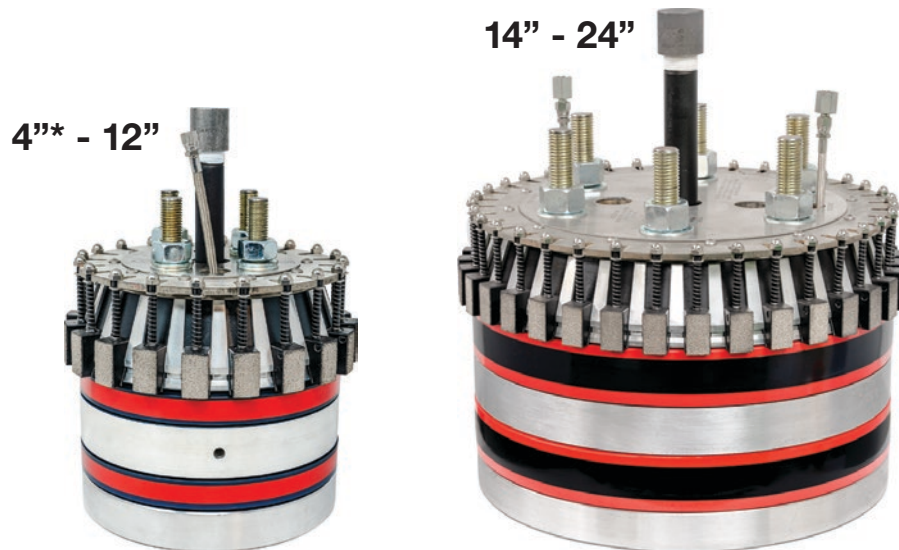




GRIPSAFE[®] ST

OPERATING MANUAL



Large Double Block and Bleed (DBB) Plug

4\"

*For all Schedules other than 120, 160 and XXH. Those Schedules use the Small Double Block & Bleed Plug Size ** Larger Sizes Available Upon Request.

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

For patent and trademark information, go to:
<https://www.USAIindustries.com/gripsafe-patents-trademarks>

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1. Introduction

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



WARNING: Do not use GripSafe ST 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 See **Section 4, Table 2** for sockets and **Section 8, Table 3** for lifting device.

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

2. Safety

- ⚠ Failure to follow proper safety requirements may result in the GripSafe ST 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 ST plug as defined by site safety rules. Always follow site procedure for safely lifting and operating equipment.
- ⚠ Never install the GripSafe ST 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.
- ⚠ Use care in the handling of the *Wedge Studs*. Never beat, hammer, or pry on the *Wedge Studs*, and never remove the nut located on the *Wedge Studs*.
- ⚠ 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.
- ⚠ Maximum plug back pressure rating 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 your system is subjected to with the use of the GripSafe ST plug adheres to the limits given by *Table 3*, and 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 performing pneumatic testing, all attempts to limit potential damage to personnel or equipment is critical. USA Industries 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.
- ⚠ For Maximum Allowable Pressures refer to *Table 3*; DO NOT EXCEED the pressure ratings identified in this the table when pressurizing the system. Carefully observe the outside of the pipe at the location 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 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 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 for technical assistance.**

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

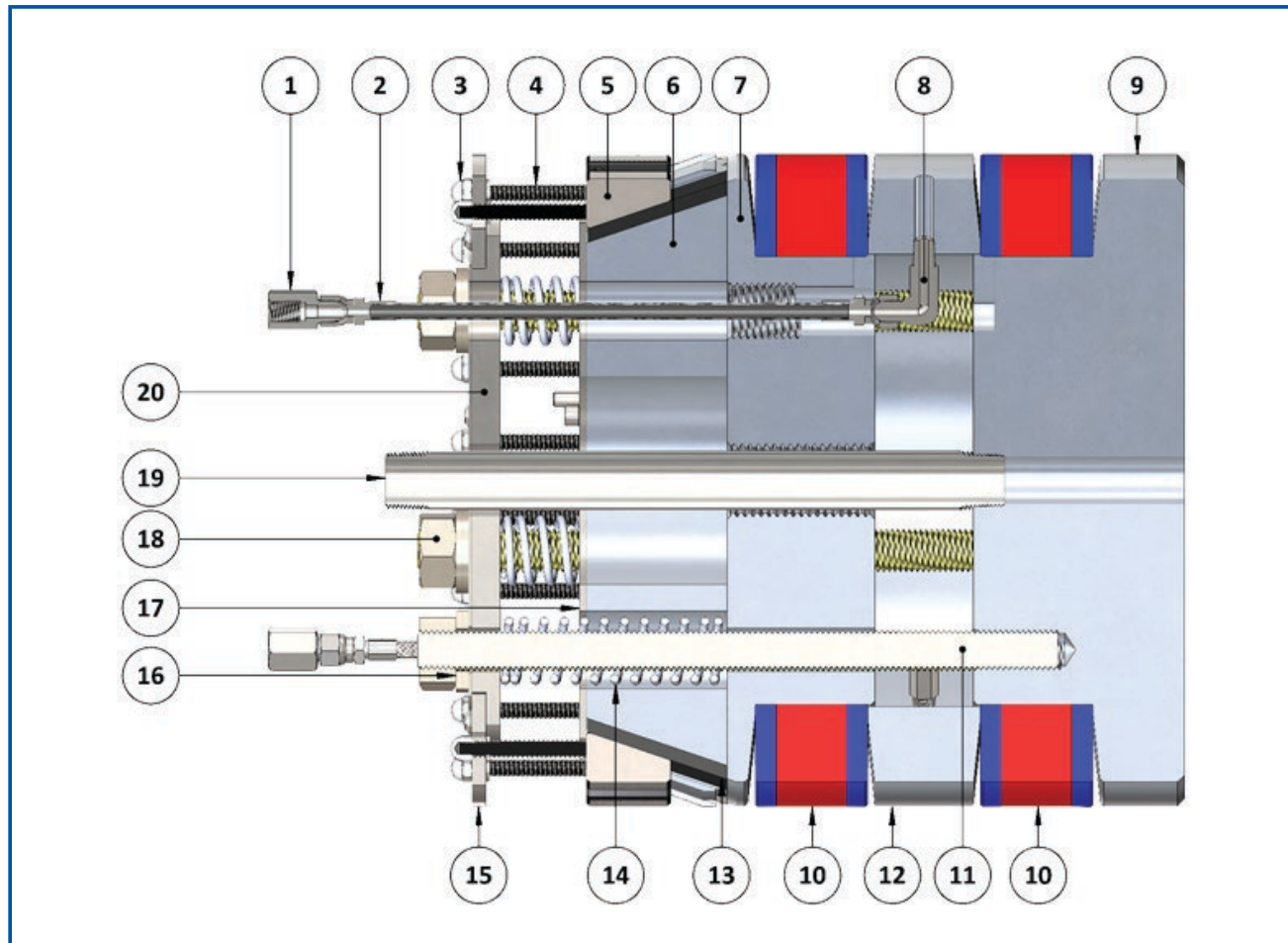


Figure 1: GripSafe ST DBB Diagram



Table 1: GripSafe ST Bill of Materials

Nominal Pipe Size (in)	Schedule	① MJIC-FNPT Adapter	② Vent Hose	③ Wedge Gripper Nut	④ Wedge Gripper Stem	⑤ Wedge Gripper	⑥ Wedge Cone	⑦ Top Compression Plate	⑧ MNPT-MJIC Elbow Fitting	⑨ Bottom Compression Plate	⑩ Seal	⑪ All-Thread Shaft	⑫ Middle Plate	⑬ Back Plate	⑭ Retraction Compression Spring	⑮ Spring Plate Halo	⑯ Compression Washer Assembly	⑰ Retainer Plate	⑱ Compression Hex Nut	⑲ Back Pressure Vent Port	⑳ Spring Plate Hub
6	10S-80S	2	2	9	9	9	1	1	2	1	2	4	1	9	1	0	8	1	4	1	1
	120	2	2	8	8	8	1	1	2	1	2	4	1	8	1	0	8	1	4	1	1
	160	2	2	7	7	7	1	1	2	1	2	4	1	7	1	0	8	1	4	1	1
	XXH	2	2	6	6	6	1	1	2	1	2	4	1	6	1	0	8	1	4	1	1
8	10S-80S	2	2	15	15	15	1	1	2	1	2	4	1	15	1	0	8	1	4	1	1
	100	2	2	14	14	14	1	1	2	1	2	4	1	14	1	0	8	1	4	1	1
	120-140	2	2	13	13	13	1	1	2	1	2	4	1	13	1	0	8	1	4	1	1
	160-XXH	2	2	12	12	12	1	1	2	1	2	4	1	12	1	0	8	1	4	1	1
10	10S-100	2	2	20	20	20	1	1	2	1	2	4	1	20	4	1	8	1	4	1	1
	120	2	2	19	19	19	1	1	2	1	2	4	1	19	1	0	8	1	4	1	1
	140-XXH	2	2	18	18	18	1	1	2	1	2	4	1	18	1	0	8	1	4	1	1
	160	2	2	17	17	17	1	1	2	1	2	4	1	17	1	0	8	1	4	1	1
12	10S-80S	2	2	24	24	24	1	1	2	1	2	4	1	24	4	1	8	1	4	1	1
	60-80	2	2	25	25	25	1	1	2	1	2	4	1	25	4	1	8	1	4	1	1
	100	2	2	24	24	24	1	1	2	1	2	4	1	24	4	1	8	1	4	1	1
	120-XXH	2	2	23	23	23	1	1	2	1	2	4	1	23	4	1	8	1	4	1	1
	140	2	2	22	22	22	1	1	2	1	2	4	1	22	4	1	8	1	4	1	1
14	160	2	2	21	21	21	1	1	2	1	2	4	1	21	4	1	8	1	4	1	1
	10S-80S	2	2	24	24	24	1	1	2	1	2	6	1	24	6	1	12	1	6	1	1
	60-100	2	2	27	27	27	1	1	2	1	2	6	1	27	6	1	12	1	6	1	1
	120	2	2	26	26	26	1	1	2	1	2	6	1	26	6	1	12	1	6	1	1
	140	2	2	25	25	25	1	1	2	1	2	6	1	25	6	1	12	1	6	1	1
16	160	2	2	24	24	24	1	1	2	1	2	6	1	24	6	1	12	1	6	1	1
	10S-80	2	2	32	32	32	1	1	2	1	2	6	1	32	6	1	12	1	6	1	1
	100	2	2	31	31	31	1	1	2	1	2	6	1	31	6	1	12	1	6	1	1
	120	2	2	30	30	30	1	1	2	1	2	6	1	30	6	1	12	1	6	1	1
	140	2	2	29	29	29	1	1	2	1	2	6	1	29	6	1	12	1	6	1	1
18	160	2	2	28	28	28	1	1	2	1	2	6	1	28	6	1	12	1	6	1	1
	10S-80S	2	2	36	36	36	1	1	2	1	2	6	1	36	6	1	12	1	6	1	1
	40-60	2	2	38	38	38	1	1	2	1	2	6	1	38	6	1	12	1	6	1	1
	80	2	2	37	37	37	1	1	2	1	2	6	1	37	6	1	12	1	6	1	1
	100	2	2	36	36	36	1	1	2	1	2	6	1	36	6	1	12	1	6	1	1
	120	2	2	35	35	35	1	1	2	1	2	6	1	35	6	1	12	1	6	1	1
	140	2	2	34	34	34	1	1	2	1	2	6	1	34	6	1	12	1	6	1	1
	160	2	2	33	33	33	1	1	2	1	2	6	1	33	6	1	12	1	6	1	1



Table 1: GripSafe ST Bill of Materials Continued

Nominal Pipe Size (in)	Schedule	① MJIC-FNPT Adapter	② Vent Hose	③ Wedge Gripper Nut	④ Wedge Gripper Stem	⑤ Wedge Gripper	⑥ Wedge Cone	⑦ Top Compression Plate	⑧ MNPT-MJIC Elbow Fitting	⑨ Bottom Compression Plate	⑩ Seal	⑪ All-Thread Shaft	⑫ Middle Plate	⑬ Back Plate	⑭ Retraction Compression Spring	⑮ Spring Plate Halo	⑯ Compression Washer	⑰ Retainer Plate	⑱ Compression Hex Nut	⑲ Back Pressure Vent Port	⑳ Spring Plate Hub
20	10S-80S	2	2	40	40	40	1	1	2	1	2	8	1	40	8	1	16	1	8	1	1
	40	2	2	44	44	44	1	1	2	1	2	8	1	44	8	1	16	1	8	1	1
	60	2	2	43	43	43	1	1	2	1	2	8	1	43	8	1	16	1	8	1	1
	80	2	2	42	42	42	1	1	2	1	2	8	1	42	8	1	16	1	8	1	1
	100	2	2	41	41	41	1	1	2	1	2	8	1	41	8	1	16	1	8	1	1
	120	2	2	40	40	40	1	1	2	1	2	8	1	40	8	1	16	1	8	1	1
	140	2	2	38	38	38	1	1	2	1	2	8	1	38	8	1	16	1	8	1	1
24	160	2	2	37	37	37	1	1	2	1	2	8	1	37	8	1	16	1	8	1	1
	10S-80S	2	2	48	48	48	1	1	2	1	2	8	1	48	8	1	16	1	8	1	1
	30	2	2	55	55	55	1	1	2	1	2	8	1	55	8	1	16	1	8	1	1
	40	2	2	54	54	54	1	1	2	1	2	8	1	54	8	1	16	1	8	1	1
	60	2	2	53	53	53	1	1	2	1	2	8	1	53	8	1	16	1	8	1	1
	80	2	2	52	52	52	1	1	2	1	2	8	1	52	8	1	16	1	8	1	1
	100	2	2	50	50	50	1	1	2	1	2	8	1	50	8	1	16	1	8	1	1
	120	2	2	48	48	48	1	1	2	1	2	8	1	48	8	1	16	1	8	1	1
	140	2	2	47	47	47	1	1	2	1	2	8	1	47	8	1	16	1	8	1	1
	160	2	2	46	46	46	1	1	2	1	2	8	1	46	8	1	16	1	8	1	1

4. Specifications

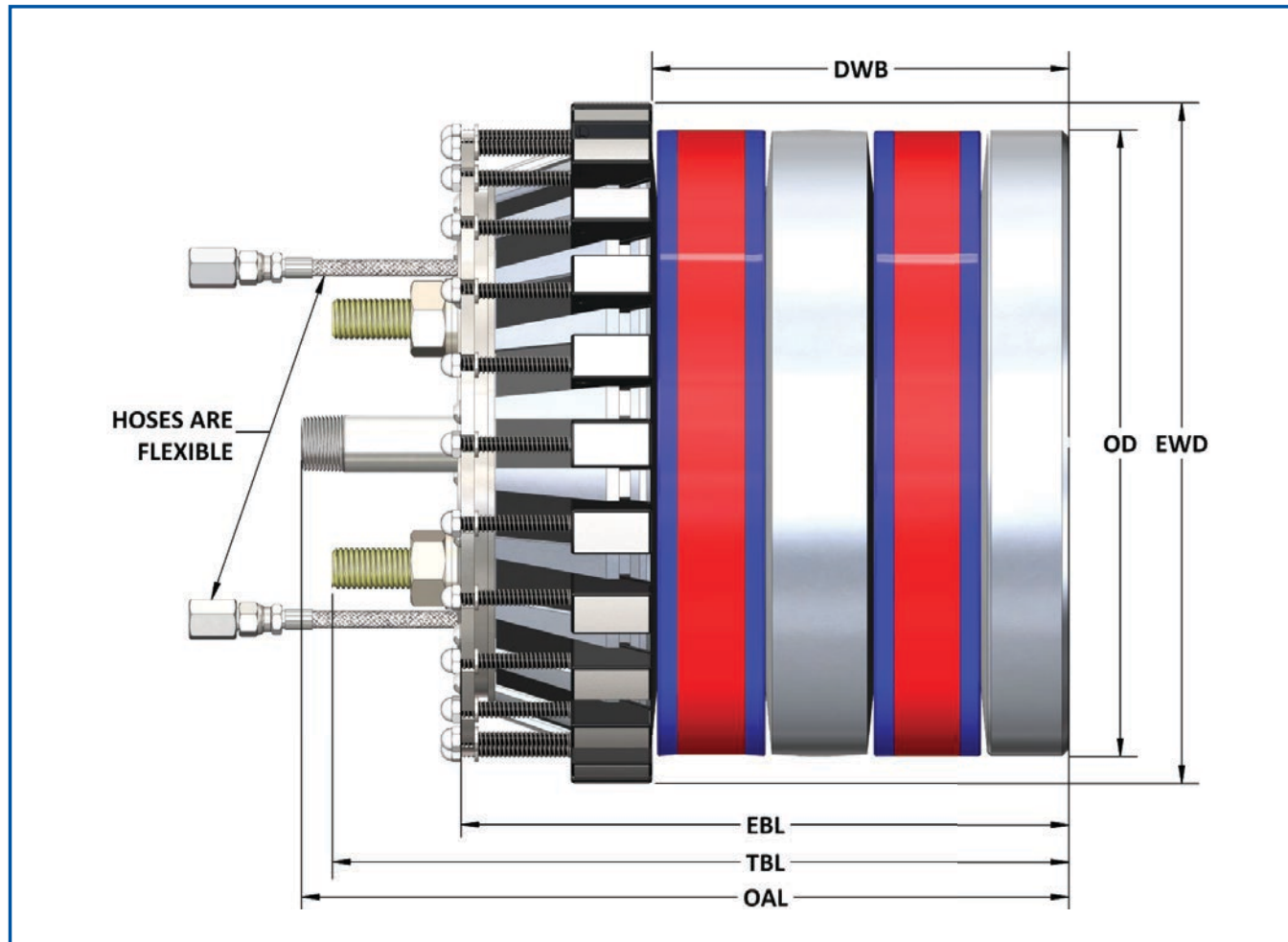


Figure 2: GripSafe ST DBB Dimensions Diagram



Table 2: GripSafe ST DBB 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)	Fill & Vent Port Thread	Back Pressure Vent Thread	MAX Plug Back Pressure Rating (PSI)	Between the Seal Test Pressure (PSI)
								Norm	Max.					
6	10,10S	GS-D-S-0600-010	5.98	6.044 - 6.422	0.375	32	11.25	85	130	1-1/16"	1/4" FNPT	1/4" MNPT	3300	2500
	40,STD,40S	GS-D-S-0600-040	5.69	5.752 - 6.129	0.375	31	11.25	75	110	1-1/16"	1/4" FNPT	1/4" MNPT	3600	2500
	80,XS,80S	GS-D-S-0600-080	5.39	5.448 - 5.823	0.375	28	11.25	60	95	1-1/16"	1/4" FNPT	1/4" MNPT	4000	2500
	120	GS-D-S-0600-120	5.13	5.188 - 5.562	0.375	26	11.25	55	80	1-1/16"	1/4" FNPT	1/4" MNPT	3900	2500
	160	GS-D-S-0600-160	4.81	4.874 - 5.246	0.375	24	11.25	50	75	3/4"	1/4" FNPT	1/4" MNPT	3850	2500
8	XXH	GS-D-S-0600-XXH	4.52	4.584 - 4.955	0.375	22	11.25	50	75	3/4"	1/4" FNPT	1/4" MNPT	3700	2500
	10,10S	GS-D-S-0800-010	7.95	8.016 - 8.404	0.375	58	13.22	190	270	1-1/4"	1/4" FNPT	1/2" MNPT	3200	2500
	20	GS-D-S-0800-020	7.75	7.812 - 8.199	0.375	58	13.22	175	265	1-1/4"	1/4" FNPT	1/2" MNPT	3350	2500
	30	GS-D-S-0800-030	7.70	7.758 - 8.145	0.375	56	13.22	170	260	1-1/4"	1/4" FNPT	1/2" MNPT	3400	2500
	40,STD,40S	GS-D-S-0800-040	7.61	7.668 - 8.054	0.375	54	13.22	165	250	1-1/4"	1/4" FNPT	1/2" MNPT	3475	2500
	60	GS-D-S-0800-060	7.44	7.500 - 7.885	0.375	52	13.22	155	235	1-1/4"	1/4" FNPT	1/2" MNPT	3625	2500
	80,XS,80S	GS-D-S-0800-080	7.25	7.312 - 7.696	0.375	50	13.22	140	215	1-1/4"	1/4" FNPT	1/2" MNPT	3800	2500
	100	GS-D-S-0800-100	7.06	7.124 - 7.507	0.375	45	13.22	105	160	1-1/4"	1/4" FNPT	1/2" MNPT	3725	2500
	120	GS-D-S-0800-120	6.81	6.874 - 7.256	0.375	43	13.22	100	155	1-1/4"	1/4" FNPT	1/2" MNPT	3725	2500
10	140	GS-D-S-0800-140	6.63	6.688 - 7.069	0.375	42	13.22	95	150	1-1/16"	1/4" FNPT	1/4" MNPT	3925	2500
	160	GS-D-S-0800-160	6.44	6.500 - 6.880	0.375	40	13.22	95	145	1-1/16"	1/4" FNPT	1/4" MNPT	3825	2500
	XXH	GS-D-S-0800-XXH	6.50	6.562 - 6.943	0.375	40	13.22	95	145	1-1/16"	1/4" FNPT	1/4" MNPT	3750	2500
	10,10S	GS-D-S-1000-010	10.05	10.107 - 10.505	0.375	88	13.20	235	270	1-1/4"	1/4" FNPT	3/4" MNPT	2725	2500
	20	GS-D-S-1000-020	9.88	9.937 - 10.335	0.375	88	13.20	235	270	1-1/4"	1/4" FNPT	3/4" MNPT	2800	2500
	30	GS-D-S-1000-030	9.76	9.823 - 10.220	0.375	86	13.20	225	270	1-1/4"	1/4" FNPT	3/4" MNPT	2875	2500
	40,STD,40S	GS-D-S-1000-040	9.65	9.707 - 10.103	0.375	86	13.20	215	270	1-1/4"	1/4" FNPT	3/4" MNPT	2950	2500
	60,XS,80S	GS-D-S-1000-08S	9.38	9.437 - 9.832	0.375	78	13.20	195	270	1-1/4"	1/4" FNPT	3/4" MNPT	3100	2500
	80	GS-D-S-1000-080	9.19	9.249 - 9.643	0.375	76	13.20	140	215	1-1/4"	1/4" FNPT	3/4" MNPT	3225	2500
12	100	GS-D-S-1000-100	8.94	8.999 - 9.392	0.375	76	13.20	135	210	1-1/4"	1/4" FNPT	3/4" MNPT	3400	2500
	120	GS-D-S-1000-120	8.69	8.749 - 9.141	0.375	74	13.20	135	205	1-1/4"	1/4" FNPT	1/2" MNPT	3425	2500
	140,XXH	GS-D-S-1000-140	8.38	8.437 - 8.827	0.375	72	13.20	130	195	1-1/4"	1/4" FNPT	1/2" MNPT	3475	2500
	160	GS-D-S-1000-160	8.13	8.187 - 8.576	0.375	70	13.20	125	190	1-1/4"	1/4" FNPT	1/2" MNPT	3475	2500
	10,10S	GS-D-S-1200-010	12.02	12.077 - 12.485	0.375	116	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2300	2500
	20	GS-D-S-1200-020	11.88	11.937 - 12.345	0.375	118	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2375	2500
	30	GS-D-S-1200-030	11.72	11.777 - 12.184	0.375	118	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2425	2500
	STD,40S	GS-D-S-1200-04S	11.63	11.687 - 12.093	0.375	122	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2475	2500
	40	GS-D-S-1200-040	11.56	11.625 - 12.031	0.375	122	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2500	2500
14	XS,80S	GS-D-S-1200-08S	11.38	11.437 - 11.842	0.375	124	13.20	200	270	1-1/4"	1/4" FNPT	3/4" MNPT	2575	2500
	60	GS-D-S-1200-060	11.25	11.313 - 11.717	0.375	128	13.20	175	270	1-1/4"	1/4" FNPT	3/4" MNPT	2725	2500
	80	GS-D-S-1200-080	11.00	11.061 - 11.464	0.375	128	13.20	175	265	1-1/4"	1/4" FNPT	3/4" MNPT	2850	2500
	100	GS-D-S-1200-100	10.69	10.749 - 11.151	0.375	132	13.20	170	255	1-1/4"	1/4" FNPT	3/4" MNPT	2900	2500
	120,XXH	GS-D-S-1200-120	10.38	10.437 - 10.837	0.375	132	13.20	160	250	1-1/4"	1/4" FNPT	3/4" MNPT	2950	2500
	140	GS-D-S-1200-140	10.13	10.187 - 10.586	0.375	134	13.20	160	240	1-1/4"	1/4" FNPT	3/4" MNPT	2950	2500
	160	GS-D-S-1200-160	9.75	9.813 - 10.210	0.375	134	13.20	150	230	1-1/4"	1/4" FNPT	3/4" MNPT	3025	2500
	10S	GS-D-S-1400-01S	13.25	13.311 - 13.725	0.375	155	15.12	270	413	1-5/8"	1/4" FNPT	1" MNPT	1925	2500
	10	GS-D-S-1400-010	13.13	13.187 - 13.601	0.375	152	15.12	265	405	1-5/8"	1/4" FNPT	1" MNPT	1950	2500
16	20	GS-D-S-1400-020	13.00	13.063 - 13.476	0.375	152	15.12	250	380	1-5/8"	1/4" FNPT	1" MNPT	1975	2500
	30,STD,40S	GS-D-S-1400-04S	12.88	12.937 - 13.333	0.375	147	15.12	235	360	1-5/8"	1/4" FNPT	1" MNPT	2025	2500
	40	GS-D-S-1400-040	12.75	12.811 - 13.223	0.375	147	15.12	220	335	1-5/8"	1/4" FNPT	1" MNPT	2050	2500
	XS,80S	GS-D-S-1400-08S	12.63	12.687 - 13.098	0.375	144	15.12	205	315	1-5/8"	1/4" FNPT	1" MNPT	2100	2500
	60	GS-D-S-1400-060	12.44	12.499 - 12.909	0.375	144	15.12	210	325	1-5/8"	1/4" FNPT	1" MNPT	2425	2500
	80	GS-D-S-1400-080	12.13	12.187 - 12.596	0.375	140	15.12	205	315	1-5/8"	1/4" FNPT	1" MNPT	2550	2500
	100	GS-D-S-1400-100	11.75	11.811 - 12.218	0.375	140	15.12	200	305	1-5/8"	1/4" FNPT	1" MNPT	2725	2500
	120	GS-D-S-1400-120	11.44	11.499 - 11.904	0.375	140	15.12	195	295	1-5/8"	1/4" FNPT	1" MNPT	2750	2500
	140	GS-D-S-1400-140	11.13	11.187 - 11.591	0.375	135	15.12	185	285	1-5/8"	1/4" FNPT	1" MNPT	2800	2500
18	160	GS-D-S-1400-160	10.81	10.875 - 11.277	0.375	135	15.12	180	275	1-5/8"	1/4" FNPT	1" MNPT	2825	2500

• Larger sizes and custom configurations available upon request. Smaller sizes release date pending.

* NPS 6-24 TOOL OD MUST BE WITHIN 1/8" CONCENTRICITY TO THE PIPE ID.

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

• DATA IS SUBJECT TO CHANGE. Consult manufacturer to verify that this document is the latest release.



Table 2: GripSafe ST DBB Specifications Continued

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)	Fill & Vent Port Thread	Back Pressure Vent Thread	MAX Plug Back Pressure Rating (PSI)	Between the Seal Test Pressure (PSI)
								Norm	Max.					
16	10S	GS-D-S-1600-01S	15.25	15.311 - 15.735	0.375	212	15.12	265	420	1-5/8"	1/4" FNPT	1" MNPT	1950	2500
	10	GS-D-S-1600-010	15.13	15.187 - 15.611	0.375	210	15.12	255	395	1-5/8"	1/4" FNPT	1" MNPT	1975	2500
	20	GS-D-S-1600-020	15.00	15.063 - 15.486	0.375	206	15.12	245	370	1-5/8"	1/4" FNPT	1" MNPT	2000	2500
	30,STD,40S	GS-D-S-1600-04S	14.88	14.937 - 15.360	0.375	199	15.12	230	350	1-5/8"	1/4" FNPT	1" MNPT	2025	2500
	40,XS,80S	GS-D-S-1600-08S	14.63	14.687 - 15.108	0.375	192	15.12	200	305	1-5/8"	1/4" FNPT	1" MNPT	2100	2500
	60	GS-D-S-1600-060	14.31	14.375 - 14.795	0.375	192	15.12	205	315	1-5/8"	1/4" FNPT	1" MNPT	2200	2500
	80	GS-D-S-1600-080	14.00	14.063 - 14.481	0.375	188	15.12	200	305	1-5/8"	1/4" FNPT	1" MNPT	2300	2500
	100	GS-D-S-1600-100	13.56	13.625 - 14.041	0.375	188	15.12	195	295	1-5/8"	1/4" FNPT	1" MNPT	2350	2500
	120	GS-D-S-1600-120	13.19	13.249 - 13.663	0.375	182	15.12	185	285	1-5/8"	1/4" FNPT	1" MNPT	2400	2500
	140	GS-D-S-1600-140	12.75	12.811 - 13.223	0.375	182	15.12	180	275	1-5/8"	1/4" FNPT	1" MNPT	2500	2500
18	160	GS-D-S-1600-160	12.44	12.499 - 12.909	0.375	178	15.12	175	270	1-5/8"	1/4" FNPT	1" MNPT	2525	2500
	10S	GS-D-S-1800-01S	17.25	17.311 - 17.745	0.375	270	15.12	395	605	1-5/8"	1/4" FNPT	1" MNPT	1725	2500
	10	GS-D-S-1800-010	17.13	17.187 - 17.621	0.375	265	15.12	380	580	1-5/8"	1/4" FNPT	1" MNPT	1750	2500
	20	GS-D-S-1800-020	17.00	17.063 - 17.496	0.375	260	15.12	365	555	1-5/8"	1/4" FNPT	1" MNPT	1775	2500
	STD,40S	GS-D-S-1800-04S	16.88	16.937 - 17.370	0.375	254	15.12	345	530	1-5/8"	1/4" FNPT	1" MNPT	1800	2500
	30	GS-D-S-1800-030	16.75	16.811 - 17.243	0.375	250	15.12	330	505	1-5/8"	1/4" FNPT	1" MNPT	1825	2500
	XS,80S	GS-D-S-1800-08S	16.63	16.687 - 17.118	0.375	247	15.12	315	480	1-5/8"	1/4" FNPT	1" MNPT	1850	2500
	40	GS-D-S-1800-040	16.50	16.563 - 16.994	0.375	245	15.12	295	450	1-5/8"	1/4" FNPT	1" MNPT	1975	2500
	60	GS-D-S-1800-060	16.25	16.311 - 16.740	0.375	240	15.12	290	440	1-5/8"	1/4" FNPT	1" MNPT	2025	2500
	80	GS-D-S-1800-080	15.75	15.811 - 16.238	0.375	235	15.12	280	425	1-5/8"	1/4" FNPT	1" MNPT	2100	2500
	100	GS-D-S-1800-100	15.31	15.375 - 15.800	0.375	230	15.12	270	415	1-5/8"	1/4" FNPT	1" MNPT	2175	2500
	120	GS-D-S-1800-120	15.08	15.137 - 15.561	0.375	225	15.12	265	405	1-5/8"	1/4" FNPT	1" MNPT	2175	2500
20	140	GS-D-S-1800-140	14.50	14.563 - 14.984	0.375	224	15.12	255	390	1-5/8"	1/4" FNPT	1" MNPT	2275	2500
	160	GS-D-S-1800-160	14.06	14.125 - 14.543	0.375	219	15.12	245	375	1-5/8"	1/4" FNPT	1" MNPT	2350	2500
	10S	GS-D-S-2000-01S	19.19	19.249 - 19.693	0.375	330	15.32	325	510	1-5/8"	1/4" FNPT	1-1/2" MNPT	1550	2500
	10	GS-D-S-2000-010	19.13	19.187 - 19.631	0.375	324	15.32	320	495	1-5/8"	1/4" FNPT	1-1/2" MNPT	1550	2500
	20,STD,40S	GS-D-S-2000-04S	18.88	18.937 - 19.380	0.375	317	15.32	295	450	1-5/8"	1/4" FNPT	1-1/2" MNPT	1600	2500
	30,XS,80S	GS-D-S-2000-08S	18.63	18.687 - 19.128	0.375	308	15.32	270	410	1-5/8"	1/4" FNPT	1-1/2" MNPT	1650	2500
	40	GS-D-S-2000-040	18.44	18.499 - 18.939	0.375	298	15.32	250	380	1-5/8"	1/4" FNPT	1-1/2" MNPT	1850	2500
	60	GS-D-S-2000-060	18.00	18.063 - 18.501	0.375	292	15.32	240	370	1-5/8"	1/4" FNPT	1-1/2" MNPT	1875	2500
	80	GS-D-S-2000-080	17.56	17.625 - 18.061	0.375	285	15.32	235	360	1-5/8"	1/4" FNPT	1-1/2" MNPT	1925	2500
	100	GS-D-S-2000-100	17.06	17.125 - 17.558	0.375	278	15.32	230	350	1-5/8"	1/4" FNPT	1-1/2" MNPT	2000	2500
24	120	GS-D-S-2000-120	16.63	16.687 - 17.118	0.375	281	15.32	220	340	1-5/8"	1/4" FNPT	1-1/2" MNPT	2050	2500
	140	GS-D-S-2000-140	16.12	16.183 - 16.612	0.375	270	15.32	215	330	1-5/8"	1/4" FNPT	1-1/2" MNPT	2075	2500
	160	GS-D-S-2000-160	15.69	15.751 - 16.178	0.375	259	15.32	210	320	1-5/8"	1/4" FNPT	1-1/2" MNPT	2125	2500
	10,10S	GS-D-S-2400-010	23.13	23.187 - 23.651	0.375	431	15.32	395	600	1-5/8"	1/4" FNPT	1-1/2" MNPT	1300	2500
	20,STD,40S	GS-D-S-2400-04S	22.88	22.937 - 23.400	0.375	422	15.32	360	555	1-5/8"	1/4" FNPT	1-1/2" MNPT	1325	2500
	XS,80S	GS-D-S-2400-08S	22.63	22.687 - 23.148	0.375	414	15.32	330	505	1-5/8"	1/4" FNPT	1-1/2" MNPT	1350	2500
	30	GS-D-S-2400-030	22.50	22.563 - 23.024	0.375	409	15.32	320	490	1-5/8"	1/4" FNPT	1-1/2" MNPT	1550	2500
	40	GS-D-S-2400-040	22.25	22.311 - 22.770	0.375	400	15.32	315	485	1-5/8"	1/4" FNPT	1-1/2" MNPT	1575	2500
	60	GS-D-S-2400-060	21.69	21.749 - 22.206	0.375	382	15.32	310	470	1-5/8"	1/4" FNPT	1-1/2" MNPT	1625	2500
	80	GS-D-S-2400-080	21.19	21.249 - 21.703	0.375	388	15.32	300	460	1-5/8"	1/4" FNPT	1-1/2" MNPT	1650	2500
24	100	GS-D-S-2400-100	20.56	20.625 - 21.076	0.375	374	15.32	290	445	1-5/8"	1/4" FNPT	1-1/2" MNPT	1700	2500
	120	GS-D-S-2400-120	20.00	20.063 - 20.511	0.375	372	15.32	285	435	1-5/8"	1/4" FNPT	1-1/2" MNPT	1725	2500
	140	GS-D-S-2400-140	19.50	19.563 - 20.009	0.375	366	15.32	275	420	1-5/8"	1/4" FNPT	1-1/2" MNPT	1750	2500
	160	GS-D-S-2400-160	18.94	18.999 - 19.442	0.375	360	15.32	265	410	1-5/8"	1/4" FNPT	1-1/2" MNPT	1825	2500

• Larger sizes and custom configurations available upon request. Smaller sizes release date pending.

* NPS 6-24 TOOL OD MUST BE WITHIN 1/8" CONCENTRICITY TO THE PIPE ID.

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

• DATA IS SUBJECT TO CHANGE. Consult manufacturer to verify that this document is the latest release.

**Table 3: Maximum Allowable Pressures (MAP)**

Use the table below to determine the maximum allowable pressure (MAP) the plug and pipe can be subjected to without yielding the pipe. The yield strengths listed in the table correspond to typical minimum yield strengths of standard pipes. If using a Material Test Report (MTR) to determine the yield strength of the pipe or if the pipe yield strength exceeds the highest in the table, the precise MAP can be determined by linear interpolation. **Do not exceed MAX PLUG BACK PRESSURE RATINGS.**

NPS Nominal Pipe Size	PIPE SCHEDULE	MAX PLUG BACK PRESSURE RATING (PSI) (NOT TO EXCEED)	MAXIMUM ALLOWABLE PRESSURE FOR GripSafe ST PLUGS IN PIPE BASED ON PIPE YIELD STRENGTH - SELECT THE COLUMN BELOW THAT IS LESS THAN OR EQUAL TO PIPE YIELD STRENGTH (PSI) -										
			30000 PSI (A106 A)	35000 PSI (A106 B)	40000 PSI (A106 C)	46000 PSI (X46)	52000 PSI (X52)	60000 PSI (X60)	70000 PSI (X70)	80000 PSI (X80)	90000 PSI (4140HR)	100000 PSI (4140SR)	110000 PSI (P110)
6	10,10S	3300	725	850	975	1125	1275	1450	1700	1950	2175	2425	2650
	40,STD,40S	3600	1875	2200	2500	2875	3250	3600	3600	3600	3600	3600	3600
	80,XS,80S	4000	3475	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
	120	3900	3900	3900	3900	3900	3900	3900	3900	3900	3900	3900	3900
	160	3850	3850	3850	3850	3850	3850	3850	3850	3850	3850	3850	3850
	XXH	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700
8	10,10S	3200	500	575	675	775	875	1000	1150	1325	1500	1650	1825
	20	3350	975	1125	1300	1475	1675	1925	2250	2575	2900	3200	3350
	30	3400	1100	1300	1475	1700	1925	2200	2575	2950	3300	3400	3400
	40,STD,40S	3475	1350	1575	1800	2075	2350	2700	3150	3475	3475	3475	3475
	60	3625	1875	2175	2500	2875	3225	3625	3625	3625	3625	3625	3625
	80,XS,80S	3800	2525	2950	3375	3800	3800	3800	3800	3800	3800	3800	3800
	100	3725	3350	3725	3725	3725	3725	3725	3725	3725	3725	3725	3725
	120	3725	3725	3725	3725	3725	3725	3725	3725	3725	3725	3725	3725
	140	3925	3925	3925	3925	3925	3925	3925	3925	3925	3925	3925	3925
	160	3825	3825	3825	3825	3825	3825	3825	3825	3825	3825	3825	3825
10	10,10S	2725	375	450	500	575	650	750	875	1000	1125	1250	1375
	20	2800	650	750	850	975	1100	1275	1475	1675	1900	2100	2325
	30	2875	825	975	1100	1275	1450	1650	1925	2200	2475	2750	2875
	40,4STD,40s	2950	1050	1225	1400	1600	1825	2100	2450	2775	2950	2950	2950
	60,XS,80S	3100	1625	1900	2175	2500	2825	3100	3100	3100	3100	3100	3100
	80	3225	2100	2450	2800	3225	3225	3225	3225	3225	3225	3225	3225
	100	3400	2825	3275	3400	3400	3400	3400	3400	3400	3400	3400	3400
	120	3425	3425	3425	3425	3425	3425	3425	3425	3425	3425	3425	3425
	140,XXH	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475
	160	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475	3475
12	10,10S	2300	325	375	425	475	525	625	725	825	925	1025	1125
	20	2375	475	550	625	700	800	925	1075	1225	1375	1525	1675
	30	2425	675	775	900	1025	1150	1325	1550	1775	1975	2200	2425
	STD,40S	2475	800	925	1050	1200	1375	1575	1825	2100	2350	2475	2475
	40	2500	875	1025	1175	1350	1525	1750	2050	2325	2500	2500	2500
	XS,80S	2575	1175	1375	1575	1800	2025	2350	2575	2575	2575	2575	2575
	60	2725	1400	1625	1850	2125	2400	2725	2725	2725	2725	2725	2725
	80	2850	1875	2200	2500	2850	2850	2850	2850	2850	2850	2850	2850
	100	2900	2575	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
	120,XXH	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950
	140	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950	2950
	160	3025	3025	3025	3025	3025	3025	3025	3025	3025	3025	3025	3025



Table 3: Maximum Allowable Pressures (MAP) Continued

NPS Nominal Pipe Size	PIPE SCHEDULE	MAX PLUG BACK PRESSURE RATING (PSI) (NOT TO EXCEED)	MAXIMUM ALLOWABLE PRESSURE FOR GripSafe ST PLUGS IN PIPE BASED ON PIPE YIELD STRENGTH - SELECT THE COLUMN BELOW THAT IS LESS THAN OR EQUAL TO PIPE YIELD STRENGTH (PSI) -										
			30000 PSI (A106 A)	35000 PSI (A106 B)	40000 PSI (A106 C)	46000 PSI (X46)	52000 PSI (X52)	60000 PSI (X60)	70000 PSI (X70)	80000 PSI (X80)	90000 PSI (4140HR)	100000 PSI (4140SR)	110000 PSI (P110)
14	10S	1925	275	325	375	425	475	550	625	725	800	900	1000
	10	1950	400	450	525	600	675	775	900	1025	1150	1300	1425
	20	1975	525	600	700	800	900	1025	1200	1375	1550	1725	1900
	30,STD,40S	2025	675	775	875	1025	1150	1325	1550	1750	1975	2025	2025
	40	2050	825	950	1100	1250	1425	1625	1900	2050	2050	2050	2050
	XS,80S	2100	1000	1150	1325	1500	1700	1975	2100	2100	2100	2100	2100
	60	2425	1275	1475	1675	1925	2175	2425	2425	2425	2425	2425	2425
	80	2550	1775	2075	2375	2550	2550	2550	2550	2550	2550	2550	2550
	100	2725	2525	2725	2725	2725	2725	2725	2725	2725	2725	2725	2725
	120	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750
16	10S	1950	225	250	300	325	375	425	500	575	650	700	775
	10	1975	300	350	400	475	525	600	700	800	900	1000	1100
	20	2000	425	475	550	625	700	825	950	1075	1225	1350	1475
	30,STD,40S	2025	525	600	700	800	900	1025	1200	1375	1550	1725	1900
	40,XS,80S	2100	775	900	1025	1175	1325	1525	1775	2050	2100	2100	2100
	60	2200	1125	1325	1500	1725	1950	2200	2200	2200	2200	2200	2200
	80	2300	1650	1925	2200	2300	2300	2300	2300	2300	2300	2300	2300
	100	2350	2250	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	120	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
	140	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
18	10S	1725	175	200	225	275	300	350	400	450	525	575	625
	10	1750	250	300	325	375	425	500	575	650	750	825	900
	20	1775	325	400	450	500	575	650	775	875	975	1100	1200
	STD,40S	1800	425	500	550	650	725	825	975	1100	1250	1375	1525
	30	1825	525	600	700	800	900	1025	1200	1375	1550	1700	1825
	XS,80S	1850	625	725	825	950	1075	1225	1450	1650	1850	1850	1850
	40	1975	725	850	975	1125	1275	1450	1700	1950	1975	1975	1975
	60	2025	1100	1300	1475	1700	1925	2025	2025	2025	2025	2025	2025
	80	2100	1550	1800	2075	2100	2100	2100	2100	2100	2100	2100	2100
	100	2175	2150	2175	2175	2175	2175	2175	2175	2175	2175	2175	2175
20	10S	1550	175	200	225	275	300	350	400	450	525	575	625
	10	1550	200	250	275	325	350	400	475	550	600	675	750
	20,STD,40S	1600	350	400	475	525	600	700	800	925	1025	1150	1250
	30,XS,80S	1650	525	600	675	775	875	1025	1200	1350	1525	1650	1650
	40	1850	650	775	875	1000	1125	1300	1525	1725	1850	1850	1850
	60	1875	1025	1200	1375	1575	1775	1875	1875	1875	1875	1875	1875
	80	1925	1475	1725	1925	1925	1925	1925	1925	1925	1925	1925	1925
	100	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	120	2050	2050	2050	2050	2050	2050	2050	2050	2050	2050	2050	2050
	140	2075	2075	2075	2075	2075	2075	2075	2075	2075	2075	2075	2075
24	10S	1300	150	175	200	225	250	300	350	400	450	500	550
	20,STD,40S	1325	250	300	350	400	450	500	575	675	750	825	925
	XS,80S	1350	375	425	500	575	650	750	850	975	1100	1225	1350
	30	1550	450	500	575	675	750	875	1000	1150	1300	1450	1550
	40	1575	575	675	775	875	1000	1150	1350	1525	1575	1575	1575
	60	1625	950	1125	1275	1450	1625	1625	1625	1625	1625	1625	1625
	80	1650	1350	1575	1650	1650	1650	1650	1650	1650	1650	1650	1650
	100	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
	120	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
	140	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
24	10S	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	20,STD,40S	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	XS,80S	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	30	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	40	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	60	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	80	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	100	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	120	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	140	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825
	160	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825	1825

If the pipe ID is within 0.200" of the max ID Range, a 1/8" concentricity alignment between the plug OD and the pipe ID must be maintained to obtain the max pressure rating.

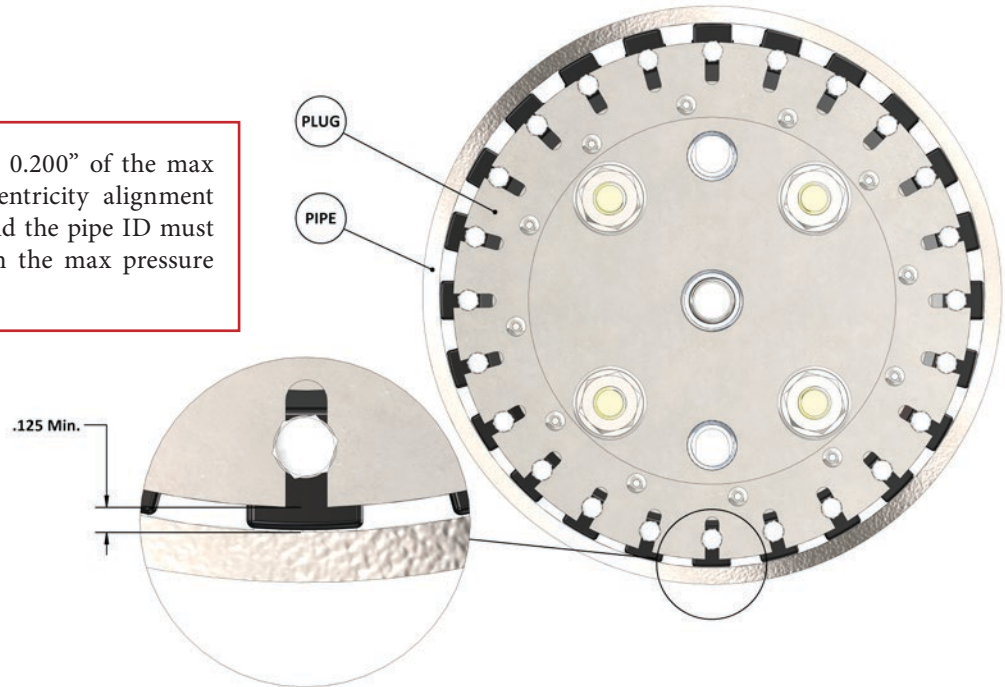


Figure 3: GripSafe ST Plug and Pipe Concentricity

5. Preparing the GripSafe ST DBB Plug for Installation

5.1 The GripSafe ST DBB should be in the “Ready to Install” position from the factory.

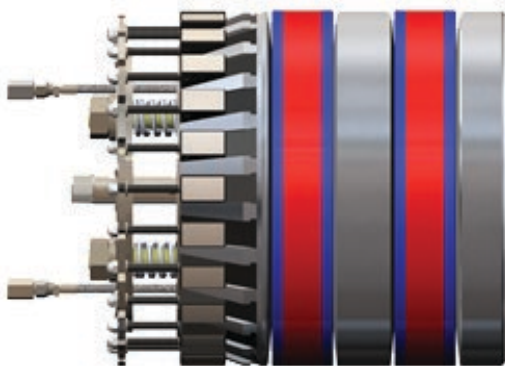


Figure 4:
“Not Ready to Install” State (Retracted)

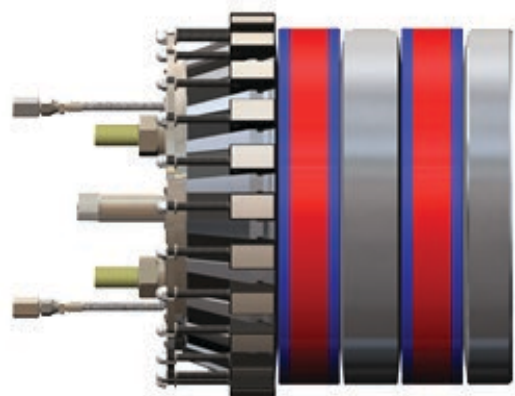


Figure 5:
“Ready to Install” State (Energized)


- Ensure the *Compression Hex Nuts*(18) are tightened to the point where the *Spring Plate Hub*(20) is in the energized state, flush to the *Retainer Plate*(17).
- Do not over tighten or torque nuts to the point that the *Seal*(10) starts to swell or extrude over the OD of the plug.
- In the “Ready to Install” state (see **Figure 5**), the GripSafe ST plug will immediately grip on the pipe upon insertion.



CAUTION: Make sure plug is clean of debris and contaminants. Each *Wedge Gripper*(5) should slide freely up and down in its slot with a full range of motion and no resistance. *Wedge Grippers*(5) with impeded movement due to debris, dirt or contaminants will cause the plug to not grip on the pipe’s ID which can cause it to eject under pressure, potentially leading to injury or death, material loss, and/or damage to equipment.

6. Installing the GripSafe ST DBB 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,  and **contact USA Industries 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.

6.1 Insert the GripSafe ST DBB plug evenly into the pipe.

- See *Table 2* for Operational ID Range and clearance requirements.
- For using GripSafe ST *Lifting Device*, see **Section 8**.
- When the *Gripping Wedges* come into contact with the pipe I.D., evenly push the GripSafe ST DBB plug further into the pipe.
- A slight rocking motion will assist in insertion.
- Once the *Gripping Wedges* have begun entering the pipe, each will be in independent contact with the pipe I.D. Retraction or removal of the plug at this juncture is not possible unless the *Compression Nuts*(18) are loosened. See **Section 7** for plug removal.
- Insert plug until the top of the *Spring Plate Hub*(20) is at least flush with the end of the pipe (see **Figure 6**).

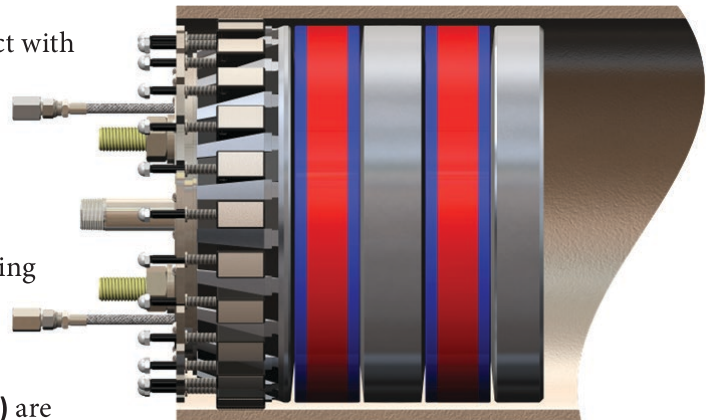


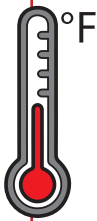
Figure 6: GripSafe ST DBB Minimum Insertion Depth in a Sectioned Pipe

- If insertion into the pipe proves problematic in the “Ready to Install” state (see **Figure 5**), it may be advantageous to insert the plug in the “Not Ready to Install” state (see **Figure 4**). To do so, loosen all **Compression Hex Nuts(18)** to the top of their respective **All-Thread Shafts(11)**. Care should be taken to not completely remove the **Compression Hex Nuts(18)** from the assembly. In this orientation, the **Gripping Wedges** will be fully retracted and the plug can be inserted freely into the pipe.



CAUTION: In this orientation, it is important to note the plug will not be immediately gripping the pipe upon insertion. Only after tightening the **Compression Hex Nuts(18)** while the plug is in the pipe, to advance the bottom of the **Spring Plate Hub(20)** to contact the top of the **Retainer Plate(17)** will the plug be securely gripping the pipe. Continue installation with **Step 6.2**.

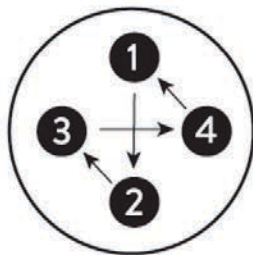
TEMPERATURE NOTE:



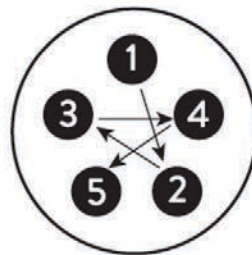
If welding is to occur on the pipe while the plug is installed the front face of the plug (**Spring Plate Hub(20)**) should be installed a minimum of 6” from the center of an active weld to prevent the **Seals (Tri-Ply™)(10)** from degrading or ultimately failing due to melting. For post weld heat treats, bake-outs, etc., the plug should be at least 12” from the nearest edge of the heating element, and the temperature at the depth the plug is installed at should not exceed 220°F. If a high temperature bake out is being performed (400°F or higher) increase the installation depth as much as possible. In all cases, monitor the pressure behind the plug and/or between the seals at all times and stop work immediately if any pressure drop is detected. In addition, the pipes external surface temperature should be monitored corresponding to the plugs seal location at all times to ensure damage to the seals does not occur.

6.2 Evenly tighten the Compression Nuts.

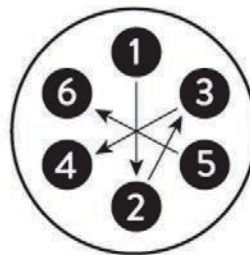
- Using a star pattern (see **Figure 7**), turn each **Compression Hex Nut(18)** a maximum of 3 full revolutions before moving to the next nut. Repeat until 50% target torque is achieved on all nuts, and then increase to 100% target installation torque and continue torquing in a star pattern. After completing the star pattern at 100% of the target torque, use a circular pattern to confirm all nuts are torqued correctly.
- Minimal torque will be required for the first several passes, but torque will increase notably after the **Seals(10)** begin to compress against the pipe ID.



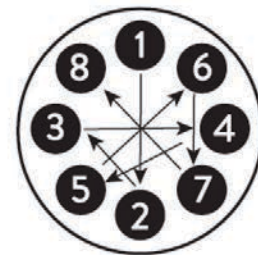
4 Compression Hex Nut Tightening Pattern



5 Compression Hex Nut Tightening Pattern



6 Compression Hex Nut Tightening Pattern



8 Compression Hex Nut Tightening Pattern



NOTE: To help center the plug in the pipe it may be desirable to tighten the two bottom-most *Compression Hex Nuts(18)* to expand the *Seals(10)* under them, thereby lifting the plug up to center. A short push of the plug will reset the *Wedge Grippers(5)* to accommodate the new centered position respective to the rest of the plug body. Normal installation should commence once the plug is centered. This may be desirable in the event the plug is noticeably not in the center of the pipe and test pressures are not achieved while the plug is at **Maximum Compression Torque** or the plug is not within the 1/8" concentricity limit if the pipe ID is within 0.200" of maximum range.

6.3 Verify integrity of the *Seals(10)*.

- If the plug is being used for pressure testing, use proper fittings to install a hydro test pump to the *Backpressure Vent Port(19)*; otherwise, install a cap to seal off the system or a back pressure monitoring tee.
- Increase pressure to 25% of target pressure or 150 psig, whichever is less. Observance of a pressure drop may not be an indication of leakage. The *Seals(10)* 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 *Seals(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.

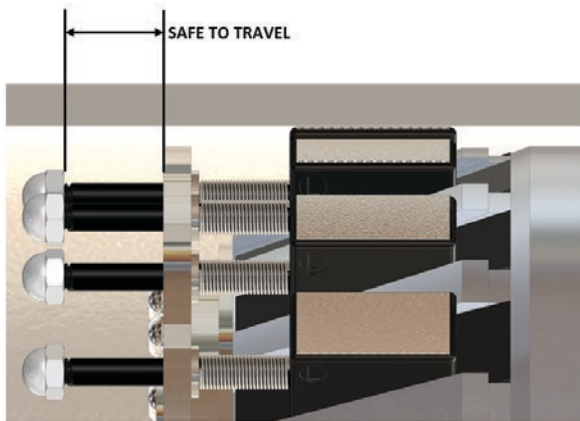


Figure 8: *Wedge Grippers* Safe to Travel

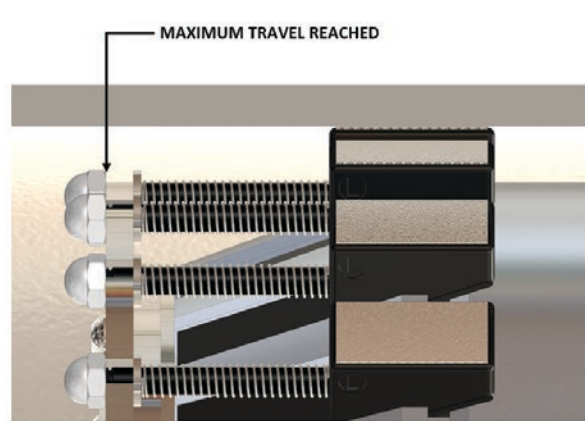


Figure 9: *Wedge Grippers* Maximum Travel Reached



CAUTION: If the plug is being used for pressure testing, careful observation is needed on the *Wedge Gripper Nuts(3)* travel. On **Figure 8**, pressure can be added to the system since the *Wedge Gripper Nuts(3)* are still far from the *Spring Plate Halo(15)*. On **Figure 9** however, no additional pressure can be added to the system since the *Wedge Gripper Nuts(3)* have reached their maximum travel.

- It may be desirable to attach a gauge and vent hose assembly, or a back pressure monitoring tee, to the **Backpressure Vent Port(19)** to bleed off any back pressure. The hose should be long enough to redirect vapor coming out of the vessel to a safe location away from personnel that may be in the area. A valve may also be attached to this port to allow safe back pressure removal before plug extraction (see **Section 7**). If using a back pressure 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(19)** and a ball valve. Further advantages can be made by attaching a hose to the ball valve on the monitoring tee and running the hose to vent to a safe location away from workers that may be in the area.



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



CAUTION: Do not stand directly in front of the GripSafe ST DBB plug at any time. Installed plugs should always be treated in this manner irrespective if the plug has back pressure on it or not.



CAUTION: If back pressure develops, constant observation of pressure observed through the use of an attached gauge and physical observation of pipe integrity is necessary to ensure safety to personnel and equipment. Any bulging, enlargement or tapering of the pipe is an indication of over pressuring. The Backpressure Rating listed in **Table 1** is for the pressure holding capability of the GripSafe ST Outboard Wedge Double Block and Bleed and could be well beyond the system design limitations in which it is being used to test.

6.4 The GripSafe ST plug is now ready to accept back pressure. Observe pressure ratings listed in Table 3.



CAUTION: If at any time during hydro testing a popping or clicking sound is heard, **STOP IMMEDIATELY** and slowly release the pressure from the system. Popping or clicking sounds during hydro testing could 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 for further assistance.**



CAUTION: **REFER TO TABLE 3: MAXIMUM ALLOWABLE PRESSURE** in this manual; **DO NOT EXCEED** the pressure ratings identified in the table when pressurizing the pipe. Careful observation is needed at the location of the pipe where the **Wedge Grippers** make contact while performing a hydro test. If any deformation or swelling of the pipe is observed, **STOP IMMEDIATELY** and slowly release the pressure from the system. **Contact USA Industries for further assistance.**

7. Positioning for Between the Seal Hydro Testing

7.1 If using the plug to hydrostatically test a weld, ensure proper Depth of Insertion by using the following method:

1. Measure the **Weld Zone Depth** distance from the pipe or fitting end to the center of weld area to be tested.
2. Obtain the **Plug Insertion Depth** from *Table 4* in respect to the Weld Neck Flange being tested.
3. Subtract the **Plug Insertion Depth** from the **Weld Zone Depth**.
4. If the difference is a negative number, insert the plug while measuring from the pipe or fitting end to the top of the **Spring Plate Hub/Halo(15)/(20)** and stop inserting when the reading on the measuring tape matches the difference found in **Step 3**.

Example: Testing a weld on a 14" Class 150 Weld Neck Flange.

- Weld Zone Depth: 5.00"
- 12" Class 150 Plug Insertion Depth obtained from *Table 4*: 6.14"
- Weld Zone Depth – Plug Insertion Depth = 5.00 – 6.14 = -1.14

From the calculation, the top face of the **Spring Plate Hub/Halo(15)/(20)** should be 1.14" out past the end of the weld neck flange (see **Figure 8**).

5. If the difference is a positive number, measure from the pipe or fitting end into the pipe or fitting by the difference found in **Step 3** and make a mark on the ID of the pipe or fitting. Insert the plug until the top of the **Spring Plate Hub/Halo(15)/(20)** is aligned to this mark.

Example: Testing a weld on a 14" Class 600 Weld Neck Flange.

- Weld Zone Depth: 8.38"
- 12" Class 600 Plug Insertion Depth obtained from *Table 4*: 6.63"
- Weld Zone Depth – Plug Insertion Depth = 8.38 – 6.63 = 1.75"

From the calculation, the top face of the **Spring Plate Hub/Halo(15)/(20)** should be 1.75" into the weld neck flange's end (see **Figure 9**).

Table 4: GripSafe ST ORB DBB Depth Insertion

Nominal Plug Size (in)	GripSafe ORB DBB Depth Insertion Per Weld Neck Class						
	Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
6	4.58	4.95	5.14	5.44	5.44	5.44	5.44
8	5.08	5.45	5.56	5.56	5.56	5.56	5.56
10	5.14	5.63	5.63	5.63	5.63	5.63	5.63
12	5.63	5.63	5.63	5.63	5.63	5.63	5.63
14	6.14	6.63	6.63	6.63	6.63	6.63	N/A
16	6.14	6.63	6.63	6.63	6.63	6.63	N/A
18	6.63	6.63	6.63	6.63	6.63	6.63	N/A
20	6.75	6.75	6.75	6.75	6.75	6.75	N/A
24	6.75	6.75	6.75	6.75	6.75	6.75	N/A

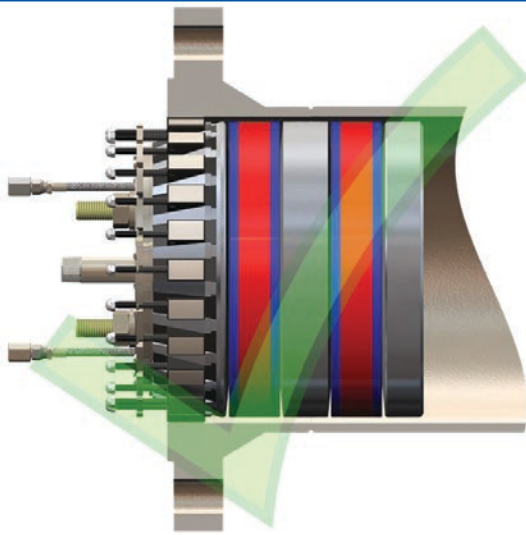


Figure 10: Permissible Insertion Depth with back pressure Rating

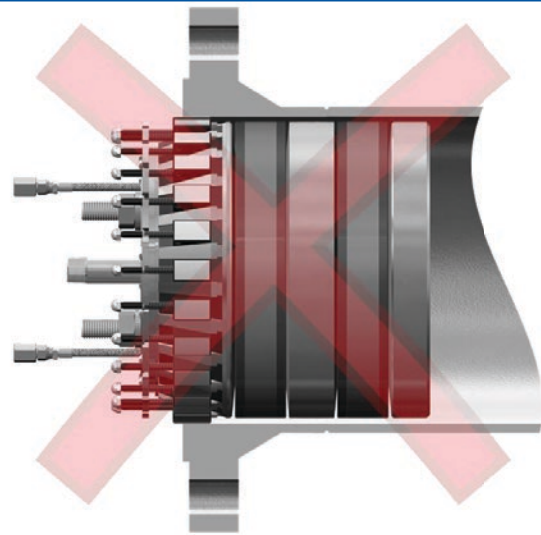


Figure 11: Impermissible Insertion Depth with No back pressure Rating



CAUTION: Gripping failure may occur if the Gripping Wedges are not fully inserted into the pipe or fitting. If any of the *Wedge Gripper's(5)* surface is visible beyond the end of the pipe or fitting end, represented in **Figure 11**, the GripSafe ST plug may not hold any back pressure. Advancement of the plug into the vessel being tested is necessary so none of the *Wedge Gripper's(5)* surface is visible beyond the end of the pipe or fitting end shown in **Figure 10**. Care should be taken to not cover the weld area with the *Seal(10)* as it could render a false outcome of a hydro test. The plug may be out of center with the pipe. To help center the plug in the pipe it may be desired to tighten the two bottom most *Compression Hex Nuts(18)* to expand the *Seal(10)* under them, thereby lifting the plug up to center. A short push of the plug will reset the *Wedge Grippers(5)* to accommodate the new centered position respective to the rest of the plug body.

Normal installation should commence once plug is centered. This may be desirable in the event the plug is noticeably not in the center of the pipe and test pressures are not achieved while the plug is at Maximum Compression Torque or the plug is not within the 1/8" concentricity limit if the pipe ID is within 0.200" of max range.

8. GripSafe ST DBB Plug Removal

8.1 Depressurize the system through the hydro test pump and drain all water from the *Test Vent Port* and *Test Fill Port*.

8.2 Remove hydro test equipment and or gauges from the *Test Ports(1)*.



NOTE: Use caution to ensure the *Test Ports(1)* do not become unthreaded or loosened within the plug during removal of the hydro testing equipment when testing is complete. Failure to do so may cause internal leaks when the plug is used again. Use appropriately sized wrenches.

8.3 Ensure there is no back pressure on the GripSafe ST DBB plug.



CAUTION: SLOWLY open *Vent Port(19)* to relieve any back pressure. Care must be taken when opening valves or loosening fittings if any inadvertent back pressure was introduced to the vessel. Failure to do so may result in hazardous pressure flow and/or fittings becoming violently hazardous projectiles that may damage personnel and/or equipment. If utilizing a back pressure monitoring tee, fast flowing gases or liquids through hosing can cause hose whip. Take caution to avoid this, failure to do so may result in injury to personnel or equipment.

8.4 Loosen the *Compression Hex Nuts(18)* in an even star pattern as to not place the whole load on one bolt.

- If a *Compression Hex Nut(18)* runs free during loosening, run the nut back to flush with the top of the *Spring Plate*. The *Seal(10)* act as a spring containing a large amount of force, too great for one *All Threaded Shaft(11)* to handle.
- Once the seal has broken free from the pipe ID, continue loosening the *Compression Hex Nuts(18)* until it is even with the top of the *All Threaded Shaft(11)*.



NOTE: Do not remove the *Compression Hex Nut(18)* from the *All Threaded Shaft(11)*. If this happens, immediately reinstall the components.



CAUTION: Ensure that all *Compression Hex Nuts(18)* maintain a load on them during the entire loosening process. Having all *Compression Hex Nuts(18)* loose but one, means that a large load is left on one *All Threaded Shaft(11)* and the risk of breakage is probable. Once the seals have relaxed enough to break the seal from the pipe ID the plug is now in a much more relaxed state and *Compression Hex Nuts(18)* can be loosened in full.

8.5 Remove the GripSafe ST DBB plug from the pipe.

- Clean and store for later use or return to USA Industries, Inc.
- Store out of direct sunlight in an area not exposed to above 150°F UV. Excessive heat will cause seal degradation over time.



- *Wedge Gripper(5)* texture may become packed with pipe scale and rust after several uses of the plug. Inspection of this surface after use is necessary to keep the gripping strength of the *Gripping Wedges* at peak performance. To clean, simply use a mild dishwashing soap and a stiff stainless steel bristled brush such as a welding brush. If plugging is persistent, use of a household rust remover along with a stiff stainless steel bristled brush should be sufficient. Rinse plug clean of residual chemicals with tap water and dry thoroughly.

9. GripSafe ST Lifting Device

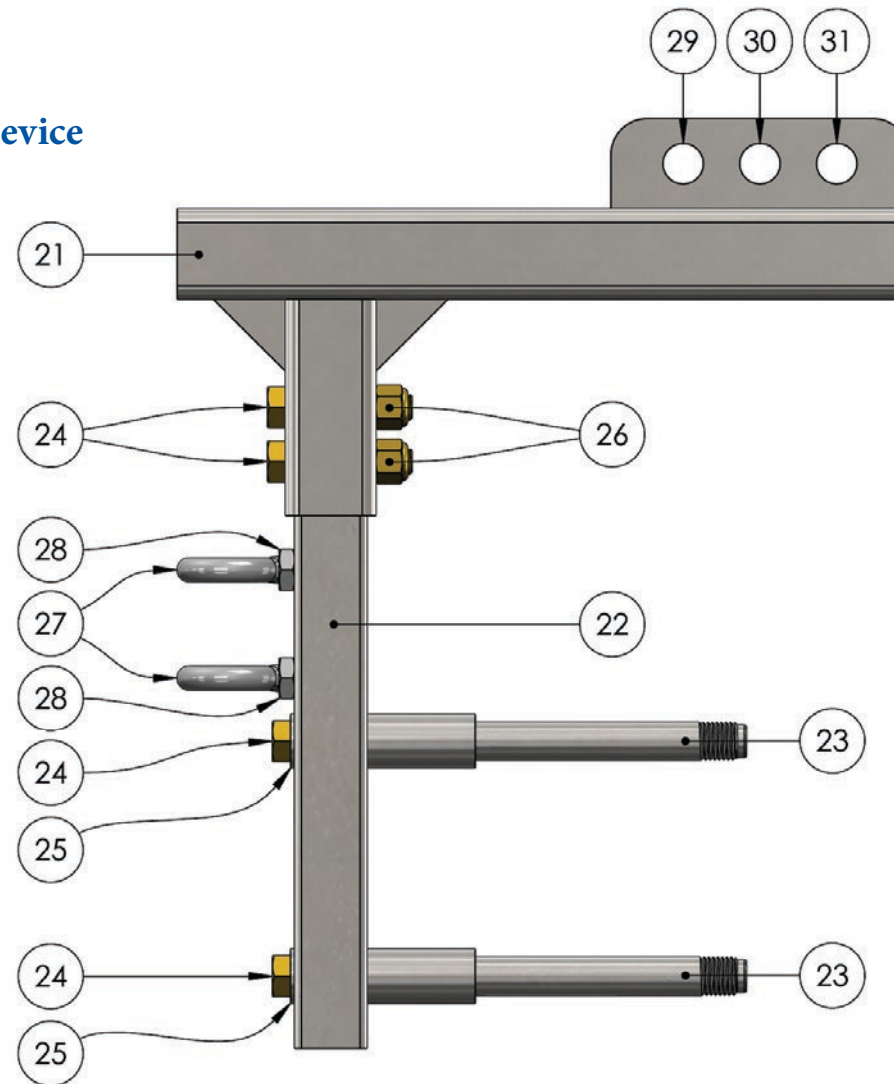


Figure 12: GripSafe ST Lifting Device Diagram



Table 5: Lifting Device Bill of Materials

Plug Size	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
	Universal Lifting Bar	Telescoping Lifting Attachment #1	Telescoping Lifting Attachment #2	Telescoping Lifting Attachment #3	Lifting Standoff #1	Lifting Standoff #2	Lifting Device Bolt	Lifting Device Washer	Lifting Device Nut	Vertical Lifting Eyebolt	Eyebolt Nut
10	1	1	N/A	N/A	2	N/A	4	2	2	2	2
12	1	1	N/A	N/A	2	N/A	4	2	2	2	2
14	1	N/A	1	N/A	N/A	2	4	2	2	2	2
16	1	N/A	1	N/A	N/A	2	4	2	2	2	2
18	1	N/A	1	N/A	N/A	2	4	2	2	2	2
20	1	N/A	N/A	1	N/A	2	4	2	2	2	2
24	1	N/A	N/A	1	N/A	2	4	2	2	2	2

9.1 Installing the lifting device on the GripSafe ST DBB 10" - 12" plug.

- Remove the *MJIC-FNPT Adapter*(1) from the *Vent Hose*(2). The internal thread for the lifting device on 10"-12" plugs are located in the holes where the *Vent Hoses*(2) originate.
- Insert the *Vent Hose*(2) into the hole of the *Lifting Standoff*(23) (see **Figure 13**).
- Insert the *Lifting Standoffs*(23) into the two holes located on top of the *Spring Plate Hub*(20). Hand tighten both *Lifting Standoffs*(23) until they bottom out (see **Figure 13**).



CAUTION: A minimum of 6 full turns is needed when threading both the *Lifting Standoffs*(23) into the GripSafe ST DBB plug. Failure to follow this step may cause the *Lifting Threads* to fail under the load of the plug, causing it to fall, injuring personnel and/or damage to the equipment.

9.2 Installing the lifting device on the GripSafe ST DBB 14+ plug.

- On GripSafe ST DBB 14"+, the internal threads for the lifting device are located between the *back pressure Vent Port*(19) and *Vent Hose Ports*(2) (see **Figure 14**).
- Insert the *Lifting Standoffs*(23) into the two holes through the *Spring Plate Hub*(20). Hand tighten both *Lifting Standoffs*(23) until they bottom out (see **Figure 14**).



CAUTION: A minimum of 6 full turns is needed when threading both the *Lifting Standoffs*(23) into the GripSafe ST DBB plug. Failure to follow this step may cause the *Lifting Threads* to fail under the load of the plug, causing it to fall, injuring personnel and/or damage to the equipment.

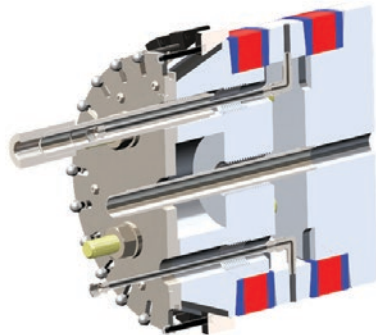


Figure 13: Inserting and Threading *Lifting Standoffs* into the DBB 10" - 12" Plug

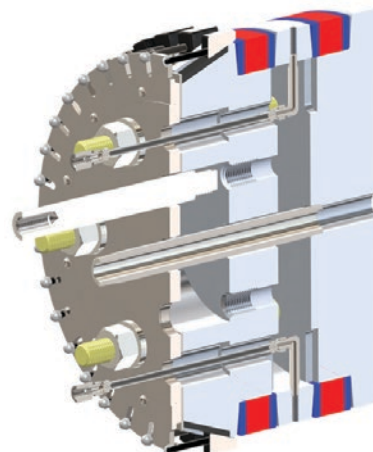


Figure 14: Inserting and Threading *Lifting Standoffs* in to the DBB Plug 14"+

- Line up the holes on the *Telescoping Lifting Attachment*(22) with the internally threaded holes on the *Lifting Standoffs*(23). Fasten the *Telescoping Lifting Attachment*(22) on to the *Lifting Standoffs*(23) with the provided *Lifting Device Bolts*(24) and *Washers*(25) (see Figure 15).



NOTE: There are 3 sizes of *Telescoping Lifting Attachment*(22), #1, #2, #3. Each have different lengths and mounting hole locations to accommodate distinct plug sizes. Refer to Table 5 for details.

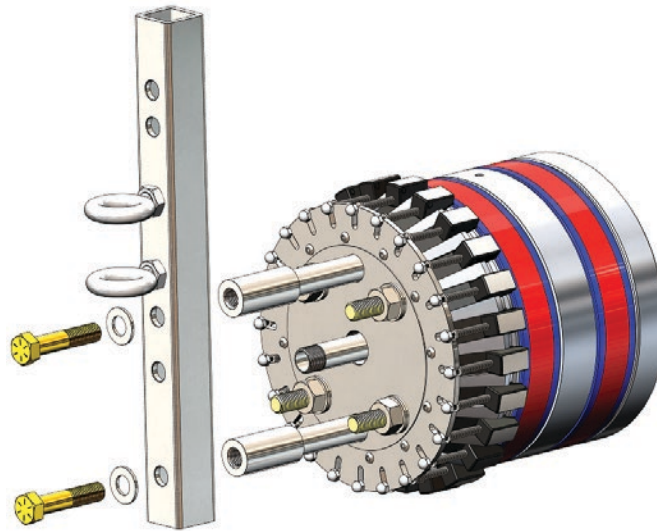


Figure 15: Aligning and fastening *Telescoping Lifting Attachment* on to *Lifting Standoffs*

- After fastening the *Telescoping Lifting Attachment*(22) to the *Lifting Standoffs*(23), slide it into the *Universal Lifting Bar's*(21) shorter square tubing. Upon insertion, align the two holes on both the *Telescoping Lifting Attachment*(22) and the *Universal Lifting Bar*(20).
- Fasten the *Telescoping Lifting Attachment*(22) with the provided *Lifting Bolts*(24) and *Nuts*(26) (see Figure 16).

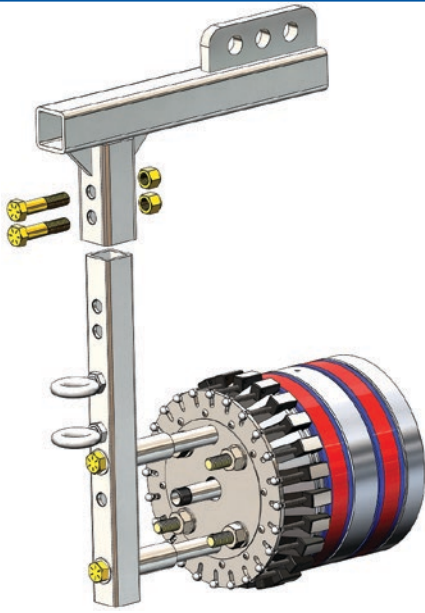


Figure 16: Aligning and Fastening Telescoping Lifting Attachment onto Universal Lifting Bar

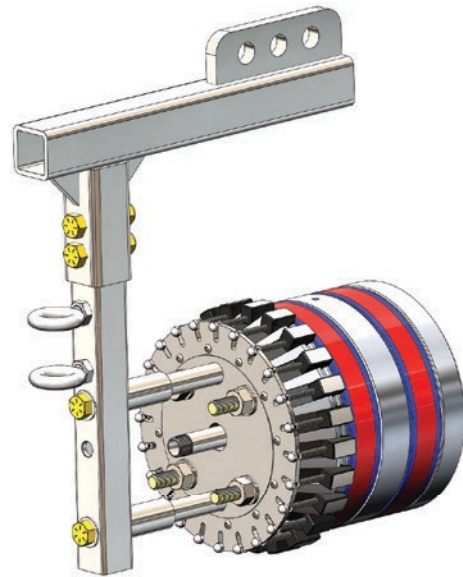


Figure 17: Lifting Device Finished Assembly

9.3 Using Lifting Device.

- There are three *Anchor Holes*(29),(30),and (31) on the *Lifting Device*. Use one or two of the three anchor holes to orient the GripSafe ST DBB plug horizontally.
- If none of the three holes comes close to the center gravity of the plug, a *Cheater Bar* may be inserted in the long square tubing portion of the *Universal Lifting Bar*(20) and used as leverage. A *Cheater Bar* can also be used to help manipulate the plug while inserting it into the pipe.

9.4 Vertical Lifting

- For vertical lifting, remove the *Vertical Lifting Device Bolts*(27) that are holding the *Lifting Standoffs*(26) to the *Telescoping Lifting Attachment*(25).
- Fasten the provided *Vertical Lifting Eyebolt*(30) and *Eyebolt Nut*(31) to both *Lifting Standoffs*(26). Note, the *Vertical Lifting Eyebolts*'(30) thread is $\frac{3}{4}$ -10.
- While holding the *Vertical Lifting Eyebolt*(30) in the correct orientation, snug its *Eyebolt Nut*(31) against the top of the *Lifting Standoffs*(26) and turn the *Eyebolt Nut*(31) an additional $\frac{1}{2}$ turn. Do the same to the other *Vertical Lifting Eyebolt*(30) and its *Eyebolt Nut*(31). See **Figure 18** for properly installed *Vertical Lifting Eyebolts*(30) and *Eyebolt Nuts*(31) illustration.
- When lifting vertically, both *Vertical Lifting Eyebolts*(30) and *Eyebolt Nuts*(31) must be used.



CAUTION: A minimum of 6 full turns is needed when threading both *Vertical Lifting Eyebolts(30)* and *Eyebolt Nuts(31)* into the Lifting Standoffs(23). Failure to ensure the *Vertical Lifting Eyebolts(30)* and *Eyebolt Nuts(31)* are fully threaded-in may cause the mating threads to fail under the load of the GripSafe ST causing it to fall and potentially injuring personnel and damaging equipment.



CAUTION: Lifting the GripSafe ST with only one *Vertical Lifting Eyebolt(30)* and *Eyebolt Nut(31)* is not recommended. Failing to lift the plug with both *Vertical Lifting Eyebolts(30)* and *Eyebolt Nuts(31)* could cause the plug to twist and turn which could lead to the *Vertical Lifting Eyebolts(30)* and *Eyebolt Nuts(31)* unthreading/loosening causing it to fall and potentially injuring personnel and damaging equipment.



Figure 18: Properly Installed Lifting Eyes for Vertical Lifting



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