



Stargrip® series 3000

Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe

Sizes 3" - 60"



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 (PC150 - PC350 and CL50 - CL56).

Proven Design - 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 Head, ensuring proper installation.
- The Stargrip® offers a full 5° deflection through 12" size, 3° on 14"-24", 2° on 30"-36", 1° on 42"-48" and ½° on 54" & 60".
- 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.
- Stargrip® eliminates tie rods and thrust blocks.
- Standard gland color is Black.
- Stargrip® may be used on steel pipe of any size. For steel pipe 12" and under a transition gasket is required if the diameter regimen is IPS. For steel pipe 14" and larger, the pipe's outside diameter must be the same as ductile iron pipe (CIOD diameter regimen). For sizes 3" - 8", minimum SCH40 steel pipe wall thickness is required. For sizes 10" through 16" the minimum wall thickness must be equal to or greater than PC350 ductile iron pipe. For sizes 18" and above, the minimum wall thickness of the steel pipe must be equal to or greater than PC 250 ductile iron pipe.

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 head. The restraining twist off head 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.

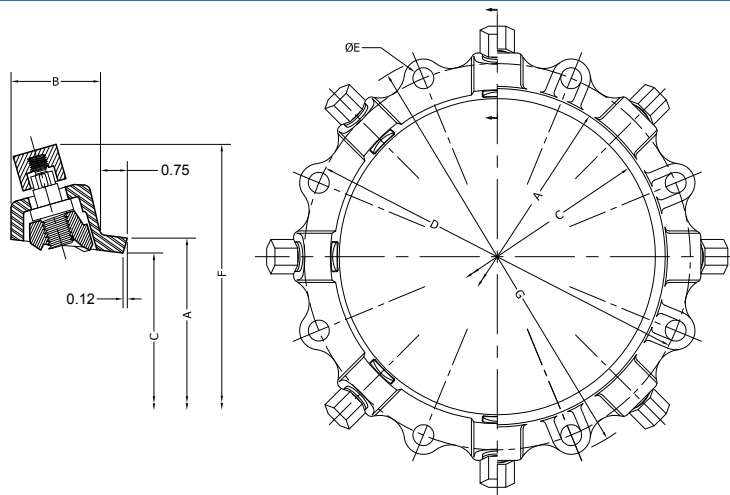
The mechanical joint restraint mechanism shall have a maximum water working pressure of 350 PSI for sizes 3"- 16", 250 PSI for sizes 18"- 48" and 200 PSI for sizes 54"- 60". All sizes shall have a minimum safety factor of 2:1 (i.e. twice the maximum pressure rating of the restraint). The mechanical joint 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
Sizes 3" - 60"

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	8.78	8.13	2	4	7
4	350	5.92	2.40	4.90	7.50	7/8	11.06	9.62	9.12	2	4	9
6	350	8.02	2.40	7.00	9.50	7/8	13.06	11.72	11.12	3	6	13
8	350	10.17	2.51	9.15	11.75	7/8	15.25	13.84	13.37	4	6	17
10	350	12.22	2.51	11.20	14.00	7/8	17.25	15.88	15.62	6	8	23
12	350	14.32	2.51	13.30	16.25	7/8	19.50	17.98	17.88	8	8	31
14	350	16.40	2.91	15.44	18.75	7/8	21.25	20.12	20.90	10	10	54
16	350	18.50	2.91	17.54	21.00	7/8	23.34	22.22	23.00	12	12	60
18	250	20.60	2.91	19.64	23.25	7/8	26.40	24.90	25.25	12	12	69
20	250	22.70	2.67	21.74	25.50	7/8	28.56	27.00	27.50	14	14	72
24	250	26.90	3.50	25.94	30.00	7/8	33.86	32.34	31.54	16	16	170
30	250	33.29	3.49	32.17	36.88	1 1/8	40.12	38.62	39.12	20	20	197
36	250	39.59	3.49	38.47	43.75	1 1/8	46.42	44.92	46.00	24	24	242
42	250	45.79	5.15	44.75	50.62	1 3/8	54.86	53.32	53.12	28	28	425
48	250	52.09	5.15	51.05	57.50	1 3/8	61.16	59.62	60.00	32	32	500
54	200	58.87	5.00	57.90	63.20	1 3/8	68.33	66.30	66.00	36	36	581
60	200	62.92	5.00	61.95	67.72	1 3/8	72.38	70.35	70.52	36	36	636

* All dimensions in inches except where indicated.

** Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.

Notes:

- Stargrip® Series 3000 restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- Star High Pressure gaskets are provided with 54" - 60" Stargrip®. They are required on these sizes for maximum pressure rating listed above.
- Stargrips® must be adequately wrapped or protected if they are covered by concrete to ensure that concrete does not enter the wedge pocket.
- For applications exceeding the maximum pressure ratings listed, please contact Star Pipe Products for recommendations (see Tandem Stargrip® Series 3000T).
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.
- For applications on existing pipe, the pipe needs to be structurally sound and the surface needs to be relatively free of any corrosive by-products in order for the wedges to function properly. Please contact Star Pipe Products for technical assistance.
- Sizes 42" - 60" require extra long 1 1/4" x 8 1/2" T-bolts.



Oversized Stargrip® series 3000OS

Mechanical Joint Wedge Action Restraint
for A, B, C & D Pit Cast Pipe
Sizes 4" - 16"



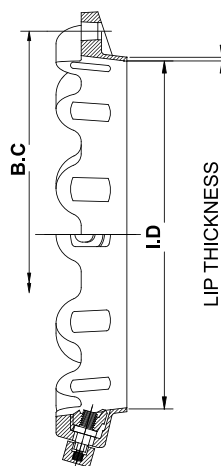
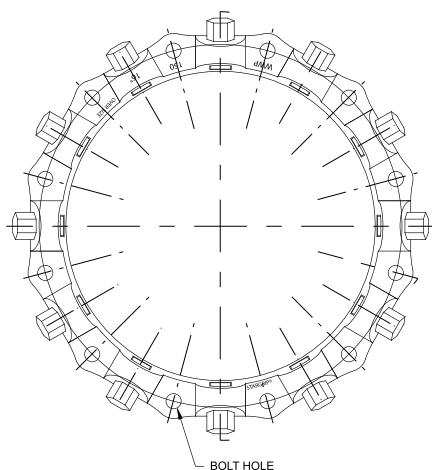
Stargrip® series 3000OS

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.

Oversized Accommodates 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	9
6	250	9.50	6 x 7/8	7.20	0.32	13
8	250	11.75	6 x 7/8	9.40	0.29	18
10	250	14.00	8 x 7/8	11.50	0.27	23
12	250	16.25	8 x 7/8	13.60	0.27	31
14	150	18.75	10 x 7/8	15.79	0.23	54
16	150	21.00	12 x 7/8	17.94	0.21	60

* All dimensions in inches except where indicated.

** Pressure ratings shall not exceed the maximum pressure rating of the iron pipe it is installed on.



Stargrip® series 3000 & 3000OS

Mechanical Joint Wedge Action Restraint
for Ductile Iron Pipe

Sizes 3" - 60"

INSTALLATION INSTRUCTIONS - SIZES 3" - 60"



STEP 1

To ensure the rubber gasket will seal 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 with lip extension towards the plain end, follow by the MJ gasket with narrow edge of the gasket towards the MJ bell. High pressure MJ gaskets as supplied by Star Pipe Products are bi-directional. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.



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 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 5

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

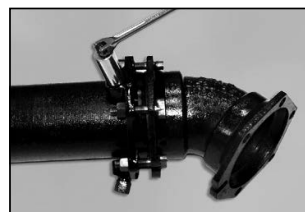
Continue tightening in an alternative manner going on the opposite sides [Star Pattern], until all nuts have been twisted off.



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 6

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 on sizes 3"-20", 120 ft-lbs on sizes 24"-36" & 130 ft-lbs on sizes 42"-60"].

(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
42-60	1 1/4	120-150

¹These torque ranges are requirements of AWWA C600

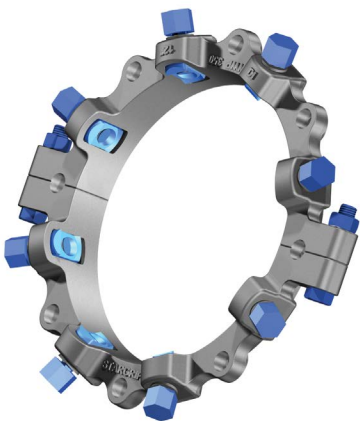
Notes:

- Stargrip® Series 3000 restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- 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.**
- Tightening of T-Bolts and torque limiting twist off nuts can be performed by use of Wrench (box, ratchet or pneumatic).
- Not to be used on plain end fittings or PVC or HDPE pipe.
- StarGrip may be used on steel pipe of any size. For steel pipe 12" and under a transition gasket is required if the diameter regimen is IPS. For steel pipe 14" and larger, the pipe's outside diameter must be the same as ductile iron pipe (CIOD diameter regimen). For sizes 3" - 8", minimum SCH40 steel pipe wall thickness is required. For sizes 10" through 16" the minimum wall thickness must be equal to or greater than PC350 ductile iron pipe. For sizes 18" and above, the minimum wall thickness of the steel pipe must be equal to or greater than PC 250 ductile iron pipe.
- Stargrips® must be adequately wrapped or protected if they are covered by concrete to ensure that concrete does not enter the wedge pocket.
- For applications exceeding the maximum pressure ratings listed, please contact Star Pipe Products for recommendations (see Tandem Stargrip® Series 3000T).
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.
- For applications on existing pipe, the pipe needs to be structurally sound and the surface needs to be relatively free of any corrosive by-products in order for the wedges to function properly. Please contact Star Pipe Products for technical assistance.
- Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.



Split Stargrip® series 3000S

Split Mechanical Joint Wedge Action Restraint
for New or Existing Ductile Iron Pipe
Sizes 3" - 48"



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. Split Stargrip® pressure rating per table on next page.

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 Head, 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.
- Clamping bolts per SAE J429 Grade 5 steel
- Eliminates tie rods and thrust blocks
- Standard gland color is Black.
- Split Stargrip® may also be used on steel pipe of any size. For steel pipe 12" and under a transition gasket is required if the diameter regimen is IPS. For steel pipe 14" and larger, the pipe's outside diameter must be the same as ductile iron pipe (CIOD diameter regimen). For sizes 3" – 8", minimum SCH40 steel pipe wall thickness is required. For sizes 10" through 16" the minimum wall thickness must be equal to or greater than PC350 ductile iron pipe. For sizes 18" and above, the minimum wall thickness of the steel pipe must be equal to or greater than PC 250 ductile iron pipe.

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 head. The restraining twist off head 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.

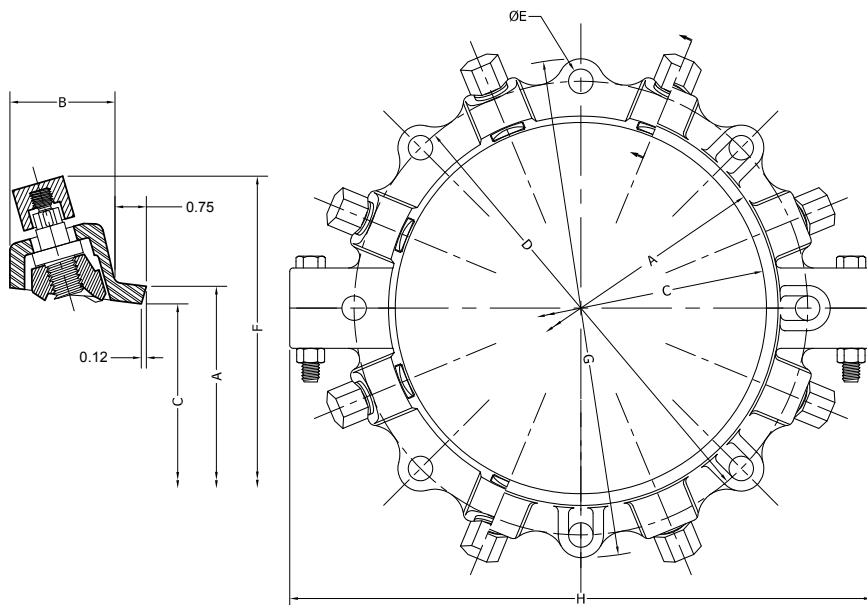


Split Stargrip® series 3000S

Split Mechanical Joint Wedge Action Restraint
for New or Existing Ductile Iron Pipe

Sizes 3" - 48"

TECHNICAL INFORMATION



CLAMPING BOLT SIZE		
SERIES 3000S (IN)	BOLT SIZE (IN)	QTY
3-6	5/8 x 3 1/2	2
8-10	3/4 x 3 1/2	2
12	3/4 x 4	2
14-24	7/8 x 3 3/4	2
30	1 x 3 3/4	2
36	7/8 x 3 3/4	4
42-48	1 1/8 x 4 1/2	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	9.12	9.80	2	4	11
6	350	8.02	2.44	7.00	9.50	7/8	13.06	11.38	11.12	13.86	3	6	15
8	350	10.17	2.44	9.15	11.75	7/8	15.25	13.53	13.37	15.16	4	6	20
10	350	12.22	2.44	11.20	14.00	7/8	17.25	15.58	15.62	17.98	6	8	26
12	350	14.32	2.44	13.30	16.25	7/8	19.50	12.68	17.88	20.86	8	8	35
14	300	16.40	2.83	15.44	18.75	7/8	21.25	19.82	20.75	25.08	10	10	54
16	300	18.50	2.83	17.54	21.00	7/8	23.34	21.92	23.00	27.12	12	12	60
18	200	20.60	2.91	19.64	23.25	7/8	26.40	24.84	25.25	29.64	12	12	76
20	200	22.70	2.67	21.74	25.50	7/8	28.56	27.00	27.50	31.66	14	14	77
24	200	26.90	3.50	25.94	30.00	7/8	33.86	32.30	31.54	36.14	16	16	131
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	60.00	65.12	32	32	664

* All dimensions in inches except where indicated.

** Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.

Notes:

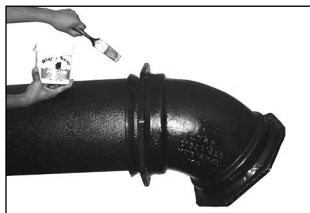
- Stargrip® Series 3000S restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- Sizes 42" & 48" require extra long 1 1/4" x 8 1/2" T-bolts.
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.



Split Stargrip® series 3000S

Split Mechanical Joint Wedge Action Restraint
for New or Existing Ductile Iron Pipe
Sizes 3" - 48"

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, with narrow edge of the gasket towards the MJ bell. 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. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.

**STEP 3**

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

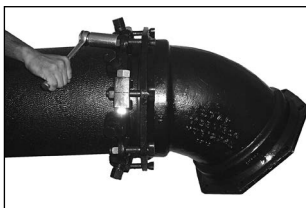
**STEP 4**

Tighten Clamping bolts on the Split Stargrip® to the following:

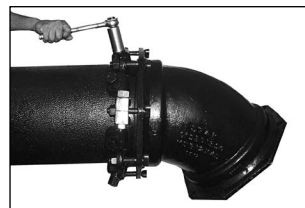
3" - 12": 100-125 FT-LBS.

14" - 36": 250-275 FT-LBS.

42" - 48": 300-325 FT-LBS.

**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.

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 ft-lbs on sizes 3"-20", 120 ft-lbs on sizes 24"-36" & 130 ft-lbs on sizes 42"-48"].

(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

Notes:

- Stargrip® Series 3000S restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- Not to be used on plain end fittings or PVC or HDPE pipe.
- Split Stargrip may be used on steel pipe of any size. For steel pipe 12" and under a transition gasket is required if the diameter regimen is IPS. For steel pipe 14" and larger, the pipe's outside diameter must be the same as ductile iron pipe (CIOD diameter regimen). For sizes 3" – 8", minimum SCH40 steel pipe wall thickness is required. For sizes 10" through 16" the minimum wall thickness must be equal to or greater than PC350 ductile iron pipe. For sizes 18" and above, the minimum wall thickness of the steel pipe must be equal to or greater than PC 250 ductile iron pipe.
- Stargrips® must be adequately wrapped or protected if they are covered by concrete to ensure that concrete does not enter the wedge pocket.
- Tightening of T-Bolts and torque limiting twist off nuts can be performed by use of Wrench (box, ratchet or pneumatic).
- For applications exceeding the maximum pressure ratings listed, please contact Star Pipe Products for recommendations.
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.
- For applications on existing pipe, the pipe needs to be structurally sound and the surface needs to be relatively free of any corrosive by-products in order for the wedges to function properly. Please contact Star Pipe Products for technical assistance.
- Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.

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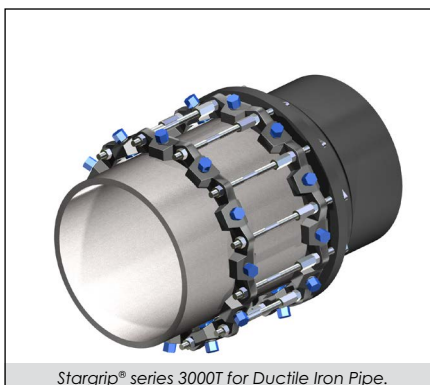
STAR[®] PIPE PRODUCTS



Tandem Stargrip® series 3000T

For High Pressure DI Pipe to MJ Fitting Applications

Sizes 3" - 60"



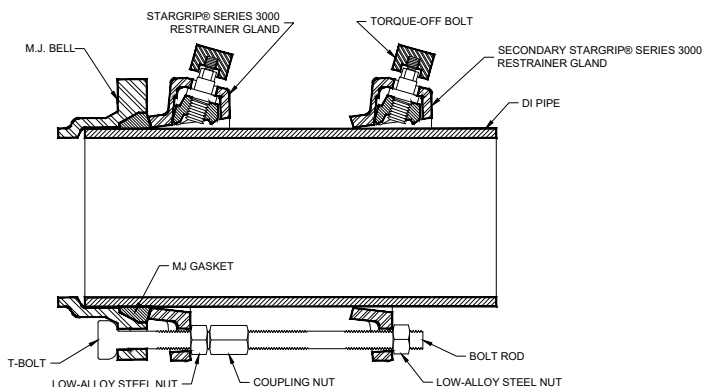
Stargrip® series 3000T for Ductile Iron Pipe.

INFORMATION

The Tandem Stargrip® Mechanical Joint Restraint System was designed for high pressure Ductile Iron Pipe to MJ Fitting applications (AWWA C153 or C110).

For High Pressure Ductile Iron Pipe to MJ Fitting Applications

TECHNICAL INFORMATION



TANDEM STARGRIP® 3000T SPECIFICATIONS*

NOM. SIZE	DI PIPE OD	BOLT ROD SIZE	T-BOLT SIZE	T-BOLT TORQUE (FT-LBS)	COUPLING NUT-GRADE 5 STEEL	WT
3	3.96	5/8 x 6	5/8 x 4	45-60	5/8 x 2 1/8	18
4	4.80	3/4 x 12	3/4 x 4 1/2	75-90	3/4 x 2 1/4	28
6	6.90	3/4 x 12	3/4 x 4 1/2	75-90	3/4 x 2 1/4	41
8	9.05	3/4 x 12	3/4 x 4 1/2	75-90	3/4 x 2 1/4	49
10	11.10	3/4 x 12	3/4 x 4 1/2	75-90	3/4 x 2 1/4	69
12	13.20	3/4 x 12	3/4 x 5	75-90	3/4 x 2 1/4	88
14	15.30	3/4 x 12	3/4 x 5 1/2	90-110	3/4 x 2 1/4	141
16	17.40	3/4 x 12	3/4 x 5 1/2	90-110	3/4 x 2 1/4	159
18	19.50	3/4 x 12	3/4 x 5 1/2	120-140	3/4 x 2 1/4	177
20	21.60	3/4 x 12	3/4 x 5 1/2	120-140	3/4 x 2 1/4	191
24	25.80	3/4 x 12	3/4 x 6	120-140	3/4 x 2 1/4	294
30	32.00	1 x 12	1 x 7 1/2	120-140	1 x 2 3/4	520
36	38.30	1 x 12	1 x 7 1/2	120-140	1 x 2 3/4	616
42	44.50	1 1/4 x 12	1 1/4 x 9 1/2	120-150	1 1/4 x 3	1118
48	50.80	1 1/4 x 12	1 1/4 x 9 1/2	120-150	1 1/4 x 3	1357
54	57.56	1 1/4 x 12	1 1/4 x 9 1/2	120-150	1 1/4 x 3	1572
60	61.61	1 1/4 x 12	1 1/4 x 9 1/2	120-150	1 1/4 x 3	1682

*All dimensions in inches except where indicated.

Notes:

- For applications with vertical offsets and desired pressure rating, please contact Star Pipe Products for technical assistance.



Tandem Stargrip® series 3000T

For High Pressure DI Pipe to MJ Fitting Applications

Sizes 3" - 60"

INSTALLATION INSTRUCTIONS

Tandem Stargrip® Installation Instructions

1. To ensure the rubber gasket will seal 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 both Stargrip® Glands on the plain end, followed by the MJ gasket, with narrow edge of the gasket towards the MJ bell. High pressure MJ gaskets as supplied by Star Pipe Products are bi-directional. Ensure that the lip of Stargrip® Glands are facing towards the MJ Gasket & MJ bell. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.
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.
3. Slide the first 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.
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 there is less than 1/4" gap present between the bottom of the gland wedge pocket & the MJ flange. T-Bolts should be tightened alternately on the opposite sides (Criss-Cross Pattern) to the torque listed in the table.
5. Tighten the torque limiting twist off heads in a clockwise direction until all wedges are in firm contact with the pipe surface.
6. Continue tightening in an alternative manner going on the opposite sides [Criss-Cross Pattern], until all 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 on sizes 3"-20", 120 ft-lbs on sizes 24"-36" and 130 ft-lbs on sizes 42"-60"].
7. Slide the secondary Stargrip® towards the first Stargrip®. Thread the coupling nut onto the exposed threads of the first assembled Stargrip® T-bolts.
8. Ensure that the bolt is threaded into the coupling nut at least half its length.
9. Then pass Bolt Rods through the bolt holes of the secondary Stargrip® & thread them into the coupling nuts & ensure that they enter approximately halfway into the coupling nuts. Make sure that the T-bolts & the bolt rods are butted against each other in the coupling nuts.
10. Tighten nuts onto the Bolt Rods behind the Secondary Stargrip® as shown in the sketch on the previous page & ensure that threads are shown past nut by at least the full length of the nut.
11. Pull the secondary Stargrip® away from the first Stargrip® to remove any slack in the joint. Tighten the torque limiting twist off heads on the secondary Stargrip® in a clockwise direction until all wedges are in firm contact with the pipe surface.
12. Continue tightening in an alternative manner going on the opposite sides [Criss-Cross Pattern], until all heads have been twisted off.
13. If removal is necessary, utilize the 5/8" hex head provided.
14. Ensure that the nuts behind the secondary Stargrip® are snug. Half turn by wrench only.
15. If reassembly is required, assemble the joint in the same manner as above and tighten the wedge bolts to 90 FT-LBS on sizes 3"-20", 120 FT-LBS on sizes 24"-36" and 130 FT-LBS on sizes 42"-60".

Notes:

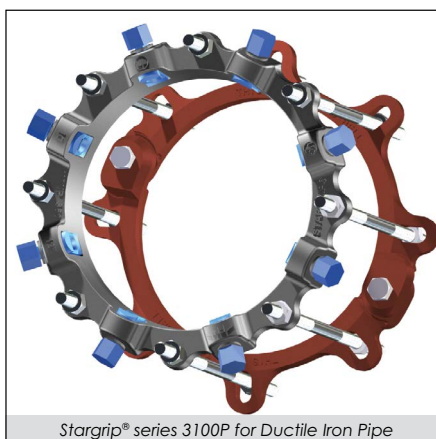
- Tandem Stargrip® Series 3000T restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- For applications with vertical offsets and desired pressure rating, please contact Star Pipe Products for technical assistance.
- Pressure Rating has 2:1 safety factor
- Tightening of T-Bolts and torque limiting twist off heads can be performed by use of Wrench (box, ratchet or pneumatic).
- Maintains same deflection capability as standard Stargrip®
- T-Bolts/Rods/Hex Nuts: High Strength Low Alloy Steel Per ANSI/AWWA C111/A21.11
- Sizes 42" - 60" require extra long 1 1/4" x 9 1/2" T-bolts.
- Due to additional length of the T-bolt, some appurtenances (valves, etc.) may not accommodate T-bolt insertion through the backside of MJ bell.
- Sizes 54"-60" require Star high pressure gaskets.



Stargrip® series 3100P

Wedge Action Restraint
for Ductile Iron Pipe Bells - New Installations

Sizes 3" - 48"



Stargrip® series 3100P for Ductile Iron Pipe

FEATURES & ADVANTAGES

- Stargrip® and split back-up rings are manufactured from Ductile Iron per ASTM A536, Grade 65-45-12.
- Includes Stargrip® and Split Back-Up Ring (for sizes 3"-36") or two Stargrips® for sizes 42"-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 (PC150 - PC350 and CL50 - CL56) -- Stargrip® restraint pressure rating per table below
- 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 Black.

TECHNICAL INFORMATION

SPLIT STARGRIP® 3100P SPECIFICATIONS*

NOM. SIZE	MAX PRESSURE RATING** (PSI)	RODS (QTY)	ROD DIA x LENGTH	MAX. BELL OD	APPROX WT. (LBS)
3	350	4	5/8 x 17	5.57	19
4	350	4	3/4 x 17	6.75	23
6	350	6	3/4 x 17	9.27	35
8	350	6	3/4 x 17	11.63	42
10	350	8	3/4 x 24	13.37	60
12	350	8	3/4 x 24	16.60	76
14	350	8	3/4 x 24	19.17	121
16	350	10	3/4 x 24	21.41	142
18	250	10	3/4 x 24	23.64	165
20	250	12	3/4 x 24	26.05	192
24	250	14	3/4 x 24	30.78	276
30	250	18	1 x 24	37.39	499
36	250	22	1 x 24	44.42	495
***42	250	28	1 1/4 x 30	49.37	996
***48	250	32	1 1/4 x 30	56.25	1175

* All dimensions in inches except where indicated.

** Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.

*** For sizes 42" and 48" two Stargrips® are provided; one on the spigot and one behind the bell.

Notes:

- Stargrip® Series 3100P restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.

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 head. The restraining twist off head 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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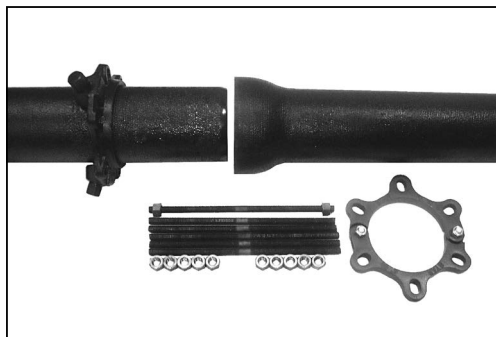


Stargrip® series 3100P

Wedge Action Restraint
for Ductile Iron Pipe Bells - New Installations

Sizes 3" - 48"

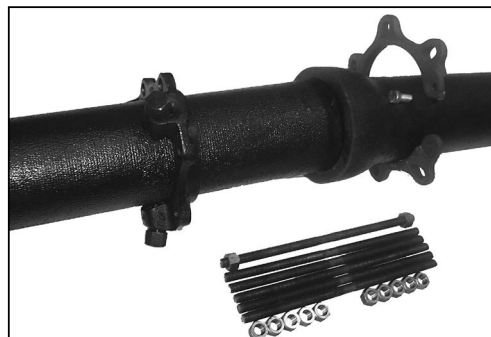
INSTALLATION INSTRUCTIONS - SIZES 3" - 48"*



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 Split Back-Up Ring behind the bell.

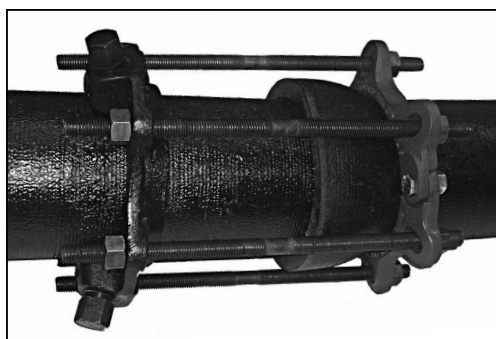
Place the Stargrip® Series 3000 restraint gland on the spigot end of the plain pipe with the lip extension facing towards the mating bell. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.



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 ft-lb.

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

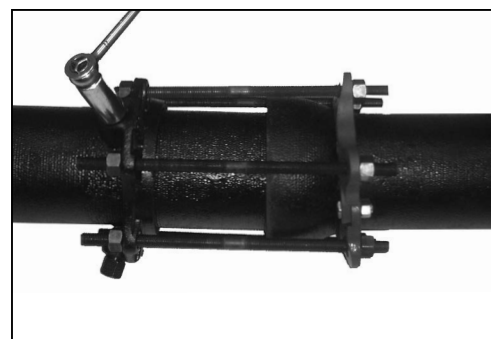


STEP 3

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. Ensure 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.

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 ft-lbs on sizes 3"-20", 120 ft-lbs on sizes 24"-36", and 130 ft-lbs on sizes 42" and 48".

Important Note for Sizes 42" & 48":

- For sizes 42" & 48", two Stargrips are provided. Stargrip is placed on the spigot end of plain pipe with lip extension facing towards the mating bell. The other Stargrip is placed on the second pipe behind the bell with lip extension toward the bell. Proceed to follow steps 3 & 4 as listed above to complete installation.

Notes:

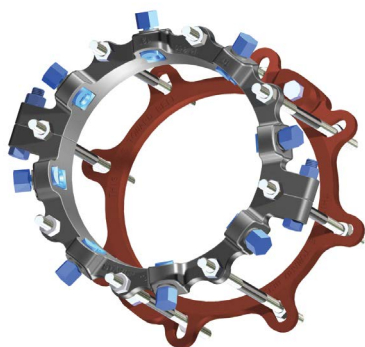
- Stargrip® Series 3100P restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- Not to be used on plain end fittings or PVC or HDPE pipe.
- Stargrips® must be adequately wrapped or protected if they are covered by concrete to ensure that concrete does not enter the wedge pocket.
- Tightening of torque limiting twist off nuts can be performed by use of Wrench (box, ratchet or pneumatic).
- For applications exceeding the maximum pressure ratings listed, please contact Star Pipe Products for recommendations.
- For applications with vertical offsets please contact Star Pipe Products for technical assistance.
- For applications on existing pipe, the pipe needs to be structurally sound and the surface needs to be relatively free of any corrosive by-products in order for the wedges to function properly. Please contact Star Pipe Products for technical assistance.



Split Stargrip® series 3100S

Split Wedge Action Restraint
for Ductile Iron Pipe - New or Existing Installations

Sizes 3" - 48"



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 (PC150 - PC350 and CL50 - CL56) - Stargrip® restraint pressure rating per table below
- 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 black.

TECHNICAL INFORMATION

SPLIT STARGRIP® 3100S SPECIFICATIONS*

NOM. SIZE	MAX PRESSURE RATING** (PSI)	RODS (QTY)	ROD DIA x LENGTH	MAX. BELL OD	APPROX WT. (LBS)
3	350	4	5/8 x 17	5.57	22
4	350	4	3/4 x 17	6.75	26
6	350	6	3/4 x 17	9.27	36
8	350	6	3/4 x 17	11.63	42
10	300	8	3/4 x 24	13.37	64
12	300	8	3/4 x 24	16.60	78
14	300	8	3/4 x 24	19.17	122
16	300	10	3/4 x 24	21.41	142
18	200	10	3/4 x 24	23.64	154
20	200	12	3/4 x 24	26.05	186
24	200	14	3/4 x 24	30.78	288
30	200	18	1 x 24	37.39	485
36	200	22	1 x 24	44.42	600
42	175	28	1 1/4 x 30	49.37	1176
48	175	32	1 1/4 x 30	56.25	1366

* All dimensions in inches except where indicated.

** Pressure ratings shall not exceed the maximum pressure rating of the ductile iron pipe it is installed on.

Notes:

- Stargrip® Series 3100S restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.

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 head. The restraining twist off head 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" - 8", 300 PSI for sizes 10" - 16", 200 PSI for sizes 18" - 36" & 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 3100S or an approved equal.

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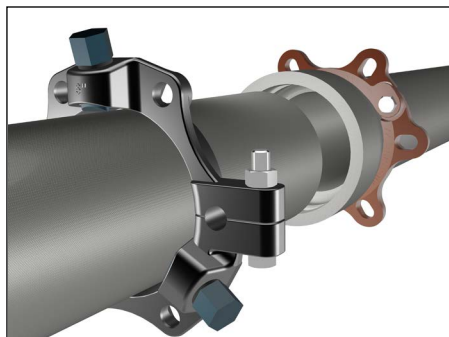


Split Stargrip® series 3100S

Split Wedge Action Restraint
for Ductile Iron Pipe - New or Existing Installations

Sizes 3" - 36"

INSTALLATION INSTRUCTIONS - SIZES 3" - 36"

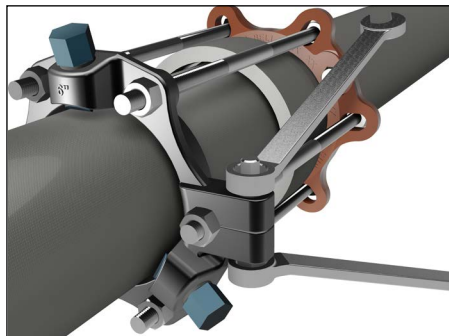


STEP 1

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 Push-On Pipe joint per pipe manufacturer's installation instructions in case of new installations or make sure that Push-On Pipe joint is installed correctly per manufacturer's 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 ft-lbs on sizes 3" - 36". Remove the clamping bolts for 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. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.



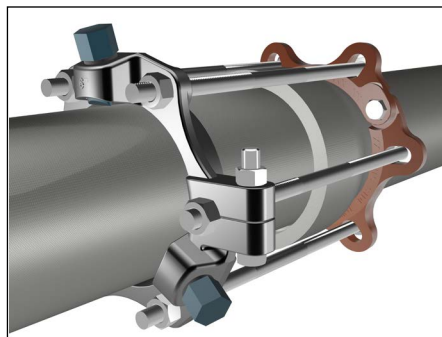
STEP 3

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 to the following:

3" to 12" -- 100-125 FT-LBS
14" to 36" -- 250-275 FT-LBS

Notes:

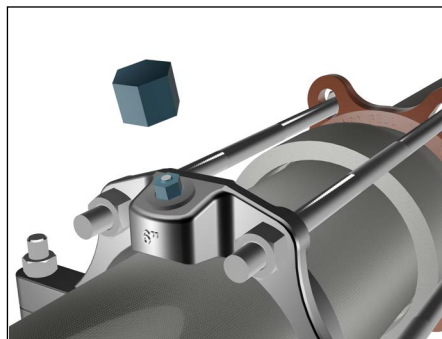
- Stargrip® Series 3100S restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.
- Not to be used on plain end fittings, PVC or HDPE.
- 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.
- Tightening of torque limiting twist off nuts can be performed by use of Wrench (box, ratchet or pneumatic).
- Maximum pressure rating for sizes 3"-8" is 350psi, for sizes 10"-16" it is 300psi and for sizes 18"-36" it is 200psi. For applications exceeding the maximum pressure rating, please contact Star Pipe Products for recommendations.
- For applications with vertical offsets please contact Star Pipe Products for technical assistance.
- For applications on existing pipe, the surface of the pipe needs to be sufficient for proper wedge engagement. Please contact Star Pipe Products for technical assistance.



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 such that rod sticks out approximately 0.50" past the nut on each end.

Install the remaining double-ended rods provided in each bolt hole. Place nuts on the ends of each double-ended rod with rod approximately 0.50" past the nut on each end.



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 alternative manner going on the opposite sides (Star Pattern), until all of the nuts have been twisted off.

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.

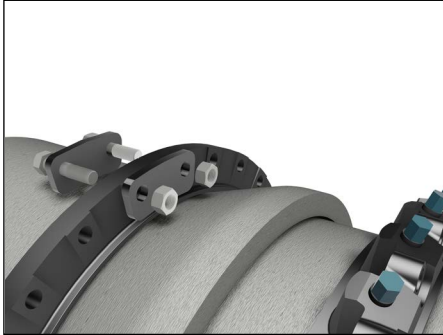
If removal of the Split Stargrip® Series 3000S restraint gland is necessary, utilize the 5/8" hex head provided. If reassembly is required, assemble the product in the same manner as above and tighten the wedge bolts to 90ft-lbs on sizes 3"-20" & 120 ft-lbs on sizes 24"-36".



Split Stargrip® series 3100S

Split Wedge Action Restraint
for Ductile Iron Pipe - New or Existing Installations
Sizes 42" - 48"

INSTALLATION INSTRUCTIONS - SIZES 42" - 48"

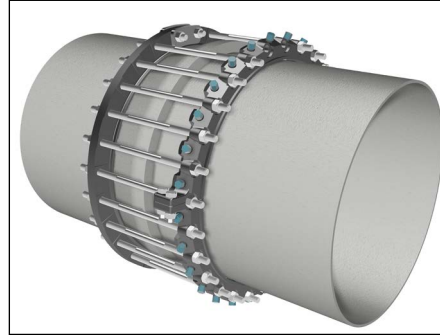
**STEP 1**

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 with links behind the bell.

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

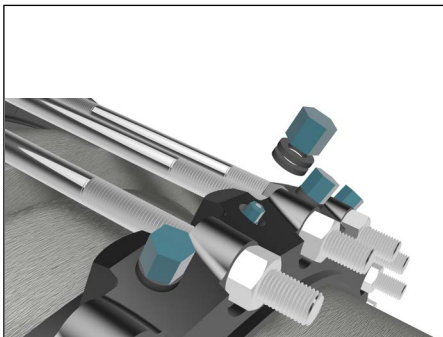
Remove the clamping bolts for the Split Stargrip® Series 3000S. Loosely assemble the halves on the spigot end of the pipe with clamping bolts making sure that the lip extension on the halves is towards the mating pipe bell. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.

Install the split back up ring, with lip facing towards the pipe bell and it is in firm contact with back of the pipe bell, along with hex head bolts, nuts and links provided on both split ends. Tighten nuts on link to 300-325 ft-lbs. The Split Stargrip is positioned such that split surface of Stargrip is 90° to Split Surface of back up ring.

**STEP 2**

Pull Split Stargrip® Series 3000S restraint gland away from the joint such that double-ended rods provided sticks out approximately 0.50" past the nuts. Tighten Clamping bolts on the Split Stargrip® to 300-325 ft-lbs.

Install the double-ended rods provided in each bolt hole except the bolt holes directly facing the bolt holes on back-up ring where hex bolts have been used and assemble nuts on the ends of each double-ended rod.

**STEP 3**

Tighten the torque limiting twist off nuts in 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. Tightening of torque limiting twist off nuts can be performed by use of Wrench (box, ratchet or pneumatic).

If removal of the Split Stargrip® 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 130 ft-lbs

Notes:

- Stargrip® Series 3100S restraints are designed for use on ductile iron pipe that meets all physical requirements of ANSI/AWWA C151/A21.51. The pipe must be fully annealed to assure primary carbides have been dissolved and pearlite has been converted to ferrite. Please contact Star Pipe Products for technical assistance.

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This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

STAR[®] PIPE PRODUCTS