



GRIPSAFE[®]

INSTALLATION MANUAL



Small Outboard Retraction Blocking (ORB) Plug

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

Patents & Trademarks

- US PATENTS: 9,927,058 | 9,810,364 | D894,349 | 10,746,339
- CANADIAN PATENT: 3,004,787
- CANADIAN INDUSTRIAL DESIGN: CA 186293
- EUROPEAN PATENT: 3,377,797 B1
- EUROPEAN PATENT [Germany]: 602016051864.3
- EUROPEAN UNION DESIGN REGISTRATION: 00628264-001
- INTERNATIONAL TRADEMARK REGISTRATION: 1550298
- Other US and Foreign Patents Pending

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1. Introduction

USA Industries, Inc. thanks you for choosing GripSafe pipe plugging technology. This manual covers the proper use of this technology to ensure safe operating conditions.



WARNING:

Do not use GripSafe equipment before fully reading and comprehending this manual. Failure to follow this manual in full may result in injury to personnel and damage to equipment.

All necessary sockets, wrenches and lifting device to install this equipment are available for rental or purchase from USA Industries, Inc. (see **Section 4, Table 2** for sockets).

The information in this manual is for the use of a GripSafe plug in metallic piping. If the intended use of this plug is for any piping other than metallic piping, please contact USA Industries, Inc.’s Customer Service Department for technical support.

2. Safety

- ⚠ Failure to follow proper safety requirements may result in the GripSafe plug failing, which could lead to personnel injury, material loss, and/or damage to equipment.
- ⚠ Wear proper Personal Protective Equipment (PPE) when performing any task with the GripSafe plug as defined by site safety rules. Always follow site procedure for safely lifting and operating equipment.
- ⚠ Never install the GripSafe plug in a position where the *Gripping Wedge* would be located over weld droop or ridge.
- ⚠ Never install the *Seals* or *Gripping Wedge* over a section of pipe that is missing its interior wall; i.e. weldolet, tee, etc.
- ⚠ Pressure testing can be a hazardous operation and safety precautions are important. Never stand or pass in front of a test plug during installation, testing, and removal.
- ⚠ Do not make adjustments to the plug, safety equipment, or vessel while the plug is under pressure.
- ⚠ Do not exceed rated pressure stamped on the plug. Plugs are rated for holding pressure in one direction; never apply pressure on the non-rated side of the plug.
- ⚠ Backpressure rating on the references the plugs ultimate holding capacity. Never exceed the pressure capacity of the weakest component in a pressurized system. Study your system's components prior to beginning a pressure test to ascertain and confirm that the maximum test pressure of your system is subjected to is in accordance with all applicable industry and site-specific standards.
- ⚠ We recommend using water as the test medium. Before pressurizing the system, vent all gases from the vessel.
- ⚠ If pneumatic testing, all attempts to limit potential damage to personnel or equipment is critical. USA Industries, Inc. recommends Nitrogen as the medium for pneumatic testing as it does not support combustion. Follow provisions outlined in ASME PCC-2 Repair of Pressure Equipment and Piping when testing pneumatically.
- ⚠ Carefully observe the location of the pipe where the *Wedge Grippers* make contact when performing a hydro test. If you observe any deformation or swelling of the pipe, stop immediately and slowly release the pressure from the system. **Contact USA Industries, Inc. for further assistance.**
- ⚠ If you hear a popping or clicking sound at any time during a hydro test, **STOP IMMEDIATELY** and slowly release the pressure from the system. Popping or clicking sounds during hydro testing may be a sign of the *Wedge Gripper* slipping, cracking, or one of the plug components failing. Remove the plug from the pipe or fitting and inspect for damage. **Contact USA Industries, Inc. for further assistance.**
- ⚠ Make sure the plug is clean of debris and contaminants. Each *Wedge Gripper* should freely slide up and down in its slot with a full range-of-motion, and incur no resistance. If you experience impeded movement due to debris, dirt or contaminants, the plug may not grip the pipe's ID securely, which can cause plug ejection under pressure, potentially leading to injury, death, material loss, and/or damage.
- ⚠ **For any questions or concerns, contact USA Industries, Inc. for technical assistance.**

3. Parts (This manual references the part numbers identified below throughout the document)

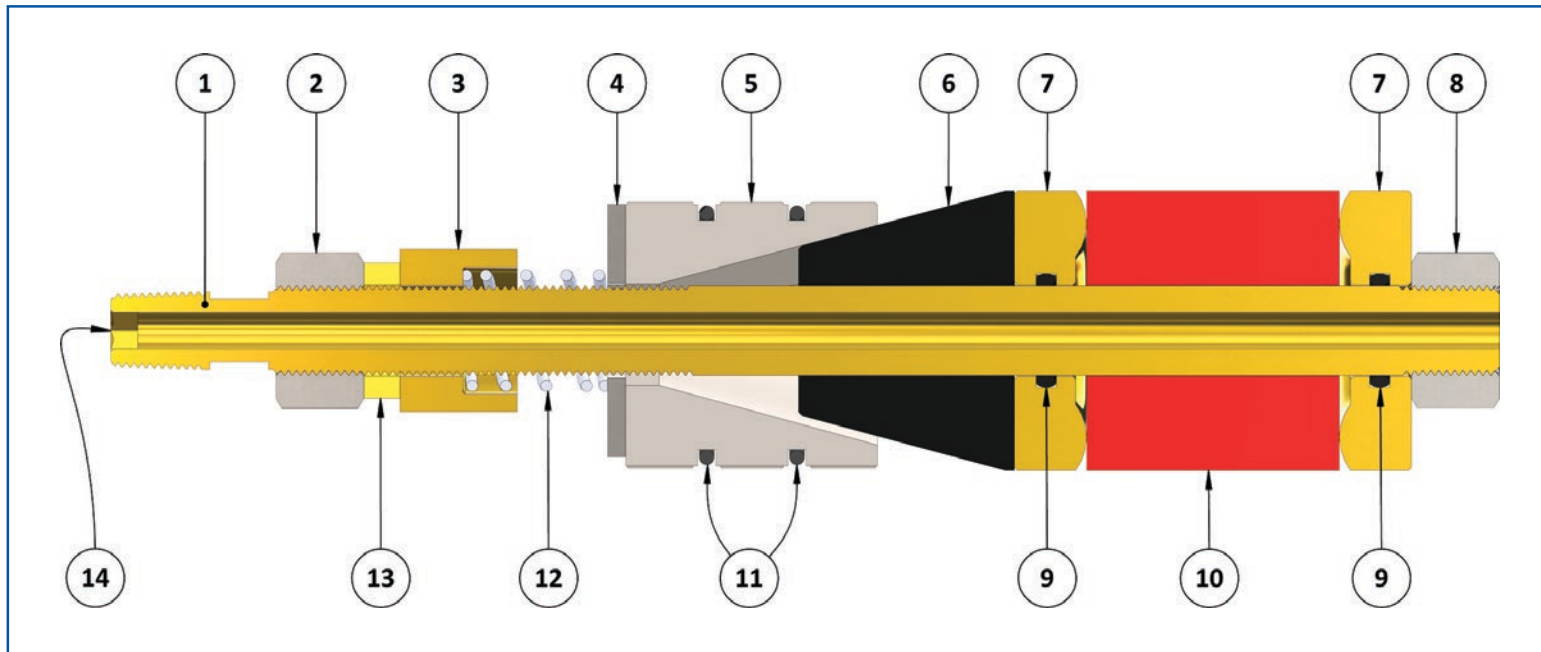


Figure 1: GripSafe ORB Diagram

Table 1: GripSafe Bill of Materials

Nominal Pipe Size (in)	Schedule	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭
		Shaft	Compression Hex Nut	Spring Cup	Wedge Gripper Washer	Wedge Gripper	Wedge Cone	Compression Ring	Rear Hex Nut	Compression Ring O-ring	Seal	Retraction Band	Retraction Spring	Thrust Washer	Vent Port
3/4	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
1	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
1-1/4	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
1-1/2	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
2	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
2-1/2	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
3	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
3-1/2	10	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	40,STD,40S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	80,XS,80S	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
4	120	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	160	1	1	1	1	3	1	2	1	2	1	2	1	1	1
	XXH	1	1	1	1	3	1	2	1	2	1	2	1	1	1

4. Specifications

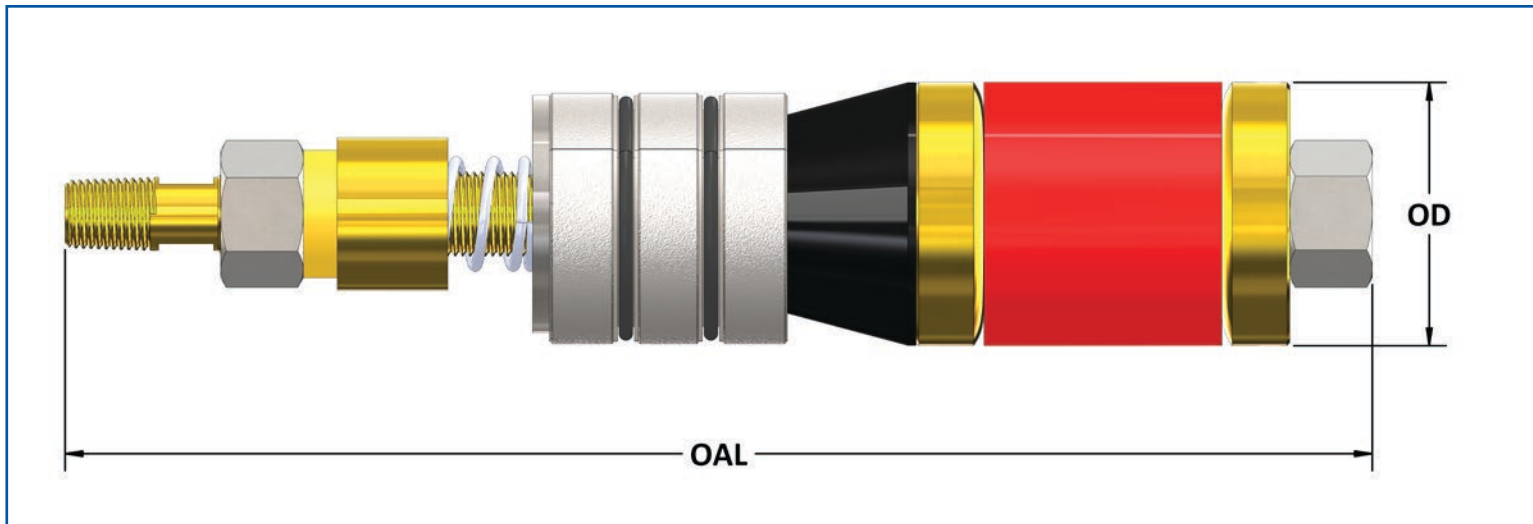


Figure 2: GripSafe ORB Dimensions Diagram

Table 2: GripSafe 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)		Comp. Hex Nut Socket Size (in)	Backup Wrench Size (in)	Back Pressure Vent Thread	Back Pressure Rating (PSI)
								Norm	Max.				
3/4	40,STD,40S	GS-I-S-0075-040	0.79	0.80 - 0.91	0.035	0.3	5.88	3.0	5.0	9/16	1/4 Open End	1/16 MNPT	10000
	80,XS,80S	GS-I-S-0075-080	0.71	0.72 - 0.79	0.035	0.3	5.88	2.0	3.5	9/16	1/4 Open End	1/16 MNPT	10000
1	10	GS-I-S-0100-010	0.99	1.02 - 1.15	0.103	0.5	5.88	5.5	8.5	9/16	1/4 Open End	1/16 MNPT	2825
	40,STD,40S	GS-I-S-0100-040	0.99	1.02 - 1.15	0.055	0.5	5.88	5.5	8.5	9/16	1/4 Open End	1/16 MNPT	10000
	80,XS,80S	GS-I-S-0100-080	0.90	0.92 - 1.04	0.055	0.4	5.88	1.5	7.0	9/16	1/4 Open End	1/16 MNPT	10000
	160	GS-I-S-0100-160	0.78	0.79 - 0.90	0.035	0.3	5.88	3.0	5.0	9/16	1/4 Open End	1/16 MNPT	10000
1-1/4	10	GS-I-S-0125-010	1.31	1.33 - 1.49	0.130	1.8	9.38	10	20	15/16	7/16 Open End	1/4 MNPT	2350
	40,STD,40S	GS-I-S-0125-040	1.31	1.33 - 1.49	0.068	1.8	9.38	10	20	15/16	7/16 Open End	1/4 MNPT	10000
	80,XS,80S	GS-I-S-0125-080	1.21	1.23 - 1.37	0.065	1.7	9.38	10	20	15/16	7/16 Open End	1/4 MNPT	10000
	160	GS-I-S-0125-160	1.11	1.11 - 1.24	0.055	0.6	5.88	7.0	11.0	9/16	1/4 Open End	1/16 MNPT	10000
	XXH	GS-I-S-0125-XXH	0.85	0.87 - 0.99	0.045	0.4	5.88	4.0	6.0	9/16	1/4 Open End	1/16 MNPT	10000
1-1/2	10	GS-I-S-0150-010	1.53	1.56 - 1.73	0.157	2.3	9.38	20	30	15/16	7/16 Open End	1/4 MNPT	2125
	40,STD,40S	GS-I-S-0150-040	1.53	1.56 - 1.73	0.085	2.3	9.38	20	30	15/16	7/16 Open End	1/4 MNPT	10000
	80,XS,80S	GS-I-S-0150-080	1.42	1.45 - 1.62	0.085	2.1	9.38	20	30	15/16	7/16 Open End	1/4 MNPT	10000
	160	GS-I-S-0150-160	1.27	1.30 - 1.45	0.068	1.8	9.38	10	20	15/16	7/16 Open End	1/4 MNPT	10000
	XXH	GS-I-S-0150-XXH	1.05	1.05 - 1.18	0.055	0.5	5.88	6.0	10.0	9/16	1/4 Open End	1/16 MNPT	10000
2	10	GS-I-S-0200-010	1.94	1.97 - 2.25	0.220	3.4	9.38	30	50	15/16	7/16 Open End	1/4 MNPT	1825
	40,STD,40S	GS-I-S-0200-040	1.94	1.97 - 2.25	0.130	3.4	9.38	30	50	15/16	7/16 Open End	1/4 MNPT	10000
	80,XS,80S	GS-I-S-0200-080	1.81	1.84 - 2.09	0.130	3.1	9.38	30	50	15/16	7/16 Open End	1/4 MNPT	10000
	160	GS-I-S-0200-160	1.60	1.59 - 1.78	0.085	2.5	9.38	25	35	15/16	7/16 Open End	1/4 MNPT	10000
	XXH	GS-I-S-0200-XXH	1.42	1.45 - 1.62	0.085	2.1	9.38	15	25	15/16	7/16 Open End	1/4 MNPT	10000
2-1/2	10	GS-I-S-0250-010	2.34	2.38 - 2.69	0.291	9.7	12.88	60	100	1-7/8	1 Box End	3/8 FNPT	1975
	40,STD,40S	GS-I-S-0250-040	2.34	2.38 - 2.69	0.125	9.7	12.88	60	100	1-7/8	1 Box End	3/8 FNPT	8000
	80,XS,80S	GS-I-S-0250-080	2.20	2.24 - 2.41	0.125	9.0	12.88	60	100	1-7/8	1 Box End	3/8 FNPT	8000
	160	GS-I-S-0250-160	2.00	2.06 - 2.22	0.125	8.5	12.88	55	85	1-7/8	1 Box End	3/8 FNPT	8000
	XXH	GS-I-S-0250-XXH	1.69	1.75 - 1.95	0.085	3.0	9.38	25	40	15/16	7/16 Open End	1/4 MNPT	8000
3	10	GS-I-S-0300-010	2.88	2.92 - 3.32	0.385	13.6	12.88	150	200	1-7/8	1 Box End	3/8 FNPT	1725
	40,STD,40S	GS-I-S-0300-040	2.88	2.92 - 3.32	0.193	13.6	12.88	150	200	1-7/8	1 Box End	3/8 FNPT	8000
	80,XS,80S	GS-I-S-0300-080	2.71	2.75 - 3.01	0.190	12.5	12.88	125	175	1-7/8	1 Box End	3/8 FNPT	8000
	160	GS-I-S-0300-160	2.50	2.57 - 2.81	0.125	11.7	12.88	80	140	1-7/8	1 Box End	3/8 FNPT	8000
	XXH	GS-I-S-0300-XXH	2.18	2.24 - 2.41	0.125	9.0	12.88	60	100	1-7/8	1 Box End	3/8 FNPT	8000
3-1/2	10	GS-I-S-0350-010	3.34	3.39 - 3.82	0.416	17.2	12.88	200	325	1-7/8	1 Box End	3/8 FNPT	1575
	40,STD,40S	GS-I-S-0350-040	3.34	3.39 - 3.82	0.204	17.2	12.88	200	325	1-7/8	1 Box End	3/8 FNPT	8000
	80,XS,80S	GS-I-S-0350-080	3.16	3.21 - 3.44	0.208	15.8	12.88	180	290	1-7/8	1 Box End	3/8 FNPT	8000
	XXH	GS-I-S-0350-XXH	2.60	2.68 - 2.90	0.125	12.1	12.88	115	165	1-7/8	1 Box End	3/8 FNPT	8000
4	120	GS-I-S-0400-120	3.42	3.52 - 3.72	0.205	17.8	12.88	220	340	1-7/8	1 Box End	3/8 FNPT	8000
	160	GS-I-S-0400-160	3.23	3.33 - 3.53	0.205	17.2	12.88	200	300	1-7/8	1 Box End	3/8 FNPT	8000
	XXH	GS-I-S-0400-XXH	2.95	3.01 - 3.20	0.205	15.6	12.88	155	245	1-7/8	1 Box End	3/8 FNPT	8000

5. Preparing the GripSafe ORB Plug for Installation

- 5.1 The GripSafe ORB plug should be in the relaxed position from the factory. There are two methods of insertion of the plug.

Method 1: Auto-Locking, the preferred method, allows the *Wedges* ⑤ to immediately conform and engage to the pipe ID, ensuring the plug is immediately incapable of being pushed out of the pipe, i.e., in the event of accidental discharge of pressure when the *Wedges* ⑤ are fully inserted into the pipe.

Method 2: Free Insertion is used when the plug is met with an obstruction in the pipe that is not allowing free entry of the plug into the pipe, i.e., weld droop or other pipe interior discontinuity.

5.2 Method 1: Auto-Locking for immediate gripping upon insertion

- Expand the *Wedge Grippers* ⑤ to the end of the *Wedge Cone* ⑥ by advancing the *Compression Hex Nut* ② (see **Figure 3**). At this point, the *Wedge Grippers* ⑤ expanded outside diameter will be larger than the ID of the pipe.
- The plug is ready to be installed, continue to **Section 6**.

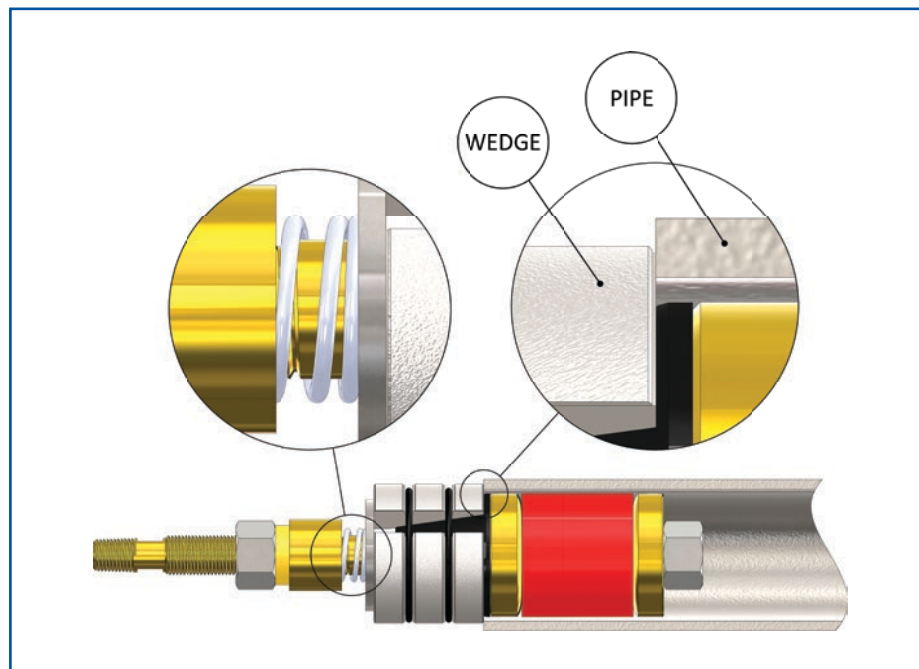


Figure 3: Immediate Gripping Upon Insertion

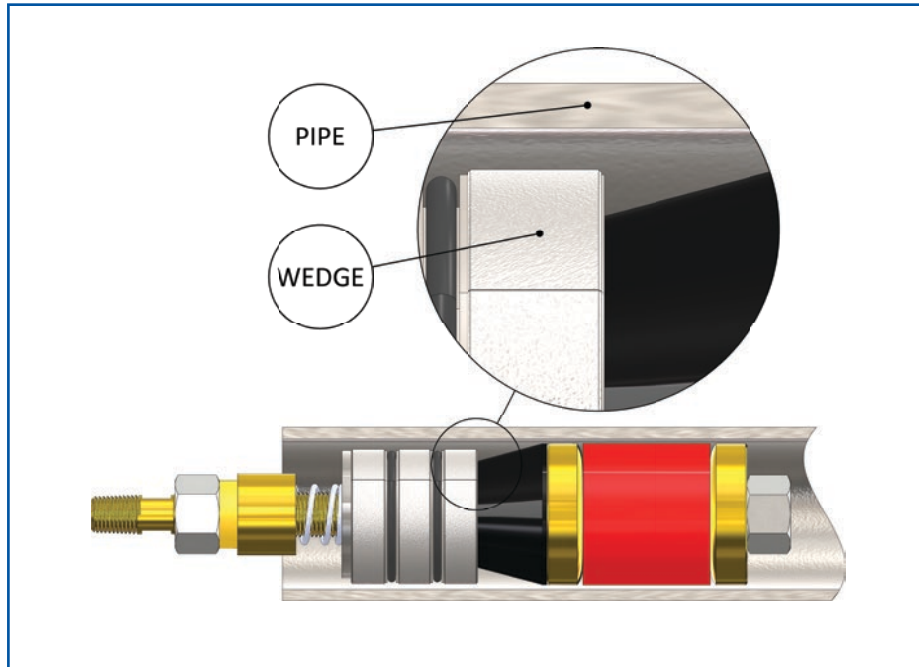


Figure 4: No Immediate Gripping Upon Insertion

5.3 Method 2: Free Insertion for free entry into the pipe or fitting

- Ensure the plug is in the relaxed position (see **Figure 4**).
- The *Compression Hex Nut* ② should not be tight.
- The *Wedge Grippers* ⑤ should be fully retracted under the bodyline of the plug OD and should fit inside the pipe (see **Figure 4**).
- The plug is ready to be installed, continue to **Section 6**.

6. Installing the GripSafe ORB Plug



CAUTION: Ensure pipe I.D. is clean, and loose debris is removed to the deepest point the plug will be installed into. If the pipe is lined or has an irremovable product, **STOP** and **contact USA Industries, Inc. for support before proceeding**. Failure to do so may impede the wedges ability to grip and cause the plug to eject under pressure. Be sure to wear proper PPE and follow all site guidelines.

TEMPERATURE NOTE:



If welding is to occur while the plug is inside the pipe, then the *Top Compression Ring* (7) must be at least 12 inches into the pipe beyond the location that the welding is to occur. USA Industries, Inc.'s *Urethane Seals (Tri-Ply™)* can withstand 225° Fahrenheit for short durations. If high temperature seals are needed **contact USA Industries, Inc. for alternative sealing solutions.**

6.1 Method 1: Auto-Locking (see Section 5, Step 5.2) – immediate gripping upon insertion installation

- See *Table 2* for clearance requirements, and to ensure the pipe ID falls within the **Internal Diameter Range**.
- Slowly push the plug into the pipe; the *Compression Spring* (12) (see **Figure 3**) will compress into the *Spring Cup* (3) and will allow the *Wedge Grippers* (5) to retract forward, decreasing its expanded outside diameter until they match the ID of the pipe.
- Once the *Wedge Grippers* (5) contact the ID of the pipe they will automatically grip; removal of the plug at this point is not possible. See **Section 8** for plug removal if necessary.
- A slight rocking motion may assist installation.
- Insert plug to the desired depth. The *Wedge Gripper Washer* (4) must be inserted flush with the pipe or fitting face at a minimum.
- If insertion into the pipe proves problematic in this orientation use *Method 2*.
- Continue to **Step 6.3**.

6.2 Method 2 (see Section 5, Step 5.3) – Free entry into a pipe or fitting installation



Caution: In this orientation, it is important to note that the plug will not immediately grip the pipe upon insertion. Only after tightening the *Compression Hex Nut* (2) to advance the *Wedge Grippers* (5) will the plug engage the pipe ID and be able to withstand backpressure.

- See *Table 2* for clearance requirements, and to ensure the pipe ID falls within the **Internal Diameter Range**.
- Insert plug to the desired depth. *The Wedge Gripper Washer* (4) must be inserted flush with the pipe or fitting face at a minimum.
- Continue to **Step 6.3**.

6.3 Tighten the *Compression Hex Nut* (2)

- Use a crow's foot attached to a torque wrench to turn the *Compression Hex Nut* (2) while holding the backup hex or wrench flats on the *Shaft* (1), stationary with a mechanic's end wrench.
- If the *Compression Hex Nut* (2) is inside the fitting or pipe, and if the *Shaft* (1) cannot be held stationary, use an impact wrench with the appropriate socket (see *Table 2*) to tighten the *Compression Hex Nut* (2).
- Continue tightening until the **Minimum Compression Torque** (see *Table 2*) is met.



Caution: When using an impact wrench, care must be taken not to over tighten the *Compression Hex Nut* (2) which could lead to galling of the *Shaft's* (1) threads or seal over extrusion.

6.4 Verify integrity of the Seal (10).

- If the plug is being used for pressure testing, use proper fittings to install a hydro test pump to the *Backpressure Vent Port* (14); otherwise, install a cap to seal off the system or a backpressure monitoring tee.
- Increase pressure to 20% of target pressure or 100 psig, whichever is less. Observe Seal (10) integrity by visually inspecting for leaks. Observance of pressure drop may not be an indication of leakage. USA Industries seals will creep under pressure until they are fully seated. This creep will increase the pressure test volume. Depending on the test volume size, this may be by such a trivial amount it will not be seen on a gauge. For relatively small test volumes, a noticeable, gradual loss in pressure may be observed during this creep phase. Seating the Seal (10) is obtained by reapplying pressure until the pressure becomes stable. This seal creep may also be observed when the system is subjected to the full pressure. Resolution to the creep is the same at high pressure and while verifying integrity.

6.5 The GripSafe ORB plug is now safely installed to accept rated hydro test and backpressure pressures.

- It may be desirable to attach a gauge and vent hose assembly, backpressure monitoring tee to the *Backpressure Vent Port* (14) to bleed off any backpressure. The hose should be long enough to redirect any vapor coming out of the vessel to a safe location away from personnel that may be in the area. A valve can be attached to this port to allow safe backpressure removal during plug removal (see Section 7). If using a backpressure monitoring tee, it may be useful to have a pressure gauge on the branch side of the tee while connecting the run side to the *Backpressure Vent Port* (14) and a ball valve. Further advantages can be made by attaching a hose to the ball valve on the backpressure monitoring tee and running the hose to a safe location away from personnel that may be in the area.



CAUTION: Fast flowing gases or liquids through hosing can cause hose whip. Take caution to avoid this, as failure to do so may result in injury and/or equipment damage.



CAUTION: Do not stand directly in front of the GripSafe ORB plug at any time. Installed plugs should always be treated in this manner irrespective of if the plug has backpressure or not.



CAUTION: If backpressure develops, constant observation of pressure is necessary to ensure safety to personnel and equipment using the attached gauge and physical observation of pipe integrity. Any bulging, enlargement, or tapering of the pipe is an indication of over pressuring. The backpressure rating listed in Table 2 is for the pressure holding capability of the GripSafe ORB plug and could be well beyond the systems design limitations that it is being used to test.

7. GripSafe ORB Plug Removal

- 7.1 Depressurize system using the pressure bleed-off valve on the hydro test pump or the valve on the backpressure monitoring tee and drain all water.
- 7.2 Ensure there is no backpressure on the GripSafe ORB plug.



CAUTION: SLOWLY open the *Vent Port* (14) to relieve backpressure. Care must be taken when opening valves or loosening fittings if any inadvertent backpressure was introduced to the vessel. Failure to do so may result in hazardous pressure flow and/or fittings becoming hazardous projectiles that can damage equipment and/or personnel. If utilizing a backpressure monitoring tee, fast flowing gases or liquids through hosing can cause hose whip. Take caution to avoid this; failure to do so may also result in injury to personnel or equipment.

7.3 Loosen the *Compression Hex Nut* (2).

- Once the *Seal* (10) has broken free from the pipe ID, water may flow out from the pipe. Be prepared to capture this if desired. Continue loosening the *Compression Hex Nut* (2) until the wedges are fully relaxed.



NOTE: Do not remove the *Compression Nut* (2) from the *Shaft* (1). If this happens, immediately reinstall the component.

7.4 Remove the GripSafe ORB plug from the pipe.

- Completely back the *Compression Hex Nut* (2) up to the end of the threads. This will allow the *Wedge Grippers* (5) to fully retract and ensure the *Retraction Bands* (11) do not become permanently set in shape to the extended position, rendering them incapable of retracting the *Wedge Grippers* (5) in the relaxed state.
- Clean and store for later use or return to USA Industries, Inc.
- Store away from direct sunlight, and in an area not exposed to above 150°F UV. Excessive heat will cause *Seal* (10) degradation over time.
- The *Wedge Gripper* (5) gripping texture (*Gritlock*™) may become packed with pipe scale and rust over time from several uses of the plug. Inspection of *Gritlock* after use is necessary to ensure the gripping strength of the *Gripping Wedges* remains at peak performance. To clean, simply use a mild dishwashing soap and a stiff stainless steel bristled brush, such as a welding brush. If pipe scale is persistent, use of a household rust remover along with a stiff, stainless steel bristled brush should be sufficient. Rinse plug thoroughly with tap water to remove residual chemicals and dry thoroughly.



GripSafe is a registered trademark of USA Industries, Inc.