



JOINT RESTRAINT PRODUCTS



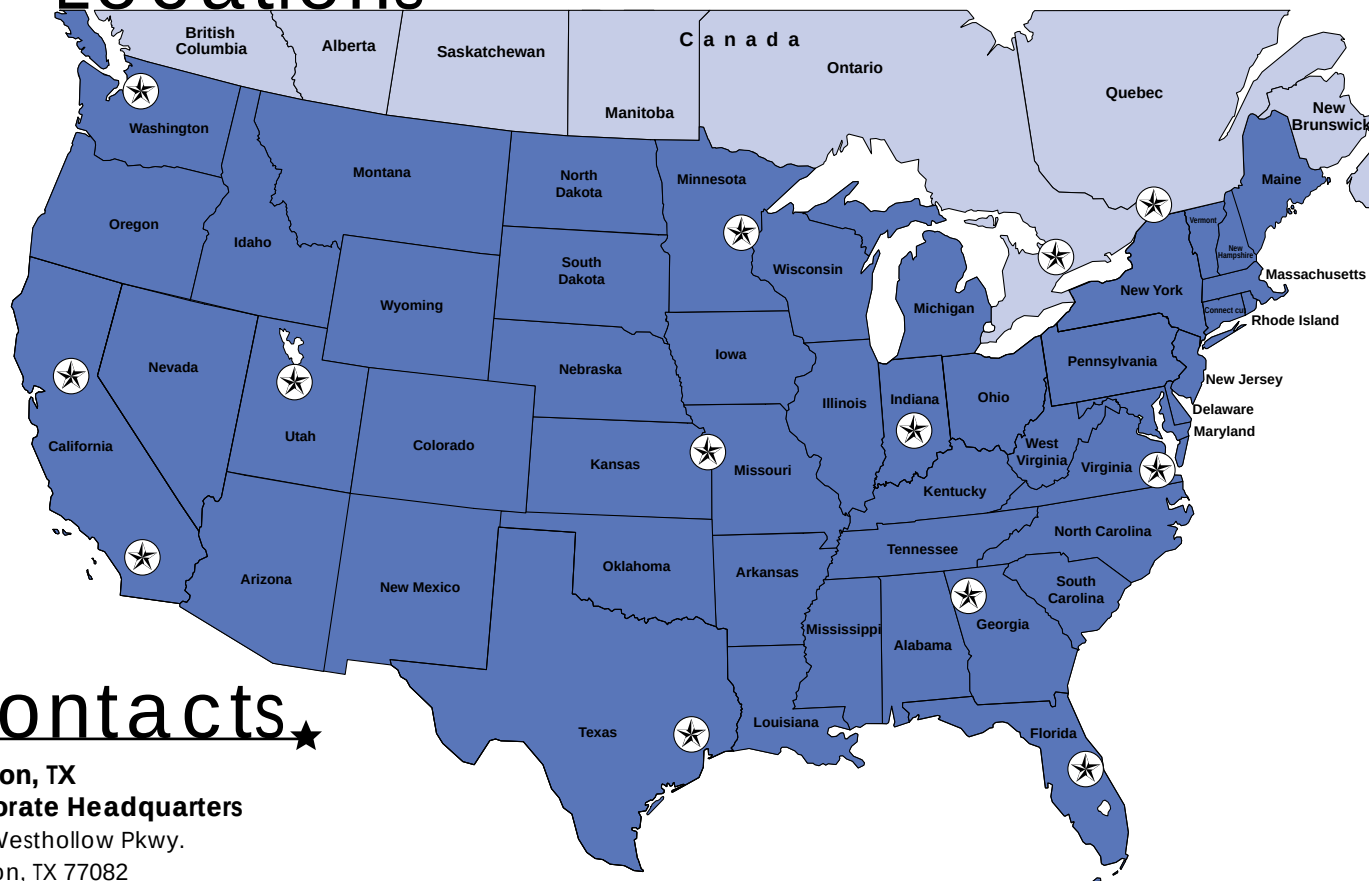
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	GENERAL TERMS & CONDITIONS	pg.2
	STARGRIP® Series 3000, 3000S, 3000OS, 3100P, 3100S Mechanical joint wedge action restraints for ductile iron pipe.	pg. 3-16 Nominal pipe size: 3"-48"
	PVC STARGRIP® Series 4000, 4100P Mechanical joint wedge action Restraint for C900/C905 and IPS PVC pipe.	pg. 17-22 Nominal pipe size: 3"-36"
	PVC RING LOCK (PVCGRIP™) Series 3500 Mechanical joint 360° ring type restraint system designed for C900/C905 and IPS PVC pipe.	pg. 23-25 Nominal pipe size: 4"-16"
	STARFLANGE™ Series 3200 Restrained adapter flange coupling for ductile iron pipe.	pg. 27-29 Nominal pipe size: 3"-24"
	PVC STARFLANGE™ Series 4200 Restrained adapter flange coupling for PVC pipe.	pg. 31-33 Nominal pipe size: 3"-24"
	FLANGE ADAPTERS Series 200, 400 Flange adapters for ductile iron and steel pipe. Standard and heavy duty.	pg. 35-38 Nominal pipe size: 3"-36"
	PVC PIPE RESTRAINERS Series 1000, 1100, 1200 Joint restraint for mechanical joint and push-on fittings for C900/C905 and IPS PVC, pipe to pipe connections and PVC pressure fittings.	pg. 39-48 Nominal pipe size: 4"-48"
	RETAINER GLANDS Series 600 Mechanical joint retainer glands for ductile iron pipe, valves and fittings.	pg. 49-51 Nominal pipe size: 3"-36"

►► Please refer to Star Pipe Products' web site (www.starpipeproducts.com) for continual updated information.



STAR® PIPE PRODUCTS

General Terms and Conditions

GENERAL	These terms and conditions shall control with respect to any purchase order or sale of Seller's products. No waiver, alteration or modification of these terms and conditions whether on Buyer's purchase order or otherwise shall be valid unless the waiver, alteration or modification is specifically accepted in writing and signed by an authorized representative of Seller.
DELIVERY	Seller will make every effort to complete delivery of products as indicated on Seller's acceptance of an order, but Seller assumes no responsibility or liability, and will accept no backcharge, for loss or damage due to delay or inability to deliver caused by acts of God, war, labor difficulties, accident, delays of carriers, by contractors or suppliers, inability to obtain materials, shortages of fuel and energy, or any other causes of any kind whatsoever beyond the control of Seller. Seller may terminate any contract of sale of its products without liability of any nature, by written notice to Buyer, in the event that the delay in delivery or performance resulting from any of the aforesaid causes shall continue for a period of sixty (60) days. Under no circumstances shall Seller be liable for any special or consequential damages or for loss, damage, or expense (whether or not based on negligence) directly or indirectly arising from delays or failure to give notice of delay.
WARRANTY	Seller warrants for one year from the date of shipment Seller's manufactured products to the extent that Seller will replace those having defects in material or workmanship when used for the purpose and in the manner which Seller recommends. If Seller's examination shall disclose to its satisfaction that the product is defective, and an adjustment is required, the amount of such adjustment shall not exceed the net sales price of the defective products only and no allowance will be made for labor or expense of repairing or replacing defective product or workmanship or damage resulting from the same. No adjustment shall be implemented unless product in question is returned to seller in its originally installed condition, still connected to other components of the joint. Buyer must contact Seller as quickly as possible so Seller can assess product in its installed condition. No claims will be honored unless claim is made within forty five (45) days of the defect being found. Where engineering design or fabrication work is supplied, Buyer's acceptance of Seller's design or of delivery of work shall relieve Seller of all further obligation, other than expressed in Seller's product warranty. THIS IS SELLER'S SOLE WARRANTY. SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED SELLER'S AFORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM THIS WARRANTY. Seller neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of its engineering designs or product. This warranty shall not apply to any products or parts of products which (a) have been repaired or altered outside of Seller's factory, in any manner; (b) have been subjected to misuse, negligence or accidents; (c) have been used in a manner contrary to Seller's instructions or recommendations. Seller shall not be responsible for design errors due to inaccurate or incomplete information supplied by Buyer or its representatives. This warranty is non-transferable.
LIABILITY	Seller will not be liable for any loss, damage, cost of repairs, incidental or consequential damages of any kind, whether based upon warranty (except for the obligation accepted by Seller under "Warranty" above), contract or negligence, arising in connection with the design, manufacture, sale, use or repair of the products or of the engineering designs supplied to Buyer.
DISCLAIMER	Per AWWA/ANSI C110 A21.10, the flanged joint is generally specified for above ground service. Underground use of the flanged joint is generally not desirable due to the rigidity of the joint.
RETURNS	Seller cannot accept return of any products unless its written permission has been first obtained, in which case same will be credited subject to the following: (a) All material returned must, on its arrival at Seller's plant, be found to be in first-class condition; if not, cost of putting in saleable condition will be deducted from credit memoranda; (b) A handling charge deduction of twenty-five percent (25%) will be made from all credit memoranda issued for material returned; (c) Transportation charges, if not prepaid will be deducted from credit memoranda.
SHIPMENTS	All products sent out will be carefully examined, counted and packed. The cost of any special packing or special handling caused by Buyer's requirements or requests shall be added to the amount of the order. No claim for shortages will be allowed unless made in writing within ten (10) days of receipt of a shipment. Claims for products damaged or lost in transit should be made on the carrier, as Seller's responsibility ceases, and title passes, on delivery to the carrier.
PRODUCTS	Orders covering special or non-standard products are not subject to cancellation except on such terms as Seller may specify on application.
PRICES	Prices and designs are subject to change without notice. All prices are F.O.B. Point of Shipment, unless otherwise stated.
TAXES	The amount of any sales, excise or other taxes, if any, applicable to the products covered by this order, shall be added to the purchase price and shall be paid by Buyer unless Buyer provides Seller with an exemption certificate acceptable to the taxing authorities.

**Stargrip® series 3000**

Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252



Stargrip® series 3000 for Ductile Iron Pipe

INFORMATION

The Stargrip® Mechanical Joint Restraint System is a unique product with a proven design that provides an exceptional restraining system for mechanical joint fittings (AWWA C153 or C110), valves, fire hydrants and all classes of ductile iron pipe.

More Adaptable for Field Use**FEATURES & ADVANTAGES**

- Gland is made from high strength Ductile Iron per ASTM A536, Grade 65-45-12 and is compatible with all Mechanical Joints conforming to ANSI/AWWA C111/A21.11.
- The Wedge Assembly is designed with a Break-Off Torque Control Nut that will only break off in one direction, ensuring proper installation.
- The Stargrip® offers a full 5° deflection through 12" size, 3° on 14"-24", 2° on 30"-36" and 1° on 42"-48".
- Minimum safety factor of 2:1.
- Stargrip® sizes 3"-36" are listed with Underwriters Laboratories Inc. and sizes 3"-12" are approved by Factory Mutual Research.
- The Wedges are heat treated to a minimum of 370 BHN.
- The Wedge Assembly is designed to fit specific pipe sizes and is field repairable.
- No special tools are required for installation of the Stargrip®.
- Stargrip® eliminates tie rods and thrust blocks.
- Standard gland color is Graphite Black (RAL 9011).

SAMPLE SPECIFICATIONS

Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

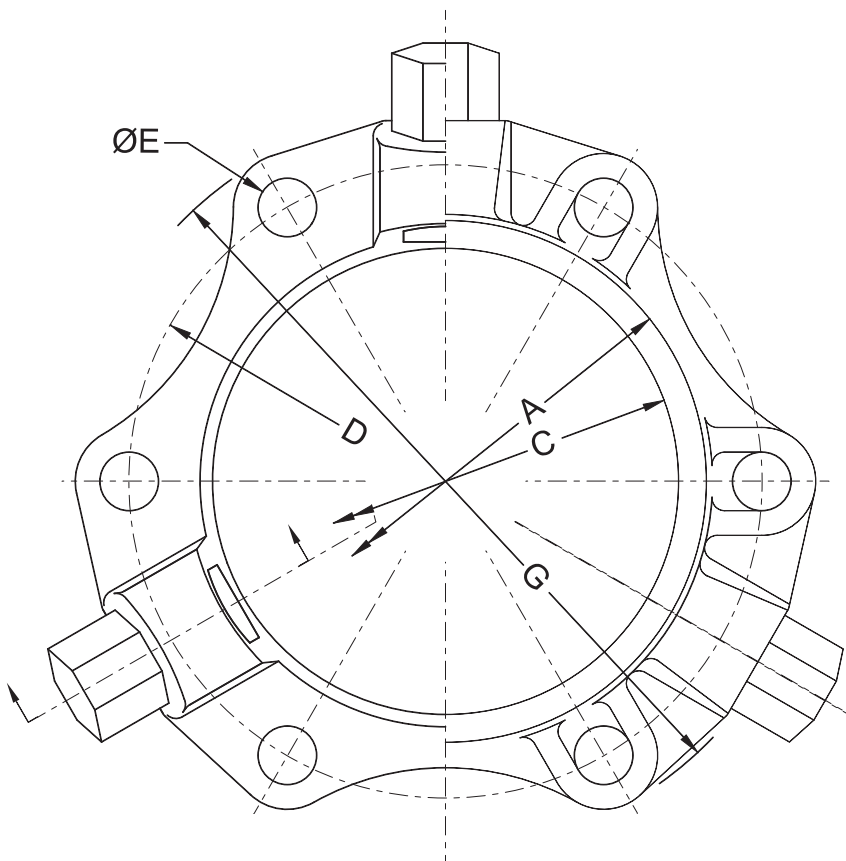
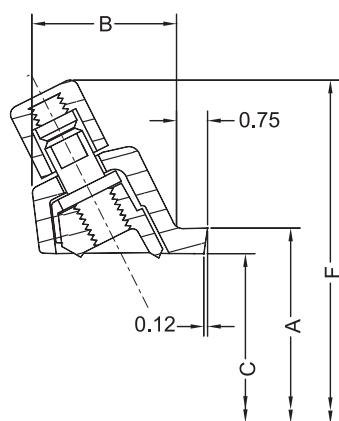
The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" hex operating nut. The operating nut shall be threaded onto the actuating bolt, not swaged or riveted. The restraining twist off nut bolt system shall have a torque-limiting feature designed to break off at preset torque levels, thus insuring proper action of restraining device. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements. The wedge shall be manufactured of high strength ductile iron and be heat treated to a minimum hardness of 370 BHN. Applicable dimensions shall conform to ANSI/AWWA C111/A21.11 and shall be incorporated into the mechanical joint restraint so that the device facilitates use with standard mechanical joint bells.

The mechanical joint restraint mechanism shall have a maximum water working pressure of 350 PSI for sizes 3"-16" and 250 PSI for sizes 18" and above. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The mechanical joint restraint mechanism shall be Underwriters Laboratories listed on size 3" through 36" and Factory Mutual Research Approved on size 3"-12". The restraint mechanism shall be Star® Pipe Products Stargrip® series 3000 or an approved equal.

**Stargrip® series 3000**

Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252

TECHNICAL INFORMATION



STARGRIP® 3000 SPECIFICATIONS*

NOM. SIZE	MAX PRESSURE RATING (PSI)	A	B	C	D	E	F	F W/NUTS TWISTED OFF	G	NO. OF WEDGES	NO. OF T-BOLTS	APPROX WT. (LBS)
3	350	4.84	2.40	4.06	6.19	3/4	9.85	8.45	7.69	2	4	6
4	350	5.92	2.40	4.90	7.50	7/8	11.06	9.28	9.15	2	4	8
6	350	8.02	2.40	7.00	9.50	7/8	13.06	11.38	11.15	3	6	12
8	350	10.17	2.51	9.15	11.75	7/8	15.25	13.53	13.40	4	6	17
10	350	12.22	2.51	11.20	14.00	7/8	17.25	15.58	15.92	6	8	24
12	350	14.32	2.51	13.30	16.25	7/8	19.50	12.68	17.90	8	8	34
14	350	16.40	2.91	15.44	18.75	7/8	21.25	19.82	20.25	10	10	49
16	350	18.50	2.91	17.54	21.00	7/8	23.34	21.92	24.83	12	12	56
18	250	20.60	2.91	19.64	23.25	7/8	26.40	24.84	25.25	12	12	59
20	250	22.70	2.67	21.74	25.50	7/8	28.56	27.00	27.50	14	14	75
24	250	26.90	3.50	25.94	30.00	7/8	33.86	32.30	31.54	16	16	139
30	250	33.29	3.49	32.17	36.88	1-1/8	40.12	38.56	39.12	20	20	199
36	250	39.59	3.49	38.47	43.75	1-1/8	46.42	44.86	46.00	24	24	232
42	250	45.79	5.15	44.75	50.62	1-3/8	54.86	53.32	53.12	28	28	400
48	250	52.09	5.15	51.05	57.50	1-3/8	61.16	59.62	59.42	32	32	488

*All dimensions in inches except where indicated.



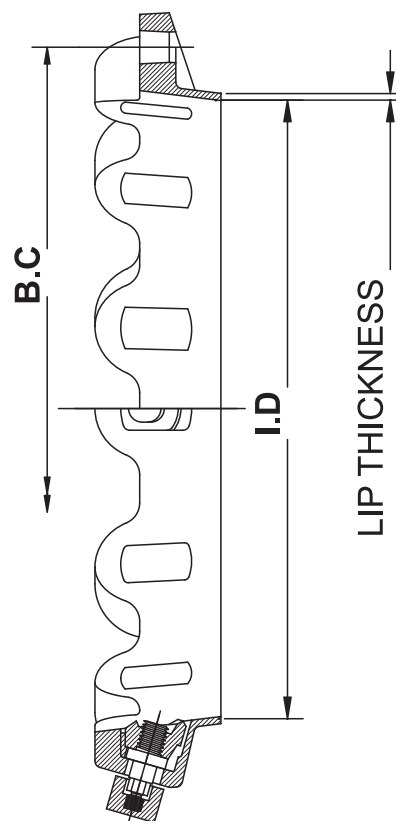
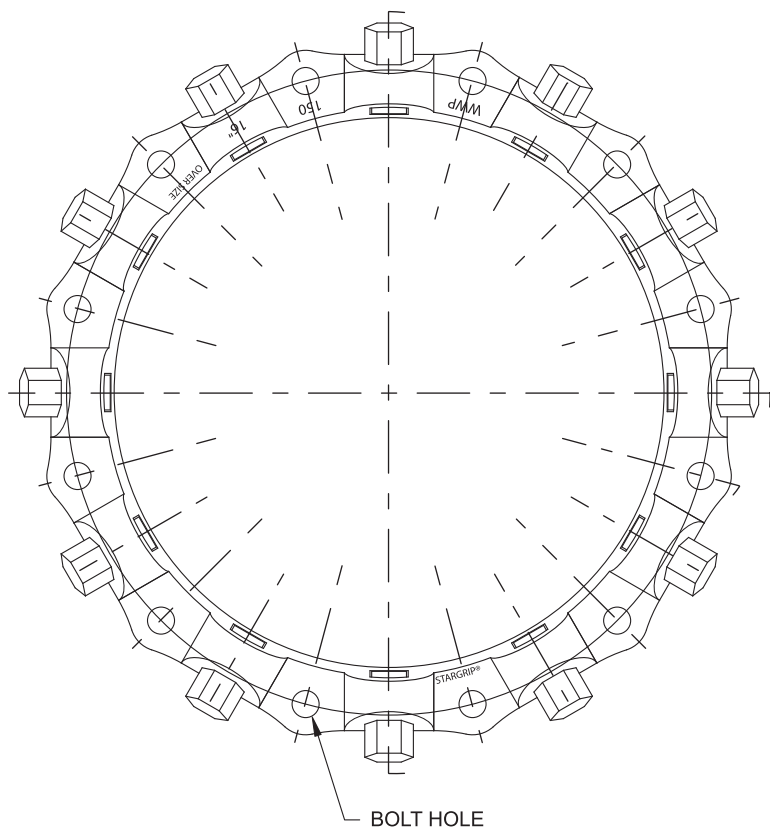
Pipe Restrainers® series 3000OS

Oversized Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252

INFORMATION

The oversized Stargrip® series 3000OS has the same features as the series 3000 except the bore (ID) has been increased to accommodate Class A, B, C, & D pit cast pipe.

TECHNICAL INFORMATION



STARGRIP® 3000OS SPECIFICATIONS*

NOM. SIZE	MAX PRESSURE RATING (PSI)	B.C. DIAMETER	BOLT HOLES	NOMINAL GLAND I.D.	LIP THICKNESS	APPROX WT. (LBS)
4	250	7.50	4 x 7/8	5.10	0.32	8
6	250	9.50	6 x 7/8	7.20	0.32	12
8	250	11.75	6 x 7/8	9.40	0.29	16
10	250	14.00	8 x 7/8	11.50	0.27	24
12	250	16.25	8 x 7/8	13.60	0.27	34
14	150	18.75	10 x 7/8	15.75	0.23	49
16	150	21.00	12 x 7/8	17.90	0.21	56

*All dimensions in inches except where indicated.

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® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

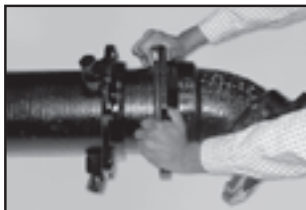
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**Stargrip® series 3000 & 3000OS**

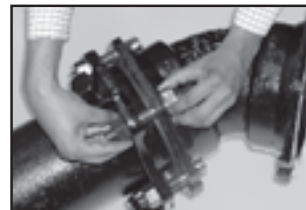
Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252

INSTALLATION INSTRUCTIONS - SIZES 3" - 48"**STEP 1**

To ensure the rubber gasket will seal more effectively, clean and remove all loose materials and rust from the mating surfaces. Lubricate the gasket and plain end by brushing either soapy water or pipe lubricant. Slide the Stargrip® on the plain end, followed by the MJ gasket.

**STEP 2**

After insertion of the pipe into the bell of the fitting firmly press the gasket into the gasket recess. During this process the joint should be kept straight.

**STEP 3**

Slide the Stargrip® toward the MJ bell with the gland lip against the gasket. Insert T-bolts and hand tighten nuts.

IMPORTANT: Make deflection after joint is assembled but before tightening T-bolts.

**STEP 4**

When tightening bolts it is essential that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. All T-bolts should be tightened until they are in within the torque range per ANSI/AWWA C600 (See Table A). T-Bolts should be tightened alternately on the opposite sides (Star Pattern).

**STEP 5**

Tighten the torque limiting twist off nuts in a clockwise direction until all wedges are in firm contact with the pipe surface.

**STEP 6**

Continue tightening in an alternative manner going on the opposite sides [Star Pattern], until all of nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

If removal is necessary utilize the 5/8" hex head provided. [If reassembly is required assemble the joint in the same manner as above and tighten the wedge bolt to 90 lbs. ft. on sizes 3"-20" 120 lbs. ft. on sizes 24"-36" & 130 lbs. ft. on sizes 42"-48"].

Note: If effective sealing is not attained at the maximum torque indicated, then the joint should be disassembled, thoroughly cleaned, and reassembled. **Overstressing the bolts to compensate for poor installation practice is not acceptable.**

Note: Not to be used on plain end fittings or PVC, HDPE or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS

PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1 1/4	120-150

¹These torque ranges are requirements of AWWA C600



Split Stargrip® series 3000S

Split Mechanical Joint Wedge Action Restraint
for New or Existing Ductile Iron Pipe
Patent #5,772,252



Stargrip® series 3000S for Ductile Iron Pipe.

INFORMATION

The Split Stargrip® is used for restraining new or existing ductile iron mechanical joint fittings, valves, fire hydrants and all classes of ductile iron pipe.

The unique split design makes installation fast and simple.

Easy Installation

FEATURES & ADVANTAGES

- Split design Stargrip® Series 3000S for easy installation on new or existing Ductile Iron Mechanical Joint systems.
- Gland is made from high strength Ductile Iron per ASTM A536, Grade 65-45-12 and is compatible with all Mechanical Joints conforming to ANSI/AWWA C111/A21.11.
- The Wedge Assembly is designed with a Break-Off Torque Control Nut that will only break off in one direction, ensuring proper installation.
- Offers a full 5° deflection through 12" size, 3° on 14"-24", 2° on 30"-36" and 1° on 42"-48".
- Minimum safety factor of 2:1.
- The Wedges are heat treated to a minimum of 370 BHN.
- The Wedge Assembly is designed to fit specific pipe sizes and is field repairable.
- Clamping bolts per SAE J429 Grade 5 steel.
- Eliminates tie rods and thrust blocks.
- Standard gland color is Graphite Black (RAL 9011).

SAMPLE SPECIFICATIONS

Restraint mechanism shall be of split design for use on new or existing mechanical joints. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" hex operating nut. The operating nut shall be threaded onto the actuating bolt, not swaged or riveted. The restraining twist off nut bolt system shall have a torque-limiting feature designed to break off at preset torque levels, thus insuring proper action of restraining device. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements. The wedge shall be manufactured of high strength ductile iron and be heat treated to a minimum hardness of 370 BHN.

Applicable dimensions shall conform to ANSI/AWWA C111/A21.11 and shall be incorporated into the mechanical joint restraint so that the device facilitates use with standard mechanical joint bells.

The mechanical joint restraint mechanism shall have a maximum water working pressure of 350 PSI for sizes 3"-8", 300 PSI for sizes 10"-16", 200 PSI for sizes 18"-36" and 175 PSI for sizes 42"-48". All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The restraint mechanism shall be Star® Pipe Products Split Stargrip® series 3000S or an approved equal.

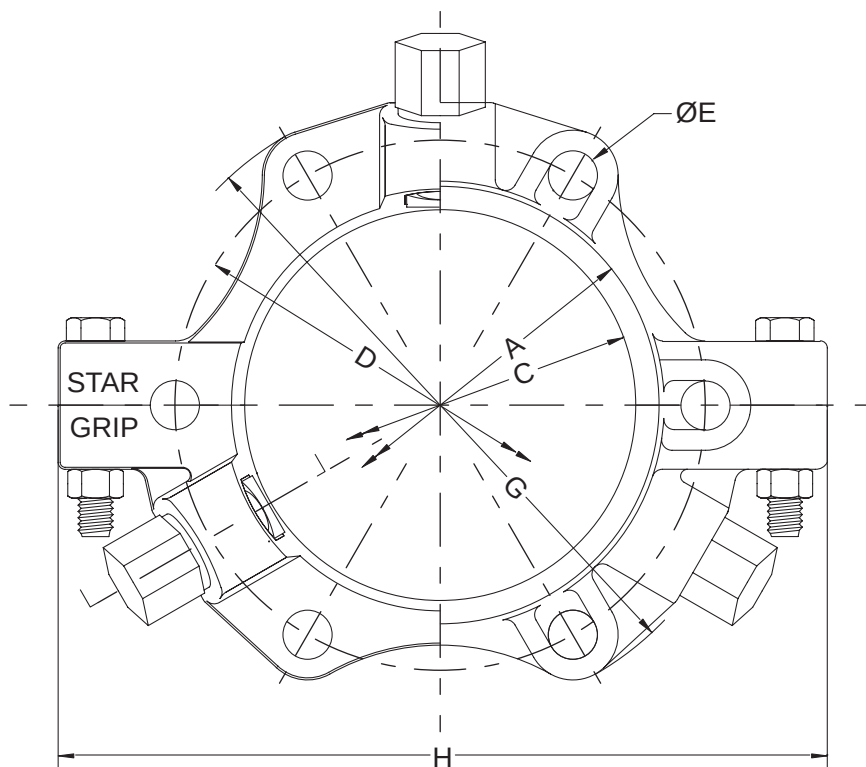
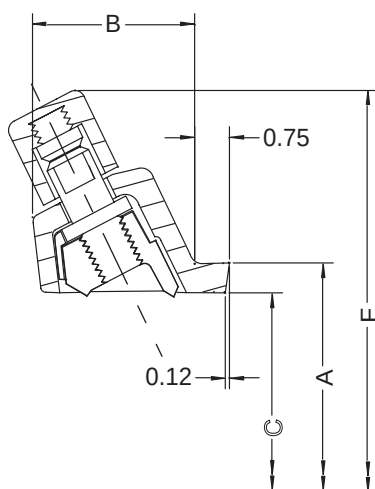


Split Stargrip® series 3000s

Split Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252

TECHNICAL INFORMATION

CLAMPING BOLT SIZE	
SERIES 3000S (IN)	BOLT SIZE (IN)
3-6	5/8 x 3 1/2
8-10	3/4 x 3 1/2
12	3/4 x 4
14-24	7/8 x 3 3/4
30-36	1 x 3 1/2
42-48	1 1/4 x 4



SPLIT STARGRIP® 3000S SPECIFICATIONS*

NOM. SIZE	MAX PRESSURE RATING (PSI)	A	B	C	D	E	F	F W/NUTS TWISTED OFF	G	H	WEDGES (QTY)	T-BOLTS (QTY)	APPROX WT. (LBS)
3	350	4.66	2.40	4.06	6.19	3/4	9.85	8.45	7.69	8.77	2	4	9
4	350	5.92	2.44	4.90	7.50	7/8	11.06	9.28	9.15	9.80	2	4	11
6	350	8.02	2.44	7.00	9.50	7/8	13.06	11.38	11.15	13.86	3	6	14
8	350	10.17	2.44	9.15	11.75	7/8	15.25	13.53	13.40	15.16	4	6	17
10	300	12.22	2.44	11.20	14.00	7/8	17.25	15.58	15.92	17.98	6	8	26
12	300	14.32	2.44	13.30	16.25	7/8	19.50	12.68	17.90	20.86	8	8	36
14	300	16.40	2.83	15.44	18.75	7/8	21.25	19.82	20.25	25.08	10	10	49
16	300	18.50	2.83	17.54	21.00	7/8	23.34	21.92	24.83	27.12	12	12	56
18	200	20.60	2.91	19.64	23.25	7/8	26.40	24.84	25.25	29.64	12	12	61
20	200	22.70	2.67	21.74	25.50	7/8	28.56	27.00	27.50	31.66	14	14	75
24	200	26.90	3.50	25.94	30.00	7/8	33.86	32.30	31.54	36.14	16	16	134
30	200	33.29	3.49	32.17	36.88	1 1/8	40.12	38.56	39.12	44.18	20	20	201
36	200	39.59	3.49	38.47	43.75	1 1/8	46.42	44.86	46.00	51.29	24	24	240
42	175	45.79	5.15	44.75	50.62	1 3/8	54.86	53.32	53.12	58.82	28	28	581
48	175	52.09	5.15	51.05	57.50	1 3/8	61.16	59.62	59.42	65.12	32	32	664

*All dimensions in inches except where indicated.



Split Stargrip® series 3000s

Split Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe
Patent #5,772,252

INSTALLATION INSTRUCTIONS - SIZES 3" - 48"

**STEP 1**

Existing joint must be disassembled and thoroughly cleaned. If necessary, replace the existing gasket with a field cut gasket. Brush both the gasket and the plain end with soapy water or approved pipe lubricant which meets ANSI/AWWA C111/A21.11. Firmly insert the split gasket into the bell cavity.

**STEP 2**

Remove the clamping bolts from the split Stargrip®. Loosely assemble the halves on the pipe making sure that the lip extension is towards the mechanical joint bell. Then reinstall the clamping bolts.

**STEP 3**

Slide the loosely assembled Stargrip® towards the MJ bell and insert T-Bolts and hand-tighten the nuts.

**STEP 4**

Tighten Clamping bolts on the Split Stargrip® to 90 - 110 lbs-ft.

**STEP 5**

Tighten the T-bolts to normal range of bolt torque. It is necessary that the gland be brought up toward the bell flange evenly maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. T-Bolts should be tightened alternately on the opposite sides (Star Pattern). (see table A).

**STEP 6**

Hand tighten the torque limiting twist off nuts in a clockwise direction until all wedges are in firm contact with the pipe surface.

Continue tightening in an alternative manner going on opposite sides [Star Pattern], until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

If removal is necessary utilize the 5/8" hex head provided. [If reassembly is required assemble the joint in the same manner as above and tighten the wedge bolts to 90 lbs. ft. on sizes 3"-20" 120 lbs. ft. on sizes 24"-36" & 130 lbs. ft. on sizes 42"-48"].

Note: Not to be used on plain end fittings or PVC, HDPE or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1 1/4	120-150

¹These torque ranges are requirements of AWWA C600



Stargrip® series 3100P

Wedge Action Restraint
for Ductile Iron Pipe Bells - New Installations
Patent #5,772,252



Stargrip® series 3100P for Ductile Iron Pipe

FEATURES & ADVANTAGES

- Stargrip® and MJ Gland manufactured from Ductile Iron per ASTM A536, Grade 65-45-12.
- Includes Stargrip®, Split Back-Up Ring (for sizes 3"-30") or MJ Gland (for sizes 36"-48") and high strength low alloy steel double ended rods and nuts which meet the requirements of ANSI/AWWA C111/A21.11
- Minimum Safety Factor 2:1
- For use on all classes of Ductile Iron Pipe
- For new pipe-to-pipe installations only
- Pipe OD must be gauged overall to assure restraint will fit properly.
- Please refer to chart for maximum bell outside diameter for rod clearance.
- Standard gland color is Graphite Black (RAL 9011).

TECHNICAL INFORMATION

SPLIT STARGRIP® 3100P SPECIFICATIONS*

NOM. SIZE	ITEM CODE	MAX PRESSURE RATING (PSI)	RODS (QTY)	ROD DIA X LENGTH	MAX. BELL OD	APPROX WT. (LBS)
3	SGDPG03	350	4	3/4 X 17	5.44	19
4	SGDPG04	350	4	3/4 X 17	6.62	23
6	SGDPG06	350	6	3/4 X 17	8.62	35
8	SGDPG08	350	6	3/4 X 17	10.88	42
10	SGDPG10	350	8	3/4 X 24	13.12	60
12	SGDPG12	350	8	3/4 X 24	15.38	76
14	SGDPG14	350	8	3/4 X 24	17.88	121
16	SGDPG16	350	10	3/4 X 24	20.12	142
18	SGDPG18	250	10	3/4 X 24	22.38	165
20	SGDPG20	250	12	3/4 X 24	24.62	192
24	SGDPG24	250	14	3/4 X 24	29.12	276
30	SGDPG30	250	18	1 X 24	35.75	499
36	SGDPG36	250	24	1 X 24	42.62	495
42	SGDPG42	250	28	1 1/4 X 24	49.25	1176
48	SGDPG48	250	32	1 1/4 X 24	56.12	1379

*All dimensions in inches except where indicated.

SAMPLE SPECIFICATIONS

Restrainer mechanism shall be integrated into the design of the gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" hex operating nut. The operating nut shall be threaded onto the actuating bolt, not swaged or riveted. The restraining twist off nut bolt system shall have a torque-limiting feature designed to break off at preset torque levels, thus insuring proper action of restraining device. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements. The wedge shall be manufactured of high strength ductile iron and be heat treated to a minimum hardness of 370 BHN.

The mechanical joint restraint mechanism shall have a maximum water working pressure of 350 PSI for sizes 3"-16" and 250 PSI for sizes 18" and above. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The restraint mechanism shall be Star® Pipe Products, Stargrip® series 3100P or an approved equal.

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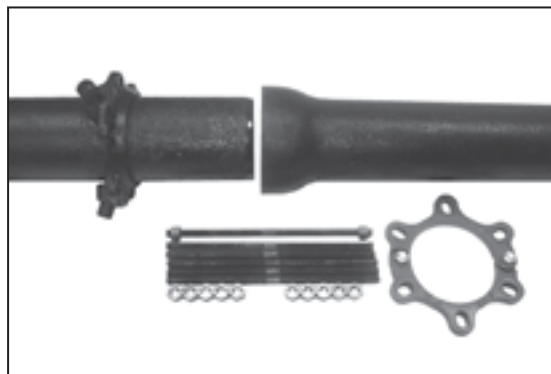


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**Stargrip® series 3100P**

Wedge Action Restraint
for Ductile Iron Pipe Bells - New Installations
Patent #5,772,252

INSTALLATION INSTRUCTIONS - SIZES 3" - 30"**STEP 1**

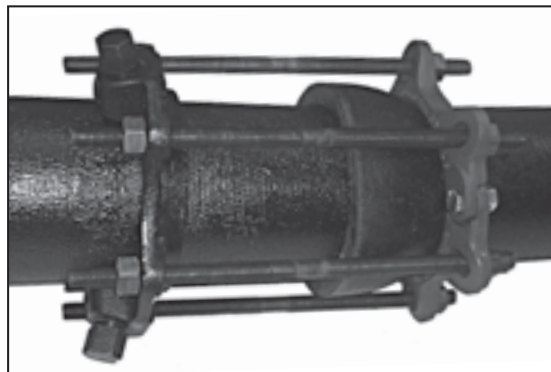
Stargrip® Series 3100P is designed to restrain Push-On Ductile Iron Pipe connections (all thickness classes). It includes a Stargrip® Series 3000 restraint gland for the spigot end and an Split Back-Up Ring behind the bell.

Place the Stargrip® Series 3000 restraint gland on the spigot end of the plain pipe with the lip extension facing towards the mating bell.

**STEP 2**

Install the Split Back-Up Ring behind the pipe bell in the direction indicated on the casting. Tighten clamping bolts on the Split Back-Up Ring 90 lb-ft

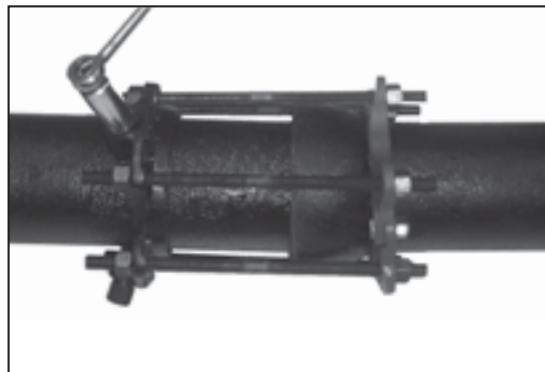
Assemble the Pipe Push-On joint per the pipe manufacturer's installation instructions.

**STEP 3**

Rotate Stargrip® Series 3000 restraint gland on the spigot such that the boltholes are in alignment and adjust the position so that the distance between the glands is suitable for the double-ended rod length. Adequate length should be allowed on the double-ended rods so that nuts can be fully engaged with several threads showing.

Install the remaining double-ended rods provided in each bolt hole. Place nuts on the ends of each double-ended rod. It is to be ensured that adequate length is allowed on rods to fully engage the nuts with several threads showing.

Pull Stargrip® Series 3000 restraint gland away from the joint until there is no slack in the rods.

**STEP 4**

Tighten the torque limiting twist off nuts in a clockwise direction until all the wedges are in firm contact with the pipe OD. Continue tightening in an alternative manner going on opposite sides (Star Pattern) until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

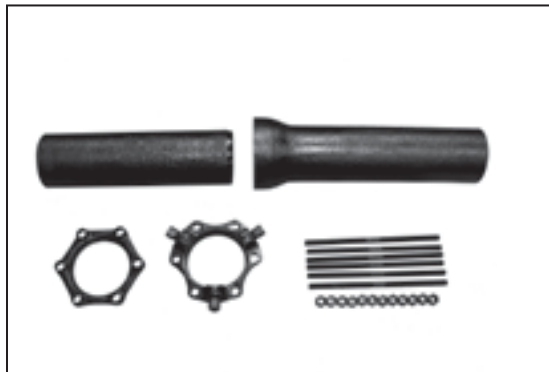
The nuts on the double-ended rods must be tightened until the Split Back-Up Ring is in firm contact with the back of the bell. These nuts should not be over tightened.

If removal of the Stargrip® Series 3000 restraint gland is necessary, utilize the 5/8" hex head provided. If reassembly is required assemble the product in the same manner as above and tighten the wedge bolts to 90 lbs. ft. on sizes 3"-20" 120 lbs. ft. on sizes 24"-30".

Note: Not to be used on plain end fittings or PVC HDPE and steel pipe.

**Stargrip® series 3100P**

Wedge Action Restraint
for Ductile Iron Pipe Bells - New Installations
Patent #5,772,252

INSTALLATION INSTRUCTIONS - SIZES 36" - 48"**STEP 1**

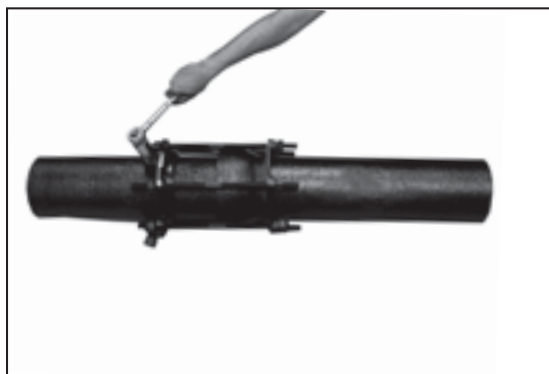
Stargrip® Series 3100P is designed to restrain Push-On Ductile Iron Pipe connections (all thickness classes). It includes a Stargrip® Series 3000 restraint gland for the spigot end and an MJ Gland behind the bell.

Place the Stargrip® Series 3000 restraint gland on the spigot end of the plain pipe with the lip extension facing towards the mating bell.

**STEP 2**

Install the MJ Gland behind the pipe bell with the lip extension facing towards the bell.

Assemble the Pipe Push-On joint per the pipe manufacturer's installation instructions.

**STEP 3**

Rotate Stargrip® Series 3000 restraint gland on the spigot such that the bolt holes are in alignment and adjust the position so that the distance between the glands is suitable for the double-ended rod length. Adequate length should be allowed on the double-ended rods so that nuts can be fully engaged with several threads showing.

Install the remaining double-ended rods provided in each bolt hole. Place nuts on the ends of each double-ended rod. It is to be ensured that adequate length is allowed on rods to fully engage the nuts with several threads showing.

Pull Stargrip® Series 3000 restraint gland away from the joint until there is no slack in the rods.

**STEP 4**

Tighten the torque limiting twist off nuts in a clockwise direction until all the wedges are in firm contact with the pipe OD. Continue tightening in an alternative manner going on opposite sides (Star Pattern) until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

The nuts on the double-ended rods must be tightened until the MJ Gland is in firm contact with the back of the bell. These nuts should not be over tightened.

If removal of the Stargrip® Series 3000 restraint gland is necessary, utilize the 5/8" hex head provided. If reassembly is required assemble the product in the same manner as above and tighten the wedge bolts to 120 lbs. ft. on size 36" & 130 lbs. ft. on sizes 42"-48".

Note: Not to be used on plain end fittings or PVC HDPE and steel pipe.

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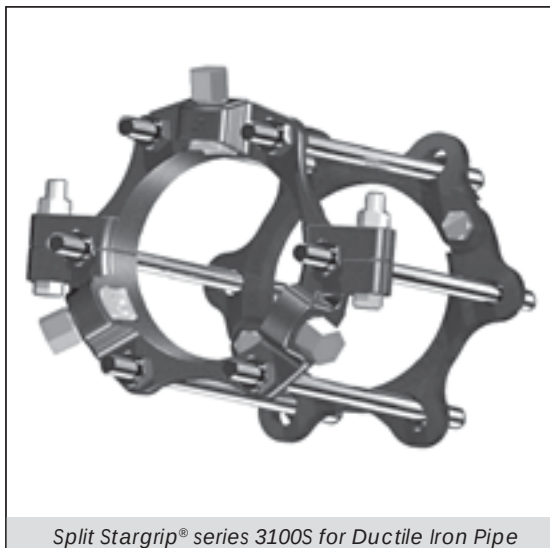
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Split Stargrip® series 3100S

Split Wedge Action Restraint
for Ductile Iron Pipe - New or Existing Installations
Patent #5,772,252



Split Stargrip® series 3100S for Ductile Iron Pipe

FEATURES & ADVANTAGES

- Split Stargrip® series 3000S and Split Back-Up ring produced from Ductile Iron per ASTM A536, Grade 65-45-12.
- Includes Stargrip® series 3000S, Split Back-Up Ring and high strength low alloy steel double ended rods and nuts which meet the requirements of ANSI/AWWA C111/A21.11
- Minimum Safety Factor 2:1
- For use on all classes of Ductile Iron Pipe
- For new and existing pipe to pipe installations
- Pipe OD must be gauged overall to assure restraint will fit properly.
- Please refer to chart for maximum bell outside diameter for rod clearance.
- Standard gland color is Graphite Black (RAL 9011).

TECHNICAL INFORMATION

SPLIT STARGRIP® 3100S SPECIFICATIONS*

NOM. SIZE	ITEM CODE	MAX PRESSURE RATING (PSI)	RODS (QTY)	ROD DIA X LENGTH	MAX. BELL OD	APPROX WT. (LBS)
3	SGDPG03S	350	4	3/4 X 17	5.44	22
4	SGDPG04S	350	4	3/4 X 17	6.62	26
6	SGDPG06S	350	6	3/4 X 17	8.62	36
8	SGDPG08S	350	6	3/4 X 17	10.88	42
10	SGDPG10S	300	8	3/4 X 24	13.12	64
12	SGDPG12S	300	8	3/4 X 24	15.38	78
14	SGDPG14S	300	8	3/4 X 24	17.88	122
16	SGDPG16S	300	10	3/4 X 24	20.12	142
18	SGDPG18S	200	10	3/4 X 24	22.38	154
20	SGDPG20S	200	12	3/4 X 24	24.62	186
24	SGDPG24S	200	14	3/4 X 24	29.12	288
30	SGDPG30S	200	18	1 X 24	35.75	485
36	SGDPG36S	200	22	1 X 24	42.62	600
42	SGDPG42S	175	26	1 1/4 X 24	49.25	944
48	SGDPG48S	175	30	1 1/4 X 24	56.12	1131

*All dimensions in inches except where indicated.

SAMPLE SPECIFICATIONS

Restraint for DI push on bells shall incorporate the use of a split restraint and split follower into its design. Split restrainer mechanism shall be integrated into the design of the gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" hex operating nut. The operating nut shall be threaded onto the actuating bolt, not swaged or riveted. The restraining twist off nut bolt system shall have a torque-limiting feature designed to break off at preset torque levels, thus insuring proper action of restraining device. Split follower shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements. The wedge shall be manufactured of high strength ductile iron and be heat treated to a minimum hardness of 370 BHN.

The split mechanical joint restraint shall have a maximum water working pressure of 350 PSI for sizes 3"-16" and 250 PSI for sizes 18" and above. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The restraint mechanism shall be Star® Pipe Products, Split Stargrip® series 3100S or an approved equal.

REV 07



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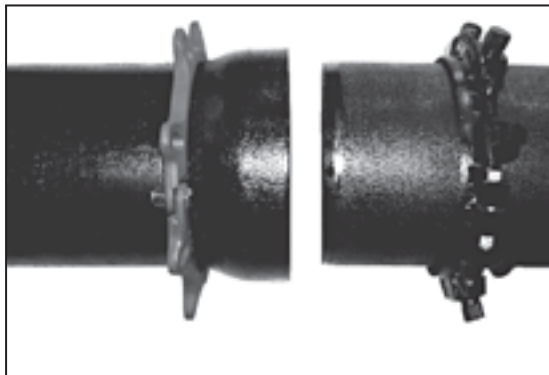
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Split Stargrip® series 3100S

Split Wedge Action Restraint
for Ductile Iron Pipe - New or Existing Installations
Patent #5,772,252

INSTALLATION INSTRUCTIONS - SIZES 3" - 48"

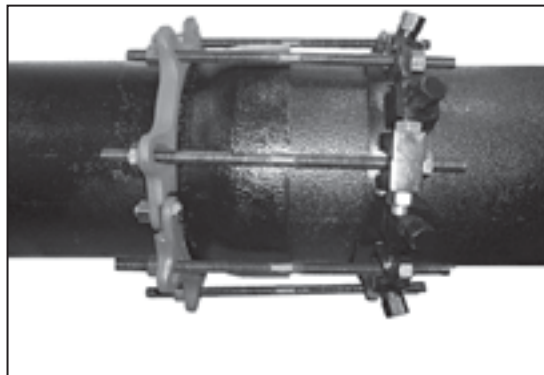
**STEP 1**

Split Stargrip® Series 3100S is designed to restrain new and existing installations of Ductile Iron Pipe conforming to AWWA/ANSI C151/A21.51 (all thickness classes) push-on pipe bells. It includes a Split Stargrip® Series 3000S restraint gland for the spigot end and a Split Back-Up Ring behind the bell.

Assemble the Pipe Push-On joint per the pipe manufacturer's installation instructions in case of new installations or make sure that Push-On Pipe joint pipe is installed correctly per manufacturers installation instructions in case of existing joints.

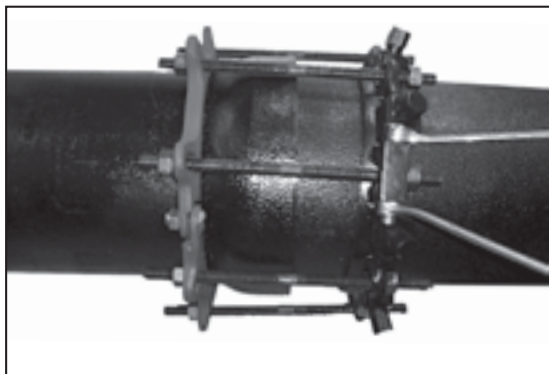
Install the split back up ring behind the pipe bell in the direction indicated on the casting. Tighten clamping bolts on the split back-up ring to 90 lb-ft.

Remove the clamping bolts from the Split Stargrip® Series 3000S. Loosely assemble the halves on the spigot end of the pipe with clamping bolts making sure that the lip extension on the halves is towards the mating pipe bell.

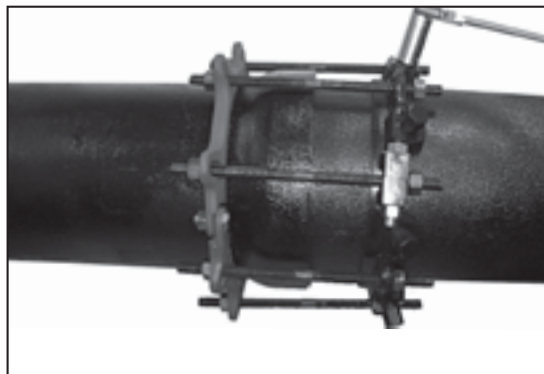
**STEP 2**

Rotate Split Stargrip® Series 3000S restraint gland on the spigot such that the bolt holes are in alignment and adjust the position so that the distance between the glands is suitable for the double-ended rod length. Adequate length should be allowed on the double-ended rods so that nuts can be fully engaged with several threads showing.

Install the remaining double-ended rods provided in each bolthole. Place nuts on the ends of each double-ended rod.

**STEP 3**

Pull Split Stargrip® Series 3000S restraint gland away from the joint until there is no slack in the rods. Tighten Clamping bolts on the Split Stargrip® Series 3000S to 90 - 110 lb-ft.

**STEP 4**

Tighten the torque limiting twist off nuts in a clockwise direction until all the wedges are in firm contact with the pipe OD. Continue tightening in an alternative manner going on the opposite sides (Star Pattern) until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

The nuts on the double-ended rods for the Back-Up Ring must be tightened until the Back-Up Ring is in firm contact with the back of the bell. These nuts should not be over tightened.

If removal of the Split Stargrip® Series 3000S restraint gland is necessary, utilize the 5/8" hex head provided. If reassembly is required assemble the product in the same manner as above and tighten the wedge bolts to 90 lbs. ft. on sizes 3"-20" 120 lbs. ft. on sizes 24"-36" & 130 lbs. ft. on sizes 42"-48".

Note: Not to be used on plain end fittings or PVC, HDPE or steel pipe.



PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint
for AWWA C900/C905 and IPS PVC Pipe
Patent #5,071,175



PVC Stargrip® Series 4000 for PVC Pipe

INFORMATION

The PVC Stargrip® Mechanical Joint Restraint System is a unique product with a proven design that provides an exceptional restraining system for mechanical joint fittings (AWWA 153 or C110), valves, fire hydrants and all classes of PVC pipe.

Unique Product with a Proven Design

FEATURES & ADVANTAGES

- The design has been proven in the market since 1992.
- Can be used on 4"-12" AWWA C900, 14"-36" AWWA C905 PVC pipe or 3"-12" IPS PVC pipe.
- Gland is made from high strength Ductile Iron per ASTM A536 Grade 65-45-12 and is compatible with all Mechanical Joints Conforming to ANSI/AWWA C111/A21.11.
- Eliminates tie rods and thrust blocks.
- Listed with Underwriters Laboratories in sizes 4"-12" for use on DR18 class 150 C900 PVC pipe and approved by Factory Mutual Research in sizes 4"-12" for use on DR18 class 150 and DR14 class 200 C900 PVC pipe.
- Tested to and meets the requirements of ASTM F1674 through 14" size.
- The safety factor is twice (2:1) the standardized pressure rating of the pipe on which it is used.
- Double headed torque limiting bolts utilize 1 1/4" wrench size on both hex heads.
- Will fit any Mechanical Joint configuration, meaning compatibility with different types of installations.
- PVC Stargrip® offers 5° deflection through 12", 3° on 14"-24" and 2° on 30"-36".
- Larger ID allows easier installation on out-of-round pipe.
- Torque limiting bolts are designed with collars so that a wrench won't slip off the bottom for easier installation.
- Torque limiting bolts are designed so that you can't over torque and damage PVC pipe.
- All sizes have curved wedges that will not flatten pipe.
- For use on HDPE or C909 pipe, please contact Star Engineering
- Standard gland color is Coral Red (RAL 3016).

SAMPLE SPECIFICATIONS

Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

The actuating bolt shall be threaded into the gland and have a 1-1/4" hex operating nut. The actuating bolt system shall have a torque-limiting head designed to break off at preset torque levels, thus insuring proper action of the restraining device. After removal of the torque-limiting head, a 1 1/4" hex head shall remain to facilitate the removal and re-assembly of the gland. Glands, bolts and wedges shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements.

Applicable dimensions conforming to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/121.53 and shall be incorporated into the design so that the device facilitates use with standard mechanical joint sockets.

The restraining mechanism shall have a pressure rating equal to that of the pipe on which it is used and shall have a safety factor of at least 2:1. The restraining device for C900/C905 PVC and IPS PVC Pipe shall be Star® Pipe Products PVC Stargrip® Series 4000 or equal.

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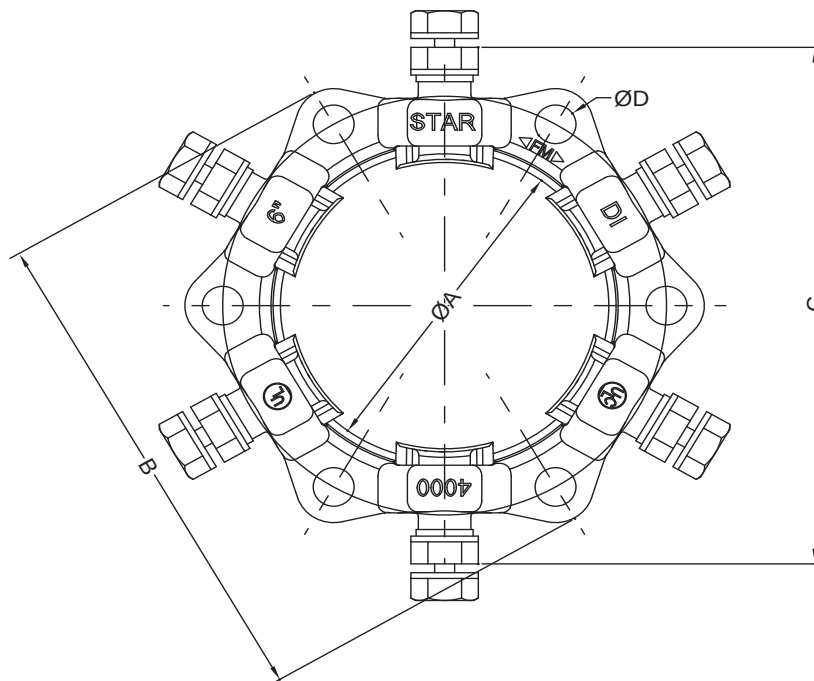


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**PVC Stargrip® series 4000**

Mechanical Joint Wedge Action Restraint
for AWWA C900/C905 and IPS PVC Pipe
Patent #5,071,175

TECHNICAL INFORMATION**PVC STARGRIP® 4000 SPECIFICATIONS***

NOM. SIZE	C900/C905 PIPE OD	IPS PIPE OD	ØA	B	C¹	ØD	T-BOLTS SIZE (QTY)	APPROX WT. (LBS)
3	N/A	3.50	4.09	7.79	8.50	3/4	5/8 (4)	7
4	4.80	4.50	4.93	9.16	9.64	7/8	3/4 (4)	9
6	6.90	6.63	7.03	11.16	11.72	7/8	3/4 (6)	12
8	9.05	8.63	9.18	13.75	13.97	7/8	3/4 (6)	17
10	11.10	10.75	11.23	16.00	16.18	7/8	3/4 (8)	23
12	13.20	12.75	13.33	18.25	18.23	7/8	3/4 (8)	28
14	15.30	N/A	15.45	20.75	20.36	7/8	3/4 (10)	49
16	17.40	N/A	17.55	23.00	22.46	7/8	3/4 (12)	59
18	19.50	N/A	19.65	25.25	24.56	7/8	3/4 (12)	67
20	21.60	N/A	21.75	27.50	26.66	7/8	3/4 (14)	79
24	25.80	N/A	25.95	32.00	30.86	7/8	3/4 (16)	102
30	32.00	N/A	32.18	39.38	36.82	1-1/8	1 (20)	185
36	38.30	N/A	38.48	46.25	43.12	1-1/8	1 (20)	209

*All dimensions in inches except where indicated.

¹ - dimension after assembly on pipe

STANDARDIZED PRESSURE RATINGS**

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD		ASTMD2241 IPS OD	
DR 14	200 PSI	DR 18	235 PSI	SDR 17	250 PSI
DR 18	150 PSI	DR 21	200 PSI	SDR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI	SDR 26	160 PSI
		DR 32.5	125 PSI		

**For ordinary water works with transient surges only. Ratings are for PVC pipes with SERIES 4000 Restrainer.

**PVC Stargrip® series 4000**

Mechanical Joint Wedge Action Restraint
for AWWA C900/C905 and IPS PVC Pipe
Patent #5,071,175

INSTALLATION INSTRUCTIONS - SIZES 3" - 36"**STEP 1**

The rubber gasket seals more effectively if the surfaces with which it comes in contact are thoroughly cleaned just before assembly to remove all loose foreign material. Lubrication and additional cleaning should be provided by brushing both the gasket and the plain end with soapy water or pipe lubricant. Slide the PVC Stargrip® on the plain end, followed by the MJ gasket.

**STEP 2**

After insertion of the pipe into the bell of the fitting firmly press the gasket into the gasket recess. During this process the joint should be kept straight.

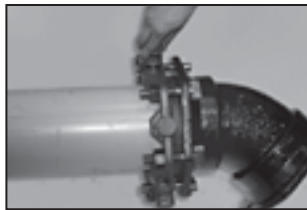
**STEP 3**

Slide the PVC Stargrip® toward the MJ bell with the gland lip against the gasket. Insert T-bolts and hand tighten nuts.

IMPORTANT: Make deflection after joint is assembled but before tightening T-bolts.

**STEP 4**

While tightening T-bolts it is essential that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. All T-bolts should be tightened until they are in within the torque range per ANSI/AWWA C600 (See Table A). T-Bolts should be tightened alternately on opposite sides (Star Pattern).

**STEP 5**

Hand tighten the Torque-limiting twist-off Bolts in a clockwise direction until all wedges are in firm contact with the pipe surface.

IMPORTANT: When installing sizes 4" through 12" on IPS PVC the spacer washers must be removed from the torque limiting bolts.

**STEP 6**

Continue tightening in an alternative manner going on opposite sides [Star Pattern], until all of the Torque-limiting twist-off Bolt heads have been twisted off. Never turn a single bolt over 180 degrees without alternating to another bolt.

If removal is necessary utilize the 1 1/4" hex head provided. [If reassembly is required assemble the joint in the same manner as above and tighten the wedge bolt to 90 ft. lb].

Note: If effective sealing is not attained at the maximum torque indicated then the joint should be disassembled thoroughly cleaned and reassembled.
Overstressing the bolts to compensate for poor installation practice is not acceptable.

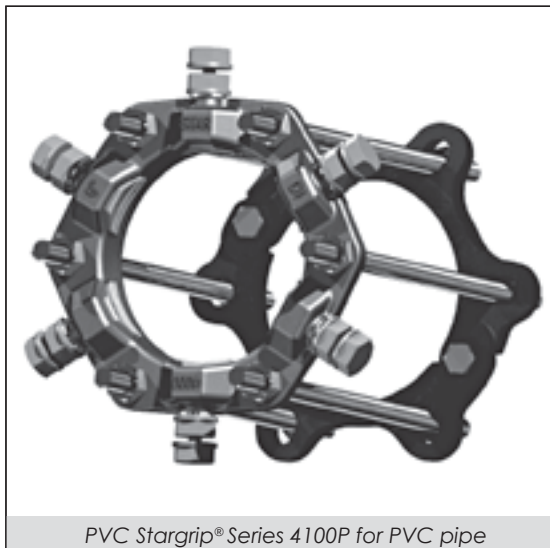
Note: Not to be used on plain end fittings DI or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120

¹These torque ranges are requirements of AWWA C600

**PVC Stargrip® series 4100P**

Wedge Action Restraint for AWWA C900/C905 PVC Pipe Bells
New Installations Only
Patent #5,071,175



PVC Stargrip® Series 4100P for PVC pipe

FEATURES & ADVANTAGES

- For use on ANSI/AWWA C900/C905 CI OD PVC pipe.
- For new Push-On Pipe Bell installations only
- Includes PVC Stargrip®, Split Back-Up Ring and high strength low alloy steel double ended rods and nuts which meet the requirements of ANSI/AWWA C111/A21.11
- Please refer to chart for maximum bell outside diameter for rod clearance.
- The safety factor is twice (2:1) the standardized pressure rating of the pipe on which it is used.
- Standard gland color is Coral Red (RAL 3016).

New Installations Only**TECHNICAL INFORMATION****PVC STARGRIP® 4100P SPECIFICATIONS***

NOM. SIZE	ITEM CODE	RODS (QTY)	ROD DIA X LENGTH	MAX. BELL OD	APPROX WT. (LBS)
4	PVCG4004	4	3/4 X 17	6.62	24
6	PVCG4006	6	3/4 X 17	8.62	34
8	PVCG4008	6	3/4 X 17	10.88	42
10	PVCG4010	8	3/4 X 24	13.12	61
12	PVCG4012	8	3/4 X 24	15.38	70
14	PVCG4014	8	3/4 X 24	17.88	121
16	PVCG4016	10	3/4 X 24	20.12	144
18	PVCG4018	10	3/4 X 24	22.38	161
20	PVCG4020	12	3/4 X 24	24.62	189
24	PVCG4024	14	3/4 X 24	29.12	250
30	PVCG4030	18	1 X 24	35.75	470
36	PVCG4036	22	1 X 24	42.62	576

*All dimensions in inches except where indicated. See page 20 for installation instructions.

SAMPLE SPECIFICATIONS

Restraint for PVC push-on bells shall incorporate the use of a solid wedge action restraint and split follower into its design. Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained.

The actuating bolt shall be threaded into the gland and have a 1-1/4" hex operating nut. The actuating bolt system shall have a torque-limiting head designed to break off at preset torque levels, thus insuring proper action of the restraining device. After removal of the torque-limiting head, a 1 1/4" hex head shall remain to facilitate the removal and re-assembly of the gland. Glands, bolts and wedges shall be manufactured of high strength ductile iron in accordance with ASTM A536 Grade 65-45-12 requirements.

Applicable dimensions conforming to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/121.53 and shall be incorporated into the design so that the device facilitates use with standard mechanical joint sockets.

All sizes shall have a minimum safety factor of 2:1 (i.e. twice the pressure rating of the pipe on which it is used). The restraint mechanism shall be Star® Pipe Products, PVC Stargrip® series 4100P or approved equal.

REV 07



® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

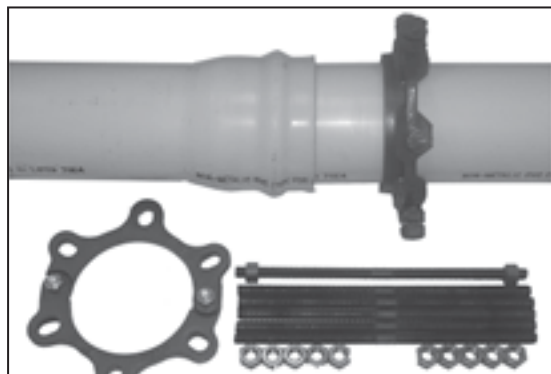
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PVC Stargrip® series 4100P

Wedge Action Restraint for AWWA C900/C905 PVC Pipe Bells
New Installations Only
Patent #5,071,175

INSTALLATION INSTRUCTIONS - SIZES 3" - 36"

**STEP 1**

PVC Stargrip® Series 4100P is designed to restrain PVC Pipe conforming to AWWA/ANSI AWWA C900/C905 (all pressure classes) push-on pipe bells. It includes a PVC Stargrip® Series 4000 gland for the spigot end and a split back-up ring behind the bell.

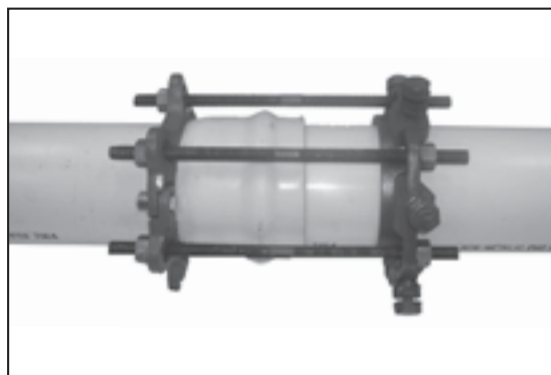
Place the PVC Stargrip® Series 4000 restraint gland on the spigot end of the second pipe with the lip extension facing towards the mating bell.

Assemble the PVC Pipe Push-On joint per the pipe manufacturer's installation instructions.

**STEP 2**

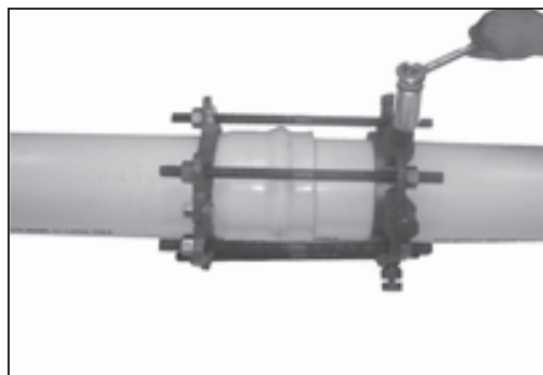
Install the split back up ring behind the pipe bell in the direction indicated on the casting. Tighten clamping bolts on the split back-up ring to 90 lb-ft.

Rotate PVC Stargrip® Series 4000 restraint gland on the spigot such that the boltholes are in alignment and adjust the position so that the distance between the glands is suitable for the double-ended rod length. Adequate room should be allowed on the double-ended rods so that nuts can be fully engaged with several threads showing.

**STEP 3**

Install the remaining double-ended rods provided in each bolt hole for evenly distributing the operating load. Place nuts on the ends of each double-ended rod. It is to be ensured that adequate room is allowed on rods to fully engage the nuts with several threads showing.

Pull PVC Stargrip® Series 4000 restraint gland away from the joint until there is no slack in the rods.

**STEP 4**

Tighten the torque limiting twist off nuts in a clockwise direction until all the wedges are in firm contact with the pipe OD. Continue tightening in an alternative manner going on opposite sides (Star Pattern) until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

The nuts on the double-ended rods must be tightened until the back-up ring is in firm contact with the back of the bell. These nuts should not be over tightened.

If removal of the PVC Stargrip® Series 4000 restraint gland is necessary, utilize the 1 1/4" hex head provided. If reassembly is required assemble the product in the same manner as above and tighten the wedge bolts to 90 lb-ft.

Note: Not to be used on plain end fittings DI or steel pipe.

STANDARDIZED PRESSURE RATINGS*

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD	
DR 14	200 PSI	DR 18	235 PSI
DR 18	150 PSI	DR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI
		DR 32.5	125 PSI

*For the ordinary water works with Transient surges only. Ratings are for PVC pipes with series 4100P Restraint.



PVC Ring Lock^{series 3500} (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System

Designed for C900/C905 and IPS PVC Pipe

Patent #5,947,527



PVC Ring Lock series 3500 for PVC pipe

INFORMATION

The PVC Ring Lock System is an innovative design with a 360° grip-ring feature. This feature provides uniform restraining pressure around the circumference of the pipe, thus avoiding pipe distortion and point loading. Its unique independent restraining and sealing features allows it to be used for Push-On and Mechanical Joint fittings, Valves and Fire Hydrants. It can be used on any class, C900 PVC and IPS PVC pipe.

Innovative 360° Grip-Ring Restraint

FEATURES & ADVANTAGES

- Unique ring design provides 360° pipe restraint, so there is no point loading on the pipe.
- No washers or spacers to remove when used on CI OD PVC pipe or IPS PVC pipe
- One ring fits both CI OD PVC pipe and IPS PVC pipe used.
- Universal application for various types of PVC pipe simplifies inventory requirements and reduces carry cost.
- Double headed torque limiting bolts utilize 1¼" wrench size on both hex heads.
- Torque limiting bolts are designed with collars so that a wrench won't slip off bottom for easier installation.
- PVC Grip sizes 4"-12" are listed with Underwriters Laboratories for use on DR18 class 150 C900 PVC pipe and are Factory Mutual Research Approved for use on DR18 class 150 C900 PVC pipe.
- Tested to and meets the requirements of ASTM F1674 through 12" size
- Safety factor is twice (2:1) the standardized pressure rating of the pipe on which it is used.
- Offers a full 5° deflection through 12" and 3° on 16"
- Gland, ring and follower gland are made from high strength ductile iron per ASTM A536, grade 65-45-12 and are compatible with all mechanical joints conforming to ANSI/AWWA C111/A21.11.
- Eliminates tie rods and thrust blocks
- For use on HDPE or C909 pipe, Please contact Star Engineering
- Standard gland color is Coral Red (RAL 3016).

SAMPLE SPECIFICATIONS

Restrainer mechanism shall be integrated into the design of the follower gland. The gripping or restraining mechanism shall transmit uniform restraining pressure around the circumference of the pipe, thus avoiding point loading or pipe distortion. This restraining process shall be kept separate from the mechanical joint sealing process and not a part of the sealing function. Glands and rings components shall be manufactured of ductile iron conforming to ASTM A536, grade 65-45-12.

The restraining torque limiting bolt system shall have a torque-limiting feature designed to break off at preset torque limit to ensure proper actuation. Both the twist off head and the removal head shall be the same size as the T-bolt nut.

The restraining mechanism design can replace the standard mechanical joint gland and can be used with the standard mechanical joint bells conforming to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/A21.53 of the latest revision.

The restraining mechanism shall have a pressure rating equal to that of the pipe on which it is used. All sizes shall have a minimum safety factor of 2:1 (i.e. twice the pressure rating of the pipe on which it is used). The restraining mechanism through 12" size shall be Listed by Underwriters Laboratories, Inc., Approved by Factory Mutual Research and shall be tested to ASTM F 1674. The restraining device for C900/C905 PVC and IPS PVC Pipe shall be Star Pipe Products PVC Ring Lock Series 3500 or equal.



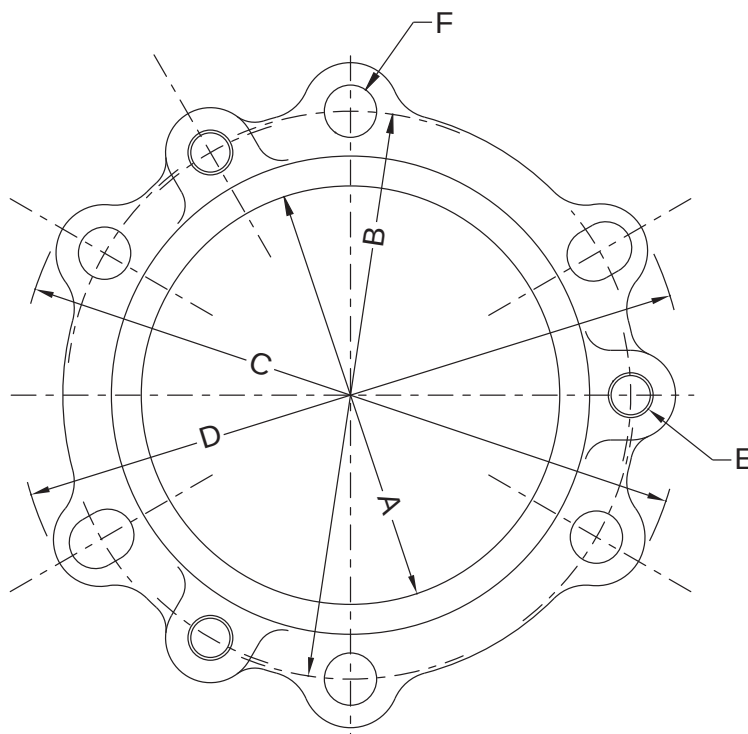
PVC Ring Lock^{series} 3500 (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System

Designed for C900/C905 and IPS PVC Pipe

Patent #5,947,527

TECHNICAL INFORMATION



PVC RING LOCK 3500 SPECIFICATIONS*

SIZE	ANSI/AWWA C900/C905 PIPE O.D.	IPS PIPE O.D.	A	B	C	D	E	F	APPROX WT. (LBS)
4	4.80	4.50	4.90	7.50	9.13	9.13	4 @ .75	4 @ .75	13
6	6.90	6.63	7.00	9.50	11.13	11.75	3 @ .75	6 @ .75	16
8	9.05	8.63	9.15	11.75	13.38	14.00	4 @ .75	6 @ .75	21
10	11.10	10.75	11.20	14.00	15.63	16.75	6 @ .75	8 @ .75	31
12	13.20	12.75	13.30	16.25	17.88	19.13	8 @ .75	8 @ .75	41
16	17.40	N/A	17.54	21.00	22.50	22.50	10 @ .75	12 @ .75	73

*All dimensions in inches except where indicated.

STANDARDIZED PRESSURE RATINGS**

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD		ASTM D2241 IPS OD	
DR 14	200 PSI	DR 18	235 PSI	SDR 17	250 PSI
DR 18	150 PSI	DR 21	200 PSI	SDR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI	SDR 26	160 PSI
		DR 32.5	125 PSI		

**For the ordinary water works with Transient surges only. Ratings are for PVC pipes with SERIES 3500 Restrainer.

REV 07



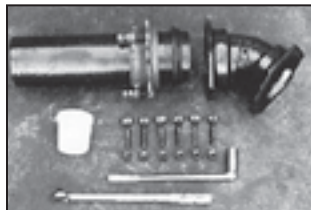
PVC Ring Lock series 3500 (PVCGRIP™)

Mechanical Joint 360° Ring Type Restraint System

Designed for C900/C905 and IPS PVC Pipe

Patent #5,947,527

INSTALLATION INSTRUCTIONS - SIZES 4" - 16"

**STEP 1**

The rubber gasket will seal more effectively if the surfaces with which it comes in contact are thoroughly cleaned just before assembly to remove all loose foreign material. Lubrication and additional cleaning should be provided by brushing both the gasket and the plain end with soapy water or pipe lubricant. Slide the PVCGRIP on the plain end followed by the MJ gasket.

**STEP 2**

After insertion of the pipe into the bell of the fitting firmly press the gasket into the gasket recess. During this process the joint should be kept straight.

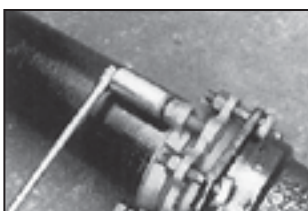
**STEP 3**

Slide the PVCGRIP toward the MJ bell with the fitting firmly press the gasket into the gasket recess. Insert T-bolts and hand tighten nuts.

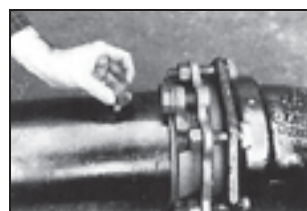
IMPORTANT: Make deflection after joint is assembled but before tightening T-bolts.

**STEP 4**

When tightening bolts it is essential that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. All T-bolts should be tightened until they are within the torque range per ANSI/AWWA C600 (See table A below). T-Bolts should be tightened alternately on opposite sides (Star Pattern).

**STEP 5**

After correct assembly of the mechanical joint tighten each torque limiting bolt by turning approximately 180 degrees in a clockwise direction alternating between bolts on opposite sides (Star Pattern) until the break away heads twist off. Never turn a single head over 180 degrees without alternating to another bolt.

**STEP 6**

If removal is necessary use the 1 1/4" hex provided. [If reassembly is required contact Star for replacement torque limiting bolts].

Note: Not to be used on plain end fittings DI or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1 1/4	120-150

¹These torque ranges are requirements of AWWA C600

**StarFlange™ series 3200**Restrained Adapter Flange Coupling
for Ductile Iron Pipe

StarFlange™ Series 3200 for Ductile Iron Pipe

INFORMATION

StarFlange™ Series 3200 is a restrained adapter flange coupling device designed to connect plain end ductile iron pipe to a flanged pipe, valve or fitting. A ductile iron flange body provides the flange connection and includes an O-ring gasket that seals with the mating flange. The Stargrip® Series 3000 provides restraint for the plain end ductile iron pipe.

**No Special Tools
Required for Installation****FEATURES & ADVANTAGES**

- Provides flexibility to accommodate pipe misalignment
- No special tools required for installation
- Fully restrained to pressure rating of pipe with a 2:1 safety factor
- Pipe end does not need to be square cut.
- StarFlange™ body and Stargrip® are manufactured from high strength Ductile Iron per ASTM A536, Grade 65-45-12.
- Flange meets ANSI Class 125/150 and ANSI/AWWA C115/A21.15 drill pattern.
- MJ gasket and O-ring flange gasket are made from styrene butadiene rubber (SBR) per ANSI/AWWA C111/A-21.11.
- T-bolts / nuts are produced from high strength low alloy steel per ANSI/AWWA C111/A-21.11
- Restraint wedges are heat-treated to minimum 370 BHN.
- Includes Stargrip®, Flange Adapter, MJ Gasket, O-Ring gasket and low alloy steel T-bolts
- StarFlange™ size 3"-12" are listed with Underwriters Laboratories Inc. and approved by Factory Mutual Research (FM).
- Standard gland color is Coral Red (RAL 3016).

SAMPLE SPECIFICATIONS

Restrained adapter flange is to be used to connect plain end ductile iron pipe to a flanged pipe, valve or fitting. The device shall be manufactured of high strength ductile iron in accordance to ASTM A36 Grade 65-45-12 for all sizes. The restrainer portion of the device shall be of wedge type design with torque limiting bolts to insure proper engagement of the wedges.

Applicable dimensions shall conform to ANSI/AWWA C111/A21.15, C110/A21.10 and C153/A21.53. Flange ends to meet ANSI Class 125/150 & ANSI/AWWA C115/A21.15 drill pattern.

The restrained adapter flange shall have a maximum working pressure of 350 PSI for sizes 3"-16" and 250 PSI for sizes 18"-24". All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum rating of the StarFlange™ Series 3200). Restrained flange adapter shall be Star® Pipe Products StarFlange™ Series 3200 or an approved equal.

REV 07



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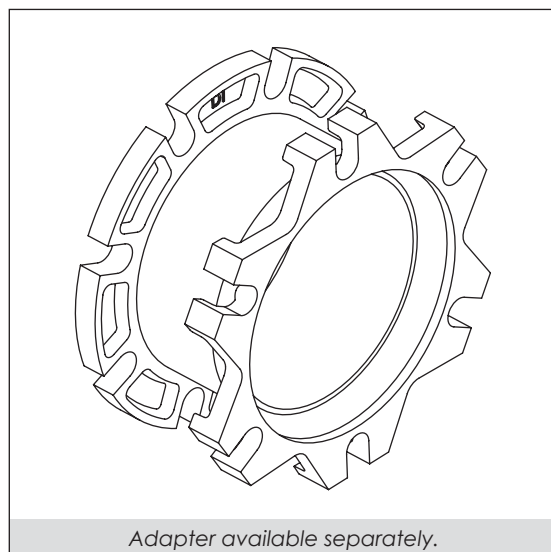
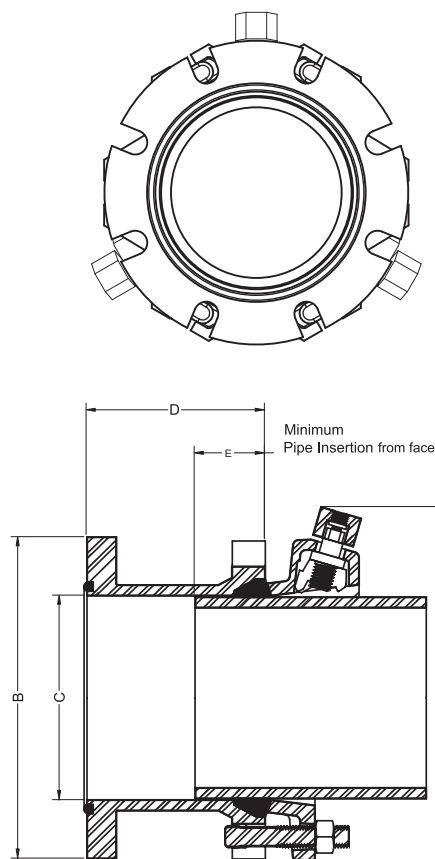
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StarFlange™ series 3200

Restrained Adapter Flange Coupling
for Ductile Iron Pipe

TECHNICAL INFORMATION



STARFLANGE™ 3200 SPECIFICATIONS*

NOM. SIZE	ITEM CODE	MAX PRESSURE RATING (PSI)	A	A W/NUTS TWISTED OFF	B	C	D	E	¹ MAX. JOINT DEFLECTION°	APPROX WT. (LBS)
3	RAC3203	350	9.85	8.45	7.50	4.06	3.88	2.13	5°	19
4	RAC3204	350	11.06	9.28	9.00	4.90	4.35	2.13	5°	27
6	RAC3206	350	13.06	11.38	11.00	7.00	5.25	2.50	5°	40
8	RAC3208	350	15.25	13.53	13.50	9.15	5.25	2.50	5°	52
10	RAC3210	350	17.25	15.58	16.00	11.20	5.62	2.50	3°	71
12	RAC3212	350	19.50	12.68	19.00	13.30	5.69	2.50	3°	98
14	RAC3214	350	21.25	19.82	21.00	15.44	6.67	3.00	2°	133
16	RAC3216	350	23.34	21.92	23.50	17.54	6.79	3.00	2°	162
18	RAC3218	250	26.40	24.84	25.00	19.64	7.40	3.00	1.5°	196
20	RAC3220	250	28.56	27.00	27.50	21.74	7.41	3.00	1.5°	229
24	RAC3224	250	33.86	32.30	32.00	25.94	7.90	3.00	1°	328
30	RAC3230	250	40.12	38.56	38.75	32.17	8.50	3.00	1°	508
36	RAC3236	250	46.42	44.86	46.00	38.47	9.00	3.00	1°	659

*All dimensions in inches except where indicated.

1 - Deflection attained at minimum pipe insertion.



StarFlange™ series 3200

Restrained Adapter Flange Coupling
for Ductile Iron Pipe

INSTALLATION INSTRUCTIONS - SIZES 3"- 24"



STEP 1

Check the StarFlange™ ensuring that no damage has occurred or parts are missing. Make sure that the O-ring gasket on the flange face of the StarFlange™ is securely in place.

The pipe end must be thoroughly cleaned for a distance of 2" greater than the length of the StarFlange™ body. (see dimension "D")

Slide the Stargrip® Gland on the plain end of the pipe making sure that the lip extension is towards the mechanical joint bell of the StarFlange™.



STEP 2

Brush both the gasket and the plain end of the pipe with soapy water or approved pipe lubricant which meets ANSI/AWWA C111/A21.11. Slide the MJ gasket over the pipe with the beveled edge towards the MJ bell of StarFlange™.

Slide the StarFlange™ on to the pipe with the MJ bell towards the Stargrip® Gland. Pipe must be inserted into the StarFlange™ a minimum of 2.125" on 3"-4", 2.500" on 6"-12" and 3.000" on 14"-24" to attain maximum deflection per table.

Position the pipe and flanged end of StarFlange™ against the mating flange making sure that the flange bolt holes line-up. Assemble the flanged joint using flange bolts. **Note: Flange bolts not supplied with StarFlange™.**



STEP 3

Center the pipe so that the space between the OD of the pipe and the ID of the StarFlange™ is even all around the pipe. Slide the MJ Gasket into the MJ bell recess of the StarFlange™.

Slide the Stargrip® towards the StarFlange™ with the Gland lip against the gasket. Insert T-bolts and hand-tighten nuts.



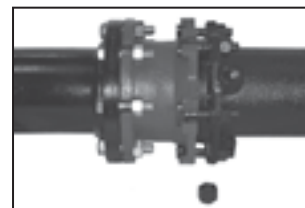
STEP 4

Tighten the T-bolts to normal range of bolt torque (see table below). It is necessary that the gland be brought up toward the bell flange evenly maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. T-bolts should be tightened alternately on opposite sides (Star Pattern) (See Table A).



STEP 5

Hand tighten the torque limiting twist off nuts in a clockwise direction until all wedges are in firm contact with the pipe surface.



STEP 6

Continue tightening in an alternative manner going on the opposite sides [Star Pattern], until all of the nuts have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

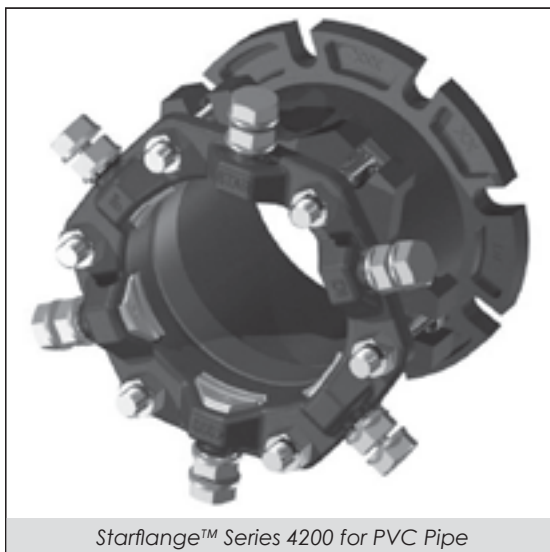
If removal is necessary utilize the 5/8" hex head provided. [If reassembly is required assemble the joint in the same manner as above and tighten the wedge bolts to 90 lbs. ft. on sizes 3"-20" 120 lbs. ft. on sizes 24"-36" & 130 lbs. ft. on sizes 42"-48"].

Note: If effective sealing is not attained at the maximum torque indicated then the joint should be disassembled thoroughly cleaned and reassembled. **Overstressing the bolts to compensate for poor installation practice is not acceptable.**

Note: Not to be used on plain end fittings or PVC HDPE or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120

¹These torque ranges are requirements of AWWA C600

**StarFlange™ series 4200**Restrained Adapter Flange Coupling
for PVC Pipe

Starflange™ Series 4200 for PVC Pipe

INFORMATION

StarFlange™ Series 4200 is a restrained adapter flange coupling device designed to connect plain end PVC pipe to a flanged pipe or fitting. A ductile iron flange body provides the flange connection and includes an O-ring gasket that seals with the mating flange. The PVC Stargrip® Series 4000 provides restraint for the plain end PVC pipe.

**No Special Tools Required
For Installation****FEATURES & ADVANTAGES**

- Provides flexibility to accommodate pipe misalignment
- No special tools required for installation
- Fully restrained to pressure rating of pipe with a 2:1 safety factor
- Pipe end does not need to be square cut.
- Flange meets ANSI Class 125/150 and ANSI/AWWA C115/A21.15 drill pattern.
- Can be used on 3" - 12" IPS PVC Pipe (a transition MJ gasket is required with IPS pipe)
- StarFlange™ body and PVC Stargrip® are manufactured from high strength Ductile Iron per ASTM A536, Grade 65-45-12.
- MJ gasket and O-ring flange gasket are made from styrene butadiene rubber (SBR) per ANSI / AWWA C111/ A-21.11.
- T-bolts / nuts are produced from high strength low alloy steel per ANSI/AWWA C111/A-21.11
- Includes PVC Stargrip®, Flange Adapter, MJ Gasket, O-Ring gasket and low alloy steel T-bolts
- StarFlange™ size 4"-12" are listed with Underwriters Laboratories Inc. and approved by Factory Mutual Research (FM) Approved.
- Standard gland color is Coral Red (RAL 3016).

SAMPLE SPECIFICATIONS

Restrained adapter flange is to be used to connect plain end PVC pipe to a flanged pipe, valve or fitting. The device shall be manufactured of high strength ductile iron in accordance to ASTM A36 Grade 65-45-12 for all sizes. The restrainer portion of the device shall be of wedge type design with torque limiting bolts to insure proper engagement of the wedges.

Applicable dimensions shall conform to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/A21.53. Flange ends to meet ANSI Class 125/150 & ANSI/AWWA C115/A21.15 drill pattern.

All sizes shall have a minimum safety factor of 2:1 (i.e. twice the pressure rating of the pipe on which it is used). Restrained flange adapter shall be Star® Pipe Products StarFlange™ Series 4200 or an approved equal.

REV 07



® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

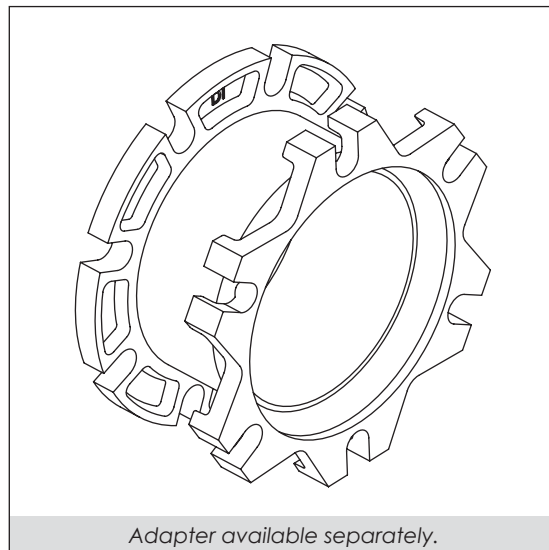
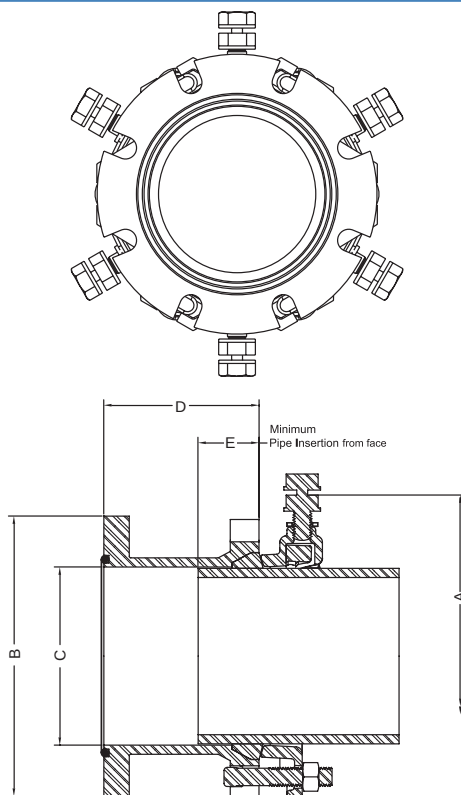
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StarFlange™ series 4200

Restrained Adapter Flange Coupling
for PVC Pipe

TECHNICAL INFORMATION



STARFLANGE™ 4200 SPECIFICATIONS*

NOM. SIZE	ITEM CODE	C900/C905 PIPE OD	IPS PIPE OD	A ¹	B	C	D	E	² MAXIMUM JOINT DEFLECTION*	APPROX. WT. (LBS)
3	RAC4203	N/A	3.50	8.50	7.50	4.06	3.88	2.13	5°	20
4	RAC4204	4.80	4.50	9.64	9.00	4.90	4.35	2.13	5°	27
6	RAC4206	6.90	6.63	11.72	11.00	7.00	5.25	2.50	5°	39
8	RAC4208	9.05	8.63	13.97	13.50	9.15	5.25	2.50	5°	52
10	RAC4210	11.10	10.75	16.18	16.00	11.20	5.62	2.50	3°	72
12	RAC4212	13.20	12.75	18.23	19.00	13.30	5.69	2.50	3°	92
14	RAC4214	15.30	N/A	20.36	21.00	15.44	6.67	3.00	2°	133
16	RAC4216	17.40	N/A	22.46	23.50	17.54	6.79	3.00	2°	164
18	RAC4218	19.50	N/A	24.56	25.00	19.64	7.40	3.00	1.5°	193
20	RAC4220	21.60	N/A	26.66	27.50	21.74	7.41	3.00	1.5°	227
24	RAC4224	25.80	N/A	30.86	32.00	25.94	7.90	3.00	1°	302
30	RAC4230	32.00	N/A	36.82	38.75	32.17	8.50	3.00	1°	494
36	RAC4236	38.30	N/A	43.12	46.00	38.47	9.00	3.00	1°	636

*All dimensions in inches except where indicated.

1 - Dimension after assembly on pipe.

2 - Deflection attained at minimum pipe insertion.

STANDARDIZED PRESSURE RATINGS**

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD		ASTMD2241 IPS OD	
DR 14	200 PSI	DR 18	235 PSI	SDR 17	250 PSI
DR 18	150 PSI	DR 21	200 PSI	SDR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI	SDR 26	160 PSI
		DR 32.5	125 PSI		

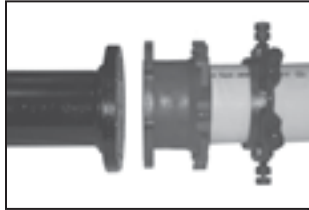
**For the ordinary water works with Transient surges only. Ratings are for PVC pipes with SERIES 4000 Restrainer.



StarFlange™ series 4200

Restrained Adapter Flange Coupling
for PVC Pipe

INSTALLATION INSTRUCTIONS - SIZES 3"- 24"



STEP 1

Check the StarFlange™ parts ensuring that no damage has occurred or parts are missing. Make sure that the O-ring gasket on the flange face of the StarFlange™ is securely in place.

The pipe end must be thoroughly cleaned for a distance of 2" greater than the length of the Star Flange body.

Slide the PVC Stargrip® Gland on the plain end of the pipe making sure that the lip extension is towards the mechanical joint bell of the StarFlange™.



STEP 2

Brush both the gasket and the plain end of the pipe with soapy water or approved pipe lubricant which meets ANSI/AWWA C111/A21.11. Slide the MJ gasket over the pipe with the beveled edge towards the MJ bell of StarFlange™.

Slide the StarFlange™ on to the pipe with the MJ bell towards the PVC Stargrip® Gland. Pipe must be inserted into the StarFlange™ a minimum of 2.125" on 3"-4" 2.500" on 6"-12" and 3.000" on 14"-24" to attain maximum deflection per table.

Position the pipe and flanged end of StarFlange™ against the mating flange making sure that the flange bolt holes line-up. Assemble the flanged joint using flange bolts. **Note: Flange bolts not supplied with StarFlange™.**



STEP 3

Center the pipe so that the space between the OD of the pipe and the ID of the StarFlange™ is even all around the pipe. Slide the MJ Gasket into the MJ bell recess of the StarFlange™.

Slide PVC Stargrip® towards the StarFlange™ with Gland lip against the gasket. Insert T-bolts and hand-tighten nuts.



STEP 4

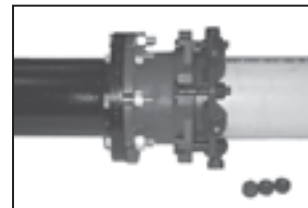
Tighten the T-bolts to normal range of bolt torque (see Table A). It is necessary that the gland be brought up toward the bell flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. T-bolts should be tightened alternately on opposite sides (Star Pattern).



STEP 5

Hand tighten the torque limiting twist off bolts in a clockwise direction until all wedges are in firm contact with the pipe surface.

Note: When installing sizes 4"-12" on IPS PVC pipe, the spacer washers must be removed from the torque limiting bolts.



STEP 6

Continue tightening in an alternative manner going on opposite sides [Star Pattern], until all of the bolt heads have been twisted off. Never turn a single nut over 180 degrees without alternating to another nut.

If removal is necessary utilize the 1 1/4" hex head provided. [If reassembly is required assemble the joint in the same manner as above and tighten the wedge bolts to 90 lb-ft].

Note: If effective sealing is not attained at the maximum torque indicated then the joint should be disassembled thoroughly cleaned and reassembled. **Overstressing the bolts to compensate for poor installation practice is not acceptable.**

For use on IPS PVC pipe Transition MJ gasket must be used and removal of spacer washers from the torque limiting bolts must be ensured

Note: Not to be used on plain end fittings DI or steel pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ² OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120

²These torque ranges are requirements of AWWA C600



Flange Adapters series 200

For Steel and Ductile Iron Pipe - Flange Drilling ANSI B16.1 125 lbs
Working Pressure: 3"-8" 200 PSI, 10"-12" 175 PSI



Flange Adapter Series 200 for
Steel and Ductile Iron Pipe

INFORMATION

The Series 200 Flange Adapter provides restraint by utilizing set screws in a locking device similar to the mechanical joint retainer glands. This adapter eliminates the need for thrust blocks and other restraining devices and has been used throughout the world for more than 40 years.

Used Throughout the World

FEATURES & ADVANTAGES

- Flange adapters are made of Ductile Iron - ASTM A536 Grade 65-45-12.
- Sizes 3"-12" are Underwriters Laboratories Listed.
- Bolt hole drilling is to ANSI B16.1 class 125.
- Uses standard mechanical joint gasket for seal.
- Pipe fabrication can be done on site, using plain end pipe.
- Flange Adapters are ideal for jobs involving retro-fitting.
- Can be used on Ductile Iron or Steel Pipe
- Can be used in above or below ground applications
- If future maintenance is required, Flange Adapters can be easily disassembled.
- Standard gland color is Coral Red (RAL 3016).

Note: See page 36 for Technical information and page 38 for installation instructions.

SAMPLE SPECIFICATIONS

Flange Adapter for use on iron or steel pipe shall be manufactured of high strength ductile iron in accordance to ASTM A36 Grade 65-45-12 for all sizes. Applicable dimensions shall conform to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/A21.53. Flange ends to meet ANSI Class 125/150 & ANSI/AWWA C115/A21.15.

The device shall be Underwriters Laboratories Listed for sizes 3"-12" and Factory Mutual Research approved for sizes 3"-10". Flange Adapter shall have a working pressure rating of 200 PSI for sizes 3"-8"; 175 PSI for 10"-12" and have a minimum safety factor of 2:1 (i.e. twice the working pressure).

Flange adapters shall be Star® Pipe Products Flange adapter Series 200 or an approved equal.

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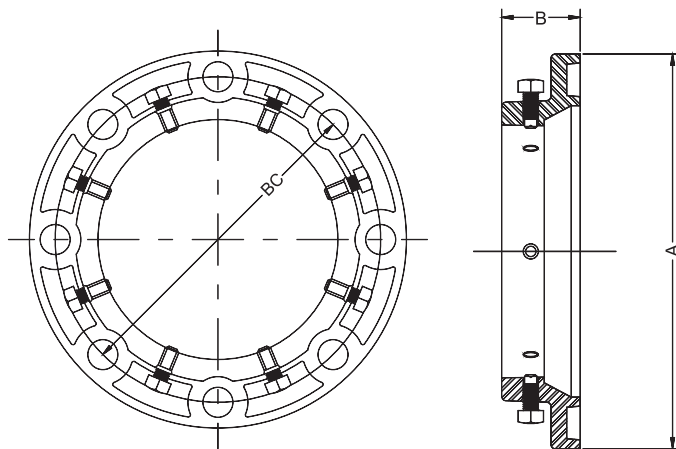
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www.starpipeproducts.com



Flange Adapters series 200/400

For Steel and Ductile Iron Pipe - Flange Drilling ANSI B16.1 125 lbs

TECHNICAL INFORMATION



FLANGE ADAPTER 200 SPECIFICATIONS*

NOM. SIZE	DUCTILE PIPE		STEEL PIPE		APPROX. WT. (LBS)	A	B	BC	BOLT HOLE DIA.	SET SCREWS	
	O.D.	ITEM CODE	O.D.	ITEM CODE						QTY	SIZE
3	3.96	SF203G	3.50	SF203TG	6.00	7.50	2.00	6.00	3/4	4	1/2 X 1 1/4
4	4.80	SF204G	4.50	SF204TG	9.00	9.00	2.07	7.50	3/4	4	1/2 X 1 1/4
6	6.90	SF206G	6.63	SF206TG	12.00	11.00	2.19	9.50	7/8	8	1/2 X 1 1/4
8	9.05	SF208G	8.63	SF208TG	19.00	13.50	2.31	11.75	7/8	8	5/8 X 1 1/2
10	11.10	SF210G	10.75	SF210TG	27.00	16.00	2.50	14.25	1	12	5/8 X 1 1/2
12	13.20	SF212G	12.75	SF212TG	37.00	19.00	2.50	17.00	1	12	5/8 X 1 1/2

*All dimensions in inches except where indicated. See page 38 for installation instructions.

FLANGE ADAPTER 400 SPECIFICATIONS*

NOM. SIZE	DUCTILE PIPE		STEEL PIPE		APPROX. WT. (LBS)	A	B	BC	BOLT HOLE DIA.	SET SCREWS	
	O.D.	ITEM CODE	O.D.	ITEM CODE						QTY	SIZE
4	4.80	SF404G	4.50	SF404TG	11.00	9.00	2.06	7.50	3/4	8	1/2 X 1 1/4
6	6.90	SF406G	6.63	SF406TG	14.00	11.00	2.13	9.50	7/8	8	1/2 X 1 1/4
8	9.05	SF408G	8.63	SF408TG	21.00	13.50	2.13	11.75	7/8	8	5/8 X 1 1/2
10	11.10	SF410G	10.75	SF410TG	38.00	16.00	2.19	14.25	1	12	5/8 X 1 1/2
12	13.20	SF412G	12.75	SF412TG	56.00	19.00	2.25	17.00	1	12	5/8 X 1 1/2
14	15.30	SF414G	N/A	N/A	70.00	21.00	2.75	18.75	1 1/8	12	5/8 X 1 1/2
16	17.40	SF416G	N/A	N/A	79.00	23.50	2.75	21.25	1 1/8	16	5/8 X 1 1/2
18	19.50	SF418G	N/A	N/A	90.00	25.00	3.25	22.75	1 1/4	16	3/4 X 2
20	21.60	SF420G	N/A	N/A	145.00	27.50	3.25	25.00	1 1/4	20	3/4 X 2
24	25.80	SF424G	N/A	N/A	175.00	32.00	3.69	29.50	1 3/8	20	3/4 X 2
30	32.00	SF430G	N/A	N/A	270.00	38.75	4.25	36.00	1 3/8	28	1 X 2 1/4
36	38.30	SF436G	N/A	N/A	400.00	46.00	4.38	42.75	1 5/8	32	1 X 2 1/4

*All dimensions in inches except where indicated. See page 37 for features & advantages and page 36 for installation instructions.



Flange Adapters series 400

For Steel and Ductile Iron Pipe Flange - Drilling ANSI B16.1 125 lbs
Working Pressure: 4"-12" 250 PSI, 14"-24" 150 PSI, 30"-36" 100 PSI



Flange Adapter Series 400 for
Steel and Ductile Iron Pipe

INFORMATION

Flange adapters can be used to restrain plain end ductile iron pipe to flange fittings instead of using threaded or welded flanges on plain end ductile iron pipe. Flange adapters provide restraint by use of a set screw locking device similar to that used in mechanical joint restrainer gland.

FEATURES & ADVANTAGES

- Flange adapters are made of Ductile Iron - ASTM A536 Grade 65-45-12.
- Bolt hole drilling is to ANSI B16.1 class 125.
- Uses standard mechanical joint gasket for seal
- Pipe fabrication can be done on site, using plain end pipe.
- Flange Adapters are ideal for jobs involving retro-fitting.
- Can be used on Ductile Iron 4"-36" and steel pipe 4"-12"
- Can be used in above or below ground applications
- If future maintenance is required, Flange Adapters can be easily disassembled.
- Standard gland color is Coral Red (RAL 3016).

Note: See page 36 for Technical information and page 38 for installation instructions.

SAMPLE SPECIFICATIONS

Flange Adapter for use on iron or steel pipe shall be manufactured of high strength ductile iron in accordance to ASTM A36 Grade 65-45-12 for all sizes. Applicable dimensions shall conform to ANSI/AWWA C111/A21.11, C110/A21.10 and C153/A21.53. Flange ends to meet ANSI Class 125/150 & ANSI/AWWA C115/A21.15.

Flange Adapter shall have a working pressure rating of 250 PSI for sizes 4"-12", 150 PSI for sizes 14"-24", 100 PSI for 30"-36" and have a safety factor of 2:1 (i.e. twice the working pressure).

Flange adapters shall be Star® Pipe Products Flange adapter Series 400 or an approved equal.

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Flange Adapters series 200/400

For Steel and Ductile Iron Pipe Flange - Drilling ANSI B16.1 125 lbs

INSTALLATION INSTRUCTIONS - SIZES 3" - 36"

**STEP 1**

Pipe should be cut square and be free of burrs. Series 200/400 adapter flanges should not be used on beveled end of pipe. Clean the plain end of the pipe. Thoroughly lubricate the pipe and gasket with soap based lubricant. Slide the flange onto the pipe with the gasket cavity facing the end of the pipe. Slide the lubricated gasket over the pipe end with the taper end facing the gasket cavity in the flange.

**STEP 2**

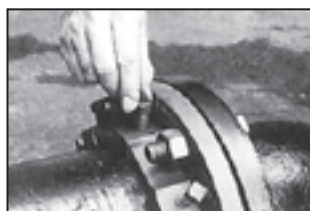
Slide the flange forward until the gasket is evenly seated in the flange cavity with the leading edge of the gasket flush with the end of the pipe. Butt the end of the pipe against the facing flange.

**STEP 3**

Using conventional flange bolts mate the Flange Adapter to the standard flange.

**STEP 4**

Be sure to evenly tighten the bolts alternately on opposite sides. Do not over tighten the flange bolts. It is not necessary to bring the Flange Adapter to a face to face contact with the standard flange. A gap of approximately 1/8" between flanges is normal.

**STEP 5**

Hand tighten all set screws until they come in contact with the pipe.

**STEP 6**

Tighten in an alternating manner going on opposite sides (star method) to the torque values shown on the chart below.

For Auto-Tork® screw simply use a 7/16" 12" - point socket wrench. Tighten alternately on opposite sides until.

Note: Not to be used on plain end fittings or PVC and HDPE pipe.

RECOMMENDED SET SCREW TORQUE VALUES

FLANGE SIZE	SET SCREW SIZE	RECOMMENDED SET SCREW TORQUE VALUE (FT/LBS)							
		DUCTILE IRON PIPE (CLASS)				STEEL PIPE (SCHEDULE)			
		50	51	52	53+	10	20	30	40+
3"	1/2" x 1 1/4"	-	50	70	70	30	-	-	70
4"	1/2" x 1 1/4"	-	50	70	70	30	-	-	70
6"	1/2" x 1 1/4"	50	60	80	90	30	-	-	90
8"	5/8" x 1 1/2"	50	60	80	90	30	50	50	90
10"	5/8" x 1 1/2"	50	60	80	90	40	50	50	90
12"	5/8" x 1 1/2"	50	60	80	90	40	50	60	90
14"	5/8" x 1 1/2"	60	70	90	90	N/A	N/A	N/A	N/A
16"	5/8" x 1 1/2"	60	70	90	90	N/A	N/A	N/A	N/A
18"	3/4" x 2"	70	80	115	115	N/A	N/A	N/A	N/A
20"	3/4" x 2"	70	80	115	115	N/A	N/A	N/A	N/A
24"	3/4" x 2"	70	80	115	115	N/A	N/A	N/A	N/A
30"	1" x 2 1/4"	90	110	125	125	N/A	N/A	N/A	N/A
36"	1" x 2 1/4"	90	110	125	125	N/A	N/A	N/A	N/A



Pipe Restrainers series 1000

1000C Restrainers for AWWA C900/C905 PVC Pipe and MJ or Push-On Fittings
1000S Restrainer for IPS PVC and MJ or Push-On Fittings



Series 1000C for DI OD PVC Pipe

INFORMATION

PVC Restrainers for restraining mechanical joint, push-on and PVC pressure fittings with PVC pipe and PVC pipe bell joints. These restraints work in any type of soil for a guaranteed joint restraint with the full rated pressure of the PVC pipe on which it is installed.

PVC restrainers can be installed on new or existing systems, totally eliminating the use of thrust blocks. These restrainers have internal serrations that lock onto the pipe and give 360° contact and support the pipe wall. Restraint devices may be used with any type of PVC piping system.

Can be Installed on New or Existing Systems

FEATURES & ADVANTAGES

- 360° Contact, No Pipe Distortion or Point Loading and Supports the Wall of the Pipe.
- Made of Ductile Iron - ASTM Grade 536, Grade 65-45-12
- Restrainers work with Mechanical Joint or Push-On Fittings.
- All Restrainers are Machined to Exact Tolerances.
- Rated at the Full Rated Pressure of Any Class of PVC Pipe with a 2:1 Safety Factor
- Can Be Installed Outside the Trench, to Ease Installation
- Maintains Full Deflection on Mechanical Joint and Push-On Fittings
- T-Bolts/Rods/Hex Nuts: Low Alloy Steel Per ANSI/AWWA C111/A21.11
- Clamping Bolts: SAE J429 Grade 5
- Series 1000C is approved by Factory Mutual Research in sizes 4" - 10" for use on DR18 class 150 C900 PVC pipe.
- Standard color is Graphite Black (RAL 9011).
- Casting halves for IPS PVC pipe color is Moss Green (RAL 6005).



1000C with MJ Fitting

STANDARDIZED PRESSURE RATINGS**

ANSI/AWWA C900 CI OD		ANSI/AWWA C905 CI OD		ASTMD2241 IPS OD	
DR 14	200 PSI	DR 18	235 PSI	SDR 17	250 PSI
DR 18	150 PSI	DR 21	200 PSI	SDR 21	200 PSI
DR 25	100 PSI	DR 25	165 PSI	SDR 26	160 PSI
		DR 32.5	125 PSI		

**For ordinary water works with transient surges only. Ratings are for PVC pipes with SERIES 1000 Restrainer.

SAMPLE SPECIFICATIONS

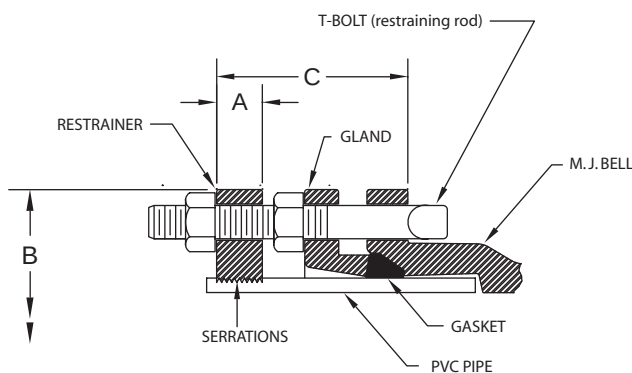
PVC restraint devices shall be manufactured of high strength ductile iron in accordance to ASTM A536 Grade 65-45-12 for all sizes. Internal serrations will be machined to provide exact tolerances to provide 360° contact and support of the pipe wall. PVC Restraint devices shall have a pressure rating of 2:1 (i.e. twice the pressure rating of the pipe on which it is used).



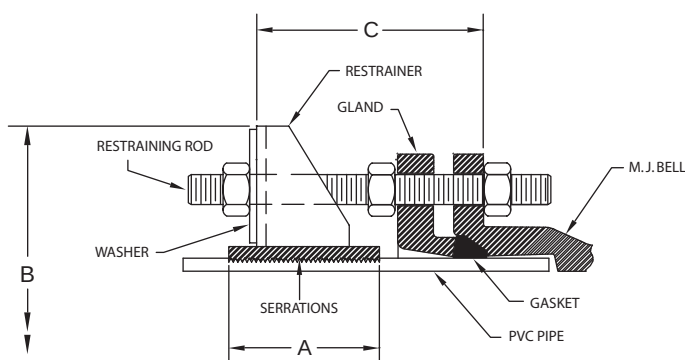
Pipe Restrainers series 1000

1000C Restrainers for AWWA C900/C905 PVC Pipe and MJ or Push-On Fittings
1000S Restrainer for IPS PVC and MJ or Push-On Fittings

TECHNICAL INFORMATION



4" - 12" Sizes



14" - 48" Sizes

PIPE RESTRAINERS 1000 SPECIFICATIONS*

NOM. SIZE	PVC PIPE WITH DUCTILE IRON PIPE O.D. STYLE 1000C		PVC PIPE WITH STEEL PIPE O.D. STYLE 1000S		A	B APPROX.	C MAX.	RESTRAINT BOLTS/RODS		CLAMPING BOLTS		APPROX WT. (LBS)
	O.D.	ITEM CODE	O.D.	ITEM CODE				QTY	SIZE	QTY	SIZE	
4	4.80	PRC1004	4.50	PRS1004	1.12	9.12	6.00	2	3/4" X 7"	2	5/8 X 3 1/2	8
6	6.90	PRC1006	6.63	PRS1006	1.15	11.12	6.00	2	3/4" X 7"	2	5/8 X 3 1/2	10
8	9.05	PRC1008	8.63	PRS1008	1.47	14.75	6.00	2	3/4" X 7"	2	3/4 X 4	15
10	11.10	PRC1010	10.75	PRS1010	1.38	16.82	6.00	4	3/4" X 7"	2	7/8 X 5	25
12	13.20	PRC1012	12.75	PRS1012	1.42	19.46	6.00	4	3/4" X 7"	2	7/8 X 5	27
14	15.30	PRC1014	N/A	N/A	4.00	22.55	15.00	6	3/4" X 17"	4	7/8 X 7	55
16	17.40	PRC1016	N/A	N/A	4.00	24.65	15.00	6	3/4" X 17"	4	7/8 X 7	60
18	19.50	PRC1018	N/A	N/A	5.00	26.65	15.00	8	3/4" X 17"	4	7/8 X 7	75
20	21.60	PRC1020	N/A	N/A	6.87	28.75	22.00	8	3/4" X 24"	6	1 1/8 X 9	115
24	25.80	PRC1024	N/A	N/A	6.87	33.90	22.00	12	3/4" X 24"	6	1 1/8 X 9	145
30	32.00	PRC1030	N/A	N/A	9.40	42.40	22.00	14	1" X 24"	8	1 1/8 X 10	330
36	38.30	PRC1036	N/A	N/A	10.00	49.10	22.00	14	1" X 24"	8	1 1/8 X 10	354
42	44.50	PRC1142	N/A	N/A	11.00	57.00	26.00	16	1-1/4" X 30"	6	1 1/2 X 10	1003
48	50.80	PRC1148	N/A	N/A	11.00	63.88	26.00	16	1-1/4" X 30"	6	1 1/2 X 10	1166

*All dimensions in inches except where indicated.



Pipe Restrainers series 1000

1000C Restrainers for AWWA C900/C905 PVC Pipe and MJ or Push-On Fittings

1000S Restrainer for IPS PVC and MJ or Push-On Fittings

INSTALLATION INSTRUCTIONS (SERIES 1000 4"-12")



STEP 1

Insert pipe into the MJ fitting bell. Then insert one of the provided long T-bolts/ restraint rods through one of the flange holes to mark a line about 1" away from the end of the bolt as shown.



STEP 2

Assemble the MJ joint using the gland gasket and T-bolts to AWWA standards. Assemble the restrainer on the pipe so that it is even with the marked line on the pipe while making sure restrainer ears line up with the bolt holes of the MJ gland. Evenly tighten the restrainer clamping bolts to recommended torque (see Table B).



STEP 3

Insert one of the long T-bolts/rods provided installing one nut each between the gland and the restrainer as shown. Follow the same procedure for remaining long T-bolts/rods. Tighten nuts against MJ Gland to AWWA standards (See table A). T-bolts should be tightened alternately on opposite sides (Star Pattern).



STEP 4

Snug tighten the second nut on each long T-Bolt/Rod against the restrainer as shown.

Caution: Do not over-tighten the restrainer nuts. Turn nut to hand tight plus half turn.

INSTALLATION INSTRUCTIONS (SERIES 1000 14"- 48")



STEP 1

Insert pipe into the MJ fitting bell. Then insert one of the provided long T-bolts/ restraint rods through one of the flange holes to mark a line about 1" away from the end of the bolt as shown.



STEP 2

Assemble the MJ joint using the gland gasket and T-bolts to AWWA standards. Assemble the restrainer on the pipe so that it is even with the marked line on the pipe while making sure restrainer ears line up with the bolt holes of the MJ gland. Evenly tighten the restrainer clamping bolts to recommended torque (see Table B).



STEP 3

Insert one of the long T-bolts/rods provided installing one nut each between the gland and the restrainer as shown. Follow the same procedure for remaining long T-bolts/rods. Tighten nuts against MJ Gland to AWWA standards (see table A). T-bolts should be tightened alternately on opposite sides (Star Pattern).



STEP 4

Snug tighten the second nut on each rod against the restrainer as shown.

Caution: Do not over-tighten the restrainer nuts. Turn nut to hand tight plus half turn.

(TABLE A) T-HEAD BOLT & NUT DETAILS

PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
4-24	3/4	75-90
30-36	1	100-120
42-48	1 1/4	120-150

¹These torque ranges are requirements of AWWA C600

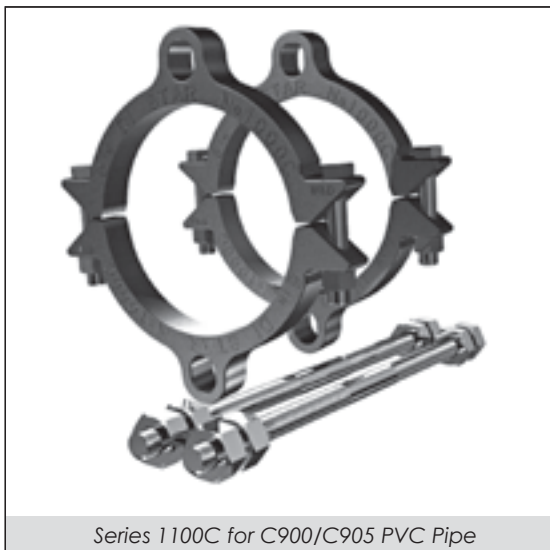
(TABLE B) CLAMPING BOLTS RECOMMENDED TORQUE

PIPE SIZE (IN)	RANGE OF TORQUE (FT/LBS)
4-12	90-110
14-16	150-200
18	175-225
20	200-250
24-36	225-275
42-48	300-350



Pipe Restrainers series 1100

1100C Bell Restrainers for AWWA C900/C905 PVC Pipe
and 1100S Bell Joint for IPS PVC Pipe



Series 1100C for C900/C905 PVC Pipe

INFORMATION

PVC Restrainers for restraining pipe and PVC pipe bell joints. These restraints work in any type of soil for a guaranteed joint restraint with the full rated pressure of the PVC pipe on which it is installed.

PVC restrainers can be installed on new or existing systems, totally eliminating the use of thrust blocks. These restrainers have internal serrations that lock onto the pipe and give 360° contact and support the pipe wall. Restraint devices may be used with any type of PVC piping system.

Can be Installed on New or Existing Systems

FEATURES & ADVANTAGES

- 360° Contact, No Pipe Distortion or Point Loading
- Made of Ductile Iron - ASTM Grade 536, Grade 65-45-12
- Restrainers work with Push-On Pipe Bells.
- All Restrainers are Machined to Exact Tolerances.
- Rated at the Full Rated Pressure of Any Class of PVC Pipe with a 2:1 Safety Factor
- Can Be Installed Outside the Trench, to Ease Installation
- T-Bolts/Rods/Hex Nuts: Low Alloy Steel Per ANSI/AWWA C111/A21.11
- Clamping Bolts: SAE J429 Grade 5
- Series 1100C is approved by Factory Mutual Research in sizes 4"-10" for use on DR18, C900 PVC pipe.
- Available in sizes 4"-48"
- Standard color is Graphite Black (RAL 9011).
- Casting halves for IPS PVC pipe color is Moss Green (RAL 6005).



1100C on pipe bell

SAMPLE SPECIFICATIONS

PVC restraint devices shall be manufactured of high strength ductile iron in accordance to ASTM A536 Grade 65-45-12 for all sizes. Internal serrations will be machined to provide exact tolerances to provide 360° contact and support of the pipe wall. PVC Restraint devices shall have a pressure rating of 2:1 (i.e. twice the pressure rating of the PVC pipe on which it is used). Serrated Rings shall be used to grip the pipe and be capable of being installed bidirectional.

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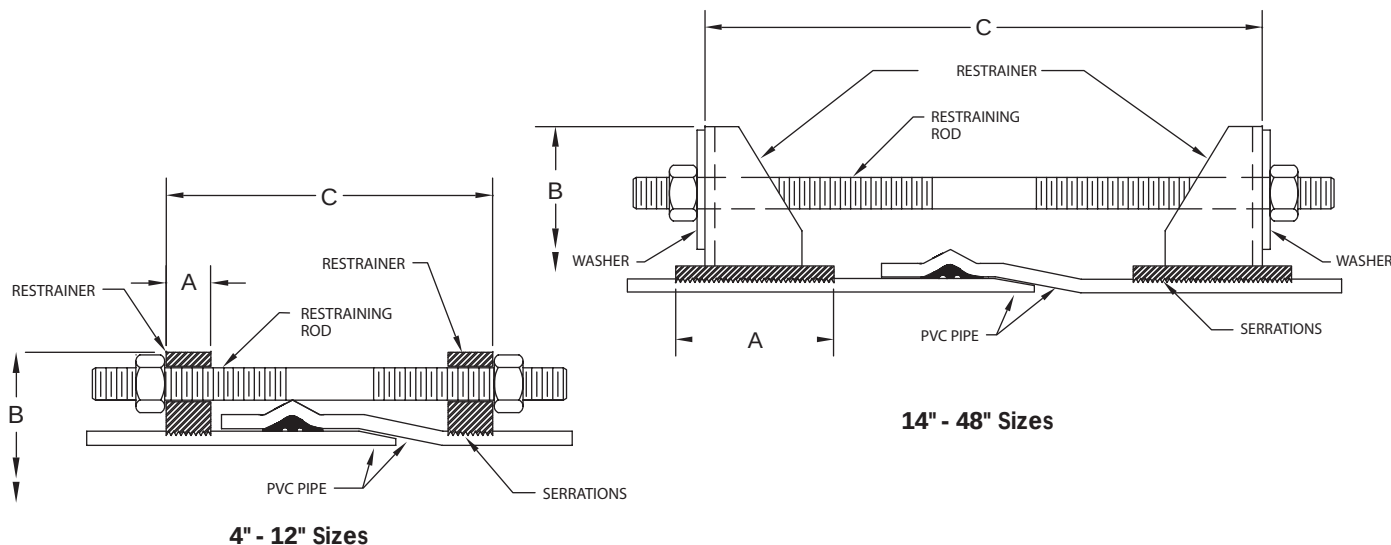
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Pipe Restrainers series 1100

1100C Bell Restrainers for AWWA C900/C905 PVC Pipe
and 1100S Bell Joint for IPS PVC Pipe

TECHNICAL INFORMATION



PIPE RESTRAINERS 1100 SPECIFICATIONS*

NOM. SIZE	PVC PIPE WITH DUCTILE IRON PIPE O.D. STYLE 1100C		PVC PIPE WITH STEEL PIPE O.D. STYLE 1100S		A	B APPROX.	C MAX.	RESTRAINT BOLTS/RODS		CLAMPING BOLTS		APPROX WT. (LBS)
	O.D.	ITEM CODE	O.D.	ITEM CODE				QTY	SIZE	QTY	SIZE	
4	4.80	PRC1104	4.50	PRS1104	1.12	9.12	12.00	2	3/4 X 17	4	5/8 X 3 1/2	16
6	6.90	PRC1106	6.63	PRS1106	1.15	11.12	13.00	2	3/4 X 17	4	5/8 X 3 1/2	20
8	9.05	PRC1108	8.63	PRS1108	1.47	14.75	15.00	2	3/4 X 17	4	3/4 X 4	32
10	11.10	PRC1110	10.75	PRS1110	1.38	16.82	16.00	4	3/4 X 24	4	7/8 X 5	52
12	13.20	PRC1112	12.75	PRS1112	1.42	19.46	18.00	4	3/4 X 24	4	7/8 X 5	56
14	15.30	PRC1114	N/A	N/A	4.00	22.55	24.00	6	3/4 X 30	8	7/8 X 7	150
16	17.40	PRC1116	N/A	N/A	4.00	24.65	28.00	6	3/4 X 30	8	7/8 X 7	154
18	19.50	PRC1118	N/A	N/A	5.00	26.65	28.00	8	3/4 X 30	8	7/8 X 7	222
20	21.60	PRC1120	N/A	N/A	6.87	28.75	28.00	8	3/4 X 36	12	1 1/8 X 9	330
24	25.80	PRC1124	N/A	N/A	6.87	33.90	34.00	12	3/4 X 36	12	1 1/8 X 9	380
30	32.00	PRC1130	N/A	N/A	9.40	42.40	38.00	14	1 X 40	16	1 1/8 X 10	820
36	38.30	PRC1136	N/A	N/A	10.00	49.10	38.00	14	1 X 40	16	1 1/8 X 10	984
42	44.50	PRC1142	N/A	N/A	11.00	57.00	46.00	16	1 1/4 X 48	12	1 1/2 X 10	1916
48	50.80	PRC1148	N/A	N/A	11.00	63.88	46.00	16	1 1/4 X 48	12	1 1/2 X 10	2242

*All dimensions in inches except where indicated.



Pipe Restrainers series 1100

1100C Bell Restrainers for AWWA C900/C905 PVC Pipe
and 1100S Bell Joint for IPS PVC Pipe

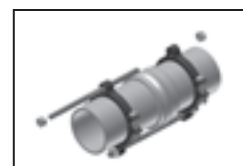
INSTALLATION INSTRUCTIONS (SERIES 1100 4"-12")

**STEP 1**

Assemble the spigot end of first pipe into the pipe bell using standard procedure per pipe manufacturer.

**STEP 2**

Assemble one restrainer behind the bell of pipe and evenly tighten the restrainer clamping bolts to the recommended torque. Then insert one of the provided restraint rods through one of the restrainer holes. Mark a line about 1" away from the end of the rod as shown. Assemble the second restrainer even with the mark on the spigot end of pipe. Use one of the provided restraining rods as a guide to align restraint holes. Tighten restrainer clamping bolts to the recommended torque on the second restrainer after it is aligned with the first one. (see Table B).

**STEP 3**

Insert the restraining rods through the restrainers as shown. Snug tighten the remaining nuts behind each restraint so that the spigot end is secured into the bell end.

Caution: Do not over-tighten the restrainer nuts. Turn nut to hand tight plus half turn.

INSTALLATION INSTRUCTIONS (SERIES 1100 14"- 48")

**STEP 1**

Assemble the spigot end of first pipe into the pipe bell using standard procedure per pipe manufacturer.

**STEP 2**

Assemble one restrainer behind the bell of pipe and evenly tighten the restrainer clamping bolts to the recommended torque. Then insert one of the provided restraint rods through one of the restrainer holes. Mark a line about 1" away from the end of the rod as shown. Assemble the second restrainer even with the mark on the spigot end of pipe. Use one of the provided restraining rods as a guide to align restraint holes. Tighten restrainer clamping bolts to the recommended torque on the second restrainer after it is aligned with the first one.

**STEP 3**

Assemble the second restrainer even with the mark on the spigot end of pipe. Use one of the provided restraining rods as a guide to align restraint holes. Tighten clamping bolts to the recommended torque (see Table B) on the second restrainer after it is aligned with the first one.

**STEP 4**

Insert the restraining rods through the restrainers as shown. Snug tighten the remaining nuts behind each restraint so that the spigot end is secured into the bell end.

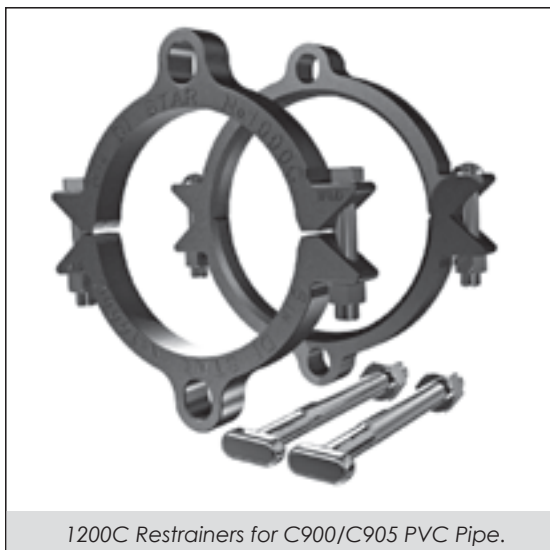
Caution: Do not over-tighten the restrainer nuts. Turn nut to hand tight plus half turn.

(TABLE B) CLAMPING BOLTS RECOMMENDED TORQUE	
PIPE SIZE (IN)	RANGE OF TORQUE (FT/LBS)
4-12	90-110
14-16	150-200
18	175-225
20	200-250
24-36	225-275
42-48	300-350



Pipe Restrainers series 1200

1200C Restrainers for PVC Pipe and PVC Pressure Fittings
w/Ductile Iron Pipe OD



1200C Restrainers for C900/C905 PVC Pipe.

INFORMATION

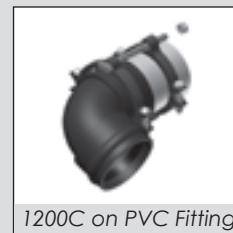
PVC Restrainers for restraining pipe and PVC fitting bell joints. These restraints work in any type of soil for a guaranteed joint restraint with the full rated pressure of the PVC pipe and fitting on which it is installed.

PVC restrainers can be installed on new or existing systems, totally eliminating the use of thrust blocks. These restrainers have internal serrations that lock onto the pipe and give 360° contact and support the pipe wall. Restraint devices may be used with any type of PVC piping system.

Can be Installed on New or Existing Systems

FEATURES & ADVANTAGES

- 360° Contact, No Pipe Distortion or Point Loading
- Made of Ductile Iron - ASTM Grade 536, Grade 65-45-12
- Restrainers work with PVC Pressure Fittings per ANSI/AWWA C907.
- All Restrainers are Machined to Exact Tolerances.
- Rated at the Full Rated Pressure of Any Class of PVC Pipe and fitting with a 2:1 Safety Factor
- Supports Wall of Pipe with 360 degree Contact
- Can Be Installed Outside the Trench, to Ease Installation
- T-Bolts/Rods/Hex Nuts: Low Alloy Steel Per ANSI/AWWA C111/A21.11
- Clamping Bolts: SAE J429 Grade5
- Standard gland color is Graphite Black (RAL 9011).



1200C on PVC Fitting

SAMPLE SPECIFICATIONS

PVC restraint devices shall be manufactured of high strength ductile iron in accordance to ASTM A536 Grade 65-45-12 for all sizes. Internal serrations will be machined to provide exact tolerances to provide 360° contact and support of the pipe wall. PVC Restraint devices shall possess a pressure rating of twice (2:1) the pressure rating of the pipe and fitting on which it is used.

REV 07



® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

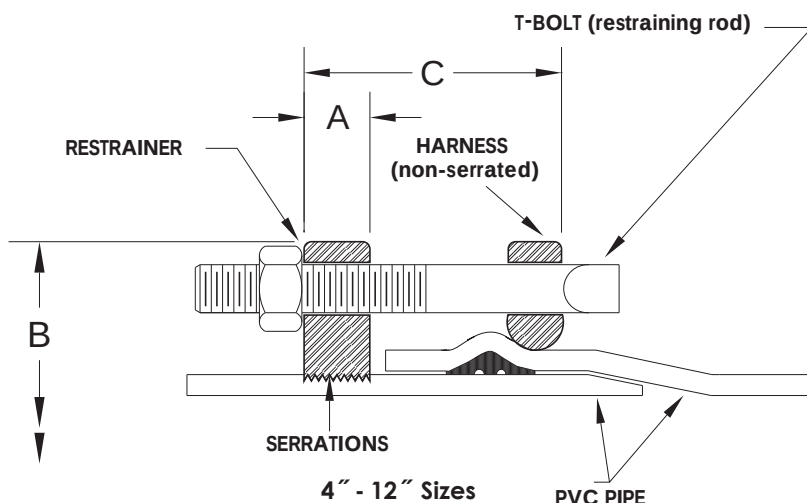
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www.starpipeproducts.com



Pipe Restrainers series 1200

1200C Restrainers for PVC Pipe and PVC Pressure Fittings
w/Ductile Iron Pipe OD

TECHNICAL INFORMATION



(TABLE B) CLAMPING BOLTS RECOMMENDED TORQUE

PIPE SIZE (IN)	RANGE OF TORQUE (FT/LBS)
4-12	90-110
14-16	150-200
18	175-225
20	200-250
42-48	300-350

PIPE RESTRAINERS 1200 SPECIFICATIONS*

NOM. SIZE ¹	PVC PIPE WITH DUCTILE IRON PIPE O.D. STYLE 1200C		A	B APPROX.	C MAX.	RESTRAINT BOLTS/ RODS		CLAMPING BOLTS		APPROX WT. (LBS)
	O.D.	ITEM CODE				QTY	SIZE	QTY	SIZE	
4	4.80	PRC1204	1.12	9.12	6.00	2	3/4 X 9	4	5/8 X 3-1/2	13.8
6	6.90	PRC1206	1.15	11.12	6.00	2	3/4 X 9	4	5/8 X 3-1/2	17.0
8	9.05	PRC1208	1.47	14.75	8.00	2	3/4 X 12	4	3/4 X 4	30.0
10	11.10	PRC1210	1.38	16.82	8.00	4	3/4 X 12	4	7/8 X 5	46.4
12	13.20	PRC1212	1.42	19.46	8.00	4	3/4 X 12	4	7/8 X 5	50.0

*All dimensions in inches except where indicated.

1 - 14"-48" available for PVC pressure fittings with various O.D. dimensions. Contact Star Pipe Products for more information.

INSTALLATION INSTRUCTIONS (SERIES 1200 4"- 12")



STEP 1

Insert the pipe into the Push-On fitting according to standard procedure. Assemble serrated restrainer on pipe using the provided restraining rods (or T-Bolts if applicable) as a guide to position the restraint. Tighten restrainer clamp bolts to recommended torque.



STEP 2

Assemble harness behind the bell of pipe and restrainer on spigot end of pipe using restraining T-Head bolt/rod as an alignment guide. Evenly tighten harness clamp bolts and nuts to recommended torque (see Table B).



STEP 3

Insert the restraining rods (or T-bolts) through the restrainers as shown. Snug tighten the remaining nuts so that the spigot end is secured into the bell end.

Caution: Do not over-tighten the restrainer nuts. Turn nut to hand tight plus half turn.



Retainer Gland series 600

For Ductile Iron Mechanical Joints



Retainer Gland Series 600 for Ductile Iron

INFORMATION

Ductile Iron Retainer Glands provide reliable restraint for ductile iron pipe, valves and fittings. This simple design has been in service for over 30 years. Retainer glands install in minutes, in any type of soil condition and offer guaranteed restraint. Eliminating expensive time consuming concrete thrust blocks, pipe.

Proven Success for Over 30 Years

FEATURES & ADVANTAGES

- Gland is made of Ductile Iron, ASTM A536 Grade 65-45-12
- Offers a full 5° deflection through 12" size, 3° on 14"-20" & 2° on 24"-36"
- Sizes 3" through 12" are Underwriters Laboratories Listed
- All sizes have a 2:1 safety factor.
- Intended for use on Ductile Iron Pipe, minimum Class 51 and above
- For use on Schedule 40 Steel Pipe, please contact Star® Engineering
- Retainer Glands eliminate tie rods and thrust blocks.
- Standard gland color is Graphite Black (RAL 9011).

SAMPLE SPECIFICATIONS

Restrainer mechanism dimensions shall be in accordance with ANSI/AWWA C111/A21.11. This mechanism shall be designed to fit standard mechanical joint bells with standard T-Bolts.

The mechanical joint restrainer glands shall be manufactured of ductile iron Grade 65-45-12 Conforming to ASTM A536. Set screws are to be of high strength low alloy steel in accordance with ANSI 4140 and heat-treated to Rockwell C45-53 with cup points. Restrainer mechanism sizes 3"-12" shall be Underwriters Laboratories Listed and sizes 3"-12" shall be Factory Mutual Research approved.

Restrainer mechanism shall possess specified pressure rating and abide by a minimum safety factor of 2:1. Restrainer mechanism shall be Star® Pipe Products, Series 600 or an approved equal.

REV 07



® REGISTERED TRADEMARK OF STAR PIPE PRODUCTS

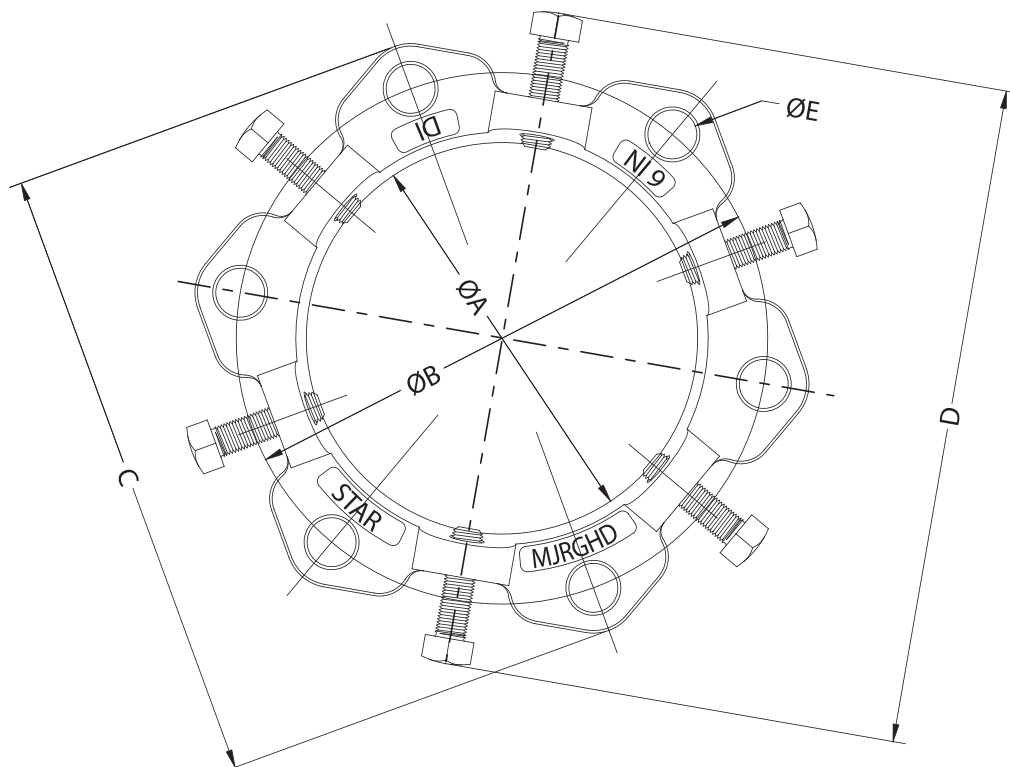
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Retainer Gland series 600

For Ductile Iron Mechanical Joints

TECHNICAL INFORMATION



RETAINER GLAND 600 SPECIFICATIONS*

NOM. SIZE	DI PIPE OD	WWP (PSI)	ØA	ØB	C	D	ØE	SET SCREWS SIZE (QTY)	SET SCREW TORQUE (FT/LBS)	APPROX WT. (LBS)
3	3.96	350	4.06	6.19	7.69	8.87	3/4	5/8x2 (4)	85	4
4	4.80	350	4.90	7.50	9.12	9.72	7/8	5/8x2 (4)	85	7
6	6.90	350	7.00	9.50	11.12	11.82	7/8	5/8x2 (6)	85	11
8	9.05	350	9.15	11.75	13.37	13.95	7/8	5/8x2 (9)	85	15
10	11.10	350	11.20	14.00	15.62	16.00	7/8	5/8x2 (16)	85	22
12	13.20	300	13.30	16.25	17.88	18.12	7/8	5/8x2 (16)	85	27
14	15.30	250	15.44	18.75	20.25	20.50	7/8	5/8x2 (20)	90	38
16	17.40	250	17.54	21.00	22.50	22.50	7/8	5/8x2 (24)	90	45
18	19.50	150	19.64	23.25	24.75	24.60	7/8	5/8x2 (24)	90	60
20	21.60	150	21.74	25.50	27.00	26.70	7/8	5/8x2 (28)	90	73
24	25.80	150	25.94	30.00	31.50	30.90	7/8	5/8x2 (32)	90	92
30	32.00	100	32.17	36.88	39.12	39.50	1-1/8	3/4x3 (40)	90	162
36	38.30	100	38.47	43.75	46.00	45.80	1-1/8	3/4x3 (48)	90	208

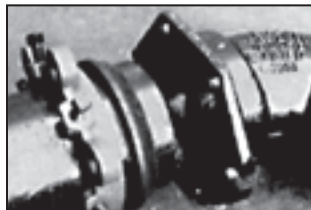
*All dimensions in inches except where indicated.



Retainer Gland series 600

For Ductile Iron Mechanical Joints

INSTALLATION INSTRUCTIONS - SIZES 3" - 36"



STEP 1

Wash socket and plain end pipe with soapy water. Ensure that the set crews are retracted to clear the pipe OD. Slip gland and gasket over plain end pipe with small side of gasket and lip side of gland facing socket.



STEP 2

Slip plain end pipe into socket. Lubricate gasket with soapy water to allow it to slip easily into place. Push gasket into socket making sure it is evenly seated.



STEP 3

Slide gland into position against gasket. Align bolt holes and insert T-bolts. Tighten nuts by hand. Note: deflection of joint must be made prior to tightening of T-bolts and set screws. The max deflection is 5° for 3"-12" 3° for 14"-20" and 2° for 24"-36".



STEP 4

T-bolts should be tightened alternately on opposite sides (Star Pattern), to the torque recommended by AWWA (see table A) and hand tighten set screws until tips evenly touch pipe, assuring concentricity.



STEP 5

Then tighten set screws alternately on opposite sides to approximate 50 ft. lbs. of torque. Finally in the same sequence, tighten set screws to recommended torque DO NOT RE-TORQUE. (see table B)



STEP 6

For Auto-Tork® screws simply use a 7/16" 12-point socket wrench. Tighten alternately on opposite sides until caps shear off.

Note: Not to be used on plain end fittings PVC or HDPE pipe.

(TABLE A) T-HEAD BOLT & NUT DETAILS		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE ¹ OF TORQUE (FT/LBS)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120

¹These torque ranges are requirements of AWWA C600

(TABLE B) SET SCREW TORQUE		
PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE OF TORQUE (FT/LBS)
3-12	5/8 X 2	85
14-24	3/4 X 2	90
30-36	1 X 3	90