



## PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

6" PVC Stargrip® / 16" PVC Stargrip®

## SUBMITTAL INFORMATION

PROJECT NAME:

ENGINEER:

CONTRACTOR:

SPEC. SECTION:



## FEATURES &amp; ADVANTAGES

**Consists of 3" to 12" G2 design and 14" and larger original Series 4000HD design:**

- Can be used on 4" through 12" AWWA C900 and AWWA C909 PVCO pipe, HDPE pipe or 3"-12" IPS PVC pipe\*. (\*A transition gasket is required on IPS Plastic Pipe).
- Listed with Underwriters Laboratories in sizes 4" to 12" and Approved by Factory Mutual Research in sizes 4" to 12".
- Tested to and meets the requirements of ASTM F1674.
- Safety factor is twice (2:1) the standardized pressure rating listed in Tables A and B.
- Offers five degrees of deflection on 3" to 12" AWWA C900, three degrees on 14" to 24" and two degrees on 30" to 36".
- Gland is made from high strength Ductile Iron per ASTM A536 Grade 65-45-12 and is compatible with all Mechanical Joints that conform to ANSI/AWWA C111/A21.11. Standard gland color is Coral Red.

**Features & Advantages for Sizes 3" - 12" only (US Patent# 9,822,910):**

- Fewer wedges and lower wedge-bolt torque (45 to 60 ft-lbs) results in quicker and easier installation.
- Design uses a spacer that is easily removed when restraint is used on IPS Plastic pipe. Wedge bolts do not need to be removed and reinstalled to remove spacer.
- Curved wedges reduce the amount of localized pipe deformation.
- Offers five degrees of deflection on all sizes of AWWA C900 pipe.
- The gland's larger inside diameter allows restraint to be installed on pipe with more ovality.
- Improved design of the wedge bolts prevents over torquing which can damage PVC pipe.
- Wedges are mechanically attached to wedge bolts, which eliminates the possibility of falling out during shipping and handling.

## MATERIAL SPECIFICATIONS:

- Wedges: Ductile Iron per ASTM A536, Grade 65-45-12. Wedge coating is a thermally cured fluoropolymer epoxy.

**GLAND FINISH OPTIONS (Please check one):**

Standard: alkyd enamel coating

Optional: Starbond™ TGIC polyester powder coating  
applied by an electrostatic spray process

Optional: Other (specify) \_\_\_\_\_

**COUNTRY OF ORIGIN OPTION (Please check one):**

Import

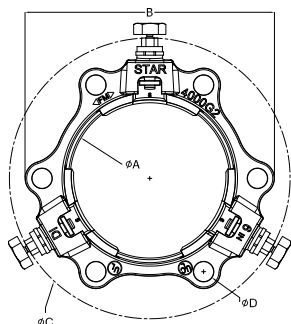
100% Domestic<sup>1</sup>Domestic gland with import components<sup>1</sup>(\*Please see [Domestic Restraint Options Available](#) on our website.)**HARDWARE OPTIONS (Please check):**Standard: T-bolts and nuts are high strength low  
alloy steel manufactured in accordance with ANSI/  
AWWA C111/A21.11Optional: T-bolts alloy SS 304 per ASTM F593;  
Nuts alloy SS 304 per ASTM F594 CWOptional: T-bolts SS 316 per ASTM F593;  
Nuts SS 316 per ASTM A194 Grade 8MOptional: T-bolts and nuts Fluoropolymer Star-Blue  
coated high strength low alloy steel manufactured  
in accordance with ANSI/AWWA C111/A21.11



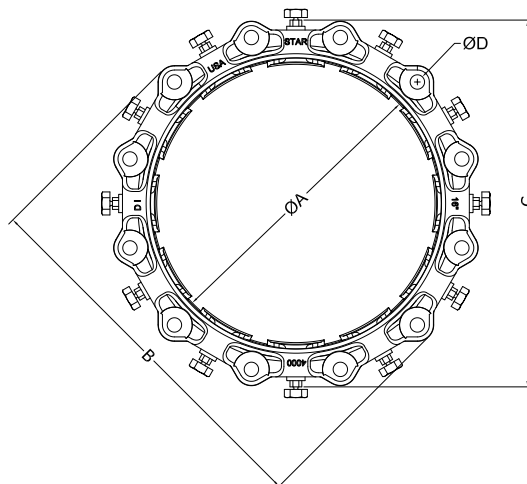
# PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

## TECHNICAL INFORMATION



6" PVC Stargrip® Series 4000 for PVC Pipe



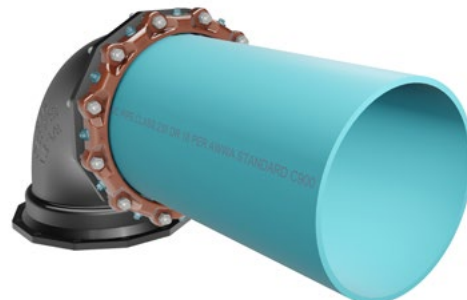
16" PVC Stargrip® Series 4000 for PVC Pipe

Please  
check sizes:

PVC STARGRIP® 4000 SPECIFICATIONS*									
NOM. SIZE	C900/C909 PIPE CI OD	IPS PIPE OD (TRANSITION GASKET REQUIRED)	ØA	B	ØC <sup>1</sup>	ØD	T-BOLT SIZE (QTY)	WEDGE (QTY)	APPROX WT. (LBS)
3	N/A	3.50	4.09	7.57	9.01	3/4	5/8 x 3 (4)	2	6
4	4.80	4.50	4.93	9.00	10.29	7/8	3/4 x 3 1/2 (4)	2	7
6	6.90	6.63	7.03	11.00	12.39	7/8	3/4 x 3 1/2 (6)	3	10
8	9.05	8.63	9.18	13.25	14.44	7/8	3/4 x 4 (6)	4	15
10	11.10	10.75	11.23	15.62	16.59	7/8	3/4 x 4 (8)	6	21
12	13.20	12.75	13.33	17.87	18.54	7/8	3/4 x 4 (8)	6	25
14	15.30	N/A	15.45	20.75	20.36	7/8	3/4 x 4 1/2 (10)	10	50
16	17.40	N/A	17.55	23.00	22.46	7/8	3/4 x 4 1/2 (12)	12	60
18	19.50	N/A	19.65	25.25	24.56	7/8	3/4 x 4 1/2 (12)	12	65
20	21.60	N/A	21.75	27.50	26.66	7/8	3/4 x 4 1/2 (14)	14	76
24	25.80	N/A	25.95	32.00	30.86	7/8	3/4 x 5 (16)	16	98
30	32.00	N/A	32.18	39.38	36.82	1-1/8	1 x 6 (20)	20	173
36	38.30	N/A	38.48	46.25	43.12	1-1/8	1 x 6 (24)	24	219

\*All dimensions in inches except where indicated.

1 - dimension after assembly on pipe





# PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

## TECHNICAL INFORMATION (cont'd)

**Table A. Maximum Working Pressure Rating with Occasional or Recurring Surges in PSI for Plastic Pipes Made to a CIOD Diameter Regimen**

NOM. SIZE (IN)	Actual Plastic Pipe OD	AWWA C900 PVC									AWWA C909 PVCO			AWWA C906 HDPE*						
											IPEX PVCO		JM EAGLE PVCO							
		DR14	DR17	DR18	DR21	DR25	DR27.5	DR32.5	DR41	DR51	PC235	PC235	PC165	DR 7.3	DR 9	DR 9.3	DR11	DR13.5	DR17	
4	4.80	305	250	235	200	165	-	-	-	-	235	-	-	254	200	193	160	130	100	
6	6.90	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100	
8	9.05	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100	
10	11.10	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100	
12	13.20	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100	
14	15.30	305	250	235	200	165	150	125	-	-	235	-	-	-	200	193	160	-	-	
16	17.40	305	250	235	200	165	150	125	-	-	235	-	165	-	-	-	160	-	-	
18	19.50	-	250	235	200	165	150	125	-	-	200	-	-	-	-	-	160	-	-	
20	21.60	-	250	235	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-	
24	25.80	-	250	235	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-	
30	32.00	-	-	200	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-	
36	38.30	-	-	-	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-	

\* A stainless steel pipe stiffener (provided by others) is required for the Series 4000 to be installed on HDPE pressure pipe. The stiffener must be installed in the HDPE pipe before installing the Series 4000. The stainless steel pipe stiffener must be of sufficient length to support the full bearing length of the restrainer.

**Table B. Maximum Working Pressure Rating with Occasional or Recurring Surges in PSI for Plastic Pipes Made to an IPS Diameter Regimen**

NOM. SIZE (IN)	Actual Plastic Pipe OD	ASTM D2241 PVC			AWWA C901 and AWWA C906 HDPE**					
		SDR17	SDR21	SDR26	DR 7.3	DR 9	DR 9.3	DR11	DR13.5	DR17
3	3.50	250	200	160	254	200	-	160	130	100
4	4.50	250	200	160	254	200	193	160	130	100
6	6.63	250	200	160	254	200	193	160	130	100
8	8.63	250	200	160	254	200	193	160	130	100
10	10.75	250	200	160	254	200	193	160	130	100
12	12.75	250	200	160	254	200	193	160	130	100

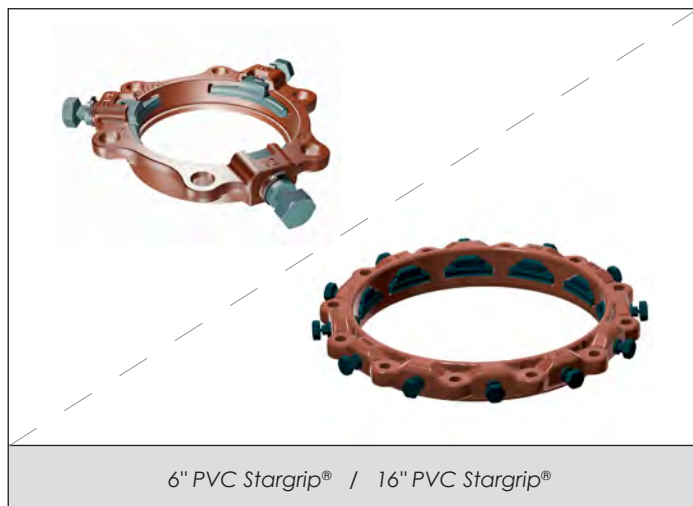
NOTE: A transition gasket is required for use with pipes made to an IPS diameter regimen.

\*\* A stainless steel pipe stiffener (provided by others) is required for the Series 4000 to be installed on HDPE pressure pipe. The stiffener must be installed in the HDPE pipe before installing the Series 4000. The stainless steel pipe stiffener must be of sufficient length to support the full bearing length of the restrainer.



# PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe



6" PVC Stargrip® / 16" PVC Stargrip®

## INFORMATION

The PVC Stargrip® Mechanical Joint Restraint System is an exceptional restraint system for mechanical joint fittings (AWWA C153 or C110), valves, fire hydrants on a variety of plastic pressure pipes.

## Quick and Easy Installation.

## FEATURES & ADVANTAGES

### Consists of 3" to 12" G2 design and 14" and larger original Series 4000HD design:

- Can be used on 4" through 12" AWWA C900 and AWWA C909 PVC pipe, HDPE pipe or 3"-12" IPS PVC pipe\*. (\*A transition gasket is required on IPS Plastic Pipe).
- Listed with Underwriters Laboratories in sizes 4" to 12".
- Approved by Factory Mutual Research in sizes 4" to 12".
- Tested to and meets the requirements of ASTM F1674.
- Safety factor is twice (2:1) the standardized pressure rating listed in Tables A and B.
- Offers five degrees of deflection on 3" to 12" AWWA C900, three degrees on 14" to 24" and two degrees on 30" to 36".
- Gland is made from high strength Ductile Iron per ASTM A536 Grade 65-45-12 and is compatible with all Mechanical Joints that conform to ANSI/AWWA C111/A21.11. Standard gland color is Coral Red.
- Eliminates the need for tie rods and thrust blocks.

### Features & Advantages for Sizes 3" - 12" only:

- Fewer wedges and lower wedge-bolt torque (45 to 60 ft-lbs) results in quicker and easier installation.
- Design uses a spacer that is easily removed when restraint is used on IPS Plastic pipe. Wedge bolts do not need to be removed and reinstalled to remove spacer.
- Curved wedges reduce the amount of localized pipe deformation.
- Offers five degrees of deflection on all sizes of AWWA C900 pipe.
- The gland's larger inside diameter allows restraint to be installed on pipe with more ovality.
- Improved design of the wedge bolts prevents over torquing which can damage PVC pipe.
- Wedges are mechanically attached to wedge bolts, which eliminates the possibility of falling out during shipping and handling.
- US Patent# 9,822,910

## SAMPLE SPECIFICATIONS

*Restrainer mechanism shall be integrated into the design of the restraint gland. As the mechanism is activated, multiple wedge action shall be imparted against the pipe OD 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 head. 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 secondary 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/A21.53 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 as stated in most current catalog and shall have a safety factor of at least 2:1. The restraining device for C900 PVC, C909 PVC and IPS PVC Pipe shall be Star® Pipe Products second Generation PVC Stargrip® Series 4000 or equal.*

JRCAT19.01

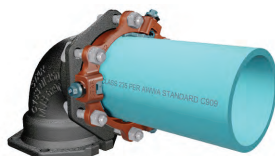
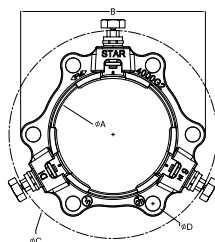


# PVC Stargrip® series 4000

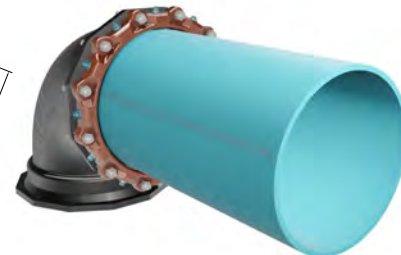
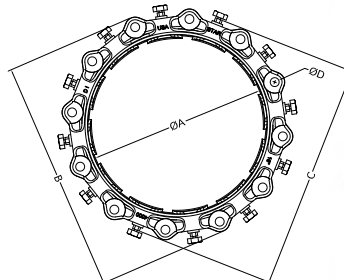
Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

## TECHNICAL INFORMATION

6" PVC Stargrip® Series 4000 for PVC Pipe



16" PVC Stargrip® Series 4000 for PVC Pipe



### PVC STARGRIP® 4000 SPECIFICATIONS\*

NOM. SIZE	C900/C909 PIPE CI OD	IPS PIPE OD (TRANSITION GASKET REQUIRED)	ØA	B	ØC¹	ØD	T-BOLT SIZE (QTY)	WEDGE (QTY)	APPROX WT. (LBS)
3	N/A	3.50	4.09	7.57	9.01	3/4	5/8 x 3 (4)	2	6
4	4.80	4.50	4.93	9.00	10.29	7/8	3/4 x 3 1/2 (4)	2	7
6	6.90	6.63	7.03	11.00	12.39	7/8	3/4 x 3 1/2 (6)	3	10
8	9.05	8.63	9.18	13.25	14.44	7/8	3/4 x 4 (6)	4	15
10	11.10	10.75	11.23	15.62	16.59	7/8	3/4 x 4 (8)	6	21
12	13.20	12.75	13.33	17.87	18.54	7/8	3/4 x 4 (8)	6	25
14	15.30	N/A	15.45	20.75	20.36	7/8	3/4 (10)	10	50
16	17.40	N/A	17.55	23.00	22.46	7/8	3/4 (12)	12	60
18	19.50	N/A	19.65	25.25	24.56	7/8	3/4 (12)	12	65
20	21.60	N/A	21.75	27.50	26.66	7/8	3/4 (14)	14	76
24	25.80	N/A	25.95	32.00	30.86	7/8	3/4 (16)	16	98
30	32.00	N/A	32.18	39.38	36.82	1-1/8	1 (20)	20	173
36	38.30	N/A	38.48	46.25	43.12	1-1/8	1 (24)	24	219

\*All dimensions in inches except where indicated.

1 - dimension after assembly on pipe

Table A. Maximum Working Pressure Rating with Occasional or Recurring Surges in PSI for Plastic Pipes Made to a CIOD Diameter Regimen

NOM. SIZE (IN)	Actual Plastic Pipe OD	AWWA C900 PVC										AWWA C909 PVC			AWWA C906 HDPE*						
												IPEX PVC0		JM EAGLE PVC0							
		DR14	DR17	DR18	DR21	DR25	DR27.5	DR32.5	DR41	DR51	PC235	PC235	PC165	DR 7.3	DR 9	DR 9.3	DR11	DR13.5	DR17		
4	4.80	305	250	235	200	165	-	-	-	-	235	-	-	254	200	193	160	130	100		
6	6.90	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100		
8	9.05	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100		
10	11.10	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100		
12	13.20	305	250	235	200	165	-	-	-	-	235	235	-	254	200	193	160	130	100		
14	15.30	305	250	235	200	165	150	125	-	-	235	-	-	-	200	193	160	-	-		
16	17.40	305	250	235	200	165	150	125	-	-	235	-	165	-	-	-	160	-	-		
18	19.50	-	250	235	200	165	150	125	-	-	200	-	-	-	-	-	160	-	-		
20	21.60	-	250	235	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-		
24	25.80	-	250	235	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-		
30	32.00	-	-	200	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-		
36	38.30	-	-	-	200	165	150	125	-	-	-	-	-	-	-	-	-	-	-		

\* A stainless steel pipe stiffener (provided by others) is required for the Series 4000 to be installed on HDPE pressure pipe. The stiffener must be installed in the HDPE pipe before installing the Series 4000. The stainless steel pipe stiffener must be of sufficient length to support the full bearing length of the restrainer.

Table B. Maximum Working Pressure Rating with Occasional or Recurring Surges in PSI for Plastic Pipes Made to an IPS Diameter Regimen

NOM. SIZE (IN)	Actual Plastic Pipe OD	ASTM D2241 PVC			AWWA C901 and AWWA C906 HDPE**					
		SDR17	SDR21	SDR26	DR 7.3	DR 9	DR 9.3	DR11	DR13.5	DR17
3	3.50	250	200	160	254	200	-	160	130	100
4	4.50	250	200	160	254	200	193	160	130	100
6	6.63	250	200	160	254	200	193	160	130	100
8	8.63	250	200	160	254	200	193	160	130	100
10	10.75	250	200	160	254	200	193	160	130	100
12	12.75	250	200	160	254	200	193	160	130	100

NOTE: A transition gasket is required for use with pipes made to an IPS diameter regimen.

\*\* A stainless steel pipe stiffener (provided by others) is required for the Series 4000 to be installed on HDPE pressure pipe. The stiffener must be installed in the HDPE pipe before installing the Series 4000. The stainless steel pipe stiffener must be of sufficient length to support the full bearing length of the restrainer.





## PVC Stargrip® series 4000

Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

## INSTALLATION INSTRUCTIONS - SIZES 3" - 12"

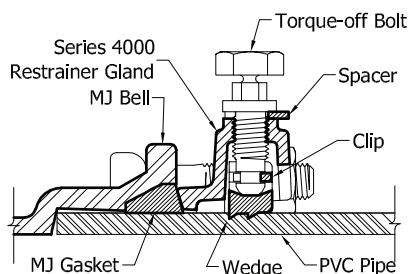


## STEP 1

The rubber gasket seals more effectively if the surfaces with which it comes in contact are thoroughly cleaned just before assembly. Remove all foreign material while cleaning. Lubrication and additional cleaning should be provided by brushing both the gasket and the plain end with soapy water or pipe lubricant. Slide the SERIES 4000 on the plain end with lip facing the plain end, followed by the MJ gasket with tapered side facing the plain end.

**IMPORTANT:** When installing sizes 4" through 12" on IPS PVC pipe, MJ Transition gasket must be used.

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 2

Slide the SERIES 4000 toward the MJ bell with the gland lip evenly pressed against the gasket. Insert T-bolts and hand tighten nuts.

**IMPORTANT:** Make deflection after joint is assembled but before tightening T-bolts to required torque range as listed in table below.



## STEP 3

## 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. In order to keep the spigot fully homed in the MJ bell, the joint will need to be kept in compression until the completion of Step 6. All T-bolts should be tightened until they are within the torque range as listed in table below. This process may require multiple rounds.

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 pipe, spacers must be removed from the torque-limiting bolts.

## STEP 5

## STEP 6

Continue tightening in an alternating manner until all of the Torque-limiting twist-off bolt heads have been twisted off. If removal is necessary, utilize the 5/8" hex head provided. If reassembly is required, assure that all of the Torque-off bolts, wedges, clips and spacers (if required) are in place. Assemble the joint in the same manner as above and tighten the wedge bolts to 45-60 ft.-lbs. using 5/8" hex head provided.

Table C. T-Head Bolt and Nut Details

NOM. PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE OF TORQUE (FT-LBS)			
		AWWA C900 (PVC)	ASTM D2241 (PVC)	AWWA C909 (PVC)	AWWA C901 / AWWA C906 (HDPE)
3	5/8		45 - 60		75-90
4 to 12	3/4	75-90	75-90	55-65	75-90

\* Deflection not allowed for C909.

## Notes:

- 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.**
- Not to be used on DI or steel pipe.
- PVC Stargrips must be adequately wrapped or protected if they are covered by concrete to ensure that concrete is not allowed to enter the wedge pocket.
- For applications with vertical offsets please contact Star Pipe Products for technical assistance.



# PVC Stargrip® series 4000

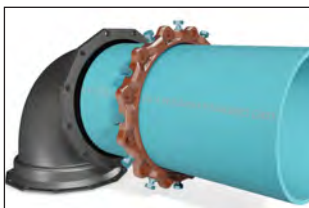
Mechanical Joint Wedge Action Restraint  
for Plastic Pressure Pipe

## INSTALLATION INSTRUCTIONS - SIZES 14" - 36"

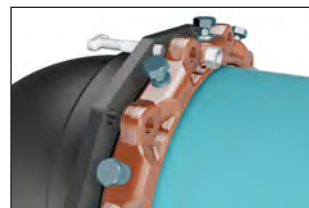
**STEP 1**

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 rust or 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 SERIES 4000 on the plain end, followed by the MJ gasket.

NOTE: If installing the Series 4000 on HDPE pressure pipe, a stainless steel pipe stiffener (provided by others) is required. The stiffener must be installed in the HDPE pipe before installing the Series 4000. The stainless steel pipe stiffener must be of sufficient length to support the full bearing length of the restrainer.

**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**

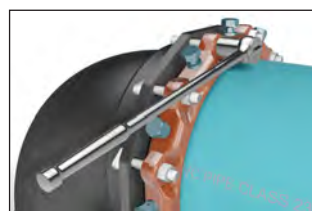
Slide the SERIES 4000 toward the MJ bell with the gland lip against the gasket. Insert T-bolts and hand tighten nuts.

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

**Table D. T-Head Bolt and Nut Details**

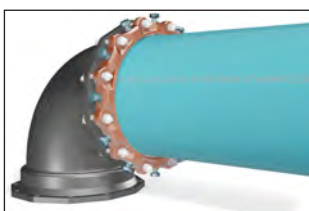
NOM. PIPE SIZE (IN)	BOLT SIZE (IN)	RANGE OF TORQUE (FT-LBS)		
		AWWA C900 (PVC)	AWWA C909 (PVC)	AWWA C901/ AWWA C906 (HDPE)
14 to 18	3/4	75-90	75-90	75-90
20 to 24	3/4	75-90		
30 to 36	1	100-120		

\* Deflection not allowed for C909.

**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. In order to keep the spigot fully homed in the MJ bell, the joint will need to be kept in compression until the completion of step 6.

All T-bolts should be tightened until they are within the torque range as listed in Table D. This may require multiple rounds.

**STEP 5**

Tighten the Torque – limiting twist – off bolts in a clockwise direction until all wedges are in firm contact with the pipe surface.

**STEP 6**

Continue tightening in an alternating manner until all of the Torque – limiting twist – off bolt heads have been twisted off.

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 ft-lbs.

### Notes:

- 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.**
- Not to be used on DI or steel pipe.
- PVC Stargrips must be adequately wrapped or protected if they are covered by concrete to ensure that concrete is not allowed to enter the wedge pocket.
- For applications with vertical offsets please contact Star Pipe Products for technical assistance.