Stargrip® series 3000 for Ductile Iron Pipe

**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" 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.
- Stargrip® eliminates tie rods and thrust blocks.
- Standard gland color is Black.
- Stargrip® may also be used on steel pipe* up to 12" (*transition gasket required on 12" and under). For 14" and larger steel applications, contact Star 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**

**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" 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.
Joint Restraint Products

Stargrip® series 3000
Mechanical Joint Wedge Action Restraint for Ductile Iron Pipe

TECHNICAL INFORMATION

STARGRIP® 3000 SPECIFICATIONS*

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* 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.

- 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 on page 11).

- 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" & 48" require extra long 1 ½" x 8 ½" T-bolts.
Joint Restraint Products

Oversized Stargrip® series 3000OS
Mechanical Joint Wedge Action Restraint for A, B, C & D Pit Cast Pipe

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

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* All dimensions in inches except where indicated.
** Pressure ratings shall not exceed the maximum pressure rating of the iron pipe it is installed on.
INSTALLATION INSTRUCTIONS - SIZES 3" - 48"

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, followed by the MJ gasket. Do not remove rubber washers prior to installation. Washers have been provided for proper wedge placement during shipment and installation.

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.

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.

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).

Tighten the torque limiting twist off bolts 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 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 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"-48").]

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.
- Not to be used on plain end fittings or PVC or HDPE pipe.
- Stargrip® Series 3000 may also be used on steel pipe* up to 12" (*transition gasket required on 12" and under). For 14" and larger steel applications, contact Star 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 on page 11).
- 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 iron pipe it is installed on.

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**TABLE A**

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*These torque ranges are requirements of AWWA C600
Joint Restraint Products

Split Stargrip® series 3000S
Split Mechanical Joint Wedge Action Restraint for New or Existing 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

Stargrip® series 3000S for Ductile Iron Pipe.

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, 3º on 14”-24”, 2º on 30”-36” and 1º 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* up to 12” (*transition gasket required on 12” and under). For 14” and larger steel applications, contact Star 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.
Joint Restraint Products

Split Stargrip® series 3000S
Split Mechanical Joint Wedge Action Restraint
for New or Existing Ductile Iron Pipe

### TECHNICAL INFORMATION

#### SPLIT STARGRIP® 3000S SPECIFICATIONS*

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<td>50.62</td>
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<td>54.86</td>
<td>53.32</td>
<td>53.12</td>
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<td>48</td>
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<td>65.12</td>
<td>32</td>
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</tr>
</tbody>
</table>

* 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 ¼” x 8 ½” T-bolts.
- For applications with vertical offsets, please contact Star Pipe Products for technical assistance.
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.

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.

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

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).

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

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").

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.

• May also be used on steel pipe* up to 12" ("transition gasket required on 12" and under). For 14" and larger steel applications, contact Star 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 on page 11).

• 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.

---

**TABLE A**  T-HEAD BOLT & NUT DETAILS

<table>
<thead>
<tr>
<th>PIPE SIZE (IN)</th>
<th>BOLT SIZE (IN)</th>
<th>RANGE OF TORQUE (FT-LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5/8</td>
<td>45-60</td>
</tr>
<tr>
<td>4-24</td>
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<tr>
<td>30-36</td>
<td>1</td>
<td>100-120</td>
</tr>
<tr>
<td>42-48</td>
<td>1 1/4</td>
<td>120-150</td>
</tr>
</tbody>
</table>

*These torque ranges are requirements of AWWA C600
**TECHNICAL INFORMATION**

The Tandem Stargrip® Mechanical Joint Restraint System was designed for high pressure Ductile Iron Pipe to MJ Fitting applications (AWWA C153 or C110). Tandem Stargrip® pressure rating per table below is based on use with PC350 or TC50 (or above) ductile iron pipe.

**DATA FOR HIGH PRESSURE STARGRIP® ASSEMBLY**

<table>
<thead>
<tr>
<th>NOM. SIZE</th>
<th>DI PIPE OD</th>
<th>PRESSURE RATING (PSI)</th>
<th>BOLT ROD SIZE</th>
<th>T-BOLT SIZE</th>
<th>T-BOLT TORQUE (FT-LBS)</th>
<th>COUPLING NUT-GRADE 5 STEEL</th>
<th>WT</th>
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<td>75-90</td>
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<td>120-140</td>
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<tr>
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<td>1 1/4 x 8 1/2</td>
<td>120-150</td>
<td>1 1/4 x 3</td>
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<td>48</td>
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<td>300</td>
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<td>1 1/4 x 8 1/2</td>
<td>120-150</td>
<td>1 1/4 x 3</td>
<td>1357</td>
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*All dimensions in inches except where indicated.

**Notes:**

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

**For High Pressure Ductile Iron Pipe to MJ Fitting Applications**
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. 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 bolts 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 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 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”-48”].

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 above & 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 bolts 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 bolt heads have been twisted off.

13. Never turn a single bolt over 180 degrees without alternating to another bolt. 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”-48”.

Notes:
- 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, please contact Star Pipe Products for technical assistance.
- Pressure Rating has 2:1 safety factor
- Maintains full deflection on Mechanical Joints - same as standard Stargrip® (See page 3)
- T-Bolts/Rods/Hex Nuts: High Strength Low Alloy Steel Per ANSI/AWWA C111/A21.11
- Sizes 42” & 48” require extra long 1 ¼” x 8 ½” 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.
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*

<table>
<thead>
<tr>
<th>NOM. SIZE</th>
<th>MAX PRESSURE RATING** (PSI)</th>
<th>RODS (QTY)</th>
<th>ROD DIA x LENGTH</th>
<th>MAX. BELL OD</th>
<th>APPROX WT. (LBS)</th>
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<tbody>
<tr>
<td>3</td>
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<td>9.27</td>
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<td>350</td>
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<td>3/4 x 24</td>
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<td>32</td>
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<td>1175</td>
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</table>

* 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.
Joint Restraint Products

Stargrip® series 3100P
Wedge Action Restraint for Ductile Iron Pipe Bells - New Installations

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 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. 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 bolts 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 bolt heads have been twisted off. Never turn a single bolt over 180 degrees without alternating to another bolt.

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 ducitile 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 perlite 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.

- May also be used on steel pipe up to 12". For 14" and larger steel applications, contact Star 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.

- 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.
Joint Restraint Products

Split Stargrip® series 3100S
Split Wedge Action Restraint for Ductile Iron Pipe - New or Existing Installations

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*

<table>
<thead>
<tr>
<th>NOM. SIZE</th>
<th>MAX PRESSURE RATING** (PSI)</th>
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<th>MAX. BELL OD</th>
<th>APPROX WT. (LBS)</th>
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<td>32</td>
<td>1 1/4 x 30</td>
<td>56.25</td>
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* 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 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” - 30” & 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.

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.
Joint Restraint Products

**Split Stargrip® Series 3100S**
Split Wedge Action Restraint for Ductile Iron Pipe - New or Existing Installations

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

**STEP 1**
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

**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.

**STEP 3**
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 bolts 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 bolt heads have been twisted off. Never turn a single bolt over 180 degrees without alternating to another bolt.

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 ft-lbs on sizes 3"-20" & 120 ft-lbs on sizes 24"-36".

**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 pearlitic 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.**
- **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.
**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 bolts 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 bolt heads have been twisted off. Never turn a single bolt over 180° without alternating to another bolt.

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.