No: MC-01

SUBMITTAL COVERSHEET
Nanuet UFSD –Phase 3 Projects

Architect:
KSQ Architects
215 W 40th Street,15th Floor
New York, NY 10018

Owner:
Nanuet Union Free School District
101 Church Street
Nanuet, NY 10954

Construction Manager:
Jacobs
One Penn Plaza, 54th floor
New York, NY 10019

Contractor: Joe Lombardo Plumbing & Heating of Rockland Inc

Contract: Ron Lombardo

Address: 321 Spook Rock Road Suite 109A
Suffern, New York 10901

Telephone: 845-357-6537

Fax: 845-357-8529

School Name: Nanuet Union Free School District Phase 3 Bond Projects @ Barr Middle School & Nanuet High School

Type of Submittal:

Re-submittal: **[ ] No** **[ ] Yes**

[ ] Shop Drawings [ ] Product Data [ ] Schedule [ ] Sample [ ] _____
[ ] Test Report [ ] Certificate [ ] Color Sample [ ] Warranty [ ] _____

Submittal Description:

Product Name: HYDRONIC PIPING VALVES AND BALANCING VALEVS WILL FOLLOW UNDER ANOTHER SUBMITTAL

Manufacturer: VARIOUS

Subcontractor/ Supplier: FW WEBB

References:

Spec. Section No.: 232113

Drawing No(s): _____

Paragraph: _____

Rm. or Detail No(s): _____

Architect's/ Engineer's Review Stamp

SAGE ENGINEERING ASSOCIATES, LLP

☐ Reviewed ☑ Furnish as Corrected
☐ Rejected ☐ Revise and Resubmit
☐ Submit Specified Item

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

SAGE LOG NO. M-27

Date: 11/8/2023 By: J. Venditte

Contractor Review Statement:

These documents have been checked for accuracy and coordinated with job conditions and Contract requirements by this office and have been found to comply with the provisions of the Contract Documents.

Ronald J. Lombardo 11.3.23
Name: Date:

Company Name:
Joe Lombardo Plumbing & Heating of Rockland Inc.

Remarks:

1. Dielectric fittings (pages 80-81) shall be provided with EPDM gaskets to allow for water temperatures up to 300 F.
2. Dielectric unions (page 79) shall be provided with optional gasket B to allow for ratings up to 300 F.

2.2 Hydonic , Steam and STEAM Condensate piping 1/2 to 8"

Standard Steel Pipe

ASTM A53 TYPE E GRADE B PIPE

Submittal Data Sheet

Scope

XXXXXXXXXX

Covers black and hot-dipped galvanized electric-resistance welded Grade B pipe. Pipe is intended for mechanical and pressure applications and is acceptable for ordinary uses in steam, water, gas and air lines. Wheatland ASTM A53 is UL Listed and FM Approved, sizes 1" through 6" nominal, for use in Fire Sprinkler Pipe Applications. Pipe is suitable for welding, threading and grooving. Produced to the latest revision of ASTM A53/53M, Federal Specification WW-P404 and ASME B36.10M.

Manufacture

The weld seam shall be heat treated after welding to a minimum of 1400°F or be otherwise processed in such a manner that no untempered martensite remains.

Hot-dipped galvanized

The average weight of zinc coating shall be not less than 1.8 oz. per sq. ft. of surface (inside and outside). When galvanized pipe is bent or otherwise fabricated to a degree which causes zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.

Hydrostatic and Nondestructive Electric testing

Hydrostatic inspection test pressures for plain-end pipe are listed in Table X 2.2 of the A53/A53M specification. Test pressures shall be maintained for a minimum of five seconds. Nondestructive electric testing of the weld seam is required on each length of ERW pipe NPS 2 and larger.

Chemical Requirements

Composition, max. %

Carbon	Manganese	Phosphorus	Sulfur	
.30	1.20	.05	.045	
Copper	**Nickel**	**Chromium**	**Molybdenum**	**Vanadium**
.40	.40	.40	.15	.08

*The combination of these five elements shall not exceed 1.00%.

Tensile Requirements

TENSILE STRENGTH, MIN.	YIELD STRENGTH, MIN.	ELONGATION IN 2"
60,000 psi	35,000 psi	Refer to A53 table x 4.1

Bending Test (Cold)

NPS	DEGREE OF BEND	DIAMETER OF MANDREL
2 and under	90°	12x pipe OD

Flattening Test

As a test for ductility of the weld for pipe 2½" NPS and larger, position the weld at 0° and alternately at 90° to the direction of force and flatten until the OD is ⅔ of the original outside diameter. No cracks shall occur along the inside or outside surface of the weld.

Frequency of Tests

Tensile tests are required on one length of pipe from each lot of 500 lengths or fraction thereof for each size. Refer to A53 specification for frequency of flattening tests.

End Finish

Plain End: NPS 2 and larger, STD and XS weights: ends beveled to angle of 30°, +5°, -0° with a root face of 1/16" ± 1/32"

Threaded: To ANSI Standard B 1.20.1
Couplings: To ASTM Standard A 865

Weights and Dimensions Charts

STANDARD (SCH. 40) BLACK PLAIN END

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.154	3.66
2½"	2.875	.203	5.80
3"	3.500	.216	7.58
4"	4.500	.237	10.88
5"	5.563	.258	14.63
6"	6.625	.280	18.99
8"	8.625	.322	28.58

EXTRA STRONG (SCH. 80) BLACK PLAIN END

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.218	5.03
2½"	2.875	.276	7.67
3"	3.500	.300	10.26
4"	4.500	.337	15.00

All information contained herein is accurate as known at the time of publication. Wheatland reserves the right to change product specifications without notice and without incurring obligations.

Permissible Variations in Wall Thickness

Minimum wall thickness at any point shall not be more than 12.5% under nominal wall thickness specified.

Permissible Variations in Outside Diameter

Pipe NPS 2 and larger shall not vary more than + 1% from the standard specified.

Permissible Variations in Weight per Foot

Pipe shall not vary more than + 10% from the standard specified.

Product Marking

Each length of pipe is continuously stenciled to show the manufacturer, the grade of pipe (ASTM A53), the kind of pipe E for Electric Resistance Welded, B for Grade B, the size, XS for extra strong, and length. Stencil markings indicate UL Listing and FM Approval for sizes 1" through 6" nominal for use in Fire Sprinkler Pipe Applications. Bar coding is acceptable as a supplementary identification method.

SUBMITTAL INFORMATION

PROJECT: _____ CONTRACTOR: _____ DATE: _____

ENGINEER: _____ SPECIFICATION REFERENCE: _____ SYSTEM TYPE: _____

LOCATIONS: _____ COMMENTS: _____

WST-051516

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Sharon, PA 16146
P 800.257.8182
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info@wheatland.com
wheatland.com
Follow us on Twitter:
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Wheatland Tube
A DIVISION OF ZEKELMAN INDUSTRIES

WELDBEND®

Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged fittings simplify insulation and take up less space.

ASTM A 234

Scope

This standard covers wrought carbon steel fittings of seamless and welded construction which are manufactured to the dimensional specifications of ASME B16.9 and B16.28. These fittings are primarily for use in pressure piping and in pressure vessel fabrication for service at moderate and elevated temperatures.

Materials

The starting material for fittings shall consist of killed steel, forgings, bars, plates, seamless or fusion-welded tubular products with filler metal added and shall conform to the the chemical requirements of ASTM A 234. Unless otherwise specified, carbon steel plates may be either coarse grain or fine grain practice.

Manufacture

Forging or shaping operations are performed by hammering, pressing, piercing, extruding, upsetting, rolling, bending, machining, or by a combination of two or more of these operations. The forming process shall be applied so that it will not produce injurious imperfections in the fittings.

Heat Treatment

Hot-formed WPB fittings, upon which the final forming operation is completed at a temperature above 1150ºF and below 1800ºF, need not be heat treated. Cold-Formed WPB fittings, upon which the final forming operation is completed at a temperature below 1150ºF, shall be normalized, or shall be stress relieved at 1100ºF to 1275ºF.

Fitting Summary Data Sheet

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.30 max	.29-1.06	.050	.058

Silicon	Chromium	Molybdenum	Nickel	Copper
.10 min	.40 max	.15 max	.40 max	.40 max

Vanadium	Columbium
.08 max	.02 max

Mechanical requirements:

Tensile Strength		60,000-85,000 psi
Yield Strength (min)		35,000 psi
Elongation	- Longitudinal:	22%
	- Transverse:	14%

Dimensions

Butt-welding fittings and butt-welding short radius elbows and returns purchased in accordance with this specification shall conform to the dimensions and tolerances given in the latest revision of ANSI B16.9 and B16.28, respectively.

Certification

When requested by the purchaser, the manufacturer shall provide a certificate of compliance to this specification. If requested to provide test reports, the manufacturer shall also provide the following where applicable:

* Chemical analysis results. When the amount of an element is less than .02%, the analysis for that element is reported as "<0.02%."
* Tensile property results, report the yield strength and ultimate strength in ksi [or MPa] and elongation in percent,
* Hardness acceptable in accordance with Section 10 of ASTM A-234,
* Seamless or Welded,
* Type of Heat Treatment, if any,
* Starting material, specifically pipe, plate, etc.,
* Statement regarding radiographic or ultrasonic examination.
* Any supplemental testing required by the purchase order.

Product Marking

All fittings shall have the prescribed information stamped or otherwise suitable marked on each fitting in accordance with ASTM A 234/MSS SP-25. A Weldbend fitting is marked as follows: Weldbend's Name, Nominal Pipe Size, Pipe Wall Thickness Designation, Material Grade (WPB/WPC) and Heat Identification Number.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.

WELDBEND®

Flange Summary Data Sheet

Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries, and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged flanges simplify insulation and take up less space.

ASTM A 105

Scope

This standard covers forged carbon steel piping components for ambient- and higher-temperature service in pressure systems. Flanges are ordered either to dimensions specified by the purchaser or to dimensional specifications such as ASME 16.5 and API 6A. Forgings made to ASTM A 105 are normally limited to a maximum weight of 10,000 lb.

Materials

Weldbend flanges are made by hammering, pressing, rolling and/or machining cast or forged bars, billets or slabs. These adhere to the extent described in the following sections.

Manufacture

ASTM A 105 covers the requirements for forged steel components as finished products only.
The requirements for raw materials are covered by the standards specified in Section 2: Referenced Documents of ASTM A 105.

Heat Treatment

Heat treatment is not a mandatory requirement of this specification except for the following piping components:
* Flanges above Class 300,
* Flanges of special design where the design pressure at the design temperature exceeds the pressure-temperature ratings of Class 300, Group 1.1,
* Flanges of special design where the design pressure or design temperature is not known.

Heat treatment, when required by the above, shall be annealing, normalizing, normalizing and tempering, or quenching and tempering in accordance with ASTM A 961.

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.35 max	.60-1.05	.035	.040

Silicon	Copper	Nickel	Chromium
.10-.35	.40 max	.40 max	.30 max

Molybdenum	Vanadium	Columbium
.12 max	.08 max	.02 max

Mechanical requirements:

Tensile Strength (min)	70,000 psi
Yield Strength (min)	36,000 psi
Basic minimum elongation for walls 5/16 in. and over in thickness, strip tests.	30%
Reduction of area (min)	30%
Hardness, HB (max)	187

Dimensions

Weldbend flanges are manufactured in accordance with ASME B 16.5 (24" NPS and smaller) and ASME B 16.47 (26" - 60" NPS).

Certification

For forgings made to specified dimensions agreed upon by the purchaser, and for forgings made to dimensional standards, the application of identification marks, as required by ASTM A 961, shall be the certification that the forgings have been furnished in accordance with the requirements of this standard. The specification designation included on test reports shall include the year of issue and revision letter, if any.
Test Reports: When test reports are required, Weldbend will also provide the following, if applicable:
*Type of heat treatment,
*Tensile property results, i.e., yield strength and ultimate strength in ksi, elongation and reduction in area, in percent,
*Chemical analysis results,
*Hardness results, and,
*Any supplementary testing required by the purchase order.

Product Marking

All flanges shall have the prescribed information stamped or otherwise suitable marked on each flange in accordance with the Standard/MSS SP-25. A Weldbend flange is marked as follows:
Weldbend's Name, Nominal Pipe Size, A105/SA105, Bore Designation, Heat Identification Number and manufacture date.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.

Fleetweld® 5P

Mild Steel, Cellulosic • AWS E6010

Key Features

- Deep arc penetration
- Light slag with minimal arc interference
- Excellent vertical and overhead capability

Typical Applications

- Steel with moderate surface contaminants
- Cross country and in-plant pipe welding
- Square edge butt welds
- Welding on galvanized and specially coated steels

Conformances

AWS A5.1/A5.1M: 2004	E6010
ASME SFA-A5.1:	E6010
ABS:	E6010
Lloyd's Register:	3M
CWB/CSA W48-06:	E4310
TUV:	EN ISO 2560-A: E 42 3 C25

Welding Positions

All

DIAMETERS / PACKAGING

Diameter in (mm)	Length in (mm)	5 lb (2.3 kg) Plastic Tube 20 lb (9.1 kg) Master Carton	10 lb (4.5 kg) Easy Open Can 30 lb (13.6 kg) Master Carton	50 lb (22.7kg) Easy Open Can
3/32 (2.4)	12 (300)	ED032402	ED032561	ED010211
1/8 (3.2)	14 (350)	ED032403	ED032562	ED010203
5/32 (4.0)	14 (350)		ED032563	ED010216
3/16 (4.8)	14 (350)			ED010207
7/32 (5.6)	14 (350)			ED010219
1/4 (6.4)	14 (350)			ED010200

MECHANICAL PROPERTIES[1] – *As Required per AWS A5.1/A5.1M: 2004*

	Yield Strength[2] MPa (ksi)	Tensile Strength MPa (ksi)	Elongation %	Charpy V-Notch J (ft•lbf) @-29°C (-20°F)
Requirements - AWS E6010	330 (48) min.	430 (60) min.	22 min.	27 (20) min.
Typical Results[3] - As-Welded	420-475 (61-69)	515-570 (75-83)	25-31	41-68 (30-50)

DEPOSIT COMPOSITION[1] – *As Required per AWS A5.1/A5.1M: 2004*

	%C	%Mn	%Si	%P	%S
Requirements - AWS E6010	0.20 max.	1.20 max.	1.00 max.	Not Specified	Not Specified
Typical Results[3] - As-Welded	0.09-0.17	0.40-0.63	0.09-0.43	0.005-0.017	0.005-0.014
	%Ni	**%Cr**	**%Mo**	**%V**	
Requirements - AWS E6010	0.30 max.	0.20 max.	0.30 max.	0.08 max.	
Typical Results[3] - As-Welded	0.01-0.05	0.01-0.05	≤ 0.03	≤ 0.01	

TYPICAL OPERATING PROCEDURES

	Current (Amps)					
Polarity[4]	3/32 in (2.4 mm)	1/8 in (3.2 mm)	5/32 in (4.0 mm)	3/16 in (4.8 mm)	7/32 in (5.6 mm)	1/4 in (6.4 mm)
DC+	40-80	70-130	90-165	140-225	200-275	220-325
DC-	50-85	75-135	100-175	–	–	–

[1]Typical all weld metal. [2]Measured with 0.2% offset. [3]See test results disclaimer below. [4]Preferred polarity is listed first.

Material Safety Data Sheets (MSDS) and Certificates of Conformance are available on our website at www.lincolnelectric.com

TEST RESULTS

Test results for mechanical properties, deposit or electrode composition and diffusible hydrogen levels were obtained from a weld produced and tested according to prescribed standards, and should not be assumed to be the expected results in a particular application or weldment. Actual results will vary depending on many factors, including, but not limited to, weld procedure, plate chemistry and temperature, weldment design and fabrication methods. Users are cautioned to confirm by qualification testing, or other appropriate means, the suitability of any welding consumable and procedure before use in the intended application.

CUSTOMER ASSISTANCE POLICY

The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

THE LINCOLN ELECTRIC COMPANY
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Phone: +1.216.481.8100 • www.lincolnelectric.com

LINCOLN® ELECTRIC
THE WELDING EXPERTS®

Issue Date 01/12

2.2 - A - 1 - 2 & 3 - threaded fittings for 1/2 to 2" hydronic steam and STEAM condensate piping

WARD MANUFACTURING
P.O. Box 9
117 Gulick Street
Blossburg, PA 16912-0009
(570) 638-2131

January 11, 2013

To whom it may concern:

I hereby certify that our products listed below comply with the current specification. The products listed below are made with pride in Blossburg, Pennsylvania, USA.

1 >>>>>>>> CL 150 Malleable Iron Threaded Fittings

Fed. Spec. WW - P - 521

ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

CL 300 Malleable Iron Threaded Fittings

ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

3 >>>>>>>> Unions, Union Fittings, Flange Unions & Companion Flanges

CL 150 Malleable Iron to Brass Seat, Iron to Iron Unions
Fed. Spec. WW - U - 531 ASME B16.39

CL 250 Malleable Iron to Brass Seat,Unions
Fed. Spec. WW - U - 531 ASME B16.39

CL 300 Malleable Iron to Brass Seat, Iron to Iron Unions
MIL - U - 18250 ASME B16.39

CL 125 - CL 250 Cast Iron Flanges		ASME B16.1
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Bushings and Plugs

Fed. Spec. WW - P - 471

ASME	B16.14	(Dimensions)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads) Supersedes B-2-1
ASTM	A-197 or A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)

4 >>>>>>> CL 125 Cast Iron Threaded Fittings

Fed. Spec. WW - P - 501

ASME	B16.4	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Top Beam & C-Clamps

ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
UL	203	(Test Parameters)

Drainage Fittings

ASME	B16.12	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Cast Iron Flanges

ASME	B16.1	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

WARDLOX Plain-End Fittings

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

TEE-LOX Mechanical Branch Connectors

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Full Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Half Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Welded Steel Pipe Nipples

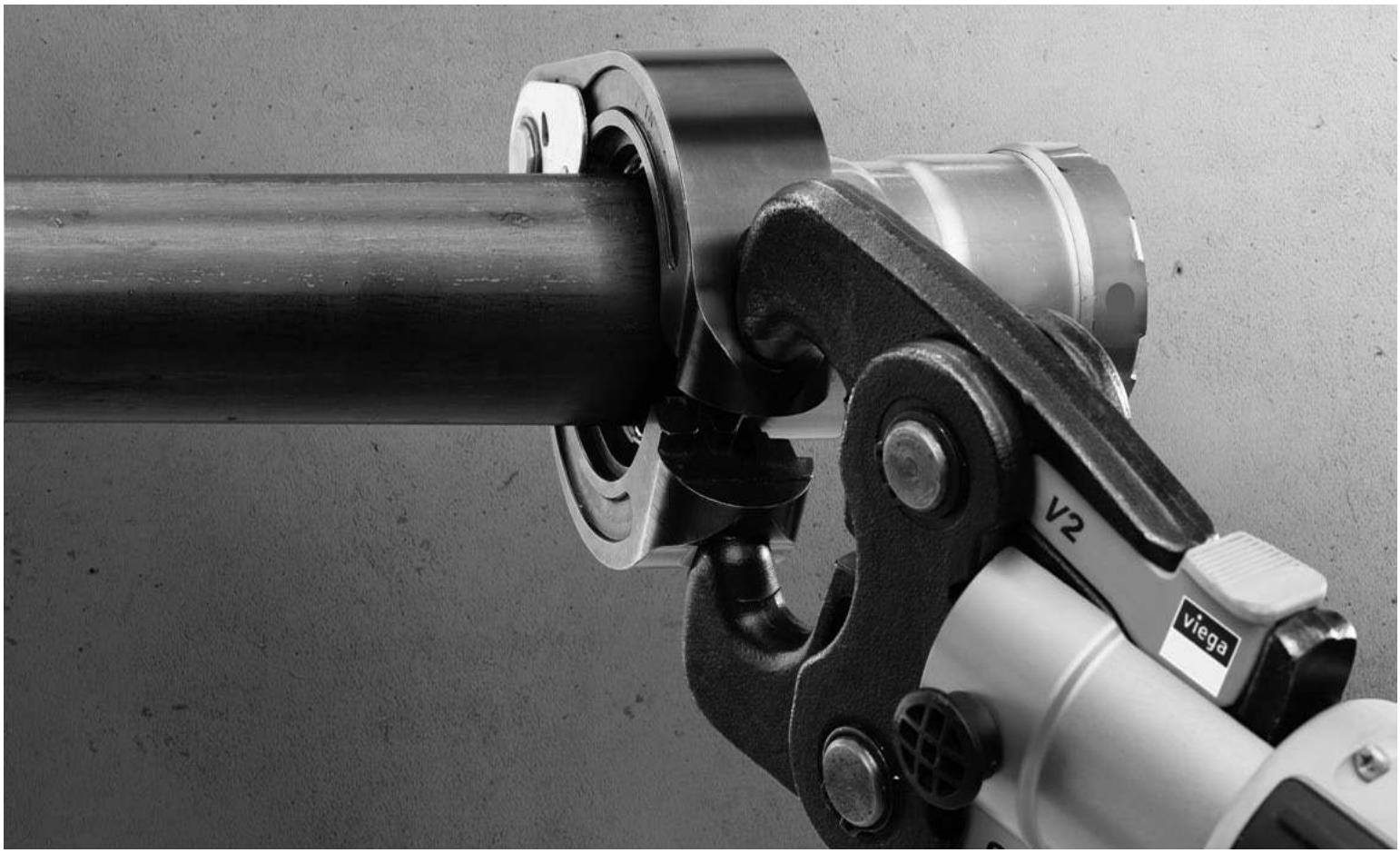
ASTM	A-733	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ASNI/ASME	B1.20.1	(Pipe Threads)

Sincerely,

Jim Belawski
Manager of Quality Assurance

Submittal Package

Viega MegaPress FKM Fittings



Project _____ **Date** _____

Engineer _____ **Contractor** _____

Submitted by _____

Approved by _____ **Date** _____ **Approved by** _____ **Date** _____

Table of Contents

- ☐ Chilled Water
- ☑ Hydronic Heating
- ☐ Fire Protection
- ☐ Low-Pressure Steam
- ☐ Compressed Air
- ☐ Industrial Gases
- ☐ Vacuum
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Viega products must be installed by trained installers. MegaPress credential training is provided at no cost by Viega and is recommended every two years. Please contact Viega to arrange credential training onsite or at our training facility.
Installation by non-professionals may void Viega LLC's warranty.

This document is subject to updates. For the most current Viega technical literature please visit www.viega.us.

1 System Data Sheet

MegaPress FKM Fittings

MegaPress FKM is a carbon steel, cold press system designed for use in chilled water, hydronic heating, compressed air, and fire sprinkler applications. MegaPress FKM fittings in sizes from ½" to 4" are offered in configurations including: elbows, couplings, no-stop couplings, reducers, tees, reducing tees, adapters, unions, caps, and flanges

Components

- Alloy: carbon steel with corrosion-resistant zinc/nickel coating
- FKM sealing element
- 420 stainless steel grip ring
- 304 stainless steel separator ring for ½" to 2" fittings
- PBT separator ring for 2½" to 4" fittings

Operating Parameters

- Operating Pressure: 200 psi max
- Test Pressure: 600 psi max
- Operating Temperatures: 14°F to 284°F (with temperature spikes up to 356°F)

Listings and Certificates

- ABS type approval
- ASME B31.1, B31.3, B31.9
- BV (Bureau Veritas)
- CRN 0A14541.5 A/B/C
- DNV-GL
- IAPMO PS117
- ICC LC1002
- Lloyd's Register
- NFPA 13, 13D, 13R

The following apply to 2½" to 4" fittings only:

- FM Class 1920
- UL/ANSI 213
- ULC/ANSI ORD-C21

Compliant With

- ASME B31: Code for Pressure Piping
- IAPMO Uniform Mechanical Code (UMC)
- ICC International Mechanical Code (IMC)
- ICC International Residential Code (IRC)
- National Building Code of Canada (NBCC)
- National Plumbing Code of Canada (NPCC)

Approved Applications

MegaPress FKM		
Application	**Pressure (Max)**	**Temperature**
Fire Sprinkler	175 psi	Ambient
Hydronics	200 psi	14°F to 284°F
Low Pressure Steam	Max 15 psi	Max 250°F
Fuel Oil	125 psi	Max 100°F
Industrial Gases	200 psi	Max 140°F
Compressed Air	200 psi	Max 140°F
Vacuum	Max 29.2" of Mercury	Max 140°F

MegaPress FKM is not approved for potable water application. For more specific information on applications for MegaPress FKM, contact Viega Technical Services at 1-800-976-9819.

MegaPress FKM systems are approved for underground use and must be protected against corrosion in accordance with NFPA 54 section 404.8, NACE Standard RP0169-2002 section 5, 2009 UPC Chapter 6 section 609.3.1, 2009 UMC Chapter 13 section 1312.1.3, and in accordance with local and national codes.

MegaPress FKM fittings are designed for use in piping systems utilizing ASTM A53, A106, A135, and A795 Schedule 10 to Schedule 40 carbon steel pipe.

Recommended Tools

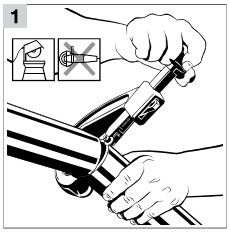
- Standard size press tool (minimum hydraulic ram output of 7200 lbs.)
- #56013 MegaPress jaw/ring kit (½" to 2")
- Viega 26200 PressBooster with 2½" MegaPress XL ring
- Viega 26201 3" and 4" MegaPress XL rings

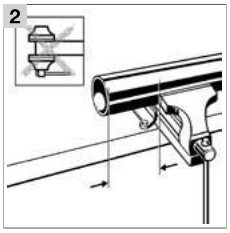
Smart Connect® Technology

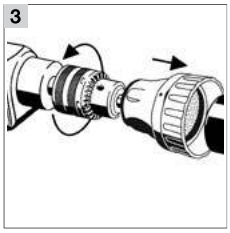
MegaPress FKM fittings are manufactured with Viega's unique Smart Connect technology. Designed into the fitting itself, Smart Connect technology allows identification of an unpressed fitting during pressure testing.

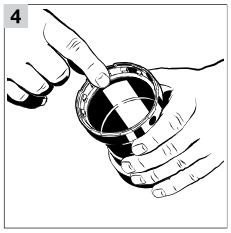
2 Product Instructions

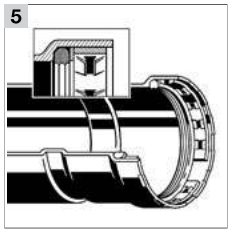
MegaPress FKM ½" to 2" Fittings

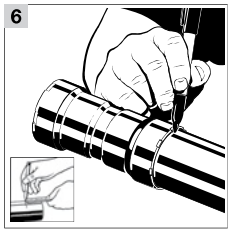


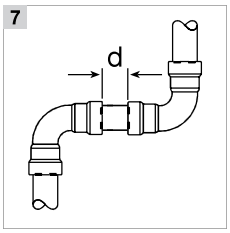


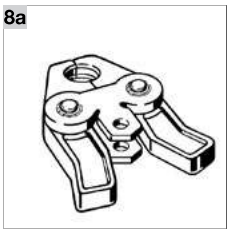


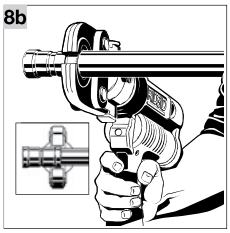


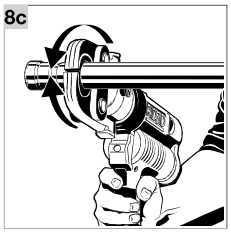


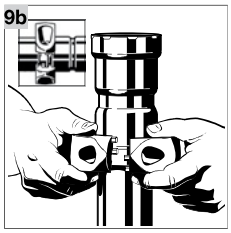


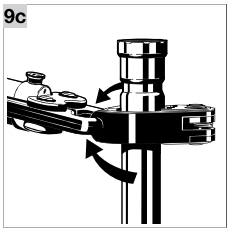


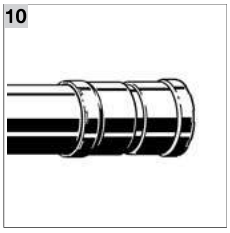












1 Cut piping at right angles using displacement type cutter.

2 Keep end of piping a minimum of 4" away from the contact area of the vise to prevent possible damage to the piping in the press area. See *MegaPress Installation Manual* for minimum clearance required for prep tools.

3 Remove burr from inside and outside of piping and prep to proper insertion depth using a preparation tool or fine grit sandpaper.

4 Check seal and grip ring for correct fit. Do not use oils or lubricants.

5 Illustration demonstrates proper fit of grip ring, separation ring and sealing element.

6 Mark proper insertion depth. Improper insertion depth may result in an improper seal. The depth marking shall be visible on the completed assembly.

Pipe Size (in)	Insertion Depth (in)
½	1 1/16
¾	1 3/16
1	1 3/8
1¼	1 13/16
1½	1 7/8
2	2

7 Refer to chart for minimum distance between fittings. To ensure a correct press, a minimum distance between press fittings must be maintained. Failure to provide this distance may result in an improper seal.

Pipe Diameter (in)	d (in)	d (mm)
½	¼	6
¾	¼	6
1	¼	6
1¼	½	13
1½	½	13
2	½	13

8a Viega MegaPress ½" to 1" fitting connections must be performed with MegaPress jaws. See the pressing tool's Operator's Manual for proper tool instructions

Warning!
Keep extremities and foreign objects away from press tool during pressing operation to prevent injury or incomplete press.

8b Open the MegaPress jaw and place at right angles on the fitting. Visually check insertion depth using mark on piping.

8c Start pressing process and hold the trigger until the jaw has engaged the fitting.

9a Viega MegaPress 1¼" to 2" fitting connections must be performed with MegaPress rings and V2 actuator. See the pressing tool's Operator's Manual for proper tool instructions.

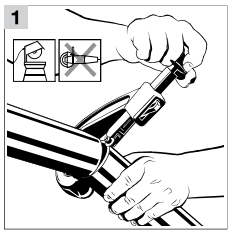
9b Open the MegaPress ring and place at right angles on the fitting. The MegaPress ring must be engaged on the fitting bead. Check insertion depth.

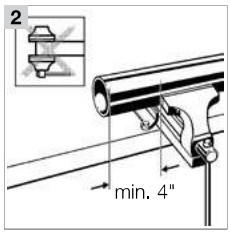
9c Place V2 actuator onto the MegaPress ring and start pressing process. Hold the trigger until the actuator has engaged the MegaPress ring.

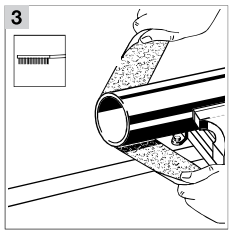
10 Remove the MegaPress jaw from the fitting or release the V2 actuator from the MegaPress ring and then remove the MegaPress ring from the fitting on completion of press. Remove control label to indicate press has been completed.

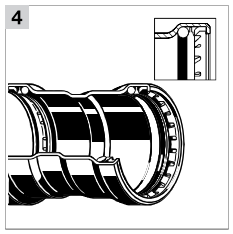
Product Instructions

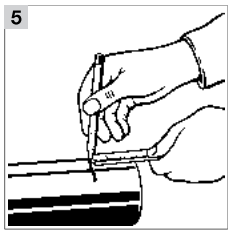
MegaPress FKM 2½" to 4" Fittings

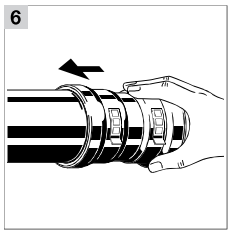


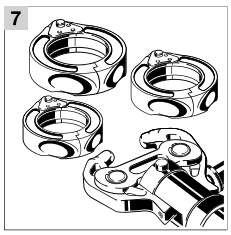


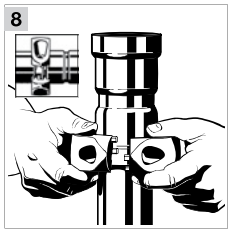


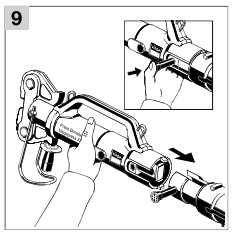


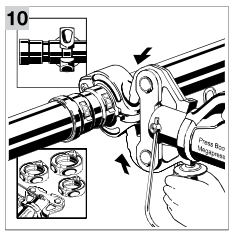


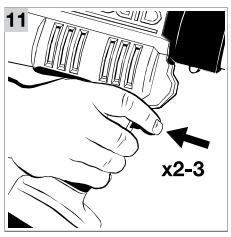












1 Cut piping at right angles using displacement type cutter.

2 Keep end of piping a minimum of 4" away from the contact area of the vise to prevent possible damage to the piping in the press area. See *MegaPress Installation Manual* for minimum clearance required for prep tools.

3 Remove burr from inside and outside of piping and prep to proper insertion depth using a preparation tool or fine grit sandpaper.

4 Illustration demonstrates proper fit of grip ring, separation ring and sealing element.

Caution!
Due to the brittle nature of the graphite separator ring, extra care must be taken when sliding the fitting onto the pipe so as not to damage the separator ring.

5 Mark proper insertion depth. Improper insertion depth may result in an improper seal. The depth marking shall be visible on the completed assembly.

Insertion Depth (in)	d (in)	d (mm)
2½	$1^{13}/_{16}$	46
3	$2^{5}/_{16}$	59
4	3⅛	80

6 While turning slightly, slide fitting onto tubing to the marked depth. End of tubing must contact stop.

Warning!
Keep extremities and foreign objects away from press tool during pressing operation to prevent injury or incomplete press.

7 Viega MegaPress FKM 2½" to 4" fitting connections must be made using MegaPress XL rings and a PressBooster/Z3 actuator. See Operator's Manual for proper tool instructions.

8 Open MegaPress ring and place at right angles on the fitting. MegaPress ring must be engaged on the fitting bead. Check insertion depth.

9 Remove the retaining bolt of the press machine. Slide the PressBooster in via the press jaw fixture.

10 Place PressBooster/Z3 actuator onto MegaPress XL rings and start pressing process. Hold the trigger until the actuator has engaged the MegaPress ring.

11 The PressBooster requires two presses of the trigger to execute a complete press. A third press may be needed to initiate a release cycle to reset the rollers back to the original position.

3 Engineering Specifications
MegaPress FKM Fittings

Part 1: General

1.1 Summary
MegaPress FKM is a cold press mechanical joint fitting system utilizing standard Schedule 5 to Schedule 40 carbon steel pipe in sizes ½" to 4".

1.2 Definitions
ASME: American Society of Mechanical Engineers
ASTM: American Society for Testing and Materials
AWWA: American Water Works Association
CRN: Canadian Registration Number
CSA: Canadian Standards Association
FKM: Fluoroelastomer
FM: Factory Mutual
IACS: International Association of Classification Societies
IAPMO: International Association of Plumbing & Mechanical Officials
ICC: International Code Council
MSS: Manufacturers Standardization Society
NACE International: National Association of Corrosion Engineers
NFPA: National Fire Protection Association
UL: Underwriters Laboratory

1.3 References
ASME A13.1 Scheme for the Identification of Piping Systems
ASME B1.20.1 Pipe Threads, General Purpose (inch)
ASME B16.3 Malleable Iron Threaded Fittings
ASME B16.9 Factory Made Wrought Steel Butt Welding Fittings
ASME B31.1 Power Piping
ASME B31.3 Process Piping
ASME B31.9 Building Piping Systems
ASME B36.10 Welded and Seamless Wrought Steel Pipe
ASTM A106 Specification for Seamless Carbon Steel Pipe - High Temperature Service
ASTM A135 Specification for Electric-Resistance-Welded Steel Pipe
ASTM A420 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service
ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless Pipe
ASTM A795 Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASTM D2000 Classification System for Rubber Products in Automotive Applications
ASTM F1476 Performance of Gasketed Mechanical Couplings for Use in Piping Applications
AWWAC651 Standard for Disinfecting Water Mains
IACS Requirements concerning Pipes And Pressure Vessels
IAPMO Uniform Mechanical Code
IAPMO Uniform Plumbing Code
ICC International Mechanical Code
ICC International Plumbing Code
NACE RP 0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems
MSS SP 58 Pipe Hangers and Supports Materials, Design and Manufacturer
NFPA13 Standard for the Installation of Sprinkler Systems
NFPA13D Standard for the Installation of Sprinkler Systems in One/Two Family Dwellings and Mobile Homes

NFPA13R Standard for the Installation of Sprinkler Systems for Residential Occupancies up to and including Four Stories in Height
NFPA14 Standard for the Installation of Standpipe and Hose Systems

1.4 Quality Assurance

A. Installer shall be qualified, licensed within the jurisdiction, and familiar with the installation of cold press mechanical joint systems.
B. MegaPress press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer.
C. The installation of carbon steel pipe in sprinkler or standpipe systems shall conform to NFPA13, 13D, 13R and 14.
D. The installation of carbon steel pipe in hydronic systems shall conform to the requirements of the ICC International Mechanical Code or the IAPMO Uniform Mechanical Code.
E. Compliance to ASME B31.9 for building services piping.

1.5 Delivery, Storage and Handling

A. Carbon steel pipe shall be shipped to the job site in such a manner to protect the pipe. The pipe and fittings shall not be roughly handled during shipment. Pipe and fittings shall be unloaded with reasonable care.
B. Protect the stored product from moisture and dirt. Elevate above grade. When stored inside, do not exceed the structural capacity of the floor.
C. Protect fittings and piping specialties from moisture and dirt.

1.6 Project Conditions

Verify length of pipe required by field measurements.

1.7 Warranty

A. Viega LLC (Viega) warrants to end users, installers and distribution houses that its Viega metal press products (MegaPress) when properly installed shall be free from failure caused by manufacturing defects. Refer to Viega warranties for specific information.
B. Viega LLC (Viega) manufacturer of the fittings shall not be responsible for the improper use, handling or installation of the product.

Part 2: Products

2.1 Manufacturer

Viega LLC
585 Interlocken Blvd.
Broomfield CO, 80021
Phone: (800) 976-9819
www.viega.us

2.2 Material

A. Pipe: Carbon steel pipe shall conform to ASTM A53, A106, A135 or A795. Pipe schedule (pipe wall thickness) shall conform to the standard referenced dimensions for Schedule 10 to 40.
B. Fittings: Cold Press Mechanical Joint Fitting shall conform to material requirements of ASTM A420 or ASME B16.3 and performance criteria of IAPMO PS117. Sealing elements for press fittings shall be FKM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have Smart Connect® technology design. MegaPress fittings with the Smart Connect technology assure leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this technology is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.
C. Pipe Thread: Pipe Threads shall conform to ASTM B16.3.
D. Hangers and supports: Hangers and supports shall conform to MSS SP 58.
E. Hanger spacing: In accordance with ASME B 31.1, NFPA54, UPC, IMC other National or local codes.

2.3 Source Quality Control

A. Fittings shall be listed & approved for their intended application.
B. All fittings used in Fire Sprinkler Applications shall be UL or FM listed.

Part 3: Execution

3.1 Examination

A. The installing contractor shall examine the pipe and fittings for defects, sand holes or cracks. There shall be no defects of the pipe or fittings. Any damaged pipe or fittings shall be rejected.
B. The installing contractor shall insure that internal components of the cold press mechanical joint press fitting are properly in place and free from damage. This is to include sealing elements, grip ring & separator rings.

3.2 Preparation

A. Carbon steel pipe shall be cut with an approved pipe cutting tool. The pipe shall be cut square to permit proper joining with the fittings.
B. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly. The protective coating shall be removed from the outside of the pipe end and shall be wiped clean and dry. The burrs on the pipe shall be reamed with a deburring or reaming tool.

3.3 Installation General Locations

Plans indicate general location and arrangement of piping systems. Identified locations and arrangements are used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

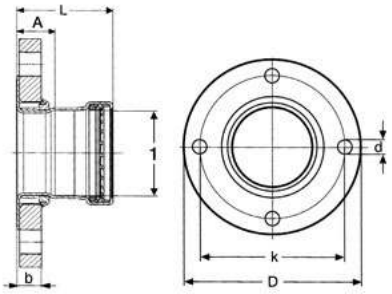
3.4 Installation

A. Pressure ratings: Components shall have a pressure rating equal to or greater than the system operating pressure.
B. Install piping free of sags, bends and kinks.
C. Change of Direction: Fittings shall be used for changes in direction and branch connections.
D. Threaded Joints: Threaded joints shall have pipe joint compound or teflon tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.
E. Press Fittings: MegaPress FKM cold press mechanical joint fittings shall be installed in accordance with the manufacturer's installation instructions. The protective corrosion coating shall be removed from the outside of the pipe end. The pipe shall be fully inserted into the fitting and the pipe marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the pipe to assure the pipe is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.
F. Pipe Protection: Pipe shall be protected against abrasion where pipe is in contact with other building members by an approved tape, pipe insulation or otherwise suitable method of isolation.
G. Penetration Protection: Provide allowance for thermal expansion and contraction of pipe passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation or by installing through an appropriately sized sleeve. Penetrations for fire resistant rated assemblies shall maintain the rating of the assembly.
H. Backfill Material: Backfill material shall not include any ashes, cinders, refuse, stones, boulders or other materials which can damage or break the piping or promote corrosive action in any trench or excavation in which piping is installed.
I. Horizontal Support: Install hangers for horizontal piping in accordance with MSS SP 58.
J. Vertical Support: Pipe shall be supported at each floor.
K. Galvanic Corrosion: Hangers and supports shall be applicable to prevent galvanic corrosion between the system and the supporting members.
L. Seismic Restraint: In areas where seismic conditions exist, the system shall be installed per the applicable seismic recommendations.
M. Pipe Identification: Systems shall be identified in accordance with the requirements of ASME A13.1.

3.5 Field Quality Control

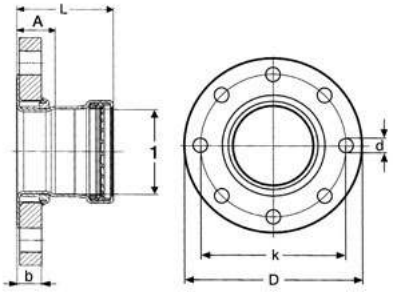
A. All piping systems shall be tested per applicable local codes for joint tightness & leak detection prior to being placed in service.
B. Water Testing: The piping system shall be water tested for joint tightness. The piping system shall be filled with water. The system shall be pressurized to the maximum pressure and length of time required by the code or standard. The system shall have no leaks at the rated pressure.
C. Air Testing: The piping system shall be air tested for joint tightness. The piping system shall be pressurized with air to the maximum pressure of the system or to the code or standard required minimum for the required length of time. The system shall have no leaks at the rated pressure.

Viega MegaPress Adapter Flange P - Models 4859XL / 6659XL



Part No.		Size (in)	A (in)	L (in)	b (in)	k (in)	D (in)	d (in)
FKM	HNBR	1						
26775	28875	2½	1.54	3.33	0.89	5.51	7.09	0.75
26780	28880	3	1.65	3.95	0.96	5.98	7.48	0.75

Viega MegaPress Adapter Flange P - Models 4859XL / 6659XL



Part No.		Size (in)	A (in)	L (in)	b (in)	k (in)	D (in)	d (in)
FKM	HNBR	1						
26785	28885	4	1.63	4.80	0.96	7.52	9.06	0.75

5 Limited Warranty

Viega MegaPress

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (Viega) warrants to end users, installers, and distribution houses that its Viega MegaPress metal press fittings (Viega Product) with application appropriate sealing element when properly installed in non-industrial and non-marine applications and under normal conditions of use shall be free from failure caused by manufacturing defects for a period of ten (10) years from date of installation in Viega MegaPress Approved Applications for fluids/water, oil and lubricant, and gases under Viega specified system operating conditions. MegaPress valves, when properly installed and under normal conditions of use, will be free of failure from manufacturing defects for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the Viega Product and the failure or leak occurs during the warranty period. You do not have a remedy under this warranty and the warranty remedy does not apply if the failure or any resulting damage is caused by (1) components other than those manufactured or sold by Viega, such as black iron pipe; (2) not designing, installing, inspecting, testing, or maintaining the Viega Product in accordance with Viega's installation and product instructions in effect at the time of installation and other specifications and approvals applicable to the installation; (3) use of Viega Product under non recommended system operating conditions, improper handling and protection of the Viega Product prior to, during and after installation, inadequate freeze protection, or exposure to environmental conditions not recommended for the application; or (4) acts of nature, such as, but not limited to, earthquakes, fire, or weather damage. In the event of a leak or other failure of the Viega Product covered by this warranty, it is the responsibility of the end user to take appropriate measures to mitigate any damage, to include making timely repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) calendar days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of the repair or replacement if performed by you. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at a Viega location and reasonable access to the site of damage. Viega will notify you in writing as to the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the Viega Product covered by this warranty and this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for reasonable charges for repair or replacement of the Viega Product itself. VIEGA SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, ECONOMIC LOSS, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR ANY STATUTE OF LIMITATIONS RELATING TO SUCH WARRANTIES. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a COMMERCIAL WARRANTY.

Limited Warranty

Viega Metal Systems for Industrial Applications

Industrial applications are defined as non-residential and non-commercial applications not normally accessible to the general public, including manufacturing, mining, process or fabrication environments.

Subject to the terms and conditions of this Limited Warranty, Viega LLC (Viega) warrants to end users, installers and distribution houses that its Viega metal press products (Viega product) when properly installed in industrial applications shall be free from failure caused by manufacturing defects for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the Viega product and the failure or leak occurs during the warranty period. You do not have a remedy under this warranty and the warranty remedy does not apply if the failure or any resulting damage is caused by (1) components other than those sold by Viega; (2) not designing, installing, inspecting, testing, or maintaining the Viega product in accordance with Viega's installation and product instructions in effect at the time of installation and other specifications and approvals applicable to the installation; (3) improper handling and protection of the Viega product prior to, during and after installation, inadequate freeze protection, or exposure to environmental or operating conditions not recommended for the application; or (4) acts of nature, such as, but not limited to earthquakes, fire, or weather damage. Final approval as to use compatibility to a specific process or fluid application is the responsibility of the engineer of record or responsible design/facilities personnel and this Limited Warranty only applies to manufacturing defects in the Viega Product.

In the event of a leak or other failure in the Viega product covered by this warranty, it is the responsibility of the end user to take appropriate measures to diminish any damage, to include making timely repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) calendar days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of the repair or replacement if performed by you. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at a Viega location and reasonable access to the site of damage. Viega will notify you in writing as to the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the Viega Product covered by this warranty and to which this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for reasonable charges for repair or replacement of the Viega Product itself. VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, ECONOMIC LOSS, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR ANY STATUTE OF LIMITATIONS RELATING TO SUCH WARRANTIES. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a Commercial Warranty.

Viega LLC
585 Interlocken Blvd.
Broomfield, CO 80021

Phone (800) 976-9819
www.viega.us

2.2 - B HYDRONIC PIPING

MUELLER INDUSTRIES, INC.

Date_____

Product Certification

Mueller Copper Tube products are all manufactured in the USA. All tubing produced in Fulton, MS, and Wynne, AR, is seamless and of UNS C12200 grade of copper and is manufactured to meet the chemical and mechanical properties of the applicable ASTM specifications set forth below. When specified at order placement, Mueller Copper Tube can supply Certified Tube to meet all requirements of the current applicable ASTM specification, at an additional cost.

2.2 - Hard copper tube

"L"

Streamline Copper Water Tube (Types K,L,M)
ASTM B88 and ANSI/NSF 61

Streamline Copper Refrigeration Service Coils
ASTM B280

Streamline Nitrogenized ACR Hard Drawn
Copper Tube - ASTM B280

Streamline Copper Drainage Tube (DWV)
ASTM B306

* Please contact Technical Services for certification in Oxygen and Medical service tube. (1.662.862.1700)
Oxygen & Medical Service Tube - To ASTM B819 (Types K & L) Hard Drawn Straight Lengths Only in Accordance To CGA Cleanness Specification; CGA G4.1 (Compressed Gas Association); & NFPA 99 (Health Care Facilities).

NSF 61 Restriction Statement: "Copper Tube (Alloy C12200) is certified by NSF to ANSI/NSF Standard 61 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

P. O. BOX 849 ◆ FULTON, MS 38843 ◆ (662) 862-1700 ◆ FAX (662) 862-3002

P. O. BOX 309 ◆ WYNNE, AR 72396 ◆ (870) 238-3201 ◆ FAX (870) 238-8724

2.2 B 1 HYDRONIC & 2.3- COIL CONDENSATE PIPING

Mueller Streamline Co.
8285 Tournament Drive, Suite 150
Memphis, TN 38125
P 901.753.3200

Date: June 5, 2014
Subject: **Product Standards - Copper Fittings**

Mueller Fittings Co. Inc. manufactures or supplies product which are manufactured to meet the following specifications.

STANDARDS:

2.2-B -1A B

- ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings <<<<<<<
- MSS SP-104: Wrought Copper Solder Joint Pressure Fittings
- ASME B16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
- ASME/ANSI B16.18: Cast Copper Alloy Solder Joint Pressure Fittings
- ASME/ANSI B16.15: Cast Bronze Threaded Fittings
- ASME/ANSI B16.23: Cast Copper Alloy Solder Joint Drainage Fittings DWV
- ASME/ANSI B16.26: Cast Copper Alloy Fittings for Flared Copper Tube
- NSF/ANSI 61-G: Drinking Water System Components
- MSS SP-106: Class 150-Cast Copper Flanges shall meet the requirements of MSS SP-106 and/or the workmanship and dimensional of Federal Spec. WW-F-406 ASME B16.24.

2.2-B-1 A B

- MSS SP – 106: Class 125 Bronze Pipe Flanges and Flanged Fittings <<<<<<<<
- MSS SP – 109: Welded Fabricated Copper Solder Joint Pressure Fittings

2.2-B 1 A B

- MSS SP - 123: Threaded and Solder Joint Copper Unions <<<<<<<<

The materials used to manufacture these fittings are also in compliance with the following specifications:

Products Made From Sheet:

- ASTM B152 Alloy C11000: Standard Specification for Copper Sheet, Strip, Plated Rolled Bar Cast Products
- ASTM B584 Alloy C84400: Standard Specification for Copper Alloy Sand Castings
  - Or Alloy C87850: General Applications: Federal Specification WW-U-516
  - Or Alloy C87600: Type III, Class A and B Copper Alloy Unions
  - Or Alloy C89836: General Applications

Copper Fittings:

- ASTM B280 Alloy C12200: Standard Specification for Seamless Round, Copper Tube*
  - Or Alloy C10200: General Engineering applications

*NSF 61 Restriction Statement: "Copper Tube (Alloy C12200) is certified by NSF to ANSI/NSF Standard 61 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

THE HARRIS PRODUCTS GROUP
A LINCOLN ELECTRIC COMPANY
4501 Quality Place • Mason, OH 45040 U.S.A Tel: 513-754-2000 Fax: 513-754-6015

TECHNICAL SPECIFICATION SHEET

ISO 9002
Cert. No. 31598

HARRIS SPEEDY® LEAD FREE SOLDER

STATEMENT OF LIABILITY- DISCLAIMER

Any suggestion of product applications or results is given without representation or warranty, either expressed or implied. Without exception or limitation, there are no warranties of merchantability or of fitness for particular purpose or application. The user must fully evaluate every process and application in all aspects, including suitability, compliance with applicable law and non-infringement of the rights of others. The Harris Products Group and its affiliates shall have no liability in respect thereof.

NOMINAL SOLDER COMPOSITION:

Copper	2.5 – 3.5%
Tin	Balance

PHYSICAL PROPERTIES: Mechanical properties of bulk solder

Solidus	450°F (232°C)	Density	7.52 g/cm³
Liquidus	555°F (290°C)	Brinell Hardness	11 HV
Color	Bright Silver		

SOLDERING PROPERTIES:

Speedy has a faster melting range, which allows operators to fill small, tight-fitting pipe connections speedily. Speedy's low temperature, free flowing nature increases cycle time while reducing setup time. Speedy can be used with Stay-Clean paste or liquid flux, as well as Bridgit paste flux. Speedy is a lead-free, low temperature alloy formulated for joining copper pipe in potable water systems. This tin-based alloy conforms to the 1986 Federal Safe Drinking Water Act Amendment.

AVAILABLE FORMS:

Speedy is available in 1/8" diameter wire on one pound spools.
Master cartons hold 50 pounds.

SPECIFICATION COMPLIANCE:

Harris Internal

RECOMMENDED FLUX:

Stay Clean soldering fluxes are recommended except on electrical or electronic applications, which require the use of a rosin core solder or 505 neutral flux.

WARNING: PROTECT yourself and others. Read and understand this information.
FUMES AND GASES can be hazardous to your health.
ARC RAYS can injure eyes and burn skin.
ELECTRIC SHOCK can KILL.

- Before use, read and understand the manufacturer's instructions, Material Safety Data Sheets (MSDS), and your employer's safety practices.
- Keep your head out of fumes.
- Use enough ventilation, exhaust at the arc, or both, to keep fumes and gases from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.
- Do not touch live electrical parts.
- See American National Standard Z49.1, *Safety in Welding, Cutting, and Allied Processes,* published by the American Welding Society, 550 N.W. LeJeune Road, Miami, Florida 33126; OSHA Safety and Health Standards, available from the U.S. Government Office, Washington, DC 20402.

Additional information available at our web site: www.harrisproductsgroup.com
6/99 DC

2.2 & 2.3 - HYDRONIC & COOLING COIL

Oatey®
4700 W. 160th St.
Cleveland, OH 44135
PH:800-321-9532
FX:800-321-9535
www.oatey.com

TECHNICAL SPECIFICATION

H-20^{95} WATER SOLUBLE TINNING FLUX

Quality ISO 9001 System

TECHNICAL SPECIFICATION: Oatey H-20^{95} Water Soluble Tinning Flux cleans, tins and fluxes most commonly soldered metals including copper, brass, zinc, galvanized iron, lead and tin or copper-coated metals. Fluxing is a critical step in the soldering process. H-20^{95} Tinning Flux is lead-free and ideal for copper systems including fire sprinkler, hydronic heating, potable water service and DWV piping. H-20^{95} Tinning Flux remains active up to 700° F. H-2O^{95} Flux complies with CA & VT lead content regulations.

PHYSICAL/CHEMICAL PROPERTIES

Appearance	Greenish-Gray Paste
Shelf Life	1 year from manufacture date
pH	3-4
Solder Temp. Range	400-700 F

DIRECTIONS FOR USE

Paste Fluxes require only a small amount of flux applied to the joint. Clean all surfaces before soldering. Apply small amount of flux inside the fitting and outside of the pipe. Heat to temperature required for soldering. Do not overheat the piping. For small diameter piping, direct the heat near the joint. For large diameter piping, move the heat around the joint to ensure adequate solder flow around the circumference of the joint. NOT FOR USE WITH ALUMINUM, STAINLESS STEEL OR MAGNESIUM. DO NOT USE ON ELECTRICAL PARTS.

When soldering process is complete, allow joint to cool undisturbed. Remove any flux residual with a damp cloth. Do not store H-20^{95} Tinning Flux above 120° F.

PRECAUTIONS

Read all cautions and directions carefully before using this product. Apply flux with brush- do not apply with fingers. Wash thoroughly after handling and before eating. Eye/Skin contact may cause intense irritation and injury. In case of eye/skin contact, flush freely with water and seek medical attention immediately. If swallowed, DO NOT INDUCE VOMITING, drink water and call a physician or poison control center immediately. Ingestion of this product could cause gastrointestinal distress. DO NOT REUSE EMPTY CONTAINER. KEEP OUT OF REACH OF CHILDREN.

Refer to material safety data sheet for more information. For emergency first aid help, call 1-877-740-5015.

COMMON APPLICATIONS

Oatey H-20^{95} Water Soluble Tinning Flux can be used to solder most commonly soldered metals including copper, brass, zinc, galvanized iron and tin or copper-coated metals.

Consult Oatey Technical Department for applications not specifically referenced above.

INGREDIENTS (CAS Number)

Triethanolamine Hydrochloride (637-39-8)
Zinc Chloride (7646-85-7)
Ammonium Chloride (12125-02-9)
Surfactant Blend (N/A)
Inert Fillers (N/A)
Tin (7440-31-5)
Copper (7440-50-8)
Bismuth (7440-69-9)

COMPLIANCE AND LISTINGS

NSF

NSF Listed to Standard 61	Lead Free Flux Complies with CA & VT lead legislation

Flux Base meets ASTM Standard B 813

PRODUCT NUMBER	DESCRIPTION	PACK	CARTON WEIGHT
30140	1.7 oz. H-20^{95} Water Soluble Tinning Flux	12	4 lbs.
30142	8 oz. H-20^{95} Water Soluble Tinning Flux	24	16 lbs.
30143	16 oz. H-20^{95} Water Soluble Tinning Flux	24	15 lbs.
53068	1.7 oz. H-20^{95} Water Soluble Tinning Flux with Brush – Carded	12	2 lbs.

Submittal Package

viega

ProPress® System

- ☐ **Potable Water**
- ☐ **Hydronic Heating**
- ☐ **Chilled Water**
- ☐ **Compressed Air**
- ☐ **Nitrogen N_2**
- ☐ **Argon**
- ☐ **Low Pressure Steam**
- ☐ **Fire Protection**
- ☐ **Vacuum**
- ☐ **Corgon**
- ☐ **Oxygen 0_2 (non medical)**
- ☐ _____

Viega LLC, 100 N. Broadway, 6th Floor • Wichita, KS 67202 • Ph: 800-976-9819 • Fax: 316-425-7618

Submittal Package

System Data Sheet

ProPress® and ProPress XL (Copper) are safe, reliable and economical copper pipe installation systems that use modern cold press connection technology.
Viega® ProPress fittings are for use with type K, L and M hard copper tubing from ½" to 4" and soft copper tubing in ½" to 1¼" diameters. All tubing must comply with the ASTM B88 standard. ProPress fittings are approved for installations in both above and below ground applications. Per code, local inspector approval must be obtained prior to installation below ground.
ProPress has been used in Europe since the late 1980s and in the United States since the late 1990s for a variety of applications. Backed by two plumbing leaders with over 175 years of combined excellence.

Listings and Certificates

- NSF 61G
- IAPMO PS117
- UL 213
- FM Class 1920
- ICC LC 1002
- CSA MSE-13
- ABS

International Listings and Certificates

- Deutsch Verein des Gas-und Wasserfachese.V. (DVGW)
- Lloyd's Register (LR)
- Det Norske Veritas (DNV)
- Registro Italiano Navale (RINA)
- Bureau Veritas (BV)
- KIWA

Compliant with:

- ICC International Plumbing Code
- IAPMO Uniform Plumbing Code
- PHCC National Standard Plumbing Code
- Florida Building Code, Volume II Plumbing Code
- NFPA 13, 13D and 13R
- ASME B16.51
- U.S. Coast Guard

Viega ProPress fittings are offered in configurations including: Elbows, Couplings, Reducers, Tees, Reducing Tees, Threaded Adapters, Unions, Caps and Flanges. All threaded ½" to 2" fittings are Zero Lead bronze.

Operating Parameters

Operating Pressure:	200 PSI maximum
Test Pressure:	600 PSI maximum
Operating Temperature:	0°F to 250°F

Approved Applications:

- Potable Water
- Hydronic Heating (w/ Glycol)
- Chilled Water
- Compressed Air
- Non-medical Gases
- Fire Sprinkler (175 PSI maximum)
- Low Pressure Steam (15 PSI maximum)
- Vacuum (29.2 in. Hg maximum @ 68°F)

In ProPress ½" to 4" dimensions, the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

Recommended Tools:

- RIDGID RP 200-B (½" to 1¼")
- RIDGID RP 210-B (½" to 1¼")
- RIDGID RP 320-E
- RIDGID RP 330-B or 330-C
- RIDGID RP 340
- RIDGID CT 400

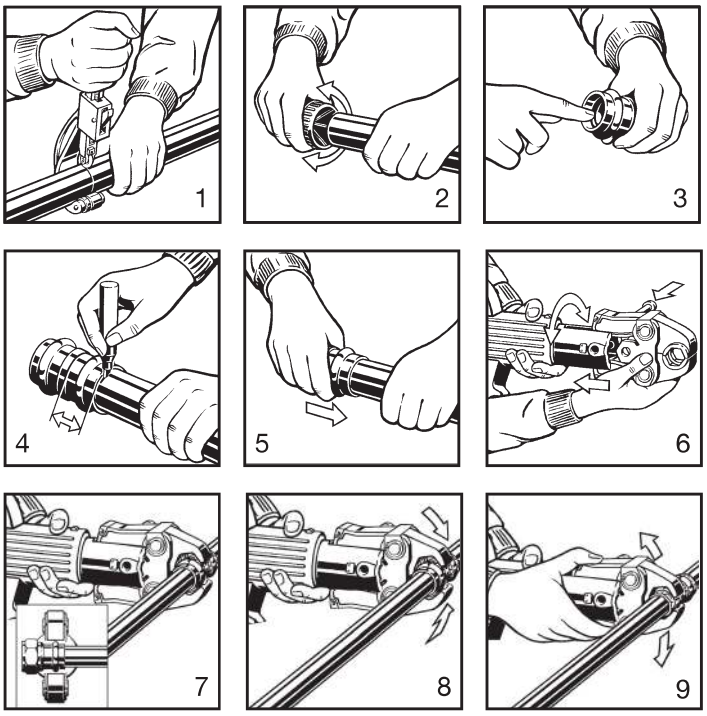
Contact your local Viega representative for details on local approvals.

Submittal Package

ProPress Product Instructions

Viega ProPress®

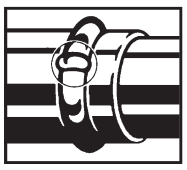
For Types K, L and M Hard Copper Tubing in ½" to 2" and Soft Copper Tubing in ½" to 1¼"



Viega ProPress Insertion Depth Chart						
Tube Size	½"	¾"	1"	1¼"	1½"	2"
Insertion Depth	¾"	⅞"	⅞"	1"	1 7/16"	1 9/16"

⚠ WARNING Read and understand all instructions for installing Viega ProPress fittings. Failure to follow all instructions may result in extensive property damage, serious injury or death.

1. Cut copper tubing at right angles using displacement-type cutter or fine-toothed steel saw.
2. Remove burr from inside and outside of tubing to prevent cutting sealing element.
3. Check seal for correct fit. Do not use oils or lubricants. Use only Viega ProPress Shiny Black EPDM or Dull Black FKM sealing elements.
   Note: For applications requiring Viega ProPress with FKM sealing elements, remove the factory-installed EPDM sealing element and replace with FKM sealing element.
4. Mark proper insertion depth as indicated by the Viega ProPress Insertion Depth Chart. Improper insertion depth may result in improper seal.
5. While turning slightly, slide press fitting onto tubing to the marked depth.
   Note: End of tubing must contact stop.
6. Insert appropriate Viega jaw into the pressing tool and push in, holding pin until it locks in place.
7. Open the jaw and place at right angles on the fitting. Visually check insertion depth using mark on tubing.
8. Start pressing process and hold the trigger until the jaw has engaged the fitting.
9. After pressing, the jaw can be opened again.



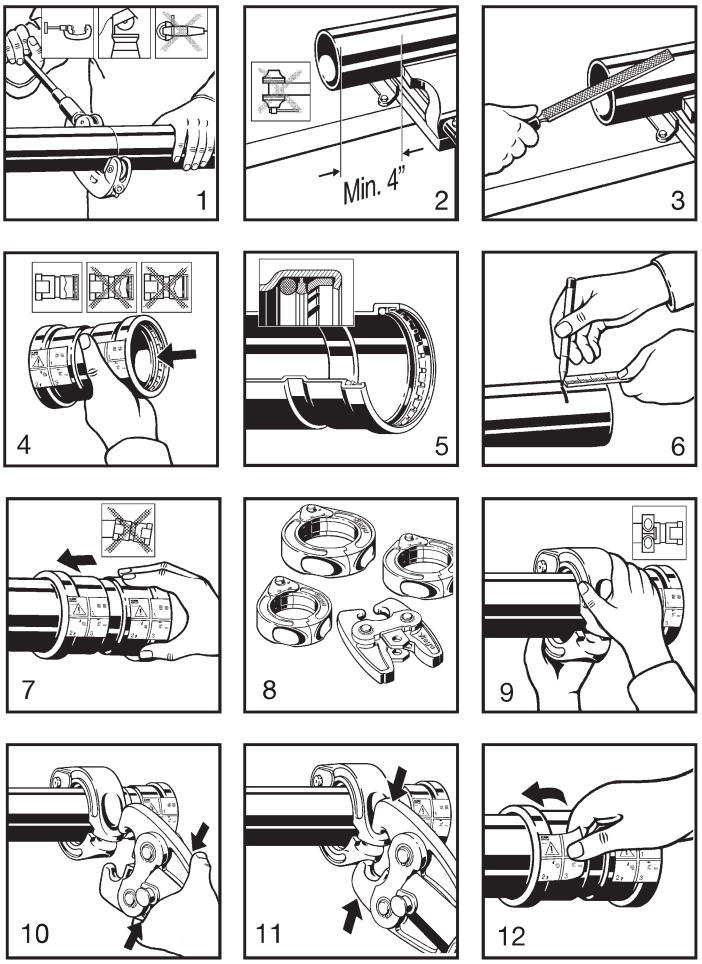
Leak Testing with Smart Connect®: Unpressed connections are located by pressurizing the system with air or water. When testing with water the proper pressure range is 15 psi to 85 psi maximum. Leak testing with air can be dangerous at high pressures. When testing with compressed air the proper pressure range is ½ psi to 45 psi maximum. Following a successful leak test, the system may be pressure tested up to 200 psi with air, or up to 600 psi with water, if required by local code requirements or project specifications.

Submittal Package

viega

Viega ProPress® XL (Copper)

For Types K, L and M Hard Copper Tubing in 2½" to 4"



ProPress XL (copper) Insertion Depth Chart			
Tube Size	2½"	3"	4"
Insertion Depth	1 11/16"	1 15/16"	2 3/8"

⚠ WARNING Read, understand and follow all instructions for installing ProPress XL (copper) fittings. Failure to follow all instructions may result in extensive property damage, serious injury or death.

1. Cut copper tubing at right angles using displacement-type cutter or fine-toothed steel saw.
2. Keep end of tubing a minimum of 4" away from the contact area of the vise to prevent possible damage to the tubing in the press area.
3. Remove burr from inside and outside of tubing to prevent cutting sealing element.
4. Check seal and grip ring for correct fit. Do not use oils or lubricants. Use only ProPress Shiny Black EPDM sealing elements.
5. Illustration demonstrates proper fit of grip ring, separation ring and sealing element.
6. Mark proper insertion depth as indicated by the ProPress XL (copper) Insertion Depth Chart. Improper insertion depth may result in an improper seal.
7. While turning slightly, slide press fitting onto tubing to the marked depth. End of tubing must contact stop.
8. ProPress XL (copper) fitting connections must be performed with ProPress XL-C Rings and V2 ACTUATOR. Use of ProPress XL Rings and/or Actuator (for Bronze fittings) will result in an improper connection. See Ridgid Operator's Manual for proper tool instructions.
9. Open XL-C Ring and place at right angles on the fitting. XL-C Ring must be engaged on the fitting bead. Check insertion depth.
10. With V2 ACTUATOR inserted into the tool, open the V2 ACTUATOR as shown and connect V2 ACTUATOR to the XL-C Ring.
11. Place V2 ACTUATOR onto XL-C Ring and start pressing process. Hold the trigger until the Actuator has engaged the XL-C Ring. Keep extremities and foreign objects away from XL-C Ring and V2 ACTUATOR during pressing operation to prevent injury or incomplete press.
12. Release V2 ACTUATOR from XL-C Ring and then remove the XL-C Ring from the fitting on completion of press. Remove tag from fitting, indicating press has been performed.

Leak Testing with Smart Connect®: Unpressed connections are located by pressurizing the system with air or water. When testing with water the proper pressure range is 15 psi to 85 psi. Leak testing with air can be dangerous at high pressures. When testing with compressed air the proper pressure range is ½ psi to 45 psi. Following a successful leak test, the system may be pressure tested up to 200 psi with air, or up to 600 psi with water, if required by local code requirements or project specifications.

Submittal Package

Viega Limited Warranty ProPress® Fittings And Valves

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (VIEGA) warrants to wholesalers and licensed plumbing and mechanical contractors in the United States and Canada that its PROPRESS fittings, when properly installed in non industrial and non marine applications and under normal conditions of use, will be free of failure from manufacturing defect for a period of fifty (50) years from date of installation and that its PROPRESS valves, when properly installed in non industrial and non marine applications and under normal conditions of use, will be free of failure from manufacturing defect for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the products covered by this warranty and the failure or leak occurred during the warranty period. You do not have a remedy under this warranty and the warranty does not apply if the failure or any resulting damage is caused by (1) components other than those manufactured or sold by Viega; (2) not designing, installing, inspecting, or testing the ProPress fittings or valves in accordance with Viega's installation instructions in effect at the time of the installation; applicable code requirements; and accepted industry practice; (3) improper handling and protection of the product prior to and during installation, inadequate freeze protection, exposure to water pressures or temperatures or in applications outside acceptable operating conditions; (4) acts of nature such as, but not limited to, earthquakes, fire, flood, or lightning, or (5) external environmental causes, such as water quality variations, aggressive water, or other external chemical or physical conditions.

In the event of a leak or other failure of the parts covered by this warranty, it is the responsibility of the property owner to obtain and pay for repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect and document the date of installation. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega. Viega will notify you in writing of the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the part covered by this warranty and that this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for repair and/or replacement of the part. VIEGA SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. If a limited warranty shall be found to apply, such warranty is limited to four years. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a Commercial Warranty.

*Zero Lead identifies Viega® products meeting the lead free requirements of NSF 61-G through testing under NSF/ANSI 372 (0.25% or less maximum weighted average lead content).

Viega products are designed to be installed by licensed and trained plumbing and mechanical professionals who are familiar with our products' proper use and installation. *Installation by non-professionals may void Viega LLC's warranty.*

This document subject to updates. For the most current Viega technical literature please visit www.viega.us.
Click Services -> Click Electronic Literature Downloads -> Select Product Line -> Select Desired Document

Viega LLC, 100 N. Broadway, 6th Floor • Wichita, KS 67202 • Ph: 800-976-9819 • Fax: 316-425-7618

2.4 - NATURAL GAS PIPING 1/2 to 8"

Standard Steel Pipe

ASTM A53 TYPE E GRADE B PIPE

Submittal Data Sheet

Scope

Covers black and ~~hot-dipped galvanized~~ XXXXXXXXXX electric-resistance welded Grade B pipe. Pipe is intended for mechanical and pressure applications and is acceptable for ordinary uses in steam, water, gas and air lines. Wheatland ASTM A53 is UL Listed and FM Approved, sizes 1" through 6" nominal, for use in Fire Sprinkler Pipe Applications. Pipe is suitable for welding, threading and grooving. Produced to the latest revision of ASTM A53/53M, Federal Specification WW-P404 and ASME B36.10M.

Manufacture

The weld seam shall be heat treated after welding to a minimum of 1400°F or be otherwise processed in such a manner that no untempered martensite remains.

~~Hot-dipped galvanized~~

~~The average weight of zinc coating shall be not less than 1.8 oz. per sq. ft. of surface (inside and outside). When galvanized pipe is bent or otherwise fabricated to a degree which causes zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.~~

Hydrostatic and Nondestructive Electric testing

Hydrostatic inspection test pressures for plain-end pipe are listed in Table X 2.2 of the A53/A53M specification. Test pressures shall be maintained for a minimum of five seconds. Nondestructive electric testing of the weld seam is required on each length of ERW pipe NPS 2 and larger.

Chemical Requirements

Composition, max. %

Carbon	Manganese	Phosphorus	Sulfur	
.30	1.20	.05	.045	
Copper	**Nickel**	**Chromium**	**Molybdenum**	**Vanadium**
.40	.40	.40	.15	.08

*The combination of these five elements shall not exceed 1.00%.

Tensile Requirements

TENSILE STRENGTH, MIN.	YIELD STRENGTH, MIN.	ELONGATION IN 2"
60,000 psi	35,000 psi	Refer to A53 table x 4.1

Bending Test (Cold)

NPS	DEGREE OF BEND	DIAMETER OF MANDREL
2 and under	90°	12x pipe OD

Flattening Test

As a test for ductility of the weld for pipe 2½" NPS and larger, position the weld at 0° and alternately at 90° to the direction of force and flatten until the OD is ⅔ of the original outside diameter. No cracks shall occur along the inside or outside surface of the weld.

Frequency of Tests

Tensile tests are required on one length of pipe from each lot of 500 lengths or fraction thereof for each size. Refer to A53 specification for frequency of flattening tests.

End Finish

Plain End: NPS 2 and larger, STD and XS weights: ends beveled to angle of 30°, +5°, -0° with a root face of 1/16" ± 1/32"

Threaded: To ANSI Standard B 1.20.1
Couplings: To ASTM Standard A 865

Weights and Dimensions Charts

STANDARD (SCH. 40) BLACK PLAIN END

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.154	3.66
2½"	2.875	.203	5.80
3"	3.500	.216	7.58
4"	4.500	.237	10.88
5"	5.563	.258	14.63
6"	6.625	.280	18.99
8"	8.625	.322	28.58

~~**EXTRA STRONG (SCH. 80) BLACK PLAIN END**~~

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.218	5.03
2½"	2.875	.276	7.67
3"	3.500	.300	10.26
4"	4.500	.337	15.00

All information contained herein is accurate as known at the time of publication. Wheatland reserves the right to change product specifications without notice and without incurring obligations.

Permissible Variations in Wall Thickness

Minimum wall thickness at any point shall not be more than 12.5% under nominal wall thickness specified.

Permissible Variations in Outside Diameter

Pipe NPS 2 and larger shall not vary more than + 1% from the standard specified.

Permissible Variations in Weight per Foot

Pipe shall not vary more than + 10% from the standard specified.

Product Marking

Each length of pipe is continuously stenciled to show the manufacturer, the grade of pipe (ASTM A53), the kind of pipe E for Electric Resistance Welded, B for Grade B, the size, XS for extra strong, and length. Stencil markings indicate UL Listing and FM Approval for sizes 1" through 6" nominal for use in Fire Sprinkler Pipe Applications. Bar coding is acceptable as a supplementary identification method.

SUBMITTAL INFORMATION

PROJECT: _____ CONTRACTOR: _____ DATE: _____

ENGINEER: _____ SPECIFICATION REFERENCE: _____ SYSTEM TYPE: _____

LOCATIONS: _____ COMMENTS: _____

WST-051516

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Sharon, PA 16146
P 800.257.8182
F 724.346.7260

info@wheatland.com
wheatland.com
Follow us on Twitter:
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A DIVISION OF ZEKELMAN INDUSTRIES

WELDBEND®

Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged fittings simplify insulation and take up less space.

ASTM A 234

Scope

This standard covers wrought carbon steel fittings of seamless and welded construction which are manufactured to the dimensional specifications of ASME B16.9 and B16.28. These fittings are primarily for use in pressure piping and in pressure vessel fabrication for service at moderate and elevated temperatures.

Materials

The starting material for fittings shall consist of killed steel, forgings, bars, plates, seamless or fusion-welded tubular products with filler metal added and shall conform to the the chemical requirements of ASTM A 234. Unless otherwise specified, carbon steel plates may be either coarse grain or fine grain practice.

Manufacture

Forging or shaping operations are performed by hammering, pressing, piercing, extruding, upsetting, rolling, bending, machining, or by a combination of two or more of these operations. The forming process shall be applied so that it will not produce injurious imperfections in the fittings.

Heat Treatment

Hot-formed WPB fittings, upon which the final forming operation is completed at a temperature above 1150ºF and below 1800ºF, need not be heat treated. Cold-Formed WPB fittings, upon which the final forming operation is completed at a temperature below 1150ºF, shall be normalized, or shall be stress relieved at 1100ºF to 1275ºF.

Fitting Summary Data Sheet

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.30 max	.29-1.06	.050	.058

Silicon	Chromium	Molybdenum	Nickel	Copper
.10 min	.40 max	.15 max	.40 max	.40 max

Vanadium	Columbium
.08 max	.02 max

Mechanical requirements:

Tensile Strength		60,000-85,000 psi
Yield Strength (min)		35,000 psi
Elongation	- Longitudinal:	22%
	- Transverse:	14%

Dimensions

Butt-welding fittings and butt-welding short radius elbows and returns purchased in accordance with this specification shall conform to the dimensions and tolerances given in the latest revision of ANSI B16.9 and B16.28, respectively.

Certification

When requested by the purchaser, the manufacturer shall provide a certificate of compliance to this specification. If requested to provide test reports, the manufacturer shall also provide the following where applicable:

* Chemical analysis results. When the amount of an element is less than .02%, the analysis for that element is reported as "<0.02%."
* Tensile property results, report the yield strength and ultimate strength in ksi [or MPa] and elongation in percent,
* Hardness acceptable in accordance with Section 10 of ASTM A-234,
* Seamless or Welded,
* Type of Heat Treatment, if any,
* Starting material, specifically pipe, plate, etc.,
* Statement regarding radiographic or ultrasonic examination.
* Any supplemental testing required by the purchase order.

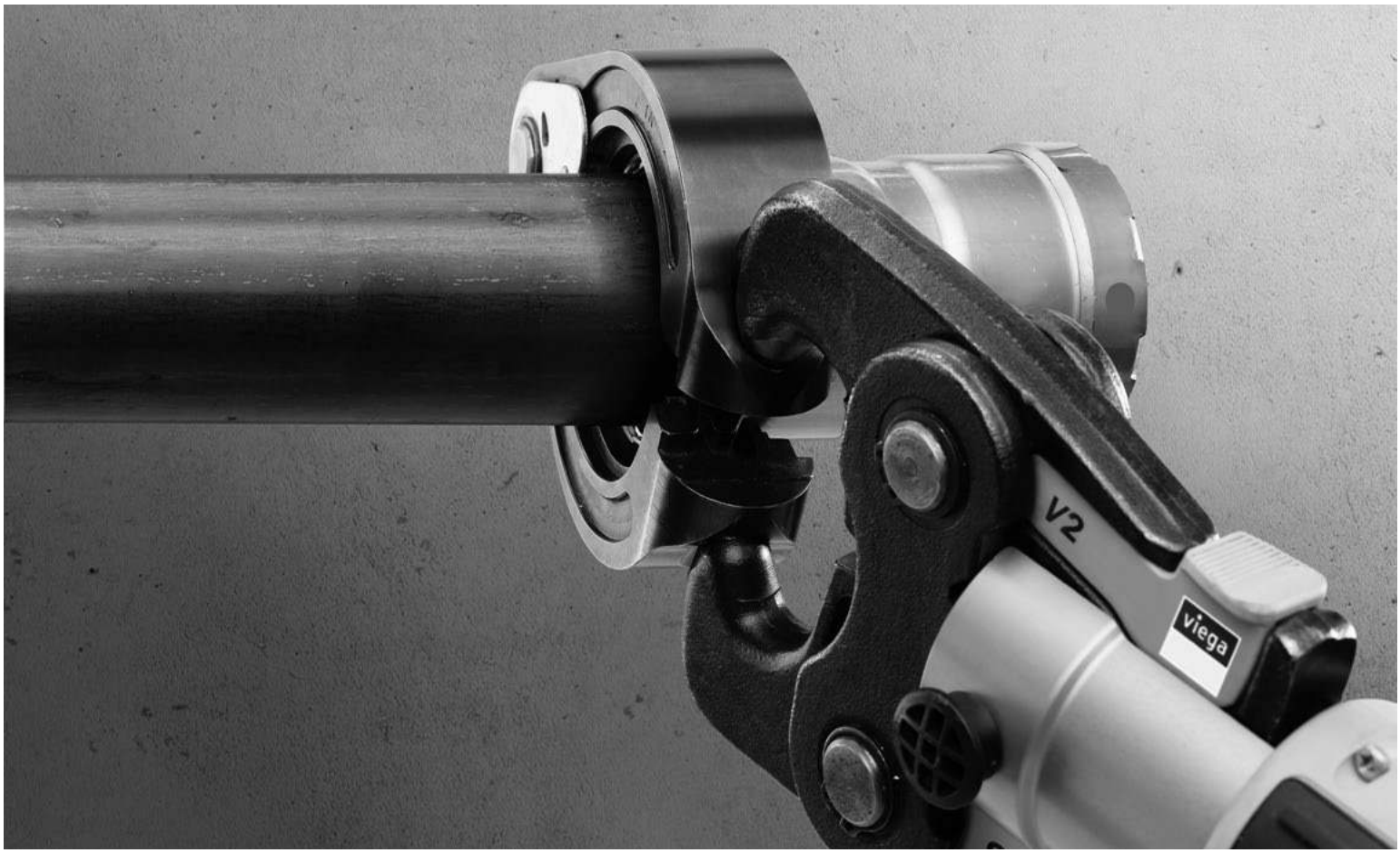
Product Marking

All fittings shall have the prescribed information stamped or otherwise suitable marked on each fitting in accordance with ASTM A 234/MSS SP-25. A Weldbend fitting is marked as follows: Weldbend's Name, Nominal Pipe Size, Pipe Wall Thickness Designation, Material Grade (WPB/WPC) and Heat Identification Number.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.

Submittal Package

Viega MegaPress FKM Fittings



Project _____ **Date** _____

Engineer _____ **Contractor** _____

Submitted by _____

Approved by _____ **Date** _____ **Approved by** _____ **Date** _____

Table of Contents

- ☐ Chilled Water
- ☑ Hydronic Heating
- ☐ Fire Protection
- ☐ Low-Pressure Steam
- ☐ Compressed Air
- ☐ Industrial Gases
- ☐ Vacuum
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Viega products must be installed by trained installers. MegaPress credential training is provided at no cost by Viega and is recommended every two years. Please contact Viega to arrange credential training onsite or at our training facility.
Installation by non-professionals may void Viega LLC's warranty.

This document is subject to updates. For the most current Viega technical literature please visit www.viega.us.

1 System Data Sheet

MegaPress FKM Fittings

MegaPress FKM is a carbon steel, cold press system designed for use in chilled water, hydronic heating, compressed air, and fire sprinkler applications. MegaPress FKM fittings in sizes from ½" to 4" are offered in configurations including: elbows, couplings, no-stop couplings, reducers, tees, reducing tees, adapters, unions, caps, and flanges

Components

- Alloy: carbon steel with corrosion-resistant zinc/nickel coating
- FKM sealing element
- 420 stainless steel grip ring
- 304 stainless steel separator ring for ½" to 2" fittings
- PBT separator ring for 2½" to 4" fittings

Operating Parameters

- Operating Pressure: 200 psi max
- Test Pressure: 600 psi max
- Operating Temperatures: 14°F to 284°F (with temperature spikes up to 356°F)

Listings and Certificates

- ABS type approval
- ASME B31.1, B31.3, B31.9
- BV (Bureau Veritas)
- CRN 0A14541.5 A/B/C
- DNV-GL
- IAPMO PS117
- ICC LC1002
- Lloyd's Register
- NFPA 13, 13D, 13R

The following apply to 2½" to 4" fittings only:

- FM Class 1920
- UL/ANSI 213
- ULC/ANSI ORD-C21

Compliant With

- ASME B31: Code for Pressure Piping
- IAPMO Uniform Mechanical Code (UMC)
- ICC International Mechanical Code (IMC)
- ICC International Residential Code (IRC)
- National Building Code of Canada (NBCC)
- National Plumbing Code of Canada (NPCC)

Approved Applications

MegaPress FKM		
Application	**Pressure (Max)**	**Temperature**
Fire Sprinkler	175 psi	Ambient
Hydronics	200 psi	14°F to 284°F
Low Pressure Steam	Max 15 psi	Max 250°F
Fuel Oil	125 psi	Max 100°F
Industrial Gases	200 psi	Max 140°F
Compressed Air	200 psi	Max 140°F
Vacuum	Max 29.2" of Mercury	Max 140°F

MegaPress FKM is not approved for potable water application. For more specific information on applications for MegaPress FKM, contact Viega Technical Services at 1-800-976-9819.

MegaPress FKM systems are approved for underground use and must be protected against corrosion in accordance with NFPA 54 section 404.8, NACE Standard RP0169-2002 section 5, 2009 UPC Chapter 6 section 609.3.1, 2009 UMC Chapter 13 section 1312.1.3, and in accordance with local and national codes.

MegaPress FKM fittings are designed for use in piping systems utilizing ASTM A53, A106, A135, and A795 Schedule 10 to Schedule 40 carbon steel pipe.

Recommended Tools

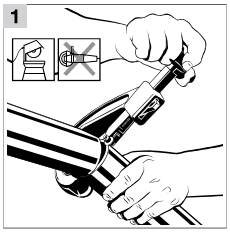
- Standard size press tool (minimum hydraulic ram output of 7200 lbs.)
- #56013 MegaPress jaw/ring kit (½" to 2")
- Viega 26200 PressBooster with 2½" MegaPress XL ring
- Viega 26201 3" and 4" MegaPress XL rings

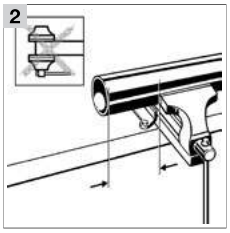
Smart Connect® Technology

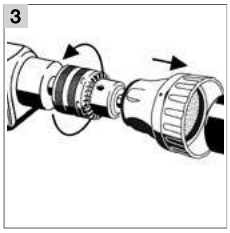
MegaPress FKM fittings are manufactured with Viega's unique Smart Connect technology. Designed into the fitting itself, Smart Connect technology allows identification of an unpressed fitting during pressure testing.

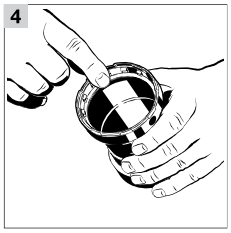
2 Product Instructions

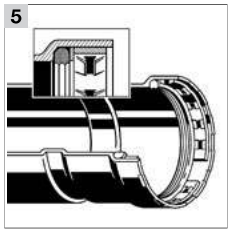
MegaPress FKM ½" to 2" Fittings

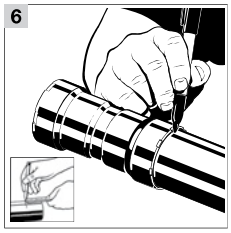


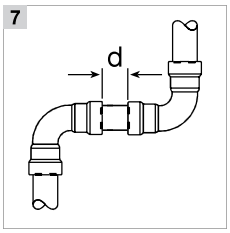


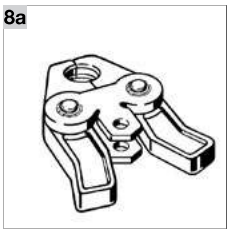


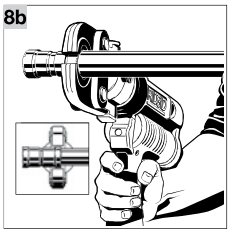


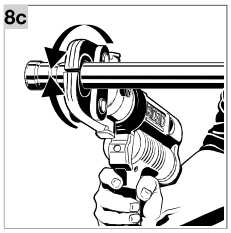


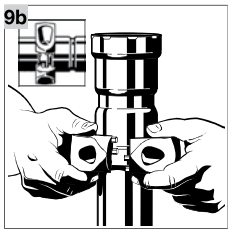


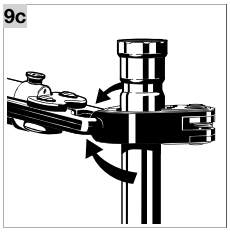


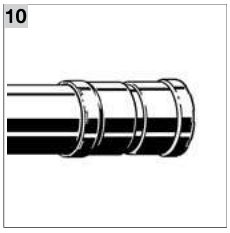












1 Cut piping at right angles using displacement type cutter.

2 Keep end of piping a minimum of 4" away from the contact area of the vise to prevent possible damage to the piping in the press area. See *MegaPress Installation Manual* for minimum clearance required for prep tools.

3 Remove burr from inside and outside of piping and prep to proper insertion depth using a preparation tool or fine grit sandpaper.

4 Check seal and grip ring for correct fit. Do not use oils or lubricants.

5 Illustration demonstrates proper fit of grip ring, separation ring and sealing element.

6 Mark proper insertion depth. Improper insertion depth may result in an improper seal. The depth marking shall be visible on the completed assembly.

Pipe Size (in)	Insertion Depth (in)
½	1 1/16
¾	1 3/16
1	1 3/8
1¼	1 13/16
1½	1 7/8
2	2

7 Refer to chart for minimum distance between fittings. To ensure a correct press, a minimum distance between press fittings must be maintained. Failure to provide this distance may result in an improper seal.

Pipe Diameter (in)	d (in)	d (mm)
½	¼	6
¾	¼	6
1	¼	6
1¼	½	13
1½	½	13
2	½	13

8a Viega MegaPress ½" to 1" fitting connections must be performed with MegaPress jaws. See the pressing tool's Operator's Manual for proper tool instructions

Warning!
Keep extremities and foreign objects away from press tool during pressing operation to prevent injury or incomplete press.

8b Open the MegaPress jaw and place at right angles on the fitting. Visually check insertion depth using mark on piping.

8c Start pressing process and hold the trigger until the jaw has engaged the fitting.

9a Viega MegaPress 1¼" to 2" fitting connections must be performed with MegaPress rings and V2 actuator. See the pressing tool's Operator's Manual for proper tool instructions.

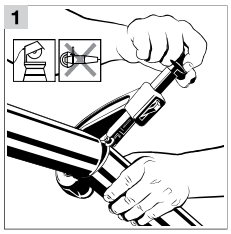
9b Open the MegaPress ring and place at right angles on the fitting. The MegaPress ring must be engaged on the fitting bead. Check insertion depth.

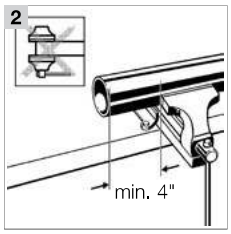
9c Place V2 actuator onto the MegaPress ring and start pressing process. Hold the trigger until the actuator has engaged the MegaPress ring.

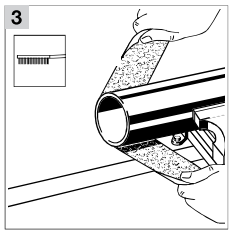
10 Remove the MegaPress jaw from the fitting or release the V2 actuator from the MegaPress ring and then remove the MegaPress ring from the fitting on completion of press. Remove control label to indicate press has been completed.

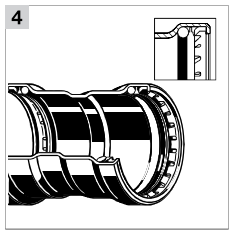
Product Instructions

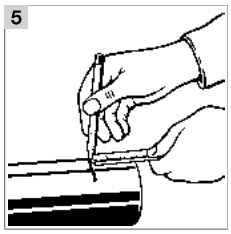
MegaPress FKM 2½" to 4" Fittings

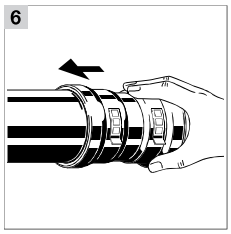


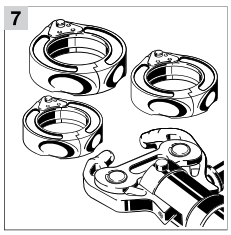


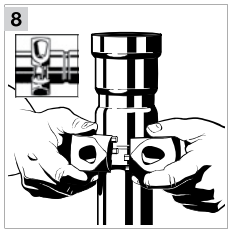


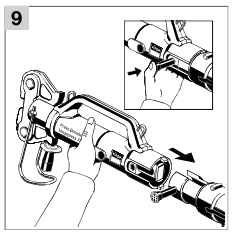


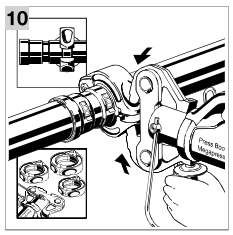


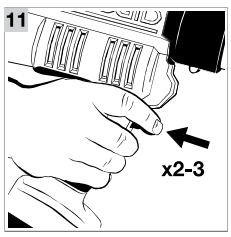












1 Cut piping at right angles using displacement type cutter.

2 Keep end of piping a minimum of 4" away from the contact area of the vise to prevent possible damage to the piping in the press area. See *MegaPress Installation Manual* for minimum clearance required for prep tools.

3 Remove burr from inside and outside of piping and prep to proper insertion depth using a preparation tool or fine grit sandpaper.

4 Illustration demonstrates proper fit of grip ring, separation ring and sealing element.

Caution!
Due to the brittle nature of the graphite separator ring, extra care must be taken when sliding the fitting onto the pipe so as not to damage the separator ring.

5 Mark proper insertion depth. Improper insertion depth may result in an improper seal. The depth marking shall be visible on the completed assembly.

Insertion Depth (in)	d (in)	d (mm)
2½	$1^{13}/_{16}$	46
3	$2^{5}/_{16}$	59
4	3⅛	80

6 While turning slightly, slide fitting onto tubing to the marked depth. End of tubing must contact stop.

Warning!
Keep extremities and foreign objects away from press tool during pressing operation to prevent injury or incomplete press.

7 Viega MegaPress FKM 2½" to 4" fitting connections must be made using MegaPress XL rings and a PressBooster/Z3 actuator. See Operator's Manual for proper tool instructions.

8 Open MegaPress ring and place at right angles on the fitting. MegaPress ring must be engaged on the fitting bead. Check insertion depth.

9 Remove the retaining bolt of the press machine. Slide the PressBooster in via the press jaw fixture.

10 Place PressBooster/Z3 actuator onto MegaPress XL rings and start pressing process. Hold the trigger until the actuator has engaged the MegaPress ring.

11 The PressBooster requires two presses of the trigger to execute a complete press. A third press may be needed to initiate a release cycle to reset the rollers back to the original position.

3 Engineering Specifications
MegaPress FKM Fittings

Part 1: General

1.1 Summary
MegaPress FKM is a cold press mechanical joint fitting system utilizing standard Schedule 5 to Schedule 40 carbon steel pipe in sizes ½" to 4".

1.2 Definitions
ASME: American Society of Mechanical Engineers
ASTM: American Society for Testing and Materials
AWWA: American Water Works Association
CRN: Canadian Registration Number
CSA: Canadian Standards Association
FKM: Fluoroelastomer
FM: Factory Mutual
IACS: International Association of Classification Societies
IAPMO: International Association of Plumbing & Mechanical Officials
ICC: International Code Council
MSS: Manufacturers Standardization Society
NACE International: National Association of Corrosion Engineers
NFPA: National Fire Protection Association
UL: Underwriters Laboratory

1.3 References
ASME A13.1 Scheme for the Identification of Piping Systems
ASME B1.20.1 Pipe Threads, General Purpose (inch)
ASME B16.3 Malleable Iron Threaded Fittings
ASME B16.9 Factory Made Wrought Steel Butt Welding Fittings
ASME B31.1 Power Piping
ASME B31.3 Process Piping
ASME B31.9 Building Piping Systems
ASME B36.10 Welded and Seamless Wrought Steel Pipe
ASTM A106 Specification for Seamless Carbon Steel Pipe - High Temperature Service
ASTM A135 Specification for Electric-Resistance-Welded Steel Pipe
ASTM A420 Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service
ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless Pipe
ASTM A795 Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASTM D2000 Classification System for Rubber Products in Automotive Applications
ASTM F1476 Performance of Gasketed Mechanical Couplings for Use in Piping Applications
AWWAC651 Standard for Disinfecting Water Mains
IACS Requirements concerning Pipes And Pressure Vessels
IAPMO Uniform Mechanical Code
IAPMO Uniform Plumbing Code
ICC International Mechanical Code
ICC International Plumbing Code
NACE RP 0169 Control of External Corrosion on Underground or Submerged Metallic Piping Systems
MSS SP 58 Pipe Hangers and Supports Materials, Design and Manufacturer
NFPA13 Standard for the Installation of Sprinkler Systems
NFPA13D Standard for the Installation of Sprinkler Systems in One/Two Family Dwellings and Mobile Homes

NFPA13R Standard for the Installation of Sprinkler Systems for Residential Occupancies up to and including Four Stories in Height
NFPA14 Standard for the Installation of Standpipe and Hose Systems

1.4 Quality Assurance

A. Installer shall be qualified, licensed within the jurisdiction, and familiar with the installation of cold press mechanical joint systems.
B. MegaPress press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer.
C. The installation of carbon steel pipe in sprinkler or standpipe systems shall conform to NFPA13, 13D, 13R and 14.
D. The installation of carbon steel pipe in hydronic systems shall conform to the requirements of the ICC International Mechanical Code or the IAPMO Uniform Mechanical Code.
E. Compliance to ASME B31.9 for building services piping.

1.5 Delivery, Storage and Handling

A. Carbon steel pipe shall be shipped to the job site in such a manner to protect the pipe. The pipe and fittings shall not be roughly handled during shipment. Pipe and fittings shall be unloaded with reasonable care.
B. Protect the stored product from moisture and dirt. Elevate above grade. When stored inside, do not exceed the structural capacity of the floor.
C. Protect fittings and piping specialties from moisture and dirt.

1.6 Project Conditions

Verify length of pipe required by field measurements.

1.7 Warranty

A. Viega LLC (Viega) warrants to end users, installers and distribution houses that its Viega metal press products (MegaPress) when properly installed shall be free from failure caused by manufacturing defects. Refer to Viega warranties for specific information.
B. Viega LLC (Viega) manufacturer of the fittings shall not be responsible for the improper use, handling or installation of the product.

Part 2: Products

2.1 Manufacturer

Viega LLC
585 Interlocken Blvd.
Broomfield CO, 80021
Phone: (800) 976-9819
www.viega.us

2.2 Material

A. Pipe: Carbon steel pipe shall conform to ASTM A53, A106, A135 or A795. Pipe schedule (pipe wall thickness) shall conform to the standard referenced dimensions for Schedule 10 to 40.
B. Fittings: Cold Press Mechanical Joint Fitting shall conform to material requirements of ASTM A420 or ASME B16.3 and performance criteria of IAPMO PS117. Sealing elements for press fittings shall be FKM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have Smart Connect® technology design. MegaPress fittings with the Smart Connect technology assure leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this technology is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.
C. Pipe Thread: Pipe Threads shall conform to ASTM B16.3.
D. Hangers and supports: Hangers and supports shall conform to MSS SP 58.
E. Hanger spacing: In accordance with ASME B 31.1, NFPA54, UPC, IMC other National or local codes.

2.3 Source Quality Control

A. Fittings shall be listed & approved for their intended application.
B. All fittings used in Fire Sprinkler Applications shall be UL or FM listed.

Part 3: Execution

3.1 Examination

A. The installing contractor shall examine the pipe and fittings for defects, sand holes or cracks. There shall be no defects of the pipe or fittings. Any damaged pipe or fittings shall be rejected.
B. The installing contractor shall insure that internal components of the cold press mechanical joint press fitting are properly in place and free from damage. This is to include sealing elements, grip ring & separator rings.

3.2 Preparation

A. Carbon steel pipe shall be cut with an approved pipe cutting tool. The pipe shall be cut square to permit proper joining with the fittings.
B. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly. The protective coating shall be removed from the outside of the pipe end and shall be wiped clean and dry. The burrs on the pipe shall be reamed with a deburring or reaming tool.

3.3 Installation General Locations

Plans indicate general location and arrangement of piping systems. Identified locations and arrangements are used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

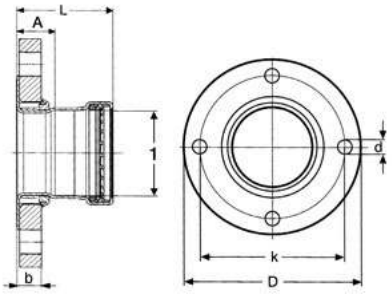
3.4 Installation

A. Pressure ratings: Components shall have a pressure rating equal to or greater than the system operating pressure.
B. Install piping free of sags, bends and kinks.
C. Change of Direction: Fittings shall be used for changes in direction and branch connections.
D. Threaded Joints: Threaded joints shall have pipe joint compound or teflon tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.
E. Press Fittings: MegaPress FKM cold press mechanical joint fittings shall be installed in accordance with the manufacturer's installation instructions. The protective corrosion coating shall be removed from the outside of the pipe end. The pipe shall be fully inserted into the fitting and the pipe marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the pipe to assure the pipe is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.
F. Pipe Protection: Pipe shall be protected against abrasion where pipe is in contact with other building members by an approved tape, pipe insulation or otherwise suitable method of isolation.
G. Penetration Protection: Provide allowance for thermal expansion and contraction of pipe passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation or by installing through an appropriately sized sleeve. Penetrations for fire resistant rated assemblies shall maintain the rating of the assembly.
H. Backfill Material: Backfill material shall not include any ashes, cinders, refuse, stones, boulders or other materials which can damage or break the piping or promote corrosive action in any trench or excavation in which piping is installed.
I. Horizontal Support: Install hangers for horizontal piping in accordance with MSS SP 58.
J. Vertical Support: Pipe shall be supported at each floor.
K. Galvanic Corrosion: Hangers and supports shall be applicable to prevent galvanic corrosion between the system and the supporting members.
L. Seismic Restraint: In areas where seismic conditions exist, the system shall be installed per the applicable seismic recommendations.
M. Pipe Identification: Systems shall be identified in accordance with the requirements of ASME A13.1.

3.5 Field Quality Control

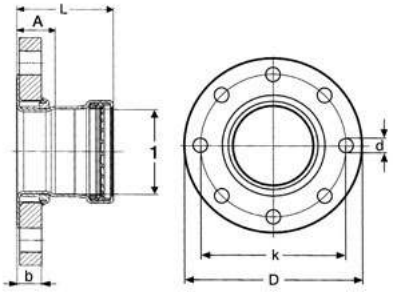
A. All piping systems shall be tested per applicable local codes for joint tightness & leak detection prior to being placed in service.
B. Water Testing: The piping system shall be water tested for joint tightness. The piping system shall be filled with water. The system shall be pressurized to the maximum pressure and length of time required by the code or standard. The system shall have no leaks at the rated pressure.
C. Air Testing: The piping system shall be air tested for joint tightness. The piping system shall be pressurized with air to the maximum pressure of the system or to the code or standard required minimum for the required length of time. The system shall have no leaks at the rated pressure.

Viega MegaPress Adapter Flange P - Models 4859XL / 6659XL



Part No.		Size (in)	A (in)	L (in)	b (in)	k (in)	D (in)	d (in)
FKM	HNBR	1						
26775	28875	2½	1.54	3.33	0.89	5.51	7.09	0.75
26780	28880	3	1.65	3.95	0.96	5.98	7.48	0.75

Viega MegaPress Adapter Flange P - Models 4859XL / 6659XL



Part No.		Size (in)	A (in)	L (in)	b (in)	k (in)	D (in)	d (in)
FKM	HNBR	1						
26785	28885	4	1.63	4.80	0.96	7.52	9.06	0.75

5 Limited Warranty

Viega MegaPress

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (Viega) warrants to end users, installers, and distribution houses that its Viega MegaPress metal press fittings (Viega Product) with application appropriate sealing element when properly installed in non-industrial and non-marine applications and under normal conditions of use shall be free from failure caused by manufacturing defects for a period of ten (10) years from date of installation in Viega MegaPress Approved Applications for fluids/water, oil and lubricant, and gases under Viega specified system operating conditions. MegaPress valves, when properly installed and under normal conditions of use, will be free of failure from manufacturing defects for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the Viega Product and the failure or leak occurs during the warranty period. You do not have a remedy under this warranty and the warranty remedy does not apply if the failure or any resulting damage is caused by (1) components other than those manufactured or sold by Viega, such as black iron pipe; (2) not designing, installing, inspecting, testing, or maintaining the Viega Product in accordance with Viega's installation and product instructions in effect at the time of installation and other specifications and approvals applicable to the installation; (3) use of Viega Product under non recommended system operating conditions, improper handling and protection of the Viega Product prior to, during and after installation, inadequate freeze protection, or exposure to environmental conditions not recommended for the application; or (4) acts of nature, such as, but not limited to, earthquakes, fire, or weather damage. In the event of a leak or other failure of the Viega Product covered by this warranty, it is the responsibility of the end user to take appropriate measures to mitigate any damage, to include making timely repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) calendar days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of the repair or replacement if performed by you. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at a Viega location and reasonable access to the site of damage. Viega will notify you in writing as to the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the Viega Product covered by this warranty and this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for reasonable charges for repair or replacement of the Viega Product itself. VIEGA SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, ECONOMIC LOSS, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR ANY STATUTE OF LIMITATIONS RELATING TO SUCH WARRANTIES. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a COMMERCIAL WARRANTY.

Limited Warranty

Viega Metal Systems for Industrial Applications

Industrial applications are defined as non-residential and non-commercial applications not normally accessible to the general public, including manufacturing, mining, process or fabrication environments.

Subject to the terms and conditions of this Limited Warranty, Viega LLC (Viega) warrants to end users, installers and distribution houses that its Viega metal press products (Viega product) when properly installed in industrial applications shall be free from failure caused by manufacturing defects for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the Viega product and the failure or leak occurs during the warranty period. You do not have a remedy under this warranty and the warranty remedy does not apply if the failure or any resulting damage is caused by (1) components other than those sold by Viega; (2) not designing, installing, inspecting, testing, or maintaining the Viega product in accordance with Viega's installation and product instructions in effect at the time of installation and other specifications and approvals applicable to the installation; (3) improper handling and protection of the Viega product prior to, during and after installation, inadequate freeze protection, or exposure to environmental or operating conditions not recommended for the application; or (4) acts of nature, such as, but not limited to earthquakes, fire, or weather damage. Final approval as to use compatibility to a specific process or fluid application is the responsibility of the engineer of record or responsible design/facilities personnel and this Limited Warranty only applies to manufacturing defects in the Viega Product.

In the event of a leak or other failure in the Viega product covered by this warranty, it is the responsibility of the end user to take appropriate measures to diminish any damage, to include making timely repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) calendar days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of the repair or replacement if performed by you. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at a Viega location and reasonable access to the site of damage. Viega will notify you in writing as to the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the Viega Product covered by this warranty and to which this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for reasonable charges for repair or replacement of the Viega Product itself. VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, ECONOMIC LOSS, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR ANY STATUTE OF LIMITATIONS RELATING TO SUCH WARRANTIES. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a Commercial Warranty.

Viega LLC
585 Interlocken Blvd.
Broomfield, CO 80021

Phone (800) 976-9819
www.viega.us

2.5 DOMESTIC WATER PIPING

MUELLER INDUSTRIES, INC.

Date_____

Product Certification

Mueller Copper Tube products are all manufactured in the USA. All tubing produced in Fulton, MS, and Wynne, AR, is seamless and of UNS C12200 grade of copper and is manufactured to meet the chemical and mechanical properties of the applicable ASTM specifications set forth below. When specified at order placement, Mueller Copper Tube can supply Certified Tube to meet all requirements of the current applicable ASTM specification, at an additional cost.

2.5 - Hard copper tube

"L"

Streamline Copper Water Tube (Types K,L,M)
ASTM B88 and ANSI/NSF 61

Streamline Copper Refrigeration Service Coils
ASTM B280

Streamline Nitrogenized ACR Hard Drawn
Copper Tube - ASTM B280

Streamline Copper Drainage Tube (DWV)
ASTM B306

* Please contact Technical Services for certification in Oxygen and Medical service tube. (1.662.862.1700)
Oxygen & Medical Service Tube - To ASTM B819 (Types K & L) Hard Drawn Straight Lengths Only in Accordance To CGA Cleanness Specification; CGA G4.1 (Compressed Gas Association); & NFPA 99 (Health Care Facilities).

NSF 61 Restriction Statement: "Copper Tube (Alloy C12200) is certified by NSF to ANSI/NSF Standard 61 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

P. O. BOX 849 ◆ FULTON, MS 38843 ◆ (662) 862-1700 ◆ FAX (662) 862-3002

P. O. BOX 309 ◆ WYNNE, AR 72396 ◆ (870) 238-3201 ◆ FAX (870) 238-8724

Submittal Package

viega

ProPress® System

- ☐ Potable Water
- ☐ Hydronic Heating
- ☐ Chilled Water
- ☐ Compressed Air
- ☐ Nitrogen N_2
- ☐ Argon
- ☐ Low Pressure Steam
- ☐ Fire Protection
- ☐ Vacuum
- ☐ Corgon
- ☐ Oxygen 0_2 (non medical)
- ☐ _____

Viega LLC, 100 N. Broadway, 6th Floor • Wichita, KS 67202 • Ph: 800-976-9819 • Fax: 316-425-7618

Submittal Package

System Data Sheet

ProPress® and ProPress XL (Copper) are safe, reliable and economical copper pipe installation systems that use modern cold press connection technology.
Viega® ProPress fittings are for use with type K, L and M hard copper tubing from ½" to 4" and soft copper tubing in ½" to 1¼" diameters. All tubing must comply with the ASTM B88 standard. ProPress fittings are approved for installations in both above and below ground applications. Per code, local inspector approval must be obtained prior to installation below ground.
ProPress has been used in Europe since the late 1980s and in the United States since the late 1990s for a variety of applications. Backed by two plumbing leaders with over 175 years of combined excellence.

Listings and Certificates

- NSF 61G
- IAPMO PS117
- UL 213
- FM Class 1920
- ICC LC 1002
- CSA MSE-13
- ABS

International Listings and Certificates

- Deutsch Verein des Gas-und Wasserfachese.V. (DVGW)
- Lloyd's Register (LR)
- Det Norske Veritas (DNV)
- Registro Italiano Navale (RINA)
- Bureau Veritas (BV)
- KIWA

Compliant with:

- ICC International Plumbing Code
- IAPMO Uniform Plumbing Code
- PHCC National Standard Plumbing Code
- Florida Building Code, Volume II Plumbing Code
- NFPA 13, 13D and 13R
- ASME B16.51
- U.S. Coast Guard

Viega ProPress fittings are offered in configurations including: Elbows, Couplings, Reducers, Tees, Reducing Tees, Threaded Adapters, Unions, Caps and Flanges. All threaded ½" to 2" fittings are Zero Lead bronze.

Operating Parameters

Operating Pressure:	200 PSI maximum
Test Pressure:	600 PSI maximum
Operating Temperature:	0°F to 250°F

Approved Applications:

- Potable Water
- Hydronic Heating (w/ Glycol)
- Chilled Water
- Compressed Air
- Non-medical Gases
- Fire Sprinkler (175 PSI maximum)
- Low Pressure Steam (15 PSI maximum)
- Vacuum (29.2 in. Hg maximum @ 68°F)

In ProPress ½" to 4" dimensions, the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

Recommended Tools:

- RIDGID RP 200-B (½" to 1¼")
- RIDGID RP 210-B (½" to 1¼")
- RIDGID RP 320-E
- RIDGID RP 330-B or 330-C
- RIDGID RP 340
- RIDGID CT 400

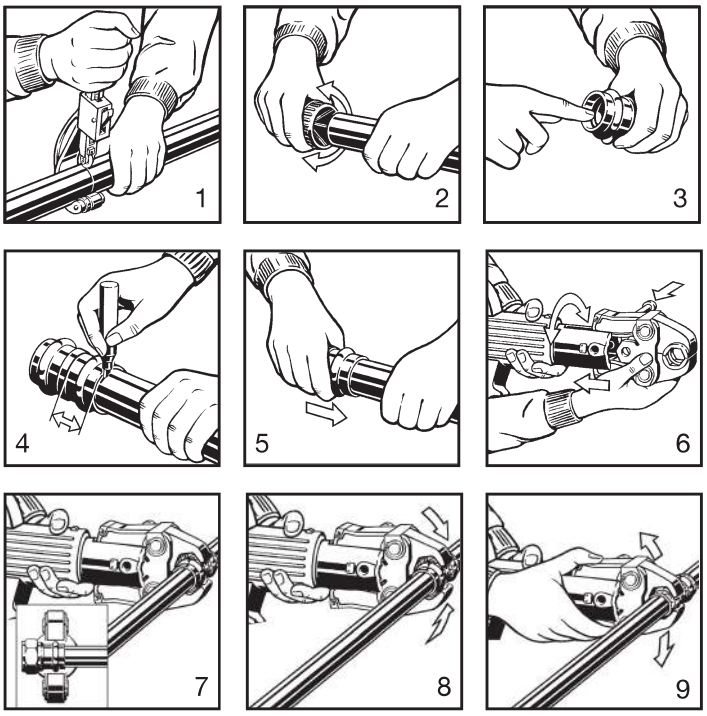
Contact your local Viega representative for details on local approvals.

Submittal Package

ProPress Product Instructions

Viega ProPress®

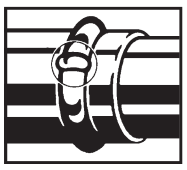
For Types K, L and M Hard Copper Tubing in ½" to 2" and Soft Copper Tubing in ½" to 1¼"



Viega ProPress Insertion Depth Chart						
Tube Size	½"	¾"	1"	1¼"	1½"	2"
Insertion Depth	¾"	⅞"	⅞"	1"	1 7/16"	1 9/16"

⚠ WARNING Read and understand all instructions for installing Viega ProPress fittings. Failure to follow all instructions may result in extensive property damage, serious injury or death.

1. Cut copper tubing at right angles using displacement-type cutter or fine-toothed steel saw.
2. Remove burr from inside and outside of tubing to prevent cutting sealing element.
3. Check seal for correct fit. Do not use oils or lubricants. Use only Viega ProPress Shiny Black EPDM or Dull Black FKM sealing elements.
   Note: For applications requiring Viega ProPress with FKM sealing elements, remove the factory-installed EPDM sealing element and replace with FKM sealing element.
4. Mark proper insertion depth as indicated by the Viega ProPress Insertion Depth Chart. Improper insertion depth may result in improper seal.
5. While turning slightly, slide press fitting onto tubing to the marked depth.
   Note: End of tubing must contact stop.
6. Insert appropriate Viega jaw into the pressing tool and push in, holding pin until it locks in place.
7. Open the jaw and place at right angles on the fitting. Visually check insertion depth using mark on tubing.
8. Start pressing process and hold the trigger until the jaw has engaged the fitting.
9. After pressing, the jaw can be opened again.



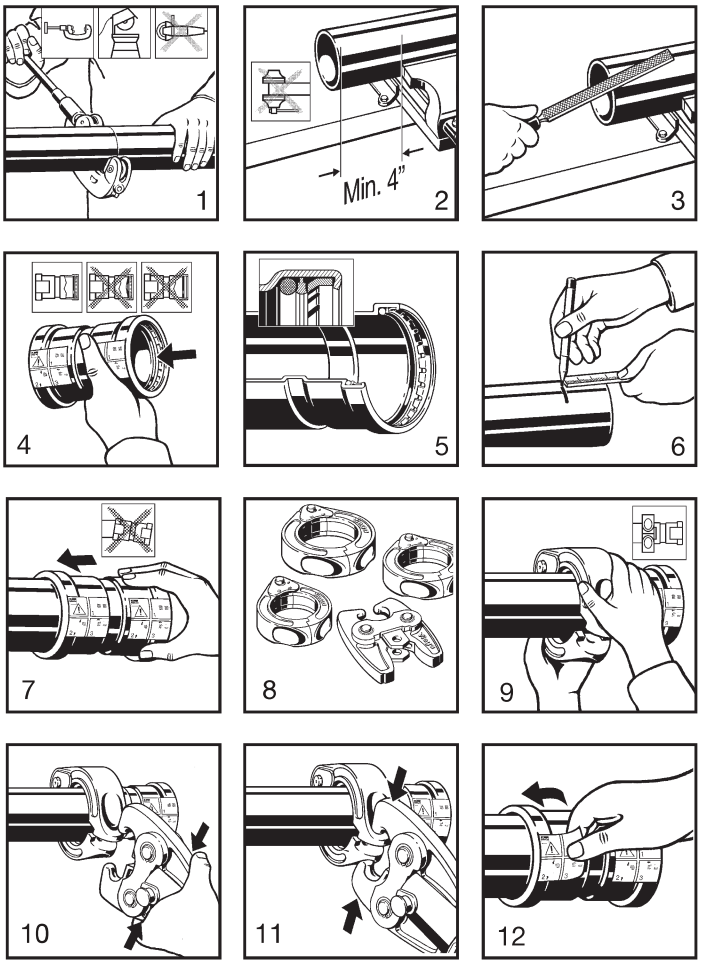
Leak Testing with Smart Connect®: Unpressed connections are located by pressurizing the system with air or water. When testing with water the proper pressure range is 15 psi to 85 psi maximum. Leak testing with air can be dangerous at high pressures. When testing with compressed air the proper pressure range is ½ psi to 45 psi maximum. Following a successful leak test, the system may be pressure tested up to 200 psi with air, or up to 600 psi with water, if required by local code requirements or project specifications.

Submittal Package

viega

Viega ProPress® XL (Copper)

For Types K, L and M Hard Copper Tubing in 2½" to 4"



ProPress XL (copper) Insertion Depth Chart			
Tube Size	2½"	3"	4"
Insertion Depth	1 11/16"	1 15/16"	2 3/8"

⚠ WARNING Read, understand and follow all instructions for installing ProPress XL (copper) fittings. Failure to follow all instructions may result in extensive property damage, serious injury or death.

1. Cut copper tubing at right angles using displacement-type cutter or fine-toothed steel saw.
2. Keep end of tubing a minimum of 4" away from the contact area of the vise to prevent possible damage to the tubing in the press area.
3. Remove burr from inside and outside of tubing to prevent cutting sealing element.
4. Check seal and grip ring for correct fit. Do not use oils or lubricants. Use only ProPress Shiny Black EPDM sealing elements.
5. Illustration demonstrates proper fit of grip ring, separation ring and sealing element.
6. Mark proper insertion depth as indicated by the ProPress XL (copper) Insertion Depth Chart. Improper insertion depth may result in an improper seal.
7. While turning slightly, slide press fitting onto tubing to the marked depth. End of tubing must contact stop.
8. ProPress XL (copper) fitting connections must be performed with ProPress XL-C Rings and V2 ACTUATOR. Use of ProPress XL Rings and/or Actuator (for Bronze fittings) will result in an improper connection. See Ridgid Operator's Manual for proper tool instructions.
9. Open XL-C Ring and place at right angles on the fitting. XL-C Ring must be engaged on the fitting bead. Check insertion depth.
10. With V2 ACTUATOR inserted into the tool, open the V2 ACTUATOR as shown and connect V2 ACTUATOR to the XL-C Ring.
11. Place V2 ACTUATOR onto XL-C Ring and start pressing process. Hold the trigger until the Actuator has engaged the XL-C Ring. Keep extremities and foreign objects away from XL-C Ring and V2 ACTUATOR during pressing operation to prevent injury or incomplete press.
12. Release V2 ACTUATOR from XL-C Ring and then remove the XL-C Ring from the fitting on completion of press. Remove tag from fitting, indicating press has been performed.

Leak Testing with Smart Connect®: Unpressed connections are located by pressurizing the system with air or water. When testing with water the proper pressure range is 15 psi to 85 psi. Leak testing with air can be dangerous at high pressures. When testing with compressed air the proper pressure range is ½ psi to 45 psi. Following a successful leak test, the system may be pressure tested up to 200 psi with air, or up to 600 psi with water, if required by local code requirements or project specifications.

Submittal Package

Viega Limited Warranty ProPress® Fittings And Valves

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (VIEGA) warrants to wholesalers and licensed plumbing and mechanical contractors in the United States and Canada that its PROPRESS fittings, when properly installed in non industrial and non marine applications and under normal conditions of use, will be free of failure from manufacturing defect for a period of fifty (50) years from date of installation and that its PROPRESS valves, when properly installed in non industrial and non marine applications and under normal conditions of use, will be free of failure from manufacturing defect for a period of two (2) years from date of installation.

Under this Limited Warranty, you only have a right to a remedy if the failure or leak resulted from a manufacturing defect in the products covered by this warranty and the failure or leak occurred during the warranty period. You do not have a remedy under this warranty and the warranty does not apply if the failure or any resulting damage is caused by (1) components other than those manufactured or sold by Viega; (2) not designing, installing, inspecting, or testing the ProPress fittings or valves in accordance with Viega's installation instructions in effect at the time of the installation; applicable code requirements; and accepted industry practice; (3) improper handling and protection of the product prior to and during installation, inadequate freeze protection, exposure to water pressures or temperatures or in applications outside acceptable operating conditions; (4) acts of nature such as, but not limited to, earthquakes, fire, flood, or lightning, or (5) external environmental causes, such as water quality variations, aggressive water, or other external chemical or physical conditions.

In the event of a leak or other failure of the parts covered by this warranty, it is the responsibility of the property owner to obtain and pay for repairs. Only if the warranty applies will Viega be responsible for the remedy under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect and document the date of installation. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega. Viega will notify you in writing of the results of its review.

In the event that Viega determines that the failure or leak was the result of a manufacturing defect in the part covered by this warranty and that this warranty applies, the EXCLUSIVE AND ONLY REMEDY under this warranty shall be the reimbursement for repair and/or replacement of the part. VIEGA SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL OR OTHER DAMAGE (FOR EXAMPLE, WATER OR PROPERTY OR MOLD REMEDIATION) UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. If a limited warranty shall be found to apply, such warranty is limited to four years. Other than this Limited Warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products.

This Limited Warranty gives you specific legal rights and you also may have other rights which may vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed and is intended as a Commercial Warranty.

*Zero Lead identifies Viega® products meeting the lead free requirements of NSF 61-G through testing under NSF/ANSI 372 (0.25% or less maximum weighted average lead content).

Viega products are designed to be installed by licensed and trained plumbing and mechanical professionals who are familiar with our products' proper use and installation. *Installation by non-professionals may void Viega LLC's warranty.*

This document subject to updates. For the most current Viega technical literature please visit www.viega.us.
Click Services -> Click Electronic Literature Downloads -> Select Product Line -> Select Desired Document

Viega LLC, 100 N. Broadway, 6th Floor • Wichita, KS 67202 • Ph: 800-976-9819 • Fax: 316-425-7618

2.6 -STEAM CONDESNATE VENTS DRAIN AND OVERFLOWS

Standard Steel Pipe

ASTM A53 TYPE E GRADE B PIPE

Submittal Data Sheet

Scope

Covers black and ~~hot-dipped galvanized~~ XXXXXXXXXX electric-resistance welded Grade B pipe. Pipe is intended for mechanical and pressure applications and is acceptable for ordinary uses in steam, water, gas and air lines. Wheatland ASTM A53 is UL Listed and FM Approved, sizes 1" through 6" nominal, for use in Fire Sprinkler Pipe Applications. Pipe is suitable for welding, threading and grooving. Produced to the latest revision of ASTM A53/53M, Federal Specification WW-P404 and ASME B36.10M.

Manufacture

The weld seam shall be heat treated after welding to a minimum of 1400°F or be otherwise processed in such a manner that no untempered martensite remains.

~~Hot-dipped galvanized~~

~~The average weight of zinc coating shall be not less than 1.8 oz. per sq. ft. of surface (inside and outside). When galvanized pipe is bent or otherwise fabricated to a degree which causes zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.~~

Hydrostatic and Nondestructive Electric testing

Hydrostatic inspection test pressures for plain-end pipe are listed in Table X 2.2 of the A53/A53M specification. Test pressures shall be maintained for a minimum of five seconds. Nondestructive electric testing of the weld seam is required on each length of ERW pipe NPS 2 and larger.

Chemical Requirements

Composition, max. %

Carbon	Manganese	Phosphorus	Sulfur	
.30	1.20	.05	.045	
Copper	**Nickel**	**Chromium**	**Molybdenum**	**Vanadium**
.40	.40	.40	.15	.08

*The combination of these five elements shall not exceed 1.00%.

Tensile Requirements

TENSILE STRENGTH, MIN.	YIELD STRENGTH, MIN.	ELONGATION IN 2"
60,000 psi	35,000 psi	Refer to A53 table x 4.1

Bending Test (Cold)

NPS	DEGREE OF BEND	DIAMETER OF MANDREL
2 and under	90°	12x pipe OD

Flattening Test

As a test for ductility of the weld for pipe 2½" NPS and larger, position the weld at 0° and alternately at 90° to the direction of force and flatten until the OD is ⅔ of the original outside diameter. No cracks shall occur along the inside or outside surface of the weld.

Frequency of Tests

Tensile tests are required on one length of pipe from each lot of 500 lengths or fraction thereof for each size. Refer to A53 specification for frequency of flattening tests.

End Finish

Plain End: NPS 2 and larger, STD and XS weights: ends beveled to angle of 30°, +5°, -0° with a root face of 1/16" ± 1/32"

Threaded: To ANSI Standard B 1.20.1
Couplings: To ASTM Standard A 865

Weights and Dimensions Charts

STANDARD (SCH. 40) BLACK PLAIN END

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.154	3.66
2½"	2.875	.203	5.80
3"	3.500	.216	7.58
4"	4.500	.237	10.88
5"	5.563	.258	14.63
6"	6.625	.280	18.99
8"	8.625	.322	28.58

~~**EXTRA STRONG (SCH. 80) BLACK PLAIN END**~~

NOMINAL SIZE	O.D. INCHES	NOMINAL WALL	WEIGHT/ LB. FT.
2"	2.375	.218	5.03
2½"	2.875	.276	7.67
3"	3.500	.300	10.26
4"	4.500	.337	15.00

All information contained herein is accurate as known at the time of publication. Wheatland reserves the right to change product specifications without notice and without incurring obligations.

Permissible Variations in Wall Thickness

Minimum wall thickness at any point shall not be more than 12.5% under nominal wall thickness specified.

Permissible Variations in Outside Diameter

Pipe NPS 2 and larger shall not vary more than + 1% from the standard specified.

Permissible Variations in Weight per Foot

Pipe shall not vary more than + 10% from the standard specified.

Product Marking

Each length of pipe is continuously stenciled to show the manufacturer, the grade of pipe (ASTM A53), the kind of pipe E for Electric Resistance Welded, B for Grade B, the size, XS for extra strong, and length. Stencil markings indicate UL Listing and FM Approval for sizes 1" through 6" nominal for use in Fire Sprinkler Pipe Applications. Bar coding is acceptable as a supplementary identification method.

SUBMITTAL INFORMATION

PROJECT: _____ CONTRACTOR: _____ DATE: _____

ENGINEER: _____ SPECIFICATION REFERENCE: _____ SYSTEM TYPE: _____

LOCATIONS: _____ COMMENTS: _____

WST-051516

700 South Dock Street
Sharon, PA 16146
P 800.257.8182
F 724.346.7260

info@wheatland.com
wheatland.com
Follow us on Twitter:
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Wheatland Tube
A DIVISION OF ZEKELMAN INDUSTRIES

2.6 - threaded fittings for 1/2 to 2" STEAM CONDNSATE OVERFLOWS DRAINS & VENTS

WARD MANUFACTURING
P.O. Box 9
117 Gulick Street
Blossburg, PA 16912-0009
(570) 638-2131

January 11, 2013

To whom it may concern:

I hereby certify that our products listed below comply with the current specification. The products listed below are made with pride in Blossburg, Pennsylvania, USA.

1 >>>>>>>> **CL 150 Malleable Iron Threaded Fittings**

Fed. Spec. WW - P - 521		
ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

CL 300 Malleable Iron Threaded Fittings

ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

3 >>>>>>>> **Unions, Union Fittings, Flange Unions & Companion Flanges**

CL 150 Malleable Iron to Brass Seat, Iron to Iron Unions		
Fed. Spec. WW - U - 531		ASME B16.39
CL 250 Malleable Iron to Brass Seat,Unions		
Fed. Spec. WW - U - 531		ASME B16.39
CL 300 Malleable Iron to Brass Seat, Iron to Iron Unions		
MIL - U - 18250		ASME B16.39
CL 125 - CL 250 Cast Iron Flanges		ASME B16.1
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Bushings and Plugs

Fed. Spec. WW - P - 471		
ASME	B16.14	(Dimensions)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads) Supersedes B-2-1
ASTM	A-197 or A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)

4 >>>>>>> **CL 125 Cast Iron Threaded Fittings**

Fed. Spec. WW - P - 501		
ASME	B16.4	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Top Beam & C-Clamps

ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
UL	203	(Test Parameters)

Drainage Fittings

ASME	B16.12	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Cast Iron Flanges

ASME	B16.1	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

WARDLOX Plain-End Fittings

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

TEE-LOX Mechanical Branch Connectors

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Full Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Half Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Welded Steel Pipe Nipples

ASTM	A-733	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ASNI/ASME	B1.20.1	(Pipe Threads)

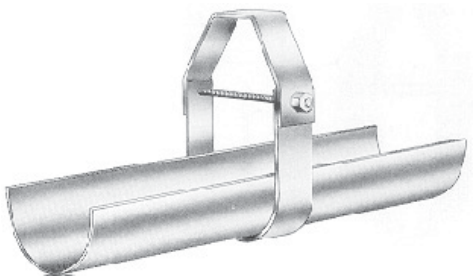
Sincerely,

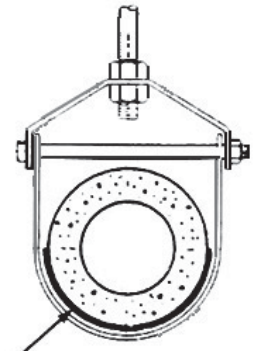
Jim Belawski
Manager of Quality Assurance

FIG. 220

CLEVIS HANGER WITH WELDED SHIELD

MATERIAL: Carbon steel or
FINISH: electro galvanized.
SERVICE: For vapor sealed lines.
ORDERING: Specify pipe size, figure number, insulation thickness and finish.



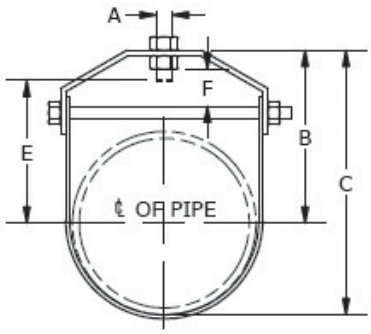


WITH WELDED SHIELD

PIPE SIZE	HANGER SIZING GUIDE THICKNESS OF PIPE INSULATION					
	½"	1"	1½"	2"	2½"	3"
½	1½	2½	3½	5	6	7
¾	2	3	3½	5	6	7
1	2	3	4	5	6	7
1¼	2½	3½	4	5	6	7
1½	2½	3½	5	6	7	8
2	3	4	5	6	7	8
2½	3½	5	6	7	8	10
3	4	5	6	7	8	10
3½	5	6	7	8	10	10
4	5	6	7	8	10	10
5	6	7	8	10	10	12
6	7	8	10	10	12	12
8	10	10	12	12	14	16
10	12	12	14	16	16	18
12	14	16	16	18	18	20
14	16	16	18	18	20	20
16	18	18	20	20	24	24

FIG. CT200 COPPER TUBING CLEVIS HANGER

MATERIAL: Carbon steel.
FINISH: Copper plated.
SERVICE: For the suspension of stationary copper tubing lines.
ORDERING: Specify tubing size and figure number.
APPROVALS: FS WW-H-171E TYPE 12.

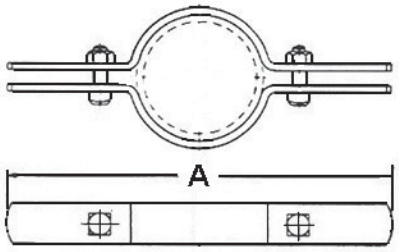


TUBING SIZE	MATERIAL SIZE		A	B	C	E	F	WEIGHT EACH, LBS.
	UPPER	LOWER						
1/2	18ga. x 7/8	18ga. x 7/8	3/8	1 7/8	2 3/16	1 1/2	1/2	.12
3/4	18ga. x 7/8	18ga. x 7/8	3/8	1 3/4	2 1/8	1 3/8	1/2	.12
1	18ga. x 7/8	18ga. x 7/8	3/8	1 13/16	2 5/16	1 7/16	1/2	.14
1 1/4	18ga. x 7/8	18ga. x 7/8	3/8	2 1/8	2 3/4	1 11/16	3/4	.17
1 1/2	18ga. x 7/8	18ga. x 7/8	3/8	2 1/2	3 1/4	2 1/8	15/16	.20
2	14ga. x 7/8	16ga. x 7/8	3/8	2 15/16	4	2 9/16	1 1/16	.38
2 1/2	12ga. x 1 3/16	14ga. x 1 3/16	1/2	4 7/8	5 3/4	3 7/8	2 1/16	.71
3	12ga. x 1 3/16	14ga. x 1 3/16	1/2	4 1/2	6 1/8	3 15/16	2	.76
3 1/2	12ga. x 1 3/16	14ga. x 1 3/16	1/2	5 9/16	7 7/8	5	2 5/8	.82
4	11ga. x 1 3/16	14ga. x 1 3/16	1/2	5 7/8	7 7/8	5 1/4	2 9/16	1.02
5	8ga. x 1 1/4	8ga. x 1 1/4	5/8	5 7/8	8 3/4	5 3/8	1 5/8	1.68
6	8ga. x 1 1/4	8ga. x 1 1/4	5/8	6 1/16	9	5 3/8	1 1/2	1.84

COPPER RISER CLAMPS

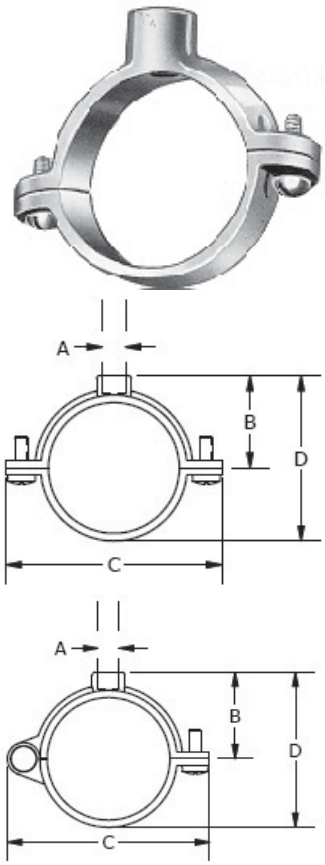
FIG. CT420 COPPER TUBING RISER CLAMP

MATERIAL: Carbon steel.
FINISH: Copper plated.
SERVICE: For support of tubing risers.
ORDERING: Specify tubing size and figure number.
APPROVALS: MSS SP-58 & SP-69 TYPE 8
FS WW-H-171E TYPE 8



NOMINAL TUBING SIZE	A	MATERIAL SIZE	REC. LOAD LBS.	WEIGHT EACH, LBS.
1/2	6 3/4	1/8 x 1	225	.69
3/4	7 1/16	1/8 x 1	225	.73
1	9 1/4	1/8 x 1	250	.75
1 1/4	9 5/8	1/8 x 1	250	.77
1 1/2	10 1/8	1/8 x 1	500	.80
2	10 3/4	1/8 x 1 1/4	500	1.05
2 1/2	11 1/4	3/16 x 1 1/4	500	1.68
3	11 1/2	3/16 x 1 1/4	500	1.78
3 1/2	12 1/4	3/16 x 1 1/4	500	1.91
4	12 3/4	3/16 x 1 1/4	500	2.05
5	14	1/4 x 1 1/2	815	3.46
6	15 1/2	1/4 x 1 1/2	815	3.86

FIG. CT100 COPPER TUBING SPLIT RING HANGER



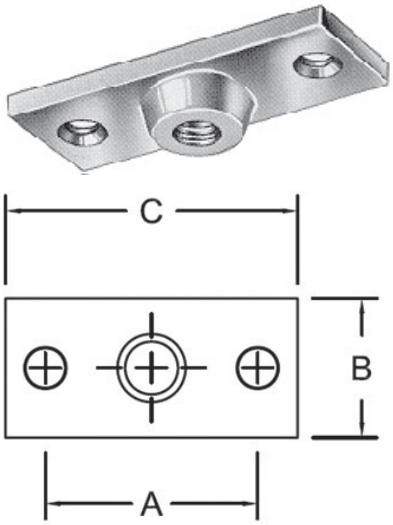
WALL FLANGE

MATERIAL: Malleable iron.
FINISH: Copper epoxy coated (COPPER-GARD).
ORDERING: Specify tubing size and figure number.
SERVICE: For suspension of non-insulated stationary tubing lines.
APPROVALS: MSS SP-58 & SP-69 TYPE 12
FS WW-H-171E TYPE 25

TUBE SIZE	MAX. REC. LOAD, LBS.	A ROD SIZE	B	C	D	WEIGHT PER 100, LBS.
1/4*	180	3/8	9/16	1 3/4	7/8	7.3
3/8*	180	3/8	5/8	1 3/4	1 1/16	8.0
1/2	180	3/8	11/16	1 7/8	1 1/8	8.7
3/4	180	3/8	13/16	2 1/4	1 3/8	9.6
1	180	3/8	15/16	2 1/2	1 5/8	12.8
1 1/4	180	3/8	1 1/16	2 7/8	1 7/8	14.1
1 1/2	180	3/8	1 3/16	3	2 3/16	17.9
2	180	3/8	1 7/16	3 1/2	2 11/16	22.9
2 1/2*	300	1/2	1 7/8	4 15/16	2 7/16	44.9
3*	300	1/2	2 1/8	5 1/2	4 1/16	66.3
4*	300	1/2	2 5/8	6 5/8	5 1/16	75.3

*Sizes 1/4", 3/8", 2 1/2", 3" and 4" are hinged style

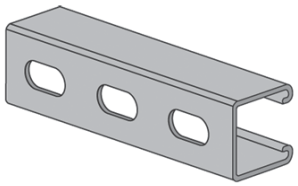
FIG. CT105 COPPER HANGER FLANGE



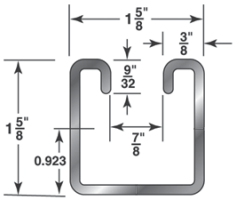
MATERIAL: Malleable iron.
FINISH: Copper epoxy coated (COPPER-GARD)
SERVICE: For suspension of non-insulated stationary tubing lines.
ORDERING: Specify tap size and figure number.

ROD SIZE	A	B	C	WEIGHT PER 100, LBS.
3/8	1 15/16	1 5/16	2 3/4	17
1/2	1 15/16	1 5/16	2 3/4	17

FIG. H132 STRUT

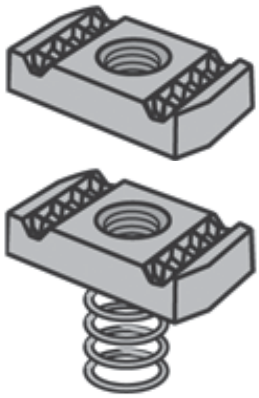


MATERIAL: Carbon steel
FINISH: Pre-galvanized (ASTM-A653) or epoxy coated green.
ORDERING: Specify size, figure number, length and finish.



1⅝" X 1⅝" X 1⅝" X 12 GA.
⁹⁄₁₆" X 1⅛" Slot
2" On centers
189 Lbs. per 100 feet

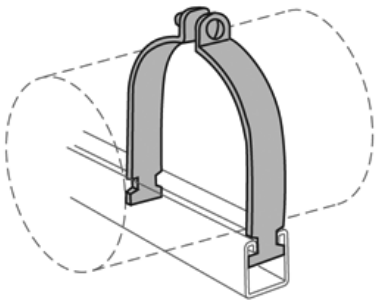
FIG. SN STRUT NUT



MATERIAL: Carbon steel
FINISH: Electro-galvanized.
ORDERING: Specify size with or without spring and figure number.

	WITHOUT SPRING		WITH SPRING	
ROD SIZE	STD. PKG.	WEIGHT EACH, LBS.	STD. PKG.	WEIGHT EACH, LBS.
¼	100	.067	100	.076
⅜	100	.094	100	.102
½	100	.09	100	.094
⅝	100	.13	50	.15
¾	100	.13	50	.15

FIG. SPC STRUT PIPE CLAMP



MATERIAL: Carbon steel o
FINISH: Electro-galvanized.
ORDERING: Specify pipe/tube size and figure number.

	STRUT PIPE CLAMP		STRUT TUBE CLAMP	
PIPE/TUBE SIZE	STD. PKG.	WEIGHT EACH, LBS.	STD. PKG.	WEIGHT EACH, LBS.
⅜	100	.106	100	.084
½	100	.108	100	.091
¾	100	.138	100	.102
1	100	.156	100	.15
1¼	100	.191	100	.17
1½	50	.286	100	.182
2	50	.336	50	.316
2½	50	.372	50	.346
3	50	.446	50	.386
3½	25	.576	50	.54
4	25	.628	25	.606
5	25	.732	25	.69
6	25	.976	25	.91
8	25	1.24		

NOTE: Tubing sizes only available up to 4".

FIG. 635 JUNIOR TOP BEAM CLAMP

MATERIAL: Malleable Iron.
FINISH: electro-galvanized.
SERVICE: For use under roof installations with bar joist type construction where the thickness of the joist does not exceed 5/8".
ORDERING: Specify size, figure number, and finish.
APPROVALS: MSS SP-58 & SP-69 TYPE 19
FM (3/8" & 1/2" rod)
UL

ROD SIZE A	SIZE PIPE	MAX RECOMMENDED LOAD, LBS.	WEIGHT PER 100, LBS.	B	C	D	E	F
3/8	1/2 to 2	350	30	1 1/2	1 7/16	3/4	1 3/16	3/4
1/2	2 1/2 to 3 1/2	470	39	1 5/8	1 1/2	3/4	1 1/4	7/8
5/8	4 to 5	550	40	1 3/4	1 1/2	3/4	1 3/32	1
3/4	6	700	67	2 1/4	1 3/4	1 1/16	1 5/16	1 1/4
7/8	8	1000	66	2 1/4	1 3/4	1 1/16	1 5/16	1 1/4

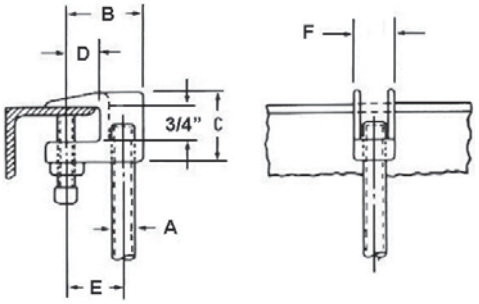
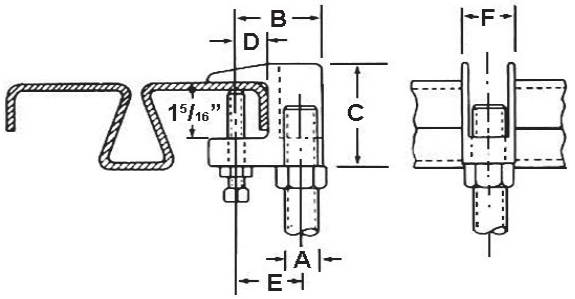


FIG. 640 TOP BEAM CLAMP

MATERIAL: Malleable Iron.
FINISH: lectro-galvanized.
SERVICE: For use under roof installations with bar joist type construction where the thickness of the joist does not exceed 1 1/4".
ORDERING: Specify size, figure number and finish.

ROD SIZE A	SIZE PIPE	MAX RECOMMENDED LOAD, LBS.	WEIGHT PER 100, LBS.	B	C	D	E	F
3/8	1/2 to 2	400	38	1 7/16	2	3/4	1 3/16	3/4
1/2	2 1/2 to 3 1/2	500	49	1 5/8	2 1/16	3/4	1 1/4	7/8
5/8	4 to 5	850	66	1 3/4	2 1/4	3/4	1 1/4	1
3/4	6	900	83	1 7/8	2 3/8	3/4	1 3/8	1 3/16



Double *Shield Expansion Anchor*

PRODUCT DESCRIPTION

The Double is a dual expansion machine bolt anchor particularly suited for materials of questionable strength. It can be used in solid concrete, block, brick, and stone. Job site tests are recommended when used in base materials of questionable strength.

FEATURES AND BENEFITS

- Performs in base material of questionable strength
- Internally threaded anchor for easy removability and service work
- Corrosion resistant body

APPROVALS AND LISTINGS

Federal GSA Specification – Meets the descriptive and proof load requirements of CID A-A 1923A, Type 3

GUIDE SPECIFICATIONS

CSI Divisions: *03151-Concrete Anchoring, 04081-Masonry Anchorage* and *05090-Metal Fastenings.* Expansion anchors shall be Double as supplied by Powers Fasteners, Inc., Brewster, NY.

SECTION CONTENTS Page No.

Double

THREAD VERSION

UNC Thread

ANCHOR MATERIALS

Zamac Alloy

ROD/ANCHOR SIZE RANGE (TYP.)

1/4" to 3/4" diameter

SUITABLE BASE MATERIALS

Normal-weight Concrete
Hollow Concrete Masonry (CMU)
Brick Masonry

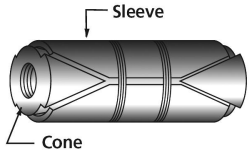
INSTALLATION AND MATERIAL SPECIFICATIONS

Installation Specifications

Dimension	Rod/Anchor Diameter, *d*					
	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
ANSI Drill Bit Size, d_{bit} (in.)	1/2	5/8	3/4	7/8	1	1 1/4
Max. Tightening Torque, T_{max} (ft.-lbs.)	5	7	10	20	30	60
Sleeve Length (in.)	1	1 3/16	1 9/16	2	2 1/4	3 1/4
Thread Size (UNC)	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	3/4-10
Thread Length In Cone (in.)	1/2	1/2	5/8	3/4	7/8	1 1/8
Overall Anchor Length (in.)	1 3/8	1 5/8	2	2 1/2	2 3/4	3 15/16

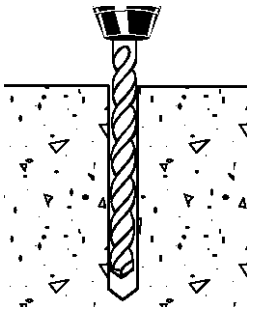
Material Specifications

Anchor Component	Component Material
Anchor Shield	Zamac Alloy
Cone	Zamac Alloy

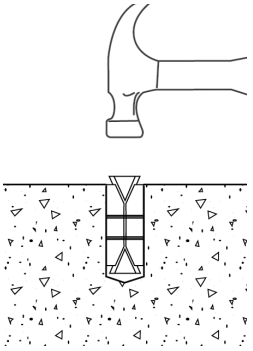


Installation Guidelines

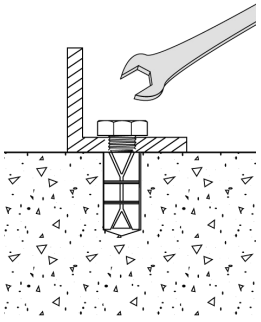
Drill a hole into the base material to the minimum depth required. The tolerances of the drill bit used should meet the requirements of ANSI Standard B212.15. Do not expand the anchor prior to installation. Do not over drill the hole unless the application calls for a subset anchor.



Insert anchor into the hole, threaded cone end first until the outer sleeve is flush with the surface of the base material.



Position fixture, then insert screw or bolt and tighten. For maximum expansion, the upper cone should protrude slightly before setting. The bolt must engage a minimum of 2/3 of the anchor threads.



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PERFORMANCE DATA

Ultimate Load Capacities for Double Expansion Anchor in Normal-Weight Concrete[1,2]

Rod/Anchor Diameter	Minimum Embedment Depth	Minimum Concrete Compressive Strength (f'_c)					
		2,000 psi (13.8 MPa)		**4,000 psi** (27.6 MPa)		**6,000 psi** (41.4 MPa)	
d in. (mm)	h_v in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	1 1/4 (31.8)	710 (3.2)	1,110 (5.0)	900 (4.0)	1,135 (5.2)	1,220 (5.5)	1,335 (6.0)
5/16 (7.9)	1 1/2 (38.1)	1,130 (5.1)	1,735 (7.8)	1,500 (6.7)	2,020 (9.1)	2,160 (9.7)	2,155 (9.7)
3/8 (9.5)	1 3/4 (44.5)	1,365 (6.1)	2,690 (12.1)	2,000 (9.0)	3,000 (13.5)	3,085 (13.9)	4,030 (18.1)
1/2 (12.7)	2 1/4 (57.2)	2,590 (11.7)	3,740 (16.8)	3,550 (16.0)	4,310 (19.4)	4,645 (20.9)	6,930 (31.2)
5/8 (15.9)	2 1/2 (63.5)	4,290 (19.3)	9,640 (43.4)	6,150 (27.7)	10,270 (46.2)	6,890 (81.0)	11,580 (52.2)
3/4 (19.1)	3 1/2 (88.9)	6,000 (27.0)	10,920 (49.2)	8,150 (36.7)	13,330 (60.0)	11,510 (51.8)	14,480 (65.2)

1. Tabulated load values are for anchors installed in concrete. Concrete compressive strength must be at the specified minimum at the time of installation.
2. Ultimate load capacities must be reduced by a minimum safety factor of 4.0 or greater to determine allowable working load. Consideration of safety factors of 20 or higher may be necessary depending upon the application such as life safety, overhead and in sustained tensile loading applications.

Allowable Load Capacities for Double Expansion Anchor in Normal-Weight Concrete[1,2,3]

Rod/Anchor Diameter	Minimum Embedment Depth	Minimum Concrete Compressive Strength (f'_c)					
		2,000 psi (13.8 MPa)		**4,000 psi** (27.6 MPa)		**6,000 psi** (41.4 MPa)	
d in. (mm)	h_v in. (mm)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	1 1/4 (31.8)	180 (0.8)	280 (1.3)	225 (1.0)	285 (1.3)	305 (1.4)	335 (1.5)
5/16 (7.9)	1 1/2 (38.1)	285 (1.3)	435 (20)	375 (1.7)	505 (2.3)	540 (2.4)	540 (2.4)
3/8 (9.5)	1 3/4 (44.5)	340 (1.5)	675 (3.0)	500 (2.3)	750 (3.4)	770 (3.5)	1,010 (4.5)
1/2 (12.7)	2 1/4 (57.2)	650 (2.9)	935 (4.2)	890 (4.0)	1,080 (4.9)	1,160 (5.2)	1,735 (7.8)
5/8 (15.9)	2 1/2 (63.5)	1,075 (4.8)	2,410 (10.9)	1,540 (6.9)	2,570 (11.6)	1,725 (20.3)	2,895 (13.1)
3/4 (19.1)	3 1/2 (88.9)	1,500 (6.8)	2,730 (12.3)	2,040 (9.2)	3,335 (15.0)	2,880 (13.0)	3,620 (16.3)

1. Allowable load capacities listed are calculated using and applied safety factor of 4.0. Consideration of safety factors of 20 or higher may be necessary depending upon the application such as life safety, overhead and in sustained tensile loading applications.
2. Linear interpolation may be used to determine allowable loads for intermediate compressive strengths.
3. Allowable load capacities are multiplied by reduction factors found in the Design Criteria section when anchor spacing or edge distances are less than critical distances.

PERFORMANCE DATA

Ultimate and Allowable Load Capacities for Double Expansion Anchor in Hollow Concrete Masonry[1,2,3]

Rod/Anchor Diameter d in. (mm)	Minimum Embedment Depth h_v in. (mm)	$f'_m \geq$ 1,500 psi (10.4 MPa)			
		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	1 1/4 (31.8)	885 (4.0)	1,350 (6.1)	175 (0.8)	270 (1.2)
5/16 (7.9)	1 1/2 (38.1)	1,295 (5.8)	1,635 (7.4)	260 (1.2)	325 (1.5)
3/8 (9.5)	1 1/2 (38.1)	1,575 (7.1)	2,160 (9.7)	315 (1.4)	430 (1.9)
1/2 (12.7)	1 1/2 (38.1)	2,710 (12.2)	3,130 (14.1)	540 (2.4)	625 (2.8)

1. Tabulated load values are for anchors installed in minimum 8-inch wide, minimum Grade N, Type II, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90. Mortar must be minimum Type N. Masonry cells may be grouted. Masonry compressive strength must be at the specified minimum at the time of installation ($f'_m \geq$ 1,500 psi).
2. Allowable load capacities listed are calculated using and applied safety factor of 5.0. Consideration of safety factors of 20 or higher may be necessary depending upon the application such as life safety, and in sustained tensile loading applications.
3. Anchors with diameters of 3/8" and 1/2" installed in hollow concrete masonry units are limited to one anchor per unit cell.

Ultimate and Allowable Load Capacities for Double Shell Expansion Anchor in Clay Brick Masonry[1,2]

Rod/Anchor Diameter d in. (mm)	Minimum Embedment Depth h_v in. (mm)	Structural Brick Masonry $f'_m \geq$ 1,500 psi (10.4 MPa)			
		Ultimate Load		Allowable Load	
		Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4 (6.4)	1 1/4 (31.8)	1,175 (5.3)	1,585 (7.1)	235 (1.1)	315 (1.4)
5/16 (7.9)	1 1/2 (38.1)	1,585 (7.1)	2,040 (9.2)	315 (1.4)	410 (1.8)
3/8 (9.5)	1 3/4 (44.5)	1,830 (8.2)	3,590 (16.2)	365 (1.6)	720 (3.2)
1/2 (12.7)	2 1/4 (57.2)	3,420 (15.4)	5,185 (23.3)	685 (3.1)	1,035 (4.7)
5/8 (15.9)	2 1/2 (63.5)	4,460 (19.8)	6,055 (27.2)	890 (4.0)	1,210 (5.4)
3/4 (19.1)	3 1/2 (88.9)	6,000 (26.7)	7,935 (35.7)	1,200 (5.3)	1,585 (7.1)

1. Tabulated load values are for anchors installed in multiple wythe, minimum Grade SW, solid clay brick masonry walls conforming to ASTM C 62. Mortar must be minimum Type N. Masonry compressive strength must be at the specified minimum at the time of installation ($f'_m \geq$ 1,500 psi).
2. Allowable load capacities listed are calculated using and applied safety factor of 5.0. Consideration of safety factors of 20 or higher may be necessary depending upon the application such as life safety, and in sustained tensile loading applications.

DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

Combined Loading

For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$\left(\frac{N_u}{N_n}\right) + \left(\frac{V_u}{V_n}\right) \leq 1$$

Where: N_u = Applied Service Tension Load
N_n = Allowable Tension Load
V_u = Applied Service Shear Load
V_n = Allowable Shear Load

Load Adjustment Factors for Spacing and Edge Distances[1]

Anchor Installed in Normal-Weight Concrete					
Anchor Dimension	Load Type	Critical Distance (Full Anchor Capacity)	Critical Load Factor	Minimum Distance (Reduced Capacity)	Minimum Load Factor
Spacing (s)	Tension and Shear	$s_{cr} = 10d$	$F_{Ns} = F_{Vs} = 1.0$	$s_{min} = 5d$	$F_{Ns} = F_{Vc} = 0.50$
Edge Distance (c)	Tension	$c_{cr} = 12d$	$F_{Nc} = 1.0$	$c_{min} = 5d$	$F_{Nc} = 0.80$
	Shear	$c_{cr} = 12d$	$F_{Vc} = 1.0$	$c_{min} = 5d$	$F_{Vc} = 0.50$

1. Allowable load values found in the performance data tables are multiplied by reduction factors when anchor spacing or edge distances are less than critical distances. Linear interpolation is allowed for intermediate anchor spacing and edge distances between critical and minimum distances.When an anchor is affected by both reduced spacing and edge distance, the spacing and edge reduction factors must be combined (multiplied). Multiple reduction factors for anchor spacing and edge distance may be required depending on the anchor group configuration.

d

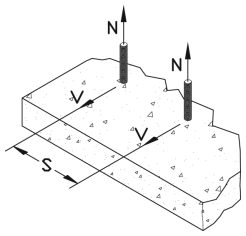
DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

Load Adjustment Factors for Normal-Weight Concrete

Spacing, Tension (F_{N_S}) & Shear (F_{V_S})							
Dia. (in.)		1/4	5/16	3/8	1/2	5/8	3/4
s_{cr} (in.)		2 1/2	3 1/8	3 3/4	5	6 1/4	7 1/2
s_{min} (in.)		1 1/4	1 9/16	1 7/8	2 1/2	3 1/8	3 3/4
Spacing, s (inches)	1 1/4	0.50					
	1 9/16	0.63	0.50				
	1 7/8	0.75	0.60	0.50			
	2 1/2	1.00	0.80	0.67	0.50		
	3 1/8		1.00	0.83	0.63	0.50	
	3 3/4			1.00	0.75	0.60	0.50
	5				1.00	0.80	0.67
	6 1/4					1.00	0.83
	7 1/2						1.00

Notes: For anchors loaded in tension and shear, the critical spacing (s_{cr}) is equal to 10 anchor diameters (10d) at which the anchor achieves 100% of load.

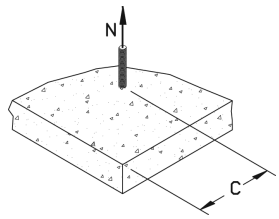
Minimum spacing (s_{min}) is equal to 5 anchor diameters (5d) at which the anchor achieves 50% of load.



Edge Distance, Tension (F_{N_C})							
Dia. (in.)		1/4	5/16	3/8	1/2	5/8	3/4
c_{cr} (in.)		3	3 3/4	4 1/2	6	7 1/2	9
c_{min} (in.)		2	2 1/2	3	4	5	6
Edge Distance, c (inches)	2	0.80					
	2 1/2	0.90	0.80				
	3	1.00	0.88	0.80			
	3 3/4		1.00	0.90			
	4			0.93	0.80		
	4 1/2			1.00	0.85		
	5				0.90	0.80	
	6				1.00	0.88	0.80
	7 1/2					1.00	0.90
	9						1.00

Notes: For anchors loaded in tension, the critical edge distance (c_{cr}) is equal to 12 anchor diameters (12d) at which the anchor achieves 100% of load.

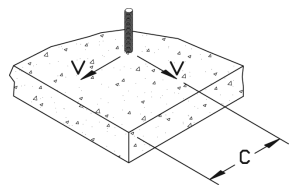
Minimum edge distance (c_{min}) is equal to 8 anchor diameters (8d) at which the anchor achieves 80% of load.



Edge Distance, Shear (F_{V_C})							
Dia. (in.)		1/4	5/16	3/8	1/2	5/8	3/4
c_{cr} (in.)		3	3 3/4	4 1/2	6	7 1/2	9
c_{min} (in.)		2	2 1/2	3	4	5	6
Edge Distance, c (inches)	2	0.50					
	2 1/2	0.75	0.50				
	3	1.00	0.70	0.50			
	3 3/4		1.00	0.75			
	4			0.83	0.50		
	4 1/2			1.00	0.63		
	5				0.75	0.50	
	6				1.00	0.70	0.50
	7 1/2					1.00	0.75
	9						1.00

Notes: For anchors loaded in shear, the critical edge distance (c_{cr}) is equal to 12 anchor diameters (12d) at which the anchor achieves 100% of load.

Minimum edge distance (c_{min}) is equal to 8 anchor diameters (8d) at which the anchor achieves 50% of load.



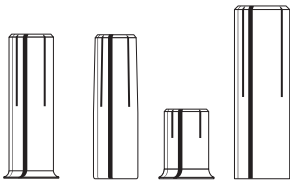
ORDERING INFORMATION

Double Expansion Anchor

Catalog Number	Rod/Anchor Diameter	Drill Diameter	Overall Length	Minimum Hole Depth	Standard Box	Standard Carton	Wt./ 100
9510	1/4"	1/2"	1 3/8"	1 1/4"	50	500	4
9515	5/16"	5/8"	1 5/8"	1 1/2"	50	500	7 1/2
9520	3/8"	3/4"	2"	1 3/4"	50	250	12 1/2
9525	1/2"	7/8"	2 1/2"	2 1/4"	25	250	18
9530	5/8"	1"	2 3/4"	2 1/2"	25	100	25 1/2
9535	3/4"	1 1/4"	3 15/16"	3 1/2"	10	50	54 1/2

c

Multi-Set II®



SPECIFIED FOR ANCHORAGE INTO CONCRETE

Drop-In, shell-type anchors feature an internally threaded, all-steel shell with expansion cone insert and flush embedment lip. "Anchors are manufactured from zinc-plated carbon steel, 18-8 stainless steel and 316 stainless steel.

Anchors should be installed with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 specifications.

Anchors should be tested to ASTM E488 criteria and listed by ICC (formerly ICBO). Anchors should also be listed by the following agencies as required by the local building code: UL, FM, City of Los Angeles, California State Fire Marshal and Cal Trans.

APPROVALS/LISTINGS

Meets or exceeds U.S. Government G.S.A. Specification A-A-55614 Type 1 (Formerly GSA: FF-S-325 Group VIII)

Underwriters Laboratories

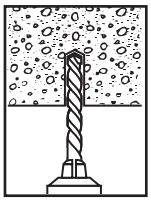
Factory Mutual

City of Los Angeles – #RR2748

California State Fire Marshal

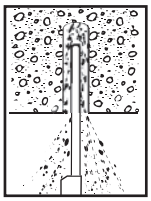
Caltrans

INSTALLATION STEPS

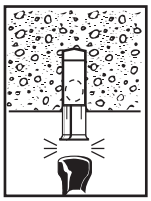


To set anchor flush with surface:

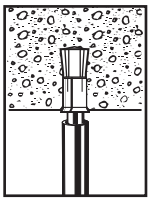
1. Drill hole to required embedment (see Table on page 73).



2. Clean hole with pressurized air.



3. Drive anchor flush with surface of concrete.



4. Expand anchor with setting tool provided (see chart). Anchor is properly expanded when shoulder of setting tool is flush with top of anchor.

To set anchor below surface:

Drill hole deeper than anchor length. Thread bolt into anchor. Hammer anchor into hole until bolt head is at desired depth. Remove bolt and set anchor with setting tool.

Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

BOLT DIA. In. (mm)	ANCHOR DIA. In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	TENSION Lbs. (kN) f'c = 2000 PSI (13.8 MPa)	TENSION Lbs. (kN) f'c = 4000 PSI (27.6 MPa)	TENSION Lbs. (kN) f'c = 6000 PSI (41.4 MPa)	SHEAR Lbs. (kN) f'c > 2000 PSI (13.8 MPa)
1/4 (6.4)	3/8 (9.5)	1 (25.4)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	1,680 (7.5)	2,360 (10.5)	2,980 (13.3)	1,080 (4.8)
3/8 (9.5)	1/2 (12.7)	1-5/8 (41.3)		2,980 (13.3)	3,800 (16.9)	6,240 (27.8)	3,160 (14.1)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		3,300 (14.7)	5,840 (26.0)	8,300 (36.9)	4,580 (20.4)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		5,500 (24.5)	8,640 (38.4)	11,020 (49.0)	7,440 (33.1)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		8,280 (36.8)	9,480 (42.2)	12,260 (54.5)	10,480 (46.6)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

* For continuous extreme low temperature applications, use stainless steel.

Combined Tension and Shear Loading—for Multi-Set Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt)^{5/3} + (Vs/Vt)^{5/3} \leq 1$$

Ps = Applied tension load **Vs = Applied shear load** **Pt = Allowable tension load** **Vt = Allowable shear load**

Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

BOLT DIA. In. (mm)	ANCHOR DIA. In. (mm)	MINIMUM EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1/2 (12.7)	1-5/8 (39.7)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	2,035 (9.1)	1,895 (8.4)	3,340 (14.9)	4,420 (19.6)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		2,740 (12.2)	2,750 (12.2)	3,200 (14.2)	4,940 (22.0)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		4,240 (18.9)	4,465 (19.9)	5,960 (26.5)	5,840 (26.0)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		5,330 (23.7)	6,290 (28.0)	8,180 (36.4)	9,120 (40.6)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Multi-Set II Drop-In Anchors — Recommended Edge and Spacing Distance Requirements*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH LOAD FACTOR APPLIED =.80 FOR TENSION =.70 FOR SHEAR In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS LOAD FACTOR APPLIED =.80 FOR TENSION =.55 FOR SHEAR In. (mm)
1/4 (6.4)	3/8 (9.5)	1 (25.4)	RM, RL or CL-Carbon or SRM-18-8 S.S. or SSRM-316 S.S.	1-3/4 (44.5)	7/8 (22.2)	3-1/2 (88.9)	1-3/4 (44.5)
3/8 (9.5)	1/2 (12.7)	1-5/8 (41.3)		2-7/8 (73.0)	1-7/16 (36.5)	5-11/16 (144.5)	2-7/8 (73.0)
1/2 (12.7)	5/8 (15.9)	2 (50.8)		3-1/2 (88.9)	1-3/4 (44.5)	7 (177.8)	3-1/2 (88.9)
5/8 (15.9)	7/8 (22.2)	2-1/2 (63.5)		4-3/8 (111.1)	2-3/16 (55.6)	8-3/4 (222.3)	4-3/8 (111.1)
3/4 (19.1)	1 (25.4)	3-3/16 (81.0)		5-5/8 (142.9)	2-13/16 (71.4)	11-3/16 (284.2)	5-5/8 (142.9)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

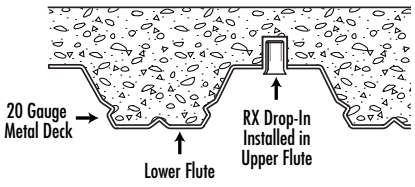
Multi-Set II Drop-In Anchors — Ultimate Tension and Shear Values (Lbs/kN) for RX-series (3/4" and 1" Embedment)*

BOLT DIA. In. (mm)	DRILL BIT SIZE In. (mm)	EMBEDMENT In. (mm)	2500 PSI (17.2 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE		HOLLOW CORE	
			TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	1/2 (12.7)	3/4 (19.1)	1,571 (7.0)	2,295 (10.2)	1,987 (8.8)	2,903 (12.9)	1,908 (8.5)	2,401 (10.7)
1/2 (12.7)	5/8 (15.9)	1 (25.4)	2,113 (9.4)	2,585 (11.5)	2,673 (11.9)	3,270 (14.5)	2,462 (11.0)	2,401 (10.7)

* The tabulated values are for RX anchors installed at a minimum of 12 diameters on center and minimum edge distance of 6 diameters for 100 percent anchor efficiency. Spacing and edge distance may be reduced to 6 diameters spacing and 3 diameter edge distance provided the values are reduced 50 percent. Linear Interpolation may be used for intermediate spacings and edge margins.

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Multi-Set II Drop-In Anchors — Anchoring Overhead in 3000 PSI Lightweight Concrete On Metal Deck

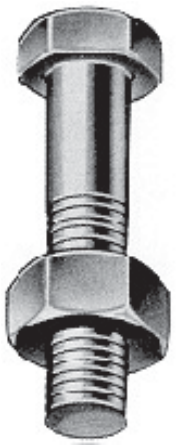


ANCHOR	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT In. (mm)	3000PSI (20.7 MPa) CONCRETE		
			ULTIMATE TENSION LOAD Lbs. (kN)		ALLOWABLE WORKING LOAD Lbs. (kN)
RX-38 Drop-In	1/2 (12.7)	3/4 (19.1)	Upper Flute	1,410 (6.3)	353 (1.6)
			Lower Flute	1,206 (5.4)	301 (1.3)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

FIG. 780 HEX HEAD MACHINE BOLT

MATERIAL: Carbon steel or 304/316 stainless steel.
FINISH: Black, electro or hot-dipped galvanized.
SERVICE: For use as a fastening device.
ORDERING: Specify size, figure number and finish. Length of bolt is measured from under the head to the extreme point. Sizes as shown are carried in stock, other sizes are also available.



DIAMETER OF BOLT	WEIGHT PER HUNDRED, LBS.														
	LENGTH OF BOLT IN INCHES														
	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	5½	6
⅜	9	10	11	–	–	–	–	–	–	–	–	–	–	–	–
½	18	20	21	22	24	25	27	–	–	–	–	–	–	–	–
⅝	31	33	35	37	39	41	43	46	48	50	52	56	61	65	69
¾	49	52	55	58	61	64	67	70	73	76	80	86	92	98	105
⅞	–	–	–	–	89	93	98	102	106	110	115	123	131	140	148
1	–	–	–	–	–	128	134	139	145	150	156	167	178	189	200
1⅛	–	–	–	–	–	–	–	–	193	–	207	221	235	249	263
1¼	–	–	–	–	–	–	–	–	–	–	–	–	302	320	337

FIG. 785 STANDARD HEX NUTS

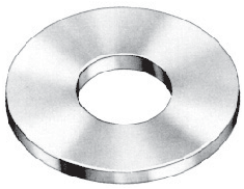
FIG. 790 HEAVY DUTY HEX NUTS

MATERIAL: Carbon steel or 304/316 stainless steel.
FINISH: Black, electro or hot-dipped galvanized.
ORDERING: Specify rod size, figure number and finish.

ROD SIZE	WEIGHT PER 100, LBS.	
	FIG. 785	FIG. 790
¼	0.74	1.2
⅜	1.60	3.2
½	3.75	6.6
⅝	7.33	12
¾	11.9	19
⅞	19.0	30
1	28.3	43
1⅛	40.3	59
1¼	54.3	79
1⅜	73.0	102
1½	94.3	131

FIG. 795

ROUND STEEL WASHERS



MATERIAL: Carbon steel or 304/316 stainless steel.
FINISH: Black, electro or hot-dipped galvanized.
ORDERING: Specify rod size, figure number and finish.

SIZE OF BOLT	OUTSIDE DIAMETER	DIAMETER OF HOLE	WEIGHT PER 100, LBS.
1/4	3/4	5/16	0.67
3/8	1	7/16	1.50
1/2	1 3/8	9/16	3.90
5/8	1 3/4	11/16	7.80
3/4	2	13/16	11.00
7/8	2 1/4	15/16	15.00
1	2 1/2	1 1/16	19.00
1 1/8	2 3/4	1 1/4	22.00
1 1/4	3	1 3/8	26.00
1 1/2	3 1/2	1 5/8	38.00

FIG. 800

LOCK WASHER

MATERIAL: Carbon steel or 304/316 stainless steel.
FINISH: Black or electro-galvanized.
ORDERING: Specify size, figure number and finish.

ROD SIZE	INSIDE DIAMETER	WIDTH OF STEEL	THICKNESS OF STEEL	WEIGHT PER 100, LBS.
3/8	7/16	.141	.094	7
1/2	9/16	.171	.125	15
5/8	11/16	.203	.156	26
3/4	13/16	.234	.188	43

FIG. 805

STEEL WASHER PLATE

MATERIAL: Carbon steel or 304/316 stainless steel.
FINISH: Black, electro or hot-dipped galvanized.
SERVICE: For use as a heavy duty washer to suspend hanger rods.
ORDERING: Specify rod tapping size, figure number and finish.

ROD SIZE	WEIGHT PER 100, LBS.	SIZE OF STOCK
3/8	62	3 x 3 x 1/4
1/2	62	3 x 3 x 1/4
5/8	92	3 x 3 x 3/8
3/4	164	4 x 4 x 3/8
7/8	220	4 x 4 x 1/2
1	220	4 x 4 x 1/2

FIG. 755 CONTINUOUS THREADED ROD

MATERIAL: Carbon steel or 304/316 stainless steel.

FINISH: Black, electro or hot-dipped galvanized.

SERVICE: For use in applications for attaching hangers to structural attachments. Continuous threaded rod can be cut to required lengths. Sizes below are stocked in 6', 10' and 12' lengths. SAE national fine thread can be furnished to order.

ORDERING: Specify rod diameter, figure number, length and finish.

ROD SIZE	WEIGHT PER 100, LBS.	MAX. REC. LOAD, LBS.
1/4	12	240
5/16	20	300
3/8	30	610
1/2	54	1130
5/8	85	1810
3/4	120	2710
7/8	170	3770
1	225	4960
1 1/8	280	6230
1 1/4	350	8000
1 3/8	450	9000
1 1/2	500	11630

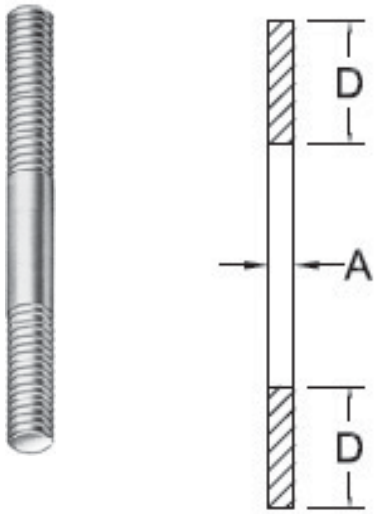
FIG. 760 HANGER ROD

MATERIAL: Carbon steel or 304/316 stainless steel.

FINISH: Black, electro or hot-dipped galvanized.

SERVICE: For use in applications for attaching hangers to structural attachments. Threaded on both ends and can be furnished in standard lengths of 8" - 240"

ORDERING: Specify rod diameter, figure number, length, thread length and finish.



ROD SIZE A	STANDARD ROD THREAD LENGTH D, IN.	MAX. REC. LOAD, LBS. 650° F
1/4	2 1/2	240
3/8	2 1/2	610
1/2	2 1/2	1130
5/8	2 1/2	1810
3/4	3	2710
7/8	3 1/2	3770
1	4	4960

Tapcon® Concrete and MasonryAnchors

SPECIFIED FOR ANCHORAGE INTO CONCRETE, BRICK OR BLOCK

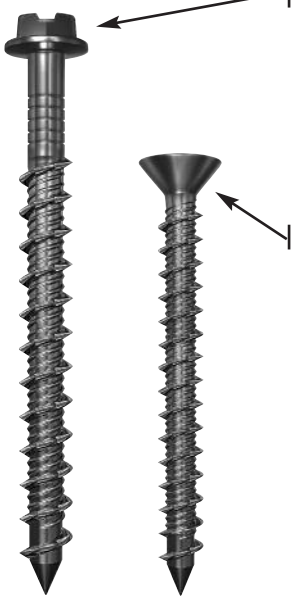
The "original masonry" anchor that cuts its own threads into concrete, brick, or block. Maximum performance is achieved because the Tapcon Anchor, the Condrive Installation Tool, and the carbide-tipped Tapcon Drill Bits are designed to work as a system. It is essential to use the Condrive tool and the correct drill bit to assure consistent anchor performance.

Now available in 410 stainless steel.

APPROVALS/LISTINGS

ICC Evaluation Service, Inc. – #ESR-1671
ICC Evaluation Service, Inc. – #ESR-2202
Miami-Dade County – #07-0315.03
Florida Building Code

THE ORIGINAL Tapcon®



Hex Head style on Tapcon Anchors is available for majority of fixture anchoring needs

Climaseal™ Coating is standard on all Tapcon anchors to provide extended corrosion resistance

Now available in 410 Stainless Steel

Phillips Flat Head style is available when flush seating is necessary in countersink applications

Advanced Threadform cuts into masonry materials for greater pullout values

Lengths of Tapcon Anchors range from 1-1/4" to 4" in 3/16" and up to 6" in 1/4" diameters.

Nail-Type Point guides the anchor into the pre-drilled hole. Excellent for wood to concrete applications

INSTALLATION STEPS

Read instructions before using (installation)!

WARNING: If there are any questions concerning proper installation, applications or appropriate use of this product, please call our Technical Services Department at 1-800-899-7890. Failure to follow these instructions can result in serious personal injury.

1. **Select proper fastener – diameter / head style / length**
   a) **Use selection chart to choose proper length.**
2. **Drill Hole – use selection chart to determine drill bit length and depth of hole**
   a) **Choose appropriate drill bit based upon diameter of Tapcon Anchor.**
   b) **Drill hole minimum ?" deeper than Tapcon Anchor to be embedded.**
   Minimum anchor embedment: 1"
   Maximum anchor embedment: 1-3/4"
3. **Drive Anchor**

WARNING: Failure to wear safety glasses with side shields can result in serious personal injury. Always wear ANSI compliant eye protection (ANSI Z87.1-2003).

WARNING: Using the wrong size drill bit will affect performance values and may cause failure.

Head Styles

3/16" diameter has a 1/4" slotted hex washer head (HWH)
1/4" diameter has a 5/16" slotted hex washer head (HWH)

3/16" diameter uses a #2 phillips flat head (PFH)
1/4" diameter uses a #3 phillips flat head (PFH)

PERFORMANCE TABLE

Tapcon Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete

ANCHOR DIA. In. (mm)	MIN. DEPTH OF EMBEDMENT In. (mm)	f'c = 2000 PSI (13.8 MPa)		f'c = 3000 PSI (20.7 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 5000 PSI (34.5 MPa)	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	600 (2.7)	720 (3.2)	625 (2.8)	720 (3.2)	650 (2.9)	720 (3.2)	800 (3.6)	860 (3.8)
	1-1/4 (31.8)	845 (3.7)	720 (3.2)	858 (3.8)	720 (3.2)	870 (3.9)	720 (3.2)	1,010 (4.5)	860 (3.8)
	1-1/2 (38.1)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,090 (4.8)	860 (3.8)	1,220 (5.4)	860 (3.8)
	1-3/4 (44.5)	1,450 (6.5)	870 (3.9)	1,455 (6.5)	870 (3.9)	1,460 (6.5)	990 (4.4)	1,730 (7.7)	990 (4.4)
1/4 (6.4)	1 (25.4)	750 (3.3)	900 (4.0)	775 (3.4)	900 (4.0)	800 (3.6)	1,360 (6.1)	950 (4.2)	1,440 (6.4)
	1-1/4 (31.8)	1,050 (4.7)	900 (4.0)	1,160 (5.2)	900 (4.0)	1,270 (5.6)	1,360 (6.1)	1,515 (6.7)	1,440 (6.4)
	1-1/2 (38.1)	1,380 (6.1)	1,200 (5.3)	1,600 (7.2)	1,200 (5.3)	1,820 (8.1)	1,380 (6.1)	2,170 (9.7)	1,670 (7.4)
	1-3/4 (44.5)	2,020 (9.0)	1,670 (7.4)	2,200 (9.8)	1,670 (7.4)	2,380 (10.6)	1,670 (7.4)	2,770 (12.3)	1,670 (7.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

PERFORMANCE TABLE

Tapcon Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Hollow Block

ANCHOR DIA. In. (mm)	ANCHOR EMBEDMENT In. (mm)	LIGHTWEIGHT BLOCK		MEDIUM WEIGHT BLOCK	
		TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/16 (4.8)	1 (25.4)	220 (1.0)	400 (1.8)	340 (1.5)	730 (3.2)
1/4 (6.4)	1 (25.4)	250 (1.1)	620 (2.8)	500 (2.2)	1,000 (4.4)

Safe working loads for single installation under static loading should not exceed 25% of the ultimate load capacity.

NOTE: 3/16" Tapcon requires 5/32" bit, 1/4" Tapcon requires 3/16" bit.

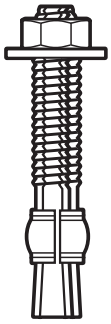
PERFORMANCE TABLE

Tapcon® Anchors — Allowable Edge and Spacing Distances

PARAMETER	ANCHOR DIA. Inch	NORMAL WEIGHT CONCRETE			CONCRETE MASONRY UNITS (CMU)		
		FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR	FULL CAPACITY (Critical Distance Inches)	REDUCED CAPACITY (Minimal Distance Inches)	LOAD REDUCTION FACTOR
Spacing Between Anchors - Tension	3/16 1/4	3 4	1-1/2 2	0.73 0.66	3 4	1-1/2 2	1.00 0.84
Spacing Between Anchors - Shear	3/16 1/4	3 4	1-1/2 2	0.83 0.82	3 4	1-1/2 2	1.00 0.81
Edge Distance - Tension	3/16 1/4	1-7/8 2-1/2	1 1-1/4	0.71 0.78	4 4	2 2	0.91 0.88
Edge Distance - Shear	3/16 1/4	2-1/4 3	1-1/8 1-1/2	0.70 0.59	4 4	2 2	0.93 0.80

For SI: 1 inch = 25.4 mm

Trubolt Wedge



SPECIFIED FOR ANCHORAGE INTO CONCRETE

Trubolt Wedge anchors feature a stainless steel expansion clip, threaded stud body, nut and washer. Anchor bodies are made of plated carbon steel, hot-dipped galvanized carbon steel, type 304 stainless steel or type 316 stainless steel as identified in the drawings or other notations.

Trubolt+ Wedge anchors consist of a high-strength threaded stud body, expansion clip, nut and washer. Anchor bodies are made of plated carbon steel. The expansion clip consists of a split cylindrical ring with undercutting grooves.

The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance with ANSI B212.15-1994 to install anchors.

Anchors are tested to ACI 355.2 and ICC-ES AC193. Anchors are listed by the following agencies as required by the local building code: ICC-ES, UL, FM, City of Los Angeles, California State Fire Marshal and Caltrans.

APPROVALS/LISTINGS

Trubolt®
Wedge Anchors

ICC Evaluation Service, Inc. # ESR-2251
- – Category 1 performance rating
- – 2006 IBC compliant
- – Meets ACI 318 ductility requirements
- – Tested in accordance with ACI 355.2 and ICC-ES AC193
- – For use in seismic zones A & B
- – 1/4", 3/8" & 1/2" diameter anchors listed in ESR-2251

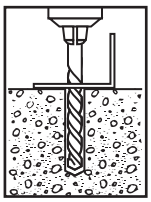
Underwriters Laboratories
Factory Mutual
City of Los Angeles - #RR2748
California State Fire Marshall
Caltrans
Meets or exceeds U.S. Government G.S.A. Specification A-A-1923A Type 4 (formerlyGSA: FF-S-325 Group II, Type 4, Class 1)

Trubolt®+
Seismic Wedge Anchors

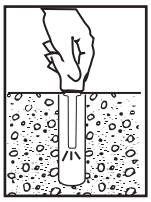
ICC Evaluation Service, Inc. # ESR-2427
- -Category 1 performance rating
- -2006 IBC and 2009 IBC compliant
- -Meets ACI 318 ductility requirements
- -Tested in accordance with ACI 355.2 and ICC-ES AC193
- -Listed for use in seismic zones A, B, C, D, E, & F
- -3/8", 1/2", 5/8" & 3/4" diameter anchors listed in ESR-2427

City of Los Angeles - #RR25867

INSTALLATION STEPS

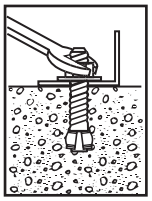


1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole to any depth exceeding the desired embedment. See chart for minimum recommended embedment.



2. Clean hole or continue drilling additional depth to accommodate drill fines.

3. Assemble washer and nut, leaving nut flush with end of anchor to protect threads. Drive anchor through material to be fastened until washer is flush to surface of material.



4. Expand anchor by tightening nut 3-5 turns past the hand tight position, or to the specified torque requirement.

LENGTH INDICATION CODE *

CODE	LENGTH OF ANCHOR		CODE	LENGTH OF ANCHOR	
A	1-1/2 < 2	(38.1 < 50.8)	K	6-1/2 < 7	(165.1 < 177.8)
B	2 < 2-1/2	(50.8 < 63.5)	L	7 < 7-1/2	(177.8 < 190.5)
C	2-1/2 < 3	(63.5 < 76.2)	M	7-1/2 < 8	(190.5 < 203.2)
D	3 < 3-1/2	(76.2 < 88.9)	N	8 < 8-1/2	(203.2 < 215.9)
E	3-1/2 < 4	(88.9 < 101.6)	O	8-1/2 < 9	(215.9 < 228.6)
F	4 < 4-1/2	(101.6 < 114.3)	P	9 < 9-1/2	(228.6 < 241.3)
G	4-1/2 < 5	(114.3 < 127.0)	Q	9-1/2 < 10	(241.3 < 254.0)
H	5 < 5-1/2	(127.0 < 139.7)	R	10 < 11	(254.0 < 279.4)
I	5-1/2 < 6	(139.7 < 152.4)	S	11 < 12	(279.4 < 304.8)
J	6 < 6-1/2	(152.4 < 165.1)	T	12 < 13	(304.8 < 330.2)

*Located on top of anchor for easy inspection.

Trubolt®+
Seismic Wedge Anchors

APPENDIX C: Strength Design Performance values in accordance to 2006 and 2009 IBC

ITW RED HEAD TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION TESTED TO ICC-ES AC 193 AND ACI 355.2, IN ACCORDANCE WITH 2006 and 2009 IBC

Trubolt® Seismic Wedge Anchors

TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION[1]

Characteristic	Symbol	Units	Nominal Anchor Diameter (inch)[4]									
			3/8"		1/2"				5/8"		3/4"	
Anchor category	1, 2 or 3	—	1		1				1		1	
Minimum effective embedment depth	h_{ef}	in	1-5/8		2		3-1/4		2-3/4	4-1/4	3-3/4	
Minimum concrete member thickness	h_{min}	in	4	5	4	6	6	8	6	6-1/4	7	8
Critical edge distance	c_{ac}	in	5	3	6	6	7-1/2	6	7-1/2	6-1/2	12	10
Data for Steel Strengths – Tension and Shear												
Minimum specified yield strength	f_y	psi	60,000		55,000				55,000		55,000	
Minimum specified ultimate strength	f_{uta}	psi	75,000		75,000				75,000		75,000	
Effective tensile stress area (neck)	A_{se}	in^2	0.056		0.119				0.183		0.266	
Effective tensile stress area (thread)	A_{se}	in^2	0.075		0.142				0.217		0.332	
Steel strength in tension	N_{sa}	lbf	4,200		8,925				13,725		19,950	
Steel strength in shear, uncracked or cracked concrete [6]	V_{sa}	lbf	1,830		5,175				8,955		14,970	
Steel strength in shear – seismic loads	V_{eq}	lbf	1,545		5,175				8,955		11,775	
Strength reduction factor f for tension, steel failure modes [2]			0.75		0.75				0.75		0.75	
Strength reduction factor f for shear, steel failure modes [2]			0.60		0.65				0.65		0.65	
Data for Concrete Breakout Concrete Pryout Strengths in Tension and Shear												
Effectiveness factor – uncracked concrete	k_{uncr}	—	24		24				24		24	
Effectiveness factor – cracked concrete	k_{cr}	—	17		17				17		17	
Modification factor for cracked and uncracked concrete [3]	$\Psi_{c,N}$	—	1.0		1.0				1.0		1.0	
Coefficient for pryout strength	k_{cp}	—	1.0		1.0		2.0		2.0		2.0	
Load-bearing length of anchor	l_e	in	1.625		2.0		3.25		2.75	4.25	3.75	
Strength reduction factor ϕ for tension, concrete failure modes, Condition B [2]			0.65		0.65				0.65		0.65	
Strength reduction factor ϕ for shear, concrete failure modes, Condition B [2]			0.70		0.70				0.70		0.70	
Data for Pullout Strengths												
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	See Footnote [5]		See Footnote [5]		6,540		5,430	8,900	See Footnote [5]	
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	See Footnote [5]		See Footnote [5]				See Footnote [5]		See Footnote [5]	
Pullout strength for seismic loads	N_{eq}	lbf	See Footnote [5]		See Footnote [5]				See Footnote [5]	6,715	See Footnote [5]	
Strength reduction factor f for tension, pullout failure modes, Condition B [2]			See Footnote [5]		0.65				0.65		See Footnote [5]	
Additional Anchor Data												
Axial stiffness in service load range in uncracked concrete	b_{uncr}	lbf/in	100,000		250,000				250,000		250,000	
Axial stiffness in service load range in cracked concrete	b_{cr}	lbf/in	40,000		20,000				20,000		20,000	

For SI: 1 inch = 25.4 mm, 1 in2 = 645.16mm2, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa, 1 lbf • 102/in - 17,500 N/m.

[1] The 1/2", 5/8" and 3/4" diameter Trubolt+ Wedge Anchors are ductile steel elements as defined by ACI 318 D.1. The 3/8" diameter Trubolt+ is considered ductile under tension loading and brittle under shear loading.

[2] All values of ϕ apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5. For installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate ϕ factor must be determined in accordance with ACI 318 D.4.4.

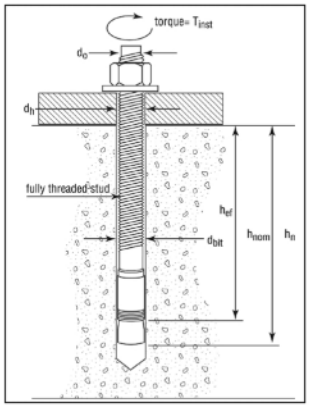
[3] For all design cases $\Psi_{c,N} = 1.0$. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.

[4] The actual diameter for the 3/8" diameter anchor is 0.361" for the 5/8" diameter anchor is 0.615" and the 3/4" diameter anchor is 0.7482".

[5] Anchor pullout strength does not control anchor design. Determine steel and concrete capacity only.

[6] Steel strength in shear values are based on test results per ACI 355.2, Section 9.4 and must be used for design.

TRUBOLT+ WEDGE ANCHOR (INSTALLED)



TRUBOLT+ WEDGE INSTALLATION INFORMATION

Parameter	Notation	Units	Nominal Achor Diameter (inch)									
			3/8		1/2				5/8		3/4	
Anchor outer diameter	d_o	inches	0.361		0.5				0.615		0.7482	
Nominal carbide bit diameter	d_{bit}	inches	3/8		1/2				5/8		3/4	
Effective embedment depth	h_{ef}	inches	1-5/8		2		3-1/4		2-3/4	4-1/4	3-3/4	
Minimum anchor embedment depth	h_{nom}	inches	2		2-1/2		3-3/4		3-1/4	4-3/4	4-3/8	
Minimum hole depth[1]	h_o	inches	2-1/4		2-3/4		4		3-1/2	5	4-5/8	
Minimum concrete member thickness[1]	h_{min}	inches	4	5	4	6	6	8	6	6-1/4	7	8
Critical edge distance[1]	c_{ac}	In.	5	3	6	6	7-1/2	6	7-1/2	6-1/2	12	10
Minimum anchor spacing[1]	s_{min}	In.	3-1/2	2-1/2	6	5-3/4	4	5-3/4	8	6	6	6
Minimum edge distance[1]	c_{min}	In.	3		6				7-1/2	5	7-1/2	7-1/2
Minimum overall anchor length	l	inches	2-1/2		3-3/4		4-1/2		4-1/4	6	5-1/2	
Installation torque	T_{inst}	ft-lb	30		45				90		110	
Minimum diameter of hole in fastened part	d_h	inches	1/2		5/8				3/4		7/8	

For SI: 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m.

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APPENDIX C: Strength Design Performance values in accordance to 2006 and 2009 IBC

TRUBOLT+ WEDGE ANCHOR ALLOWABLE STRESS DESIGN (ASD) VALUES FOR ILLUSTRATIVE PURPOSES

Anchor Notation	Anchor Embedment Depth	Effective Embedment Depth	Allowable Tension Load
	(inches), h_{nom}	(inches), h_{ef}	(lbs)
3/8	2	1-5/8	1,090
1/2	2-1/2	2	1,490
	3-3/4	3-1/4	2,870
5/8	3-1/4	2-3/4	2,385
	4-3/4	4-1/4	3,910
3/4	4-3/8	3-3/4	3,825

For SI: 1 inch = 25.4 mm, 1 ft-lb = 4.45N.
Design Assumptions:
1 Single anchor with static shear load only.
2 Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
3 Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
4 Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
5 Values do not include edge distance or spacing reductions.

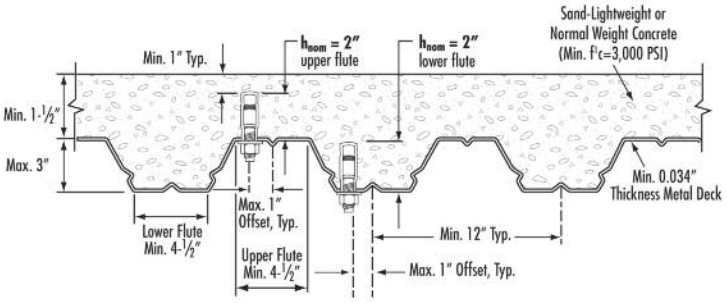
ITW RED HEAD TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION FOR INSTALLATION IN THE SOFFIT OF CONCRETE FILL ON METAL DECK FLOOR AND ROOF ASSEMBLIES

TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION

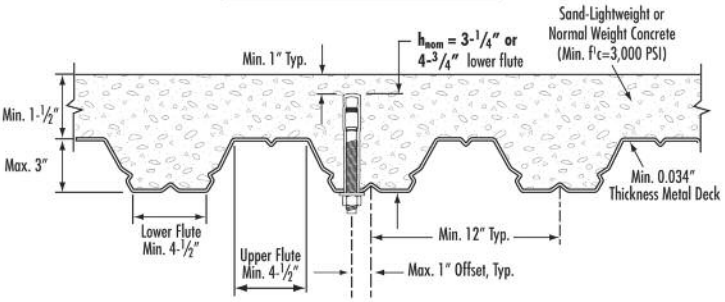
Characteristic	Symbol	Units	Nominal Anchor Diameter				
			3/8"	1/2"		5/8"	
			Upper /Lower	Upper /Lower	Lower Only	Lower Only	Lower Only
			h_{ef} = 1-5/8"	h_{ef} = 2"	h_{ef} = 3-1/4"	h_{ef} = 2-3/4"	h_{ef} = 4-1/4"
Pullout strength, uncracked concrete over metal deck	$N_{p, deck, uncr}$	lbf	2,170	2,515	5,285	3,365	6,005
Pullout strength, cracked concrete over metal deck	$N_{p, deck, cr}$	lbf	1,650	1,780	4,025	2,405	5,025
Reduction factor for pullout strength in tension, Condition B	ϕ	––	0.65				
Shear strength, uncracked concrete over metal deck	$V_{p, deck, uncr}$	lbf	1,640	2,200	3,790	2,890	6,560
Reduction factor for steel strength in shear	ϕ	––	0.60	0.65			
Anchor embedment depth	h_{nom}	in	2.0	2.5	3.75	3.25	4.75

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

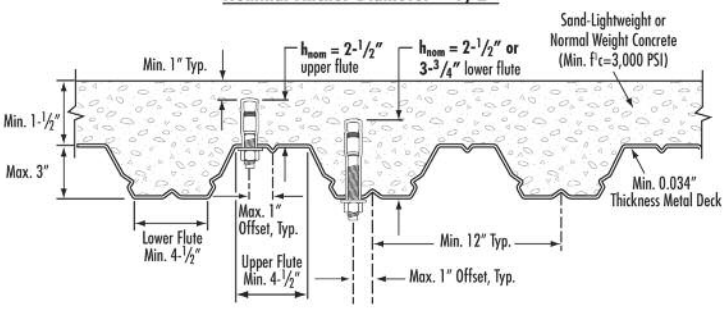
Nominal Anchor Diameter = 3/8"



Nominal Anchor Diameter = 5/8"



Nominal Anchor Diameter = 1/2"



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APPENDIX B: Strength Design Performance values in accordance to 2006 IBC

ITW RED HEAD TRUBOLT WEDGE ANCHOR

DESIGN INFORMATION TESTED TO ICC-ES AC193 AND ACI 355.2, IN ACCORDANCE WITH 2006 IBC

Trubolt® Wedge Anchors

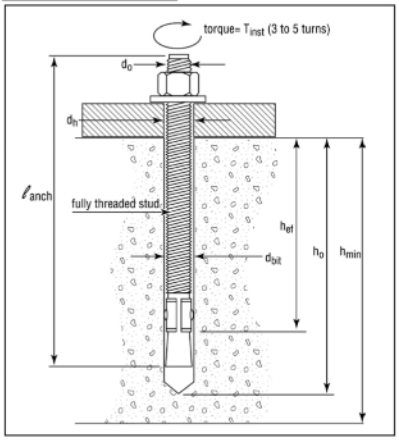
TRUBOLT WEDGE ANCHOR DESIGN INFORMATION[1,2,3]

DESIGN INFORMATION	Symbol	Units	Nominal Anchor Diameter									
			1/4		3/8		1/2		5/8		3/4	
Anchor O.D.	d_o	in	0.250		0.375		0.500		0.625		0.750	
Effective embedment	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	2-1/2	4	3-1/2	4-3/4
Minimum member thickness	h_{min}	in	4	4	4	5	5	6	5	8	6	8
Critical edge distance	c_{ac}	in	2-5/8	3	2-5/8	5-1/4	3-3/4	6-3/4	5	8	7	9
Minimum edge distance	c_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Minimum anchor spacing	s_{min}	in	1-3/4	1-1/2	2-1/4	2	3-3/4	3-3/4	4-1/4	3-1/4	3-3/4	3-1/2
Min. Specified Yield Strength	f_y	lb/in^2	55,000									
Min. Specified Ultimate Strength	f_{uta}	lb/in^2	75,000									
Effective tensile stress area	A_{se}	in^2	0.032		0.078		0.142		0.226		0.334	
Steel strength in tension	N_s	lb	2,385		5,815		10,645		16,950		25,050	
Steel strength in shear	V_s	lb	1,430		2,975	3,490	4,450	6,385	6,045	10,170	10,990	15,030
Pullout strength, uncracked concrete	$N_{p,uncr}$	lb	1,392	1,706	2,198	3,469	2,400	4,168	4,155	6,638	8,031	10,561
Anchor Category (All anchors are ductile)			1									
Effectiveness factor k_{uncr} uncracked concrete			24									
Axial stiffness in service load range	β	lb/in	14,651	9,385	17,515	26,424	32,483	26,136	42,899	21,749	43,576	28,697
Coefficient for variation for axial stiffness in service load range			34	47	28	45	17	33	55	22	63	28
Strength reduction factor ϕ for tension, steel failure modes			0.75									
Strength reduction factor ϕ for shear, steel failure modes			0.65									
Strength reduction factor ϕ for tension, concrete failure modes, Condition B			0.65									
Strength reduction factor ϕ for shear, concrete failure modes, Condition B			0.70									

[1] Trubolt+ Anchor Design Strengths must be determined in accordance with ACI 318-05 Appendix D and this table
[2] The Trubolt+ Wedge Anchor is a ductile steel element as defined by ACI 318 D.1
[3] 1/4", 3/8", & 1/2" diameter data is listed in ICC-ES ESR-2251.

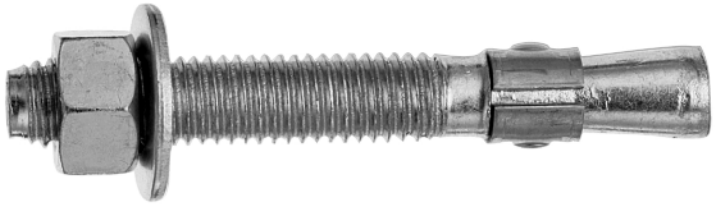
Trubolt® Wedge Anchors

TRUBOLT WEDGE ANCHOR (INSTALLED)



TRUBOLT WEDGE INSTALLATION INFORMATION

	Symbol	Units	Nominal Anchor Diameter (in.)									
			1/4		3/8		1/2		5/8		3/4	
Anchor outer diameter	d_o	in	0.25		0.375		0.5		0.625		0.750	
Nominal carbide bit diameter	d_{bit}	in	1/4		3/8		1/2		5/8		3/4	
Effective embedment depth	h_{ef}	in	1-1/2	2	1-3/4	2-5/8	1-7/8	3-3/8	2-1/2	4	3-1/2	4-3/4
Min hole depth	h_o	in	2	2-1/2	2-1/2	3-3/8	2-3/4	4-1/4	3-3/4	5-1/4	4-3/4	6
Min slab thickness	h_{min}	in	4		4	5	5	6	5	8	6	8
Installation torque	T_{inst}	ft-lb	4		25		55		90		110	
Min hole diameter in fixture	d_h	in	5/16		7/16		9/16		11/16		13/16	



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APPENDIX B: Strength Design Performance values in accordance to 2006 IBC

Trubolt®
Wedge Anchors

TRUBOLT WEDGE PULLOUT STRENGTH ($N_{p, unc}$) (POUNDS) [1]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Concrete Compressive Strength			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1-1/2	1,392	1,525	1,610	1,822
	2	1,706	1,869	1,947	2,151
3/8	1-3/4	2,198	2,408	2,621	3,153
	2-5/8	3,469	3,800	3,936	4,275
1/2	1-7/8	2,400	2,629	3,172	4,520
	3-3/8	4,168	4,520	4,520	4,520
5/8	2-1/2	4,155	4,155	4,376	5,578
	4	6,638	6,900	7,968	10,157
3/4	3-1/2	8,031	8,322	9,610	12,251
	4-3/4	10,561	10,561	10,561	12,251

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
1 Values are for single anchors with no edge distance or spacing reduction.

TRUBOLT WEDGE ANCHOR ALLOWABLE STATIC TENSION (ASD), NORMAL-WEIGHT UNCRACKED CONCRETE [1-6]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Concrete Compressive Strength			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1-1/2	611	670	707	800
	2	749	821	855	945
3/8	1-3/4	965	1,058	1,151	1,385
	2-5/8	1,524	1,669	1,729	1,878
1/2	1-7/8	1,054	1,155	1,393	1,985
	3-3/8	1,831	1,985	1,985	1,985
5/8	2-1/2	1,825	1,825	1,922	2,450
	4	2,915	3,030	3,499	4,461
3/4	3-1/2	3,527	3,655	4,221	5,381
	4-3/4	4,638	4,638	4,638	5,381

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
Design Assumptions:
1 Single anchor with static tension load only.
2 Concrete determined to remain uncracked for the life of the anchorage.
3 Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
4 Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
5 Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
6 Values do not include edge distance or spacing reductions.

2006 IBC Compliant

TRUBOLT WEDGE ANCHOR ALLOWABLE STATIC SHEAR (ASD), STEEL (POUNDS)[1-5]

Nominal Anchor Diameter (in.)	Effective Embedment Depth (in.)	Allowable Steel Capacity, Static Shear
1/4	1-1/2	628
	2	
3/8	1-3/4	1,307
	2-5/8	1,533
1/2	1-7/8	1,954
	3-3/8	2,804
5/8	2-1/2	2,655
	4	4,467
3/4	3-1/2	4,827
	4-3/4	6,601

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa
Design Assumptions:
1 Single anchor with static shear load only.
3 Load combinations from 2006 IBC, Sections 1605.2.1 and 1605.3.1 (no seismic loading).
3 Thirty percent dead load and 70 percent live load, controlling load combination 1.2D + 1.6L
4 Calculation of weighted average: 1.2D + 1.6L = 1.2 (0.3) + 1.6 (0.7) = 1.48
5 Values do not include edge distance or spacing reductions.

PERFORMANCE TABLE

Trubolt Wedge Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	f'c = 2000 PSI (13.8 MPa)		f'c = 4000 PSI (27.6 MPa)		f'c = 6000 PSI (41.4 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
1/4 (6.4)	4 (5.4)	1-1/8 (28.6)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,180 (5.2)	1,400 (6.2)	1,780 (7.9)	1,400 (6.2)	1,900 (8.5)	1,400 (6.2)
		1-15/16 (49.2)		2,100 (9.3)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
		2-1/8 (54.0)		2,260 (10.1)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)	3,300 (14.7)	1,680 (7.5)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)		1,680 (7.5)	2,320 (10.3)	2,240 (10.0)	2,620 (11.7)	2,840 (12.6)	3,160 (14.1)
		3 (76.2)		3,480 (15.5)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
		4 (101.6)		4,800 (21.4)	4,000 (17.8)	5,940 (26.4)	4,140 (18.4)	6,120 (27.2)	4,500 (20.0)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		4,660 (20.7)	4,760 (21.2)	5,100 (22.7)	4,760 (21.2)	7,040 (31.3)	7,040 (31.3)
		4-1/8 (104.8)		4,660 (20.7)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
		6 (152.4)		5,340 (23.8)	7,240 (32.2)	9,640 (42.9)	7,240 (32.2)	10,820 (48.1)	8,160 (36.3)
5/8 (15.9)	90 (122.0)	2-3/4 (69.9)		6,580 (29.3)	7,120 (31.7)	7,180 (31.9)	7,120 (31.7)	9,720 (43.2)	9,616 (42.8
		5-1/8 (130.2)		6,580 (29.3)	9,600 (42.7)	14,920 (66.4)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
		7-1/2 (190.5)		7,060 (31.4)	9,600 (42.7)	15,020 (66.8)	11,900 (52.9)	16,380 (72.9)	12,520 (55.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		7,120 (31.7)	10,120 (45.0)	10,840 (48.2)	13,720 (61.0)	13,300 (59.2)	15,980 (71.1)
		6-5/8 (168.3)		10,980 (48.8)	20,320 (90.4)	17,700 (78.7)	23,740 (105.6)	20,260 (90.1)	23,740 (105.6)
		10 (254.0)		10,980 (48.8)	20,320 (90.4)	17,880 (79.5)	23,740 (105.6)	23,580 (104.9)	23,740 (105.6)
7/8 (22.2)	250 (339.0)	3-3/4 (95.3)		9,520 (42.3)	13,160 (58.5)	14,740 (65.6)	16,580 (73.8)	17,420 (77.5)	19,160 (85.2)
		6-1/4 (158.8)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
		8 (203.2)		14,660 (65.2)	20,880 (92.9)	20,940 (93.1)	28,800 (128.1)	24,360 (108.4)	28,800 (128.1)
1 (25.4)	300 (406.7)	4-1/2 (114.3)		13,940 (62.0)	16,080 (71.5)	20,180 (89.8)	22,820 (101.5)	21,180 (94.2)	24,480 (108.9)
		7-3/8 (187.3)		14,600 (64.9)	28,680 (127.6)	23,980 (106.7)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)
		9-1/2 (241.3)		18,700 (83.2)	28,680 (127.6)	26,540 (118.1)	37,940 (168.8)	33,260 (148.0)	38,080 (169.4)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

* For Tie-Wire Wedge Anchor, TW-1400, use tension data from 1/4" diameter with 1-1/8" embedment.

* For continuous extreme low temperature applications, use stainless steel.

Trubolt Wedge Anchors — Ultimate Tension and Shear Values (Lbs/kN) in Lightweight Concrete*

ANCHOR DIA. In. (mm)	INSTALLATION TORQUE Ft. Lbs. (Nm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	LIGHTWEIGHT CONCRETE f'c = 3000 PSI (20.7 MPa)		LOWER FLUTE OF STEEL DECK WITH LIGHTWEIGHT CONCRETE FILL f'c = 3000 PSI (20.7 MPa)	
				TENSION Lbs. (kN)	SHEAR Lbs. (kN)	TENSION Lbs. (kN)	SHEAR Lbs. (kN)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	1,175 (5.2)	1,480 (6.6)	1,900 (8.5)	3,160 (14.1)
		3 (76.2)		2,825 (12.6)	2,440 (10.9)	2,840 (12.6)	4,000 (17.8)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		2,925 (13.0)	2,855 (12.7)	3,400 (15.1)	5,380 (23.9)
		3 (76.2)		3,470 (15.4)	3,450 (15.3)	4,480 (19.9)	6,620 (29.4)
		4 (101.6)		4,290 (19.1)	3,450 (15.3)	4,800 (21.4)	6,440 (28.6)
5/8 (15.9)	90 (122.0)	3 (76.2)		4,375 (19.5)	4,360 (19.4)	4,720 (21.0)	5,500 (24.5)
		5 (127.0)		6,350 (28.2)	6,335 (28.2)	6,580 (29.3)	9,140 (40.7)
3/4 (19.1)	110 (149.2)	3-1/4 (82.6)		5,390 (24.0)	7,150 (31.8)	5,840 (26.0)	8,880 (39.5)
		5-1/4 (133.4)		7,295 (32.5)	10,750 (47.8)	7,040 (31.3)	--- ---

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

PERFORMANCE TABLE

Trubolt Wedge Anchors — Recommended Edge and Spacing Distance Requirements for Shear Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .60 In. (mm)	MIN. EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .20 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING BETWEEN ANCHORS In. (mm) LOAD FACTOR APPLIED = .40
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2)	1-5/16 (33.3) 1 (25.4)	--- ---	3-15/16 (100.0) 3-7/8 (98.4)	2 (50.8) 1-15/16 (49.2)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2)		2-5/8 (66.7) 3-3/4 (95.3)	1-3/4 (44.5) 3 (76.2)	--- 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8)		3-15/16 (100.0) 5-3/16 (131.8)	2-9/16 (65.1) 3-1/8 (79.4)	--- 1-9/16 (39.7)	7-7/8 (200.0) 6-3/16 (157.2)	3-15/16 (100.0) 3-1/8 (79.4)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2)		4-13/16 (122.2) 6-7/16 (163.5)	3-1/8 (79.4) 3-7/8 (98.4)	--- 1-15/16 (49.2)	9-5/8 (244.5) 7-11/16 (195.3)	4-13/16 (122.2) 3-7/8 (98.4)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3)		5-11/16 (144.5) 6-5/16 (160.3)	3-3/4 (95.3) 5 (127.0)	--- 2-1/2 (63.5)	11-3/8 (288.9) 9-15/16 (252.4)	5-11/16 (144.5) 5 (127.0)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8)		6-9/16 (166.7) 8-1/2 (215.9)	4-5/16 (109.5) 6-1/4 (158.8)	--- 3-1/8 (79.4)	13-1/8 (333.4) 12-1/2 (317.5)	6-9/16 (166.7) 6-1/4 (158.8)
1 (25.4)	4-1/4 (108.0) 7-3/8 (187.3)		7-7/8 (200.0) 10-1/16 (255.6)	5-1/8 (130.2) 7-3/8 (187.3)	--- 3-11/16 (93.7)	15-3/4 (400.1) 14-3/4 (374.7)	7-7/8 (200.0) 7-3/8 (187.3)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Trubolt Wedge Anchors — Recommended Edge and Spacing Distance Requirements for Tension Loads*

ANCHOR DIA. In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR TYPE	EDGE DISTANCE REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE EDGE DISTANCE AT WHICH THE LOAD FACTOR APPLIED = .65 In. (mm)	SPACING REQUIRED TO OBTAIN MAX. WORKING LOAD In. (mm)	MIN. ALLOWABLE SPACING AT WHICH THE LOAD FACTOR APPLIED = .70 In. (mm)
1/4 (6.4)	1-1/8 (28.6) 1-15/16 (49.2) 2-1/8 (54.0)	WS-Carbon or WS-G Hot-Dipped Galvanized or WW-304 S.S. or SWW-316 S.S.	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)	1 (25.4) 1 (25.4) 13/16 (20.6)	3-15/16 (100.0) 3-7/8 (98.4) 3-3/16 (81.0)	2 (50.8) 1-15/16 (49.2) 1-5/8 (41.3)
3/8 (9.5)	1-1/2 (38.1) 3 (76.2) 4 (101.6)		2-5/8 (66.7) 3 (76.2) 3 (76.2)	1-5/16 (33.3) 1-1/2 (38.1) 1-1/2 (38.1)	5-1/4 (133.4) 6 (152.4) 6 (152.4)	2-5/8 (66.7) 3 (76.2) 3 (76.2)
1/2 (12.7)	2-1/4 (57.2) 4-1/8 (104.8) 6 (152.4)		3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)	2 (50.8) 1-9/16 (39.7) 2-1/4 (57.2)	7-7/8 (200.0) 6-3/16 (157.2) 9 (228.6)	3-15/16 (100.0) 3-1/8 (79.4) 4-1/2 (114.3)
5/8 (15.9)	2-3/4 (69.9) 5-1/8 (130.2) 7-1/2 (190.5)		4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)	2-7/16 (61.9) 1-15/16 (49.2) 2-13/16 (71.4)	9-5/8 (244.5) 7-1/16 (195.3) 11-1/4 (285.8)	4-13/16 (122.2) 3-7/8 (98.4) 5-5/8 (142.9)
3/4 (19.1)	3-1/4 (82.6) 6-5/8 (168.3) 10 (254.0)		5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)	2-7/8 (73.0) 2-1/2 (63.5) 3-3/4 (95.3)	11-3/8 (288.9) 9-15/16 (252.4) 15 (381.0)	5-11/16 (144.5) 5 (127.0) 7-1/2 (190.5)
7/8 (22.2)	3-3/4 (95.3) 6-1/4 (158.8) 8 (203.2)		6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)	3-5/16 (84.1) 3-1/8 (79.4) 3 (76.2)	13-1/8 (333.4) 12-1/2 (317.5) 12 (304.8)	6-9/16 (166.7) 6-1/4 (158.8) 6 (152.4)
1 (25.4)	4-1/2 (114.3) 7-3/8 (187.3) 9-1/2 (241.3)		7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)	3-15/16 (100.0) 3-11/16 (93.7) 3-9/16 (90.5)	15-3/4 (400.1) 14-3/4 (374.7) 14-1/4 (362.0)	7-7/8 (200.0) 7-3/8 (187.3) 7-1/8 (181.0)

* Spacing and edge distances shall be divided by 0.75 when anchors are placed in structural lightweight concrete. Linear interpolation may be used for intermediate spacing and edge distances.

Combined Tension and Shear Loading—for Trubolt Anchors

Allowable loads for anchors subjected to combined shear and tension forces are determined by the following equation:

$$(Ps/Pt)^{5/3} + (Vs/Vt)^{5/3} \leq 1$$

Ps = Applied tension load Vs = Applied shear load Pt = Allowable tension load Vt = Allowable shear load

WELDBEND®

Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries, and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged flanges simplify insulation and take up less space.

ASTM A 105

Scope

This standard covers forged carbon steel piping components for ambient- and higher-temperature service in pressure systems. Flanges are ordered either to dimensions specified by the purchaser or to dimensional specifications such as ASME 16.5 and API 6A. Forgings made to ASTM A 105 are normally limited to a maximum weight of 10,000 lb.

Materials

Weldbend flanges are made by hammering, pressing, rolling and/or machining cast or forged bars, billets or slabs. These adhere to the extent described in the following sections.

Manufacture

ASTM A 105 covers the requirements for forged steel components as finished products only.
The requirements for raw materials are covered by the standards specified in Section 2: Referenced Documents of ASTM A 105.

Heat Treatment

Heat treatment is not a mandatory requirement of this specification except for the following piping components:
* Flanges above Class 300,
* Flanges of special design where the design pressure at the design temperature exceeds the pressure-temperature ratings of Class 300, Group 1.1,
* Flanges of special design where the design pressure or design temperature is not known.

Heat treatment, when required by the above, shall be annealing, normalizing, normalizing and tempering, or quenching and tempering in accordance with ASTM A 961.

Flange Summary Data Sheet

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.35 max	.60-1.05	.035	.040

Silicon	Copper	Nickel	Chromium
.10-.35	.40 max	.40 max	.30 max

Molybdenum	Vanadium	Columbium
.12 max	.08 max	.02 max

Mechanical requirements:

Tensile Strength (min)	70,000 psi
Yield Strength (min)	36,000 psi
Basic minimum elongation for walls 5/16 in. and over in thickness, strip tests.	30%
Reduction of area (min)	30%
Hardness, HB (max)	187

Dimensions

Weldbend flanges are manufactured in accordance with ASME B 16.5 (24" NPS and smaller) and ASME B 16.47 (26" - 60" NPS).

Certification

For forgings made to specified dimensions agreed upon by the purchaser, and for forgings made to dimensional standards, the application of identification marks, as required by ASTM A 961, shall be the certification that the forgings have been furnished in accordance with the requirements of this standard. The specification designation included on test reports shall include the year of issue and revision letter, if any.
Test Reports: When test reports are required, Weldbend will also provide the following, if applicable:
*Type of heat treatment,
*Tensile property results, i.e., yield strength and ultimate strength in ksi, elongation and reduction in area, in percent,
*Chemical analysis results,
*Hardness results, and,
*Any supplementary testing required by the purchase order.

Product Marking

All flanges shall have the prescribed information stamped or otherwise suitable marked on each flange in accordance with the Standard/MSS SP-25. A Weldbend flange is marked as follows:
Weldbend's Name, Nominal Pipe Size, A105/SA105, Bore Designation, Heat Identification Number and manufacture date.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.

2.8 - A & B UNIONS

WARD MANUFACTURING
P.O. Box 9
117 Gulick Street
Blossburg, PA 16912-0009
(570) 638-2131

January 11, 2013

To whom it may concern:

I hereby certify that our products listed below comply with the current specification. The products listed below are made with pride in Blossburg, Pennsylvania, USA.

CL 150 Malleable Iron Threaded Fittings

Fed. Spec. WW - P - 521		
ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

CL 300 Malleable Iron Threaded Fittings

ASME	B16.3	(Dimensions)
ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

3 >>>>>>>> **Unions, Union Fittings, Flange Unions & Companion Flanges**

CL 150 Malleable Iron to Brass Seat, Iron to Iron Unions		
Fed. Spec. WW - U - 531		ASME B16.39
CL 250 Malleable Iron to Brass Seat,Unions		
Fed. Spec. WW - U - 531		ASME B16.39
CL 300 Malleable Iron to Brass Seat, Iron to Iron Unions		
MIL - U - 18250		ASME B16.39
CL 125 - CL 250 Cast Iron Flanges		ASME B16.1
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Bushings and Plugs

Fed. Spec. WW - P - 471		
ASME	B16.14	(Dimensions)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads) Supersedes B-2-1
ASTM	A-197 or A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)

CL 125 Cast Iron Threaded Fittings

Fed. Spec. WW - P - 501		
ASME	B16.4	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Top Beam & C-Clamps

ASTM	A-197	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
UL	203	(Test Parameters)

Drainage Fittings

ASME	B16.12	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Cast Iron Flanges

ASME	B16.1	(Dimensions)
ASTM	A-126	(Chemical & Physical Properties)
ASTM	A-153	(For Galvanized Product)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

WARDLOX Plain-End Fittings

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

TEE-LOX Mechanical Branch Connectors

ASTM	A-126	(Chemical & Physical Properties, Housing)
ASTM	D2000	(Gaskets, Temperature Range)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Full Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Half Standard Merchant Couplings

ASTM	A-865	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ANSI/ASME	B1.20.1	(Tapered Pipe Threads)

Welded Steel Pipe Nipples

ASTM	A-733	(Dimensions)
ASTM	A-53	(Chemical & Physical Properties)
ASNI/ASME	B1.20.1	(Pipe Threads)

Sincerely,

Jim Belawski
Manager of Quality Assurance

For Residential and Commercial Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

LEAD FREE*

Series LF3001A

Dielectric Unions

Sizes ½" – 2" (15 – 50mm)

Series LF3001A dielectric unions feature a female iron pipe thread to solder connection. These unions are designed to be installed between pipe made from dissimilar metals to prevent accelerated corrosion and deterioration in the piping system due to galvanic and stray current. The LF3001A features Lead Free* construction to comply with Lead Free* installation requirements.

LF3001A

Features

- Female iron pipe thread to solder connection
- Designed and manufactured to the highest quality standards
- Factory certified to withstand a minimum of 600 volts on a dry line with no flashover
- Rated to 180°F (82°C) at 250psi (17.2 bar) with standard gasket A and 300ºF (149ºC) at 50psi (3.4 bar) with optional gasket B

Specifications

A dielectric union shall be installed where indicated on the plans. The union shall feature a female iron pipe thread to solder connection. The dielectric union shall be constructed using Lead Free* materials. Lead Free* dielectric unions shall comply with state codes and standards, where applicable, requiring reduced lead content. The dielectric union shall be a Watts Series LF3001A that complies with Buy America Act (BAA 1933) and The American Recovery and Reinvestment Act (ARRA 2009).

Standards

Certified to NSF/ANSI 372

Tested and Certified by NSF International

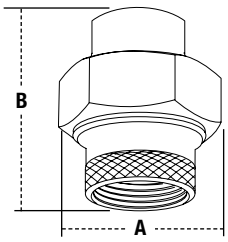
Complies with Buy America Act (BAA 1933) and The American Recovery and Reinvestment Act (ARRA 2009).

Pressure — Temperature

Maximum Pressure: 250psi (17.2 bar) with standard gasket A; 50psi (3.4 bar) with optional gasket B

Maximum Temperature: 180°F (82°C) with standard gasket A; 300ºF (149ºC) with optional gasket B

Materials — Dimensions — Weights



SIZE		MATERIALS					DIMENSIONS				WEIGHT	
		TAIL PIECE	ADAPTER †	NUT †	INSULATOR	GASKET**	A		B			
in.	*mm*						*in.*	*mm*	*in.*	*mm*	*oz.*	*gm.*
½	15	Lead Free Brass	Steel	Steel	Polysulfone	Buna-N	1½	32	1⅞	48	6	170
¾	20	Lead Free Brass	Steel	Steel	Polysulfone	Buna-N	1⅝	41	2⅛	54	6.7	190
1	25	Lead Free Brass	Steel	Steel	Polysulfone	Buna-N	2⅞	48	2½	64	9.3	264
1¼	32	Lead Free Brass	Steel	Steel	Polysulfone	Buna-N	2¼	57	3	76	14.1	400
1½	40	Lead Free Brass	Steel	Malleable Iron	Polysulfone	Buna-N	2¾	70	3	76	21.8	618
2	50	Lead Free Brass	Steel	Malleable Iron	Polysulfone	Buna-N	3½	89	3	76	42.6	1208

† Steel and malleable iron components are zinc plated

** Optional Gasket B (GB)- EPDM Gasket for use in steam or hot water applications up to 300 F (149 C) at 50 psi (3.4 bar)..

***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

USA: T: (978) 689-6066 • F: (978) 975-8350 • Watts.com

Canada: T: (905) 332-4090 • F: (905) 332-7068 • Watts.ca

Latin America: T: (52) 81-1001-8600 • Watts.com

Watts

Series 3000

Dielectric Pipe Fittings, Unions, Bolt Insulators

Description

Series 3000 Dielectric Pipe Fittings and Unions are durable, corrosion resistant fittings and unions that consist of a union nut and two tailpieces. A gasket separates the two tailpieces preventing an electric current from passing. For flanged fittings (Models 3100, 3110, and 3200), a bolt insulator is required to insulate each bolt in the flange. Watts also offers bolt insulators in a range of sizes.

Dielectric fittings/unions are designed to install between pipes made from dissimilar metals. They prevent accelerated corrosion and deterioration in the piping system due to galvanic and stray current.

Features

- Designed and manufactured to the highest quality standards.
- Unions individually factory certified to withstand a minimum of 600 volts on a dry line with no flashover.
- Unions rated to 180°F (82°C) at 250psi (17.2 bar).
- Flanged fittings rated at 175psi (12.1 bar).
- Standard Gasket A (GA) suitable for water, air, oil, natural gas, propane, gasoline, kerosene, mineral oil, vegetable oil, and alkalines in 180°F (82°C) at 250psi.

Applications

Dielectric fittings/unions are for use in residential, commercial, and industrial applications. Specific applications include the connections of piping of dissimilar metals on hot water storage tanks, water and air conditioners, processing tanks, steam, gas, and water piping. These fittings/unions prevent the flow of galvanic current (an electric current) and stray current (DC current) passing from one dissimilar metal to another. Galvanic current accelerates corrosion in the piping system leading to premature deterioration of the system. Stray current produces extraordinary anodes and cathodes that can inadvertently enter an alternate (but unintended) path and create corrosion in the piping system. Using dielectric fittings/unions prevents this type of corrosion from occurring.

Note: For applications of gaskets other than specified above, contact your local authorized Watts representative.

Materials

Dielectric fittings/unions consist of one or more of the following materials used in accordance with American Society for Testing and Materials (ASTM):

Gray iron	ASTM A48
Malleable iron parts	ASTM A-197
Steel parts	ASTM A108
Brass parts	ASTM B-16
Bronze parts	ASTM B-584
Zinc Coatings	ASTM B633
Bolt insulators (required)	Polysulfone
Standard Gasket A	Buna-N
Optional GB Gasket	EPDM

WATTS®

Standards

- All models meet federal specifications for tensile strength and thread end connections
- Thread end connections in accordance with ANSI B2.1
- Solder joints meet national plumbing standards
- Unions are rated at 250psi and conform to ANSI B16.39, including hydrostatic strength, air pressure testing
- Flange fittings are rated at 175psi and conform to ANSI B16.42 (iron) and ANSI B16.24 (bronze)

Models

Unions

- **3001A** – Sizes 1/2"- 2" (15-50mm) Female iron pipe thread to solder connection
- **3002** – Sizes 1/2" x 3/8," 3/4" x 1/2," 1" x 3/4 (15x10mm, 20x15mm, 25x20mm) Female iron pipe thread to reduced solder connection
- **3003** – Sizes 1/2"- 2" (15-50mm) Female iron pipe thread to female brass pipe
- **3004** – Sizes 1/2"- 2" (15-50mm) Female iron pipe thread to female iron pipe thread (galvanized)
- **3005A** – Sizes 1/2"- 3/4" (15-20mm) Male iron pipe thread to solder connection
- **3006** – Sizes 1/2"- 2" (15-50mm) Female iron pipe thread to female iron pipe thread (black)
- **3007** – Sizes 1/2" x 3/8"- 3/4"x 1/2" (15x10mm - 20x15 mm) Male iron pipe thread to female solder connection
- **3008** – Sizes 1/2" x 1" (15-25mm) Female brass pipe thread to female solder connection

Flanged Fittings

- **3100** – Sizes 2"- 4" (15-100mm) Iron pipe thread to copper solder joint
- **3110** – Sizes 2 1/2"- 4" (65-100mm) Solder copper fitting, bronze (125 class flange)
- **3110LF** – Sizes 2 1/2"- 4" (65-100mm) solder copper fitting only. Less fittings and gasket.
- **3200** – Sizes 2"- 4" (50-100mm) Iron pipe thread to iron pipe thread

Bolt insulators

- **Watts Insulator Kit** – One insulator required for each bolt in a flange. One kit contains 100 insulators

Gasket Options

GA – Standard Buna gasket for use in hot water applications up to 180°F (82°C) at 250psi (17.2 bar)

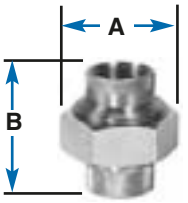
GB – Optional EPDM gasket for use in steam or hot water applications up to 300°F (149°C) at 50psi (3.4 bar)

Dielectric Bolt Insulators

Bolt Insulators

Description	Nominal Pipe Size (inches)	(mm)	No. of Bolt Holes Per Flange	Diameter of Bolts (inches)	(mm)	Qty. per Kit
Insulator kit	1 1/2	40	4	1/2	15	100
Insulator kit	2	50	4	5/8	16	100
Insulator kit	2 1/2	65	4	5/8	16	100
Insulator kit	3	80	4	5/8	16	100
Insulator kit	3 1/2	90	8	5/8	16	100
Insulator kit	4	100	8	5/8	16	100
Insulator kit	5	125	8	3/4	20	100
Insulator kit	6	150	8	3/4	20	100
Insulator kit	8	200	8	3/4	20	100
Insulator kit	10	250	12	7/8	22	100
Insulator kit	12	300	12	7/8	22	100

Dimensions/Weights




3001


3002


3003


3004


3005


3006

Model	Size (DN)		DIMENSIONS (approx.)				WEIGHT	
			A		B			
	in.	mm	in.	mm	in.	mm	lbs.	kgs.
3001A	1/2	15	1 1/2	32	1 7/8	48	0.4	0.2
3001A	3/4	20	1 5/8	41	2 1/8	54	0.4	0.2
3001A	1	25	1 7/8	48	2 1/2	64	0.6	0.3
3001A	1 1/4	32	2 1/4	57	3	76	0.8	0.4
3001A	1 1/2	40	2 3/4	70	3	76	0.8	0.4
3001A	2	50	3 1/2	89	3	76	2.2	1.0
3002	1/2 x 3/8	15x10	1 1/2	38	1 7/8	48	0.4	0.2
3002	3/4 x 1/2	20x15	1 5/8	41	1 7/8	48	0.4	0.2
3002	1x 3/4	25x20	1 7/8	48	2 1/2	64	0.7	0.3
3003	1/2	15	1 5/8	41	2 1/4	57	0.4	0.2
3003	3/4	20	1 7/8	48	2 1/4	57	0.9	0.4
3003	1	25	2 1/4	57	2 1/2	64	1.3	0.6
3003	1 1/4	32	2 3/4	70	2 3/4	70	1.7	0.8
3003	1 1/2	40	3 1/2	89	2 3/4	70	3.0	1.4
3003	2	50	4 1/8	105	3 1/8	79	4.3	2.0
3004	1/2	15	1 5/8	41	2 1/4	57	0.4	0.2
3004	3/4	20	1 7/8	48	2 1/4	57	0.9	0.4
3004	1	25	2 1/4	57	2 1/2	64	1.3	0.6
3004	1 1/4	32	2 3/4	70	2 3/4	70	1.7	0.8
3004	1 1/2	40	3 1/2	89	2 3/4	70	2.8	1.3
3004	2	50	4 1/8	105	3 1/8	79	4.0	1.8
3005A	1/2	15	1 1/2	38	2 5/8	67	0.5	0.2
3005A	3/4	20	1 5/8	41	3	76	0.8	0.4
3006	1/2	15	1 5/8	41	2 1/4	57	0.4	0.2
3006	3/4	20	1 7/8	48	2 1/4	57	0.9	0.4
3006	1	25	2 1/4	58	2 1/2	64	1.3	0.6
3006	1 1/4	32	2 3/4	70	2 3/4	70	1.7	0.8
3006	1 1/2	40	3 1/2	89	2 3/4	70	2.8	1.3
3006	2	50	4 1/8	105	3 1/8	79	4.0	1.8
3007	1/2 x 3/8	15x10	1 1/2	38	2 5/8	67	0.4	0.2
3007	3/4 x 1/2	20x15	1 5/8	41	3	76	0.4	0.2
3008	1/2	15	1 1/2	38	1 7/8	48	0.4	0.2
3008	3/4	20	1 5/8	41	2 1/8	54	0.7	0.3
3008	1	25	1 7/8	48	2 1/2	64	0.9	0.4

Flanged fittings

3100/3200

3100	2	50	5 1/8	130	3 1/4	83	8.0	3.6
3100	2 1/2	65	5 7/8	149	3 1/2	89	12.0	5.4
3100	3	80	6 3/4	171	3 3/4	95	14.0	6.4
3100	4	100	9 1/8	232	4 3/8	111	30.0	13.6
3110	2 1/2	65	5 7/8	149	3 1/2	89	12.0	5.4
3110	3	80	6 3/4	171	3 3/4	95	15.0	6.8
3110	4	100	9 1/8	232	4 3/8	111	18.0	8.2
3110LF	2 1/2	65	5 7/8	149	3 1/2	89	6.0	2.7
3110LF	3	80	6 3/4	171	3 1/2	89	7.5	3.4
3110LF	4	100	9 1/8	232	4 3/8	111	9.0	4.1
3200	2	50	5 1/8	130	2 1/8	54	8.0	3.6
3200	2 1/2	65	5 7/8	149	2 3/4	70	12.0	5.4
3200	3	80	6 3/4	171	2 3/4	70	15.0	6.8
3200	4	100	9 1/8	232	3	76	31.0	14.1

3110

Note: Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

For Technical Assistance Call Your Authorized Watts Agent.

			Telephone #	Fax #
	HEADQUARTERS: Watts Regulator Company	815 Chestnut St., North Andover, MA 01845-6098 U.S.A.	978 688-1811	978 794-1848
North East	Edwards, Platt & Deely, Inc.	271 Royal Ave., Hawthorne, NJ 07506	973 427-2898	973 427-4246
	Edwards, Platt & Deely, Inc.	368 Wyandanch Ave., North Babylon, NY 11703	631 253-0600	631 253-0303
	W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
	WMS Sales, Inc. (Main office)	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
Mid Atlantic	J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	724 745-5300	724 745-7420
	RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
	The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
	Vernon Bitzer Associates, Inc.	980 Thomas Drive, Warminster, PA 18974	215 443-7500	215 443-7573
South East	Billingsley & Associates, Inc.	2728 Crestview Ave., Kenner, LA 70062-4829	504 602-8100	504 602-8106
	Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
	Francisco J. Ortiz & Co., Inc.	Charlyn Industrial Pk., Road 190 KM1.9 - Lot #8, Carolina, Puerto Rico 00983	787 769-0085	787 750-5120
	Mid-America Marketing, Inc.	203 Industrial Drive, Birmingham, AL 35211	205 879-3469	205 870-5027
	Mid-America Marketing, Inc.	1364 Foster Avenue, Nashville, TN 37210	615 259-9944	615 259-5111
	Mid-America Marketing, Inc.	5466 Old Hwy. 78, Memphis, TN 38118	901 795-0045	901 795-0394
	Smith & Stevenson Co., Inc.	4935 Chastain Ave., Charlotte, NC 28217	704 525-3388	704 525-6749
	Harry Warren, Inc.	1400 North Orange Blossom Trail, Orlando, FL 32804	407 841-9237	407 841-9246
	Watts Georgia	2861-B Bankers Industrial Drive, Atlanta, GA 30360	770 209-3310	770 447-4583
North Central	Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
	Disney McLane & Associates	428 McGregor Ave., Cincinnati, OH 45206	800 542-1682	877 476-1682
	BWA Company	17610 S. Waterloo Rd., Cleveland, OH 44119	216 486-1010	216 486-2860
	Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	630 953-1211	630 953-1067
	Soderholm & Associates, Inc.	7150 143rd Ave. N.W., Anoka, MN 55303	763 427-9635	763 427-5665
	Stickler & Associates	333 North 121 St., Milwaukee, WI 53226	414 771-0400	414 771-3607
South Central	Hugh M. Cunningham, Inc.	13755 Benchmark, Dallas, TX 75234	972 888-3808	972 888-3838
	HMC Sandia Group	13755 Benchmark, Dallas, TX 75234	505 222-3134	800 339-0191
	Mack McClain & Associates	4407 Meramec Bottom, Suite G, St. Louis, MO 63129	314 894-8188	314 894-8388
	Mack McClain & Associates, Inc.	1450 NE 69th Place, Ste. 56 Ankeny, IA 50021	515 288-0184	515 288-5049
	Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
	OK! Sales, Inc.	214-A NE 12th., Moore, OK 73160	405 794-5200	405 794-5250
Western	Delco Sales, Inc.	1930 Raymer Ave., Fullerton, CA 92833	714 888-2444	714 888-2448
	Delco Sales, Inc.	111 Sand Island Access Rd., Unit I-10, Honolulu, HI 96819	808 842-7900	808 842-9625
	Fanning & Associates, Inc.	6765 Franklin St., Denver, CO 80229-7111	303 289-4191	303 286-9069
	Hollabaugh Brothers & Associates	6915 South 194th St., Kent, WA 98032	253 867-5040	253 867-5055
	Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
	P I R Sales, Inc.	3050 North San Marcos Place, Chandler, AZ 85225	480 892-6000	480 892-6096
	Preferred Sales	31177 Wiegman Road, Hayward, CA 94544	510 487-9755	510 476-1595
	R. E. Fitzpatrick Sales, Inc.	4109 West Nike Dr. (8250 South), West Jordan, UT 84088	801 282-0700	801 282-0600
Canada	Watts Industries (Canada) Inc. (Watts Regulator Co. Division)	5435 North Service Road, Burlington, Ontario L7L 5H7	905 332-4090	905 332-7068
	Con-Cur West Marketing, Inc.	71B Clipper Street, Coquitlam, British Columbia V3K 6X2	604 540-5088	604 540-5084
	D.C. Sales Ltd.	#10-6130 4th St. S.E., Calgary, Alberta T2H 2B6	403 253-6808	403 259-8331
	D.C. Sales Ltd.	16726 111 Ave, Edmonton, Alberta T5M 2S6	780 496-9495	780 496-9621
	GTA Sales Team.	Greater Toronto Area	888 208-8927	888 479-2887
	Hydro-Mechanical Sales, Ltd.	3700 Joseph Howe Drive, Suite 1, Halifax, Nova Scotia B3L 4H7	902 443-2274	902 443-2275
	Hydro-Mechanical Sales, Ltd.	P.O. Box 1445 (Mailing), 297 Collishaw St., Suite 7 (shipping) Moncton, New Brunswick E1C 9R2	506 859-1107	506 859-2424
	J.D.S. Sales Ltd.	4 Lancaster Street, St. John's, Newfoundland A1A 5P7	709 579-5771	709 579-1558
	Les Ent. Roland Lajoie	6221 Marivaux, St-Leonard, QC H1P 3H6	514 328-6645	514 328-6131
	Les Ent. Roland Lajoie	23 du Buisson, Pont Rouge, QC G3H 1X9	418 873-2500	418 873-2505
	Mar-Win Agencies, Ltd.	1333 Clifton St., Winnipeg, Manitoba R3E 2V1	204 775-8194	204 786-8016
	Northern Mechanical Sales	P.O. Box 280 (mailing) 163 Pine St. (shipping), Garson, Ontario P3L 1S6	705 693-2715	705 693-4394
	Palser Enterprises, Ltd.	P.O. Box 28136 (mailing), 1885 Blue Heron Dr., #4, London, Ontario N6H 5L9	519 471-9382	519 471-1049
	RAM Mechanical Marketing Inc.	1401 St. John Street, Regina, Saskatchewan S4R 1S5	306 525-1986	306 525-0809
	RAM Mechanical Marketing Inc.	510 Ave M South, Saskatoon, Saskatchewan S7M 2K9	306 244-6622	306 244-0807
	Walmar Mechanical Sales	24 Gurdwara Rd., Nepean, Ontario K2E 8B5	613 225-9774	613 225-0673
0804	**EXPORT Hdqtrs.:** Watts Regulator Co.	815 Chestnut St., North Andover, MA 01845-6098 U.S.A.	978 688-1811	978 794-1848

WATTS®

Water Safety & Flow Control Products

ISO 9001-2000 CERTIFIED

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.watts.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscanada.ca

F-3000 0811

"Apollo" Valves

SUBMITTAL SHEET

80-100 Series

UL Listed Shut-Off **Bronze Ball Valve**

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

DESCRIPTION

The Apollo® 80 Series Bronze Ball Valve is UL Listed and designed as a safe shut off valve for LP gas, natural gas, flammable liquids and heated oil.

FEATURES

- Adjustable Packing Gland
- Blow-Out Proof Stem Design
- RPTFE Seats and Seals
- Chromium Plated Ball

PERFORMANCE RATING

- Maximum Pressure: 600 psi CWP, 250 psi LP Gas, 150 psi SWP
- Vacuum Service to 29 in. Hg

OPTIONS & SIZES

- (-07) Tee Handle, Steel (1/4" to 3")
- (-27) SS Latch-Lock Lever & Nut (1/4" to 3")

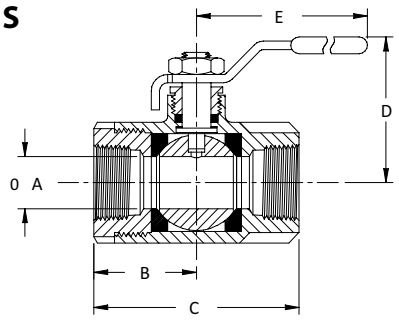
APPROVALS

- MSS SP-110; Ball Valves
- Federal Specification: WW-V-35C, Type: II, Composition: BZ, Style: 3
- CRN: OC10908.5C
- Guide YSDT: LP-Gas Shut-Off Valve
- Guide YRPV: Gas Shut-Off Valve for use with natural and manufactured gases
- Guide YRBX: Flammable liquid shutoff valve
- Guide MHKZ: No. 6 oil at 250°F

STANDARD MATERIALS LIST

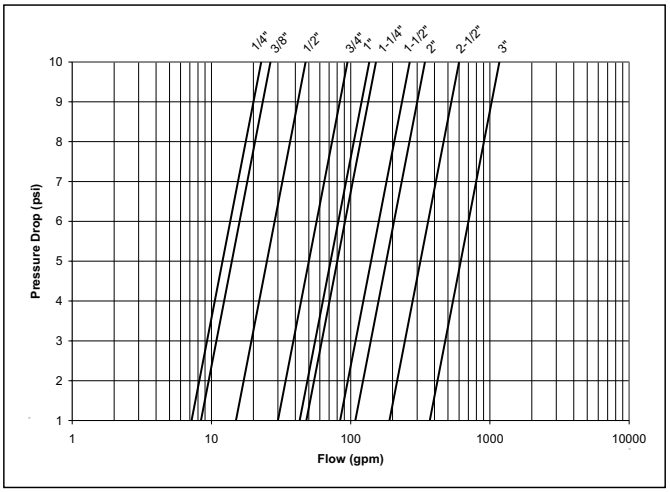
Part Name	Material
Lever and Grip	Steel, Zinc Plated w/ Vinyl
Stem Packing	RPTFE
Stem Bearing	RPTFE
Ball	B16, Chrome Plated or B283, C37700 Chrome Plated
Seat (2)	RPTFE
Retainer	B16 (1/4" to 1"), B584-C84400 (1-1/4" to 3") or B283, C37700
Gland Nut	B16
Stem	B16
Lever Nut	Steel, Zinc Plated
Body Seal (1-1/4" to 3")	PTFE
Body	B584-C84400

DIMENSIONS



Model Number	Size (in.)	Dimensions (in.)					Wt. (lbs.)
		A	B	C	D	E	
80-101	1/4"	0.37	1.03	2.06	1.75	3.87	0.60
80-102	3/8"	0.37	1.03	2.06	1.75	3.87	0.56
80-103	1/2"	0.50	1.12	2.25	1.81	3.87	0.63
80-104	3/4"	0.68	1.50	3.00	2.12	4.87	1.39
80-105	1"	0.87	1.68	3.37	2.25	4.87	1.72
80-106	1-1/4"	1.00	2.00	4.00	2.62	5.50	3.26
80-107	1-1/2"	1.25	2.18	4.37	2.87	5.50	4.57
80-108	2"	1.50	2.34	4.68	3.06	5.50	5.56
80-109	2-1/2"	2.50	3.25	6.50	4.12	8.00	17.25
80-100	3"	2.50	3.37	6.75	4.12	8.00	18.60

FLOW CHARACTERISTICS



Apollo Valves, Manufactured by **Conbraco Industries, Inc.**
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