8. Galvanized Steel Pipe

Approved Manufacturer(s):
N/A

General: Galvanized steel pipe shall only be used in temporary blow off valve assemblies.

Size(s): 2 inch

Pressure Class: The minimum Working Pressure rating of the pipe shall be 300 psi.

Materials: Galvanized steel pipe shall be seamless or Electric Resistance Welded Schedule 40 or 80 NPT. The pipe shall conform to *ASTM A53* Grade B and shall be *NSF 61* rated. Fittings shall be NSF 61 NPT and pressure rated to 300 psi.

C. Casing Pipe, Spacers and End Seals

1. Casing Pipe

Approved Manufacturer(s):
N/A

General: Casing pipe shall be steel with the following Specifications:

Casing Pipe Size (inch)	Minimum Steel Thickness (inch)
12	0.188
14	0.25
18	0.3125
24	0.375
30	0.469
38	0.562
54	0.781

Steel pipes shall have minimum yield strength of 35,000 pounds per square inch.
Cathodic Protection: Polyethylene tubing and 1-17 lb anode. Not required for boring applications.

2. Metallic Casing Spacers (Insulators)

Approved Manufacturer(s):

- **PSI Pipeline Seal and Insulator, Inc.**
- **Advance Products and Systems, Inc.**
- **PowerSeal Pipeline Products Corporation**
- **CCI Pipeline Systems**
- **BWM Company**
- **Cascade Waterworks Mfg. Co.**

General: Casing spacers center Water Mains in casings for ease of installation, are virtually corrosion proof and provide insulating protection from a possible electrical shorting between the carrier pipe and casing. Eliminating the need for annular fill allows for easy removal to repair or replace damaged pipes.

COATED STEEL CASING INSULATOR SPECIFICATIONS

Specifications:
Band – 8" or 12" Wide, 14 ga, Hot Rolled and Pickled, Two-piece 6" – 36"
Risers – 10 ga min, Hot Rolled and Pickled, Mig Welded to Band
Runners – 2" Wide Glass Reinforced Plastic or Nylon
Studs, Nuts and Washers – Electro Plated, 5/16" – 18 X 1-1/2" min Studs SAE 2330
Liner – Polyvinyl Chloride, .090" min, Hardness-Durometer "A" 85-90, Dielectric Strength 1/8" Thick Surge Test -- 60,000V min
Coating –Fusion Bonded Epoxy
Design – Center Restrained, Top Clearance 1" max

STAINLESS STEEL CASING INSULATOR SPECIFICATIONS

Specifications:
Band – 8" or 12" Wide, 14 ga, 304 Stainless Steel, Two-piece 6" – 36"
Risers – 10 ga min., 304 stainless Steel, Mig Welded to Band
Runners – 2" Wide Glass Reinforced Plastic or Nylon
Studs, Nuts and Washers –304 Stainless Steel - 5/16" – 18 X 1-1/2" min Studs
5/16" Hex Nuts
5/16" Washers, SAE 2330
Liner – Polyvinyl Chloride, .090" min, Hardness-Durometer "A" 85-90, Dielectric 1/8" Thick Strength Surge Test-60,000V min
Design – Center Restrained, Top Clearance 1" min

3. Non-Metallic Casing Spacers (Insulators)

Approved Manufacturer(s):

- **Pipeline Seal and Insulator, Inc**.
  PSI Ranger II Casing Spacers

General: Non-metallic casing spacers shall be all non-metallic (polypropylene), molded in segments for field assembly without any special tools.

Specifications:
The casing spacer polymer shall contain ultraviolet inhibitors and shall have a minimum compressive strength of 3,000 psi, an 800 volts/mil dielectric strength and impact strength of 1.5 ft-lbs. /inch. Each casing spacer shall have full length, integrally molded skids extending beyond the bell of mechanical joint of the carrier pipe.

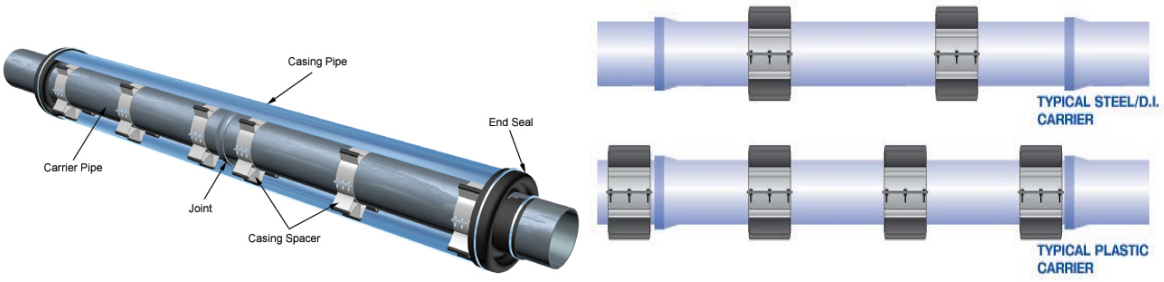
Spacers shall be at least as wide as listed below:

Carrier Pipe Diameter Inches	Ranger II Model	Length Inches
4.49 to 16.65”	Midi	5.12”
16.77 to 37.60”	Maxi	8.66”

Installation:

Spacer segments shall be secured around carrier pipe by insertion of a Slide-Lock.

Spacing recommendation: See Detail Drawing A7-3 and A7-4.



4. End Seals

Approved Manufacturer(s):

- **Pipeline Seal and Insulator, Inc.** - PSI Model "C" end seal, 1/8" thick seamless synthetic rubber end seals pull-on.
- **Advance Products and Systems, Inc**.
- **Cascade Waterworks Mfg. Co.**
- **CCI Pipeline Systems**
- End seal, 1/8" thick seamless synthetic rubber end seals pull-on.

General: After insertion of the carrier pipe into the casing, the ends of the casing shall be closed by installing a thick synthetic rubber end seals.

Size(s): designed for carrier-casing combination

Material: 1/8" thick seamless synthetic rubber

Specifications:
End seal shall be watertight and manufactured from a minimum 1/8" thick neoprene rubber. End seal shall be secured with ½" wide 304 stainless steel bands with worm screws.

Style. Pull-on with stainless steel bands and clamps

Installation:

- Prepare outside surfaces by removing dirt from casing and carrier pipe.
- After carrier pipe is inserted into casing, slide small end of end seal over the carrier pipe with stainless steel banding clamp. Large end should face casing.
- Position large end of end seal over the casing pipe.
- Position banding clamp approximately 1" from the end of the casing pipe and then tighten onto the end seal.
- Fold end seal in an S shape so it will extend into the casing.
- Position banding clamp approximately 1" from the end of the end seal on the carrier pipe and then tighten. (Make sure the end seal is folded into the casing, to relieve stress during backfilling and allow for expansion and contraction movement.)

D. Fittings

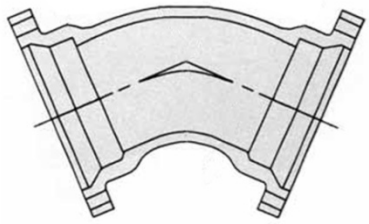
1. Ductile and Gray Iron Waterworks Fittings

Approved Manufacturer(s):

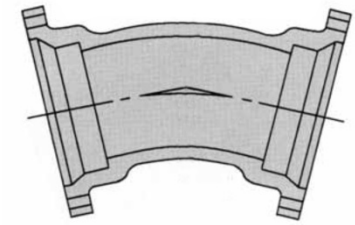
- **Tyler Union**
- **Star**
- **Sigma**
- **SIP**

Bends
MJ and MJ or Flanged

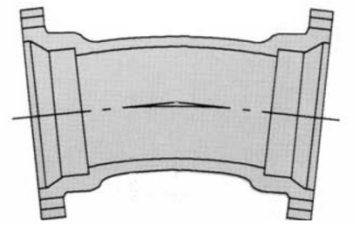
45°



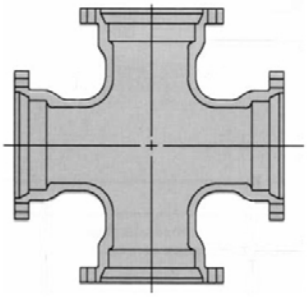
22.5°



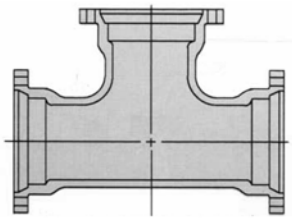
11.25°



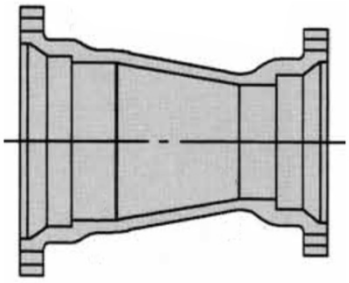
Crosses
MJ and MJ or Flanged



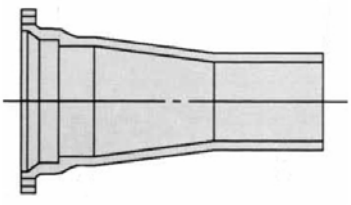
Tees
MJ and MJ or Flanged



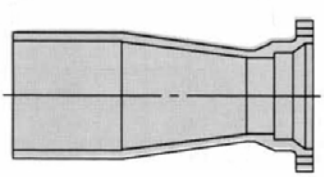
Reducers
MJ and MJ or Flanged



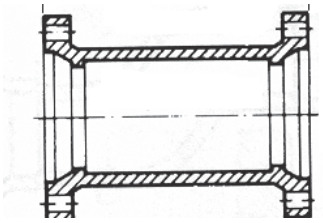
Large End Bell
MJ or Flanged by
plain end Flanged



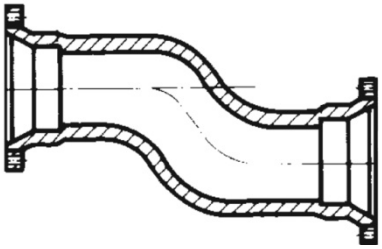
Small End Bell
MJ or Flanged by
plain end



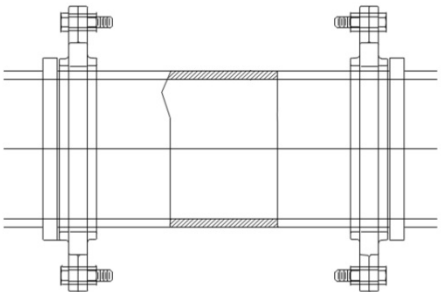
Solid Sleeves MJ x MJ



Offset



Adaptor or Anchor Pipe



General: Ductile and gray iron fittings are used to make connections, change angles, make reductions and secure pipes in piping systems.

Size(s): This Specification shall cover ductile iron fittings in 4, 6, 8, 12, 16, 20, 24, 30, 36, 42 and 48-inch nominal diameters.

Pressure Class: All fittings 3" through 24"shall be rated to 350 psi Working Pressure and 30" through 48" shall be rated for 250 psi Working Pressure, and shall conform to the dimensions and weights shown in the tables of referenced in *AWWA* and *ANSI* Standards .

Material: All fittings shall be made from ductile or gray iron, which meet Grade 70-50-05, in accordance with *AWWA C110* or *C153*. The manufacturer of fittings produced from grade 60-42-10 material must be able to provide records to demonstrate that the fittings conform to *AWWA C110* or *C153*.

Specifications:
The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings. Colorado Springs Utilities shall approve qualified manufacturers.
All ductile and gray iron fittings shall be manufactured in accordance with the following *AWWA Standards*: *C104, C110, C153, C111*.
Cement Mortar Lining. All sizes of ductile and gray iron fittings shall be furnished with a cement-mortar lining of standard thickness as defined in *AWWA C104*.

Type of Joint. All fittings shall be furnished with mechanical joint, flanged, and/or plain ends conforming to referenced Specifications.

External Coating. The manufacturer may supply either an asphaltic coating or a fusion bonded epoxy coating on the outside of the fitting per *AWWA C110*. Fusion bonded epoxy coating where used shall be in accordance with *ANSI/AWWA C116/A21.16*.

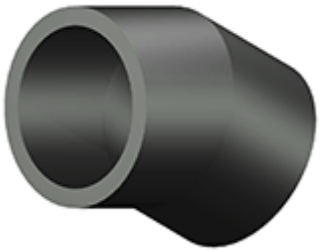
2. High Density Polyethylene (HDPE) Pipe Fittings:

Approved Manufacturer(s):

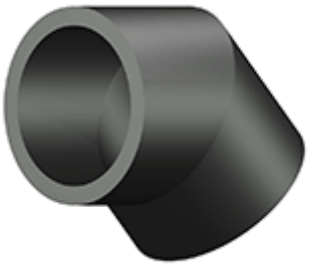
- **IPF**- Industrial Pipe Fittings, LLC
- **+GF+ Georg Fischer Central Plastics**, **LLC Company**, acquired IPPI- Independent Pipe Products, Inc. and Central Plastics
- **Secor**, Inc.
- **ISCO** Industries, Inc

HDPE Elbows

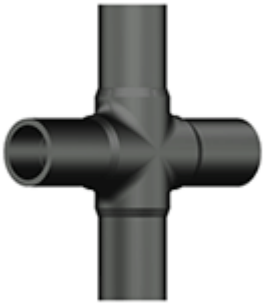
22-1/2°

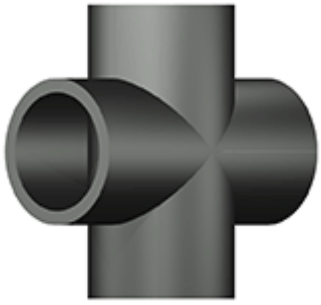


45 °



HDPE Crosses

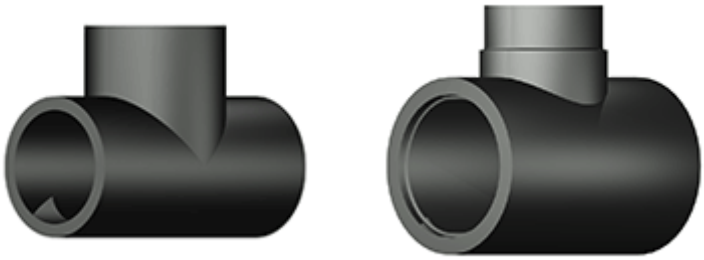




Crosses are rarely used and must come with attached fitting ends to fit into a valve or reducer. Care must be taken when placing a cross in the trench to avoid stress fractures in the center of the cross.

HDPE Tees

Standard Tee **Reducing Tee**

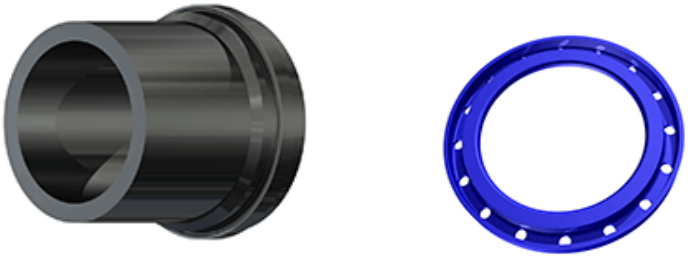


HDPE Tees will need to have additional fittings fused onto each end of the tee and branch to accommodate valves or other appurtenances.

Electrofusion

Currently HDPE electrofusion fittings are not allowed for use in the Colorado Springs Utilities Water Distribution System.

Mechanical Joint (MJ) Adapter.



MJ Adapter 4" through 24" must be provided with a Stainless Steel Stiffener (included in the manufactured fitting). All MJ Adapters shall be provided with a Heavy Duty Back-up Ring and Kit (*AWWA C110* with minimum 8 mils fusion bonded epoxy coated follower/back-up ring). The kit needed shall also include bolts and nuts, Grade 3 or higher and long enough to accommodate the added length of HDPE fittings to attach to valves or other appurtenances.

Polyethylene Flange Adapters

Flange Adaptor C207 Class E Ring Beveled Flange Adaptor



Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serration) to promote gasket-less sealing, or restrain the gasket against blowout. A Beveled Flange Adaptor is for use with Butterfly Valves.

HDPE flange and beveled flanged adaptors may be used with approval of Colorado Springs Utilities and must be installed according to *PPI TN-38*.

Note: The utilization of HDPE flange adaptors will add to the overall length of time in installation and construction.

Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe (*AWWA C207* Class E with minimum 8 mil fusion bonded epoxy coated follower or back-up ring). The back-up ring bore shall be chamfered or raised to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 3 or higher and long enough to accommodate the added length of HDPE fittings.

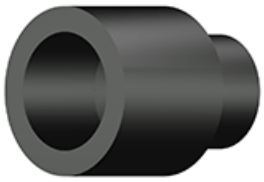
Wall Anchors

Wall anchors shall be manufactured according to *AWWA C906* with the PE 4710 cell classification and shall be manufactured as one piece, compatible to the HDPE pipe being placed and shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe. Wall anchors are used to restrain HDPE pipe at connections, tees, valves and transitions in pipe materials. The HDPE wall anchor shall be fused to the pipe and supported to allow for the placement of a concrete thrust reaction block (CTRB) or a concrete reverse anchors (CRA).

HDPE Reducers

Swage Reducer

Concentric Reducer

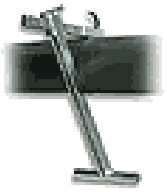


Swage reducers are preferred for use when reducing one nominal pipe size. When reducing mo than one size, the Contractor needs to be aware that the reducer length can be longer than expected due to step down from each size. Check with the manufacturer for reducer lengths.

Stiffeners

Stiffeners shall be used any time a mechanical fitting is to be applied to plain end HDPE Pipe.

Bead Removal Tool



Internal fusion beads between HDPE fittings and Pipe Pup additions shall be removed and all additional internal beads created during manufacturing (if required) after the allowable cooling time for bead removal using a suitable bead removing tool specified for HDPE pipe. The bead removal tool shall not induce any slits, gouges or defects in the pipe wall, as recommended by the manufacturer. External beads must be removed to

General: HDPE fittings are manufactured for use with HDPE pipe.

Size(s): 8, 12, 16, 20, 24-inch DIPS, 6 inch upon Colorado Springs Utilities approval.

Pressure Class: Fittings shall be DIPS DR9 PE4710 250 psi Working Pressure rated and shall be butt fused to the HDPE pipe unless otherwise stated.

Material: Fitting Materials shall be manufactured with Black PE materials of PE4710 high density polyethylene meeting *ASTM D3350* cell classification 445574C and shall be listed in the name of the pipe and fitting manufacturer in the *Plastic Pipe Institute (PPI) TR-4* with a standard grade HDB rating of 1600 psi at 73°F per *ASTM D2837*. Color material, when used, shall be the same except for meeting *ASTM D3350* cell classification 445574C. The material shall be listed and approved for Potable Water in accordance with *NSF 61*. The manufacturer shall certify that the materials used to manufacturer pipe and fittings meet these requirements.

Specifications: HDPE fittings shall be manufactured in accordance with the current version of:

- *AWWA C906*
- *ASTM F714*
- *ASTM D3350*
- *ASTM D4976*
- *ASTM D3261*
- *NSF 61*

Marking: HDPE Fittings shall be marked on the pipe either with a tag or imprinted with the following information:

- Manufacturers name or trademark
- Fitting description
- Material designations (DIPS DR9 PE4710)
- All applicable standards designations
- Date of manufacture
- Fitting size

A. HDPE Fittings and Custom Fabrications. Polyethylene fittings and custom fabrications shall be molded or fabricated by Approved Manufacturers per Colorado Springs Utilities. All fittings and custom fabricated fittings shall be pressure rated for the same Working Pressure rating as the mating pipe.

B. Molded HDPE Fittings. Molded fittings shall be manufactured and tested in accordance with *ASTM D 3261, AWWA C906* and shall be so marked.

C. Fabricated HDPE Fittings. Fabricated fittings shall be made by heat fusion joining specially machined shapes out of pipe, polyethylene sheet stock or machined from molded fittings or special extruded pipe made for machining fittings. Fabricated fittings shall be pressure rated for the same working pressure rating as the mating pipe. All fabricated fittings shall be tested in accordance with *AWWA C906, ASTMD3261 and D3350*.
Note: Colorado Springs Utilities orders all fittings with additional DR9 HDPE PE4710 pipe pups for ease of installation in the field. When a Contractor orders a HDPE fitting per the current Colorado Springs Utilities Material Specifications additional costs will be incurred for the additional material, manufacturing and freight costs. Not a requirement.

D. Fittings shall be butt fused to the HDPE pipe unless otherwise stated.

3. High Deflection Polyvinyl Chloride (PVC) Deflection Couplings

Approved Manufacturer(s):

- **North American Specialty Products**

Fluid-Tite "HD" (High Deflection) PVC restrained joint municipal water pipe.

General:
High Deflection Couplings are used to achieve gradual deflections in curvature when placing PVC pipe. Each coupling is capable of deflecting 4 degrees (2 degrees per side) and can be used in place of small bends.

Size(s): 4, 6, 8 and 12-inch

Pressure Class: 200psi (DR21) Working Pressure rating.

Size	Working Pressure rating (psi)	Insertion depth (inches)	Length (inches)
4"	200	3.00	7.25
6"	200	3.625	8.25
8"	200	4.125	9.25
12"	200	5.375	12.00

Specifications:
Polyvinyl Chloride (PVC) Pipe Couplings with Cast Iron (CI) outside diameters.

Couplings shall meet the requirements of *AWWA C900* for Municipal Water pipe and are listed by NSF for use with Potable Water.

Testing
Each coupling shall be hydrostatically tested to 800 psi (4 times its rated working pressure of 200 psi) by the manufacturer. All sizes and classes shall be listed by *Underwriters Laboratories Inc. (UL 1285).*

4. Swivel Tee

Approved Manufacturer(s):

Swivel x Swivel x Swivel

- **Infact Corporation**

General: Swivel tees shall meet the Specifications for ductile iron fittings as described above with the following additions:

Swivel: Swivel MJ glands shall have the capability of rotating 360 degrees. The glands shall bolt to internally cast ribs without the use of lug bolts, and shall be interchangeable to allow MJ glands or flange glands to be attached in the field.

External Coating: The manufacturer may supply either an asphaltic coating or a fusion bonded epoxy coating on the outside of the fitting per *AWWA C110*. Fusion bonded epoxy coating where used shall be in accordance with *ANSI/AWWA C116/A21.16*.

5. Flange Gaskets

Approved Manufacturer(s):

- **Westermann Gasket Company-Saint Ferrer (or equivalent)**
  Red Rubber

- **Garlock (or equivalent)**
  3000 Series

General: Full faced gaskets are used to seal metal flanges together**.**

Specifications: Gaskets are to be applied as specified by the Design Engineer and per Manufacturer's recommendations. Red rubber Gaskets shall be a minimum 250 psi Working Pressure rated and have a hole pattern of *Class 125/ANSI 150* or *Class 250 /ANSI 300* to mate with the hole pattern of the flange as needed.

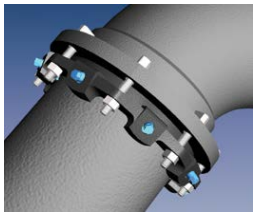
Gaskets of material other than red rubber shall be specified as needed for special applications and shall be NSF 61 compliant and shall be a minimum 250 psi Working Pressure rated and have a hole pattern of *Class 125/ANSI 150* or *Class 250 /ANSI 300* to mate with the hole pattern of the flange as needed.

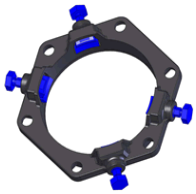
Gaskets for HDPE applications must be ordered on case-by-case basis, reference *PPI TN-38* for design requirements.

6. Mechanical Joint Pipe Restraints

Approved Manufacturer(s):

Ductile Iron Pipe MJ Restraint:





EBAA Iron, Inc.
Megalug, Series 1100 (3”-36”)

Ford Meter Box
Uni-Flange Corp.
Series 1400 (3”-36”)

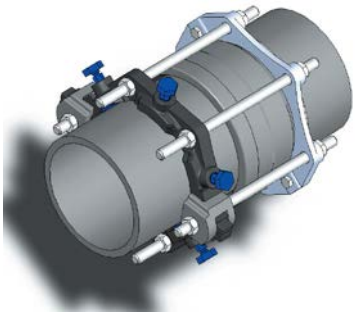
Sigma
One Lok Series SLDE (3”-24”)

Smith Blair
Series 111 (3”-24”)

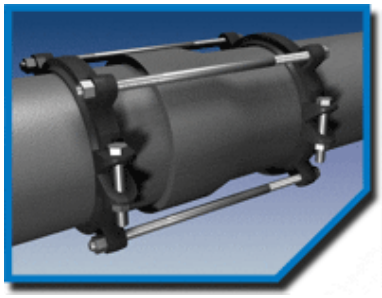
Tyler Union
TUF Grip Series 1000 (3”-24”)

DIP Slip Joint Restraint:

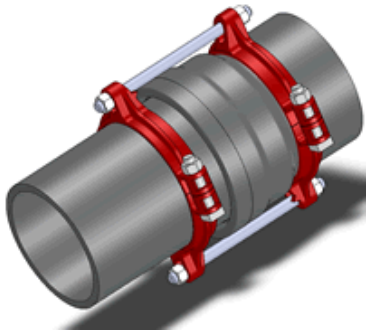
Ford Meter Box Company
Series 1450 Series for Joint Restraints for DIP (3”-36”)



Sigma
One Lok Series SLDEH for DIP
(3” – 8” @ 350 psi,
10”-16” @ 300 psi,
18” – 36” @ 200 psi)



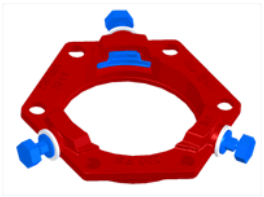
EBAA Iron, Inc.
Megalug, Series 1500TD for Joint Restraints for PVC and DIP (4”- 12”)
Series 1700 DIP (4”-48”)



Sigma
PV- Lok series PWP for DIP (4”-12”)

PVC MJ Restraint:





EBAA Iron, Inc. Megalug, Series 2000 PV (3”-16”)

Ford Meter Box Company Uni-Flange Series 1500 “Circle Lock” (3”-12”)

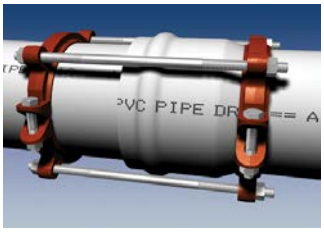
Sigma One Lok Series SLCE (3”-24”)

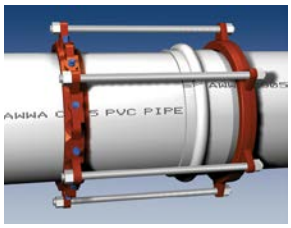
Smith Blair CamLock Series 120 (3”-24”)

Tyler Union TUF Grip Series 2000 (3”-24”)

PVC Slip Joint Restraint:





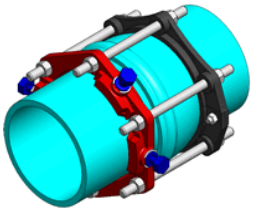
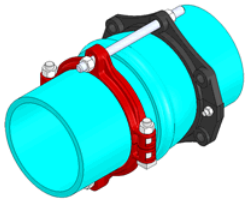


Star 1100 C Series PVC pipe to pipe (4” – 24”)

Ford Meter Box Company - Uni-Flange - Series 1390 Series for Joint Restraints for PVC (2”-24”)

EBAA Iron, Inc. Megalug, Series 1500 and 1600 for Joint Restraints for PVC (4”-12”)

EBAA Iron, Inc. - Megalug, Series 2800 for Joint Restraints for PVC (16”-20”)

Sigma One Lok series SLCEH for PVC (4”-12”)

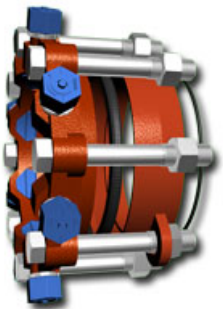
Sigma PV- Lok series PWH for PVC (4”-12”)

Split Megalugs:

Restrained Flange Adaptor:

EBAA Iron
Series 1100SD for DIP (3” – 48”)

EBAA Iron
Series 2000SV for PVC (4” – 12”)



EBAA Iron
Series 2100 MEGAFLANGE for PVC, DIP, HDPE (3” – 48”)

General: Mechanical pipe joint restraints (MJ) restrain mechanical joints for many applications including valves, hydrants, and pipe. They can be used on all types of pipe when joining to mechanical appurtenances. MJs are used to replace external restraints such as concrete thrust blocks and metal tie rods. There are specific restraints for each type of pipe.

Size(s): 6-inch up to 36-inch Diameter Ductile Iron Pipe (DIP) and 6, 8, and 12-inch Diameter PVC Pipe.

Pressure Class: Mechanical pipe joint restraint devices shall have minimum Working Pressures not less than the Working Pressure ratings of the pipe.

Material: MJ restraints shall be manufactured of ductile iron.

Specifications: Glands of the mechanical joint restraint shall be manufactured of ductile iron in accordance to *ASTM A536*, grade 65-45-12. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 bhn. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to *ANSI/AWWA C111/A21.11* and *ANSI/AWWA C153/A21.53*.

7. Mechanical Joint Pipe Restraint with Tie Rods

Approved Manufacturer(s): Springs Fastener Company

Ductile Tie Lug

All Thread Rod and Couplings

General: Tie-Lugs are for use in restraining mechanical joint valves, fittings, pipe and hydrants. MJ pipe restraints with tie rods, when used, shall conform to the Specifications described above.

Material(s):

- **Tie Lugs.** Shall be cast from high strength Ductile Iron per *ASTM A536* Grade 65-45-12 with a tensile strength of 65,000 psi and yield strength of 45,000 psi. Tie-lugs are intended for use between the MJ bell and gland in sizes 4" through 16".
- **Tie Rods**. may be black steel; in all cases they shall be equal to a minimum grade *ASTM A307*, except where high strength steel is required, in which case they shall have a minimum strength equal to *ASTM A325*.

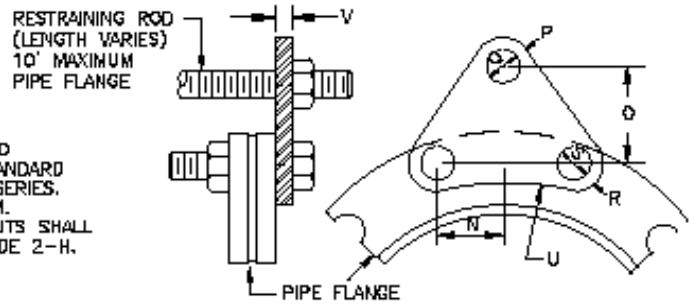
Minimum # of Eye Bolts/Ductile Tie Lugs									
Nom Pipe Size (in)	**Working Pressure (psi)**								
	100	**125**	**150**	**200**	**225**	**250**	**300**	**325**	**350**
4	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
6	**2**	**2**	**2**	**2**	**3**	**3**	**3**	**4**	**4**
8	**2**	**2**	**3**	**4**	**4**	**4**	**6**	**6**	**6**
12	**4**	**4**	**6**	**8**	**8**	**8**	**NR**	**NR**	**NR**
16	**6**	**8**	**10**	**12**	**NR**	**NR**	**NR**	**NR**	**NR**

NR= Not recommended

Threaded rod, B7 per ASTM A193, High strength

Size (Threads per inch)
7/16" – 14 TPI
1/2:" – 13 TPI
5/8" – 11 TPI
¾" – 10 TPI
7/8" – 9 TPI
1" – 8 TPI
1 1/8" – 8 TPI
1 ¼" – 8 TPI
1 ½" – 8 TPI

Flange Lug:



NOTES:

1. M.S. MEANS MILD STEEL ROD, A.S.T.M. STANDARD DESIGNATION A-36 NUTS SHALL BE S.S.T.M. STANDARD DESIGNATION A-307 GRADE A OR B HEXAGON SERIES.
2. H.S. MEANS HIGH STRENGHT STEEL ROD, A.S.T.M. STANDARD DESIGNATION A-193 GRADE B-7 NUTS SHALL BE A.S.T.M. STANDARD DESIGNATION A-193 GRADE 2-H.

PIPE DIA.	PRESS. CLASS	N	O	H.S. ROD			M.S. ROD			R	S	U	V	NO. REQD.
				P	Q	ROD DIA.	P	Q	ROD DIA.					
6"	150 LB.	1 13/16"	2 1/4"	1"	7/8"	3/4"	1"	7/8"	3/4"	7/8"	7/8"	3 3/4"	3/4"	2 EA.
	300 LB.	1 3/8"	2 3/4"	1"	1"	7/8"	1"	1"	7/8"	7/8"	7/8"	4 7/16"	1"	
8"	150 LB.	2 1/4"	2 3/4"	1"	7/8"	3/4"	1"	7/8"	3/4"	1"	7/8"	4 7/8"	3/4"	2 EA.
	300 LB.	1 11/16"	2 7/8"	1"	1"	7/8"	1"	1"	7/8"	1"	1"	5 1/2"	1"	
12"	150 LB.	2 3/16"	2 3/4"	1 1/4"	1 1/8"	1"	1 1/4"	1 1/8"	1"	1 1/8"	1"	7 1/4"	7/8"	2 EA.
	300 LB.	1 3/4"	3 3/4"	1 5/8"	1 1/4"	1 1/2"	1 3/8"	1 3/8"	1 1/4"	1 1/4"	1 1/4"	7 5/8"	1 1/4"	
16"	150 LB.	2 1/16"	2 3/4"	1 1/2"	1 3/8"	1 1/4"	1 1/2"	1 3/8"	1 1/4"	1 1/4"	1 1/8"	9 3/8"	1 1/8"	3 EA.
	300 LB.	1 3/4"	4 1/4"	1 1/2"	1 1/2"	1 3/8"	1 1/2"	1 1/2"	1 3/8"	1 1/2"	1 3/8"	8 7/8"	1 1/2"	
20"	300 LB.	2"	3 1/16"	1 3/8"	1 9/16"	1 1/2"	1 3/8"	1 9/16"	1 1/2"	1 3/8"	1 3/8"	10 1/2"	2 1/2"	4 EA.
24"	300 LB.	2 5/16"	3 1/8"	1 1/2"	1 9/16"	1 1/2"	1 1/2"	1 9/16"	1 1/2"	1 1/2"	1 5/8"	12 1/2"	2 1/4"	6 EA.
30"	300 LB.	2"	3 1/4"	1 5/8"	1 9/16"	1 1/2"	N/A	N/A	N/A	1 5/8"	1 7/8"	15 5/8"	2 5/8"	8 EA.
36"	300 LB.	2 1/16"	3 1/2"	1 7/8"	1 9/16"	1 1/2"	N/A	N/A	N/A	1 7/8"	2 1/8"	18 5/8"	3"	10 EA.

8. Bolts and Nuts for Mechanical Joints

Approved Manufacturer(s):

- **Tyler**
- **Star**
- **Sigma Corporation**
- **Trumbull**

T Head Bolts :

T Bolts – Anti Rotational (Lugged T-bolt):

General: T-Head bolts are utilized to bolt together all pipe, fittings and appurtenances.

Size(s): Varies depending on fitting being installed. Bolts are generally ¾ or 5/8 inch in diameter and length varies.

Material: Low alloy steel in accordance with *ANSI/AWWA C111/A21.11*.

Specifications: Bolt strength shall be equal to minimum *ASTM A307*.

All steel bolts shall be cathodically protected per Section 2.6I.2.

Blue Bolts for Corrosive Soils:

Approved Manufacturer(s):

- **Sigma**
- **Star**

General: T-Head bolts are utilized to bolt together all pipe, fittings and appurtenances.

Size(s): Varies depending on fitting being installed, Bolts are generally ¾ or 5/8 inch in diameter and length varies

Material: Bolts shall be manufactured from low alloy steel in accordance with *ANSI/AWWA C111/A21.11*.

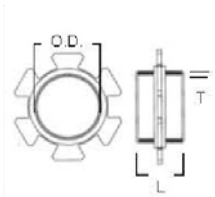
Specifications: All Tee Head bolts and nuts shall be coated with a corrosion resistant XYLAN 1424 Polytetrafluoroethylene (PTFE) Dry-Film protective coating/lubricant or fluropolymer coating. Bolt strength shall be equal to minimum *ASTM A307*. Additional cathodic protection is not required.

9. Bolt-Thru Mechanical Joint Connection (Foster Adaptor)

Approved Manufacturer(s):

- **Infact Corporation** -Foster Adaptor

General: The Foster Adaptor is an Ultra-compact, bolt-through MJ restraint, for valves and fittings.



Size(s):

Size (inches)	Dimensions (inches)			Adaptor Weight
	OD	T	L	lbs.
4	4.80	.35	4	8
6	6.90	.37	4	15
8	9.05	.39	4	19
10	11.10	.40	4	24
12	13.20	.43	4	31
16	17.30	.51	6	60
18	19.40	.55	6.75	92
20	21.50	.58	6.75	101
24	25.80	.62	6.75	117

Pressure Class: The device shall have a minimum Working Pressure rating of 350 psi
Material: Connection shall be manufactured of ductile iron conforming to *ANSI/AWWA C153/A21.53*.
Specifications:
Mechanical joint (MJ) valves and fittings shall be connected using a bolt-through positive restraint mechanism manufactured of ductile iron conforming to *ASTM A80-55-06*. The bolt-through MJ positive restraint mechanism shall connect the valves and/or fittings at a linear distance not to exceed 1 inch and without attachment to pipe. Fittings shall be sized to be used with standard mechanical joint fittings (*AWWA C110* or *C153*) and valves.
Coating. The bolt-through MJ positive restraint mechanism shall be supplied with asphaltic/epoxy coatings in accordance with *ANSI/AWWA C153/A 21.53* or fusion bonded epoxy coating in accordance with *ANSI/AWWA C116/A21.16*.

Installation: Not for use directly on hydrant shoes (longer bolts and spacers will not fit.) This may not fit on both the "branch" and "run" of compact tees or crosses for the same reason noted above. The bolt-through MJ positive restraint mechanism may not be used between 2-45 degree bends which would create a 90 degree bend.

10. Mechanical Coupling(s).

Approved Manufacturer(s):

Straight Coupling(s)

Dresser
Style 38
2 – 24 inch

Dresser
Style 253
2 – 16 inch

Romac
Style 501
2- 24-Inch

Romac
Style 400-
12-Inch and
larger

Insulating Coupling(s)

Dresser
Style 39- 4-14
inch

Romac
Style IC501
4-14 inch

Transition Coupling

Romac
Style XR501
4- 12 Inch

Reducing Coupling(s)

Romac
Style RC501
3- 24 Inch

Romac
Style RC400
12-Inch and larger

Dismantling Joint

Romac
Style DJ405
Class E Flange
3 - 24 inch
(Used in meter and
regulator valve vaults)

General. All mechanical couplings shall be of a gasketed, sleeve-type, with diameter to properly fit the pipe. Tolerance on pipe and coupling, together with proper bolt and gasket arrangements, shall be sufficient to ensure permanent watertight joints under all conditions.

Size(s) and Pressure Class:

Manufacturer	Size (in)	Working Pressure (psi)
Straight Coupling		
Dresser Style 38	2-24	343
Dresser Style 253	2-16	200
Romac 501	2-24	260
Romac 400	12-96	500
Insulating Coupling		
Dresser Style 39	4-14	300
Romac IC 501	4-14	260
Transition Coupling		
Romac XR501	4-12	260
Reducing Coupling		
Romac RC501	3-24	260
Romac RC400	12-96	500
Dismantling Joint		
Romac DJ405	3-24	varies

Materials: Materials used in the manufacture of couplings shall be Ductile Iron or Steel in accordance to *AWWA C111* and *AWWA C219*.

Specifications: Steel couplings shall meet or exceed *ASTM A283/A283M*, Grade C for Carbon steel, or *ASTM A666*. Ductile Iron shall meet or exceed *ASTM A536* Grade 65-45-12. Gaskets shall meet the requirements of *ASTM D2000*.

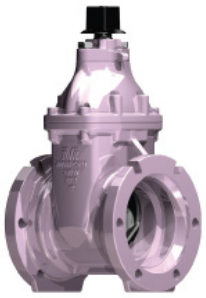
External Coating. The manufacturer may supply either an asphaltic coating or a fusion bonded epoxy coating outside the fitting per *AWWA C 110*. Fusion bonded epoxy coating where used shall be in accordance with *ANSI/AWWA C116/A21.16*.

Installation: Couplings may need to be restrained.

E. Valves

1. Gate Valves, Resilient Seat Type

Approved Manufacturer(s):



- **American Flow Control**
- **Mueller**
- **AVK Series 65**
- **Clow**

General: Resilient seat type gate valves shall be acceptable for installation in the Colorado Springs Utilities Water Distribution System. Gate valves shall conform to these Specifications.

Size(s): 4, 6, 8, 12, and 16-inch nominal diameter.

Pressure Class: The Working Pressure for all sizes shall be 250 psi.

Material: All valves shall be manufactured with Cast or Ductile Iron in accordance with *AWWA C500/C509/C515*, with the following additional requirements or exceptions:

Specifications:
Gate valves shall be resilient wedge/seat gate with cast iron or ductile iron body in compliance with *ASTM A536/A126* CL B, corrosion resistant material, with non-rising stem and rubber encapsulated wedge. All valves shall have epoxy coating both internally to *AWWA C550* and *NSF 61*, and externally to *AWWA C116*.
Valve Stems**.** Valve stems are used to raise the wedge using a 2" square-operating nut. Valve stems shall be made of a corrosion resistant material. The stem shall be non-rising and be sealed with "O" ring packing. Valve stems shall be threaded per the following

- open right (clockwise) for Potable Water valves
- open left (counterclockwise) for Nonpotable Water valves

End Connections. All direct bury valves shall have mechanical joint end connections which shall have a gasket gland and fasteners conforming to the *ANSI A21.11, AWWA C-111*, Flanged end connections for vault applications shall be *Class 125/ANSI 150* or *Class 250/ANSI 300* drilled and manufactured according to *ASME/ANSI B16.1*, type of flange is dependent upon PSI of the gate valve and flanged fitting it is being attached to.
Color.
Potable Water-Per Manufacturer's Specifications
Nonpotable-purple Color Pantone 512 or Pantone 522
Deep Valve Extension. The extension rod shall have a 2" square wrench nut at the top and a wrench nut coupling at the bottom. The wrench nut coupling fits over the 2" square nut of the valve stem being raised and is held to the nut by a set screw threaded in the wrench nut coupling. The wrench nut and wrench nut coupling are pinned to the extension rod, which is drilled to receive steel drive pins. The wrench nut and wrench nut coupling shall be made of ductile iron, Grade 65-45-12, or stainless steel, Type 316. The pinned connections permit the removal of the casting so the rod can slide through the stem guides.