USA INDUSTRIES
SINCE 1982

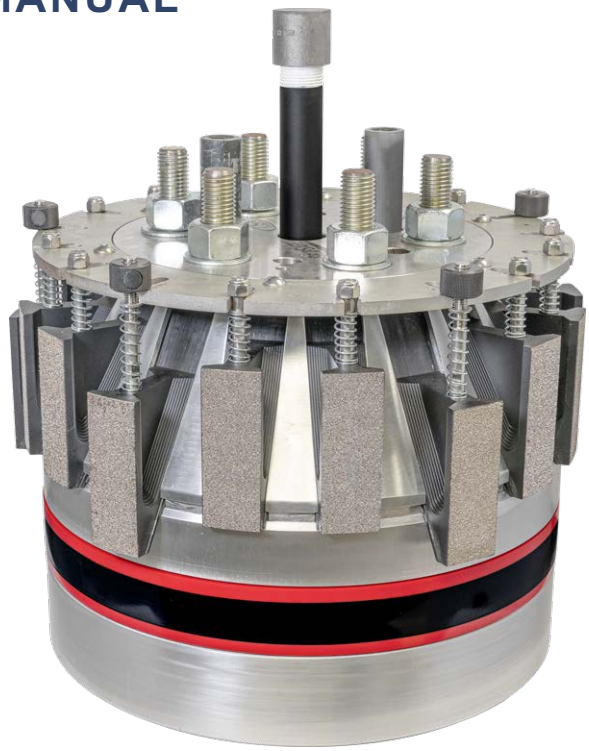
# GripSafe® ST

## OPERATING MANUAL

**NPS 4”***

***4” Schedules 120, 160 and XXH refer to the GripSafe ST ORB Small Tool Operating Manaul**

**NPS 6” - 12”**



**NPS 14” - 24”****

****** Larger sizes available upon request.**

## Large Outboard Retraction Blocking (ORB) Plug

Manufactured Exclusively by USA Industries, an ISO 9001:2015 Certified Company



www.USAIndustries.com
**(713) 941-3797 • (800) 456-8721**
315 State Street • S. Houston, TX 77587

## 1 Introduction

Thank you for choosing GripSafe ST pipe plugging technology. This manual provides essential guidelines for the safe use of this technology. You can rent or purchase the necessary sockets, wrenches, and lifting devices from USA Industries, LLC. For more information, refer to **Section 4, Table 2** for socket details, and **Section 11, Table 3** for lifting devices.

This manual specifically covers the use of GripSafe ST plugs in metallic piping. If you intend to use the plug in non-metallic piping, please contact USA Industries, LLC's Customer Service Department for technical assistance.

⚠ **Do not use GripSafe ST equipment without fully reading and understanding this manual.**

⚠ **Failure to follow the instructions in this manual may result in injury to personnel and damage to equipment.**

## 2 Safety

⚠ Failure to follow proper safety requirements may result in GripSafe ST Plug failure, potentially leading to personnel injury, material loss, and equipment damage.

⚠ Always wear proper PPE when handling the GripSafe ST Plug, as required by site safety rules. Follow site procedures for safely lifting and operating equipment.

⚠ Do not install the GripSafe ST Plug in a position where the Gripping Wedges would be located over a weld droop or ridge.

⚠ Never install the Seals or Gripping Wedge over a pipe section missing its interior wall (e.g., weldolet, tee, etc.).

⚠ Handle the Wedge Studs with care. Do not beat, hammer, or pry on the Wedge Studs. Do not remove the nut located on the Wedge Studs.

⚠ Pressure testing is hazardous, and safety precautions must be strictly followed. Never stand or pass in front of any test plug during installation or testing.

⚠ Do not make any adjustments to the plug, safety equipment, or vessel while the plug is under pressure.

⚠ Do not exceed the rated pressure stamped on the plug. Plugs are rated to hold pressure in one direction only—never apply pressure to the non-rated side.

⚠ The backpressure rating refers to the plug's ultimate holding capacity. Do not exceed the pressure capacity of the weakest system component. It is crucial to study the system components before pressure testing to confirm the maximum allowable test pressure, in line with all applicable industry and site-specific standards.

⚠ Water is recommended as the test medium. All gases must be vented from the pressurized vessel before testing.

⚠ If pneumatic testing is required, take steps to limit potential damage to personnel or equipment. USA Industries recommends Nitrogen as the pneumatic test medium since it does not support combustion. Follow ASME PCC-2 provisions when performing pneumatic tests.

⚠ The Outboard Retraction Blocking GripSafe ST Plug is designed to hold pressure from the vessel side only.

⚠ During hydro testing, carefully observe the pipe where the Wedge Grippers make contact. If you notice any deformation or swelling, stop the test immediately and release the pressure slowly. Contact USA Industries for assistance.

⚠ If you hear any popping or clicking sounds during hydro testing, stop immediately and release the pressure slowly. These sounds could indicate Wedge Gripper slippage, cracking, or other plug component failures. Remove the plug and inspect for damage. Contact USA Industries for further help.

⚠ Ensure the plug is clean and free of debris, fouling, and contaminants before each use. Each Wedge Gripper should slide freely up and down in its slot without resistance. Any blockage due to dirt or contaminants may prevent the plug from gripping the pipe's inner diameter, which can cause it to eject under pressure, leading to injury or damage.

⚠ For any questions or concerns, contact USA Industries for technical assistance.

## 3 Parts

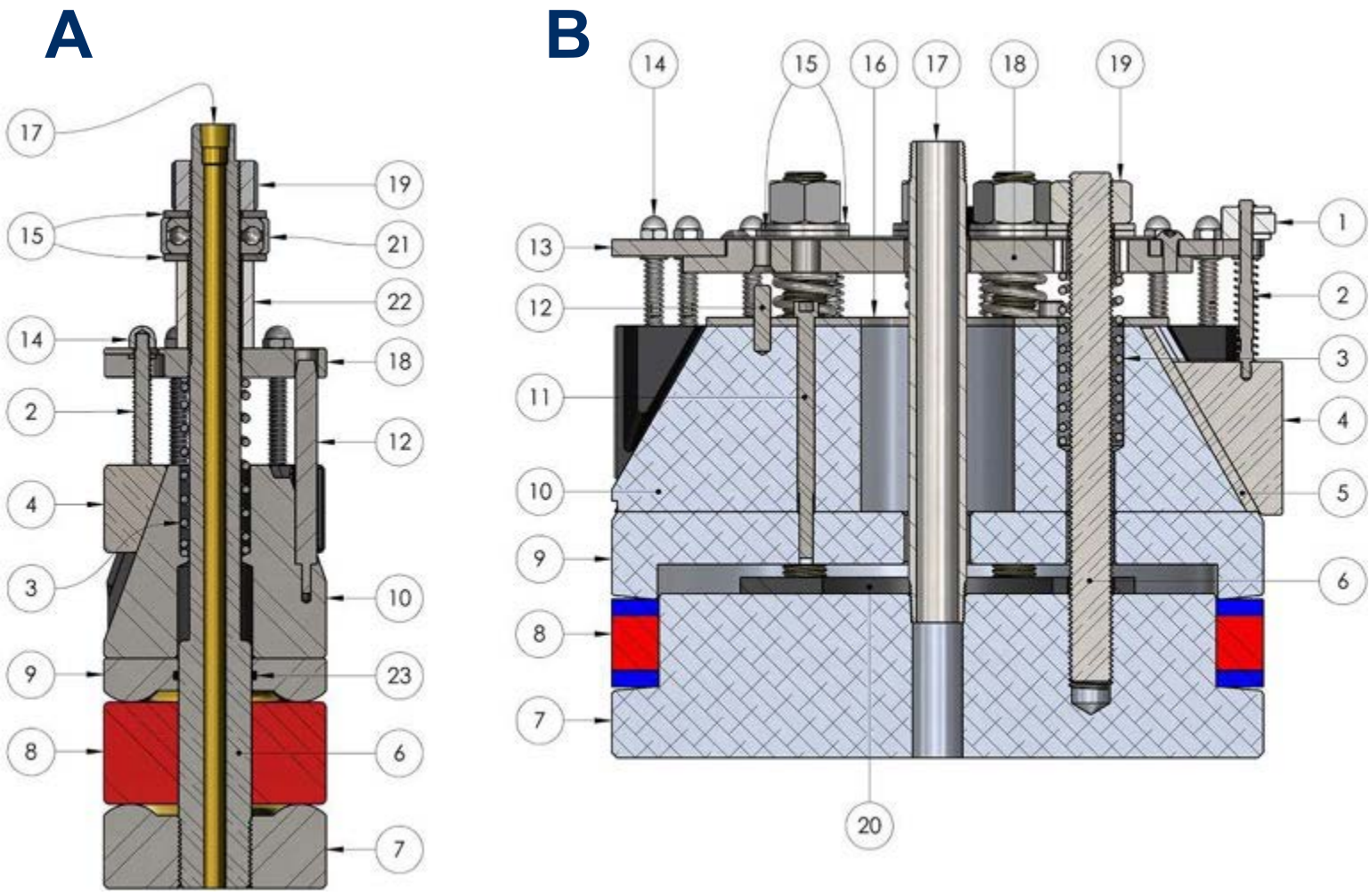



**Figure 1: A- 4" | B – 6" – 24" GripSafe® ST Outboard Retraction Blocking Diagram**

## Table 1: GripSafe® ST ORB Bill Of Materials

| Nominal Pipe Size (in) | Schedule | (1) Speed Nut | (2) Wedge Gripper Stem With Spring | (3) Retraction Compression Spring | (4) Wedge Gripper | (5) Back Plate | (6) Compression Shaft | (7) Bottom Compression Plate | (8) Seal | (9) Top Compression Plate | (10) Wedge Cone | (11) Wedge Cone Retaining Screw | (12) Alignment Dowel Pin | (13) Spring Plate Halo | (14) Wedge Gripper Nut | (15) Compression Washers | (16) Retainer Plate | (17) Back Pressure Vent Port | (18) Spring Plate Hub | (19) Compression Hex Nut | (20) Seal Dampener | (21) Thrust Bearing | (22) Compression Tubing | (23) Shaft O-Ring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 10, 10S | 0 | 6 | 1 | 6 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 6 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| | 40, STD, 40S | 0 | 6 | 1 | 6 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 6 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| | 80, XS, 80S | 0 | 6 | 1 | 6 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 3 | 0 | 6 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 |
| 6 | 10, 10S | 0 | 9 | 1 | 9 | 9 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 9 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 40, STD, 40S | 0 | 9 | 1 | 9 | 9 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 9 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 80, XS, 80S | 0 | 9 | 1 | 9 | 9 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 9 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 120 | 0 | 8 | 1 | 8 | 8 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 8 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 160 | 0 | 7 | 1 | 7 | 7 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 7 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | XX | 0 | 6 | 1 | 6 | 6 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 6 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| 8 | 10, 10S | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 20 | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 30 | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 40, STD, 40S | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 60 | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 80, XS, 80S | 0 | 15 | 1 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 15 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 100 | 0 | 14 | 1 | 14 | 14 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 14 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 120 | 0 | 13 | 1 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 140 | 0 | 13 | 1 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | 160 | 0 | 12 | 1 | 12 | 12 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 12 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| | XX | 0 | 12 | 1 | 12 | 12 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 12 | 8 | 1 | 1 | 1 | 4 | 0 | 4 | 0 | 0 |
| 10 | 10, 10S | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 20 | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 30 | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 40, STD, 40S | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 60, XS, 80S | 0 | 12 | 4 | 12 | 12 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 12 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 80 | 0 | 11 | 4 | 11 | 11 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 11 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 100 | 0 | 11 | 1 | 11 | 11 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 11 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 120 | 0 | 10 | 1 | 10 | 10 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 10 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 140, XX | 0 | 9 | 1 | 9 | 9 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 9 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |
| | 160 | 0 | 9 | 1 | 9 | 9 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 9 | 8 | 1 | 1 | 1 | 4 | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 10, 10S | 0 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 18 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 20 | 0 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 18 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 30 | 0 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | STD, 40S | 0 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 40 | 0 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | XS, 80S | 0 | 16 | 6 | 16 | 16 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 60 | 0 | 16 | 6 | 16 | 16 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 80 | 0 | 16 | 6 | 16 | 16 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 100 | 0 | 15 | 4 | 15 | 15 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 15 | 8 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | 0 |
| | 120, XX | 0 | 14 | 4 | 14 | 14 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 14 | 8 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | 0 |
| | 140 | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | 0 |
| | 160 | 0 | 13 | 4 | 13 | 13 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 13 | 8 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | 0 |
| 14 | 10S | 0 | 15 | 6 | 15 | 15 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 10 | 0 | 15 | 6 | 15 | 15 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 20 | 0 | 15 | 6 | 15 | 15 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 30,STD,40S | 0 | 14 | 6 | 14 | 14 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 40 | 0 | 14 | 6 | 14 | 14 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | XS,80S | 0 | 14 | 6 | 14 | 14 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 60 | 0 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 19 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 80 | 0 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 18 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 100 | 0 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 120 | 0 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 140 | 0 | 16 | 6 | 16 | 16 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 160 | 0 | 15 | 6 | 15 | 15 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| 16 | 10S | 5 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 10 | 5 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 20 | 5 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 30,STD,40S | 5 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 13 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 40,XS,80S | 5 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 13 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 60 | 5 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 12 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 80 | 5 | 22 | 6 | 22 | 22 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 17 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 100 | 5 | 21 | 6 | 21 | 21 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 120 | 5 | 21 | 6 | 21 | 21 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 140 | 5 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 160 | 5 | 19 | 6 | 19 | 19 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 14 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | 10S | 5 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 13 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 10 | 5 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 13 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 20 | 5 | 18 | 6 | 18 | 18 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 13 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | STD,40S | 5 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 12 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 30 | 5 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 12 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | XS,80S | 5 | 17 | 6 | 17 | 17 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 12 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 40 | 5 | 21 | 6 | 21 | 21 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 60 | 5 | 21 | 6 | 21 | 21 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 80 | 5 | 20 | 6 | 20 | 20 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 100 | 5 | 26 | 6 | 26 | 26 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 21 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 120 | 5 | 25 | 6 | 25 | 25 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 20 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 140 | 5 | 24 | 6 | 24 | 24 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 19 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 160 | 5 | 23 | 6 | 23 | 23 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 18 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| 20 | 10S | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 10 | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 20,STD,40S | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 30,XS,80S | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 40 | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 60 | 5 | 19 | 8 | 19 | 19 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 14 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 80 | 5 | 24 | 8 | 24 | 24 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 19 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 100 | 5 | 23 | 8 | 23 | 23 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 18 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 120 | 5 | 22 | 8 | 22 | 22 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 17 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 140 | 5 | 21 | 6 | 21 | 21 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 16 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| | 160 | 5 | 20 | 6 | 20 | 20 | 6 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 15 | 12 | 1 | 1 | 1 | 6 | 1 | 0 | 0 | 0 |
| 24 | 10,10S | 5 | 23 | 8 | 23 | 23 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 18 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 20,STD,40S | 5 | 22 | 8 | 22 | 22 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 17 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | XS,80S | 5 | 22 | 8 | 22 | 22 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 17 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 30 | 5 | 22 | 8 | 22 | 22 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 17 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 40 | 5 | 21 | 8 | 21 | 21 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 16 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 60 | 5 | 21 | 8 | 21 | 21 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 16 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 80 | 5 | 25 | 8 | 25 | 25 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 20 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 100 | 5 | 24 | 8 | 24 | 24 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 19 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 120 | 5 | 23 | 8 | 23 | 23 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 18 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 140 | 5 | 21 | 8 | 21 | 21 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 16 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |
| | 160 | 5 | 20 | 8 | 20 | 20 | 8 | 1 | 1 | 1 | 1 | 6 | 2 | 1 | 15 | 16 | 1 | 1 | 1 | 8 | 1 | 0 | 0 | 0 |

## 4 Specifications

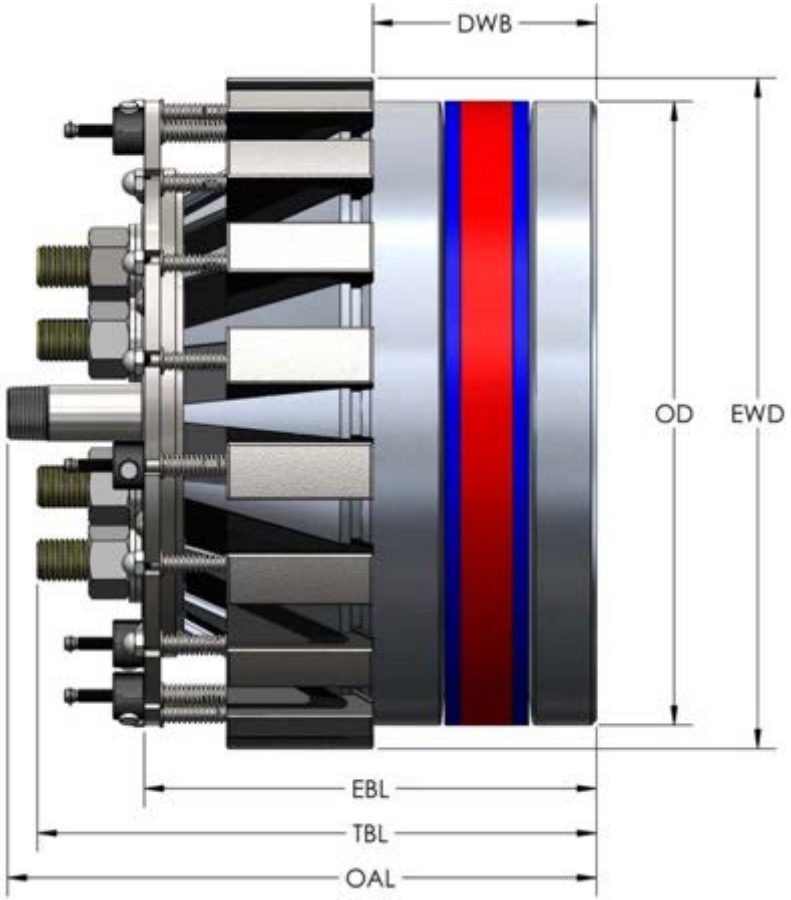


**Figure 2: GripSafe® ST Outboard Retraction Blocking Dimensions Diagram**

## 2: GripSafe® ST ORB Specifications

| Nominal Pipe Size (in) | Schedule | Part Number | Tool Diameter (in) | Rec. ID Range* (in) | Nominal Pipe ID Clearance (in) | Approx. Tool Weight (lbs) | Tool Length (in) | Torque Range (ft-lbs) | | Compression Hex Nut Size (in) | Back Pressure Vent Thread | Back Pressure Rating (PSI) | EWD Energized Wedge Diameter | EBL Energized Body Length | TBL Tool Body Length w/o Nipple | DWB Distance to Wedge Bottom |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Norm | Max. | | | | | | | |
| 4 | 10,10S | GS-I-S-0400-010 | 4.04 | 4.10 - 4.54 | 0.220 | 21 | 13.38 | 120 | 250 | 1-5/16 | 1/4 FNPT | 4875 (P-1475) | 5.00 | 7.75 | 13.00 | 4.38 |
| | 40,STD,40S | GS-I-S-0400-040 | 3.81 | 3.87 - 4.31 | 0.220 | 19 | 13.38 | 120 | 250 | 1-5/16 | 1/4 FNPT | 5450 | 4.77 | 7.75 | 13.00 | 4.38 |
| | 80,XS,80S | GS-I-S-0400-080 | 3.61 | 3.67 - 4.11 | 0.220 | 17 | 13.38 | 120 | 250 | 1-5/16 | 1/4 FNPT | 6050 | 4.57 | 7.75 | 13.00 | 4.38 |
| 6 | 10,10S | GS-I-S-0600-010 | 5.98 | 6.04 - 6.42 | 0.375 | 26 | 12.40 | 85 | 130 | 1-1/16 | 1/4 MNPT | 850 (P-850) | 6.94 | 9.06 | 11.31 | 5.34 |
| | 40,STD,40S | GS-I-S-0600-040 | 5.69 | 5.75 - 6.13 | 0.375 | 24 | 12.40 | 75 | 110 | 1-1/16 | 1/4 MNPT | 2370 (P-2200) | 6.65 | 9.06 | 11.31 | 5.34 |
| | 80,XS,80S | GS-I-S-0600-080 | 5.39 | 5.45 - 5.82 | 0.375 | 21 | 12.40 | 60 | 95 | 1-1/16 | 1/4 MNPT | 4000 | 6.35 | 9.06 | 11.31 | 5.34 |
| | 120 | GS-I-S-0600-120 | 5.13 | 5.19 - 5.56 | 0.375 | 19 | 12.40 | 55 | 80 | 1-1/16 | 1/4 MNPT | 3900 | 6.08 | 9.06 | 11.31 | 5.34 |
| | 160 | GS-I-S-0600-160 | 4.81 | 4.87 - 5.25 | 0.375 | 17 | 12.40 | 40 | 60 | 3/4 | 1/4 MNPT | 3850 | 5.77 | 9.06 | 11.31 | 5.34 |
| | XX | GS-I-S-0600-XXH | 4.52 | 4.58 - 4.96 | 0.375 | 15 | 12.40 | 35 | 55 | 3/4 | 1/4 MNPT | 3700 | 5.48 | 9.06 | 11.31 | 5.34 |
| 8 | 10,10S | GS-I-S-0800-010 | 7.95 | 8.02 - 8.40 | 0.375 | 51 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 575 (P-575) | 8.91 | 9.19 | 11.50 | 5.34 |
| | 20 | GS-I-S-0800-020 | 7.75 | 7.81 - 8.20 | 0.375 | 49 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 1125 (P-1125) | 8.71 | 9.19 | 11.50 | 5.34 |
| | 30 | GS-I-S-0800-030 | 7.70 | 7.76 - 8.15 | 0.375 | 48 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 1300 (P-1300) | 8.65 | 9.19 | 11.50 | 5.34 |
| | 40,STD,40S | GS-I-S-0800-040 | 7.61 | 7.67 - 8.05 | 0.375 | 46 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 1575 (P-1575) | 8.56 | 9.19 | 11.50 | 5.34 |
| | 60 | GS-I-S-0800-060 | 7.44 | 7.50 - 7.89 | 0.375 | 45 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 2175 (P-2175) | 8.40 | 9.19 | 11.50 | 5.34 |
| | 80,XS,80S | GS-I-S-0800-080 | 7.25 | 7.31 - 7.70 | 0.375 | 43 | 12.25 | 120 | 150 | 1-1/4 | 1/2 MNPT | 3250 (P-2950) | 8.21 | 9.19 | 11.50 | 5.34 |
| | 100 | GS-I-S-0800-100 | 7.06 | 7.12 - 7.51 | 0.375 | 40 | 12.25 | 100 | 150 | 1-1/4 | 1/2 MNPT | 3860 | 8.02 | 9.19 | 11.50 | 5.34 |
| | 120 | GS-I-S-0800-120 | 6.81 | 6.87 - 7.26 | 0.375 | 38 | 12.25 | 100 | 150 | 1-1/4 | 1/2 MNPT | 3725 | 7.77 | 9.19 | 11.50 | 5.34 |
| | 140 | GS-I-S-0800-140 | 6.63 | 6.69 - 7.07 | 0.375 | 36 | 12.25 | 90 | 150 | 1-1/16 | 1/4 MNPT | 3925 | 7.58 | 9.19 | 11.50 | 5.34 |
| | 160 | GS-I-S-0800-160 | 6.44 | 6.50 - 6.88 | 0.375 | 34 | 12.25 | 90 | 150 | 1-1/16 | 1/4 MNPT | 3825 | 7.40 | 9.19 | 11.50 | 5.34 |
| | XX | GS-I-S-0800-XXH | 6.50 | 6.56 - 6.94 | 0.375 | 34 | 12.25 | 90 | 150 | 1-1/16 | 1/4 MNPT | 3750 | 7.46 | 9.19 | 11.50 | 5.34 |
| 10 | 10,10S | GSST-I-S-1000-010 | 10.05 | 10.11 - 10.85 | 0.375 | 75 | 13.20 | 120 | 270 | 1-1/4 | 3/4 MNPT | 4200 (P-825) | 11.18 | 9.81 | 11.88 | 5.34 |
| | 20 | GSST-I-S-1000-020 | 9.88 | 9.94 - 10.68 | 0.375 | 72 | 13.20 | 120 | 270 | 1-1/4 | 3/4 MNPT | 4500 | 11.01 | 9.81 | 11.88 | 5.34 |
| | 30 | GSST-I-S-1000-030 | 9.76 | 9.82 - 10.56 | 0.375 | 71 | 13.20 | 120 | 270 | 1-1/4 | 3/4 MNPT | 4800 | 10.89 | 9.81 | 11.88 | 5.34 |
| | 40,4STD,40S | GSST-I-S-1000-040 | 9.65 | 9.71 - 10.45 | 0.375 | 69 | 13.20 | 120 | 270 | 1-1/4 | 3/4 MNPT | 5000 | 10.78 | 9.81 | 11.88 | 5.34 |
| | 60,XS,80S | GSST-I-S-1000-08S | 9.38 | 9.44 - 10.18 | 0.375 | 66 | 13.20 | 120 | 270 | 1-1/4 | 3/4 MNPT | 5975 | 10.51 | 9.81 | 11.88 | 5.34 |
| | 80 | GSST-I-S-1000-080 | 9.19 | 9.25 - 9.99 | 0.375 | 63 | 13.20 | 120 | 200 | 1-1/4 | 3/4 MNPT | 5700 | 10.32 | 9.81 | 11.88 | 5.34 |
| | 100 | GSST-I-S-1000-100 | 8.94 | 9.00 - 9.74 | 0.375 | 58 | 13.20 | 120 | 195 | 1-1/4 | 3/8 MNPT | 6000 | 10.07 | 9.81 | 11.88 | 5.34 |
| | 120 | GSST-I-S-1000-120 | 8.69 | 8.75 - 9.49 | 0.375 | 56 | 13.20 | 120 | 185 | 1-1/4 | 3/8 MNPT | 5775 | 9.82 | 9.81 | 11.88 | 5.34 |
| | 140,XX | GSST-I-S-1000-140 | 8.38 | 8.44 - 9.18 | 0.375 | 54 | 13.20 | 120 | 180 | 1-1/4 | 3/8 MNPT | 5575 | 9.51 | 9.81 | 11.88 | 5.34 |
| | 160 | GSST-I-S-1000-160 | 8.13 | 8.19 - 8.93 | 0.375 | 53 | 13.20 | 120 | 175 | 1-1/4 | 3/8 MNPT | 5925 | 9.26 | 9.81 | 11.88 | 5.34 |

**NOTE: For 6" – 8" plug sizes, OD must be within 0.125-inche concentricity to the pipe ID.**

**NOTE: For 10" plug sizes and above, no more than 0.500-inch clearance between the spring plate and the pipe's inner diameter is permissible for reliably safe operation of the plug.**

(P-XXXX) – When testing in ANSI A106 Grade B pipe material, a Pipe Reinforcement Device (PRD) is required if the test pressure will exceed the number identified after the "P-". If the material is not A106B, consult USA Industries engineering team for more information. *In general, a PRD is strongly recommended for all pipes 10/10S and thinner walled.*

**NEVER EXCEED THE MAXIMUM RATED PRESSURE OF THE LOWEST RATED COMPONENT IN THE SYSTEM.**

**DATA IS SUBJECT TO CHANGE. For the most current version of this document, go to: https://www.USAIndustries.com/downloads-library, and then scroll to the GripSafe ST Operating Manual downloads.**

## Table 2: GripSafe® ST ORB Specifications con't.

| Nominal Pipe Size (in) | Schedule | Part Number | Tool Diameter (in) | Rec. ID Range* (in) | Nominal Pipe ID Clearance (in) | Approx. Tool Weight (lbs) | Tool Length (in) | Torque Range (ft-lbs) | | Compression Hex Nut Size (in) | Back Pressure Vent Thread | Back Pressure Rating (PSI) | EWD Energized Wedge Diameter | EBL Energized Body Length | TBL Tool Body Length w/o Nipple | DWB Distance to Wedge Bottom |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Norm | Max. | | | | | | | |
| 12 | 10,10S | GSST-I-S-1200-010 | 12.02 | 12.08 - 12.82 | 0.375 | 125 | 13.20 | 120 | 180 | 1-1/4 | 3/4 MNPT | 5500 (P-675) | 13.14 | 9.81 | 11.88 | 5.34 |
| | 20 | GSST-I-S-1200-020 | 11.88 | 11.94 - 12.68 | 0.375 | 123 | 13.20 | 120 | 175 | 1-1/4 | 3/4 MNPT | 5625 (P-975) | 13.00 | 9.81 | 11.88 | 5.34 |
| | 30 | GSST-I-S-1200-030 | 11.72 | 11.78 - 12.52 | 0.375 | 119 | 13.20 | 120 | 175 | 1-1/4 | 3/4 MNPT | 5475 (P-1400) | 12.84 | 9.81 | 11.88 | 5.34 |
| | STD,40S | GSST-I-S-1200-04S | 11.63 | 11.69 - 12.43 | 0.375 | 116 | 13.20 | 120 | 250 | 1-1/4 | 3/4 MNPT | 4550 (P-1625) | 12.75 | 9.81 | 11.88 | 5.34 |
| | 40 | GSST-I-S-1200-040 | 11.56 | 11.63 - 12.36 | 0.375 | 115 | 13.20 | 120 | 245 | 1-1/4 | 3/4 MNPT | 4700 | 12.69 | 9.81 | 11.88 | 5.34 |
| | XS,80S | GSST-I-S-1200-08S | 11.38 | 11.44 - 12.18 | 0.375 | 112 | 13.20 | 120 | 225 | 1-1/4 | 3/4 MNPT | 5175 | 12.50 | 9.81 | 11.88 | 5.34 |
| | 60 | GSST-I-S-1200-060 | 11.25 | 11.31 - 12.05 | 0.375 | 98 | 13.20 | 120 | 165 | 1-1/4 | 3/4 MNPT | 5575 | 12.38 | 9.81 | 11.88 | 5.34 |
| | 80 | GSST-I-S-1200-080 | 11.00 | 11.06 - 11.80 | 0.375 | 94 | 13.20 | 120 | 160 | 1-1/4 | 3/4 MNPT | 5825 | 12.13 | 9.81 | 11.88 | 5.34 |
| | 100 | GSST-I-S-1200-100 | 10.69 | 10.75 - 11.49 | 0.375 | 90 | 13.20 | 120 | 235 | 1-1/4 | 3/4 MNPT | 5775 | 11.82 | 9.81 | 11.88 | 5.34 |
| | 120,XX | GSST-I-S-1200-120 | 10.38 | 10.44 - 11.18 | 0.375 | 88 | 13.20 | 120 | 230 | 1-1/4 | 3/4 MNPT | 5700 | 11.51 | 9.81 | 11.88 | 5.34 |
| | 140 | GSST-I-S-1200-140 | 10.13 | 10.19 - 10.93 | 0.375 | 86 | 13.20 | 120 | 220 | 1-1/4 | 3/4 MNPT | 5550 | 11.26 | 9.81 | 11.88 | 5.34 |
| | 160 | GSST-I-S-1200-160 | 9.75 | 9.81 - 10.55 | 0.375 | 82 | 13.20 | 120 | 215 | 1-1/4 | 3/4 MNPT | 5975 | 10.88 | 9.81 | 11.88 | 5.34 |
| 14 | 10S | GSST-I-S-1400-01S | 13.25 | 13.31 - 14.05 | 0.375 | 170 | 14.09 | 120 | 200 | 1-1/4 | 1 MNPT | 6250 (P-750) | 14.37 | 10.81 | 12.88 | 5.34 |
| | 10 | GSST-I-S-1400-010 | 13.13 | 13.19 - 13.93 | 0.375 | 167 | 14.09 | 120 | 195 | 1-1/4 | 1 MNPT | 6350 (P-1050) | 14.25 | 10.81 | 12.88 | 5.34 |
| | 20 | GSST-I-S-1400-020 | 13.00 | 13.06 - 13.80 | 0.375 | 164 | 14.09 | 120 | 195 | 1-1/4 | 1 MNPT | 6475 | 14.13 | 10.81 | 12.88 | 5.34 |
| | 30,STD,40S | GSST-I-S-1400-04S | 12.88 | 12.94 - 13.68 | 0.375 | 158 | 14.09 | 120 | 205 | 1-1/4 | 1 MNPT | 6175 | 14.00 | 10.81 | 12.88 | 5.34 |
| | 40 | GSST-I-S-1400-040 | 12.75 | 12.81 - 13.55 | 0.375 | 157 | 14.09 | 120 | 195 | 1-1/4 | 1 MNPT | 6275 | 13.88 | 10.81 | 12.88 | 5.34 |
| | XS,80S | GSST-I-S-1400-08S | 12.63 | 12.69 - 13.43 | 0.375 | 154 | 14.09 | 120 | 180 | 1-1/4 | 1 MNPT | 6400 | 13.75 | 10.81 | 12.88 | 5.34 |
| | 60 | GSST-I-S-1400-060 | 12.44 | 12.50 - 13.24 | 0.375 | 134 | 13.20 | 120 | 185 | 1-1/4 | 3/4 MNPT | 5425 | 13.56 | 9.81 | 11.88 | 5.34 |
| | 80 | GSST-I-S-1400-080 | 12.13 | 12.19 - 12.93 | 0.375 | 127 | 13.20 | 120 | 180 | 1-1/4 | 3/4 MNPT | 5400 | 13.25 | 9.81 | 11.88 | 5.34 |
| | 100 | GSST-I-S-1400-100 | 11.75 | 11.81 - 12.55 | 0.375 | 120 | 13.20 | 120 | 175 | 1-1/4 | 3/4 MNPT | 5425 | 12.88 | 9.81 | 11.88 | 5.34 |
| | 120 | GSST-I-S-1400-120 | 11.44 | 11.50 - 12.24 | 0.375 | 116 | 13.20 | 120 | 170 | 1-1/4 | 3/4 MNPT | 5725 | 12.56 | 9.81 | 11.88 | 5.34 |
| | 140 | GSST-I-S-1400-140 | 11.13 | 11.19 - 11.93 | 0.375 | 109 | 13.20 | 120 | 165 | 1-1/4 | 3/4 MNPT | 5700 | 12.25 | 9.81 | 11.88 | 5.34 |
| | 160 | GSST-I-S-1400-160 | 10.81 | 10.88 - 11.61 | 0.375 | 104 | 13.20 | 120 | 160 | 1-1/4 | 3/4 MNPT | 5650 | 11.94 | 9.81 | 11.88 | 5.34 |
| 16 | 10S | GSST-I-S-1600-01S | 15.25 | 15.31 - 16.05 | 0.375 | 231 | 14.09 | 120 | 310 | 1-5/8 | 1 MNPT | 6000 (P-575) | 16.37 | 10.81 | 13.00 | 5.34 |
| | 10 | GSST-I-S-1600-010 | 15.13 | 15.19 - 15.93 | 0.375 | 228 | 14.09 | 120 | 305 | 1-5/8 | 1 MNPT | 6100 (P-800) | 16.25 | 10.81 | 13.00 | 5.34 |
| | 20 | GSST-I-S-1600-020 | 15.00 | 15.06 - 15.80 | 0.375 | 225 | 14.09 | 120 | 300 | 1-5/8 | 1 MNPT | 6200 (P-1075) | 16.13 | 10.81 | 13.00 | 5.34 |
| | 30,STD,40S | GSST-I-S-1600-04S | 14.88 | 14.94 - 15.68 | 0.375 | 218 | 14.09 | 120 | 320 | 1-5/8 | 1 MNPT | 5700 | 16.00 | 10.81 | 13.00 | 5.34 |
| | 40,XS,80S | GSST-I-S-1600-08S | 14.63 | 14.69 - 15.43 | 0.375 | 213 | 14.09 | 120 | 280 | 1-5/8 | 1 MNPT | 6175 | 15.75 | 10.81 | 13.00 | 5.34 |
| | 60 | GSST-I-S-1600-060 | 14.31 | 14.38 - 15.11 | 0.375 | 204 | 14.09 | 120 | 285 | 1-5/8 | 1 MNPT | 6075 | 15.44 | 10.81 | 13.00 | 5.34 |
| | 80 | GSST-I-S-1600-080 | 13.94 | 14.00 - 14.74 | 0.375 | 170 | 13.20 | 120 | 270 | 1-5/8 | 3/4 MNPT | 4975 | 15.06 | 9.81 | 12.06 | 5.34 |
| | 100 | GSST-I-S-1600-100 | 13.56 | 13.63 - 14.36 | 0.375 | 165 | 13.20 | 120 | 270 | 1-5/8 | 3/4 MNPT | 5050 | 14.69 | 9.81 | 12.06 | 5.34 |
| | 120 | GSST-I-S-1600-120 | 13.19 | 13.25 - 13.99 | 0.375 | 158 | 13.20 | 120 | 265 | 1-5/8 | 3/4 MNPT | 5350 | 14.31 | 9.81 | 12.06 | 5.34 |
| | 140 | GSST-I-S-1600-140 | 12.75 | 12.81 - 13.55 | 0.375 | 140 | 13.20 | 120 | 190 | 1-1/4 | 3/4 MNPT | 5175 | 13.88 | 9.81 | 11.63 | 5.34 |
| | 160 | GSST-I-S-1600-160 | 12.44 | 12.50 - 13.24 | 0.375 | 135 | 13.20 | 120 | 185 | 1-1/4 | 3/4 MNPT | 5425 | 13.56 | 9.81 | 11.63 | 5.34 |

**NOTE: For 6" – 8" plug sizes, OD must be within 0.125-inche concentricity to the pipe ID.**

**NOTE: For 10" plug sizes and above, no more than 0.500-inch clearance between the spring plate and the pipe's inner diameter is permissible for reliably safe operation of the plug.**

(P-XXXX) – When testing in ANSI A106 Grade B pipe material, a Pipe Reinforcement Device (PRD) is required if the test pressure will exceed the number identified after the "P-". If the material is not A106B, consult USA Industries engineering team for more information. *In general, a PRD is strongly recommended for all pipes 10/10S and thinner walled.*

**NEVER EXCEED THE MAXIMUM RATED PRESSURE OF THE LOWEST RATED COMPONENT IN THE SYSTEM.**

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## Table 2: GripSafe® ST ORB Specifications con't.

| Nominal Pipe Size (in) | Schedule | Part Number | Tool Diameter (in) | Rec. ID Range* (in) | Nominal Pipe ID Clearance (in) | Approx. Tool Weight (lbs) | Tool Length (in) | Torque Range (ft-lbs) | | Compression Hex Nut Size (in) | Back Pressure Vent Thread | Back Pressure Rating (PSI) | EWD Energized Wedge Diameter | EBL Energized Body Length | TBL Tool Body Length w/o Nipple | DWB Distance to Wedge Bottom |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Norm | Max. | | | | | | | |
| 18 | 10S | GSST-I-S-1800-01S | 17.25 | 17.31 - 18.05 | 0.375 | 325 | 15.09 | 120 | 430 | 1-5/8 | 1 MNPT | 4175 (P-575) | 18.37 | 11.81 | 14.25 | 5.34 |
| | 10 | GSST-I-S-1800-010 | 17.13 | 17.19 - 17.93 | 0.375 | 321 | 15.09 | 120 | 430 | 1-5/8 | 1 MNPT | 4200 (P-800) | 18.25 | 11.81 | 14.25 | 5.34 |
| | 20 | GSST-I-S-1800-020 | 17.00 | 17.06 - 17.80 | 0.375 | 318 | 15.09 | 120 | 425 | 1-5/8 | 1 MNPT | 4250 | 18.13 | 11.81 | 14.25 | 5.34 |
| | STD,40S | GSST-I-S-1800-04S | 16.88 | 16.94 - 17.68 | 0.375 | 309 | 15.09 | 120 | 485 | 1-5/8 | 1 MNPT | 3550 | 18.00 | 11.81 | 14.25 | 5.34 |
| | 30 | GSST-I-S-1800-030 | 16.75 | 16.81 - 17.55 | 0.375 | 306 | 15.09 | 120 | 465 | 1-5/8 | 1 MNPT | 3750 | 17.88 | 11.81 | 14.25 | 5.34 |
| | XS,80S | GSST-I-S-1800-08S | 16.63 | 16.69 - 17.43 | 0.375 | 302 | 15.09 | 120 | 440 | 1-5/8 | 1 MNPT | 4000 | 17.75 | 11.81 | 14.25 | 5.34 |
| | 40 | GSST-I-S-1800-040 | 16.50 | 16.56 - 17.30 | 0.375 | 266 | 14.09 | 120 | 410 | 1-5/8 | 1 MNPT | 4350 | 17.63 | 10.81 | 13.00 | 5.34 |
| | 60 | GSST-I-S-1800-060 | 16.13 | 16.19 - 16.93 | 0.375 | 247 | 14.09 | 120 | 400 | 1-5/8 | 1 MNPT | 4450 | 17.25 | 10.81 | 13.00 | 5.34 |
| | 80 | GSST-I-S-1800-080 | 15.75 | 15.81 - 16.55 | 0.375 | 245 | 14.09 | 120 | 390 | 1-5/8 | 1 MNPT | 4525 | 16.88 | 10.81 | 13.00 | 5.34 |
| | 100 | GSST-I-S-1800-100 | 15.31 | 15.38 - 16.11 | 0.375 | 207 | 14.09 | 120 | 380 | 1-5/8 | 1 MNPT | 4650 | 16.44 | 9.81 | 12.06 | 5.34 |
| | 120 | GSST-I-S-1800-120 | 14.88 | 14.94 - 15.68 | 0.375 | 212 | 14.21 | 120 | 370 | 1-5/8 | 1 MNPT | 4900 | 16.01 | 9.94 | 12.19 | 5.47 |
| | 140 | GSST-I-S-1800-140 | 14.50 | 14.56 - 15.30 | 0.375 | 185 | 14.34 | 120 | 360 | 1-5/8 | 1 MNPT | 5075 | 15.63 | 10.06 | 12.31 | 5.59 |
| | 160 | GSST-I-S-1800-160 | 14.06 | 14.13 - 14.86 | 0.375 | 175 | 14.46 | 120 | 345 | 1-5/8 | 1 MNPT | 5150 | 15.19 | 10.19 | 12.44 | 5.72 |
| 20 | 10S | GSST-I-S-2000-01S | 19.19 | 19.25 - 19.99 | 0.375 | 406 | 15.32 | 120 | 365 | 1-5/8 | 1-1/2 MNPT | 5000 (P-550) | 20.31 | 12.06 | 14.50 | 5.59 |
| | 10 | GSST-I-S-2000-010 | 19.13 | 19.19 - 19.93 | 0.375 | 404 | 15.32 | 120 | 360 | 1-5/8 | 1-1/2 MNPT | 5025 (P-650) | 20.25 | 12.06 | 14.50 | 5.59 |
| | 20,STD,40S | GSST-I-S-2000-04S | 18.88 | 18.94 - 19.68 | 0.375 | 395 | 15.32 | 120 | 415 | 1-5/8 | 1-1/2 MNPT | 4275 (P-1025) | 20.00 | 12.06 | 14.50 | 5.59 |
| | 30,XS,80S | GSST-I-S-2000-08S | 18.63 | 18.69 - 19.43 | 0.375 | 380 | 15.32 | 120 | 375 | 1-5/8 | 1-1/2 MNPT | 4500 | 19.75 | 12.06 | 14.50 | 5.59 |
| | 40 | GSST-I-S-2000-040 | 18.44 | 18.50 - 19.24 | 0.375 | 374 | 15.32 | 120 | 350 | 1-5/8 | 1-1/2 MNPT | 5250 | 19.56 | 12.06 | 14.50 | 5.59 |
| | 60 | GSST-I-S-2000-060 | 18.00 | 18.06 - 18.80 | 0.375 | 357 | 15.32 | 120 | 340 | 1-5/8 | 1-1/2 MNPT | 5375 | 19.13 | 12.06 | 14.50 | 5.59 |
| | 80 | GSST-I-S-2000-080 | 17.56 | 17.63 - 18.36 | 0.375 | 309 | 14.32 | 120 | 330 | 1-5/8 | 1-1/2 MNPT | 5475 | 18.69 | 11.06 | 13.25 | 5.59 |
| | 100 | GSST-I-S-2000-100 | 17.06 | 17.13 - 17.86 | 0.375 | 293 | 14.32 | 120 | 320 | 1-5/8 | 1-1/2 MNPT | 5625 | 18.19 | 11.06 | 13.25 | 5.59 |
| | 120 | GSST-I-S-2000-120 | 16.63 | 16.69 - 17.43 | 0.375 | 279 | 14.32 | 120 | 310 | 1-5/8 | 1-1/2 MNPT | 5750 | 17.75 | 11.06 | 13.25 | 5.59 |
| | 140 | GSST-I-S-2000-140 | 16.13 | 16.19 - 16.93 | 0.375 | 258 | 14.44 | 120 | 400 | 1-5/8 | 1-1/2 MNPT | 5950 | 17.25 | 11.19 | 13.38 | 5.72 |
| | 160 | GSST-I-S-2000-160 | 15.69 | 15.75 - 16.49 | 0.375 | 245 | 14.44 | 120 | 390 | 1-5/8 | 1-1/2 MNPT | 5975 | 16.81 | 11.19 | 13.38 | 5.72 |
| 24 | 10,10S | GSST-I-S-2400-01S | 23.13 | 23.19 - 23.93 | 0.375 | 625 | 17.32 | 120 | 465 | 1-5/8 | 1-1/2 MNPT | 3700 (P-525) | 24.25 | 13.06 | 15.38 | 5.59 |
| | 20,STD,40S | GSST-I-S-2400-04S | 22.88 | 22.94 - 23.68 | 0.375 | 607 | 17.32 | 120 | 510 | 1-5/8 | 1-1/2 MNPT | 3600 (P-850) | 24.00 | 13.06 | 15.38 | 5.59 |
| | XS,80S | GSST-I-S-2400-08S | 22.63 | 22.69 - 23.43 | 0.375 | 597 | 17.32 | 120 | 465 | 1-5/8 | 1-1/2 MNPT | 3675 | 23.75 | 13.06 | 15.38 | 5.59 |
| | 30 | GSST-I-S-2400-030 | 22.50 | 22.56 - 23.30 | 0.375 | 598 | 17.32 | 120 | 450 | 1-5/8 | 1-1/2 MNPT | 3725 | 23.63 | 13.06 | 15.38 | 5.59 |
| | 40 | GSST-I-S-2400-040 | 22.25 | 22.31 - 23.05 | 0.375 | 580 | 17.32 | 120 | 445 | 1-5/8 | 1-1/2 MNPT | 3650 | 23.38 | 13.06 | 15.38 | 5.59 |
| | 60 | GSST-I-S-2400-060 | 21.69 | 21.75 - 22.49 | 0.375 | 557 | 17.32 | 120 | 435 | 1-5/8 | 1-1/2 MNPT | 3825 | 22.81 | 13.06 | 15.38 | 5.59 |
| | 80 | GSST-I-S-2400-080 | 21.19 | 21.25 - 21.99 | 0.375 | 484 | 16.32 | 120 | 425 | 1-5/8 | 1-1/2 MNPT | 4375 | 22.31 | 12.06 | 14.50 | 5.59 |
| | 100 | GSST-I-S-2400-100 | 20.56 | 20.63 - 21.36 | 0.375 | 457 | 16.32 | 120 | 410 | 1-5/8 | 1-1/2 MNPT | 4500 | 21.69 | 12.06 | 14.50 | 5.59 |
| | 120 | GSST-I-S-2400-120 | 20.00 | 20.06 - 20.80 | 0.375 | 433 | 16.44 | 120 | 395 | 1-5/8 | 1-1/2 MNPT | 5250 | 21.13 | 12.19 | 14.63 | 5.72 |
| | 140 | GSST-I-S-2400-140 | 19.50 | 19.56 - 20.30 | 0.375 | 413 | 16.57 | 120 | 385 | 1-5/8 | 1-1/2 MNPT | 5100 | 20.63 | 12.31 | 14.75 | 5.84 |
| | 160 | GSST-I-S-2400-160 | 18.94 | 19.00 - 19.74 | 0.375 | 393 | 16.69 | 120 | 375 | 1-5/8 | 1-1/2 MNPT | 5125 | 20.06 | 12.44 | 14.88 | 5.97 |
| 36 | 40S | GSST-I-S-3600-04S | 34.88 | 34.94 – 35.68 | 0.375 | 1275 | 20.00 | 250 | 400 | 1-5/8 | 2 MNPT | 450 (P-400) | 36.00 | 13.93 | 16.25 | 5.59 |
| | 80S | GSST-I-S-3600-08S | 34.63 | 34.69 – 35.43 | 0.375 | 1250 | 20.00 | 250 | 400 | 1-5/8 | 2 MNPT | 450 (P-450) | 35.75 | 13.93 | 16.25 | 5.59 |

**NOTE: For 6" – 8" plug sizes, OD must be within 0.125-inche concentricity to the pipe ID.**

**NOTE: For 10" plug sizes and above, no more than 0.500-inch clearance between the spring plate and the pipe's inner diameter is permissible for reliably safe operation of the plug.**

(P-XXXX) – When testing in ANSI A106 Grade B pipe material, a Pipe Reinforcement Device (PRD) is required if the test pressure will exceed the number identified after the "P-". If the material is not A106B, consult USA Industries engineering team for more information. *In general, a PRD is strongly recommended for all pipes 10/10S and thinner walled.*

**NEVER EXCEED THE MAXIMUM RATED PRESSURE OF THE LOWEST RATED COMPONENT IN THE SYSTEM.**

**DATA IS SUBJECT TO CHANGE. For the most current version of this document, go to: https://www.USAIndustries.com/downloads-library, and then scroll to the GripSafe ST Operating Manual downloads.**

# NPS 4” – 12” ORB PREPARATION & INSTALLATION STEPS


## 5 Preparing the 4” – 12”, 14” SCH 60-160, and 16” SCH 120-160 Nominal Pipe Size (NPS) GripSafe ST Outboard Retraction Blocking Plug for Installation

- The GripSafe ST Outboard Retraction Blocking NPS 4” to 12”, 14” SCH 60-160, and 16” SCH 120-160 plugs should be in the “Ready to Install” position from the factory, see Figure 4.

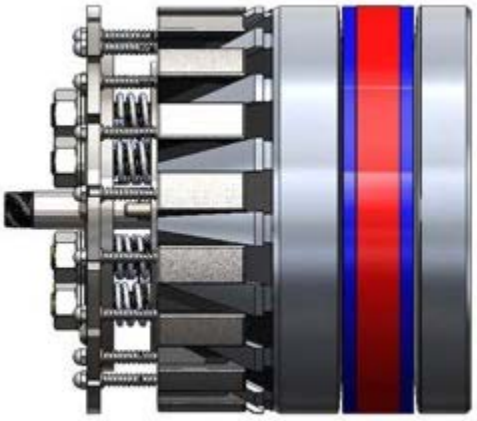


Figure 3: Not Ready to Install (Retracted)

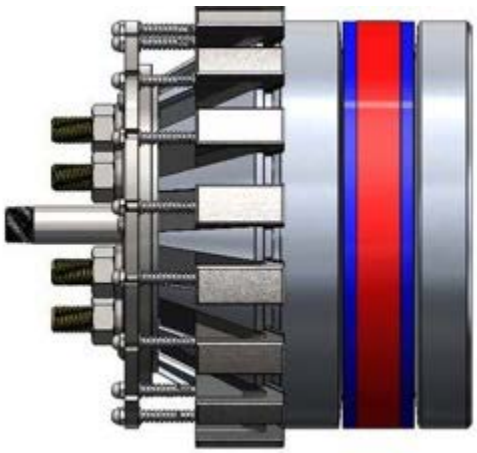


Figure 4: Ready to Install (Compressed)

- Ensure that the Compression Hex Nuts (19) are tightened until the **Spring Plate Hub (18)** is in a compressed state, as shown in Figure 4, and flush with the **Retainer Plate (16)**.
- Do not over-tighten or torque the nuts to the point where the **Seal (8)** begins to swell or extrude beyond the plug’s outer diameter, as this may hinder or prevent proper insertion into the pipe. If you need assistance with centering the plug in horizontal installations, refer to Note 6.7.
- In the compressed state shown in Figure 4, the GripSafe ST plug will immediately grip the pipe upon insertion.

**CHECK:** Before each use, ensure the plug is free from debris, fouling, and contaminants. **Each Wedge Gripper (4)** must move smoothly up and down in its slot, with full range of motion and no resistance. If the **Wedge Gripper (4)** is obstructed by debris, dirt, contaminants, or fouling, it may fail to grip the pipe’s inner diameter. This could result in the plug ejecting under pressure, potentially causing severe injury or death, material loss, and equipment damage.

# 6 Installing the GripSafe® ST NPS 4” – 12”, 14” SCH 60-160, and 16” SCH 120-160 Outboard Retraction Blocking Plug

**CAUTION:** Ensure the pipe I.D. is clean. All debris, scaling, and rust must be removed from the deepest point where the plug will be installed. If the pipe is lined or contains unremovable material, **STOP** and contact USA Industries for assistance before proceeding. Failure to do so may prevent the wedge from gripping properly and could result in the plug ejecting under pressure. Always wear appropriate PPE and follow all site safety guidelines.

6.1 Insert the GripSafe ST Outboard Retraction Blocking Plug evenly into the pipe.

- See Table 2 for Operational ID Range and clearance requirements.
- When using GripSafe ST Lifting Device, see *Section 11-12*.

6.2 When the ***Wedge Grippers(4)*** make contact with the pipe I.D., evenly push the GripSafe ST Outboard Retraction Blocking Plug further into the pipe.

6.3 A slight rocking motion will facilitate insertion.

- Once the **Wedge Grippers (4)** have engaged with the pipe's inner diameter, each will be in independent contact with it. Retraction or removal of the plug is not possible at this stage unless the **Compression Hex Nuts (19)** are loosened. If removal is necessary, refer to Section 7 for the plug removal procedure.

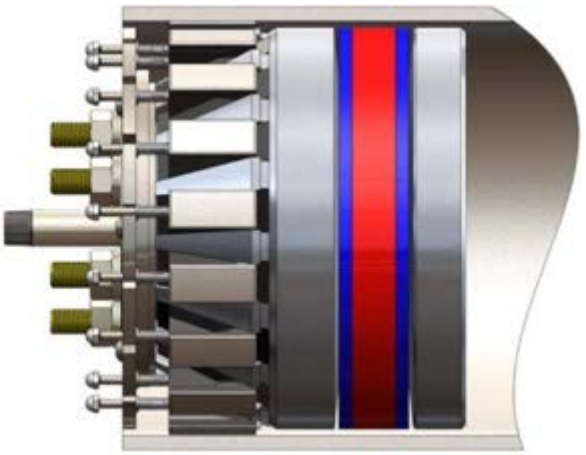


**Figure 5: GripSafe ST ORB Auto-Locking Minimum Insertion Depth in a Sectioned Pipe**

6.4 Insert the plug until the top of the ***Spring Plate Hub(18)*** is at least flush with the end of the pipe. See Figure 5.

6.5 If insertion into the pipe is difficult while in the compressed state shown in Figure 4, it may be beneficial to insert the plug in the retracted state, as illustrated in Figure 3. To do this, loosen all **Compression Hex Nuts (19)** to the top of their respective **Compression Shafts (6)**. Take care not to completely remove the **Compression Hex Nuts (19)** from the assembly. In this orientation, the **Wedge Grippers (4)** will be fully retracted, allowing the plug to be inserted freely into the pipe.

**CAUTION:** In the orientation described in 6.5, please note that the plug will not grip the pipe immediately upon insertion. The plug will securely grip the pipe only after tightening the **Compression Hex Nuts (19)** while the plug is in the pipe, allowing the bottom of the **Spring Plate Hub (18)** to make contact with the top of the Retainer Plate (16).

**TEMPERATURE NOTE:** If welding is to occur while the plug is installed, ensure the **Seal (Tri-Ply™) (8)** is at least 6” from the center of the weld to prevent degradation. For post-weld heat treatments and bake-outs, keep the **Seal (8)** at least 12” from the heating element, ensuring the temperature at the installation depth does not exceed 220°F. For high-temperature bake-outs (400°F or higher), increase the installation depth as much as possible. Always monitor pressure behind the plug (ORB) and between seals (DBB), stopping work immediately if any pressure drop is detected. Additionally, monitor the pipe's external surface temperature at the seal location to prevent seal damage.

6.6 When the plug is at the desired depth, verify the concentricity between the plug and pipe.

- For NPS 6”-8” plugs, the maximum allowable clearance between the plug's outer diameter and the pipe’s inner diameter is 0.350 inches. You can use any measuring device to assess the clearance or utilize the Concentricity Gauge (sold separately) to measure the gap (see Figure 6 below). If the gap exceeds 0.350 inches, repositioning the plug is necessary. If the gap is less than 0.350 inches, the plug meets the concentricity criteria; you may proceed to the next step.
- For NPS 10” plugs and larger, the maximum allowable clearance between the plug's outer diameter and the pipe’s inner diameter is 0.500 inches. You can use any measuring device to check the clearance or the Concentricity Gauge (sold separately) to measure the gap (see Figure 7 below). If the gap exceeds 0.500 inches, repositioning the plug is necessary. If the gap is less than 0.500 inches, the plug meets the concentricity criteria, and you may proceed to the next step. For additional guidance on achieving the plug's concentricity, refer to the note on the following page.

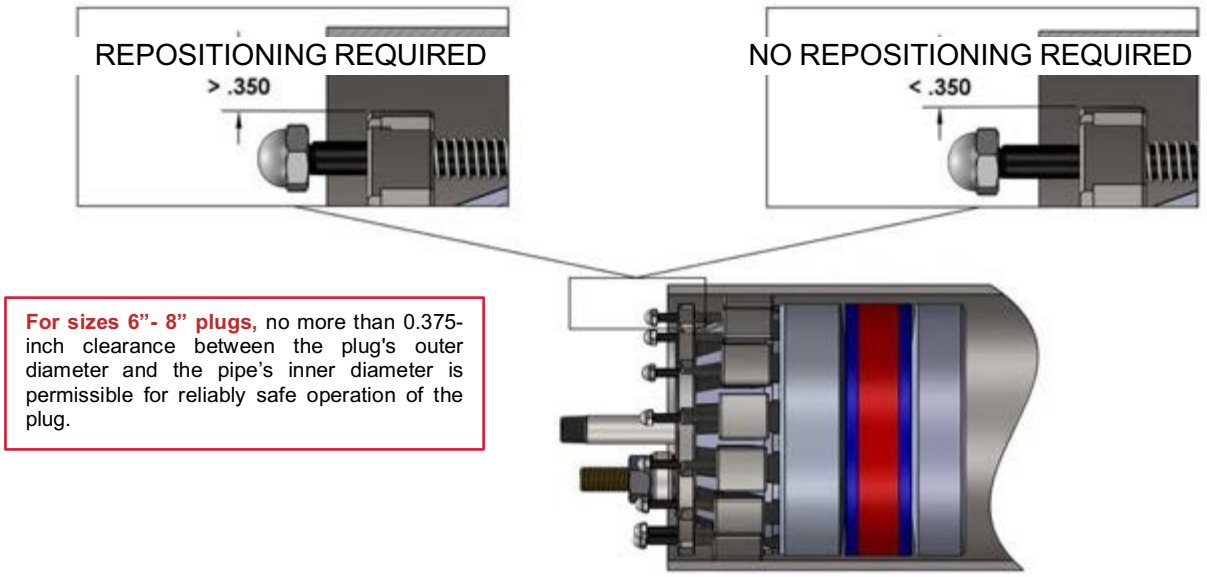
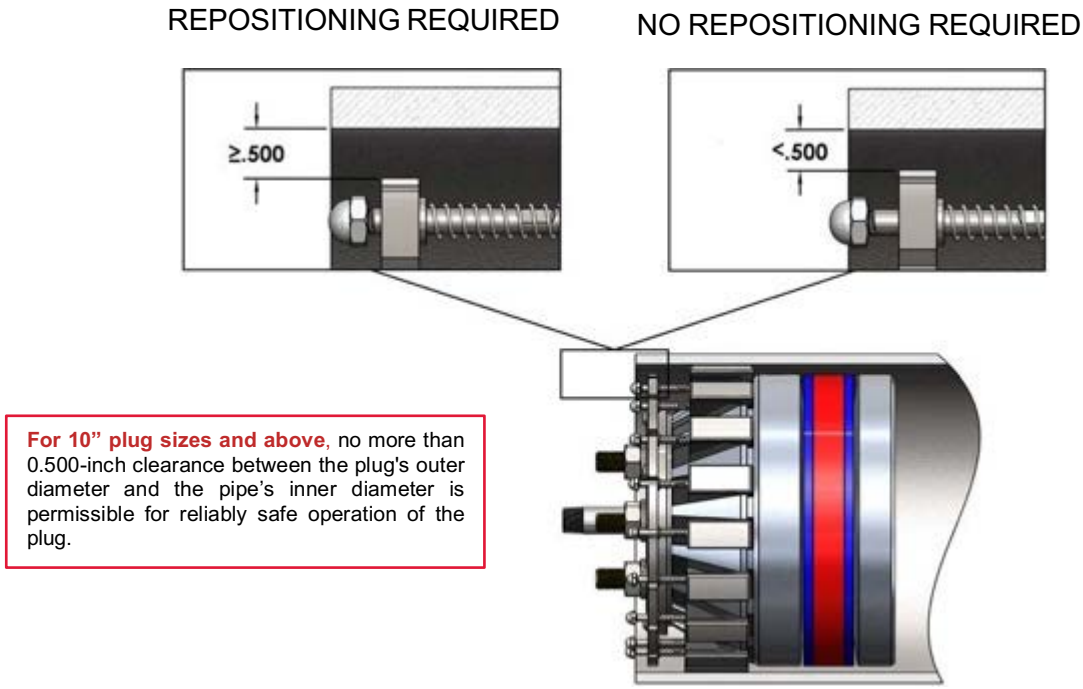



**Figure 6: Sizes 6” – 8” GripSafe ST Plug and Pipe Concentricity**




**For 10" plug sizes and above**, no more than 0.500-inch clearance between the plug's outer diameter and the pipe's inner diameter is permissible for reliably safe operation of the plug.

**Figure 7: Sizes 10" and above GripSafe ST Plug and Pipe Concentricity**

6.7 Evenly tighten the Compression Nuts.

- Using the star pattern illustrated in Figure 8, turn each **Compression Hex Nut (19)** a maximum of three full revolutions before proceeding to the next nut. Repeat this process until 50% of the target torque is achieved on all nuts, then increase to 100% of the target installation torque and continue torquing in the star pattern. After completing the star pattern at 100% of the target torque, use a circular pattern to verify that all nuts are correctly torqued.
- Minimal torque will be required for the first several passes, but torque will increase notably after the ***Seal(8)*** begins to compress against the pipe ID

6.8 For installing and using Safety Gag, see Section 13.

**NOTE:** To help center the plug in the pipe, you may wish to tighten the two or three bottom-most **Compression Hex Nuts (19)** to expand the **Seal (8)** beneath them, which will lift the plug into a centered position. A brief push on the plug will reset the **Wedge Grippers (4)** to align with the new centered position of the plug body. Normal installation should proceed once the plug is centered. This adjustment is particularly useful if the plug is noticeably off-center and test pressures are not achieved while the plug is at maximum compression torque, or the plug does not meet the clearance requirements of 0.350 inches for 6"-8" plugs if and 0.500 inches for plugs 10" and larger.

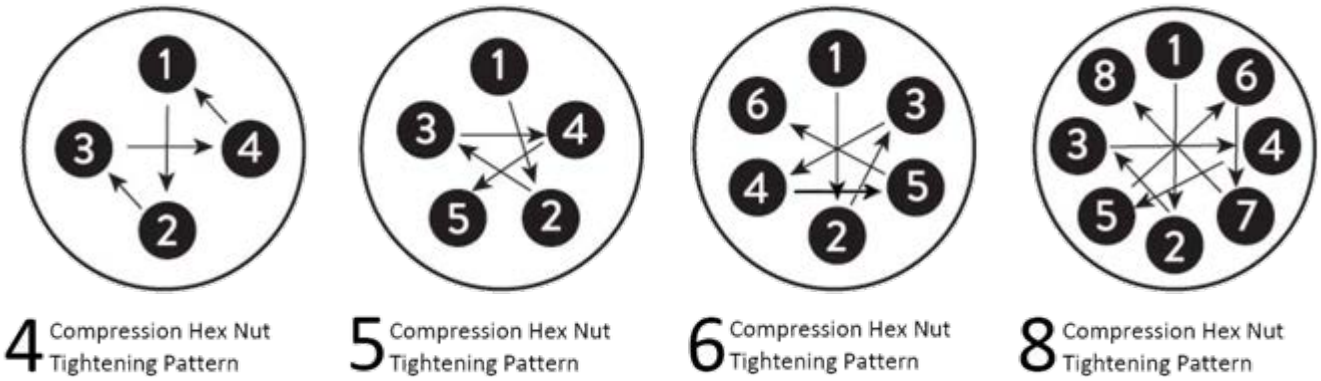



**Figure 8: Compression Hex Nut Tightening Pattern Examples**

6.8 For installing and using Safety Gag, see Section 13.

6.9 Verify the integrity of the Seals.

- If the plug is being utilized for pressure testing, ensure that proper fittings are used to connect a hydro test pump to the **Backpressure Vent Port (17)**. If not conducting a pressure test, install a cap to seal off the system or use a backpressure monitoring tee.
- It may be beneficial to attach a gauge and vent hose assembly or a backpressure monitoring tee to the **Backpressure Vent Port (17)** to safely release any backpressure. The hose should be long enough to direct any vapor escaping from the vessel to a safe location away from personnel in the area. Additionally, a valve can be connected to this port to enable safe backpressure venting prior to plug removal (refer to Section 7). When using a backpressure monitoring tee, it is advisable to install a pressure gauge on the branch side of the tee, connecting the run side to the **Backpressure Vent Port (17)** with a ball valve. For added safety, a hose can be attached to the ball valve on the monitoring tee, allowing vapor to be vented to a safe location away from workers in the vicinity.

**CAUTION:** Fast flowing gases or liquids through hosing can lead to hose whip. Exercise caution to prevent this, as failure to do so may result in injury to personnel or damage to equipment.

- Increase the pressure to 25% of the target pressure or 150 psig, whichever is lower. Note that a pressure drop may not necessarily indicate a leak. GripSafe ST Seals (8) will experience creep under pressure until they are fully seated, which may increase the pressure test volume. Depending on the size of the test volume, this increase may be so minimal that it is undetectable on a gauge. In relatively small test volumes, a gradual loss of pressure may be noticeable during this creep phase. The seal is considered seated when pressure is reapplied until it stabilizes. This seal creep may also occur when the system is subjected to full pressure, and the resolution for this creep remains the same at high pressure as it does during integrity verification.

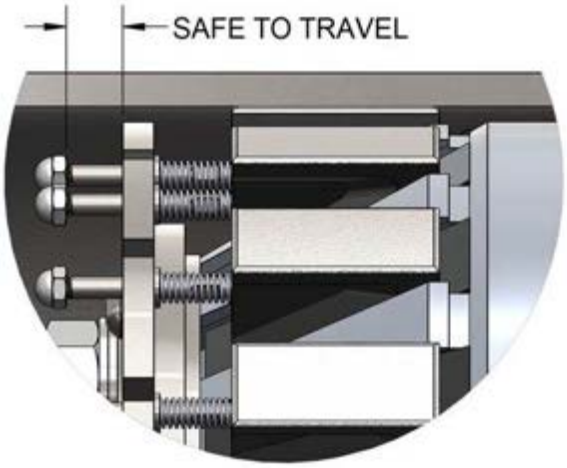



Figure 9: Wedge Grippers Safe to Travel

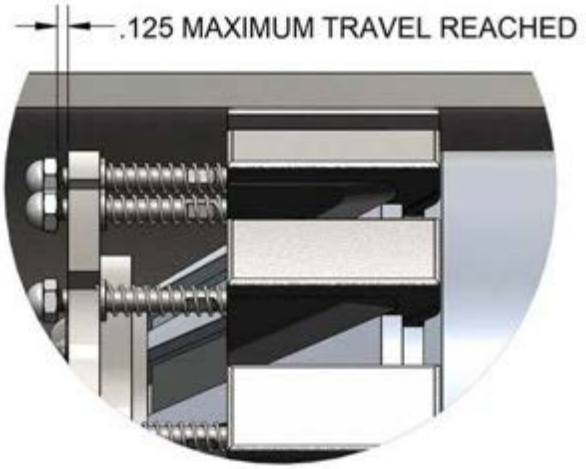



Figure 10: Wedge Grippers Maximum Travel Reached

6.10 The GripSafe plug is now ready to accept back pressure.

**CAUTION:** When the plug is being used for pressure testing, it is crucial to closely monitor the travel of the **Wedge Gripper Nuts (14)**. As illustrated in Figure 9, pressure can be applied to the system when the **Wedge Gripper Nuts (14)** are at least 1/8 inch away from the **Spring Plate Halo (13)**. However, as shown in Figure 10, no further pressure can be added to the system once the **Wedge Gripper Nuts (14)** have reached their maximum travel.

**CAUTION:** Do not stand directly in front of the GripSafe ST Outboard Retraction Blocking plug at any time. Installed plugs should always be treated with this caution, regardless of whether the plug is under backpressure.

**CAUTION:** If backpressure develops, it is essential to continuously monitor the pressure using an attached gauge and to physically inspect the integrity of the pipe to ensure the safety of personnel and equipment. Any signs of bulging, enlargement, or tapering of the pipe indicate overpressurization. The Backpressure Rating listed in Table 2 reflects the pressure-holding capacity of the GripSafe ST Outboard Retraction Blocking plug, which may exceed the design limitations of the system being tested.

**CAUTION:** If you hear a popping or clicking sound at any point during hydro testing, stop immediately and gradually release the pressure from the system. These sounds may indicate that the **Wedge Gripper (14)** is slipping, cracking, or that one of the plug components is failing. Remove the plug from the pipe or fitting and inspect it for any damage. For further assistance, please contact USA Industries.

**CAUTION:** Close attention must be paid to the area of the pipe where the **Wedge Grippers (14)** make contact during a hydro test. If you notice any deformation or swelling of the pipe, stop immediately and gradually release the pressure from the system. For further assistance, please contact USA Industries.

## 7 Removal of GripSafe® ST NPS 4” – 12”, 14” SCH 60-160, and 16” SCH 120-160 Outboard Retraction Blocking Plug

7.1 Depressurize the system using the hydrotest pump or a valve on the backpressure monitoring tee, and then drain all water.

7.2 Ensure there is no backpressure on the GripSafe ST ORB plug.

**WARNING:** Carefully open the **Vent Port (17)** to release any back pressure. Exercise caution when opening valves or loosening fittings, especially if inadvertent backpressure has been introduced to the vessel. Neglecting this precaution could result in a sudden pressure release, causing fittings to become hazardous projectiles and posing a risk of injury to personnel and damage to equipment. Additionally, if using a backpressure monitoring tee, be aware that rapid flow of gases or liquids through hoses can lead to hose whip. Take care to prevent this, as failure to do so may result in injury to personnel and damage to equipment.

7.3 Loosen the **Compression Hex Nuts (19)** in an even star pattern to avoid placing the entire load on a single bolt.

**NOTE:** *Gradually and systematically loosen each **Compression Hex Nut (19)** in a star pattern, avoiding complete loosening before moving to the next nut. Rapidly loosening the nuts can cause the spring plate to lodge in the pipe, making retrieval difficult. If the plug gets stuck, retighten all nuts in the star pattern until the spring plate realigns with the pipe, then proceed to loosen the nuts slowly and methodically.*

7.4 If a **Compression Hex Nut (19)** becomes loose while loosening, return it to a flush position with the top of the **Spring Plate Hub (18)**. The **Seal (8)** functions as a spring and exerts significant force that one **Compression Shaft (6)** alone may not be able to manage.

7.5 Once the **Seal (8)** has fully decompressed, the torque needed for loosening will be significantly reduced.

7.6 Once the **Seal (8)** is free from the pipe's inner diameter, continue loosening the **Compression Hex Nuts (19)** until they are level with the top of the **Compression Shaft (6).**

**NOTE:** Do not remove the ***Compression Hex Nuts(19)*** from the bolt. If this happens, immediately reinstall the components.

**CAUTION:** Ensure all **Compression Hex Nuts (19)** maintain a load throughout the loosening process. If only one nut is left tight, it may put excessive strain on that **Compression Shaft (6)**, increasing the risk of breakage. Once the **Seal (8)** has released from the pipe's inner diameter, the plug is relaxed, allowing the **Compression Hex Nuts (19)** to be fully loosened.

7.7 Remove the GripSafe ST ORB plug from the pipe.

- Clean and store for later use or return to USA Industries.

- The texture of the **Wedge Grippers (4)** may become clogged with pipe scale and rust after multiple uses. Inspect this surface after each use to maintain optimal gripping strength. To clean, use mild dish soap and a stiff stainless steel brush, like a welding brush. For persistent clogging, apply a household rust remover with the brush. Rinse the plug thoroughly with tap water and dry completely.
- Inspect the **Wedge Grippers (4)** for proper motion. Each **Wedge Gripper (4)** should slide freely up and down in its slot, allowing full movement without any resistance.
- Store in a shaded area away from direct sunlight and temperatures above 150°F. Prolonged exposure to UV light and excessive heat can degrade the **Seal (8)** over time.
- When replacing the **Seal (8)**, inspect the **Seal Dampener (20)** for cracks, significant permanent deformation, or loss of elasticity.
- If any damage to the **Seal Dampener (20)** is noted, replace it before using the plug for another test.

# NPS 14” – 24” PREPARATION & INSTALLATION STEPS

# 8 Installation Preparation for the NPS 14” – 24” GripSafeST Outboard Retraction Blocking Plug

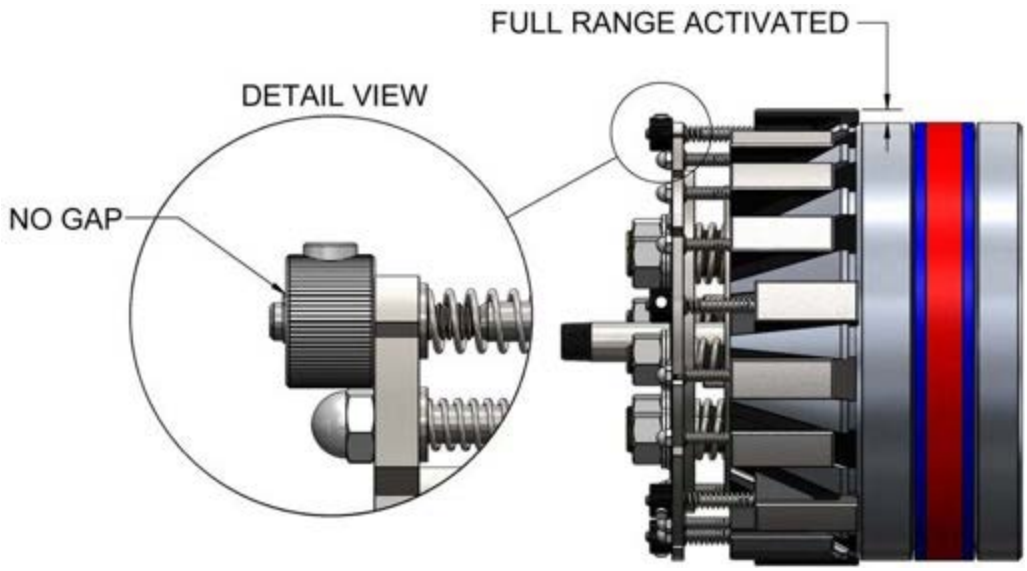



**Figure 11: Selected Wedges Auto-Locking Technology Correct Ready to Install State**

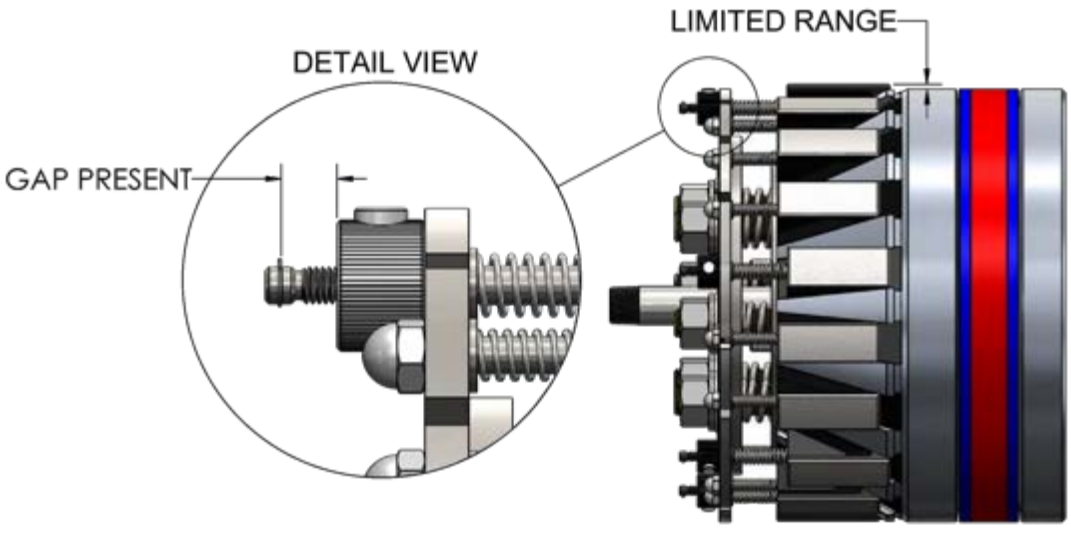



**Figure 12: Selected Wedges Auto-Locking Technology Incorrect Ready to Install State**

8.1 GripSafe ST Outboard Retraction Blocking plugs sized 14” and larger are equipped with Selected **Wedge Gripper (4)** auto-locking technology (SWAT) to facilitate easier insertion into the pipe.

- Plugs equipped with SWAT must be in the "Correct Ready to Install State" (see Figure 11) before being inserted into the pipe.
- In the "Correct Ready to Install State," only five **Wedge Grippers (4)** are active and extend beyond the plug's outer diameter, while the remaining **Wedge Grippers (4)** are inactive and housed within the plug. Upon insertion, all five active **Wedge Grippers (4)** will engage the pipe's inner diameter, allowing for easier insertion while ensuring a secure fit.
- In the "Correct Ready to Install State," the Speed Nuts (1) are positioned at the top of the **Wedge Gripper Stems (2)**, with no gap between the **Speed Nut (1)** and its retainer ring (see Figure 11 – DETAIL VIEW). It is essential that there is NO GAP between the **Speed Nuts (1)** and their retainer rings during plug installation to ensure proper activation of the SWAT mechanism.

**CAUTION:** Careful attention is required to ensure that a plug fitted with SWAT is in the “Correct Ready to Install State.” Figure 12, DETAIL VIEW, illustrates a plug with a gap between **the Speed Nuts (1)** and their retainer rings. In this condition, the **Wedge Grippers (4)** have a limited range, which may prevent the plug from gripping properly upon insertion. This gap must be eliminated during installation and is only permissible when removing the plug from service.

**CHECK:** Before each use, ensure the plug is free of debris, fouling, and contaminants. **Each Wedge Gripper (4)** must slide smoothly up and down in its slot with full range of motion and without resistance. If movement is hindered by debris, dirt, or contaminants, the plug may fail to grip the pipe’s inner diameter, increasing the risk of ejection under pressure. This can result in serious injuries or fatalities, material loss, and equipment damage.

## 9 Installing the GripSafeST NPS 14” – 24” Outboard Retraction Blocking Plug

**CAUTION:** Ensure the pipe's inner diameter (I.D.) is clean. Remove any debris, pipe scaling, or rust to the deepest point where the plug will be installed. If the pipe is lined or contains irremovable products, **STOP** and contact USA Industries for assistance before proceeding. Neglecting this step may hinder the wedge’s grip and lead to plug ejection under pressure. Always wear appropriate personal protective equipment (PPE) and adhere to all site guidelines.

9.1 Insert the GripSafe ST Outboard Retraction Blocking plug evenly into the pipe.

- See Table 2 for Operational ID Range and clearance requirements.
- When using GripSafe ST Lifting Device, see *Section 11-12*.

9.2 When the **Wedge Grippers (4)** contact the pipe's inner diameter (I.D.), apply even pressure to push the GripSafe ST Outboard Retraction Blocking plug further into the pipe.

9.3 A slight rocking motion will assist insertion.

- Once the **Wedge Grippers (4)** begin to enter the pipe, each will make independent contact with the pipe's inner diameter (I.D.). At this point, retraction or removal of the plug is not possible. For plug removal instructions, see Section 10.

9.4 Insert the plug until the top of the **Spring Plate Hub (18)** is at least flush with the end of the pipe, see Figure 13.

9.5 Once the required insertion depth is achieved, evenly tighten the **Compression Hex Nuts (19)** until the **Spring Plate Hub (18)** makes contact with the **Retainer Plate (16)**. At this stage, all **Wedge Grippers (4)** will be activated and will independently contact the pipe's inner diameter (see Figure 14).

**TEMPERATURE NOTE:** If welding is to occur while the plug is installed, ensure the **Seal (Tri-Ply™) (8)** is at least 6” from the center of the weld to prevent degradation. For post-weld heat treatments and bake-outs, keep the **Seal (8)** at least 12” from the heating element, ensuring the temperature at the installation depth does not exceed 220°F. For high-temperature bake-outs (400°F or higher), increase the installation depth as much as possible. Always monitor pressure behind the plug (ORB) and between seals (DBB), stopping work immediately if any pressure drop is detected. Additionally, monitor the pipe's external surface temperature at the seal location to prevent seal damage.

Figure 13: GripSafe ST ORB Auto-Locking Minimum Insertion Depth in a Sectioned Pipe

Figure 14: GripSafe ST ORB Auto-Locking all Wedge Grippers activated (Compressed)

9.6 After evenly tightening the **Compression Hex Nuts (19)** until the **Spring Plate Hub (18)** contacts the **Retainer Plate (16)**, verify the concentricity of the plug and pipe before moving to the next step.

- Visit Section 6.6 for this step.

9.7 Evenly tighten the Compression Nuts.

- Using the star pattern shown in Figure 15, tighten each **Compression Hex Nut (19)** by a maximum of three full revolutions before moving to the next nut. Repeat this process until you reach 50% of the target torque on all nuts, then increase to 100% target installation torque, continuing the star pattern. After reaching 100% torque, use a circular pattern to ensure all nuts are properly torqued.
- Initially, only minimal torque will be needed for the first few passes. However, the torque requirement will increase significantly once the **Seal (8)** starts to compress against the pipe's inner diameter.

**NOTE:** To center the plug in the pipe, tighten the bottom two or three **Compression Hex Nuts (19)** to expand the **Seal (8)** underneath, lifting the plug into position. A short push on the plug will reset the **Wedge Grippers (4)** for the new centered position. Proceed with normal installation once the plug is centered. This adjustment is particularly helpful if the plug is noticeably off-center or if test pressures aren't achieved at Maximum Compression Torque. Ensure the plug maintains a clearance of 0.350" for 6"-8" plugs and 0.500" for plugs 10" and above.

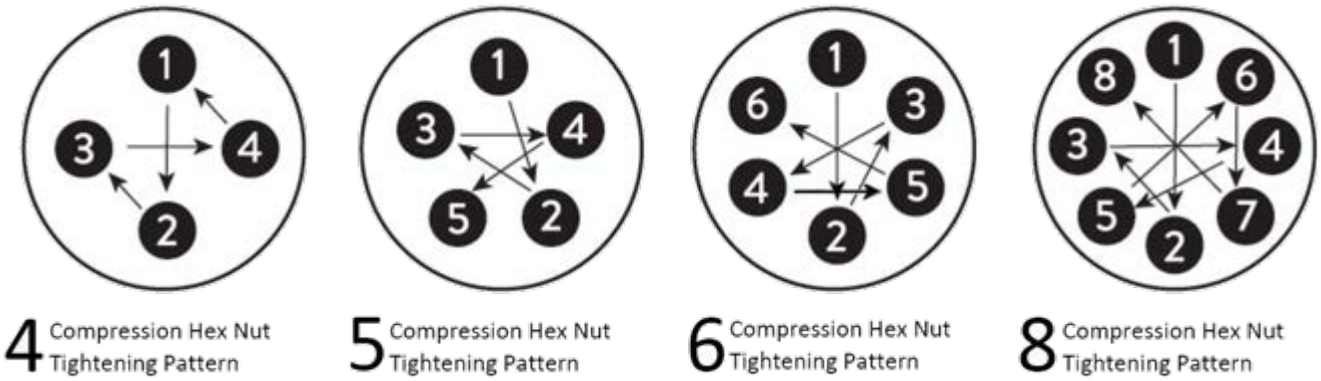



**Figure 15: Compression Hex Nut Tightening Pattern Examples**

9.8 For installing and using Safety Gag, see *Section 13*.

9.9 Verify the integrity of the Seals.

- If using the plug for pressure testing, attach the appropriate fittings to the **Backpressure Vent Port (17)** for a hydro test pump. If not, cap the port to seal the system or use a backpressure monitoring tee.
- Consider attaching a gauge and vent hose assembly or a backpressure monitoring tee to the Backpressure Vent Port (17) to relieve any backpressure. Ensure the hose is long enough to direct vapor safely away from nearby workers. You may also install a valve for safe backpressure venting before plug removal (see Section 7). When using a backpressure monitoring tee, place a pressure gauge on the branch side and connect the run side to the Backpressure Vent Port (17) with a ball valve. Additionally, attach a hose to the ball valve to vent safely away from personnel.

**CAUTION:** Rapidly flowing gases or liquids through hoses can lead to hose whip. Exercise caution to prevent this, as failure to do so may cause injuries to personnel or damage to equipment.

- Increase the pressure to 25% of the target or 150 psig, whichever is lower. Note that any pressure drop may not indicate a leak; **GripSafe ST Seals (8)** will creep under pressure until fully seated, which may slightly increase the test volume—potentially unnoticeable on the gauge. In smaller test volumes, a gradual pressure loss may occur during this phase. Stabilize the pressure by reapplying it until it is steady. This creep can also happen at full pressure, and the approach to resolve it remains the same in both scenarios.

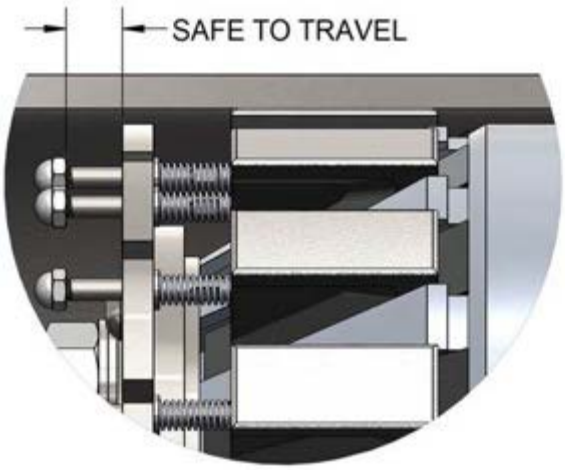



Figure 16: Wedge Grippers Safe to Travel

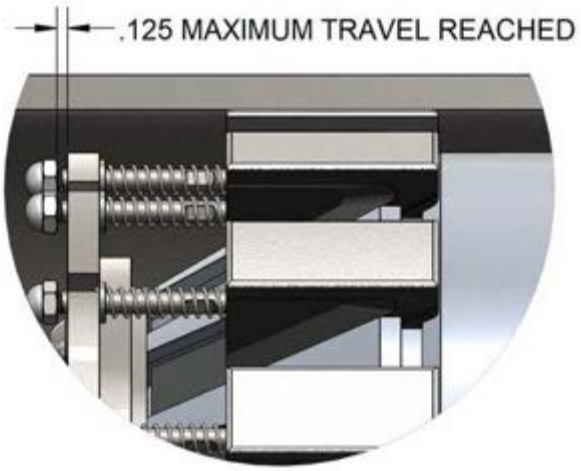



Figure 17: Wedge Grippers Maximum Travel Rached

9.10 The GripSafe plug is now ready to accept back pressure.

**CAUTION:** When using the plug for pressure testing, closely monitor the travel of the **Wedge Gripper Nuts (14)**. As shown in Figure 9, you can add pressure when the **Wedge Gripper Nuts (14)** are at least 1/8" away from the **Spring Plate Halo (13)**. However, as depicted in Figure 10, no additional pressure should be applied once the **Wedge Gripper Nuts (14)** have reached their maximum travel.

**CAUTION:** Avoid standing directly in front of the GripSafe ST Outboard Retraction Blocking at all times. This precaution should be followed regardless of whether the installed plug has backpressure.

**CAUTION:** If backpressure develops, continuously monitor pressure using an attached gauge and visually inspect the pipe for integrity to ensure safety for personnel and equipment. Signs of bulging, enlargement, or tapering indicate overpressurization. The Backpressure Rating listed in Table 1 refers to the GripSafe ST Outboard Retraction Blocking's pressure-holding capability, which may exceed the design limitations of the system being tested.

**CAUTION:** Closely monitor the area of the pipe where the **Wedge Grippers (14)** make contact during a hydro test. If you notice any deformation or swelling of the pipe, stop immediately and gradually release the pressure from the system. Reach out to USA Industries for further assistance.

**CAUTION:** If you hear a popping or clicking sound during hydro testing, stop immediately and slowly release the pressure from the system. These sounds may indicate that the **Wedge Gripper (14)** is slipping, cracking, or that a plug component has failed. Remove the plug from the pipe or fitting and inspect it for damage. If needed, contact USA Industries for further assistance.

## 10 Removal of NPS 14” – 24” GripSafeST Outboard Retraction Blocking Plug

10.1 Depressurize the system using the hydro test pump or a valve on the backpressure monitoring tee, then drain all water.

10.2 Verify that there is no back pressure on the GripSafe ST ORB plug.

**CAUTION: SLOWLY** open the **Vent Port (17)** to relieve any back pressure. Exercise caution when opening valves or loosening fittings, as inadvertent backpressure may have been introduced to the vessel. Failure to do so could result in hazardous pressure release or fittings becoming dangerous projectiles, potentially injuring personnel and damaging equipment. If using a backpressure monitoring tee, be aware that fast-flowing gases or liquids can cause hose whip. Take precautions to prevent this, as neglecting to do so may lead to injury or equipment damage.

10.3 Before loosening the **Compression Hex Nuts (19)**, ensure that all Speed Nuts (1) are fully positioned at the end of the stud's thread, as shown in Figure 18 – AFTER.

10.4 Turn the **Speed Nut (1)** clockwise until it reaches the end of the thread, away from the retainer ring. For quicker repositioning, press the button on the **Speed Nut (1)** and slide it toward the end of the thread, away from the retainer ring, as shown in Figure 18 – BEFORE. Once it is at the end of the thread, ensure the threads are interlocked by turning the **Speed Nut (1)** clockwise until it is finger-tight.

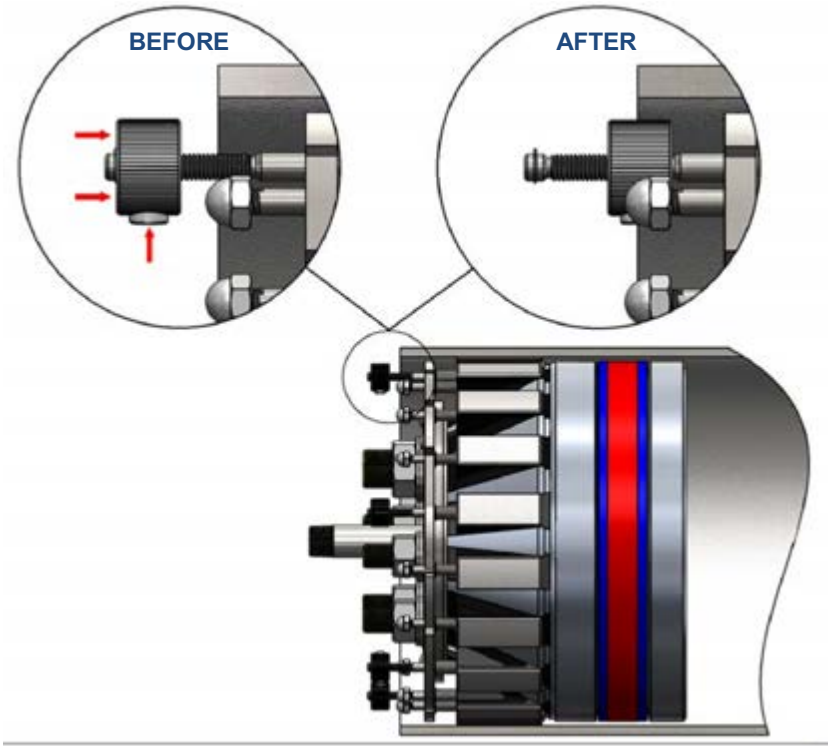



**Figure 18: Repositioning Speed Nut**

10.5 Make sure step 10.4 is done to all 5 of the ***Speed Nuts(1)***.

- All ***Speed Nut(1)*** must be in the “AFTER” position shown in Figure 18 before loosening the ***Compression Hex Nuts(19)***.

10.6 Loosen the **Compression Hex Nuts (19)** in an even star pattern to avoid placing the entire load on a single bolt.

10.7 If a **Compression Hex Nut (19)** turns freely during loosening, reposition it so that it is flush with the top of the **Spring Plate Hub (18)**. The **Seal (8)** acts as a spring and can exert a significant amount of force that one **Compression Shaft (6)** cannot manage alone.

10.8 Once the **Seal (8)** has fully decompressed, the torque needed for loosening will be significantly reduced.

10.9 Once the **Seal (8)** has released from the pipe ID, continue loosening the **Compression Hex Nuts (19)** until they are flush with the top of the **Compression Shaft (6)**.

**NOTE:** Do not remove the ***Compression Hex Nuts(19)*** from the bolt. If this happens, immediately reinstall the components.

**CAUTION:** Ensure that all **Compression Hex Nuts (19)** maintain a load throughout the loosening process. If all but one nut are loose, a significant load may remain on that single **Compression Shaft (6)**, increasing the risk of breakage. Once the **Seal (8)** has sufficiently relaxed to break the seal from the pipe's inner diameter, the plug will be in a relaxed state, allowing for complete loosening of the **Compression Hex Nuts (19)**.

10.10 Remove the GripSafe ST ORB plug from the pipe.

- Clean and store for later use or return to USA Industries.
- **Wedge Grippers (4)** can become clogged with pipe scale and rust after multiple uses. Regular inspection of this surface is essential to maintain optimal gripping strength. To clean, use mild dishwashing soap and a stiff stainless steel brush, like a welding brush. For stubborn plugging, a household rust remover combined with a stiff brush should suffice. Rinse the plug thoroughly with tap water to remove any chemical residue and dry it completely.
- Check the **Wedge Grippers (4)** for free movement. Each should slide easily up and down in its slot, allowing full motion without any resistance.
- Store in a shaded area where temperatures do not exceed 150°F. Prolonged exposure to UV light and excessive heat can degrade the **Seal (8)**.
- When replacing the **Seal (8)**, inspect the **Seal Dampener (20)** for cracks, excessive deformation, or loss of elasticity.
- If any damage to the **Seal Dampener (20)** is observed, replace it before using the plug for further testing.

## 11 GripSafe ST Lifting Device Parts

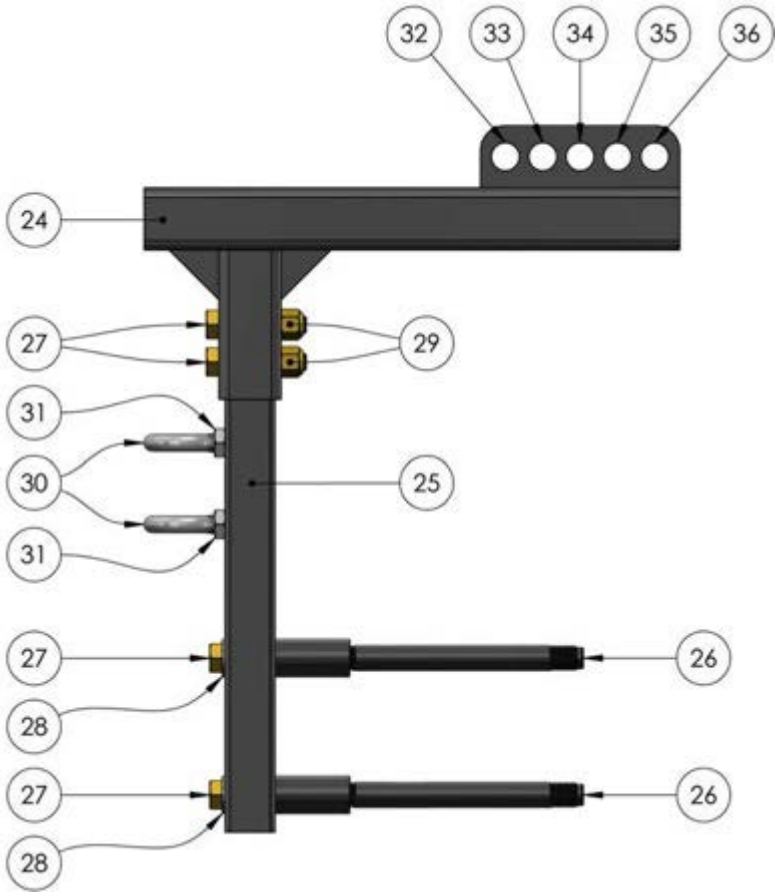



Figure 20: GripSafe Lifting Device Diagram

### Table 3: Lifting Device Bill of Materials

| Plug Size | Part Number | (24) | (25) | (25) | (26) | (26) | (26) | (26) | (27) | (28) | (29) | (30) | (31) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Universal Lifting Bar | Telescoping Lifting Attachment #1 | Telescoping Lifting Attachment #2 | Lifting Standoff #1 | Lifting Standoff #2 | Lifting Standoff #3 | Lifting Standoff #4 | Lifting Device Bolt | Lifting Device Washer | Lifting Device Nut | Vertical Lifting Eyebolt | Eyebolt Nut |
| 10 | GSST-I-A-1000-ALL-LD | 1 | 1 | N/A | 2 | N/A | N/A | N/A | 4 | 2 | 2 | 2 | 2 |
| 12 | GSST-I-A-1200-ALL-LD | 1 | 1 | N/A | N/A | 2 | N/A | N/A | 4 | 2 | 2 | 2 | 2 |
| 14 | GSST-I-A-1200-ALL-LD | 1 | 1 | N/A | N/A | 2 | N/A | N/A | 4 | 2 | 2 | 2 | 2 |
| 16 | GSST-I-A-1200-ALL-LD | 1 | 1 | N/A | N/A | 2 | N/A | N/A | 4 | 2 | 2 | 2 | 2 |
| 18 | GSST-I-S-1800-ALL-LD | 1 | 1 | N/A | N/A | N/A | 2 | N/A | 4 | 2 | 2 | 2 | 2 |
| 20 | GSST-I-S-2000-ALL-LD | 1 | N/A | 1 | N/A | N/A | 2 | N/A | 4 | 2 | 2 | 2 | 2 |
| 24 | GSST-I-S-2400-ALL-LD | 1 | N/A | 1 | N/A | N/A | 2 | N/A | 4 | 2 | 2 | 2 | 2 |

## 12 Installing the Lifting Device on the GripSafeST Plug

12.1 Insert the **Lifting Standoffs (26)** into the two holes on top of the **Spring Plate Hub (18)**. Hand-tighten both standoffs until they are fully seated, as shown in Figure 21..

**CAUTION:** Both **Lifting Standoffs (26)** must be threaded in for a minimum of 6 full turns into the GripSafe ST plug. Insufficient threading may lead to thread failure under load, risking the plug falling and potentially causing injury to personnel and damage to equipment.

**NOTE:** There are four types of ***Lifting Standoffs(26).*** #1 is used for NPS 10" ORB and IIB plugs; #2 is used for plugs NPS 12"-16" ORB and IIB plugs; #3 is used for NPS 18"-24" ORB plugs only; and #4 is used for NPS 18" - 24" IIB plugs only.

12.2 Align the holes on the **Telescoping Lifting Attachment (25)** with the internally threaded holes on the **Lifting Standoffs (26)**. Secure the **Telescoping Lifting Attachment (25)** to the **Lifting Standoffs (26)** using the provided **Lifting Device Bolts (27)** and **Washers (28)**. Refer to Figure 22 for guidance.

**NOTE:** There are two types of **Telescoping Lifting Attachments (25)**, #1 and #2, which vary in length and hole placements to fit different-sized plugs.

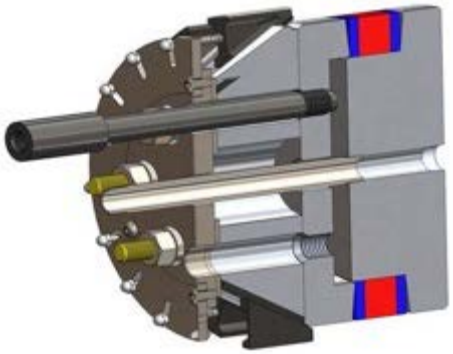


**Figure 21: Inserting and Threading Lifting Standoffs into the Plug**

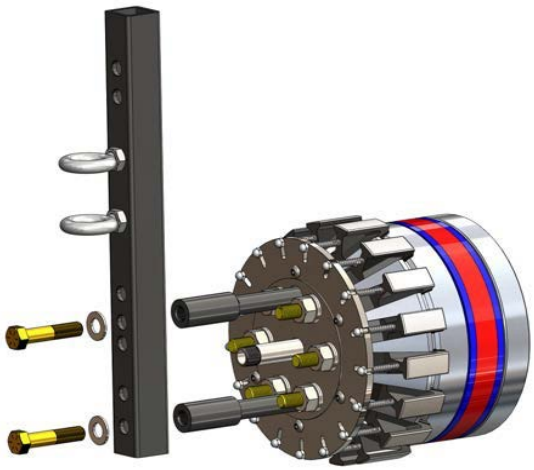


**Figure 22: Aligning and fastening Telescoping Lifting Attachment on to Lifting Stand**

12.3 After securing the **Telescoping Lifting Attachment (25)** to the **Lifting Standoffs (26)**, insert it into the shorter square tubing of the **Universal Lifting Bar (24)**. Once inserted, align the holes on both the **Telescoping Lifting Attachment (25)** and the **Universal Lifting Bar (24)**.

**12.4** Secure the **Telescoping Lifting Attachment (25)** using the provided **Lifting Device Bolts (27)** and **Nuts (29)** through the aligned holes from step 12.3. Refer to Figure 23 for guidance.

**Figure 23: Aligning and Fastening Telescoping Lifting Attachment onto Universal Lifting Bar**

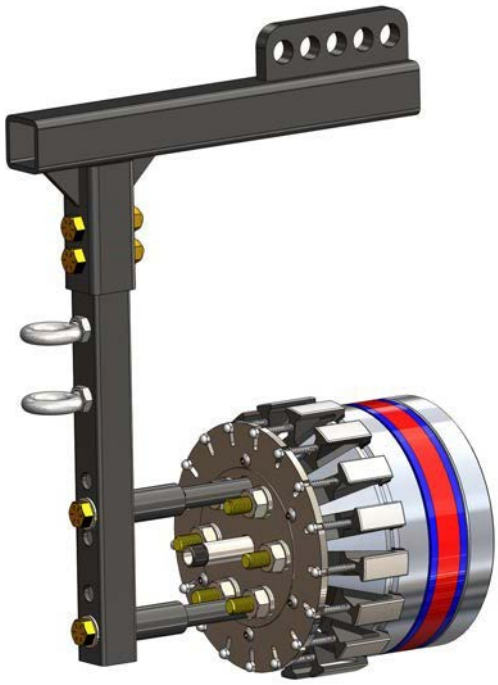


**Figure 24: Lifting Device Finished Assembly**

12.5 Using the Lifting Device.

- The Lifting Device features five lifting points **(32, 33, 34, 35, and 36)**. Utilize one or two of these points to position the GripSafe ST Plug horizontally.
- If the plug is unbalanced and does not align with its center of gravity, a cheater bar can be inserted into the long square tubing of the **Universal Lifting Bar (24)** for leverage. This will assist in maneuvering the plug during insertion into the pipe.

**CAUTION: DO NOT** lift the Lifting Device from the **Vertical Lifting Eyebolts (30)** on the **Telescoping Lifting Attachment (25)**. These eyebolts are for storage only. Lifting from this point can cause failure and result in damage to equipment and injury to personnel.

12.6 Vertical Lifting

- For vertical lifting, remove the **Lifting Device Bolts (27)** securing the **Lifting Standoffs (26)** to the **Telescoping Lifting Attachment (25)**.
- Fasten the provided ***Vertical Lifting Eyebolt(30)*** to both ***Lifting Standoffs(26)***.
- Hold the **Vertical Lifting Eyebolt (30)** in the correct orientation, snug the **Eyebolt Nut (31)** against the top of the **Lifting Standoffs (26)**, and then turn the nut an additional ½ turn. Repeat for the other **Eyebolt (30)** and its nut. See Figure 25 for proper installation.
- When lifting vertically, both ***Vertical Lifting Eyebolt(30)*** must be used

**CAUTION:** Ensure that each **Vertical Lifting Eyebolt (30)** is threaded in at least 6 full turns into the **Lifting Standoffs (22)**. Insufficient threading may lead to thread failure under the GripSafe ST's load, risking falls that could injure personnel and damage equipment.

**CAUTION:** Avoid lifting the GripSafe ST with only one **Vertical Lifting Eyebolt (30)**. Using both eyebolts is crucial to prevent the plug from twisting, which could cause the eyebolts to unthread or loosen, risking falls that may injure personnel and damage equipment.

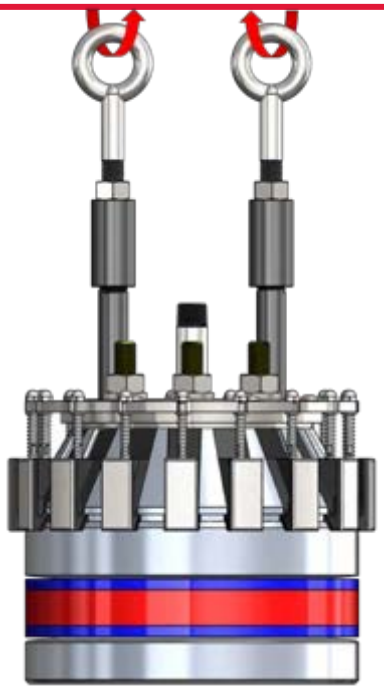


**Figure 25: Properly Installed Lifting Eyes for Vertical Lift**

## 13 Installing and Using the Safety Gag

Figure 26: Properly Installed Safety Gag on Pipe

**NOTE:** Safety Gags are not required but are recommended to provide a layer of protection in the unlikely event of plug discharge.

13.1 Position the loosely assembled Safety Gag over the pipe prior to inserting the plug.

13.2 Refer to the plug installation instructions in Sections 5-7 for NPS 4”-12” and Sections 8-10 for NPS 14”-24” before proceeding to step 13.4.

13.3 Place the pear-shaped link over the ***Back Pressure Vent Port(17)***.

13.4 Push the clamp further down the pipe to remove all slack in the chain. Ensure that the chain is not snagged, twisted, or knotted, and is tight from the gag bolt to the pear-shaped link.

13.5 Begin by snugging all bolts on the clamp, starting with the two closest to the pipe. For these two bolts, turn them an additional 1/3 to 1/2 turn.

- When correctly installed, the Safety Gag should be securely clamped and should not rotate, slide, or tilt in any direction when pushed or pulled.
- See Figure 26 for an example of a properly installed Safety Gag.

13.6 Reverse steps 13.1-13.5 to uninstall.

## 14 Installing and Using the Pipe Reinforcement Device (PRD)

Figure 27: Properly Installed PRD on Pipe

**NOTE:** Pipe Reinforcement Devices provide support for thin-walled pipes. Refer to pages 9-11 for the pressures denoted by (P-XXXX) that an A106B (35 ksi yield) pipe can safely withstand without a PRD. Additionally, PRDs can serve as a Safety Gag Device by attaching a safety chain to the front of the plug where required by procedures.

14.1 Refer to the operating manual, specifically Sections 5, 6, 8, and 9, for the preparation and installation instructions for the GripSafe ORB plugs.

14.2 Tighten the compression hex nuts as outlined in Sections 6.7 and 9.7, but do not reach the specified torque. Only tighten the hex nuts enough to expand the seal so that it contacts the inner surface of the pipe and holds itself in place. Do not apply maximum torque until after the PRDs are positioned, as failing to do so may cause distortion in thin-walled pipes due to the seal forces exerting on the pipe.

14.3 Once the seal has expanded and before applying full torque, position the PRD Positioning Scale as shown in the image below, ensuring the short end touches the spring plate. Scribe or mark the pipe at the notch locations of the wedges and seal. These notches indicate where the PRDs should be placed to reinforce the pipe and prevent seal and wedge distortion, particularly in thin-walled pipes.

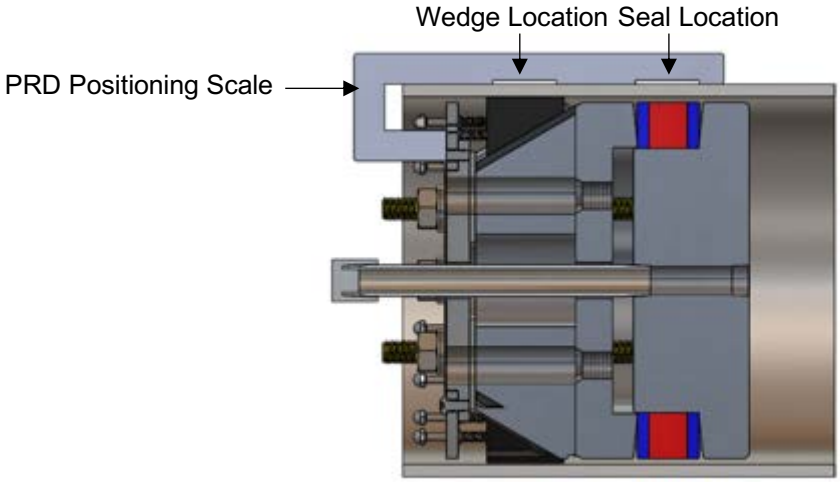
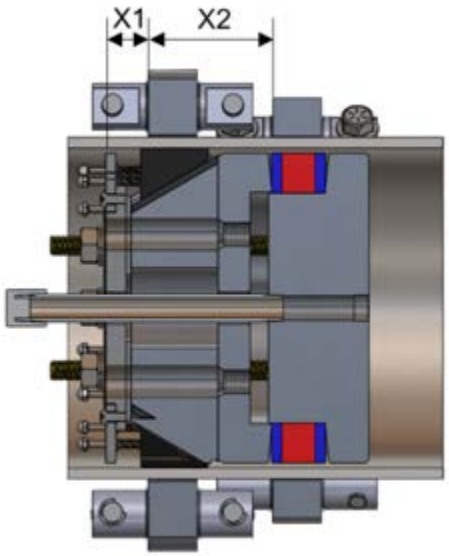



**Figure 28: PRD Positioning Scale**

**14.4** An alternative method to position the PRDs is to measure the distance from the face of the spring plate to the locations of the wedges and seals. Refer to the table and figure below for the sizes and their corresponding distances.



## 15 Plug Maintenance

**15.1 Wedge Gripping Mechanism Maintenance:** This procedure must be conducted before using the GSST plug for any pressure testing. Refer to Figures 29-36 for examples of **Wedge Grippers (4)** and **Back Plates (5)** that should be replaced and taken out of service; this list is not exhaustive:

Figure 29: Clogged GritLock Surface

Figure 30: GritLock Flaking

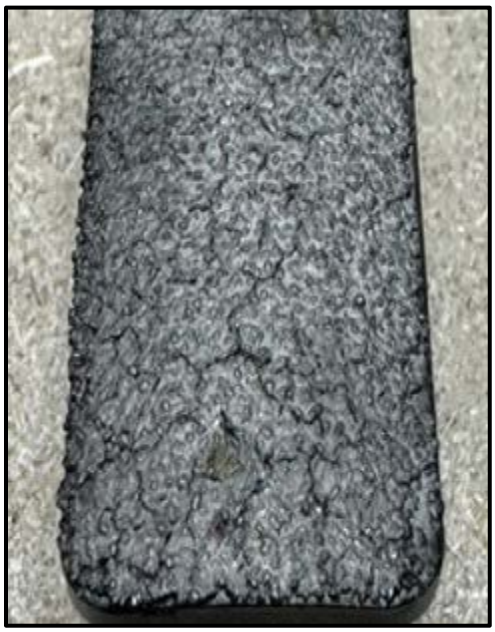


Figure 31: GritLock Cracking

Figure 32: Excessive Wear Of Low-Friction Coating On The Back Side Of Wedge Gripper

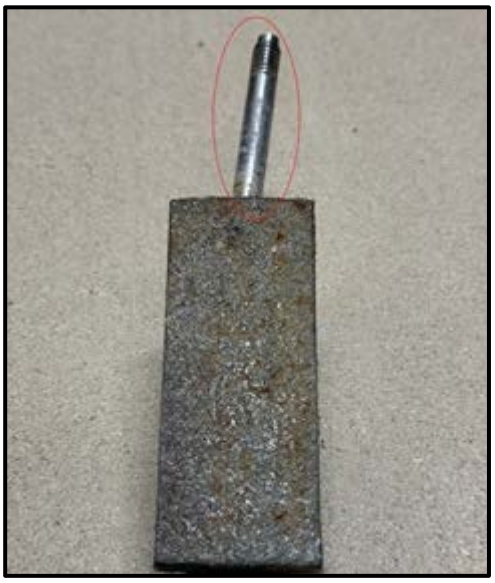


Figure 33: Bent Wedge Stem Circled in Red

Figure 34: Fouling And Debri On GritLock Surface

Figure 35: Dented Back Plate

Figure 36: Worn Out And Dirty Back Plate

**Inspection and Maintenance of Wedge Grippers (4):** All Wedge Grippers (4) must be inspected before each use. Follow these mandatory steps to ensure the proper functioning of the plug:

**Clean the GritLock Surface:** Use a stainless steel brush to remove debris, dirt, fouling, rust, or any other substances that could hinder the Wedge Gripper's ability to grip the pipe's inner surface. If the GritLock's rough texture appears compromised, replace the component.

**Pressure Wash the Plug:** Thoroughly pressure wash the entire plug to eliminate fouling and debris, including dirt, rust, oil, and hydrocarbons.

**Tighten Compression Hex Nuts (19):** Adjust the **Compression Hex Nuts (19)** until the **Spring Plate Hub (18)** is in a compressed state, as illustrated in Figures 4 and 14.

1. **Check Movement of Wedge Grippers (4):** Slide each **Wedge Gripper (4)** within its respective ramp or slot.
2. **Ensure Smooth Operation:** Each **Wedge Gripper (4)** should move freely and smoothly without any resistance.
3. **Flush Out Debris:** If movement is restricted, apply plenty of soapy water where the **Wedge Gripper (4)** meets the **Back Plate (5)** while sliding the **Wedge Gripper (4)** along its ramp/slot to flush out debris and fouling.
4. **Inspect for Damage:** If the **Wedge Gripper (4)** still does not slide freely, remove the **Wedge Gripper Nuts (14)** and take out the **Wedge Gripper (4)** from the plug. Inspect the bottom sliding surface for wear, imperfections, or debris such as grit, sand, dust, dirt, or oil.
5. **Clean the Surface:** Carefully wipe away any debris with a cloth, avoiding damage to the Black Coating.
6. **Replace if Necessary:** If more than 10% of the Black Coating on the bottom of the **Wedge Gripper (4)** is worn, replace it and send it back to USA Industries for recoating.
7. **Reassemble and Recheck:** After removing any obstructions, reassemble the **Wedge Gripper (4)** to the plug and verify that it slides freely and smoothly without resistance.
8. **Inspect the Wedge Gripper Stem:** Check the **Wedge Gripper (4)** stem for bends, as shown in Figure 33. Replace immediately if bent, as this can cause binding against mating parts.
9. **Seek Support if Needed:** If the **Wedge Gripper (4)** still seems questionable after following these steps, stop use and replace the component or contact USA Industries for assistance.

- **Back Plate (5) Inspection:**
  All **Back Plates (5)** must be inspected before each use. Refer to Figure 34 for signs of bending that may impede **Wedge Gripper (4)** movement, and Figure 35 for dirty, scratched, or worn coatings. Replace any **Back Plate (5)** causing the **Wedge Gripper (4)** to bind or function improperly

**15.2 Seal Maintenance**

- Perform this procedure before using the GSST plug for any pressure testing. Regular inspection of the seal is essential to prevent leaks during testing.
- The GripSafe **Seal (Tri-Ply™) (8)** consists of three layers with varying durometer hardness: hard-soft-hard. If any delamination occurs between these layers, replace the seal immediately.
- Refer to Figures 37-41 for examples of **the Seal (Tri-Ply™) (8)** that should be replaced and taken out of service, though this list is not exhaustive:

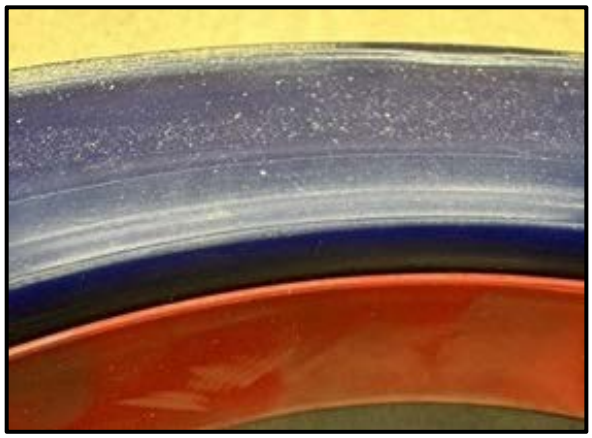


Figure 37: Delaminating of Tri-Ply Seal

Figure 38: Cracking of Tri-Ply Seal

Figure 39: Crumbling of Tri-Ply Seal

Figure 40: Excessive Deformation of Tri-Ply Seal

Figure 41: Excessive Deformation of Tri-Ply Seal

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