive latching when panel closes. ***This door is for wall installation only.***

Door and Frame are fabricated from 16 gage, galvanized steel with a white prime coat finish.

Door has a heavy duty spring to assure positive latching.

Frame is equipped with both masonry anchors and bolt holes to facilitate installation in all types of wall construction.

Concealed Hinge operates completely out of sight so that only the door and frame is visible.

Exterior Latch is recessed and is operated using a ring attached to the sliding bolt.

Interior Latch Release Slide is included enabling door to be opened from the inside.

Finish is a white prime coat suitable for painting.

Guide Specification

Provide Elmdor® FR Series, Fire Rated Access Doors (specify model number and options). Access door and frame shall be fabricated from 16 gage, galvanized steel with a white prime coat finish. Hinge shall be concealed type. Door shall have a heavy duty spring to provide positive latching when closed and an interior latch release slide enabling door to be opened from the inside. Exterior latch shall be recessed and operated using ring attached to the sliding bolt. Finish shall be a white prime coat suitable for painting.



MODEL NUMBER AND OPTIONS SELECTION

BASE MODEL NUMBER

FR Fire Rated Access Door

Suffix Options

- CL Cylinder Lock (one per door)
- CLD Cylinder Lock with Dust Shutter (one per door)
- SS Stainless Steel Construction (Type 304 No. 4 Satin Finish)

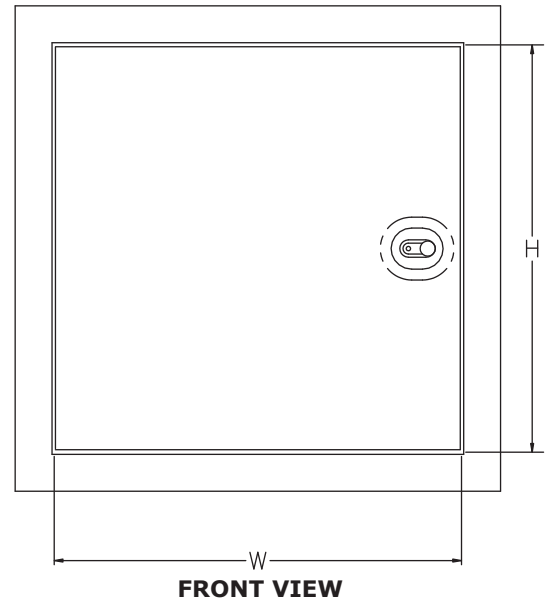
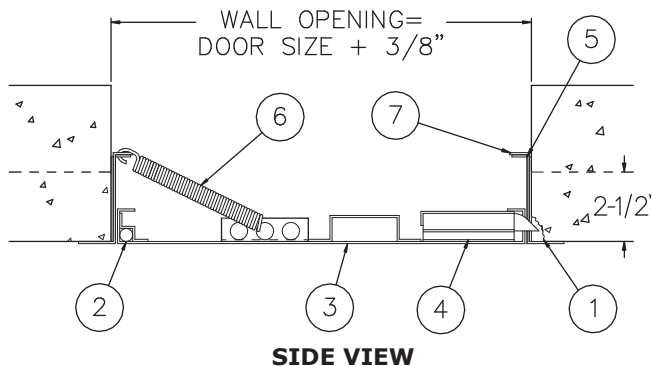
STANDARD AVAILABLE SIZES

Special sizes available upon request.

NOMINAL DOOR SIZE (W X H)	WALL OPENING (minimum required)	LATCHES	WEIGHT
FR 8" x 8"	8-3/8" x 8-3/8"	1	6 lbs.
FR 10" x 10"	10-3/8" x 10-3/8"	1	7.5 lbs.
FR 12" x 12"	12-3/8" x 12-3/8"	1	9 lbs.
FR 12" x 18"	12-3/8" x 18-3/8"	1	10.5 lbs.
FR 12" x 24"	12-3/8" x 24-3/8"	1	13 lbs.
FR 14" x 14"	14-3/8" x 14-3/8"	1	10 lbs.
FR 16" x 16"	16-3/8" x 16-3/8"	1	12.5 lbs.
FR 18" x 18"	18-3/8" x 18-3/8"	1	15 lbs.
FR 20" x 20"	20-3/8" x 20-3/8"	1	18 lbs.
FR 22" x 22"	22-3/8" x 22-3/8"	1	22 lbs.
FR 22" x 30"	22-3/8" x 30-3/8"	2	28 lbs.
FR 24" x 24"	24-3/8" x 24-3/8"	2	24.5 lbs.
FR 24" x 36"	24-3/8" x 36-3/8"	2	33 lbs.
FR 24" x 48"	24-3/8" x 48-3/8"	2	42 lbs.
FR 30" x 30"	30-3/8" x 30-3/8"	2	33.5 lbs.
FR 32" x 32"	32-3/8" x 32-3/8"	2	35 lbs.
FR 36" x 36"	36-3/8" x 36-3/8"	2	43 lbs.
FR 36" x 48"	36-3/8" x 48-3/8"	2	74 lbs.

NOTES:

1. CHIP OUT MASONRY TO CLEAR BOLT COVER
2. CONCEALED HINGE
3. DOOR
4. RECESSED LATCH
5. INTERIOR LATCH RELEASE SLIDE
6. CLOSING SPRING
7. FRAME



Dimensions are subject to manufacturer's tolerance of plus or minus 1/4". Elmdor/Stoneman assumes no responsibility for use of void or suspended data. Please visit www.elmdorstoneman.com for most current specifications. © Copyright 2009 Elmdor/Stoneman, City of Industry, CA, A Division of Acorn Engineering Company.

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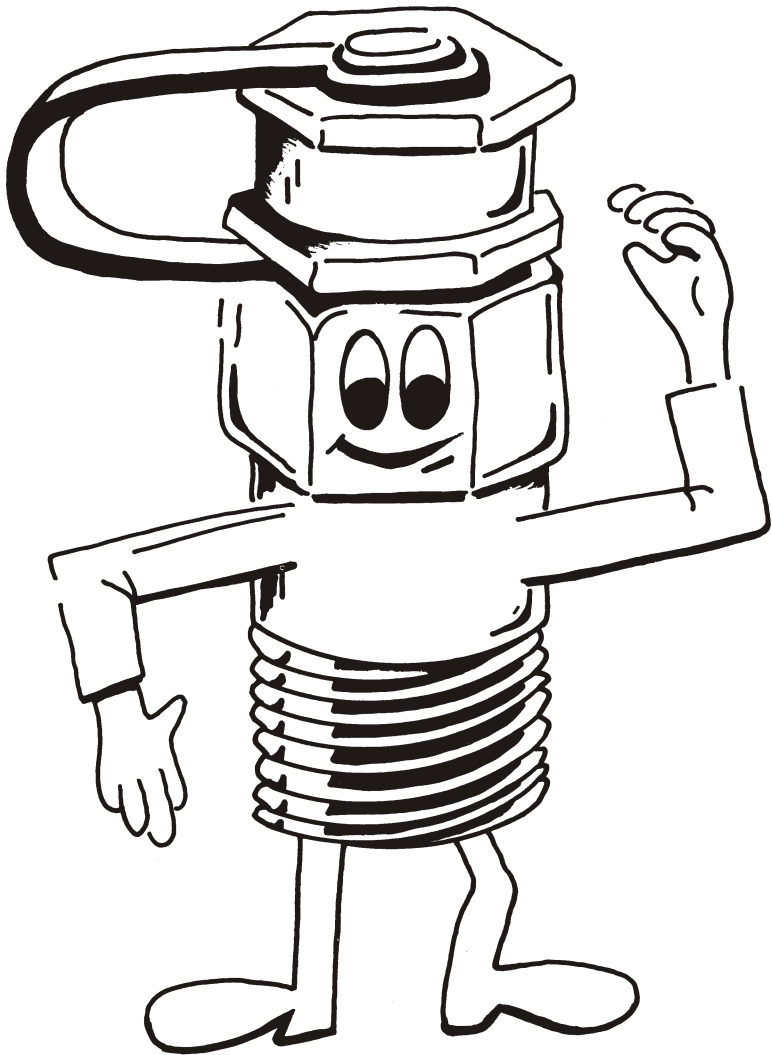
FR

Revised: 10/25/16

PETE'S PLUG II[®]

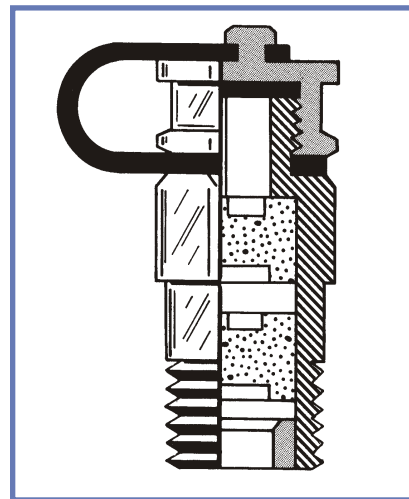
The successor to the real Pete's Plug

PETE'S PLUG II[®] WILL ALLOW YOU TO TAKE PRESSURE AND TEMPERATURE READINGS QUICKLY AND ELIMINATE THE NEED FOR LEAVING COSTLY GAUGES OR TEMPERATURE INDICATORS ON THE LINE.



Depending on the application, the Pete's Plug can be operated to a maximum of 500 PSIG and 200° or 275°F for neoprene and norden respectively. Maximum working pressures of 1000 PSIG can be attained with neoprene or norden at temperatures from 140°F to -20°F.

The enhanced version of Pete's Plug II[®] is still the only pressure and temperature test plug with two self-closing valves, but the valves are improved with interaction which speeds valve closure.



Patent Number 5,079,962



IMAC Systems, Inc
90 Main Street, PO Box 1605
Tullytown, PA 19007

Distributed in Your Area By:

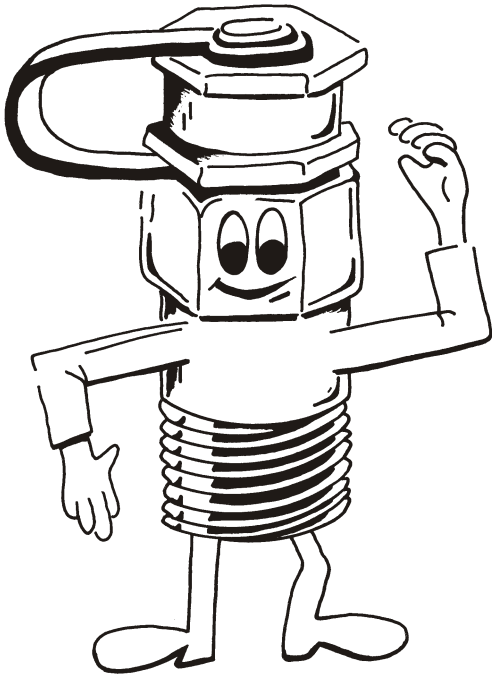
1-800-955-4GAS
Phone: (215)946-2200
Fax: (215) 943-2984
Email: sales@imacsystems.com



Pete's Plug II is available in various pipe thread sizes, lengths and materials to satisfy each application. The XL Pete's Plug II will allow you to insulate the test point and not completely cover the Pete's Plug II. The XL Pete's Plug II eliminates extra fittings for insulated applications.

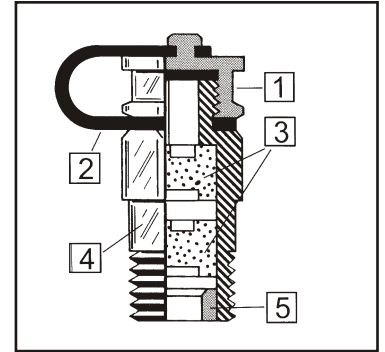
Pressure or Temperature Tests

Take pressure and temperature readings quickly with line pressurized. Reduce the need for costly permanent installation of gauges and recorders on the line.



Standard length Pete's Plug II Cross Section:

1. Cap and Gasket
2. Cap retaining strap
3. Two self closing valves with interaction to speed valve closure
4. Valve body
5. Valve retainer



Suggested specifications

Pressure and temperature test stations:

Supply and install where indicated "Pete's Plug II" a 1/4" fitting to receive either a temperature or pressure probe 1/8" OD. Fitting shall be solid brass with two valve cores of Neoprene (Max 200°F) at 500 PSI, or Nordel (Max 275°F) at 500 PSI, fitted with a color coded cap strap with gasket, and shall be rated at 1000 PSI at 140°F. In addition, the installing contractor shall supply the owner with ___ (number) pressure gauge adapters with 1/8" OD probe and ___ (number) five inch stem pocket testing thermometers; 25-125°F for chilled water and ___ (number) 0-220°F or ___ (number) 50-500°F for hot water.

Pressure and temperature test kit:

Supply and present to the owner upon completion of testing a pressure and temperature test kit. It will consist of a 0-100 PSI, 0-230 ft. of water pressure gauge with a Number 500 gauge adapter attached. It will contain one 25-125°F and one 0-220°F pocket testing thermometer, an extra number 500 gauge adapter, and a protective carrying case.

How to operate

The Pete's Plug II is permanently installed in the line at recommended test points. The cap protects the valve and provides an additional seal. After the cap has been removed, either a test thermometer or a gauge adapter with the proper pressure gauge can be inserted through the two, self-closing valves in the Pete's Plug II. Readings are made, adjustments or tests can be accomplished and when the probes are withdrawn the two valves close. The protective cap is then reinstalled. Tests should be made as quickly as possible since the valve reseal time is dependent upon time of insertion, time and pressure. Slower valve reseal time can be expected at lower temperature and lower pressures.



#1500XL test kit works with our extended length Pete's Plugs

Applications

In general the Pete's Plug is a time and money saving device which is well suited for most plant and pipeline systems and is designed to eliminate gauge cocks and thermometer wells. Hot and chilled water systems, heat exchangers, pumps, differential readings, air, gas lines and numerous other applications are only a few of the areas where the Pete's Plug are presently being used.

Valve Materials

Neoprene is a chloroprene based synthetic rubber and is resistant to deterioration from waxes, fats, oils, greases, petroleum products and most refrigerants.

Nordel is an ethylene-propylene based synthetic rubber and gives excellent service in hot and cold water and in some applications of low steam. Nordel is resistant to detergents, phosphate esters, ketone, alcohols, and glycols. It is **not** suitable for petroleum products.

Neoprene and nordel are proprietary materials and the information presented herein is believed to be accurate and reliable. Peterson Equipment Co., Inc. Can assume no liability for results obtained or damages incurred through the application of this information. The information is intended as a guide and if in doubt ask!



Pressure Tests

The pressure gauge adapter has a probe constructed of 304 stainless steel. The probe is 0.156" in diameter and extends 2 inches on the standard adapter and 3½ inches on the extra long adapter. The 1/8" diameter probe is less likely to become clogged with foreign material and resists bending. Also, the 1/8" diameter probe operates in either the ¼", 3/8", or ½" Pete's Plug. Please note the 500XL gauge adapter will operate in any of the Pete's Plug's. It is intended for use with any of the XL Pete's Plug's.

Temperature Tests

The test thermometer is constructed of stainless steel, has a 1 3/4" dial and has a bi-metallic sensing element. Accuracy within ½ % over the entire scale can be expected. Pointer adjustment or recalibrations can be made by turning the hex nut on the back of the dial case while firmly holding the dial case. The stem should be immersed in a known, controlled temperature bath. Stem lengths are 5" and diameters of 0.156" or 4mm are maximum diameters that can be inserted onto the Pete's Plug. Digital thermometers have the same specifications but can not be recalibrated in the field.

<u>Valve Core Material</u>	<u>Recommended Maximum Temperature</u>	<u>Maximum Pressure</u>	<u>Strap Color Coded</u>
Neoprene	200°F	500PSIG	Blue Strap-Neoprene
Nordel	275°F	500PSIG	Yellow Strap-Nordel

ORDERING INFORMATION

<u>Part Number</u>	<u>Valve Core Material</u>	<u>Size</u>	<u>Body and Cap Material</u>	<u>Length</u>
100	Neoprene	¼"NPT	Brass	1½"
110	Nordel	"	Brass	"
100XL	Neoprene	¼"NPT	Brass	3"
110XL	Nordel	"	Brass	"
300	Neoprene	3/8"NPT	Brass	1½"
310	Nordel	"	"	"
400	Neoprene	¼"NPT	316SS	1½"
410	Nordel	"	"	"
700	Neoprene	½"NPT	Brass	1½"
710	Nordel	"	Brass	"
700XL	Neoprene	½"NPT	Brass	3"
710XL	Nordel	"	Brass	"
12500	Neoprene	1/8"NPT	Brass	1¼"

Cap retaining straps are standard on all Pete's Plugs.

Gauge Adapters (All Connections ¼"NPTF)

- 500 Gauge Adapter with 1/8" Diameter Probe
- 500XL Gauge Adapter with 1/8" Diameter Probe for XL Plugs
- 510 Gauge Adapter with 1/16" Diameter Probe**
- 520 Gauge Adapter with 1/8" Diameter Probe all 316SS

Test Kits

- 1500 Temperature and Pressure Test Kit
- 1500XL Temperature and Pressure Test Kit-XL

Bi-Metal Pocket Testing Thermometers 5" Stem With External Calibration

<u>Part Number</u>	<u>Range</u>	<u>Degree Division</u>
600	-40° to 160°F	2
601	25° to 125°F	1
603	0° to 220°F	2

Digital Pocket Testing Thermometers 5" Stem

<u>Part Number</u>	<u>Range</u>	<u>Degree Division</u>
606	-58° to 571°F	0.1

**510 is the only gauge adapter that will fit part number 12500

U.S. Patent Number 5079962 Canadian Patent Number 981192. Patent pending in United States and other countries. All patents are sole property of the Peterson Equipment Co., Inc.® A trademark of the Peterson Equipment Company, Inc.

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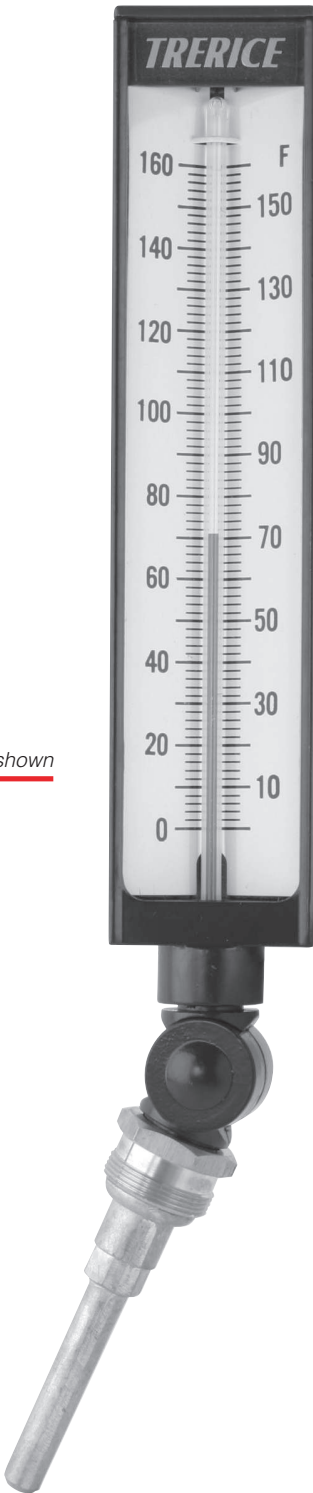
IMAC Systems, Inc.
90 Main Street, PO Box 1605
Tullyown, PA 19007

1-800-955-4GAS
Phone: (215) 946-2200
Fax: (215) 943-2984
Email: sales@imacsystems.com

Adjustable Angle

7" • 9" • 12" Scale Sizes

INDUSTRIAL THERMOMETERS



BX91403 shown

- ▶ 7", 9", 12" Scale
- ▶ ± 1 Scale Division Accuracy
- ▶ Cast Aluminum Case
- ▶ Adjustable Angle Stem

Recognized globally as the Trerice "BX" Industrial Thermometer, this is an instrument of extreme accuracy and rugged dependability. Available in scale sizes of 7" (AX9), 9" (BX9), & 12" (CX9), with a durable cast aluminum case, this universally adjustable, liquid-in-glass thermometer is the most widely specified instrument of its kind.

- Optional features available: Please consult the Options & Accessories Section for details.

Thermowell

- For applications where the process media may be corrosive or contained under pressure, the use of a thermowell is required to prevent damage to the thermometer and facilitate its removal from the process. (Refer to page 152)

Specifications

Models	Scale Sizes	
AX9	7"	Adjustable Angle
BX9	9"	
CX9	12"	

Fill Type Spirit: Blue colored, organic

Case Cast Aluminum, blue epoxy finish

Stem Aluminum, brass, 304 stainless steel or air-duct style available

Connection Standard: 1 1/4-18 UNEF-2A coupling nut

Air-Duct: Reversible mounting flange with 3 bolt holes

Window Ultraviolet protective acrylic on ranges to 300° F
Glass on ranges over 300° F

Tube Lens front, magnifying type

Scale Aluminum, white background with black graduations and markings

Top Plate ABS

Accuracy ±1 scale division

Approximate Shipping Weight

AX9: 1.5 lbs [0.68 kg]
BX9: 1.6 lbs [0.73 kg]
CX9: 2.0 lbs [0.91 kg]

HOW TO ORDER

Sample Order Number: **BX9 1 403 07**

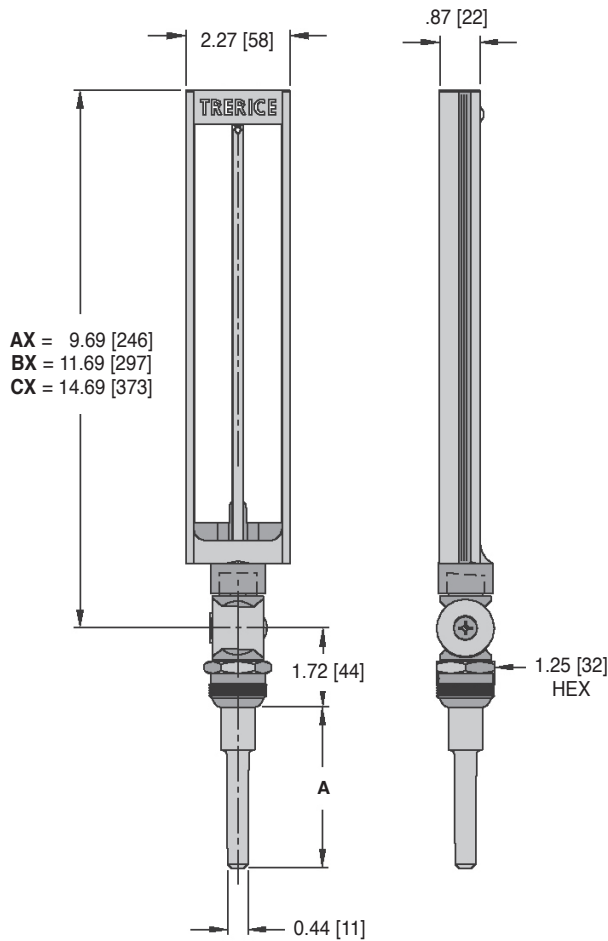
Model	Stem (Material)	Stem (Length)	Specific Range
AX9 7" Adjustable	1 Aluminum (standard)	403 3 1/2"	See Standard Ranges
BX9 9" Adjustable	2 Brass	406 6"	
CX9 12" Adjustable	3 304 SS	408 8"	
		512 12"	
		006 6" Air-Duct	
		012 12" Air-Duct	

* Not for use with Thermowells

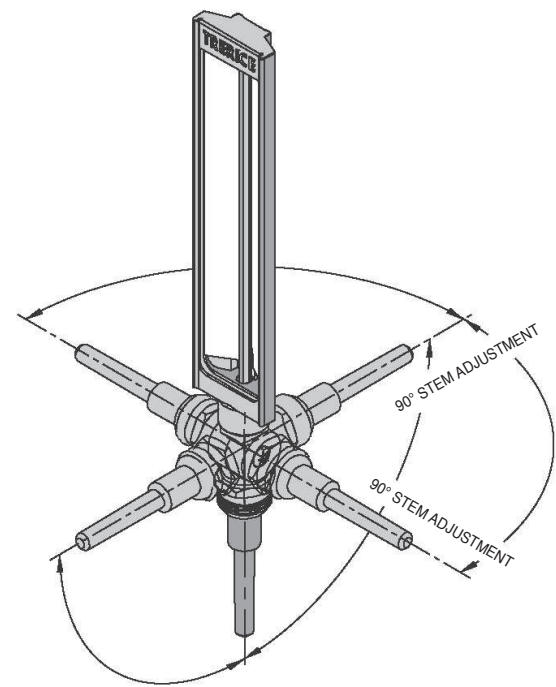
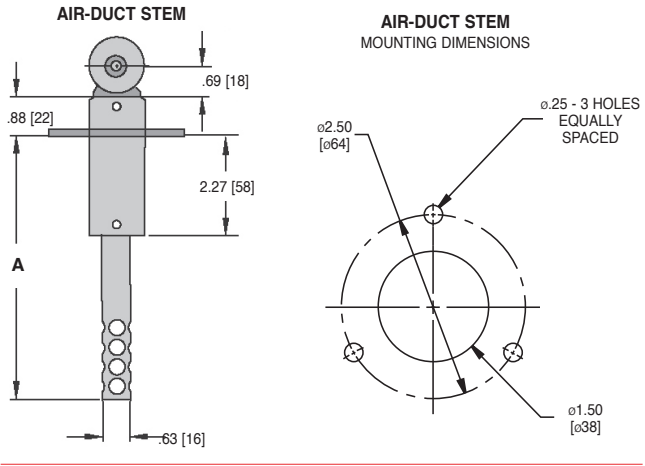
Adjustable Angle

INDUSTRIAL THERMOMETERS

All dimensions are nominal.
Dimensions in [] are in millimeters.



(A) Stem Length	Dimension	
3 1/2"	3.50	[88.9]
6"	6.00	[152.4]
8"	8.00	[203.2]
12"	12.00	[304.8]



Standard Ranges

Fahrenheit Scale		Celsius Scale		Dual Scale		Fahrenheit		Celsius	
Range Code	Range	Range Code	Range	Range Code	Range	Figure Intervals	Minor Divisions	Figure Intervals	Minor Divisions
01	-40° to 110°F	17	-40° to 40°C	41	-40° to 110°F & -40° to 40°C	10°	2°	5°	1°
02	0° to 100°F	24	-18° to 38°C	42	0° to 100°F & -18° to 38°C	5°	1°	5°	0.5°
03	30° to 130°F	25	0° to 55°C	43	30° to 130°F & 0° to 55°C	5°	1°	5°	1°
04	0° to 160°F	26	-18° to 70°C	44	0° to 160°F & -18° to 70°C	10°	2°	5°	1°
06	30° to 180°F	27	0° to 83°C	46	30° to 180°F & 0° to 83°C	10°	2°	5°	1°
07	30° to 240°F	19	0° to 115°C	47	30° to 240°F & 0° to 115°C	10°	2°	5°	1°
08	30° to 300°F	20	0° to 150°C	48	30° to 300°F & 0° to 150°C	10°	2°	10°	2°
09	50° to 400°F	28	10° to 205°C	49	50° to 400°F & 10° to 205°C	25°	5°	10°	2°
15	50° to 500°F	31	10° to 260°C	55	50° to 500°F & 10° to 260°C	25°	5°	10°	2°

Dual scale figure intervals may differ

700 Series

Field Liquid Fillable • Stainless Steel Case

INDUSTRIAL GAUGES



700SS shown

- ▶ 2 1/2", 4", 6" Dial Sizes
- ▶ ±1.0% Accuracy
- ▶ Stainless Steel Case
- ▶ Field Liquid Fillable

The Trerice **700 Series** Industrial Gauge is designed for the varying needs of the world's industrial applications. This gauge has a stainless steel case and ring. Its sturdy interior design and field liquid-fill capability (no kit required) provide the durability and accuracy required for industrial process environments. Available wetted parts are bronze tube with brass socket, stainless steel tube and socket, or Monel tube and socket.

- Optional features and case style variations available: Please consult the Options & Accessories Section for details.
- For correct use and application of all pressure gauges, please refer to: Pressure Gauge Standard ASME B40.100.



Specifications

Models	Wetted Parts
700B (dry)	Bronze tube,
700LFB (liquid-filled)	brass socket
700SS (dry)	316 stainless steel tube and socket
700LFSS (liquid-filled)	
700M (dry)	Monel tube and socket (meets NACE MR 01.75)
700LFM (liquid-filled)	
Dial Sizes	2 1/2", 4", 6"
Fill	Glycerine. Other fills available. See Options & Accessories.
Movement	Stainless steel
Connection	2 1/2" Dial Size: Lower male or center back male, 1/4 NPT 4", 6" Dial Size: Lower male or lower back male, 1/4 or 1/2 NPT
Case	304 stainless steel, satin finished, stem-mounted flangeless
Ring	Bayonet type, 304 stainless steel
Window	Laminated safety glass
Pointer	2 1/2" Dial Size: Adjustable, black finished 4", 6", Dial Size: Micro adjustable, black finished
Dial Face	Aluminum, white background with black graduations and markings
Accuracy	±1.0% Full Scale, ASME B40.100 Grade 1A
Maximum Temperature	700SS, 700M: 250°F (121°C) 700B, 700LFB, 700LFSS, 700LFM: 150°F (65°C)

Approximate Shipping Weight

700B, 700SS 2 1/2" Dial Size: 0.4 lbs [0.18 kg]

700LFB, 700LFSS, 700LFM 2 1/2" Dial Size: 0.5 lbs [0.23 kg]

700B, 700SS, 700M 4" Dial Size: 1.3 lbs [0.59 kg]

700LFB, 700LFSS, 700LFM 4" Dial Size: 2.1 lbs [0.95 kg]

700B, 700SS, 700M 6" Dial Size: 2.0 lbs [0.91 kg]

700LFB, 700LFSS, 700LFM 6" Dial Size: 3.8 lbs [1.72 kg]

HOW TO ORDER

Sample Order Number: **700LFSS 25 02 B A 140**

Model	Dial Size	Connection Size	Connection Location	Units of Measure	Range Code
700B	25 2 1/2"*	02 1/4 NPT	L Lower	A psi	See Standard Ranges
700LFB	40 4"	04 1/2 NPT	B Back	D psi/kPa	
700SS	60 6"				
700LFSS					
700M					
700LFM					

* Not available with Monel wetted parts or with 1/2 NPT connection.

700 Series

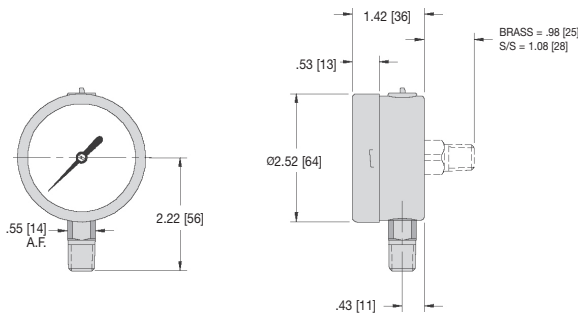
Field Liquid Fillable • Stainless Steel Case

All dimensions are nominal. Dimensions in [] are in millimeters.

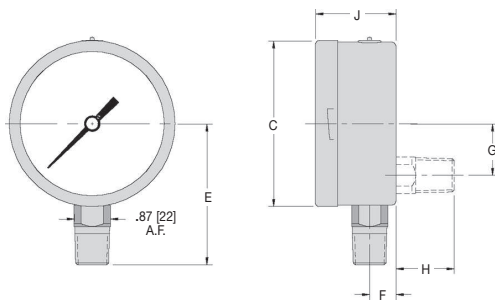
INDUSTRIAL GAUGES

Dial Size	Material	C	E	F	G	H	J
4"	Brass	3.98 [101]	3.39 [86]	0.94 [24]	1.04 [27]	1.44 [37]	2.24 [57]
	SS	3.98 [101]	3.39 [86]	0.94 [24]	1.36 [35]	1.38 [35]	2.24 [57]
6"	Brass	6.34 [161]	4.57 [116]	0.69 [18]	1.04 [27]	1.44 [37]	1.97 [50]
	SS	6.34 [161]	4.57 [116]	0.69 [18]	1.36 [35]	1.38 [35]	1.97 [50]

2 1/2"



4" & 6"



Standard Ranges

psi Ranges (A)			
All Sizes			
Range Code	Specific Range (psi)	Figure Intervals	Minor Divisions
010	30" Hg to 0	5	0.5
020	30" Hg to 15 psi	10/5	0.5/0.5
030	30" Hg to 30 psi	10/5	1/1
040	30" Hg to 60 psi	10/10	2/1
050	30" Hg to 100 psi	30/20	2/2
060	30" Hg to 150 psi	30/20	5/2
070	30" Hg to 300 psi	30/50	5/5
080	0 to 15 psi	3	0.2
090	0 to 30 psi	5	0.5
100	0 to 60 psi	10	1
110	0 to 100 psi	10	1
120	0 to 160 psi	20	2
130	0 to 200 psi	20	2
140	0 to 300 psi	50	5
150	0 to 400 psi	50	5
160	0 to 600 psi	100	10
Ranges over 600 psi are not available in 700B or 700LFB in 4" or 6" Dial Sizes.			
180	0 to 1000 psi	100	20
190	0 to 1500 psi	300	20
200	0 to 2000 psi	200	20
210	0 to 3000 psi	500	50
220	0 to 5000 psi	1000	100
230	0 to 10,000 psi	2000	200
Ranges over 10,000 psi are ONLY available in 700SS or 700LFSS in 4" or 6" Dial Sizes.			
240	0 to 15,000 psi	2000	200

For dual scale ranges, specify the appropriate **Units of Measure: D (psi/kPa)** followed by the corresponding **A (psi) Range Code**. Other pressure ranges are also available including: Altitude, Ammonia, Refrigerant and Receiver. Consult Special Application Ranges section or factory for availability.

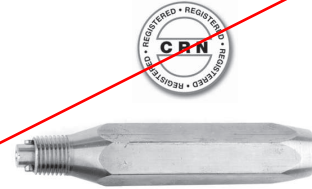
Accessories

PRESSURE GAUGES

OPTIONS & ACCESSORIES

Impulse Dampeners

870 Series Pressure Impulse Dampeners are designed to improve readability and prevent wear on delicate gauge mechanisms by slowing rapid pressure changes and reducing shock and chattering. An impulse dampener should be installed on a gauge in any application where pressure spikes and/or pulsations may be present. Trerice Impulse Dampeners are engineered for field serviceability (cleaning and parts replacement) and are constructed from brass or stainless steel for use on a variety of pressure media.



870 Series Impulse Dampeners

Item No.	Body & Insert Material	Connection Size (NPT)	Maximum Pressure (psig)	Service	Approximate Shipping Weight
870-1	Brass	1/4	1000	Air, water, steam and gases	0.5 lbs [0.23 kg]
870-2	Brass	1/4	1000	Gasoline and light oils	0.5 lbs [0.23 kg]
870-3	Brass	1/4	1000	Lubricating and heavy oils	0.5 lbs [0.23 kg]
870-7	303SS	1/4	5000	Includes 3 pistons for various viscosities	0.5 lbs [0.23 kg]
870-10	303SS	1/2	10,000	Includes 3 pistons for various viscosities	0.8 lbs [0.36 kg]
870-13	316SS	1/4	5000	Includes 3 pistons for various viscosities	0.5 lbs [0.23 kg]
870-16	316SS	1/2	10,000	Includes 3 pistons for various viscosities	0.8 lbs [0.36 kg]

Pressure Snubbers

872 Series Pressure Snubbers are designed to improve readability and prevent wear on delicate gauge mechanisms by slowing rapid pressure changes and reducing shock and chattering. A pressure snubber should be installed on a gauge in any application where pressure spikes and/or pulsations may be present. If a single snubber does not correct the oscillation, it is recommended to place an additional snubber in line with the first. Trerice Pressure Snubbers reduce the pulsation by forcing the pressure medium through a porous metal core and are constructed from brass or 303 stainless steel for use on a variety of pressure media.



872 Series Pressure Snubbers

Item No.	Body & Insert Material	Connection Size (NPT)	Maximum Pressure (psig)	Service	Approximate Shipping Weight
872-1	Brass	1/4	1000	Air and gases	0.1 lbs [0.05 kg]
872-2	Brass	1/4	1000	Water, steam, gasoline and light oils	0.1 lbs [0.05 kg]
872-3	Brass	1/4	1000	Lubricating and heavy oils	0.1 lbs [0.05 kg]
872-4	303SS	1/4	2000	Air and gases	0.3 lbs [0.14 kg]
872-5	303SS	1/4	2000	Water, steam, gasoline and light oils	0.3 lbs [0.14 kg]
872-6	303SS	1/4	2000	Lubricating and heavy oils	0.3 lbs [0.14 kg]
872-7	Brass	1/2	5000	Air and gases	0.1 lbs [0.05 kg]
872-8	Brass	1/2	5000	Water, steam, gasoline and light oils	0.1 lbs [0.05 kg]
872-9	Brass	1/2	5000	Lubricating and heavy oils	0.1 lbs [0.05 kg]
872-10	303SS	1/2	10,000	Air and gases	0.3 lbs [0.14 kg]
872-11	303SS	1/2	10,000	Water, steam, gasoline and light oils	0.3 lbs [0.14 kg]
872-12	303SS	1/2	10,000	Lubricating and heavy oils	0.3 lbs [0.14 kg]

Accessories

PRESSURE GAUGES

OPTIONS & ACCESSORIES

Coil Syphons

885 Series Coil Syphons are designed for use on steam service to form a pocket of water between the pressure gauge and the process steam, thereby preventing the steam from reaching the bourdon tube of the pressure gauge. Trerice Coil Syphons are constructed of steel, brass, or 304 stainless steel with a 180° coil for use on a variety of requirements. Other materials and coil styles are available; consult factory.



885 Series Coil Syphons

Item No.	Material	Style	Connection Size (NPT)	Maximum Pressure (psig)	Maximum Temperature	Approximate Shipping Weight
885-1	Welded steel, schedule 40	180° coil	1/4	600	750°F	0.4 lbs [0.18 kg]
885-1.1	Seamless steel, schedule 40	180° coil	1/2	800	650°F	1.4 lbs [0.64 kg]
885-2	Seamless brass, schedule 40	180° coil	1/4	250	406°F	0.4 lbs [0.18 kg]
885-3	Chrome plated brass, schedule 40	180° coil	1/4	250	406°F	0.4 lbs [0.18 kg]
885-4	Seamless steel 304SS, schedule 40	180° coil	1/4	1300	650°F	0.4 lbs [0.18 kg]
885-4.1	Seamless steel 304SS, schedule 40	180° coil	1/2	1000	650°F	1.4 lbs [0.64 kg]
885-6	Seamless steel 316SS, schedule 40	180° coil	1/4	1300	650°F	0.4 lbs [0.18 kg]
885-6.1	Seamless steel 316SS, schedule 40	180° coil	1/2	1000	650°F	1.4 lbs [0.64 kg]

Needle Valves

735/740 Series Needle Valves are of the rising stem type and are designed to shut off the flow of the process media to the pressure instrument, thereby allowing the instrument to be isolated from the pressure media or removed from service. Needle valves may also be used to throttle flow and aid in dampening pulsations. Trerice Needle Valves are constructed from brass, carbon steel and stainless steel for use on a variety of pressure media. **It is recommended to place a needle valve, ball valve or gauge cock in line before every pressure gauge installation.**



735-2
735-4

735-8
740-3
740-11

735-9
740-4
740-9

735/740 Series Needle Valves

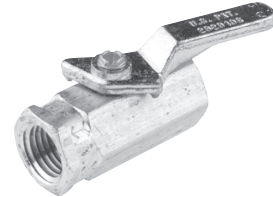
Item No.	Type	Connection Size (NPT)	Body	Seat	Stem	Packing	Maximum Pressure (psig)	Maximum Temperature	Approximate Shipping Weight
735-2	F X F	1/4	Brass	Brass	Brass	Teflon	2000	200°F	0.3 lbs [0.14 kg]
735-4	F X F	1/4	Carbon steel	Teflon	316SS	Teflon	4000	200°F	0.3 lbs [0.14 kg]
735-8	F X F	1/4	316SS	316SS	316SS	Teflon	6000	200°F	0.3 lbs [0.14 kg]
735-9	M X F	1/4	316SS	316SS	316SS	Teflon	6000	200°F	0.3 lbs [0.14 kg]
740-3	F X F	1/2	Carbon steel	Carbon steel	316SS	Teflon	10,000	200°F	1.0 lbs [0.45 kg]
740-4	M X F	1/2	Carbon steel	Carbon steel	316SS	Teflon	10,000	200°F	1.3 lbs [0.59 kg]
740-9	M X F	1/2	316SS	Delrin	316SS	Teflon	6000	200°F	1.3 lbs [0.59 kg]
740-11	F X F	1/2	316SS	316SS	316SS	Teflon	10,000	200°F	1.0 lbs [0.45 kg]

Accessories

PRESSURE GAUGES

Ball Valves

866 Ball Valve is a single entry flow valve, incorporating a Teflon seat to shut off the flow of process media to the pressure instrument, thereby allowing the instrument to be isolated from the pressure media or removed from service. The Trerice 866 Ball Valve is constructed from brass, for use on air, water, oil and other non-corrosive process media. **It is recommended to place a needle valve, ball valve or gauge cock in line before every pressure gauge installation.**



866 Ball Valve

Item No.	Type	Connection Size	Body	Seat	Ball	Handle	Maximum Pressure (psig)	Maximum Temperature	Approximate Shipping Weight
866	FXF	1/4 NPT	Brass	Teflon	Plated brass	Lever	500 psig	180°F	0.1 lbs [0.05 kg]

Gauge Cocks

865/880 Series Quarter Turn Gauge Cocks provide an economical way to shut off the flow of air to the pressure instrument, thereby allowing the instrument to be isolated from the pressure media or removed from service. Trerice Gauge Cocks are constructed from brass and are intended for use on air lines where leakage is not of concern. **It is recommended to place a needle valve, ball valve or gauge cock in line before every pressure gauge installation.**



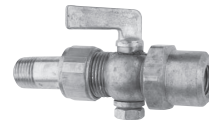
865



865MFG



865-1



880

In applications where process media leakage may result in possible personal injury or property damage, gauge cocks should not be specified as they contain no packing gland and leakage may result. For tight shut-off and prevention of leakage, use of a Trerice Ball Valve or Needle Valve is required.

865/880 Series Gauge Cocks

Item No.	Type	Connection Size	Body	Plug	Maximum Pressure (psig)	Maximum Temperature	Approximate Shipping Weight
865	FXF	1/4 NPT	Brass	Brass	200	500°F	0.1 lbs [0.05 kg]
865MFG	MXF	1/4 NPT	Brass	Brass	200	500°F	0.1 lbs [0.05 kg]
865-1	FXF	1/4 NPT	Brass	Brass	300	500°F	0.3 lbs [0.14 kg]
880	MXF	1/4 Union	Brass	Brass	150	500°F	0.5 lbs [0.23 kg]

Pointer Jack

The **D329 Pointer Jack** is required for removing the pointer of a pressure gauge without causing damage to the dial face, pointer, pointer shaft or movement of the gauge.



Approximate Shipping Weight

0.1 lbs [0.05 kg]

Test Plugs & Accessories

OPTIONS & ACCESSORIES

The **Trerice Test Plug** provides a convenient access port for determining the pressure and/or temperature of process media contained in a pipe line or vessel. The test plug is designed for use in chilled or hot water systems and is permanently installed in the system at the desired test location. A test thermometer or pressure gauge with test adapter can be inserted through the plug to determine the conditions within the system. When the probe is withdrawn, the inner valve plug closes to seal the system. The test plug includes a removable cap to protect the inner valve plug and provide a secondary seal.



Nordel, otherwise known as EPDM, provides excellent service in hot or cold water. **Nordel should not be used with hydrocarbon solvents, hydrocarbon oils, chlorinated hydro carbons or turpentine.**

Neoprene, a synthetic rubber, provides excellent service in ammonia, high aniline point petroleum oils and silicate ester lubricants. **Neoprene should not be used with silicone greases, silicone oils or di-ester based lubricants.**

Test plugs are designed for initial startup and testing, not continuous or frequent use. If continuous or frequent use is desired or expected, a test well should be installed for temperature applications and a needle valve installed for pressure applications.

Tests should be made as quickly as possible because the inner plug resealing time is dependent upon the length of time the probe remains inserted, as well as the temperature and pressure of the system. The test plug may take longer to reseal at lower temperatures or pressures. The probe used for testing should never exceed a diameter of 0.156" (4 mm). The pressure gauge used for testing should always have a range of twice the system pressure.

Test Plugs

Test Plug Item No.	Test Plug with Retainer Item No.	Connection Size (NPT)	Body & Cap	Core	Max Pres. (psig)	Max Temp.	Approximate Shipping Weight
D3741	D3764	1/4	Brass	Nordel	1000	350°F	0.1 lbs [0.05 kg]
D3743	D3763	1/4	Brass	Neoprene	1000	200°F	0.1 lbs [0.05 kg]
D3758	D3766	1/4	316SS	Nordel	1000	350°F	0.1 lbs [0.05 kg]
D3757	D3765	1/4	316SS	Neoprene	1000	200°F	0.1 lbs [0.05 kg]
D3742	D3770	1/2	Brass	Nordel	1000	350°F	0.2 lbs [0.09 kg]
D3744	D3769	1/2	Brass	Neoprene	1000	200°F	0.2 lbs [0.09 kg]
D3762	D3772	1/2	316SS	Nordel	1000	350°F	0.2 lbs [0.09 kg]
D3761	D3771	1/2	316SS	Neoprene	1000	200°F	0.2 lbs [0.09 kg]

Accessories

Item No.	Description	Approx. Shipping Weight
D3747	Gauge Adapter, 1/8" diameter	0.1 lbs [0.05 kg]
D3749	2" Brass Extension, 1/4 NPT	0.1 lbs [0.05 kg]
D3753	2" Brass Extension, 1/2 NPT	0.2 lbs [0.09 kg]

Test Kits

Item No.	Pressure Range (psi)	Approximate Shipping Weight
D3750	0 to 100	1.4 lbs [0.64 kg]
D3751	0 to 200	1.4 lbs [0.64 kg]
D3752	0 to 300	1.4 lbs [0.64 kg]
D3748	0 to 600	1.4 lbs [0.64 kg]

Each test kit contains:
 (1) 700B Pressure Gauge,
 (1) B82105P03F&C Thermometer,
 (1) B82105P05F&C Thermometer,
 (1) D3747 Gauge Adapter,
 (1) Carrying Case

Test Kit Replacement Items

Item No.	Description	Approximate Shipping Weight
700B2502LA110	700B Pressure Gauge, 2 1/2", 1/4 NPT, lower connection, 0 to 100 psi	0.4 lbs [0.18 kg]
700B2502LA130	700B Pressure Gauge, 2 1/2", 1/4 NPT, lower connection, 0 to 200 psi	0.4 lbs [0.18 kg]
700B2502LA140	700B Pressure Gauge, 2 1/2", 1/4 NPT, lower connection, 0 to 300 psi	0.4 lbs [0.18 kg]
700B2502LA160	700B Pressure Gauge, 2 1/2", 1/4 NPT, lower connection, 0 to 600 psi	0.4 lbs [0.18 kg]
B82105P03	B82105 Bimetal Thermometer, 1 3/4" dial size, 5" stem, 25° to 125°F & C	0.4 lbs [0.18 kg]
B82105P05	B82105 Bimetal Thermometer, 1 3/4" dial size, 5" stem, 20° to 240°F & C	0.4 lbs [0.18 kg]

77CLF-A Series

2 Piece Full Port Bronze Ball Valve

LEAD FREE

SUBMITTAL SHEET

"Apollo" Flow Controls



Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO#:	
Rep:	
Wholesale Dist.:	

DESCRIPTION

The Apollo® 77CLF "Contractor Series" Lead Free Ball Valve features a dezincification resistant bronze body, premium RPTFE seats and stem packing and a "Solid Ball" design that delivers true full-port flow performance. Cast and machined in Apollo's South Carolina manufacturing plants using proven EZ-Solder™ Lead Free materials.

FEATURES

- Easily Identifiable White Handle and Blue "Lead Free" Hang Tag
- EZ-Solder™ Lead Free Bronze**
- Lead Free Brass & Bronze Materials
- Blowout-Proof Stem Design
- RPTFE Seats & Seals
- **Manufactured and 100% Factory Tested in USA**

APPROVALS

- MSS SP-110 Compliant
- NSF/ANSI 61 Water Quality
- NSF/ANSI 372 Lead Free
- ANSI 3rd Party Approval to 0.25% Lead Max.
- IAPMO R&T / UPC - IGC Z1157
- City of Los Angeles DBS
- CRN: OC10908.5C

PERFORMANCE RATING

- Maximum Pressure: **600 psi** CWP, 150 psi SWP
- Maximum Temperature: 450°F
- Vacuum Service to 29 in. Hg

OPTIONS

- (-01) Standard Lever and Trim
- (-04) 2 1/4" Stem Extension
- (-07) Tee Handle
- (-10) SS Handle and Nut
- (-11) Therma-Seal™ Insulating Tee
- (-27) Locking Handle
- (-50) 2 1/2" Locking Stem Extension
- (-92) Balancing Stop
- (-94) 2 1/2" Stem Extension and Balancing Stop
- 77CLF140/240 Series - 316 SS Ball and Stem (All sizes including 2-1/2")

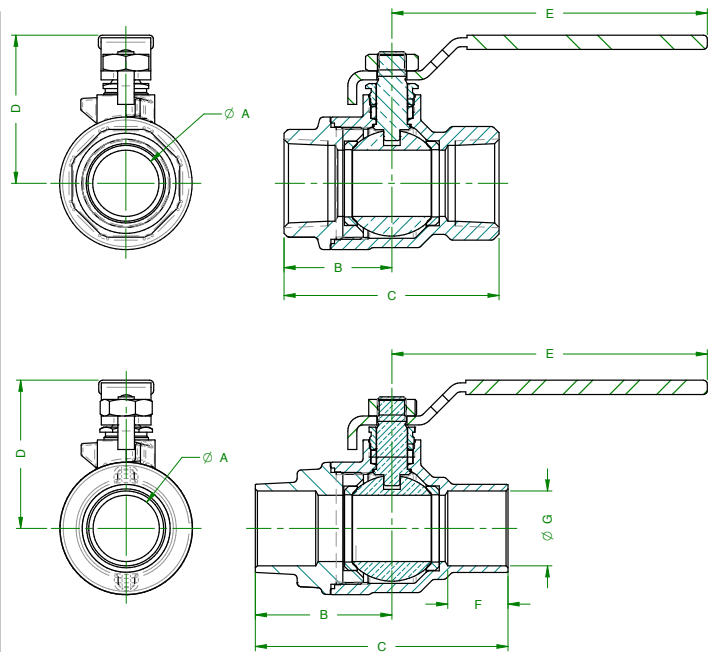
STANDARD MATERIALS LIST

GLAND NUT	ASTM B16 Brass
NUT	Zinc Plated Steel
PACKING	RPTFE
SEATS	RPTFE
STEM	C27451 Lead Free Brass
BALL	C27451 Lead Free Brass Cr. Plated
RETAINER	C27451 Lead Free Brass (1/4" to 1") B584-C89836 Lead Free Bronze (1 1/4" - 2 1/2")
BODY	B584-C89836 Lead Free Bronze
HANDLE	Zinc Plated Steel/Vinyl

**77CLF-2xxA intended for soft solder installation using solders with melting temperature of < 500°F.

DIMENSIONS

PART NO.	SIZE (IN.)	DIMENSIONS (IN.)								C _v	WT. * (LB.)
		A	B	C	D	E	F	G			
NPT											
77CLF-101-01A	1/4"	0.37	0.88	1.8	1.65	2.82	-	-	5	0.6	
77CLF-102-01A	3/8"	0.37	0.94	1.86	1.65	2.82	-	-	7	0.6	
77CLF-103-01A	1/2"	0.50	1.15	2.29	1.79	3.82	-	-	16	0.6	
77CLF-104-01A	3/4"	0.75	1.34	2.67	1.91	3.82	-	-	36	1.0	
77CLF-105-01A	1"	1.00	1.63	3.24	2.24	4.72	-	-	68	1.8	
77CLF-106-01A	1-1/4"	1.25	1.9	3.75	2.46	4.72	-	-	125	4.2	
77CLF-107-01A	1-1/2"	1.50	2.06	4.11	2.9	5.37	-	-	177	4.6	
77CLF-108-01A	2"	2.00	2.43	4.85	3.68	7.72	-	-	389	7.9	
77CLF-109-01A	2-1/2"	2.50	3.03	6.02	4.13	7.72	-	-	503	16.4	
SOLDER											
77CLF-202-01A	3/8"	0.37	1.24	2.17	1.65	2.82	0.41	0.50	7	0.6	
77CLF-203-01A	1/2"	0.50	1.36	2.47	1.79	3.82	0.50	0.63	16	0.6	
77CLF-204-01A	3/4"	0.75	1.73	3.20	1.91	3.82	0.75	0.88	36	1.0	
77CLF-205-01A	1"	1.00	2.06	3.81	2.24	4.72	0.91	1.13	68	1.5	
77CLF-206-01A	1-1/4"	1.25	2.22	4.21	2.46	4.72	0.97	1.38	125	3.9	
77CLF-207-01A	1-1/2"	1.50	2.53	4.90	2.9	5.37	1.09	1.63	177	5.9	
77CLF-208-01A	2"	2.00	3.15	6.07	3.68	7.72	1.34	2.13	389	7.5	
77CLF-209-01A	2-1/2"	2.50	3.78	7.17	4.13	7.72	1.48	2.63	503	14.5	



*WEIGHTS BASED ON STANDARD CONFIGURATION

*LEAD FREE: The wetted surfaces of this product shall contain no more than 0.25% lead by weighted average. Complies with Federal Public Law 111-380. ANSI 3rd party approved and listed.

Pipe Hangers

Manufacturer Substitution

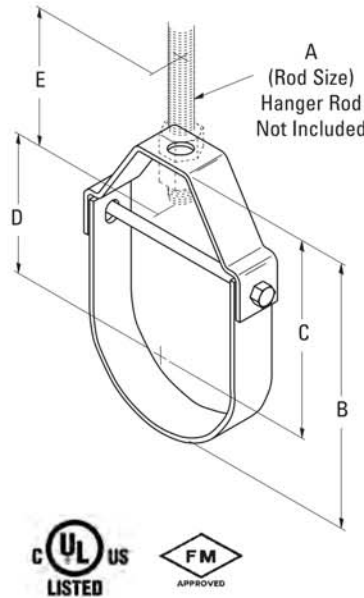
B3100 - Standard Clevis Hanger

SLIDE-RITE™ Clevis Hanger Features

Pipe will not 'pinch' when installing.
 15° swing in either direction allows pipe to easily feed thru.
 Engineered design aligns bolt holes for quicker overhead installation.

*SLIDE-RITE™ Clevis Hanger design, as shown below, for sizes 2, 2 1/2, 3, 4, 5 & 6.

Pat. No. 5,848,770
 5,924,655



Component of State of California OSHPD Approved Seismic Restraints System

- B Bottom of pipe to top of hanger.
- C Center of pipe to top of hanger.
- D Rod Take-Out
Center of pipe to bottom of hanger rod.
- E Minimum thread length of hanger rod
- F Adjustment
Top of cross bolt to bottom of hanger rod nut inside the hanger.



Part No.	Nominal Pipe Size		Rod Size A		B		C		D	
	in.	(mm)	Std	NFPA**	in.	(mm)	in.	(mm)	in.	(mm)
B3100-1/2	1/2"	(15)	3/8"-16	3/8"-16	2 1/8"	(54.0)	1 3/4"	(44.4)	15/16"	(23.8)
B3100-3/4	3/4"	(20)	3/8"-16	3/8"-16	2 1/2"	(63.5)	2"	(50.8)	1 1/8"	(28.6)
B3100-1	1"	(25)	3/8"-16	3/8"-16	2 7/8"	(73.0)	2 1/4"	(57.1)	1 3/8"	(34.9)
B3100-1 1/4	1 1/4"	(32)	3/8"-16	3/8"-16	3 1/2"	(88.9)	2 11/16"	(68.2)	1 13/16"	(46.0)
B3100-1 1/2	1 1/2"	(40)	3/8"-16	3/8"-16	4"	(101.6)	3 1/16"	(77.8)	2 1/4"	(57.1)
B3100-2 *	2"	(50)	3/8"-16	3/8"-16	4 1/2"	(114.3)	3 5/16"	(84.1)	2 1/2"	(63.5)
B3100-2 1/2 *	2 1/2"	(65)	1/2"-13	3/8"-16	5 3/8"	(136.5)	3 15/16"	(100.0)	3 1/16"	(77.8)
B3100-3 *	3"	(80)	1/2"-13	3/8"-16	6 1/2"	(165.1)	4 3/4"	(120.6)	3 15/16"	(100.0)
B3100-3 1/2	3 1/2"	(90)	1/2"-13	3/8"-16	7 1/4"	(184.1)	5 1/4"	(133.3)	4 1/16"	(103.2)
B3100-4 *	4"	(100)	5/8"-11	3/8"-16	7 3/4"	(196.8)	5 1/2"	(139.7)	5 1/2"	(139.7)
B3100-5 *	5"	(125)	5/8"-11	1/2"-13	8 3/4"	(222.2)	6 1/8"	(155.6)	6"	(152.4)
B3100-6 *	6"	(150)	3/4"-10	1/2"-13	10 5/16"	(261.9)	6 15/16"	(176.2)	7"	(177.8)
B3100-8	8"	(200)	3/4"-10	1/2"-13	12 3/4"	(323.8)	8 7/16"	(214.3)	7 1/8"	(181.0)
B3100-10	10"	(250)	7/8"-9	5/8"-11	15 1/8"	(384.2)	9 3/4"	(247.6)	8 3/8"	(212.7)
B3100-12	12"	(300)	7/8"-9	5/8"-11	17 1/2"	(444.5)	11 1/8"	(282.6)	9 11/16"	(246.1)
B3100-14	14"	(350)	1"-8	--	19 3/8"	(492.1)	12 3/8"	(314.3)	10 5/8"	(269.9)
B3100-16	16"	(400)	1"-8	--	21 3/8"	(542.9)	13 3/8"	(339.7)	11 9/16"	(293.7)
B3100-18	18"	(450)	1"-8	--	25"	(635.0)	16"	(406.4)	14 3/16"	(360.3)
B3100-20	20"	(500)	1 1/4"-7	--	28 3/4"	(730.2)	17 3/4"	(450.8)	16 5/8"	(422.3)
B3100-24	24"	(600)	1 1/4"-7	--	32 3/4"	(831.8)	19 3/4"	(501.6)	18 5/8"	(473.1)
B3100-30	30"	(750)	1 1/4"-7	--	39 15/16"	(1014.4)	24 15/16"	(633.4)	22 3/4"	(577.8)
B3100-36	36"	(900)	1 1/4"-7	--	46"	(1168.4)	28"	(711.2)	25"	(635.0)

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

B3100 - Standard Clevis Hanger

Component of State of
California OSHPD Approved
Seismic Restraints System

Size Range: 1/2" (15mm) to 36" (900mm)

Material: Steel

Function: Recommended for the suspension of non-insulated pipe or insulated pipe with a B3151 shield.

Note: When an oversized clevis is used, a pipe spacer should be placed over the cross bolt to assure that the lower U-strap will not move in on the bolt. When attaching seismic bracing to the clevis hangers, a Fig. 1CBS (cross bolt spacer) must be installed. See Seismic Restraints Approval Guidelines.

Order pipe sleeves Fig. 1CBS-(pipe size) separately.

Approvals: Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (OSHPD). For additional load, spacing and placement information relating to OSHPD projects, please refer to the B-Line/TOLCO Seismic Restraint Systems Guidelines. Underwriter's Laboratories Listed in the USA (UL) and Canada (cUL) for sizes 3/4" (20mm) thru 12" (300mm). Factory Mutual Engineering Approved (FM) for 3/4" (20mm) thru 12" (300mm) pipe. Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 1 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 1. Also available to accommodate rod schedule per National Fire Protection Association (NFPA) Pamphlet 13.

Maximum Temperature: 650°F (343°C).

Standard Finish: Plain, Electro-Galvanized, DURA GREEN™, or Hot-Dip Galvanized also available in Stainless Steel



Order By: Part number and finish.

For AWWA - Ductile Iron Clevis Hangers, see B3102, page 52.

Special Note: Do not use the dimensions shown in the B3100 chart for NFPA hanger sizes.

Contact customer service for NFPA rod sizing on 1/2" (15mm) thru 12" (300mm) pipe.
Part numbers will be 1NFPA-pipe size.

Part No.	E		Adjustment F		Design Load		Approx. Wt./100	
	in.	(mm)	in.	(mm)	Lbs.	(kN)	Lbs.	(kg)
B3100-1/2	2 1/2"	(63.5)	7/16"	(11.1)	730	(3.25)	25	(11.3)
B3100-3/4	2 1/2"	(63.5)	1/2"	(12.7)	730	(3.25)	29	(13.1)
B3100-1	2 1/2"	(63.5)	5/8"	(15.9)	730	(3.25)	35	(15.9)
B3100-1 1/4	2 1/2"	(63.5)	7/8"	(22.2)	730	(3.25)	40	(18.1)
B3100-1 1/2	2 1/2"	(63.5)	1 3/16"	(30.2)	730	(3.25)	42	(19.0)
B3100-2 *	2 1/2"	(63.5)	1 5/8"	(41.3)	730	(3.25)	52	(23.6)
B3100-2 1/2 *	2 1/2"	(63.5)	2"	(50.8)	1350	(6.00)	90	(40.8)
B3100-3 *	2 1/2"	(63.5)	2"	(50.8)	1350	(6.00)	110	(49.9)
B3100-3 1/2	2 1/2"	(63.5)	2"	(50.8)	1350	(6.00)	142	(64.4)
B3100-4 *	2 1/2"	(63.5)	2"	(50.8)	1430	(6.36)	132	(59.9)
B3100-5 *	2 1/2"	(63.5)	2"	(50.8)	1430	(6.36)	215	(97.5)
B3100-6 *	3"	(76.2)	2"	(50.8)	1940	(8.63)	320	(145.1)
B3100-8	3 1/2"	(88.9)	2 5/16"	(58.7)	2000	(8.89)	485	(220.0)
B3100-10	3 1/2"	(88.9)	2 5/16"	(58.7)	3600	(16.01)	846	(383.7)
B3100-12	3 1/2"	(88.9)	2 5/8"	(66.7)	3800	(16.90)	1083	(491.2)
B3100-14	4"	(101.6)	2 7/8"	(73.0)	4200	(18.68)	1432	(649.5)
B3100-16	4"	(101.6)	2 11/16"	(68.3)	4600	(20.46)	2200	(997.9)
B3100-18	4 1/2"	(114.3)	3 15/16"	(100.0)	4800	(21.35)	2500	(1134.0)
B3100-20	5"	(127.0)	5 3/8"	(136.5)	4800	(21.35)	4400	(1995.8)
B3100-24	5"	(127.0)	5 3/8"	(136.5)	4800	(21.35)	5000	(2268.0)
B3100-30	5"	(127.0)	6 1/4"	(158.7)	6000	(26.69)	6600	(2993.7)
B3100-36	5"	(127.0)	5 7/16"	(138.1)	6000	(26.69)	8474	(3843.8)

*SLIDE-RITE™ Clevis Hanger design, as shown above, for sizes 2, 2 1/2, 3, 4, 5 & 6.

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

B3170CT - Adjustable Swivel Hanger for Copper Tubing

B3170CTC - Adjustable Swivel Hanger for Copper Tubing - Plastic Coated

Size Range: 1/2" (15mm) thru 6" (150mm) copper tubing

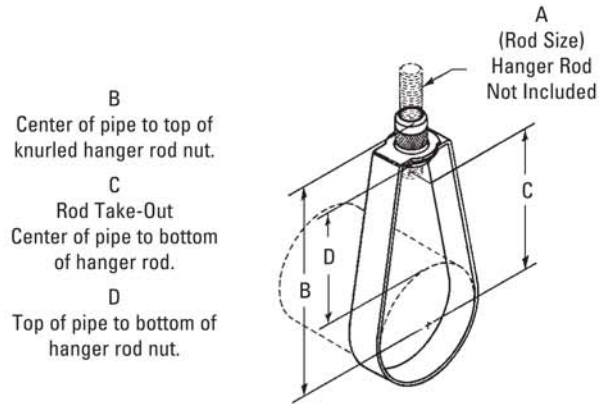
Material: Steel

Function: Recommended for the suspension of copper tubing, allowing for vertical adjustment. (Available with plastic coating to provide additional separation between tubing and hanger.)

Approvals: Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 10 and Manufacturers Standardization Society ANSI **MSS** SP-69 & SP-58, **Type 10**

Standard Finish: DURA-COPPER™

Order By: Part number and finish.



Part No.	Nominal Pipe Size	Rod Size A	B		C		D	
			in.	(mm)	in.	(mm)	in.	(mm)
B3170CT-1/2	1/2" (15)	3/8"-16	2 1/16"	(52.4)	1 1/8"	(28.6)	3 1/32"	(24.6)
B3170CT-3/4	3/4" (20)	3/8"-16	2 5/16"	(58.7)	1 5/16"	(33.3)	1 1/32"	(26.2)
B3170CT-1	1" (25)	3/8"-16	2 1/2"	(63.5)	1 9/16"	(39.7)	1 5/32"	(29.3)
B3170CT-1 1/4	1 1/4" (32)	3/8"-16	2 1/2"	(63.5)	1 9/16"	(39.7)	1"	(25.4)
B3170CT-1 1/2	1 1/2" (40)	3/8"-16	2 15/16"	(74.6)	2"	(50.8)	1 5/16"	(33.3)
B3170CT-2	2" (50)	3/8"-16	3 1/8"	(79.4)	2 1/8"	(54.0)	1 3/16"	(30.2)
B3170CT-2 1/2	2 1/2" (65)	1/2"-13	4 1/16"	(103.2)	2 9/16"	(65.1)	1 3/8"	(34.9)
B3170CT-3	3" (75)	1/2"-13	3 15/16"	(100.0)	3 3/4"	(95.2)	1 1/4"	(31.7)
B3170CT-3 1/2	3 1/2" (90)	1/2"-13	4 7/16"	(112.7)	3 1/4"	(82.5)	1 1/2"	(38.1)
B3170CT-4	4" (100)	1/2"-13	4 11/16"	(119.1)	3 9/16"	(89.6)	1 9/16"	(39.7)
B3170CT-5	5" (125)	1/2"-13	5 15/16"	(150.8)	4 5/16"	(109.5)	1 25/32"	(45.2)
B3170CT-6	6" (150)	1/2"-13	6 11/16"	(169.9)	5 3/16"	(131.8)	2 1/8"	(54.0)

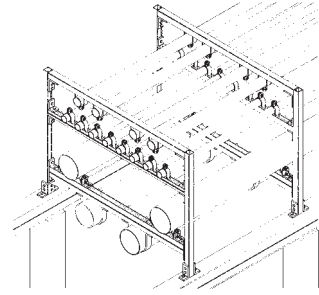
Part No.	Max. Rec. Load		Approx. Wt./100	
	lbs.	(kN)	lbs.	(kg)
B3170CT-1/2	180	(0.80)	8	(6.6)
B3170CT-3/4	180	(0.80)	10	(4.5)
B3170CT-1	180	(0.80)	10	(4.5)
B3170CT-1 1/4	180	(0.80)	12	(5.4)
B3170CT-1 1/2	180	(0.80)	12	(5.4)
B3170CT-2	180	(0.80)	12	(5.4)
B3170CT-2 1/2	200	(0.89)	31	(24.0)
B3170CT-3	250	(1.11)	33	(14.9)
B3170CT-3 1/2	300	(1.33)	39	(17.2)
B3170CT-4	360	(1.60)	40	(18.1)
B3170CT-5	480	(2.13)	95	(43.1)
B3170CT-6	630	(2.80)	118	(53.5)



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








Strut Systems

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

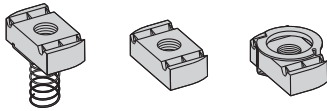


Strut Systems Information

SELECTION CHART for Channels, Materials and Hole Patterns

Channel	Channel Dimensions		Material & Thickness				Channel Hole Pattern				
	Height 	Width 	Steel 1	Alum. 2	Stainless Steel		SH 	S 	H17/8 	TH 	KO6 
					Type 304 3	Type 316 4					
B11	3 1/4" (82.5)	1 5/8" (41.3)	12 Ga.	--	--	--	1	1	1	--	1
B12	2 7/16" (61.9)	1 5/8" (41.3)	12 Ga.	.105	--	--	1 2	1	1 2	--	1 2
B22	1 5/8" (41.3)	1 5/8" (41.3)	12 Ga.	.105	12 Ga.	12 Ga.	1 2 3 4	1	1 2 3 4	1	1 2
B24	1 5/8" (41.3)	1 5/8" (41.3)	14 Ga.	.080	14 Ga.	14 Ga.	1 2 3 4	1	1 2 3 4	--	1 2
B26	1 5/8" (41.3)	1 5/8" (41.3)	16 Ga.	--	--	--	1	1	1	--	1
B32	1 3/8" (34.9)	1 5/8" (41.3)	12 Ga.	--	12 Ga.	--	1 3	1	1 3	--	1
B42	1" (25.4)	1 5/8" (41.3)	12 Ga.	--	12 Ga.	--	1 3	1	1 3	--	1
B52	1 3/16" (20.6)	1 5/8" (41.3)	12 Ga.	--	--	--	1	1	1	--	1
B54	1 3/16" (20.6)	1 5/8" (41.3)	14 Ga.	.080	14 Ga.	14 Ga.	1 2 3 4	1	1 2 3 4	--	1 2
B56	1 3/16" (20.6)	1 5/8" (41.3)	16 Ga.	--	--	--	1	1	1	--	1

Channel Nuts



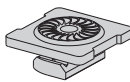
Size and Part Number

Thread Size	With Spring	Without Spring	Twirl Nut
1/4"-20	N224	N224WO	TN224
3/8"-16	N228	N228WO	TN228
1/2"-13	N225	N225WO	TN225
5/8"-11	N255	N255WO	--
3/4"-10	N275	N275WO	--

Available Finishes: Electro-Galvanized

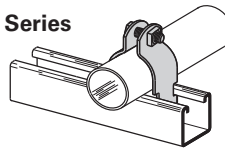
Combo Nut Washers

Part Number	Thread Size
NW524	1/4"-20
NW528	3/8"-16
NW525	1/2"-13



Available Finishes: Electro-Galvanized

B2000 Series



Copper Tubing Clamps DURA-COPPER™

Part No.	Nominal Tubing Size	Mat'l Ga.
B2026DCU	1/2" (15)	16
B2008DCU	3/4" (20)	16
B2030DCU	1" (25)	14
B2032DCU	1 1/4" (32)	14
B2011DCU	1 1/2" (40)	14
B2038DCU	2" (50)	12
B2042DCU	2 1/2" (60)	12
B2046DCU	3" (80)	12
B2050DCU	3 1/2" (90)	12
B2054DCU	4" (100)	11

Available Finishes: Electro-Galvanized, Aluminum, Stainless, DURA-COPPER Painted, Hot-Dip Galvanized and PVC coated.

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

** Add "PA" to Part No. for Pre-assembled

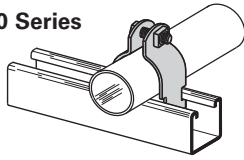
Schedule 40 Pipe Clamps

Part No.	Nominal Pipe Size	Mat'l Ga.
B2001	3/8" (10)	16
B2008	1/2" (15)	16
B2009	3/4" (20)	14
B2010	1" (25)	14
B2011	1 1/4" (32)	14
B2012	1 1/2" (40)	12
B2013	2" (50)	12
B2014	2 1/2" (60)	12
B2015	3" (80)	12
B2016	3 1/2" (90)	11
B2017	4" (100)	11
B2018	4 1/2" (115)	11
B2019	5" (125)	11
B2020	6" (150)	11
B2021	7" (175)	11
B2022	8" (200)	11

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

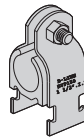
Below are some basic clamp and cushions to be used with a strut system. For the industry's most complete line of strut and strut fittings, refer to B-Line series Strut Systems catalog.

B2000 Series



O.D. Pipe Clamps

Part No.	O.D. Size (Outside Dia.)	Mat'l Ga.
B2023	1/4" (6.3)	16
B2024	3/8" (9.5)	16
B2025	1/2" (12.7)	16
B2026	5/8" (15.9)	16
B2027	3/4" (19.0)	16
B2028	7/8" (22.2)	16
B2029	1" (25.4)	14
B2030	1 1/8" (28.6)	14
B2031	1 1/4" (31.7)	14
B2032	1 3/8" (34.9)	14
B2004	1 1/2" (38.1)	14
B2011	1 5/8" (41.3)	14
B2005	1 3/4" (44.4)	12
B2036	1 7/8" (47.6)	12
B2037	2" (50.8)	12
B2038	2 1/8" (54.0)	12
B2039	2 1/4" (57.1)	12
B2013	2 3/8" (60.3)	12
B2041	2 1/2" (63.5)	12
B2042	2 5/8" (66.7)	12
B2043	2 3/4" (69.8)	12
B2014	2 7/8" (73.0)	12
B2045	3" (76.2)	12
B2046	3 1/8" (79.4)	12
B2047	3 1/4" (82.5)	12
B2048	3 3/8" (85.7)	12
B2015	3 1/2" (88.9)	12
B2050	3 5/8" (92.1)	11
B2051	3 3/4" (95.2)	11
B2016	4" (101.6)	11
B2054	4 1/8" (104.8)	11
B2055	4 1/4" (107.9)	11
B2056	4 3/8" (111.1)	11
B2017	4 1/2" (114.3)	11
B2058	4 5/8" (117.5)	11
B2059	4 3/4" (120.6)	11
B2060	4 7/8" (123.8)	11
B2061	5" (127.0)	11
B2062	5 1/8" (130.2)	11
B2063	5 1/4" (133.3)	11
B2064	5 3/8" (136.5)	11
B2065	5 1/2" (139.7)	11



BVT & BVP Series Vibra-Clamp™

For Copper Tubing & OD Sizes

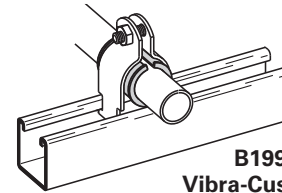
Catalog No.	Copper & Steel OD Tubing Size	Nominal Copper Size
BVT025	1/4" (6.3)	—
BVT037	3/8" (9.5)	1/4" (6)
BVT050	1/2" (12.7)	3/8" (10)
BVT062	5/8" (15.9)	1/2" (15)
BVT075	3/4" (19.0)	5/8" (17)
BVT087	7/8" (22.2)	3/4" (20)
BVT100	1" (25.4)	—
BVT112	1 1/8" (28.6)	1" (25)
BVT125	1 1/4" (31.7)	—
BVT137	1 3/8" (34.9)	1 1/4" (32)
BVT150	1 1/2" (38.1)	—
BVT162	1 5/8" (41.3)	1 1/2" (40)
BVT175	1 3/4" (44.4)	—
BVT187	1 7/8" (47.6)	—
BVT200	2" (50.8)	—
BVT212	2 1/8" (54.0)	2" (50)
BVT225	2 1/4" (57.1)	—
BVT250	2 1/2" (63.5)	—
BVT262	2 5/8" (66.7)	2 1/2" (65)
BVT300	3" (76.2)	—
BVT312	3 1/8" (79.4)	3" (80)
BVT362	3 5/8" (92.1)	3 1/2" (90)
BVT400	4" (101.6)	—
BVT412	4 1/8" (104.8)	4" (100)
BVT612	6 1/8" (155.6)	6" (150)

Available for tubing and pipe sizes 1/4" to 6", OD sizes 1/4" to 6 5/8". Easy one tool installation, dampens vibration and noise, secures tubing firmly, and protects against galvanic reaction.

Stainless Steel available

For Pipe Sizes

Catalog No.	Nominal Pipe Size
BVP025	1/4" (6)
BVP037	3/8" (10)
BVP050	1/2" (15)
BVP075	3/4" (20)
BVP100	1" (25)
BVP125	1 1/4" (32)
BVP150	1 1/2" (40)
BVP200	2" (50)
BVP250	2 1/2" (65)
BVP300	3" (80)
BVP350	3 1/2" (90)
BVP400	4" (100)
BVP500	5" (125)
BVP600	6" (150)



B1999 Vibra-Cushion™

- Inhibits Galvanic Reaction
- Reduces Sound & Vibration
- Used on refrigeration, HVAC, copper tubing, glass pipes & hydraulic lines Available in 20 Ft. rolls.

For Rigid Conduit or Iron Pipe

Nominal Size	Length of Vibra-Cushion	Use Clamp No.
3/8" (10)	2 1/8" (54.0)	B2002
1/2" (15)	2 5/8" (66.7)	B2009
3/4" (20)	3 1/4" (82.5)	B2031
1" (25)	4 1/8" (104.8)	B2004
1 1/4" (32)	5 3/16" (131.8)	B2012
1 1/2" (40)	5 5/16" (150.8)	B2038
2" (50)	7 1/2" (190.5)	B2042
2 1/2" (65)	9" (228.6)	B2046
3" (80)	11" (279.4)	B2051
3 1/2" (90)	12 1/2" (317.5)	B2055
4" (100)	14 1/2" (368.3)	B2059
5" (125)	17 7/16" (442.9)	B2067
6" (150)	20 3/4" (527.0)	B2116

For Thinwall (EMT) Conduit

Nominal Size	Length of Vibra-Cushion	Use Clamp No.
3/8" (10)	1 13/16" (46.0)	B2027
1/2" (15)	2 3/16" (58.7)	B2002
3/4" (20)	2 7/8" (73.0)	B2003
1" (25)	3 5/8" (92.1)	B2032
1 1/4" (32)	4 3/8" (120.6)	B2036
1 1/2" (40)	5 7/16" (138.1)	B2012
2" (50)	6 7/8" (174.6)	B2013

For Thinwall (EMT) Conduit

Nominal Size	Length of Vibra-Cushion	Use Clamp No.
1/4" (6)	1 3/16" (30.2)	B2026
3/8" (10)	1 9/16" (39.7)	B2027
1/2" (15)	1 7/8" (47.6)	B2028
5/8" (17)	2 5/16" (58.7)	B2029
3/4" (20)	2 3/4" (69.8)	B2030
1" (25)	3 1/2" (88.9)	B2032
1 1/4" (32)	4 5/16" (109.5)	B2011
1 1/2" (40)	5 1/8" (130.2)	B2036
2" (50)	6 1/16" (169.9)	B2013
2 1/2" (65)	8 1/4" (209.5)	B2014
3" (80)	9 13/16" (249.2)	B2048
3 1/2" (90)	11 3/8" (288.9)	B2052
4" (100)	12 15/16" (328.6)	B2056
5" (125)	16 1/8" (409.6)	B2064
6" (150)	19 1/4" (488.9)	B2112
8" (200)	25 1/2" (647.7)	B2128

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

B3373 - Standard Riser Clamp

B3373F - Felt Lined Standard Riser Clamp for Copper Tubing

B3373C - PVC Coated Standard Riser Clamp

Size Range: (B3373) 1/2" (15mm) thru 30" (760mm) pipe
 (B3373F) 1/2" (15mm) thru 2 1/2" (65mm) copper tubing
 (B3373C) 1/2" (15mm) thru 6" (150mm) pipe

Material: Steel

Insulation Material: (B3373F) 1/8" (3.2mm) thick felt.

Function: Used for supporting vertical piping.

Approvals: Underwriters Laboratories Listed in the USA (**UL**), Canada (**cUL**)
 3/4" (20mm) - 8" (200mm).

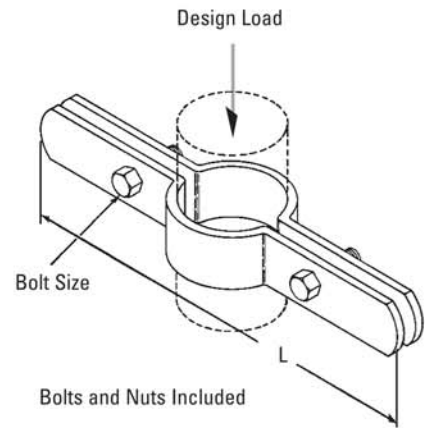
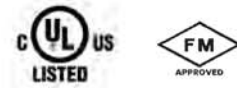
Factory Mutual Engineering Approved (**FM**) for plain and electro-Galvanized zinc,
 3/4" (20mm) thru 8" (200mm). Conforms to Federal Specification WW-H-171E &
 A-A-1192A, Type 8 and Manufacturers Standardization Society ANSI **MSS** SP-69 &
 SP-58, **Type 8**

Maximum Temperature: 650°F (343°C)

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

Order By:

(B3373 and B3373C) pipe size and finish.
 B3373F is available for Iron Pipe Size, consult factory.



Part No.	Pipe Size		L		Bolt Size	Design Load		Approx. Wt./100	
	in.	(mm)	in.	(mm)		Lbs.	(kN)	Lbs.	(kg)
B3373-1/2	1/2"	(15)	9"	(228.6)	3/8"-16 x 1 1/4"	255	(1.13)	101	(45.9)
B3373-3/4	3/4"	(20)	9 1/4"	(234.9)	3/8"-16 x 1 1/4"	255	(1.13)	105	(47.7)
B3373-1	1"	(25)	9 9/16"	(242.9)	3/8"-16 x 1 1/4"	255	(1.13)	109	(49.4)
B3373-1 1/4	1 1/4"	(32)	10"	(254.0)	3/8"-16 x 1 1/4"	255	(1.13)	112	(50.9)
B3373-1 1/2	1 1/2"	(40)	10 1/4"	(260.3)	3/8"-16 x 1 1/2"	255	(1.13)	113	(51.1)
B3373-2	2"	(50)	10 3/4"	(273.0)	3/8"-16 x 1 1/2"	255	(1.13)	165	(75.0)
B3373-2 1/2	2 1/2"	(65)	11 1/4"	(285.7)	3/8"-16 x 1 1/2"	390	(1.73)	180	(81.6)
B3373-3	3"	(80)	11 15/16"	(303.2)	3/8"-16 x 1 1/2"	530	(2.35)	195	(88.4)
B3373-3 1/2	3 1/2"	(90)	12 3/8"	(314.3)	1/2"-13 x 1 3/4"	670	(2.98)	217	(98.5)
B3373-4	4"	(100)	12 7/8"	(327.0)	1/2"-13 x 1 3/4"	810	(3.60)	228	(103.5)
B3373-5	5"	(125)	14"	(355.6)	1/2"-13 x 1 3/4"	1160	(5.16)	480	(217.7)
B3373-6	6"	(150)	15 3/16"	(385.8)	1/2"-13 x 2"	1570	(6.98)	526	(238.6)
B3373-8	8"	(200)	17 3/4"	(450.8)	5/8"-11 x 2 1/2"	2500	(11.12)	957	(434.1)
B3373-10	10"	(250)	19 7/16"	(493.7)	5/8"-11 x 2 1/2"	2500	(11.12)	1101	(499.4)
B3373-12	12"	(300)	21 11/16"	(550.9)	5/8"-11 x 3"	2700	(12.01)	1622	(735.7)
B3373-14	14"	(350)	23 9/16"	(598.5)	5/8"-11 x 3"	2700	(12.01)	1732	(785.6)
B3373-16	16"	(400)	26 3/8"	(669.9)	3/4"-10 x 3 1/4"	2900	(12.90)	2959	(1342.2)
B3373-18	18"	(450)	28 7/8"	(733.4)	3/4"-10 x 3 1/4"	2900	(12.90)	3235	(1467.4)
B3373-20	20"	(500)	30 7/8"	(784.2)	3/4"-10 x 3 1/2"	2900	(12.90)	3568	(1618.4)
B3373-24	24"	(600)	34 7/8"	(885.8)	3/4"-10 x 3 1/2"	2900	(12.90)	4064	(1843.3)
B3373-30	30"	(750)	40 3/4"	(1035.0)	7/8"-9 x 3 1/2"	2900	(12.90)	6016	(2728.8)

Notes: For ductile iron (D.I.) pipe use part number B3373DI-pipe size. Contact B-Line Engineering for more information.

Pipe Clamps

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

B3205 - Threaded Rod (right-hand threads - both ends)
B3205L - Threaded Rod (right & left hand threads)

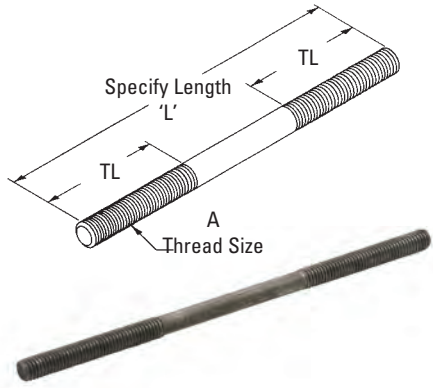
Size Range: 3/8"-16 thru 3"-4 rod
Material: Steel

Function: Recommended for use as a hanger support in hanger assemblies. Rod is threaded on both ends with right hand threads of the length shown. Also available with left and right hand threads - specify Fig. B3205L when ordering.

Maximum Temperature: 750°F (399°C)

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

Order By: Part number, rod size, length and finish



Part No.	Thread Size A	Standard Thread Length TL in. (mm)	Design Load	
			650°F (343°C) Lbs. (kN)	750°F (399°C) Lbs. (kN)
B3205-3/8 x 'L'	3/8"-16	2 1/2" (63.5)	730 (3.25)	572 (2.54)
B3205-1/2 x 'L'	1/2"-13	2 1/2" (63.5)	1350 (6.00)	1057 (4.70)
B3205-5/8 x 'L'	5/8"-11	2 1/2" (63.5)	2160 (9.61)	1692 (7.52)
B3205-3/4 x 'L'	3/4"-10	3" (76.2)	3230 (14.37)	2530 (11.25)
B3205-7/8 x 'L'	7/8"-9	3 1/2" (88.9)	4480 (19.93)	3508 (15.60)
B3205-1 x 'L'	1"-8	4" (101.6)	5900 (26.24)	4620 (20.55)
B3205-1 1/8 x 'L'	1 1/8"-7	4 1/2" (114.3)	7450 (33.14)	5830 (25.93)
B3205-1 1/4 x 'L'	1 1/4"-7	5" (127.0)	9500 (42.25)	7440 (33.09)
B3205-1 1/2 x 'L'	1 1/2"-6	6" (152.4)	13800 (61.38)	10807 (48.07)
B3205-1 3/4 x 'L'	1 3/4"-5	7" (177.8)	18600 (82.73)	14566 (64.79)
B3205-2 x 'L'	2"-4 1/2	8" (203.2)	24600 (109.42)	19625 (87.29)
B3205-2 1/4 x 'L'	2 1/4"-4 1/2	9" (228.6)	32300 (143.67)	25295 (112.51)
B3205-2 1/2 x 'L'	2 1/2"-4	10" (254.0)	39800 (177.03)	31169 (138.64)
B3205-2 3/4 x 'L'	2 3/4"-4	11" (279.4)	49400 (219.73)	38687 (172.08)
B3205-3 x 'L'	3"-4	12" (304.8)	60100 (267.32)	47066 (209.35)

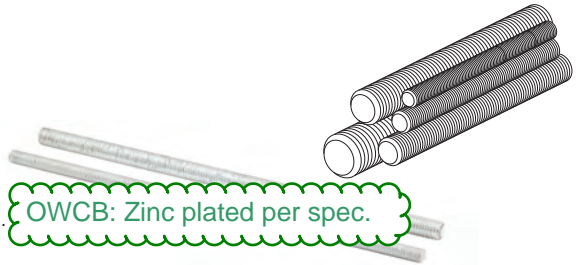
ATR - All Threaded Rod 120" (3.05m) Lengths
Fig. 99 - All Threaded Rod Cut To Length

Size Range: 3/8"-16 thru 1 1/2"-6 rod in 120" (3.05m) lengths or cut to length
Material: Steel

Maximum Temperature: 750°F (399°C)

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

Order By: Part number, rod diameter and finish



Part No. - Size x Length ATR	Fig.99	Threads Per Inch	Recommended Load		Approx. Wt./100 Ft.	
			Lbs.	(kN)	Lbs.	(kg)
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)
ATR 1" x 120	99-1" x length	8	5900	(26.24)	225	(102.06)
ATR 1 1/8" x 120	99-1 1/8" x length	7	7450	(33.14)	280	(127.01)
ATR 1 1/4" x 120	99-1 1/4" x length	7	9500	(42.25)	351	(159.21)
ATR 1 1/2" x 120	99-1 1/2" x length	6	13800	(61.38)	510	(231.33)

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



Manufacturer Substitution

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 16.1.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.

US: <http://submittals.us.hilti.com/PTGVol2/>

CA: <http://submittals.us.hilti.com/PTGVol2CA/>

To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.

US: 877-749-6337 or HNATechnicalServices@hilti.com

CA: 1-800-363-4458, ext. 6 or CATechnicalServices@hilti.com

HDI-P Drop-in Anchor 3.3.12

3.3.12.1 Product description

The HDI-P drop-in anchor is an internally threaded, flush mounted expansion anchor for solid and hollow concrete.

- Setting tool leaves mark on flange when anchor is set properly to enable inspection and verification of proper expansion

Product features

- Optimized anchor length to allow reliable fastenings in hollow core panels, precast plank and post tensioned slabs
- Shallow drilling enables fast installation
- Lip provides flush installation, consistent anchor depth and easy rod alignment

Guide specifications

Expansion anchor shall be flush or shell type and zinc plated in accordance with ASTM B633, SC 1, Type III. Anchors shall be Hilti HDI-P anchors as supplied by Hilti.

Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors in accordance with manufacturer's instructions.

3.3.12.1 Product description

3.3.12.2 Material specifications

3.3.12.3 Technical data

3.3.12.4 Installation instructions

3.3.12.5 Ordering information



Listings/Approvals

FM (Factory Mutual) for 3/8-in. model



3.3.12.2 Material specifications

The HDI-P is manufactured from mild carbon steel, which is zinc plated for corrosion protection in accordance with ASTM B633, SC 1, Type III.

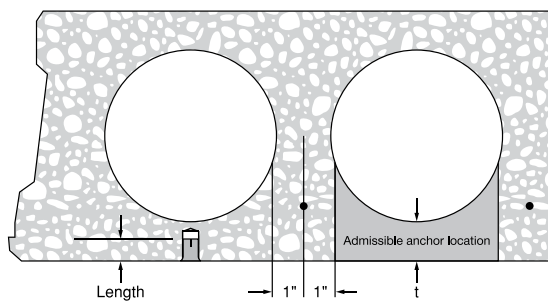
3.3.12.3 Technical data

Table 1 - Hilti HDI-P loads in normal-weight concrete and hollow core concrete panels

Nominal anchor diameter	Length in. (mm)	Nom. bit dia. in.	Ultimate loads, lb (kN)				Allowable loads, lb (kN) ³			
			$f'_c = 4,000$ psi concrete		Hollow core ^{1,2}		$f'_c = 4,000$ psi concrete		Hollow core ^{1,2}	
			Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
1/4	5/8 (15.9)	3/8	1,430 (6.4)	1,870 (8.3)	1,550 (6.9)	2,275 (10.1)	285 (1.3)	375 (1.7)	310 (1.4)	455 (2.0)
3/8	3/4 (19.1)	1/2	1,900 (8.5)	3,000 (13.3)	2,100 (9.3)	4,000 (17.8)	380 (1.7)	600 (2.7)	420 (1.9)	800 (3.6)
1/2	1 (25.4)	5/8	3,000 (13.3)	6,075 (27.0)	3,110 (13.8)	5,495 (24.5)	600 (2.7)	1215 (5.4)	620 (2.8)	1,100 (4.9)

- The Admissible Anchor Location must be established to prevent damage to the prestressed cable during the drilling process. Verify the location and height of the cable with the hollow core plank supplier to confirm Admissible Anchor Location.
- Minimum compressive strength of hollow core panels is 7,000 psi at the time of installation. The minimum thickness "t" is 1-3/8 inches.
- Allowable loads calculated with a 5:1 factor-of-safety.

Figure 1 - Installation of Hilti HDI-P in hollow core concrete



3.3.12.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.us.hilti.com (US) and www.hilti.ca (Canada). Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

3.3.12.5 Ordering information

HDI-P anchor

Description	Bit diameter	Qty / box
HDI-P 1/4	3/8	100
HDI-P 3/8	1/2	100
HDI-P 1/2	5/8	50

Setting tools for HDI-P anchors

Description
HST-P 1/4 Hand Setting Tool
HST-P 3/8 Hand Setting Tool
HSD-G 3/8 Hand Setting Tool with hand guard
HST-P 1/2 Hand Setting Tool

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 16.1.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.

US: <http://submittals.us.hilti.com/PTGVol2/>

CA: <http://submittals.us.hilti.com/PTGVol2CA/>

To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.

US: 877-749-6337 or HNATechnicalServices@hilti.com

CA: 1-800-363-4458, ext. 6 or CATechnicalServices@hilti.com

3.3.13 HCI-WF/MD Cast-in Anchor

3.3.13.1 Product description

3.3.13.2 Material specifications

3.3.13.3 Technical data

3.3.13.4 Installation instructions

3.3.13.5 Ordering information



HCI-WF



HCI-MD

Listings/Approvals

ICC-ES (International Code Council)
ESR-3713

FM (Factory Mutual)
Pipe Hanger Components for Automatic
Sprinkler Systems 3/8 through 3/4

UL LLC
UL 203 Pipe Hanger Equipment for Fire
Protection Services 3/8 through 3/4



3.3.13.1 Product description

HCI-WF/MD cast-in anchors are internally threaded cast-in anchor suitable for use with either wood (WF) or metal deck (MD) form work. The HCI-WF and HCI-MD are ideally suited for a variety of rod hanging applications and offers significant time savings over traditional post-installed anchor solutions.

Product features

- Installation performed on top of the formwork. No overhead drilling. No scissor lift rental
- Hexagonal head prevents spinning in concrete
- Anchor bodies are color coded for quick identification
- HCI-WF have large plastic flanges for secure seating to wood form. This prevents concrete seepage into the threading.
- HCI-WF have notched nails that snap off easily at the concrete surface after the wood forms are stripped.
- HCI-MD have a protective plastic sleeve that helps to prevent concrete, sprayed-on firestop or sprayed-on insulation from fouling the threading.
- HCI-MD have a robust spring that seats the anchor reliably.

Guide specifications

HCI-WF: Concrete anchor shall be carbon steel, cast-in type with single internal thread and a zinc/yellow chromate plating and contained by a plastic flange. Anchor shall have break-off nails for attachment to the surface of wood forms. Anchor will bear the diameter and manufacturer name on its hexagon head. Anchors shall be HCI-WF as supplied by Hilti.

HCI-MD: Concrete anchor shall be carbon steel, cast-in type with single internal thread and a zinc/yellow chromate plating. Anchor shall have a protective plastic sleeve, steel flange with predrilled additional fastening holes and placement spring for attachment to metal deck, anchor is to be secured by clamping the deck between the steel flange and the protective plastic sleeve. Anchor shall bear the diameter and manufacturer name on its hexagon head. Anchors shall be HCI-MD as supplied by Hilti.

HCI-WF/MD Cast-in Anchor 3.3.13

3.3.13.2 Material specifications

Component	HCI-WF	HCI-MD
Insert body	Heat treated carbon steel	Heat treated carbon steel
Flange	Engineered plastic	Heat treated carbon steel
Spring	N/A	Carbon steel wire
Plating	Zinc – yellow chromate	Zinc – yellow chromate
Protective sleeve	N/A	Engineered plastic

3.3.13.3 Technical data

Table 1 - Hilti HCI-MD specification table

Setting information	Symbol	Units	Nominal anchor diameter			
			3/8	1/2	5/8	3/4
Insert thread	d	UNC	3/8-16	1/2-13	5/8-11	3/4-10
Metal hole saw diameter	d_{bit}	in.	7/8	1-3/16	1-3/16	1-1/4
Height of assembled spring	h_s	in. (mm)	1-7/8 (48)	1-7/8 (48)	1-7/8 (48)	1-7/8 (48)
Minimum thread engagement	ℓ_{th}	in. (mm)	3/8 (10)	1/2 (13)	5/8 (16)	3/4 (20)
Sleeve length	ℓ_{sl}	in. (mm)	3-3/8 (86)	3-3/8 (86)	3-3/8 (86)	3-3/8 (86)
Length	ℓ	in. (mm)	5-7/16 (138)	5-7/16 (138)	5-7/16 (138)	5-7/16 (138)
Steel head thickness	t_{sh}	in. (mm)	1/8 (3.2)	1/8 (3.2)	1/8 (3.2)	1/8 (3.2)
Steel flange thickness	t_{sf}	in. (mm)	5/64 (2.0)	5/64 (2.0)	5/64 (2.0)	5/64 (2.0)
Minimum slab thickness	h	in. (mm)	See Figures 3, 4 and 5			

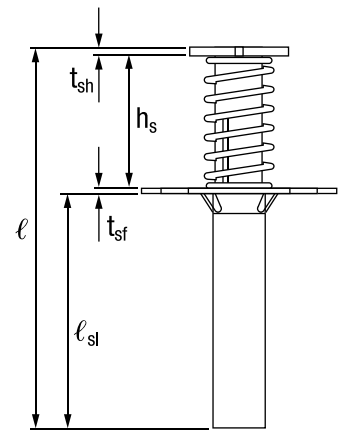


Figure 1 - HCI-MD specifications

Table 2 - Hilti HCI-WF specification table

Setting information	Symbol	Units	Nominal anchor diameter				
			1/4	3/8	1/2	5/8	3/4
Insert thread	d	UNC	1/4-20	3/8-16	1/2-13	5/8-11	3/4-10
Minimum thread engagement	ℓ_{th}	in. (mm)	1/4 6	3/8 10	1/2 13	5/8 16	3/4 20
Plastic flange diameter	d_{pf}	in. (mm)	1-1/2 (38)	1-1/2 (38)	1-1/2 (38)	1-1/2 (38)	1-1/2 (38)
Plastic flange thickness	t_{pf}	in. (mm)	7/64 (2.8)	7/64 (2.8)	7/64 (2.8)	7/64 (2.8)	7/64 (2.8)
Length	ℓ	in. (mm)	2 (51)	2 (51)	2-3/16 (57)	2-3/16 (57)	2-3/16 (57)
Steel head thickness	t_{sh}	in. (mm)	1/8 (3.2)	1/8 (3.2)	1/8 (3.2)	1/8 (3.2)	1/8 (3.2)
Length of break-off nails	ℓ_n	in. (mm)	7/8 (22)	7/8 (22)	7/8 (22)	7/8 (22)	7/8 (22)
Minimum slab thickness	h	in. (mm)	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)

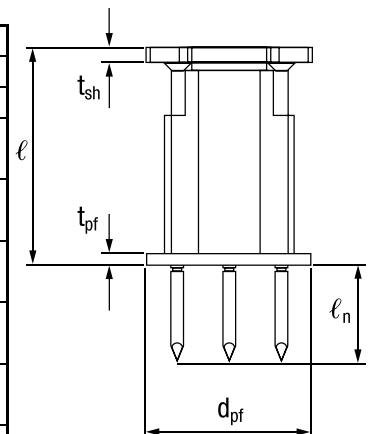


Figure 2 - HCI-WF specifications

3.3.13

3.3.13.3.1 ACI 318 Appendix D design

The technical data contained in this section are Hilti Simplified Design Tables. The load values were developed using the Strength Design parameters and variables of ESR-3713 and the equations within ACI 318-11 Appendix D. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8. Data tables from ESR-3713 are not contained in this section, but can be found at www.icc-es.org or at www.us.hilti.com.

3.3.13 HCI-WF/MD Cast-in Anchor

Table 3 - Hilti HCI-WF cast-in insert design strength with concrete/pullout failure in uncracked concrete^{1,2,3,4,5}

Nominal anchor internal diameter	Effective embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		$f'_c = 2,500$ psi (17.2 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 6,000$ psi (41.1 MPa) lb (kN)	$f'_c = 2,500$ psi (17.2 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 6,000$ psi (41.1 MPa) lb (kN)
1/4 and 3/8	1.88 (48)	2,695 (12.0)	2,950 (13.1)	3,405 (15.1)	4,175 (18.6)	2,695 (12.0)	2,950 (13.1)	3,405 (15.1)	4,175 (18.6)
1/2, 5/8 and 3/4	2.06 (52)	3,110 (13.8)	3,405 (15.1)	3,930 (17.5)	4,815 (21.4)	3,110 (13.8)	3,405 (15.1)	3,930 (17.5)	4,815 (21.4)

Table 4 - Hilti HCI-WF cast-in insert design strength with concrete/pullout failure in cracked concrete^{1,2,3,4,5}

Nominal anchor internal diameter	Effective embed. in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		$f'_c = 2,500$ psi (17.2 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 6,000$ psi (41.1 MPa) lb (kN)	$f'_c = 2,500$ psi (17.2 MPa) lb (kN)	$f'_c = 3,000$ psi (20.7 MPa) lb (kN)	$f'_c = 4,000$ psi (27.6 MPa) lb (kN)	$f'_c = 6,000$ psi (41.1 MPa) lb (kN)
1/4 and 3/8	1.88 (48)	2,155 (9.6)	2,360 (10.5)	2,725 (12.1)	3,340 (14.9)	2,155 (9.6)	2,360 (10.5)	2,725 (12.1)	3,340 (14.9)
1/2, 5/8 and 3/4	2.06 (52)	2,485 (11.1)	2,725 (12.1)	3,145 (14.0)	3,850 (17.1)	2,485 (11.1)	2,725 (12.1)	3,145 (14.0)	3,850 (17.1)

1 See section 3.1.8.6 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Apply spacing, edge distance, and concrete thickness factors in tables 5 to 10 as necessary. Compare to steel rod values in table 13. The lesser of the values is to be used for the design.

4 Tabular values are for normal-weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: for sand-lightweight, $\lambda_a = 0.85$; for all-lightweight, $\lambda_a = 0.75$

5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$.

HCI-WF/MD Cast-in Anchor 3.3.13

Table 5 - Load adjustment factors for 1/4-in. and 3/8-in. diameter Hilti HCI-WF in uncracked concrete^{1,2}

1/4-in. and 3/8-in. HCI-WF uncracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}	
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}		
Effective embed. h_{ef} in. (mm)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	n/a			n/a	
	2 (51)	n/a	0.781	n/a	0.449	0.781	
	2-1/2 (64)	n/a	0.913	n/a	0.628	0.913	
	3 (76)	n/a	1.000	n/a	0.826	1.000	
	3-1/2 (89)	n/a		n/a	1.000		0.827
	4 (102)	n/a		n/a			0.885
	4-1/2 (114)	n/a		n/a			0.938
	5 (127)	n/a		n/a			0.989
	5-1/2 (140)	0.989		0.769			1.000
	6 (152)	1.000		0.793			
	7 (178)			0.842			
	8 (203)			0.891			
9 (229)			0.940				
10 (254)			0.989				
12 (305)			1.000				

Table 6 - Load adjustment factors for 1/4-in. and 3/8-in. diameter Hilti HCI-WF in cracked concrete^{1,2}

1/4-in. and 3/8-in. HCI-WF cracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}	
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}		
Effective embed. h_{ef} in. (mm)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	1.88 (48)	
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	0.659	n/a	0.261	0.521	
	2 (51)	n/a	0.781	n/a	0.401	0.781	
	2-1/2 (64)	n/a	0.913	n/a	0.561	0.913	
	3 (76)	n/a	1.000	n/a	0.737	1.000	
	3-1/2 (89)	n/a		n/a	0.929		0.797
	4 (102)	n/a		n/a	1.000		0.852
	4-1/2 (114)	n/a		n/a			0.903
	5 (127)	n/a		n/a			0.952
	5-1/2 (140)	0.989		0.749			0.999
	6 (152)	1.000		0.772			1.000
	7 (178)			0.817			
	8 (203)			0.863			
9 (229)			0.908				
10 (254)			0.953				
12 (305)			1.000				

- Linear interpolation not permitted.
 - When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI-11 318 Appendix D (or CSAA23.3-04 (R2010) AnnexD).
 - Spacing factor reduction in shear, f_{AV} , assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.
 - Concrete thickness reduction factor in shear, f_{HV} , assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.
 - For torqued anchors, the minimum edge distance is same as the minimum spacing distance for torqued anchors.
- Shaded cells are for anchors that will remain un-torqued.

3.3.13 HCI-WF/MD Cast-in Anchor

Table 7 - Load adjustment factors for 1/2-in. and 5/8-in. diameter Hilti HCI-WF in uncracked concrete^{1,2}

1/2-in., 5/8-in. and 3/4-in. HCI-WF uncracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}	
Effective embed. h_{ef} in. (mm)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	0.628	n/a	0.260	0.521
	2 (51)	n/a	0.736	n/a	0.401	0.736
	2-1/2 (64)	n/a	0.852	n/a	0.560	0.852
	3 (76)	n/a	0.976	n/a	0.737	0.976
	3-1/2 (89)	n/a	1.000	n/a	0.928	1.000
	4 (102)	n/a		n/a	1.000	
	4-1/2 (114)	n/a		n/a		0.903
	5 (127)	n/a		n/a		0.952
	5-1/2 (140)	n/a		n/a		0.999
	5-3/4 (146)	0.965		0.761		1.000
	6 (152)	0.985		0.772		
	7 (178)	1.000		0.817		
8 (203)			0.863			
9 (229)			0.908			
10 (254)			0.953			
12 (305)			1.000			

Table 8 - Load adjustment factors for 1/2-in. and 5/8-in. diameter Hilti HCI-WF in cracked concrete^{1,2}

1/2-in., 5/8-in. and 3/4-in. HCI-WF cracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}	
Effective embed. h_{ef} in. (mm)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	0.628	n/a	0.233	0.465
	2 (51)	n/a	0.736	n/a	0.358	0.716
	2-1/2 (64)	n/a	0.852	n/a	0.500	0.852
	3 (76)	n/a	0.976	n/a	0.658	0.976
	3-1/2 (89)	n/a	1.000	n/a	0.829	1.000
	4 (102)	n/a		n/a	1.000	
	4-1/2 (114)	n/a		n/a		0.870
	5 (127)	n/a		n/a		0.917
	5-1/2 (140)	n/a		n/a		0.961
	5-3/4 (146)	0.965		0.742		0.983
	6 (152)	0.985		0.752		1.000
	7 (178)	1.000		0.794		
8 (203)			0.836			
9 (229)			0.878			
10 (254)			0.920			
12 (305)			1.000			

1 Linear interpolation not permitted.

2 When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI-11 318 Appendix D (or CSAA23.3-04 (R2010) AnnexD).

3 Spacing factor reduction in shear, f_{AV} , assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.

4 Concrete thickness reduction factor in shear, f_{HV} , assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.

5 For torqued anchors, the minimum edge distance is same as the minimum spacing distance for torqued anchors.

Shaded cells are for anchors that will remain un-torqued.

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Table 9 - Load adjustment factors for 3/4-in. diameter Hilti HCI-WF in uncracked concrete^{1,2}

3/4-in. HCI-WF uncracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}	
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}		
Effective embed. h_{ef} in. (mm)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	0.628	n/a	0.260	0.521	n/a
	2 (51)	n/a	0.736	n/a	0.401	0.736	n/a
	2-1/2 (64)	n/a	0.852	n/a	0.560	0.852	n/a
	3 (76)	n/a	0.976	n/a	0.737	0.976	n/a
	3-1/2 (89)	n/a	1.000	n/a	0.928	1.000	0.797
	4 (102)	n/a		n/a	1.000		0.852
	4-1/2 (114)	n/a		n/a			0.903
	5 (127)	n/a		n/a			0.952
	5-1/2 (140)	n/a		n/a			0.999
	6 (152)	n/a		n/a			
	6-1/4 (159)	1.000		0.783			
	6-1/2 (165)			0.795			
	7 (178)			0.817			
	8 (203)			0.863			
9 (229)			0.908				
10 (254)			0.953				
12 (305)			1.000				

Table 10 - Load adjustment factors for 3/4-in. diameter Hilti HCI-WF in cracked concrete^{1,2}

3/4-in. HCI-WF cracked concrete	Spacing factor in tension f_{AN}	Edge distance factor in tension ⁵ f_{RN}	Spacing factor in shear ³ f_{AV}	Edge distance in shear		Concrete thickness factor in shear ⁴ f_{HV}	
				⊥ toward edge ⁵ f_{RV}	to and away from edge ⁵ f_{RV}		
Effective embed. h_{ef} in. (mm)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	2.06 (52)	
Spacing (s) / edge distance (c_e) / concrete thickness (h) - in. (mm)	1-1/2 (38)	n/a	0.628	n/a	0.233	0.465	n/a
	2 (51)	n/a	0.736	n/a	0.358	0.716	n/a
	2-1/2 (64)	n/a	0.852	n/a	0.500	0.852	n/a
	3 (76)	n/a	0.976	n/a	0.658	0.976	n/a
	3-1/2 (89)	n/a	1.000	n/a	0.829	1.000	0.767
	4 (102)	n/a		n/a	1.000		0.820
	4-1/2 (114)	n/a		n/a			0.870
	5 (127)	n/a		n/a			0.917
	5-1/2 (140)	n/a		n/a			0.961
	6 (152)	n/a		n/a			1.000
	6-1/4 (159)	1.000		0.763			
	6-1/2 (165)			0.773			
	7 (178)			0.794			
	8 (203)			0.836			
9 (229)			0.878				
10 (254)			0.920				
12 (305)			1.000				

- Linear interpolation not permitted.
- When combining multiple load adjustment factors (e.g. for a 4 anchor pattern in a corner with thin concrete member) the design can become very conservative. To optimize the design, use Hilti PROFIS Anchor Design software or perform anchor calculation using design equations from ACI-11 318 Appendix D (or CSA A23.3-04 (R2010) Annex D).
- Spacing factor reduction in shear, f_{AV} , assumes an influence of a nearby edge. If no edge exists, then $f_{AV} = f_{AN}$.
- Concrete thickness reduction factor in shear, f_{HV} , assumes an influence of a nearby edge. If no edge exists, then $f_{HV} = 1.0$.
- For torqued anchors, the minimum edge distance is same as the minimum spacing distance for torqued anchors.

Shaded cells are for anchors that will remain un-torqued.

3.3.13 HCI-WF/MD Cast-in Anchor

Table 11 - Hilti HCI-MD design strength in the soffit of uncracked lightweight concrete over metal deck (B profile)^{1,2,3,4,5,6,7}

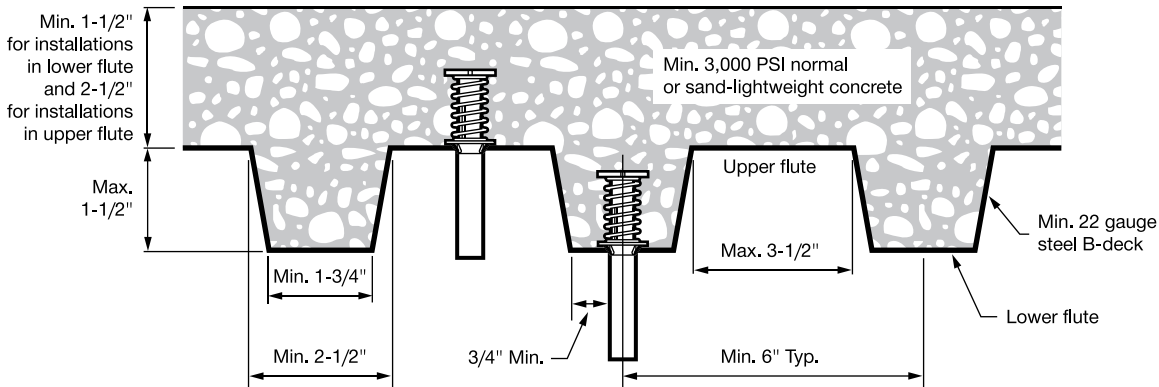
Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	615 (2.7)	710 (3.2)	690 (3.1)	690 (3.1)	2,130 (9.5)	2,460 (10.9)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	615 (2.7)	710 (3.2)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	615 (2.7)	710 (3.2)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	615 (2.7)	710 (3.2)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	4,220 (18.8)	4,220 (18.8)

Table 12 - Hilti HCI-MD design strength in the soffit of cracked lightweight concrete over metal deck (B profile)^{1,2,3,4,5,6,7}

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	490 (2.2)	565 (2.5)	690 (3.1)	690 (3.1)	2,130 (9.5)	2,460 (10.9)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	490 (2.2)	565 (2.5)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	490 (2.2)	565 (2.5)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	490 (2.2)	565 (2.5)	735 (3.3)	735 (3.3)	2,130 (9.5)	2,460 (10.9)	4,220 (18.8)	4,220 (18.8)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- 4 Tabular values are lightweight concrete and no additional reduction factor is needed.
- 5 No additional reduction factors for spacing or edge distance need to be applied.
- 6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- 7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$.
See section 3.1.8.7 for additional information on seismic applications.

Figure 3 - Installation of Hilti HCI-MD in the soffit



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Table 13 - Hilti HCI-MD design strength in the soffit of uncracked lightweight concrete over metal deck (W profile with 4-1/2" width)^{1,2,3,4,5,6,7}

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	1,490 (6.6)	1,720 (7.7)	920 (4.1)	920 (4.1)	2,660 (11.8)	3,070 (13.7)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	1,490 (6.6)	1,720 (7.7)	995 (4.4)	995 (4.4)	2,660 (11.8)	3,070 (13.7)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	1,490 (6.6)	1,720 (7.7)	995 (4.4)	995 (4.4)	2,660 (11.8)	3,070 (13.7)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	1,490 (6.6)	1,720 (7.7)	1,395 (6.2)	1,395 (6.2)	2,660 (11.8)	3,070 (13.7)	4,220 (18.8)	4,220 (18.8)

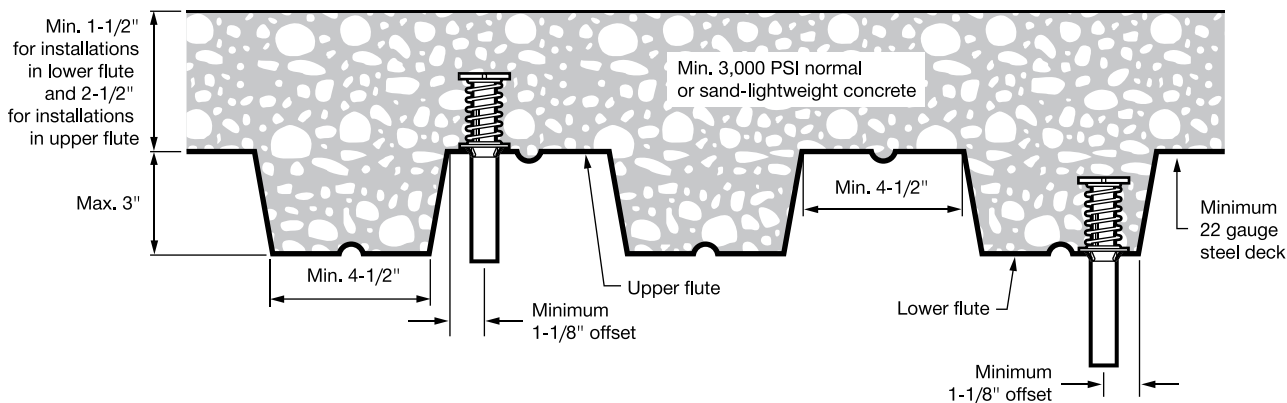
Table 14 - Hilti HCI-MD design strength in the soffit of cracked lightweight concrete over metal deck (W profile with 4-1/2" width)^{1,2,3,4,5,6,7}

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	1,190 (5.3)	1,375 (6.1)	920 (4.1)	920 (4.1)	2,130 (9.5)	2,460 (10.9)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	1,190 (5.3)	1,375 (6.1)	995 (4.4)	995 (4.4)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	1,190 (5.3)	1,375 (6.1)	995 (4.4)	995 (4.4)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	1,190 (5.3)	1,375 (6.1)	1,395 (6.2)	1,395 (6.2)	2,130 (9.5)	2,460 (10.9)	4,220 (18.8)	4,220 (18.8)

- See section 3.1.8.6 to convert design strength value to ASD value.
- Linear interpolation between concrete compressive strengths is not permitted.
- Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- Tabular values are lightweight concrete and no additional reduction factor is needed.
- No additional reduction factors for spacing or edge distance need to be applied.
- Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$.
See section 3.1.8.7 for additional information on seismic applications.

3.3.13

Figure 4 - Installation of Hilti HCI-MD in the soffit of concrete over metal deck floor and roof assemblies



3.3.13 HCI-WF/MD Cast-in Anchor

Table 15- Hilti HCI-MD design strength in the soffit of uncracked lightweight concrete over metal deck (W profile with 3-7/8" width)^{1,2,3,4,5,6,7}

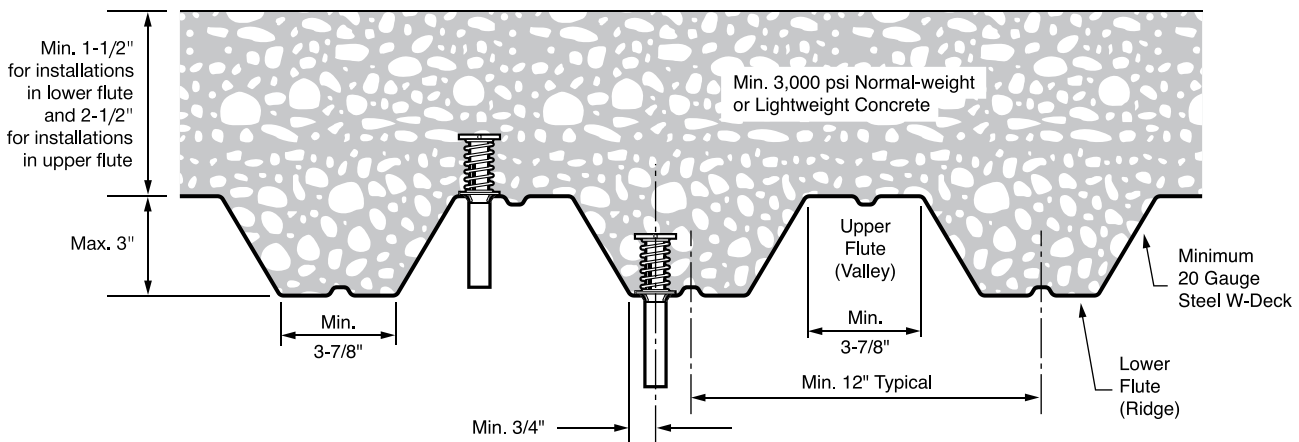
Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	1,300 (5.8)	1,500 (6.7)	920 (4.1)	920 (4.1)	2,660 (11.8)	3,070 (13.7)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	1,300 (5.8)	1,500 (6.7)	995 (4.4)	995 (4.4)	2,660 (11.8)	3,070 (13.7)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	1,300 (5.8)	1,500 (6.7)	995 (4.4)	995 (4.4)	2,660 (11.8)	3,070 (13.7)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	1,300 (5.8)	1,500 (6.7)	995 (4.4)	995 (4.4)	2,660 (11.8)	3,070 (13.7)	4,220 (18.8)	4,220 (18.8)

Table 16- Hilti HCI-MD design strength in the soffit of cracked lightweight concrete over metal deck (W profile with 3-7/8" width)^{1,2,3,4,5,6,7}

Anchor diameter in. (mm)	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
		Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
		$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)	$f'_c = 3,000$ psi (20.7 MPa)	$f'_c = 4,000$ psi (27.6 MPa)
3/8	2-1/16 (52)	1,040 (4.6)	1,200 (5.3)	920 (4.1)	920 (4.1)	2,130 (9.5)	2,460 (10.9)	1,725 (7.7)	1,725 (7.7)
1/2	2-1/16 (52)	1,040 (4.6)	1,200 (5.3)	995 (4.4)	995 (4.4)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
5/8	2-1/16 (52)	1,040 (4.6)	1,200 (5.3)	995 (4.4)	995 (4.4)	2,130 (9.5)	2,460 (10.9)	1,860 (8.3)	1,860 (8.3)
3/4	2-1/16 (52)	1,040 (4.6)	1,200 (5.3)	995 (4.4)	995 (4.4)	2,130 (9.5)	2,460 (10.9)	4,220 (18.8)	4,220 (18.8)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- 4 Tabular values are lightweight concrete and no additional reduction factor is needed.
- 5 No additional reduction factors for spacing or edge distance need to be applied.
- 6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- 7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See section 3.1.8.7 for additional information on seismic applications.

Figure 5 - Installation of Hilti HCI-MD in the soffit of concrete over metal deck



HCI-WF/MD Cast-in Anchor 3.3.13

Table 17 - Design strength for steel failure of common threaded rods used with Hilti HCI-WF or HCI-MD cast-in inserts¹

Nominal anchor diameter	Grade A36 threaded rod			ASTM A 193 B7 or ASTM F1554 Gr. 105 threaded rod		
	Tensile ² ϕN_{sa} lb (kN)	Shear ³ ϕV_{sa} lb (kN)	Seismic shear ⁴ $\phi V_{sar,eq}$ lb (kN)	Tensile ² ϕN_{sa} lb (kN)	Shear ³ ϕV_{sa} lb (kN)	Seismic shear ⁴ $\phi V_{sar,eq}$ lb (kN)
1/4	1,390 (6.2)	605 (2.7)	425 (1.9)	2,980 (13.3)	1,290 (5.7)	905 (4.0)
3/8	3,395 (15.1)	1,470 (6.5)	1,030 (4.6)	7,265 (32.3)	3,150 (14.0)	2,205 (9.8)
1/2	6,175 (27.5)	3,210 (14.3)	2,245 (10.0)	13,305 (59.2)	6,920 (30.8)	4,845 (21.5)
5/8	9,835 (43.7)	5,110 (22.7)	3,575 (15.9)	21,190 (94.3)	11,020 (49.0)	7,715 (34.3)
3/4	14,550 (64.7)	7,565 (33.7)	5,295 (23.6)	31,360 (139.5)	16,305 (72.5)	11,415 (50.8)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Tensile values determined by static tension tests with $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318 Appendix D.
- 3 Shear values determined by static shear tests with $\phi V_{sa} < \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318 Appendix D.
- 4 Seismic shear values determined by seismic shear tests with $\phi V_{sa} \leq \phi 0.60 A_{se,V} f_{uta}$ as noted in ACI 318, Annex D. See Section 3.1.8.7 for additional information on seismic applications.

Table 18 - UL LLC and FM approvals^{1,2}

Nominal anchor diameter	HCI-MD						HCI-WF		
	Upper flute			Lower flute			UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)
	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)	UL max pipe size (in.)	UL test load (lb)	FM max pipe size (in.)			
3/8	4	1,500	4	4	1,500	4	4	1,500	4
1/2	8	4,050	8	8	4,050	8	8	4,050	8
5/8	12	7,900	12	-	-	-	8	4,050	-
3/4	12	7,900	12	-	-	-	8	4,050	-

- 1 UL LLC Listing based on successful completion of testing in accordance with UL 203.
- 2 FM Approval based on successful completion of testing in accordance with FM 1952.

3.3.13.3.2 Canadian Limit State design

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post-installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. This section contains the Limit State Design tables with unfactored characteristic loads that are based on the published loads in ICC Evaluation Services ESR-3713. These tables are followed by factored resistance tables. The factored resistance tables have characteristic design loads that are prefactored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-11 Appendix D design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to Section 3.1.8. Technical assistance is available by contacting Hilti Canada at (800) 363-4458 or at www.hilti.ca



3.3.13 HCI-WF/MD Cast-in Anchor

Table 19 - Hilti HCI-WF design information in accordance with CSA A23.3-14 Annex D¹


Design parameter	Symbol	Units	Nominal anchor diameter					Ref
			1/4	3/8	1/2	5/8	3/4	A23.3-04
Anchor O.D.	d_a	in. (mm)	0.68 (17.3)		0.87 (22.1)		1 (25.4)	
Effective embedment	h_{ef}	in. (mm)	1.88 (47.8)		2.06 (52.3)			
Minimum concrete thickness ³	h_{min}	in. (mm)	3-3/4 (95)		4-1/8 (105)			
Critical edge distance, uncracked	$c_{ac,uncr}$	in. (mm)	2.82 (72)		3.09 (78)			
Minimum edge distance	c_{min}	in. (mm)	1-1/2 (38)					
Minimum anchor spacing, untorqued	$s_{min,untor}$	in. (mm)	2.72 (69)		3.48 (88)	4.00 (102)		
Minimum anchor spacing, torqued	$s_{min,tor}$	in. (mm)	4.08 (104)		5.22 (133)	6.00 (152)		
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85					8.4.3
Resistance modification factor for tension, steel failure modes ²	R	-	0.70					D.5.3
Resistance modification factor for shear, steel failure modes ²	R	-	0.65					D.5.3
Factored steel resistance in tension governed by insert	N_{sar}	lb (kN)	7,140 (32)	7,140 (32)	8,330 (37)	8,330 (37)	8,330 (37)	D.6.1.2
Factored steel resistance in tension governed by insert, seismic	$N_{sar,eq}$	lb (kN)	7,140 (32)	7,140 (32)	8,330 (37)	8,330 (37)	8,330 (37)	D.6.1.2
Factored steel resistance in shear governed by insert	V_{sar}	lb (kN)	4,801 (21)	4,801 (21)	4,801 (21)	4,801 (21)	5,011 (22)	D.7.1.2
Factored steel resistance in shear governed by insert, seismic	$V_{sar,eq}$	lb (kN)	4,801 (21)	4,801 (21)	4,801 (21)	4,801 (21)	5,011 (22)	D.7.1.2
Coeff. for factored conc. breakout resistance, uncracked concrete	$k_{c,uncr}$	-	10					D.6.2.2
Coeff. for factored conc. breakout resistance, cracked concrete	$k_{c,cr}$	-	10					D.6.2.2
Modification factor for anchor resistance, tension, uncracked conc.	$\psi_{c,N}$	-	1.25					D.6.2.6
Modification factor for anchor resistance, tension, cracked conc.	$\psi_{c,N}$	-	1.0					D.6.2.6
Anchor category	-	-	Cast-in					D.5.3 (c)
Concrete material resistance factor	ϕ_c	-	0.65					8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B ³	R	-	1.00					D.5.3 (c)

¹ Design information in this table is taken from ICC-ES ESR-3713, dated July 2016, tables 1 and 3, and converted for use with CSA A23.3-14 Annex D.

² The carbon steel HCI-WF is considered a brittle steel element as defined by CSA A23.3-14 Annex D section D.2.

³ For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.

HCI-WF/MD Cast-in Anchor 3.3.13

Table 20 - Hilti HCI-WF cast-in insert design strength with concrete / pullout failure in uncracked concrete^{1,2,3,4,5}


Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			$f'_c = 20$ MPa (2,900psi) lb (kN)	$f'_c = 25$ MPa (3,625 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c = 40$ MPa (5,800 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 25$ MPa (3,625 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c = 40$ MPa (5,800 psi) lb (kN)
1/4 and 3/8	1.88 (48)	2.01 (51)	2,715 (12.1)	3,035 (13.5)	3,325 (14.8)	3,840 (17.1)	2,715 (12.1)	3,035 (13.5)	3,325 (14.8)	3,840 (17.1)
1/2, 5/8 and 3/4	2.06 (52)	2.24 (57)	3,065 (13.6)	3,425 (15.2)	3,750 (16.7)	4,330 (19.3)	3,065 (13.6)	3,425 (15.2)	3,750 (16.7)	4,330 (19.3)

Table 21 - Hilti HCI-WF cast-in insert design strength with concrete / pullout failure in cracked concrete^{1,2,3,4,5}


Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			$f'_c = 20$ MPa (2,900psi) lb (kN)	$f'_c = 25$ MPa (3,625 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c = 40$ MPa (5,800 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 25$ MPa (3,625 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c = 40$ MPa (5,800 psi) lb (kN)
1/4 and 3/8	1.88 (48)	2.01 (51)	2,175 (9.7)	2,430 (10.8)	2,660 (11.8)	3,075 (13.7)	2,175 (9.7)	2,430 (10.8)	2,660 (11.8)	3,075 (13.7)
1/2, 5/8 and 3/4	2.06 (52)	2.24 (57)	2,450 (10.9)	2,740 (12.2)	3,000 (13.3)	3,465 (15.4)	2,450 (10.9)	2,740 (12.2)	3,000 (13.3)	3,465 (15.4)

- 1 See section 3.1.8.6 to convert factored resistance value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Apply spacing, edge distance, and concrete thickness factors in Tables 5 to 10 as necessary. Compare to the steel values in Table 29. The lesser of the values is to be used for the design.
- 4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows:
For sand-lightweight, $\lambda_a = 0.85$; for all-lightweight, $\lambda_a = 0.75$.
- 5 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic loads, multiply cracked concrete tabular values by $\alpha_{seis} = 0.75$.



3.3.13 HCI-WF/MD Cast-in Anchor

Table 22 - Hilti HCI-MD design information in accordance with CSA A23.3-14 Annex D¹


Design parameter	Symbol	Units	Nominal anchor diameter				Ref
			3/8	1/2	5/8	3/4	
Anchor O.D.	d_a	in. (mm)	0.67 (17.0)	0.87 (22.1)	0.87 (22.1)	1 (25.4)	
Effective embedment	h_{ef}	in. (mm)	1.95 (49.5)				
Max. concrete cover over metal deck, lower flute install	h_{max}	in. (mm)	1-1/2 (38.1)				
Max. concrete cover over metal deck, upper flute install	h_{min}	in. (mm)	2-1/2 (63.5)				
Min. specified ult. strength	f_{ut}	lb (kN)	13,000 (58)	13,000 (58)	13,000 (58)	13,000 (58)	
Steel embed. material resistance factor for reinforcement	ϕ_s	-	0.85				8.4.3
Resistance modification factor for tension, steel failure modes ²	R	-	0.70				D.5.3
Resistance modification factor for shear, steel failure modes ²	R	-	0.65				D.5.3
Installation in lower flute of 1 1/2-inch minimum flute height (i.e. B-deck) according to Figure 6							
Factored pullout resistance, cracked	$N_{pn,deck}$	lb (kN)	455 (2.02)	455 (2.02)	455 (2.02)	455 (2.02)	
Factored steel strength in shear as governed by insert	$V_{sa,deck}$	lb (kN)	586 (2.61)	622 (2.76)	622 (2.76)	622 (2.76)	
Factored seismic steel strength in shear as governed by insert	$V_{sa,deck,eq}$	lb (kN)	586 (2.61)	622 (2.76)	622 (2.76)	622 (2.76)	
Installation in lower flute of 3-inch minimum flute height (i.e. W-deck with 4-1/2 inch flute width) according to Figure 7							
Factored pullout resistance, cracked	$N_{pn,deck}$	lb (kN)	1,105 (4.92)	1,105 (4.92)	1,105 (4.92)	1,105 (4.92)	
Factored steel strength in shear as governed by insert	$V_{sa,deck}$	lb (kN)	779 (3.47)	843 (3.75)	843 (3.75)	1,039 (4.62)	
Factored seismic steel strength in shear as governed by insert	$V_{sa,deck,eq}$	lb (kN)	779 (3.47)	843 (3.75)	843 (3.75)	1,039 (4.62)	
Installation in lower flute of 3-inch minimum flute height (i.e. W-deck with 3-7/8 inch flute width) according to Figure 8							
Factored pullout resistance, cracked	$N_{pn,deck}$	lb (kN)	965 (4.29)	965 (4.29)	965 (4.29)	965 (4.29)	
Factored steel strength in shear as governed by insert	$V_{sa,deck}$	lb (kN)	713 (3.17)	771 (3.43)	771 (3.43)	771 (3.43)	
Factored seismic steel strength in shear as governed by insert	$V_{sa,deck,eq}$	lb (kN)	713 (3.17)	771 (3.43)	771 (3.43)	771 (3.43)	
Anchor category	-	-	cast-in				D.5.3 (c)
Concrete material resistance factor	ϕ_c	-	0.65				8.4.2
Resistance modification factor for tension and shear, concrete failure modes, Condition B ³	R	-	1.00				D.5.3 (c)

1 Design information in this table is taken from ICC-ES ESR-3713, dated July 2016, tables 2 and 4, and converted for use with CSA A23.3-14 Annex D.

2 The carbon steel HCI-WF is considered a brittle steel element as defined by CSA A23.3-14 Annex D section D.2.

3 For use with the load combinations of CSA A23.3-14 chapter 8. Condition B applies where supplementary reinforcement in conformance with CSA A23.3-14 section D.5.3 is not provided, or where pullout or pryout strength governs. For cases where the presence of supplementary reinforcement can be verified, the resistance modification factors associated with Condition A may be used.

HCI-WF/MD Cast-in Anchor 3.3.13

Table 23 - Hilti HCI-MD factored resistance in the soffit of uncracked lightweight concrete over metal deck



(B profile)^{1,2,3,4,5,6,7}

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	560 (2.5)	685 (3.0)	585 (2.6)	2,430 (10.8)	2,975 (13.2)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	560 (2.5)	685 (3.0)	625 (2.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	560 (2.5)	685 (3.0)	625 (2.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	560 (2.5)	685 (3.0)	625 (2.8)	2,430 (10.8)	2,975 (13.2)	3,590 (16.0)

Table 24 - Hilti HCI-MD factored resistance in the soffit of cracked lightweight concrete over metal deck



(B profile)^{1,2,3,4,5,6,7}

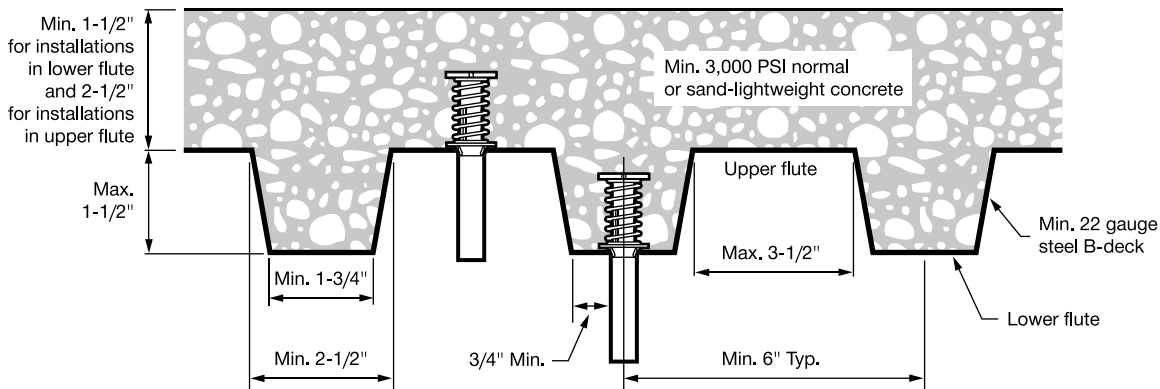
Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	445 (2.0)	550 (2.4)	585 (2.6)	1,945 (8.7)	2,380 (10.6)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	445 (2.0)	550 (2.4)	625 (2.8)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	445 (2.0)	550 (2.4)	625 (2.8)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	445 (2.0)	550 (2.4)	625 (2.8)	1,945 (8.7)	2,380 (10.6)	3,590 (16.0)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- 4 Tabular values are lightweight concrete and no additional reduction factor is needed.
- 5 No additional reduction factors for spacing or edge distance need to be applied.
- 6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- 7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$.
See section 3.1.8.7 for additional information on seismic applications.



3.3.13

Figure 6 - Installation of Hilti HCI-MD in the soffit



3.3.13 HCI-WF/MD Cast-in Anchor

Table 25 - Hilti HCI-MD factored resistance in the soffit of uncracked lightweight concrete over metal deck
(W profile with 4-1/2" width)^{1,2,3,4,5,6,7}



Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	1,360 (6.0)	1,665 (7.4)	780 (3.5)	2,430 (10.8)	2,975 (13.2)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	1,360 (6.0)	1,665 (7.4)	845 (3.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	1,360 (6.0)	1,665 (7.4)	845 (3.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	1,360 (6.0)	1,665 (7.4)	1,185 (5.3)	2,430 (10.8)	2,975 (13.2)	3,590 (16.0)

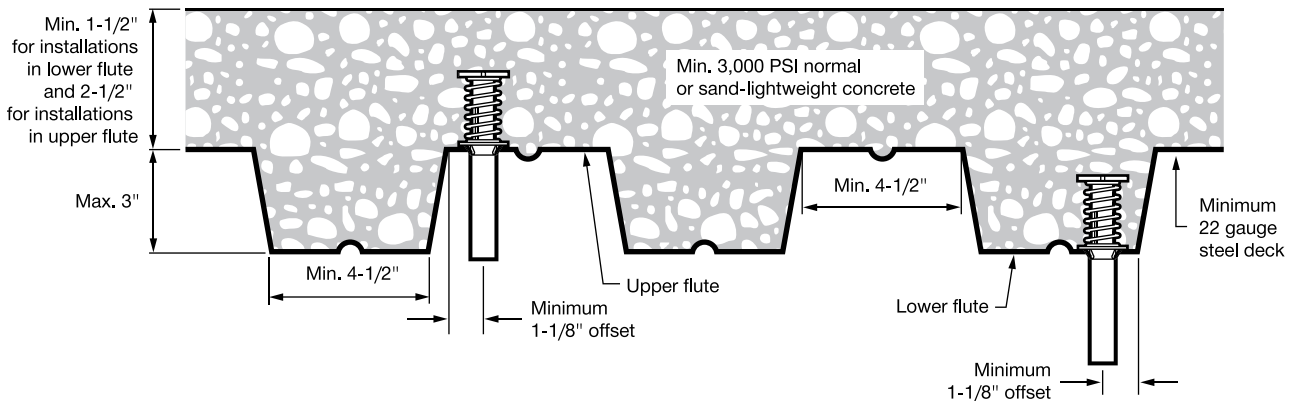
Table 26 - Hilti HCI-MD factored resistance in the soffit of cracked lightweight concrete over metal deck
(W profile with 4-1/2" width)^{1,2,3,4,5,6,7}



Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	1,085 (4.8)	1,330 (5.9)	780 (3.5)	1,945 (8.7)	2,380 (10.6)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	1,085 (4.8)	1,330 (5.9)	845 (3.8)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	1,085 (4.8)	1,330 (5.9)	845 (3.8)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	1,085 (4.8)	1,330 (5.9)	1,040 (4.6)	1,945 (8.7)	2,380 (10.6)	3,590 (16.0)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- 4 Tabular values are lightweight concrete and no additional reduction factor is needed.
- 5 No additional reduction factors for spacing or edge distance need to be applied.
- 6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- 7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$.
See section 3.1.8.7 for additional information on seismic applications.

Figure 7 - Installation of Hilti HCI-MD in the soffit of concrete over metal deck floor and roof assemblies



HCI-WF/MD Cast-in Anchor 3.3.13

Table 27 - Hilti HCI-MD factored resistance in the soffit of uncracked lightweight concrete over metal deck

(W profile with 3-7/8" width)^{1,2,3,4,5,6,7}

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	1,185 (5.3)	1,455 (6.5)	780 (3.5)	2,430 (10.8)	2,975 (13.2)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	1,185 (5.3)	1,455 (6.5)	845 (3.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	1,185 (5.3)	1,455 (6.5)	845 (3.8)	2,430 (10.8)	2,975 (13.2)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	1,185 (5.3)	1,455 (6.5)	845 (3.8)	2,430 (10.8)	2,975 (13.2)	3,590 (16.0)

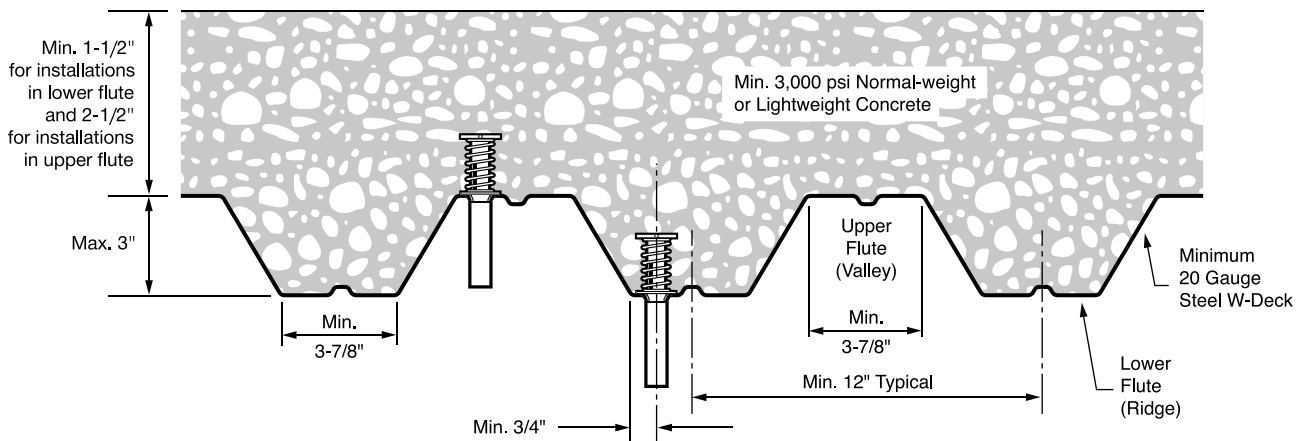
Table 28 - Hilti HCI-MD factored resistance in the soffit of cracked lightweight concrete over metal deck

(W profile with 3-7/8" width)^{1,2,3,4,5,6,7}

Nominal anchor diameter in.	Effective embed. in. (mm)	Nominal embed. in. (mm)	Installation in lower flute			Installation in upper flute		
			Tension - N_r		Shear - V_r	Tension - N_r		Shear - V_r
			$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)	$f'_c = 20$ MPa (2,900 psi) lb (kN)	$f'_c = 30$ MPa (4,350 psi) lb (kN)	$f'_c \geq 20$ MPa (2,900 psi) lb (kN)
3/8	1.95 (50)	2-1/16 (52)	950 (4.2)	1,160 (5.2)	715 (3.2)	1,945 (8.7)	2,380 (10.6)	1,465 (6.5)
1/2	1.95 (50)	2-1/16 (52)	950 (4.2)	1,160 (5.2)	770 (3.4)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
5/8	1.95 (50)	2-1/16 (52)	950 (4.2)	1,160 (5.2)	770 (3.4)	1,945 (8.7)	2,380 (10.6)	1,585 (7.1)
3/4	1.95 (50)	2-1/16 (52)	950 (4.2)	1,160 (5.2)	770 (3.4)	1,945 (8.7)	2,380 (10.6)	3,590 (16.0)

- 1 See section 3.1.8.6 to convert design strength value to ASD value.
- 2 Linear interpolation between concrete compressive strengths is not permitted.
- 3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is $3 \times h_{ef}$ (effective embedment).
- 4 Tabular values are lightweight concrete and no additional reduction factor is needed.
- 5 No additional reduction factors for spacing or edge distance need to be applied.
- 6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.
- 7 Tabular values are for static loads only. Seismic design is not permitted for uncracked concrete. For seismic tension loads, multiply cracked concrete tabular values in tension by $\alpha_{N,seis} = 0.75$. See section 3.1.8.7 for additional information on seismic applications.

Figure 8 - Installation of Hilti HCI-MD in the soffit of concrete over metal deck



3.3.13 HCI-WF/MD Cast-in Anchor

Table 29 - Design strength for steel failure of common threaded rods used with Hilti HCI-WF or HCI-MD cast-in inserts^{1,2}



Nominal anchor diameter in.	Grade A36 threaded rod			ASTM A 193 B7 or ASTM F1554 Gr. 105 threaded rod		
	Tensile ³ N_{sar} lb (kN)	Shear ⁴ V_{sar} lb (kN)	Seismic shear ⁵ $V_{sar,eq}$ lb (kN)	Tensile ³ N_{sar} lb (kN)	Shear ⁴ V_{sar} lb (kN)	Seismic shear ⁵ $V_{sar,eq}$ lb (kN)
1/4	1,260 (5.6)	595 (2.6)	415 (1.8)	2,700 (12.0)	1,265 (5.6)	890 (4.0)
3/8	3,080 (13.7)	1,440 (6.4)	1,010 (4.5)	6,585 (29.3)	3,090 (13.7)	2,165 (9.6)
1/2	5,600 (24.9)	3,150 (14.0)	2,200 (9.8)	12,065 (53.7)	6,785 (30.2)	4,750 (21.1)
5/8	8,915 (39.7)	5,010 (22.3)	3,505 (15.6)	19,210 (85.4)	10,810 (48.1)	7,565 (33.7)
3/4	13,190 (58.7)	7,420 (33.0)	5,195 (23.1)	28,435 (126.5)	15,990 (71.1)	11,195 (49.8)

1 See Section 3.1.8.6 to convert factored resistance value to ASD value.

2 Hilti HCI-WF and HCI-MD anchors are to be considered ductile steel elements.

3 Tensile $N_{sar} = A_{se} \phi_s f_{ut}$ R as noted in CSA A23.3-14 Annex D.

4 Shear determined by static shear tests with $V_{sar} < 0.6 A_{se,V} \phi_s f_{ut}$ R as noted in CSA A23.3-14 Annex D.

5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} < 0.60 A_{se,V} \phi_s f_{ut}$ R as noted in CSA A23.3-14 Annex D.
See Section 3.1.8.7 for additional information on seismic applications.

3.3.13.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.us.hilti.com (US) and www.hilti.ca (Canada). Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

3.3.13.5 Ordering information¹

HCI – WF cast-in anchor for use in wood forms

Description	Sleeve color ²	Qty / box
HCI – WF 1/4	Green	150
HCI – WF 3/8	Red	150
HCI – WF 1/2	Orange	100
HCI – WF 5/8	Yellow	100
HCI – WF 3/4	Black	100

HCI – MD cast-in anchor for use in metal deck

Description	Sleeve color ²	Qty / box	Hole saw diameter
HCI – MD 3/8	Red	100	7/8
HCI – MD 1/2	Orange	60	1-3/16
HCI – MD 5/8	Yellow	60	1-3/16
HCI – MD 3/4	Black	60	1-1/4

1 All dimensions in inches

2 Identifies anchor size

TOLCO™ Fig. 67SS - Stainless Steel Reversible C-Type Beam Clamp 3/4" (19.0mm) Throat Opening TOLCO™ Fig. 68SS - Stainless Steel Reversible C-Type Beam Clamp Wide Mouth

Size Range: 3/8"-16 and 1/2"-13 rod sizes

Material: Stainless Steel (Type 316 or 304)

Function: Recommended for hanging from steel beams where flange thickness does not exceed 3/4" (19.0mm) for Fig. 67SS or 1 1/4" (31.7mm) for Fig. 68SS.

Features: All steel construction eliminates structural deficiencies associated with casting type beam clamps. May be used on top or bottom flange of beam. May be installed with set screw in up or down position. Offset design permits unlimited rod adjustment by allowing the rod to be threaded completely through the clamp.

Approvals: Underwriters Laboratories Listed in the USA (UL) and Canada (cUL). Conforms to Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 19. Meets or exceeds requirements of the National Fire Protection Association (NFPA), pamphlet 13.

3/8"-16 rod will support 1/2" (15mm) thru 4" (100mm) pipe

1/2"-13 rod will support 1/2" (15mm) thru 8" (200mm) pipe

Order By: Part number and stainless steel type.

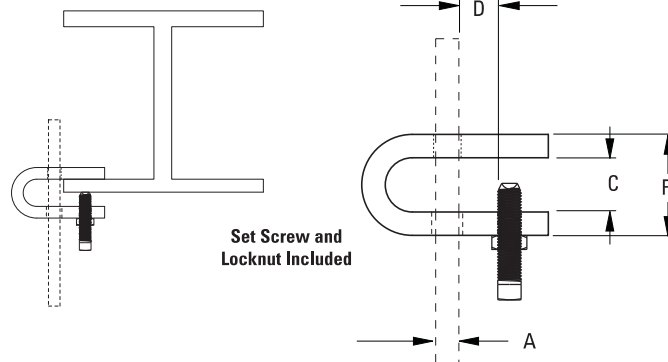
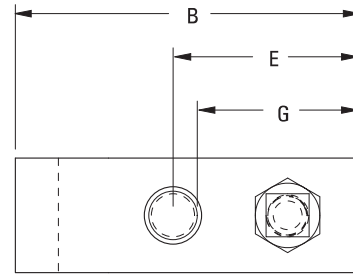


Fig. 67SS

Part No.	Rod Size A	Pipe Size		B		C		D		E	
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
67SS-3/8	3/8"-16	1/2" - 4"	(15 - 100)	3"	(76,2)	7/8"	(22,2)	1"	(25,4)	1 5/8"	(41,3)
67SS-1/2	1/2"-13	5" - 8"	(125 - 200)	3"	(76,2)	7/8"	(22,2)	1"	(25,4)	1 5/8"	(41,3)

Part No.	F		G		Test Load		Approx. Wt./100	
	in.	(mm)	in.	(mm)	lbs.	(kN)	lbs.	(kg)
67SS-3/8	1 5/8"	(41,3)	1 1/8"	(28,6)	1500	(6,67)	84	(38,1)
67SS-1/2	1 5/8"	(41,3)	1 1/8"	(28,6)	4050	(18,01)	170	(77,1)



Fig. 68SS *

Part No.	Rod Size A	Pipe Size		B		C		D		E	
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)
68SS-3/8	3/8"-16	1/2" - 4"	(15 - 100)	2 1/16"	(52,4)	1 1/8"	(28,6)	3/4"	(19,0)	1 1/4"	(31,7)
68SS-1/2	1/2"-13	5" - 8"	(125 - 200)	2 1/4"	(57,1)	1 1/4"	(31,7)	1 3/16"	(20,6)	1 1/4"	(31,7)

Part No.	F		Test Load		Approx. Wt./100	
	in.	(mm)	lbs.	(kN)	lbs.	(kg)
68SS-3/8	2"	(50,8)	1500	(6,67)	84	(38,1)
68SS-1/2	2 1/4"	(57,1)	4050	(18,01)	170	(77,1)



* Fig. 68SS minimum order quantity of 30 pieces.

Note: See page 27 for recommended setscrew torque.

B3031-3/8 - Light Duty Malleable C-Clamp

Material: Malleable Iron

Function: Designed for attaching a 3/8"-16 hanger rod to the top or bottom flange of a beam or bar joist when setscrew is in the down position as shown.

Approvals: Underwriters Laboratories Listed in the USA (UL) and Canada (cUL) for up to 4" pipe. Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 19 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 19.

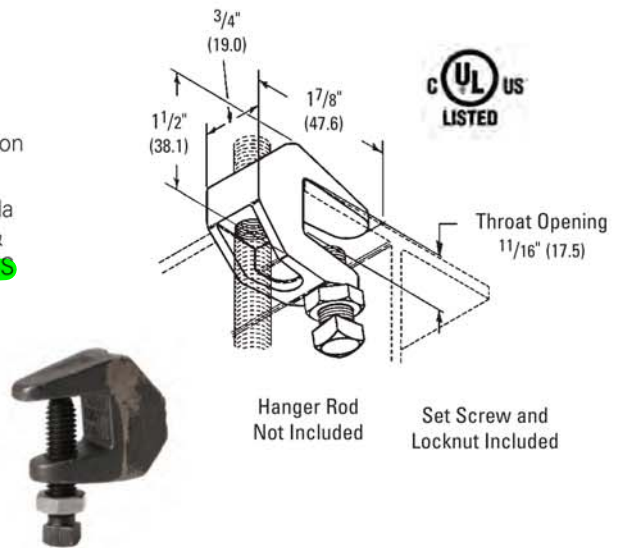
Finish: Plain or Electro-Galvanized

Order By: Part number and finish. When retaining strap is required, order Fig. 69 separately. See Page 37.

Weight: Approx. Wt./100 25 Lbs. (11.3kg)

Design Load: 350 Lbs. (1.55kN)

Note: See page 27 for recommended setscrew torque.



B3033 - Wide Jaw Reversible C-Clamp

Size Range: 3/8"-16 thru 3/4"-10 rod

Material: Cast Malleable Steel with hardened cup point set screw and jam nut

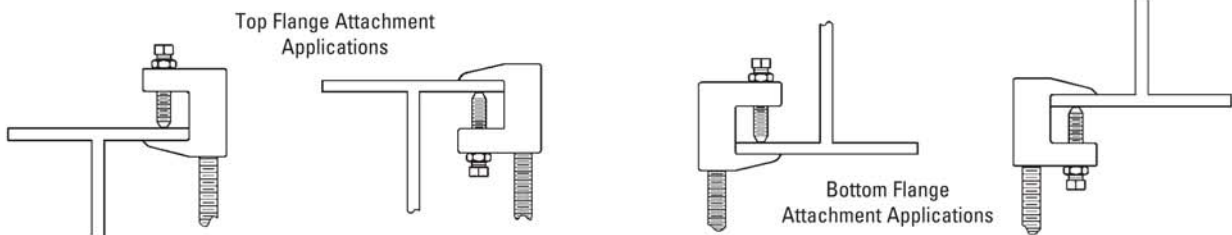
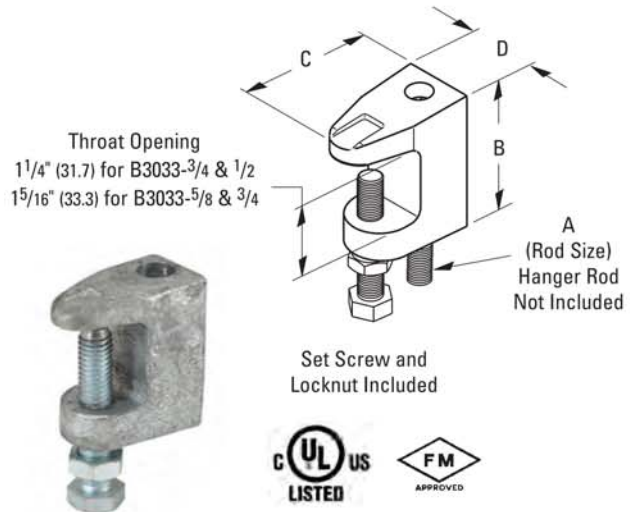
Function: For attachment to structural shapes requiring wider throat especially under roof with bar joist construction. This clamp may be used with the set screw in the up or down position.

Approvals: Underwriters Laboratories Listed in the USA (UL) and Canada (cUL), and Factory Mutual Engineering Approved (FM). Conforms to Federal Specification WW-H-171E Type 19 & A-A-1192A, Type 19 & 23 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 19 & 23.

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

Order By: Part number, rod size and finish

Note: Do not over tighten set screw.



Part No.	Rod Size A	B		C		D		Design Load with Setscrew		Maximum Iron Pipe Size Per UL		Approx. Wt./100 Lbs. (kg)
		in.	(mm)	in.	(mm)	in.	(mm)	Lbs.	(kN)	in.	(mm)	
B3033-3/8	3/8"-16	2 1/4"	(57.1)	2"	(50.8)	1 1/8"	(28.6)	500	(2.22)	4"	(100)	54 (24.5)
B3033-1/2	1/2"-13	2 5/16"	(58.7)	2 3/16"	(55.6)	1 1/4"	(31.7)	810	(3.60)	8"	(200)	51 (23.1)
B3033-5/8	5/8"-11	2 5/8"	(66.7)	2 1/2"	(63.5)	1 3/8"	(34.9)	1000	(4.45)	8"	(200)	70 (31.7)
B3033-3/4	3/4"-10	2 11/16"	(68.3)	2 1/2"	(63.5)	1 7/16"	(36.5)	1400	(6.23)	10"	(250)	98 (44.4)

Note: See page 27 for recommended setscrew torque.

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

Beam Clamps

B3034 - C-Clamp

Size Range: 3/8"-16 thru 3/4"-10 rod

Material: Cast Malleable Steel with hardened cup point set screw and jam nut

Function: Recommended for hanging from steel beam where flange thickness does not exceed 3/4" (19.0mm).

Features: May be used on top or bottom flange of the beam. Beveled lip allows hanging from top flange where clearance is limited. may be installed with the set screw in the up or down position. Offset design permits unlimited rod adjustment by allowing the rod to be threaded completely through the clamp. The rear window design permits inspection of thread engagement.

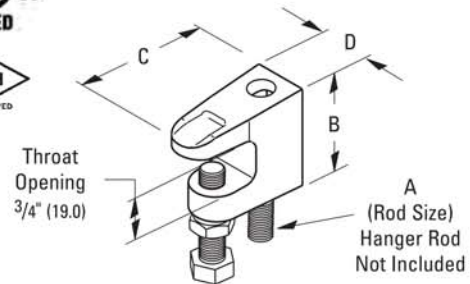
Approvals: Underwriters Laboratories Listed in the USA (UL) and Canada (cUL), and Factory Mutual Engineering Approved (FM) for 3/8"-16 and 1/2"-13 rod sizes. Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 19 & 23 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 19 & 23. 3/8"-16 is (cULus) Listed to support up to 4" (100mm) pipe with the set screw in the down position, up to 3" (75mm) pipe with the set screw in the up position. 1/2"-13 is (cULus) Listed to support up to 8" (200mm) pipe with the set screw in the down position, up to 6" (150mm) pipe with the set screw in the up position.

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

Order By: Part number and finish



B3034-3/8" and B3034-1/2" sizes
Attach only as shown.

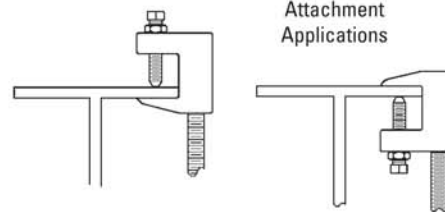


Set Screw and
Locknut Included

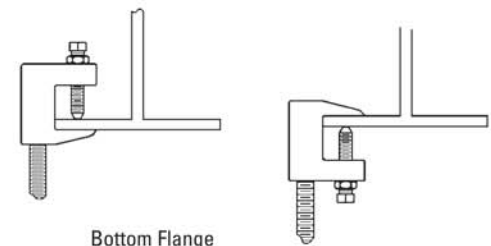


B3034-3/8
Shown

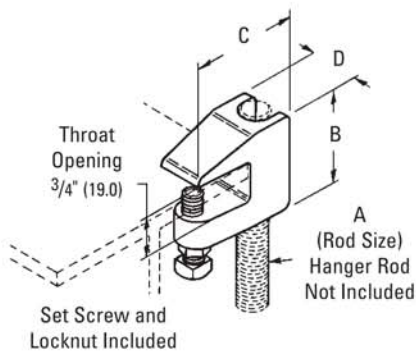
Top Flange
Attachment
Applications



Bottom Flange
Attachment
Applications



B3034-5/8" and B3034-3/4" sizes
Attach only as shown.



Part No.	Rod Size A	B		C		D		Design Load with Setscrew		Maximum Iron Pipe Size Per UL in. (mm)	Approx. Wt./100 Lbs. (kg)
		in.	(mm)	in.	(mm)	in.	(mm)	Lbs.	(kN)		
B3034-3/8	3/8"-16	1 5/8"	(41.3)	2"	(50.8)	7/8"	(19.0)	560	(2.49)	4" (100)	30 (13.6)
B3034-1/2	1/2"-13	1 13/16"	(46.0)	2 3/16"	(55.6)	1 3/16"	(30.2)	810	(3.60)	8" (200)	47 (21.3)
B3034-5/8	5/8"-11	1 3/4"	(44.5)	2 1/8"	(54.0)	1 1/4"	(31.7)	1000	(4.45)	-- --	58 (26.3)
B3034-3/4	3/4"-10	2"	(50.8)	2 1/4"	(57.2)	1 1/4"	(31.7)	1500	(6.67)	-- --	77 (35.0)

Note: See page 27 for recommended setscrew torque.

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

PRODUCT DATA SHEET

OPTI-CODE™ PIPE MARKERS



Description:	Seton Opti-Code™ Pipe Markers are made of self-adhesive, indoor/outdoor grade vinyl with ANSI specifications for background and letter colors, length of color field and letter height.
Use:	Seton Opti-Code™ Pipe Markers are designed for use on pipes from 3/4" O.D. to over 10" O.D. and for use indoors and outdoors.
Compliance:	Seton Opti-Code™ Pipe Markers meet ASME/ANSI A13.1-2007 standards and meets ANSI specifications for background and letter colors, length of field and letter height.
Standard Legend Colors:	Black and White
Standard Background Colors:	Blue, Brown, Green, Orange, Red, and Yellow
Thickness (PSTC-33):	Total 0.005 in. (0.125mm).
Gloss:	60 Gardner Units.

Standard Sizes/Dimensions:	Marker Size	Fits Pipe Outer Diameter	Length Color Field	Letter Height
	8SM	.75" - 1.375" (19mm - 35mm)	8" (203mm)	.5" (13mm)
	8LG	1.5" - 2.375" (38mm - 60mm)	8" (203mm)	.75" (19mm)
	12	2.5" - 7.875" (64mm - 200mm)	12" (305mm)	1.25" (32mm)
	24	8" - 10" (203mm - 254mm)	24" (610mm)	2.50" (64mm)
	32	over 10" (over 254mm)	32" (813mm)	3.50" (89mm)

Date: ___ / ___ / ___ Job: _____

Contractor _____

OPTI-CODE™ PIPE MARKERS (CONTINUED)

Adhesive Properties:	Adhesion to steel (PSTC-1) 15 min. dwell (Avg)—75 oz/in. (82 N/100 mm) Ultimate (72 hrs. dwell) (Avg)—116 oz/in. (127 N/100 mm) Tack (ASTM-2979) (Avg)—800g (8 N) Drop Shear (PSTC-7) (Avg)—4 Hrs																																																																																																																
Abrasion Resistance:	CS-17 Wheels, 1000 g. wts.																																																																																																																
(Method 5306 of U.S. Federal Test Method Std. No. 191A):	Legend withstands up to 700 cycles. Substrate withstands up to 8000 cycles.																																																																																																																
Service Temperature:	-40°F to 180°F (-40°C to 82°C).																																																																																																																
Average Outdoor Durability:	5 years (Average expected outdoor life of product will depend on user definition of failure, climactic conditions, mounting techniques, and material color).																																																																																																																
Chemical Resistance:	<table><thead><tr><th>Reagent</th><th>7 day Immersion</th><th>Dip Test</th><th>Rub Test</th></tr></thead><tbody><tr><td>30% Sulfuric Acid</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>10% Sulfuric Acid</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>30% HCL</td><td>F</td><td>NE</td><td>NE</td></tr><tr><td>10% HCL</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>50% NaOH</td><td>F</td><td>NE</td><td>NE</td></tr><tr><td>10% NaOH</td><td>F</td><td>NE</td><td>NE</td></tr><tr><td>Gasoline</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>Turpentine</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>Glacial Acetic Acid</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>5% Acetic Acid</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>Cellosolve Acetate</td><td>F</td><td>F</td><td>F</td></tr><tr><td>Conc. Ammonia</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>10% Ammonia</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>Methyl Ethyl Ketone</td><td>F</td><td>F</td><td>F</td></tr><tr><td>Acetone</td><td>F</td><td>F</td><td>F</td></tr><tr><td>Methanol</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>1,1,1, Trichloroethane</td><td>F</td><td>F</td><td>F</td></tr><tr><td>IPA (Isopropanol)</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>ASTM #3 Oil</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>SAE 20 Oil</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>Mineral Spirits</td><td>F</td><td>NE</td><td>NE</td></tr><tr><td>Diesel Fuel</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>Heptane</td><td>F</td><td>NE</td><td>F</td></tr><tr><td>Toluene</td><td>F</td><td>F</td><td>F</td></tr><tr><td>Alconox</td><td>F</td><td>NE</td><td>NE</td></tr><tr><td>Kerosene</td><td>NE</td><td>NE</td><td>NE</td></tr><tr><td>Water</td><td>NE</td><td>NE</td><td>NE</td></tr></tbody></table> <p>NE: No Effect F: Failed</p>	Reagent	7 day Immersion	Dip Test	Rub Test	30% Sulfuric Acid	NE	NE	NE	10% Sulfuric Acid	NE	NE	NE	30% HCL	F	NE	NE	10% HCL	NE	NE	NE	50% NaOH	F	NE	NE	10% NaOH	F	NE	NE	Gasoline	F	NE	F	Turpentine	F	NE	F	Glacial Acetic Acid	F	NE	F	5% Acetic Acid	NE	NE	NE	Cellosolve Acetate	F	F	F	Conc. Ammonia	NE	NE	NE	10% Ammonia	NE	NE	NE	Methyl Ethyl Ketone	F	F	F	Acetone	F	F	F	Methanol	F	NE	F	1,1,1, Trichloroethane	F	F	F	IPA (Isopropanol)	F	NE	F	ASTM #3 Oil	NE	NE	NE	SAE 20 Oil	NE	NE	NE	Mineral Spirits	F	NE	NE	Diesel Fuel	F	NE	F	Heptane	F	NE	F	Toluene	F	F	F	Alconox	F	NE	NE	Kerosene	NE	NE	NE	Water	NE	NE	NE
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7 Day Immersion:	Immersed in reagent for 7 days.																																																																																																																
Dip Test:	Five 10 minute dips in reagent with 30 minute recovery.																																																																																																																
Rub Test:	Rubbed sample for one minute with swab soaked in reagent.																																																																																																																
Shelf Life:	1 year when stored at 70°F (21°C) and 40% to 50% R.H.																																																																																																																

PRODUCT DATA SHEET

Engraved Nameplates

Description: Professional-looking Engraved Nameplates are ideal for identifying panel controls, switch boxes or custom installations.

Engraved Aluminum Nameplates

Material:	Aluminum
Thickness:	.020 (+ - .002)
Color Options:	Black, Blue, and Red
Sizes:	2-1/2"W x 3/4"H 3"W x 1"H 4"W x 1-1/2"H 6"W x 3"H
Adhesive:	3M 467 (optional)
Mounting Holes:	Two side holes (unless adhesive ordered)
Service Temperature:	-40°F to 350°F (-40°C to 177°C).
Application Temperature:	50°F (10°C).
Average Outdoor User Durability:	Good for both Indoor and Outdoor use



Engraved Stainless Steel Nameplates

Material:	Stainless Steel
Thickness:	.032 / 23 gauge
Sizes:	2-1/2"W x 3/4"H 3"W x 1"H 4"W x 1-1/2"H 4"W x 2"H
Mounting Holes:	Two 3/16" diameter side holes
Withstands Temps Up To:	2700°F
Average Outdoor User Durability:	Designed for use in harsh or corrosive environments



Date: ___ / ___ / ___ Job: _____

Contractor _____

PRODUCT DATA SHEET

VALVE TAGS

Use: Meet ANSI/ASME A13.1-1981 for identification of materials in pipes of less than 3/4" (19mm) in diameter, and for valve and fitting identification.

Features: Stamping or engraving available. Sequential numbering available.

BRASS VALVE TAGS

Material:	19 gauge solid Brass			
Size/Shape:	1-1/2" Round	2" Round	1-1/2" Square	2" Square
	1-1/2" Hexagon	2" Octagon	1-1/2" Triangle	2" Triangle
Ink Fill Color Options:	Black, Blue, Natural, Red, or White			
Maximum Temperature:	Material 1200°F. Ink fill 233°F			
Top Hole Size:	3/16"			
Letter Height:	1/4"			
Number Height:	1/2"			



ALUMINUM VALVE TAGS

Material:	19 gauge Aluminum			
Size/Shape:	1-1/2" Round	2" Round	1-1/2" Square	2" Square
Ink Fill Color Options:	Black, Blue, Red, or White			
Maximum Temperature:	Material 1500°F. Ink fill 233°F.			
Top Hole Size:	3/16"			
Letter Height:	1/4"			
Number Height:	1/2"			



STAINLESS STEEL VALVE TAGS

Material:	.025 / Grade 304 Stainless Steel			
Size/Shape:	1-1/2" Round	2" Round	1-1/2" Square	2" Square
Ink Fill Color Options:	Natural			
Maximum Temperature:	Material 2700°F. Ink fill 233°F			
Top Hole Size:	3/16"			
Letter Height:	1/4"			
Number Height:	1/2"			



Date: ___ / ___ / ___ Job: _____

Contractor _____

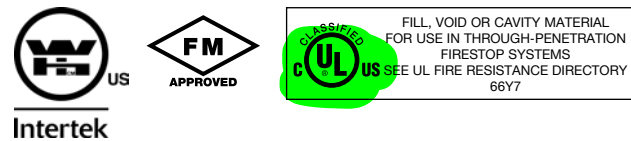
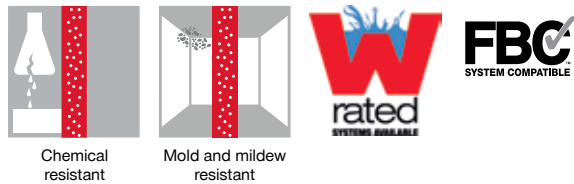
High-performance intumescent firestop sealant FS-ONE MAX

Applications

- For effectively sealing most common through penetrations in a variety of base materials
- For use on concrete, masonry and drywall
- Mixed and multiple penetrations
- Metal pipe penetrations: copper, steel and EMT
- Insulated metal pipe penetrations: steel and copper
- Plastic pipe penetrations: closed or vented

Advantages

- US-produced: "Buy American" compliant
- One product for a variety of common through penetrations
- Cost-effective, easy-to-use solution
- Water-based and paintable
- Industry-leading VOC results
- Ethylene glycol-free



Technical data	
Chemical basis	Water-based acrylic dispersion
Approx. Density	84.3 lb/ft ³
Color	Red
Application temperature range	41 - 104 °F
Approx. cure time ¹⁾	4 mm/3 days
Temperature resistance range	-4 to 212 °F
Mold and mildew performance	Class 0 (ASTM G21-96)
Mold and mildew resistance	Yes
Surface burning characteristics UL 723 (ASTM E84)	Flame spread: 0 Smoke development: 10
Tested in accordance with	UL 1479, ASTM E814, ASTM E84, CAN/ ULC-S115, ASTM G21, ASTM E90
California State fire marshal approval	CSFM Listing 4485-1200:0108 for FS-ONE MAX Intumescent Firestop Sealant
Expansion ratio (unrestricted, up to)	1:5

¹⁾ at 75°F/24°C, 50% relative humidity



Order Designation	Package Content	Item number
FS-ONE MAX 20oz foil (3 case + disp)	1x Foil pack dispenser manual CS 270-P1, 75x Firestop sealant FS-ONE MAX 20 oz foil	3530252
FS-ONE MAX 10oz tube (1 case)	12x Firestop sealant FS-ONE MAX 10 oz cartridge	3530249
FS-ONE MAX 5 gallon (18 pails)	18x Firestop sealant FS-ONE MAX 5 gallon pail	3530263
FS-ONE MAX 20oz foil (1 case)	25x Firestop sealant FS-ONE MAX 20 oz foil	3530250
FS-ONE MAX 20oz foil (3 cases)	75x Firestop sealant FS-ONE MAX 20 oz foil	3530251
FS-ONE MAX 20oz Foil-Pallet	600x FSONE-MAX 20 oz foil, 290x Bulk Shipping Condition	3534713
FS-ONE MAX 10 oz cartridge		2101531
FS-ONE MAX 5 gallon pail		2101533

Cast-In Firestop Devices (CP 680-P and CP 680-M)

For use in

- Dust and fiber free environments such as hospitals, computer centers and laboratories
- Concrete floor assemblies rated up to 4 hours

Product description

- A one-step cast-in firestop device for a variety of pipe materials and diameters
- Helps reduce labor costs and increase productivity
- Ready-to-use out of the package
- Internationally tested and approved by UL and FM
- Reduces the chance of project delays due to failed inspections

Product features

- Quick and simple installation
- SpeedLine Alignment system promotes faster layout
- QuickTurn System creates fast, simple vertical connections
- Integrated moisture and smoke seal
- Innovative adapter for metal deck applications

Installation and applications

- Concrete floors from 2.5" (63 mm) thickness for either flat concrete or concrete over metal deck

CP 680-M:

- Insulated and non-insulated metal pipes
- EMT and electrical conduits
- Cable bundles
- Multiple pipes

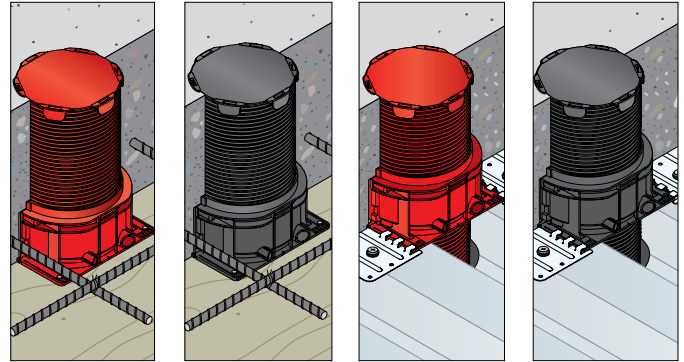
CP 680-P:

Addresses all applications for CP 680-M as well as the following:

- Plastic pipes such as PVC, CPVC, ABS, ENT and FRPP
- Fresh and waste water pipes

Not suited for

- Areas with high condensation
- Outdoor areas
- Wall applications



CP 680-P in concrete over wood forms

CP 680-M in concrete over wood forms

CP 680-P over metal deck

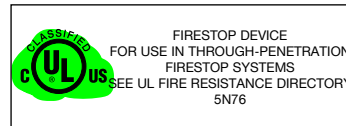
CP 680-M over metal deck

Technical Data		CP 680-P and CP 680-M
ID	Footprint	Opening required thru metal deck
2"	3-3/4" x 4-1/2"	3-1/2" diameter
3"	4-3/4" x 5-5/8"	4-1/2" diameter
4"	6-3/8" x 6-3/4"	5-1/2" diameter
6"	9" x 9-1/2"	7-1/4" diameter
Expansion temperature		392°F (200°C)
Expansion rate		1:50 (unrestrained) 1:30 (Load expansion, Load = 20g/cm³)
Standard height		8"
Temperature resistance		Maximum 212°F (100°C)
Color		CP 680-P: red CP 680-M: black

Tested in accordance with

- UL 1479 • ASTM E 814 • ASTM G21

Internationally tested and approved



Installation instructions

Notice

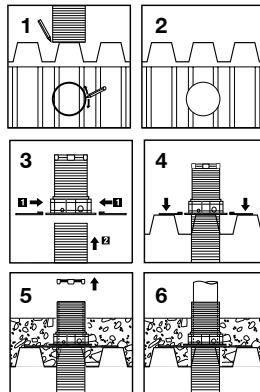
- Before handling, read Material Safety Data Sheet and product label for safe usage and health information.
- Instructions below are general guidelines — always refer to the applicable drawing in the UL Fire Resistance Directory or Hilti Firestop Systems Guide for complete installation information

Instructions for use

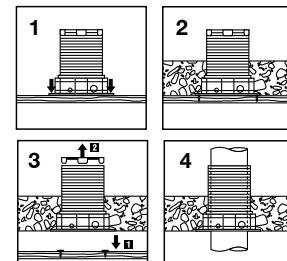
- Before pouring concrete, secure the cover cap in place, thereby preventing the flow of concrete into the cast-in device
- Do not use for wall applications

Concrete floor with metal decking

For concrete floor with metal decking applications use the correct size CP 680 Metal Deck Adapter for installed cast-in device and follow the illustrations.



Concrete floor



Installation option

Follow the illustrations if CP 680 has to be cut to slab thickness before installation, or when riser clamps are used.

