*Quality People. Building Solutions.*

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

**Date:** 2/12/2024
**Return Request:** 2/22/2024
**Project:** Arkansas Children's Hospital – 4D Renovations
**Supplier:** Comfort Systems USA (Arkansas), Inc.
**Manufacturer:** Various
**Submittal:** Hydronic Piping
**Submittal Number:** 23 21 13-01
**Drawing # and Installation:** Mechanical Drawings

**ARCHITECT**
Cromwell
1300 E. 6th Street
Little Rock, AR 72202
501-372-2900

**ENGINEER**
Cromwell
1300 E. 6th Street
Little Rock, AR 72202
501-372-2900

**GENERAL CONTRACTOR**
Nabholz
612 Garland St.
Conway, AR 72032
501-505-5800

**MECHANICAL SUBCONTRACTOR**
Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

chowell@comfortar.com

| Pipe Valve & Fitting Schedule - ACH 4D Renovations | | | | |
|---|---|---|---|---|
| **System** | **Spec Section** | **Pipe** | **Fittings** | **Joint** |
| Heating Water Piping 2" & Below - Above Grade | 23 21 13 | Type L Hard Copper; ASTM B88 | Wrought Copper; ASME B.16.22/Press Copper | Lead-Free Solder; ASTM B32/Mechanical Press |

# Fig. 260 (Formerly Afcon Fig. 371) Adjustable Clevis Hanger

**Size Range:** 1/2" through 30"
**Material:** Carbon steel
**Finish:** ☐ Plain, ☐ 8" & Smaller: Zinc Plated (Hot-Dip Galvanized optional), 10" & Larger: Hot-Dip Galvanized with Zinc Plated Bolts & Nuts, or ☐ Primed, also available in ☐ Plastic or ☐ Epoxy Coated.
**Service:** Recommended for the suspension of stationary pipe lines.
**Maximum Temperature:** Plain 650° F, Galvanized and Epoxy 450° F
**Approvals:** Complies with Federal Specification A-A-1192A (Type 1), *WW-H-171-E (Type 1)*, ANSI/MSS SP-69 and MSS SP-58 (Type 1). FM Approved (Sizes 3/4" through 8"), UL and ULC Listed (Sizes 1/2" through 8")
**Installation:** Hanger load nut *above* clevis must be tightened securely to assure proper hanger performance.
**Adjustment:** Vertical adjustment without removing pipe may be made from 3/8" through 5 1/8", varying with the size of clevis. Tighten upper nut after adjustment.
**Features:**

- Design has yoke on outside of lower U-strap so yoke cannot slide toward center of bolt, thus bending of bolt is minimized.
- Sizes 5" and up have rod and two nuts instead of bolt and nut; thread length on clevis rod is such that the thread locks the nuts in place, and threads are not in shear plane.

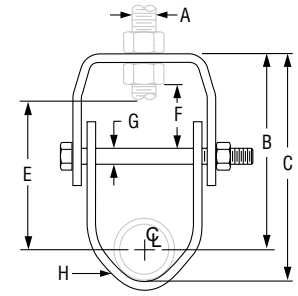
**Ordering:** Specify pipe size, figure number, name and finish.
**Notes:**

- Punched forming holes may be present on certain sizes of this clevis hanger. These holes are solely for the purpose of manufacturing, and do not effect the structural integrity or load carrying capacities of these hangers.
- For insulated line options without shields, see Figures 260 ISS and Figure 300. For insulated line options with shields, see Figures 167 and 168. For ductile iron pipe sizes, see Figure 590.
- Fig. 260F (Felt lined) – available for use for suspension of copper (or other material) so as to prevent electrolysis between the dissimilar metals of the hanger and the pipe, tube or conduit.

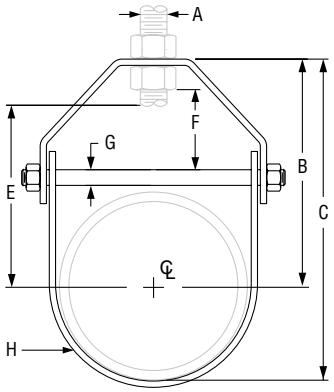
**Caution:** When an oversize clevis is used, a pipe spacer or multispacer should be placed over clevis bolt to ensure that the lower U-strap will not move in on the bolt.

| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ Approved |
| **Address:** | ☐ Approved as noted |
| **Contractor:** Comfort Systems USA (Arkansas), Inc. | ☐ Not approved |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

# Fig. 260 (Formerly Afcon Fig. 371) Adjustable Clevis Hanger (cont.)




Pipe Size 1/2" to 3/4"




Pipe Sizes 1" and Larger

**FIG. 260: DIMENSIONS (IN) • LOADS (LBS) • WEIGHTS (LBS)**

| Pipe Size | Max Load | Span Ft. | Weight | Rod Size A | B | C | Rod Take Out E | Adjust. F | G | H Width Lower |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 610 | 7* | 0.34 | 3/8 | 2 3/16 | 2 11/16 | 1 1/2 | 5/8 | 1/4 | 1 |
| 3/4 | | | 0.34 | | 2 | | 1 5/16 | | | |
| 1 | 730 | | 0.35 | | 2 5/16 | 3 | 1 5/8 | | | |
| 1 1/4 | | | 0.40 | | 2 3/8 | 3 1/4 | 1 11/16 | | | |
| 1 1/2 | | 9* | 0.45 | | 2 13/16 | 3 13/16 | 2 1/8 | 7/8 | | |
| 2 | | 10* | 0.50 | | 3 5/16 | 4 1/2 | 2 5/8 | 1 1/8 | | |
| 2 1/2 | 1,350 | 11* | 0.65 | 1/2 | 4 1/16 | 5 1/2 | 3 3/16 | 1 5/16 | 3/8 | |
| 3 | | 12* | 0.85 | | 4 3/4 | 6 1/2 | 4 1/16 | 1 5/8 | | |
| 3 1/2 | | 13* | 1.10 | | 5 1/16 | 7 1/16 | 4 3/16 | 1 13/16 | | 1 1/4 |
| 4 | 1,430 | 14* | 1.51 | 5/8 | 5 9/16 | 7 13/16 | 4 1/2 | 1 11/16 | 3/8 | |
| 5 | | 16* | 1.70 | | 6 9/16 | 8 15/16 | 5 1/2 | 1 15/16 | | 1 3/16 |
| 6 | 1,940 | 17* | 3.10 | 3/4 | 6 15/16 | 10 1/4 | 5 3/4 | 1 11/16 | 1/2 | 1 7/16 |
| 8 | 2,000 | 19* | 4.75 | | 8 3/8 | 12 11/16 | 7 3/16 | 2 | | |
| 10 | 3,600 | 22* | 8.60 | 7/8 | 9 7/8 | 15 1/4 | 8 7/16 | 2 1/8 | 5/8 | 1 3/4 |
| 12 | 3,800 | 23* | 11.20 | | 11 9/16 | 17 15/16 | 10 1/8 | 2 13/16 | | 2 |
| 14 | 4,200 | 25* | 12.50 | 1 | 12 9/16 | 19 9/16 | 10 11/16 | 2 11/16 | 3/4 | |
| 16 | 4,600 | 27 | 19.85 | | 14 | 22 | 12 | 2 3/4 | 1 | 2 1/2 |
| 18 | 4,800 | 28 | 22.25 | | 15 15/16 | 24 15/16 | 13 15/16 | 3 13/16 | | |
| 20 | 4,800 | 30 | 40.33 | 1 1/4 | 17 9/16 | 27 9/16 | 15 3/16 | 3 7/8 | 1 1/4 | 3 |
| 24 | 4,800 | 32 | 49.83 | | 19 13/16 | 31 13/16 | 17 5/16 | | 7/8* | |
| 30** | 6,000 | 33 | 70.18 | | 24 3/16 | 39 3/16 | 21 9/16 | 5 1/8 | 1 1/4 | |

"Span" represents the maximum recommended distance between hangers on a continuous and straight run of horizontal standard weight steel pipe filled with water. In all cases, verify that chosen location of hangers does not subject hangers to a load greater than the maximum recommended load shown above. *Indicates that span represents the maximum span for water filled pipe.

* The 24" pipe size assembly includes a 1 1/4" SCH 40 pipe spacer over the 7/8" threaded rod.

** 30" pipe size: When assembled, the U-strap sits outside of the yoke.

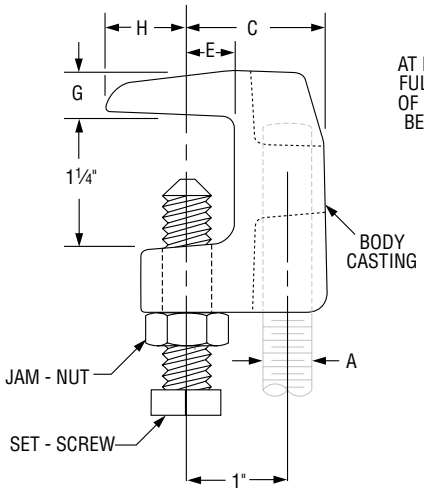
# Fig. 93 (Formerly Afcon Fig. 105) Universal C-type Clamp (Wide Throat)

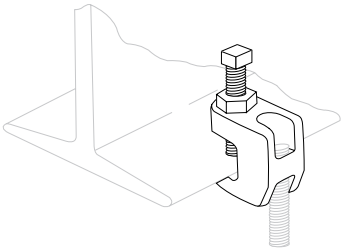
**Size Range:** 3/8" and 1/2"
**Material:** Ductile iron clamp, hardened steel cup point set screw and locknut.
**Finish:** ☐ Plain or ☐ Zinc Plated (Hot-Dip Galvanized optional)
**Service:** Recommended for use under roof installations with bar joist type constructions, or for attachment to the top or bottom flange of structural shapes where the vertical hanger rod is required to be offset from the edge of the flange and where the thickness of joist or flange does not exceed 1 1/4".
**Approvals:** Complies with Federal Specification A-A-1192A (Type 19 & 23), *WW-H-171-E (Type 23)*, ANSI/MSS SP-69 and MSS SP-58 (Type 19 & 23). UL, ULC Listed and FM Approved.
**How to size:** Size of clamp is determined by size of rod to be used.
**Installation:** Follow recommended set screw torque values per MSS-SP-69.
**Features:**

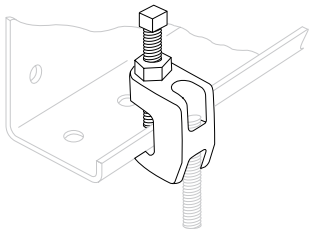
- They may be attached to horizontal flanges of structural members in either the top beam or bottom beam positions.
- Secured in place by a cup-pointed Set Screw tightened against the flange. A Jam Nut is provided for tightening the Set Screw against the Body Casting.
- Thru tapping of the body casting permits extended adjustment of the threaded rod.
- Wider throat for attaching to flange with up to 1 1/4" thickness.

**Ordering:** Specify rod size, figure number, name of clamp and finish.

C UL US LISTED FM APPROVED





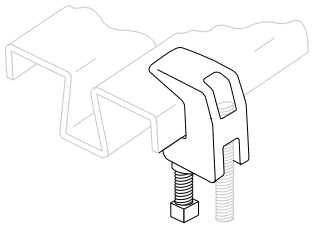


**FIG. 93: DIMENSIONS (IN) • LOAD (LBS) • TORQUE (IN-LBS) • WEIGHT (LBS)**

| Rod Size A | Set Screw Size | Torque Value | Max Loads ■ | | Weight | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Top | Bottom | | | | | | | |
| 3/8 | 3/8 | 60 | 500 | 250 | 0.41 | 1 5/16 | 2 5/32 | 9/16 | 13/16 | 3/8 | 5/8 |
| 1/2 | 1/2 | 125 | 950 | 760 | 0.75 | 1 3/8 | 2 11/32 | 1/2 | 1 1/16 | 7/16 | 13/16 |

■ Maximum temperature of 450° F

| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ Approved |
| **Address:** | ☐ Approved as noted |
| **Contractor:** Comfort Systems USA (Arkansas), Inc. | ☐ Not approved |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

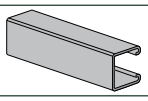
# ANVIL-STRUT™ CHANNEL

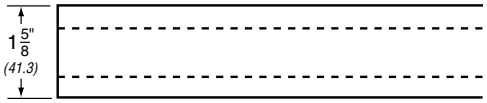
A BRAND OF ANVIL INTERNATIONAL

ANVIL INTERNATIONAL

❑ **AS 210** ❑ PL, ❑ GR, ❑ PG, ❑ SS, ❑ ZTC, ❑ HG

## SOLID

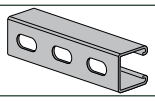


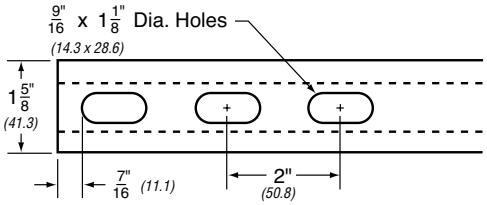



Wt/100 Ft: 145 Lbs

☑ **AS 210EH** ☐ PL, ☑ GR, ☐ PG, ☐ SS, ☐ ZTC, ☑ HG

## WITH ELONGATED HOLES

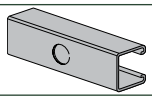


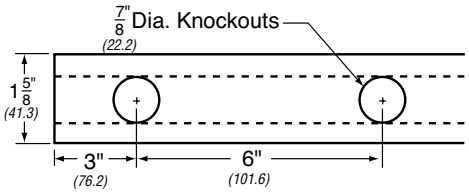



Wt/100 Ft: 140 Lbs

☐ **AS 210KO** ☐ PL, ☐ GR, ☐ PG, ☐ Other_____

## WITH KNOCK OUT

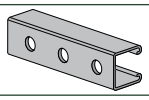


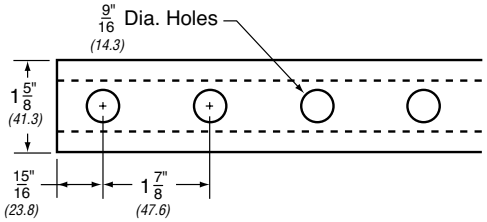



Wt/100 Ft: 145 Lbs

☐ **AS 210H** ☐ PL, ☐ GR, ☐ PG, ☐ Other_____

## WITH HOLES

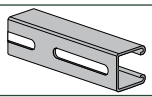


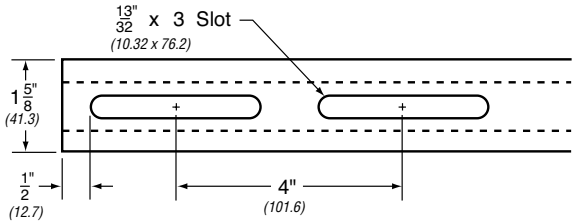



Wt/100 Ft: 140 Lbs

☐ **AS 210S** ☐ PL, ☐ GR, ☐ PG, ☐ Other_____

## WITH LONG SLOTS






Wt/100 Ft: 130 Lbs

**LEGEND:**

**GR:** Powder Coated Supr-Green **EG:** Electro-Galvanized **PG:** Pre-Galvanized **AL:** Aluminum **HG:** Hot Dipped Galvanized **PL:** Plain **SS:** Stainless Steel **ZTC:** Zinc Trivalent Chromium

Stainless Steel (**SS**), Zinc Trivalent Chromium (**ZTC**) and Hot Dipped Galvanized (**HG**) are specialty finishes. Pricing is located in the Specialty Strut Section of the Anvil-Strut price book.

| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ **Approved** |
| **Address:** | ☐ **Approved as noted** |
| **Contractor:** | ☐ **Not approved** |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

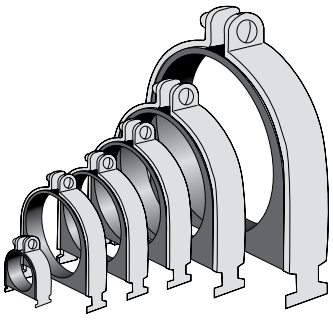
☐ AS 004OD THRU AS 106P ☐ EG, ☐ 304SS, ☐ 316SS, ☐ ZTC

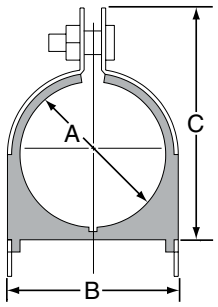
## CUSHION CLAMP ASSEMBLY

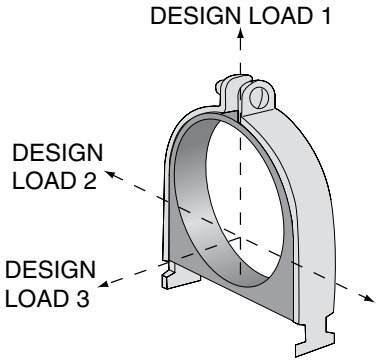
**Material**
Clamp: 1008-1018 Carbon Steel
Cushion: High Strength TPE
Locknut: Nylon Insert

Service Temperature:
-65˚F to 275˚F.

**Approvals**
UL 2043 Fire Test for Heat and Visible Smoke Release
25/50 Flame Spread/Smoke Development Index






| TUBE SERIES | | | | | | |
|---|---|---|---|---|---|---|
| Part No. | O.D. Size | A | B | C | Std Pkg | Wt/100 pcs |
| AS 004OD | 1/4" | 0.25 | 0.62 | 0.98 | 25 | 10 |
| AS 006ODN | 3/8" | 0.37 | 0.82 | 1.13 | 25 | 11 |
| AS 008ODN | 1/2" | 0.50 | 0.94 | 1.34 | 25 | 13 |
| AS 010ODN | 5/8" | 0.62 | 1.06 | 1.54 | 25 | 14 |
| AS 012ODN | 3/4" | 0.75 | 1.20 | 1.68 | 25 | 14 |
| AS 014ODN | 7/8" | 0.87 | 1.31 | 1.82 | 25 | 15 |
| AS 016OD | 1" | 1.00 | 1.44 | 1.95 | 25 | 17 |
| AS 018ODN | 1 1/8" | 1.12 | 1.57 | 2.08 | 20 | 18 |
| AS 020OD | 1 1/4" | 1.25 | 1.70 | 2.21 | 20 | 18 |
| AS 022ODN | 1 3/8" | 1.37 | 1.82 | 2.34 | 20 | 20 |
| AS 024OD | 1 1/2" | 1.50 | 1.95 | 2.47 | 20 | 33 |
| AS 026ODN | 1 5/8" | 1.62 | 2.07 | 2.60 | 20 | 35 |
| AS 028OD | 1 3/4" | 1.75 | 2.20 | 2.73 | 20 | 37 |
| AS 032OD | 2" | 2.00 | 2.45 | 3.04 | 10 | 41 |
| AS 034OD | 2 1/8" | 2.12 | 2.57 | 3.23 | 10 | 46 |
| AS 040OD | 2 1/2" | 2.50 | 2.94 | 3.79 | 10 | 49 |
| AS 042OD | 2 5/8" | 2.62 | 3.07 | 3.92 | 5 | 51 |
| AS 048OD | 3" | 3.00 | 3.57 | 4.42 | 5 | 57 |
| AS 050OD | 3 1/8" | 3.12 | 3.57 | 4.42 | 5 | 60 |
| AS 058OD | 3 5/8" | 3.62 | 4.20 | 5.11 | 5 | 70 |
| AS 066OD | 4 1/8" | 4.12 | 4.57 | 5.54 | 5 | 94 |
| AS 082OD | 5 1/8" | 5.12 | 5.57 | 6.54 | 5 | 125 |
| AS 098OD | 6 1/8" | 6.12 | 6.57 | 7.54 | 5 | 130 |

| TUBE SERIES | | | |
|---|---|---|---|
| Copper & Steel Tube O.D. Size | Design Load 1 (lbs) | Design Load 2 (lbs) | Design Load 3 (lbs) |
| 1/4" | 400 | 50 | 50 |
| 3/8" | 400 | 50 | 50 |
| 1/2" | 400 | 50 | 50 |
| 5/8" | 400 | 50 | 50 |
| 3/4" | 600 | 75 | 75 |
| 7/8" | 600 | 75 | 75 |
| 1" | 600 | 75 | 75 |
| 1 1/8" | 600 | 75 | 75 |
| 1 1/4" | 600 | 75 | 75 |
| 1 3/8" | 600 | 75 | 75 |
| 1 1/2" | 600 | 75 | 75 |
| 1 5/8" | 600 | 75 | 75 |
| 1 3/4" | 800 | 125 | 125 |
| 1 7/8" | 800 | 125 | 125 |
| 2" | 800 | 125 | 125 |
| 2 1/8" | 800 | 125 | 125 |
| 2 1/4" | 800 | 125 | 125 |
| 2 3/8" | 800 | 125 | 125 |
| 2 1/2" | 800 | 125 | 125 |
| 2 5/8" | 800 | 125 | 125 |
| 3" | 800 | 125 | 125 |
| 3 1/8" | 800 | 125 | 125 |
| 3 5/8" | 1000 | 200 | 150 |
| 4 1/8" | 1000 | 200 | 150 |
| 6 1/8" | 1000 | 200 | 150 |

Std Pkg & Wt/100 pcs: See chart above.

**PIPE SERIES ON NEXT PAGE**

**LEGEND:**
**GR:** Powder Coated Supr-Green **EG:** Electro-Galvanized **PG:** Pre-Galvanized **AL:** Aluminum **HG:** Hot Dipped Galvanized **PL:** Plain **SS:** Stainless Steel **ZTC:** Zinc Trivalent Chromium Stainless Steel (**SS**), Zinc Trivalent Chromium (**ZTC**) and Hot Dipped Galvanized (**HG**) are specialty finishes. Pricing is located in the Specialty Strut Section of the Anvil-Strut price book.

| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ **Approved** |
| **Address:** | ☐ **Approved as noted** |
| **Contractor:** Comfort Systems USA (Arkansas), Inc. | ☐ **Not approved** |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

## CUSHION CLAMP ASSEMBLY

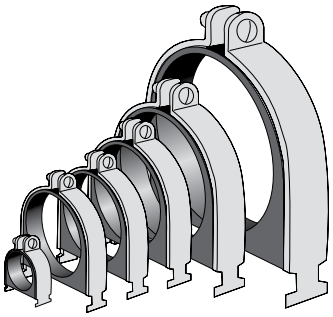
**Material**

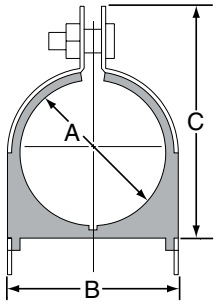
Clamp: 1008-1018 Carbon Steel
Cushion: High Strength TPE
Locknut: Nylon Insert

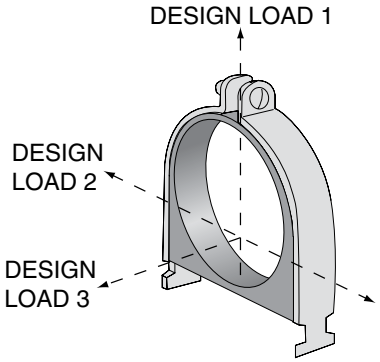
Service Temperature:
-65˚F to 275˚F.

**Approvals**

UL 2043 Fire Test for Heat and Visible Smoke Release
25/50 Flame Spread/Smoke Development Index






| PIPE SERIES | | | | | | |
|---|---|---|---|---|---|---|
| Part No. | O.D. Size | A | B | C | Std Pkg | Wt/100 pcs |
| AS 009P | 1/4" Pipe | 0.54 | 0.98 | 1.34 | 25 | 13 |
| AS 011P | 3/8" Pipe | 0.67 | 1.13 | 1.54 | 25 | 14 |
| AS 014P | 1/2" Pipe | 0.84 | 1.29 | 1.82 | 25 | 15 |
| AS 017P | 3/4" Pipe | 1.05 | 1.50 | 2.08 | 20 | 17 |
| AS 021P | 1" Pipe | 1.31 | 1.76 | 2.34 | 20 | 19 |
| AS 027P | 1 1/4" Pipe | 1.66 | 2.17 | 2.73 | 20 | 35 |
| AS 030ODP | 1 1/2" Pipe | 1.90 | 2.35 | 2.86 | 20 | 39 |
| AS 038ODP | 2" Pipe | 2.37 | 2.82 | 3.67 | 10 | 47 |
| AS 046ODP | 2 1/2" Pipe | 2.87 | 3.32 | 4.17 | 5 | 55 |
| AS 056ODP | 3" Pipe | 3.50 | 3.95 | 4.79 | 5 | 55 |
| AS 064ODP | 3 1/2" Pipe | 4.00 | 4.45 | 5.42 | 5 | 88 |
| AS 072ODP | 4" Pipe | 4.50 | 4.95 | 5.92 | 5 | 110 |
| AS 089P | 5" Pipe | 5.56 | 6.01 | 6.92 | 5 | 130 |
| AS 106P | 6" Pipe | 6.62 | 7.07 | 8.23 | 5 | 140 |

| PIPE SERIES | | | |
|---|---|---|---|
| Pipe Sizes (Nominal) | Design Load 1 (lbs) | Design Load 2 (lbs) | Design Load 3 (lbs) |
| 1/4" | 400 | 50 | 50 |
| 3/8" | 600 | 75 | 75 |
| 1/2" | 600 | 75 | 75 |
| 3/4" | 600 | 75 | 75 |
| 1" | 600 | 75 | 75 |
| 1 1/4" | 800 | 125 | 125 |
| 1 1/2" | 800 | 125 | 125 |
| 2" | 800 | 125 | 125 |
| 2 1/2" | 800 | 125 | 125 |
| 3" | 1000 | 200 | 150 |
| 3 1/2" | 1000 | 200 | 150 |
| 4" | 1000 | 200 | 150 |
| 5" | 1000 | 200 | 150 |
| 6" | 1000 | 200 | 150 |

Std Pkg & Wt/100 pcs: See chart above.

**TUBE SERIES ON PREVIOUS PAGE**

# Fig. 146 (Formerly Afcon Fig. 650) Continuous Threaded Rod

**Size Range:** 1/4" through 1 1/2" Stocked in six, ten, and twelve foot lengths. Other even foot lengths can be furnished to order.
**Material:** Carbon steel or Stainless Steel Gr 304
**Threads:** National Coarse (USS), rod threaded complete length.
**Finish:** ☐ Plain or ☐ Zinc Plated (Hot-Dip Galvanized optional)
**Maximum Temperature:** Zinc Plated 450˚F, Stainless Steel 650˚ F
**Approvals:** Complies with MSS SP-58.
**Ordering:** Specify rod diameter and length, figure number, name and finish.
**Note:** The acceptability of galvanized coatings at temperatures above 450˚F is at the discretion of the end user.

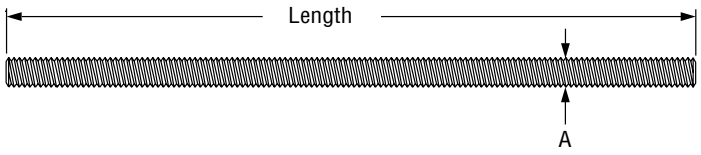


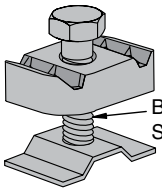

**FIG. 146:**
**DIMENSIONS (IN) • LOADS (LBS) • WEIGHTS (LBS)**

| Rod Size A | Threads per Inch | Max Load 650˚ F | Weight per Ft. |
|---|---|---|---|
| 1/4 | 20 | 240 | 0.12 |
| 3/8 | 16 | 730 | 0.30 |
| 1/2 | 13 | 1,350 | 0.53 |
| 5/8 | 11 | 2,160 | 0.84 |
| 3/4 | 10 | 3,230 | 1.20 |
| 7/8 | 9 | 4,480 | 1.70 |
| 1 | 8 | 5,900 | 2.30 |
| 1 1/4 | 7 | 9,500 | 3.60 |
| 1 1/2 | 6 | 13,800 | 5.10 |

| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ Approved |
| **Address:** | ☐ Approved as noted |
| **Contractor:** Comfort Systems USA (Arkansas), Inc. | ☐ Not approved |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

☐ AS 3500 ☐ EG, ☐ ZTC

## SEISMIC ROD STIFFENER

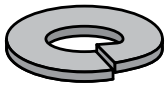



| Size | Wt./100 Pcs. |
|---|---|
| 3/8" - 5/8" | 16 |

Std Pkg: 25 · Wt/100 pcs: See chart above.

☐ AS 211 ☐ EG

## LOCK WASHER

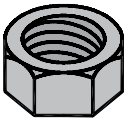


| Size | Wt./100 Pcs. |
|---|---|
| 1/4" | 0.3 |
| 3/8" | 0.7 |
| 1/2" | 1.5 |

Std Pkg: 100 · Wt/100 pcs: See chart above.

☐ AS 83 ☑ EG

## HEXAGON NUT

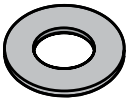


| Size | Std. Pkg. | Wt./100 Pcs. |
|---|---|---|
| 1/4" | 500 | 0.6 |
| 3/8" | 500 | 1.6 |
| 1/2" | 100 | 4.8 |
| 5/8" | 50 | 7.0 |
| 3/4" | 50 | 12.0 |

Std Pkg & Wt/100 pcs: See chart above.

☐ AS 209 ☑ EG

## FLAT WASHER

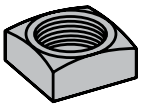


| Size | Std. Pkg. | Wt./100 Pcs. |
|---|---|---|
| 1/4" | 200 | 0.7 |
| 3/8" | 100 | 1.5 |
| 1/2" | 100 | 3.5 |
| 5/8" | 100 | 8.0 |
| 3/4" | 100 | 11.0 |

Std Pkg & Wt/100 pcs: See chart above.

☐ AS 6108 ☐ EG

## SQUARE NUT

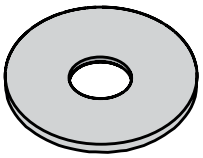


| Size | Std. Pkg. | Wt./100 Pcs. |
|---|---|---|
| 1/4" | 100 | 0.9 |
| 5/16" | 100 | 1.6 |
| 3/8" | 100 | 2.7 |
| 1/2" | 100 | 5.8 |

Std Pkg & Wt/100 pcs: See chart above.

☐ AS 230 ☐ EG

## FENDER WASHER



| Size | Std. Pkg. | Wt./100 Pcs. |
|---|---|---|
| 1/4" | 100 | 3.3 |
| 3/8" | 100 | 3.0 |
| 1/2" | 100 | 2.8 |

Std Pkg & Wt/100 pcs: See chart above.

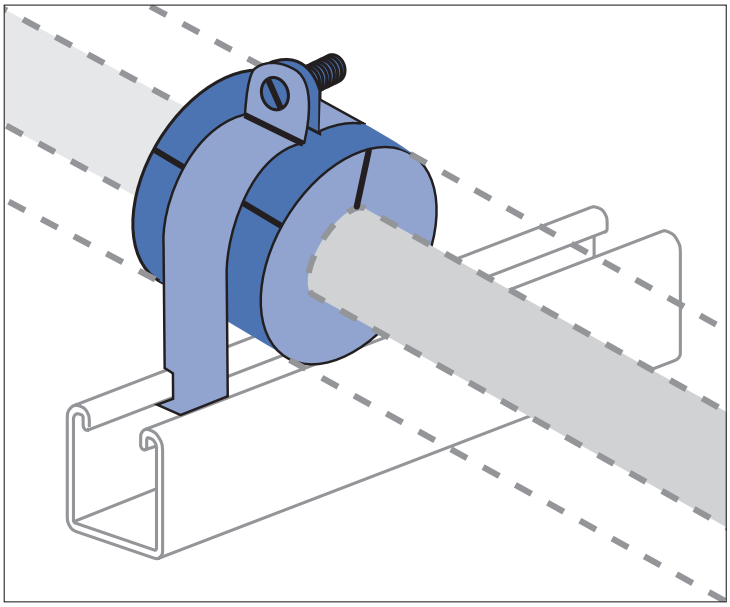
**LEGEND:**

**GR:** Powder Coated Supr-Green **EG:** Electro-Galvanized **PG:** Pre-Galvanized **AL:** Aluminum **HG:** Hot Dipped Galvanized **PL:** Plain **SS:** Stainless Steel **ZTC:** Zinc Trivalent Chromium

Stainless Steel (**SS**), Zinc Trivalent Chromium (**ZTC**) and Hot Dipped Galvanized (**HG**) are specialty finishes. Pricing is located in the Specialty Strut Section of the Anvil-Strut price book.

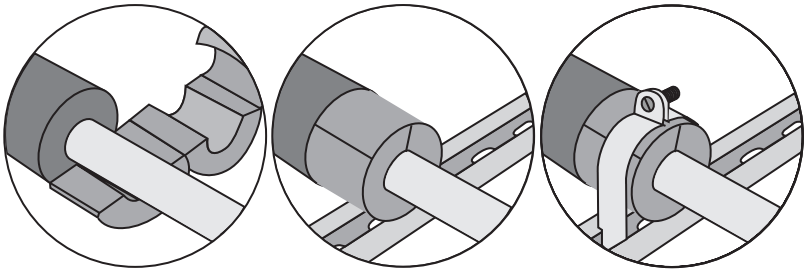
| PROJECT INFORMATION | APPROVAL STAMP |
|---|---|
| **Project:** | ☐ **Approved** |
| **Address:** | ☐ **Approved as noted** |
| **Contractor:** Comfort Systems USA (Arkansas), Inc. | ☐ **Not approved** |
| **Engineer:** | **Remarks:** |
| **Submittal Date:** | |
| **Notes 1:** | |
| **Notes 2:** | |

## PUX3834 THRU PUX41810 CUSH–A–THERM™



The only airtight, crush-resistant insulation clamp on the market.

- Maintains thermal barrier protection
- Prevents condensation
- Properly supports pipe and tube
- Absorbs vibration



1. Insulation slides over pipes
2. Pipe hanger inserts are put in place and glued to insuation.
3. Joints are wrapped and sealed with ProTape.

## MATERIAL

Unistrut pipe clamps, unless noted, are punch-press made from hot-rolled, pickled and oiled steel plates, strip or coil, and conform to ASTM specifications A1008, A575, A576, A635, or A36. The fitting steel also meets the physical requirements of ASTM A1011 SS GR 33. The pickling of the steel produces a smooth surface free from scale.

Many items are also available in stainless steel.

Consult factory for ordering information.

## FINISHES

Pipe supports are available in:

- Electro-galvanized (EG), conforming to ASTM B633 Type III SC1
- Hot-dipped galvanized (HG), conforming to ASTM A123 or A153 (hardware)
- Perma-Green III (GR), and plain (PL).

**Project:** _____

**Architect / Engineer:** _____

**Date:** _____ **Phone:** _____

**Contractor:** _____

**Address:** _____

_____

**Notes 1:** _____

_____

**Notes 2:** _____

_____

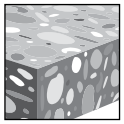
**Approval Stamp:**

# 3.3.12 HDI+, HDI-L+, AND HDI DROP IN ANCHORS

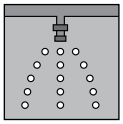
## PRODUCT DESCRIPTION

**HDI+, HDI-L+, and HDI Drop-in anchors**

| Anchor System | | Features and Benefits |
|---|---|---|
|  | HDI-L+ and HDI+ with Auto setting tools 1/4" to 1/2" | • Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings<br>• Allows shallow embedment without sacrificing performance<br>• Lip allows accurate flush surface setting, independent of hole depth for the HDI-L+<br>• Ideal for repetitive fastenings with threaded rods of equal length |
|  | HDI and Manual setting tool 5/8" to 3/4" | • HDI+ and HDI-L+ have an innovative stepped plug that reduces number of hammer blows by up to 50%<br>• HDI+ and HDI-L+ can be installed with the new HDI+ Setting Tool system (stop drill bit and machine setting tool) for improved productivity |



Uncracked concrete



Fire sprinkler listings

| Approvals/Listings | |
|---|---|
| FM (Factory Mutual) | Pipe hanger components for automatic sprinkler systems HDI+ 3/8, HDI-L+ 3/8, HDI+1/2, HDI-L+ 1/2, HDI 5/8 and HDI 3/4 |
| UL and cUL (Underwriters Laboratory) | Pipe hanger equipment for fire protection services HDI+ 3/8, HDI-L+ 3/8, HDI+1/2, HDI-L+ 1/2, HDI 5/8 and HDI 3/4 |

FM APPROVED

c UL us LISTED

## INSTALLATION PARAMETERS

**Table 1 - Hilti HDI+, HDI-L+ and HDI specifications[1]**

| Setting Information | Symbol | Units | HDI+ and HDI-L+ | | | HDI | |
|---|---|---|---|---|---|---|---|
| | | | 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 |
| Nominal bit diameter | $d_{bit}$ | in. | 3/8 | 1/2 | 5/8 | 27/32 | 1 |
| Nominal embedment<br>Anchor length<br>Hole depth | $h_{nom}$<br>$\ell$<br>$h_o$ | in.<br>(mm) | 1<br>(25) | 1-9/16<br>(40) | 2<br>(51) | 2-9/16<br>(65) | 3-3/16<br>(81) |
| Useable thread length | $\ell_{th}$ | in.<br>(mm) | 7/16<br>(11) | 5/8<br>(15) | 11/16<br>(17) | 7/8<br>(22) | 1-3/8<br>(34) |
| Installation torque | $T_{inst}$ | ft-lb<br>(Nm) | 4<br>(5) | 11<br>(15) | 22<br>(30) | 37<br>(50) | 80<br>(109) |
| Minimum slab thickness | h | in.<br>(mm) | 3<br>(76) | 3-1/8<br>(79) | 4<br>(102) | 5-1/8<br>(130) | 6-3/8<br>(162) |

1 HDI+ and HDI-L+ are available in 1/4-, 3/8- and 1/2-in. The HDI is available in 5/8- and 3/4-in.

## MATERIAL SPECIFICATIONS

HDI+, HDI-L and HDI anchors are manufactured from mild carbon steel. Anchor bodies are zinc plated in accordance with ASTM B633, AC 1, Type III

HDI stainless steel anchors are manufactured from AISI Type 303 stainless steel

# DESIGN DATA IN CONCRETE USING ALLOWABLE STRESS DESIGN

### Table 2 - Hilti HDI+, HDI-L+ and HDI carbon steel allowable loads in concrete[1,2]

| Anchor type | Nominal anchor diameter in. | $f'_c$ = 2,000 | | | | $f'_c$ = 4,000 | | | | $f'_c$ = 6,000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | |
| HDI+ | 1/4 | 385 | (1.7) | 450 | (2.0) | 510 | (2.3) | 625 | (2.8) | 640 | (2.8) | 700 | (3.1) |
| | 3/8 | 635 | (2.8) | 965 | (4.3) | 920 | (4.1) | 1,250 | (5.6) | 1,260 | (5.6) | 1,500 | (6.7) |
| | 1/2 | 945 | (4.2) | 1,500 | (6.7) | 1,605 | (7.1) | 2,125 | (9.5) | 1,950 | (8.7) | 2,500 | (11.1) |
| HDI+ | 5/8 | 1,875 | (8.3) | 2,500 | (11.1) | 2,920 | (13.0) | 3,250 | (14.5) | 3,715 | (16.5) | 3,750 | (16.7) |
| | 3/4 | 2,500 | (11.1) | 3,875 | (17.2) | 4,065 | (18.1) | 5,000 | (22.2) | 5,565 | (24.8) | 5,500 | (24.5) |

### Table 3 - Hilti HDI+, HDI-L+ and HDI carbon steel ultimate loads in concrete[1]

| Anchor type | Nominal anchor diameter in. | $f'_c$ = 2,000 | | | | $f'_c$ = 4,000 | | | | $f'_c$ = 6,000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | |
| HDI+ | 1/4 | 1,535 | (6.8) | 1,800 | (8.0) | 2,040 | (9.1) | 2,500 | (11.1) | 2,555 | (11.4) | 2,800 | (12.5) |
| | 3/8 | 2,540 | (11.3) | 3,850 | (17.1) | 3,685 | (16.4) | 5,000 | (22.2) | 5,035 | (22.4) | 6,000 | (26.7) |
| | 1/2 | 3,780 | (16.8) | 6,000 | (26.7) | 6,425 | (28.6) | 8,500 | (37.8) | 7,810 | (34.7) | 10,000 | (44.5) |
| HDI+ | 5/8 | 7,500 | (33.4) | 10,000 | (44.5) | 11,685 | (52.0) | 13,000 | (57.8) | 14,865 | (66.1) | 15,000 | (66.7) |
| | 3/4 | 10,000 | (44.5) | 15,500 | (68.9) | 16,260 | (72.3) | 20,000 | (89.0) | 22,250 | (99.0) | 22,000 | (97.9) |

1 The shear tests were conducted with SAE Grade 5 bolts with minimum yield strength of 85 ksi and minimum tension strength of 120 ksi. Shear testing for the 1/4-in. models were conducted with SAE Grade 8 bolts with minimum yield strength of 120 ksi and minimum tension strength of 150 ksi in 6,000 psi concrete. High-strength bolts were used to force concrete failure modes. When using steel bolts with a lower tensile strength, steel failure must be considered.

2 Allowable loads calculated with a factor of safety of 4.

### Table 4 - Hilti HDI+, HDI-L+ and HDI carbon steel allowable loads in lightweight concrete and lightweight concrete poured over metal deck[1,2,3,4]

| Anchor type | Nominal anchor diameter in. | 3,000 psi lightweight concrete | | | | 3,000 psi lightweight concrete over metal deck | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Upper flute | | | | Lower flute | | | |
| | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | |
| HDI+ | 1/4 | 465 | (2.1) | 340 | (1.5) | 530 | (2.4) | 335 | (1.5) | 375 | (1.7) | 250 | (1.1) |
| | 3/8 | 720 | (3.2) | 940 | (4.2) | 810 | (3.6) | 1,010 | (4.5) | 500 | (2.2) | 500 | (2.2) |
| | 1/2 | 1,035 | (4.6) | 1,700 | (7.6) | 1,035 | (4.6) | 1,755 | (7.8) | 625 | (2.8) | 750 | (3.3) |
| HDI+ | 5/8 | 1,465 | (6.5) | 2,835 | (12.6) | - | | - | | 875 | (3.9) | 875 | (3.9) |
| | 3/4 | 2,075 | (9.2) | 3,680 | (16.4) | - | | - | | 1,250 | (5.6) | 1,000 | (4.4) |

1 The shear tests were conducted with SAE Grade 5 bolts with minimum yield strength of 85 ksi and minimum tension strength of 120 ksi. Shear testing for the 1/4-in. models were conducted with SAE Grade 8 bolts with minimum yield strength of 120 ksi and minimum tension strength of 150 ksi in 6,000 psi concrete. High-strength bolts were used to force concrete failure modes. When using steel bolts with a lower tensile strength, steel failure must be considered.

2 Minimum compressive strength of structural lightweight concrete is 3,000 psi.

3 See figure 1 for typical details.

4 Allowable loads calculated with a factor of safety of 4.



### Table 5 - Hilti HDI stainless steel allowable loads in concrete[1,2,3]

| Nominal anchor diameter in. | Nominal anchor | $f'_c$ = 4,000 | | | | $f'_c$ = 6,000 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | |
| HDI+ | 1/4 | 480 | (2.1) | 600 | (2.7) | 740 | (3.3) | 600 | (2.7) |
| | 3/8 | 1,040 | (4.6) | 1,230 | (5.5) | 1,460 | (6.5) | 1,230 | (5.5) |
| | 1/2 | 1,840 | (8.2) | 2,760 | (12.3) | 2,410 | (10.7) | 2,760 | (12.3) |
| HDI+ | 5/8 | 2,630 | (11.7) | 4,510 | (20.1) | 3,770 | (16.8) | 4,510 | (20.1) |
| | 3/4 | 3,830 | (17.0) | 5,580 | (24.8) | 5,030 | (22.4) | 5,580 | (24.8) |

### Table 6 - Hilti HDI stainless steel ultimate loads in concrete[1,2]

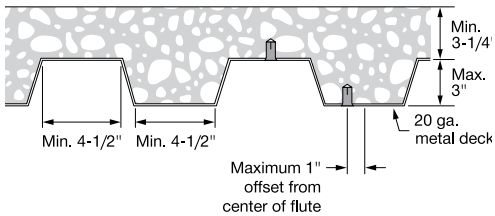
| Nominal anchor diameter in. | Nominal anchor | $f'_c$ = 4,000 | | | | $f'_c$ = 6,000 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Tension, lb (kN) | | Shear, lb (kN) | | Tension, lb (kN) | | Shear, lb (kN) | |
| HDI+ | 1/4 | 1,930 | (8.6) | 2,400 | (10.7) | 2,950 | (13.1) | 2,400 | (10.7) |
| | 3/8 | 4,170 | (18.5) | 4,920 | (21.9) | 5,850 | (26.0) | 4,920 | (21.9) |
| | 1/2 | 7,350 | (32.7) | 11,040 | (49.1) | 9,630 | (42.8) | 11,040 | (49.1) |
| HDI+ | 5/8 | 10,540 | (46.9) | 18,040 | (80.2) | 15,100 | (67.2) | 18,040 | (80.2) |
| | 3/4 | 15,340 | (68.2) | 22,320 | (99.3) | 20,130 | (89.5) | 22,320 | (99.3) |

1 Stainless steel models available in HDI version only.

2 Shear testing conducted with 18-8 stainless steel bolts.

3 Allowable loads calculated with a factor of safety of 4.

**Figure 1 - Installation of Hilti HDI+ and HDI drop-in anchor in the soffit of concrete over metal deck floor and roof assemblies W – deck**




**Combined shear and tension loading**

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0$$

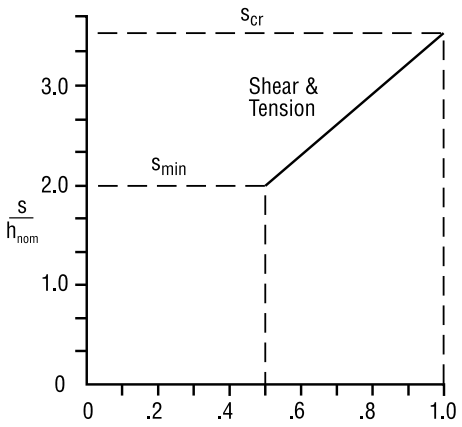
# Anchor spacing and edge distance guidelines

### Anchor spacing adjustment factors

s = Actual Spacing

$s_{min}$ = 2.0 $h_{nom}$

$s_{cr}$ = 3.5 $h_{nom}$



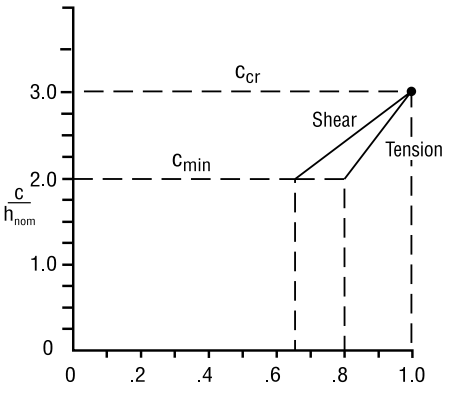

Anchor spacing adjustment Factor

### Edge distance adjustment factors

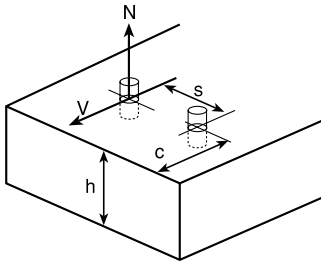
c = Actual edge distance

$c_{min}$ = 2.0 $h_{nom}$

$c_{cr}$ = 3.0 $h_{nom}$




Edge distance adjustment factor




### Influence of anchor spacing and edge distance $f_A$ and $f_R$

| Anchor Size | | $h_{nom}$ | |
|---|---|---|---|
| in. | (mm) | in. | (mm) |
| 1/4 | (6.4) | 1 | ( 25) |
| 3/8 | (9.5) | 1-9/16 | (40) |
| 1/2 | (12.7) | 2 | ( 51) |
| 5/8 | (15.8) | 2-9/16 | ( 65) |
| 3/4 | (19.1) | 3-3/16 | ( 81) |

$h_{nom}$ = nominal embedment depth

**Table 7 - Load adjustment factors for Hilti HDI drop-in anchors in concrete**

| Load adjustment factors for anchor spacing $f_A$ | | | | | | | Load adjustment factors for edge distance $f_R$ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tension/shear loads | | | | | | | Tension $f_{RN}$ | | | | | | | Shear $f_{RV}$ | | | | |
| Spacing s | | Anchor diameter | | | | | Edge distance c | | Anchor diameter | | | | | Anchor diameter | | | | |
| in. | (mm) | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | in. | (mm) | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
| 2 | ( 51) | .50 | | | | | 2 | ( 51) | .80 | | | | | .65 | | | | |
| 2-1/2 | ( 64) | .67 | | | | | 2-1/2 | ( 64) | .90 | | | | | .83 | | | | |
| 3 | ( 76) | .83 | .50 | | | | 3 | ( 76) | 1.0 | .80 | | | | 1.0 | .65 | | | |
| 3-1/2 | ( 89) | 1.0 | .58 | | | | 3-1/2 | ( 89) | | .85 | | | | | .73 | | | |
| 4 | (102) | | .69 | .50 | | | 4 | (102) | | .91 | .80 | | | | .85 | .65 | | |
| 4-1/2 | (114) | | .79 | .58 | | | 4-1/2 | (114) | | .98 | .85 | | | | .96 | .74 | | |
| 5 | (127) | | .90 | .67 | .50 | | 5 | (127) | | 1.0 | .90 | .80 | | | 1.0 | .83 | .65 | |
| 5-1/2 | (140) | | 1.0 | .75 | .55 | | 5-1/2 | (140) | | | .95 | .83 | | | | .91 | .70 | |
| 6 | (152) | | | .83 | .61 | .50 | 6 | (152) | | | 1.0 | .87 | | | | 1.0 | .77 | |
| 7 | (178) | | | 1.0 | .74 | .57 | 6-1/2 | (165) | | | | .91 | .80 | | | | .84 | .65 |
| 8 | (203) | | | | .87 | .67 | 7 | (178) | | | | .95 | .84 | | | | .91 | .72 |
| 9 | (229) | | | | 1.0 | .77 | 8 | (203) | | | | 1.0 | .90 | | | | 1.0 | .83 |
| 10 | (254) | | | | | .88 | 9 | (229) | | | | | .96 | | | | | .94 |
| 11 | (279) | | | | | .98 | 10 | (254) | | | | | 1.0 | | | | | 1.0 |
| 12 | (305) | | | | | 1.0 | | | | | | | | | | | | |

$s_{min}$ = 2.0 $h_{nom}$ $s_{cr}$ = 3.5 $h_{nom}$

$f_A = 0.33 \frac{s}{h_{nom}} - 0.17$

for $s_{cr} > s > s_{min}$

$c_{min}$ =2.0 $h_{nom}$ $c_{cr}$ = 3.0 $h_{nom}$

$f_{RN} = 0.2 \frac{c}{h_{nom}} + 0.4$

for $c_{cr} > c > c_{min}$

$c_{min}$ = 2.0 $h_{nom}$ $c_{cr}$ = 3.0 $h_{nom}$

$f_{RV} = 0.35 \frac{c}{h_{nom}} - 0.05$

for $c_{cr} > c > c_{min}$

## INSTALLATION INSTRUCTIONS

Manufacturer's Printed Installation Instructions (MPII) are included with each product package. They can also be viewed or downloaded at www.hilti.com. Because of the possibility of changes, always verify that downloaded MPII 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 MPII.

## ORDERING INFORMATION[1]

### HDI+, HDI-L+ and HDI

**Carbon steel** (Interior Use)

| Description | Description | Anchor thread size | Qty / box |
|---|---|---|---|
| **HDI+ 1/4** | **HDI-L+ 1/4** | 1/4 | 100 |
| **HDI+ 3/8** | **HDI-L+ 3/8** | 3/8 | 50 |
| **HDI+ 1/2** | **HDI-L+ 1/2** | 1/2 | 50 |
| **HDI 5/8** | **–** | 5/8 | 25 |
| **HDI 3/4** | **–** | 3/4 | 25 |

### HDI-SS anchors

**Stainless steel** (Exterior Use)

| Description | Anchor thread size | Qty / box |
|---|---|---|
| **HDI 1/4 SS303** | 1/4 | 100 |
| **HDI 3/8 SS303** | 3/8 | 50 |
| **HDI 1/2 SS303** | 1/2 | 50 |
| **HDI 5/8 SS303** | 5/8 | 25 |
| **HDI 3/4 SS303** | 3/4 | 25 |

### Setting tools for HDI and HDI-SS anchors

| Description | Anchor thread size |
|---|---|
| **HST 5/8 Setting Tool** | 5/8 |
| **HST 3/4 Setting Tool** | 3/4 |

### Setting Tools for HDI+ and HDI-L+

| Anchor thread size | Description |
|---|---|
| 1/4 | HST 1/4 Setting tool |
| | HSD-MM 1/4 (TE-C-24D6 1/4 Setting tool) |
| | HDI+ Setting Tool includes a TE-CX 3/8x1 carbide bit |
| 3/8 | HST 3/8 Setting tool |
| | HSD-MM 3/8 (TE-C-24SD10 3/8 Setting tool) |
| | HDI+ Setting Tool includes a TE-CX 1/2x1-9/16 carbide bit |
| 1/2 | HST 1/2 Setting tool |
| | HSD-MM 1/2 (TE-C-24SD12 1/2 Setting tool) |
| | HDI+ Setting Tool includes a TE-CX 5/8x2 carbide bit |

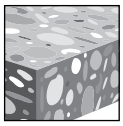
1 All dimensions in inches

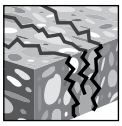
# 3.3.5 KWIK BOLT TZ EXPANSION ANCHOR

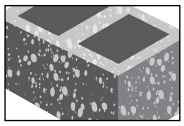
## PRODUCT DESCRIPTION

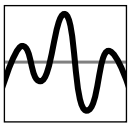
**KWIK Bolt TZ carbon steel and stainless steel anchors**

| Anchor System | Features and Benefits |
|---|---|
|  Carbon Steel KB-TZ  Stainless Steel KB-TZ  Hilti SIW-6AT-A22 impact wrench and the SI-AT-A22 Adaptive Torque Module | • Used with Hilti Dust Removal System (DRS) for dustless drilling and installation (compliant with Table 1 of OSHA 1926.1153 regulations for silica dust exposure).<br>• Accurate SafeSet™ installation when using the Hilti SIW-6AT-A22 impact wrench and the SI-AT-A22 Adaptive Torque Module<br>• Product and length identification marks facilitate quality control after installation.<br>• Through fixture installation and variable thread lengths improve productivity and accommodate various base plate thicknesses.<br>• Type 316 stainless steel wedges provide superior performance in cracked concrete.<br>• Ridges on expansion wedges provide increased reliability.<br>• Mechanical expansion allows immediate load application.<br>• Raised impact section (dog point) prevents thread damage during installation.<br>• Bolt meets ductility requirements of ACI 318-14 Section 2.3.<br>• ACI 349-01 Nuclear Design Guide is available. Call Hilti Technical Support. |


Uncracked concrete

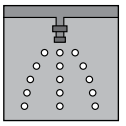

Cracked concrete


Grout-filled concrete masonry


Seismic Design Categories A-F

Hollow Drill Bit with Adaptive Torque Tool (AT)

Profis Anchor design software


Fire sprinkler listings

| Approvals/Listings | |
|---|---|
| ICC-ES (International Code Council)<br>- 2018 International Building Code / International Residential Code (IBC/IRC)<br>- 2015 National Building Code of Canada (NBC-C) | ESR-1917 in concrete per ACI 318-14 Ch. 17 / ACI 355.2/ ICC-ES AC193<br>ESR-3785 in grout-filled CMU per ICC-ES AC01<br>ELC-1917 in concrete per CSA A23.3-14 / ACI 355.2 |
| City of Los Angeles | 2017 LABC Supplement (within ESR-1917)<br>RR 26057 grout-filled CMU |
| Florida Building Code | 2010 FBC with HVHZ |
| FM (Factory Mutual) | Pipe hanger components for automatic sprinkler systems 3/8 through 3/4 |
| UL and cUL (Underwriters Laboratory) | Pipe hanger equipment for fire protection services for 3/8 through 3/4 |

# MATERIAL SPECIFICATIONS

**Carbon steel with electroplated zinc**

Carbon steel KB-TZ anchors have the following minimum bolt fracture loads.[1]

| Anchor diameter (in.) | Shear (lb) | Tension (lb) |
|---|---|---|
| 3/8 | NA | 6,744 |
| 1/2 | 7,419 | 11,240 |
| 5/8 | 11,465 | 17,535 |
| 3/4 | 17,535 | 25,853 |

Carbon steel anchor components plated in accordance with ASTM B633 to a minimum thickness of 5 µm.

Nuts conform to the requirements of ASTM A563, Grade A, Hex.

Washers meet the requirements of ASTM F844.

Expansion sleeves (wedges) are manufactured from type 316 stainless steel

**Stainless steel**



Stainless steel KB-TZ anchors are made of type 304 or 316 material and have the following minimum bolt fracture loads.[1]

| Anchor diameter (in.) | Shear (lb) | Tension (lb) |
|---|---|---|
| 3/8 | 5,058 | 6,519 |
| 1/2 | 8,543 | 12,364 |
| 5/8 | 13,938 | 19,109 |
| 3/4 | 22,481 | 24,729 |

All nuts and washers for type 304 anchors are made from type 304 stainless.

All nuts and washers for type 316 anchors are made from type 316 stainless.

Nuts meet the dimensional requirements of ASTM F594.

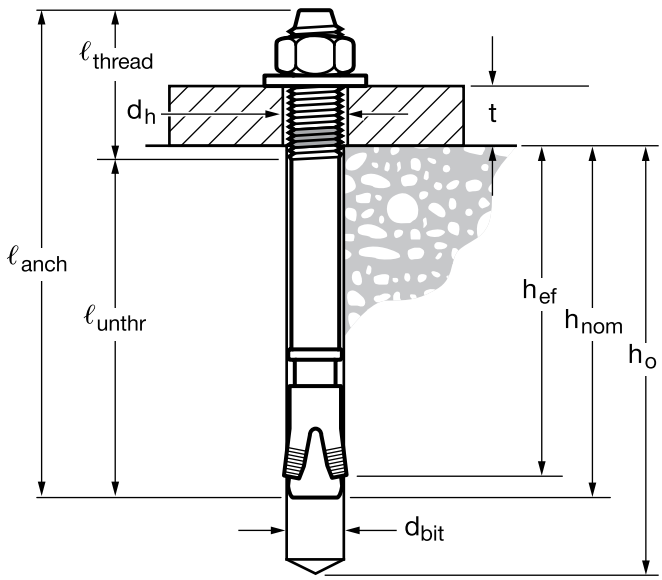
Washers meet the dimensional requirements of ANSI B18.22.1, Type A, plain.

Expansion sleeve (wedges) are made from type 316 stainless steel.

1 Bolt fracture loads are determined by testing in a universal tensile machine for quality control at the manufacturing facility. These loads are not intended for design purposes. See tables 4 and 16 for the steel design strengths of carbon steel and stainless steel, respectively.

# INSTALLATION PARAMETERS

**Figure 1 - Hilti KWIK Bolt TZ specifications**



# Bronze Ball Valves

Dezincification Resistant

Two-Piece Body • Full Port ¼"-1" • Conventional Port 1¼"-3" • Bronze Trim • Blowout-Proof Stem

**600 PSI/41.4 bar non-shock cold working pressure**
**150 PSI/10.3 bar saturated steam♦**

CONFORMS TO MSS SP-110

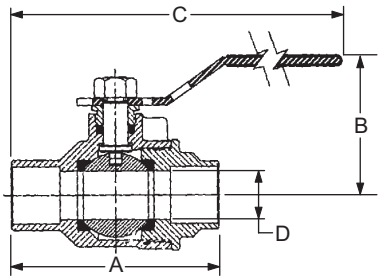
**T-580-70**
Threaded

~~S-580-70~~
~~Solder~~

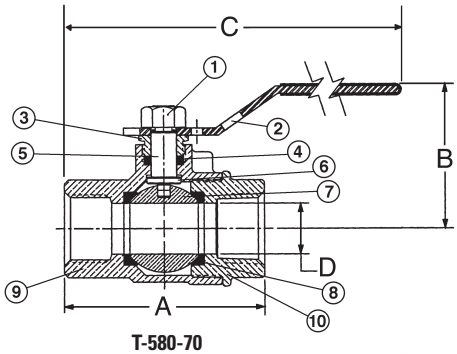
## MATERIAL LIST

| | PART | SPECIFICATION |
|---|---|---|
| 1. | Handle Nut | Zinc Plated Steel |
| 2. | Handle | Zinc Plated Steel Clear Chromate Plastisol Coated |
| 3. | Threaded Pack Gland | Brass ASTM B 16 Alloy C36000 |
| 4. | Packing | PTFE |
| 5. | Stem | Silicon Bronze ASTM B 371 Alloy C69430 or ASTM B 99 Alloy C65100 |
| 6. | Thrust Washer | Reinforced PTFE |
| 7. | Ball | Brass ASTM B 124 Alloy C37700 or ASTM B16 Alloy C36000 EACH with Hard Chrome Plate |
| 8. | Seat Ring (2) | Reinforced PTFE |
| 9. | Body | Cast Red Bronze ASTM B 584 Alloy C84400 |
| 10. | Body End Piece | Cast Red Bronze ASTM B 584 Alloy C84400 |

**¼" size only has a 304 stainless steel grounding washer.**




**S-580-70**
C x C




**T-580-70**
NPT x NPT

## DIMENSIONS—WEIGHTS—QUANTITIES

| Size | | Dimensions A | | A | | B | | C | | C | | D | | T-580-70 | | S-580-70 | | Master |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T-580-70 | | S-580-70 | | | | T-580-70 | | S-580-70 | | | | | | | | |
| In. | mm. | In. | mm. | In. | mm. | In. | mm. | In. | mm. | In. | mm. | In. | mm. | Lbs. | Kg. | Lbs. | Kg. | Ctn. Qty. |
| † ¼ | 8 | 2.00 | 51 | 1.75 | 44 | 1.75 | 44 | 5.00 | 127 | 4.75 | 121 | .38 | 10 | .45 | .21 | .42 | .19 | 100 |
| † ⅜ | 10 | 2.00 | 51 | 1.84 | 47 | 1.75 | 44 | 5.00 | 127 | 4.81 | 122 | .38 | 10 | .45 | .21 | .42 | .19 | 100 |
| † ½ | 15 | 2.44 | 62 | 2.56 | 65 | 1.88 | 48 | 5.19 | 132 | 5.25 | 133 | .50 | 13 | .64 | .29 | .60 | .27 | 100 |
| † ¾ | 20 | 2.94 | 75 | 3.25 | 83 | 2.25 | 57 | 6.25 | 159 | 6.25 | 159 | .75 | 19 | 1.33 | .60 | 1.27 | .58 | 50 |
| †1 | 25 | 3.34 | 85 | 3.75 | 95 | 2.38 | 60 | 6.44 | 164 | 6.63 | 168 | 1.00 | 25 | 1.79 | .81 | 1.72 | .78 | 40 |
| 1 ¼ | 32 | 3.94 | 100 | 4.00 | 102 | 2.63 | 67 | 6.75 | 171 | 6.75 | 171 | 1.00 | 25 | 2.17 | .98 | 1.78 | .81 | 20 |
| 1 ½ | 40 | 4.31 | 109 | 4.44 | 113 | 3.00 | 76 | 8.88 | 226 | 9.00 | 229 | 1.25 | 32 | 3.27 | 1.48 | 2.87 | 1.30 | 20 |
| 2 | 50 | 4.63 | 118 | 5.50 | 140 | 3.16 | 80 | 9.06 | 230 | 9.50 | 241 | 1.50 | 38 | 5.09 | 2.31 | 4.60 | 2.08 | 10 |
| 2 ½ | 65 | 5.84 | 148 | 7.28 | 185 | 3.50 | 89 | 9.66 | 245 | 10.38 | 264 | 2.00 | 51 | 8.25 | 3.74 | 8.18 | 3.71 | 6 |
| 3 | 80 | 7.09 | 180 | 8.78 | 223 | 4.41 | 112 | 11.53 | 293 | 12.38 | 314 | 2.50 | 64 | 15.65 | 7.10 | 14.86 | 6.74 | 4 |

**†NIBCO supplies full port T or S-585-70 on this size.**

**Note: solder end is designed to be soft-soldered into lines using solders with the melting point not exceeding 500°F. Higher temperature solders will damage the seat material. See installation sheet packaged with valves.**

**♦For detailed operating pressure, refer to pressure temperature chart on page 42.**

**WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.**

**LEAD FREE* OPTION AVAILABLE**

**OXYGEN SERVICE OPTION AVAILABLE**

*Weighted average lead content ≤ 0.25%

*Visit our website for the most current information.*

# Class 125 Bronze Check Valves

Dezincification Resistant

Horizontal Swing • Regrinding Type • Y-Pattern • Renewable Seat and Disc

**125 PSI/8.6 Bar Saturated Steam to 353°F/178°C**
**200 PSI/13.8 Bar Non-Shock Cold Working Pressure**

CONFORMS TO MSS SP-80

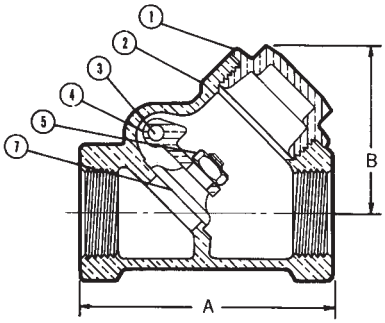
**T-413**
Threaded

~~S-413~~
~~Solder~~

## MATERIAL LIST

| PART | | SPECIFICATION |
|---|---|---|
| 1. | Bonnet | Bronze ASTM B 62 |
| 2. | Body | Bronze ASTM B 62 |
| 3. | Hinge Pin | 316 SS or 304 SS |
| 4. | Disc Hanger | Bronze ASTM B 62 or MPIF SS-316NI-25 |
| 5. | Hanger Nut | Bronze ASTM B 16 |
| 6. | Disc Holder | Bronze ASTM B 62 |
| 7. | Seat Disc | Petroleum or Water (Buna-N) (W)<br>Steam (PTFE) (Y)<br>Bronze ASTM (B) FKM (V) B 62 C83600 |
| 8. | Seat Disc Nut | Bronze ASTM B 16 or B 62 |
| 9. | Hinge Pin Plug | Bronze ASTM B140 Alloy C31400 (not shown) |
| 10. | Seat Disc Washer* | ASTM B 98 Alloy C65500 or ASTM B 103 |

***Sizes ¾", 1", 1¼", 1½" and 2" only.**




**T-413-B**
NPT x NPT

## DIMENSIONS—WEIGHTS—QUANTITIES

| Size | | Dimensions A | | B | | C | | T-413 | | S-413 | | Master |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| In. | mm. | In. | mm. | In. | mm. | In. | mm. | Lbs. | Kg. | Lbs. | Kg. | Ctn. Qty. |
| ¼ | 8 | 2.13 | 54 | 1.63 | 41 | 1.38 | 35 | 0.50 | 0.23 | 0.51 | 0.23 | 50 |
| ⅜ | 10 | 2.13 | 54 | 1.63 | 41 | 1.31 | 33 | 0.47 | 0.22 | 0.48 | 0.22 | 50 |
| ½ | 15 | 2.44 | 62 | 1.69 | 43 | 1.50 | 38 | 0.55 | 0.25 | 0.55 | 0.25 | 50 |
| ¾ | 20 | 2.94 | 75 | 1.88 | 48 | 1.88 | 48 | 0.90 | 0.41 | 0.88 | 0.40 | 10 |
| 1 | 25 | 3.56 | 90 | 2.31 | 59 | 2.25 | 57 | 1.46 | 0.66 | 1.48 | 0.67 | 5 |
| 1¼ | 32 | 4.19 | 106 | 2.69 | 68 | 2.75 | 70 | 2.17 | 0.99 | 2.22 | 1.01 | 20 |
| 1½ | 40 | 4.50 | 114 | 2.94 | 75 | 3.11 | 79 | 2.95 | 1.34 | 3.00 | 1.36 | 10 |
| 2 | 50 | 5.25 | 133 | 3.94 | 100 | 3.75 | 95 | 4.79 | 2.17 | 4.87 | 2.21 | 10 |
| 2½* | 65 | 8.00 | 203 | 5.06 | 129 | 5.06 | 129 | 11.48 | 5.21 | 10.48 | 4.76 | 5 |
| 3* | 80 | 9.25 | 235 | 6.25 | 159 | 6.25 | 159 | 17.53 | 7.96 | 15.29 | 6.94 | 4 |

**Ordering: T-413 and S-413 normally furnished with Bronze Disc (T-413-B) or (S-413-B). Both available with PTFE Steam Disc (T-413-Y), (S-413-Y), or CWP Disc (T-413-W), (S-413-W) or 300° F 67 PSI steam FKM Disc (T-413-V).**

***Class 150 (433) furnished for these sizes.**

**Install 5 pipe diameters minimum downstream from pump discharge or changes in direction to avoid flow turbulence. Flow straighteners may be required in extreme cases.**

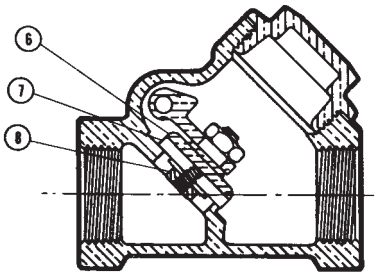
**Note: On pump discharge, the preferred check valves are: inline, spring assisted, center-guided, lift checks.**

**NIBCO® Check Valves may be installed in both horizontal and vertical lines with upward flow or in any intermediate position. They will operate satisfactorily in a declining plane (no more than 15°).**

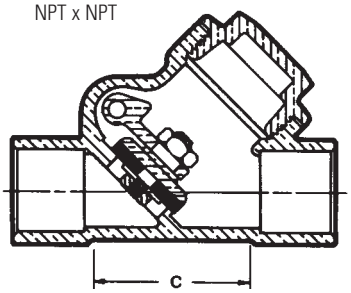
**Warning – Do Not Use For Reciprocating Air Compressor Service.**

♦ **For detailed Operating Pressure, refer to Pressure Temperature Chart on page 116.**

**WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.**




**T-413-Y**
NPT x NPT




**S-413-W**
C x C

*Visit our website for the most current information.*