Operating Procedures for ¾" to 3" Double Block and Bleed Isolation Plugs

WARNING

- ⚠ Pressure testing is inherently dangerous. Strict adherence to these operating instructions and industry safety practices could prevent injury to personnel.
- ⚠ All personnel must be clear of test plug during pressure testing.
- ⚠ Pressures must never exceed the maximum pressure rating of the weakest component in a system.
- ⚠ An incompressible liquid such as water should be used as the test medium. Residual air or gas must be evacuated from the pipe prior to testing.
- ⚠ Remove metal shipping band or tape securing gripper assembly prior to testing.
- ⚠ Failure to apply specified installation torque (see Table 1) may result in unsafe operation or leakage. Installation equipment and tool must be adequately sized to handle installation torque.
- ⚠ Constant monitoring of upstream pressure is required. Immediately discontinue work if an unplanned or unanticipated increase in upstream pressure occurs.
- ⚠ Failure to replace worn or damaged components may affect the ability of the plug to hold pressure and may cause injury or damage to persons or property within the test area.

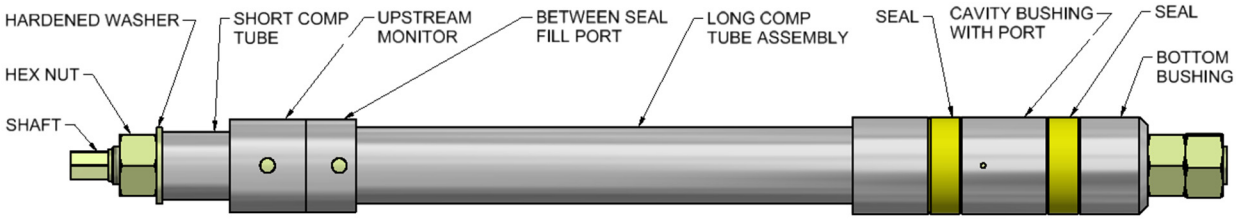

Figure 1: Double Block and Bleed Isolation Plug

MAXIMUM TEST PRESSURE BETWEEN SEALS: 2250 PsiG (155 BarG)

MAXIMUM UPSTREAM PRESSURE: 10 PsiG (0.7 BarG)

Questions? Contact EST Group Customer Service at any of the following locations.

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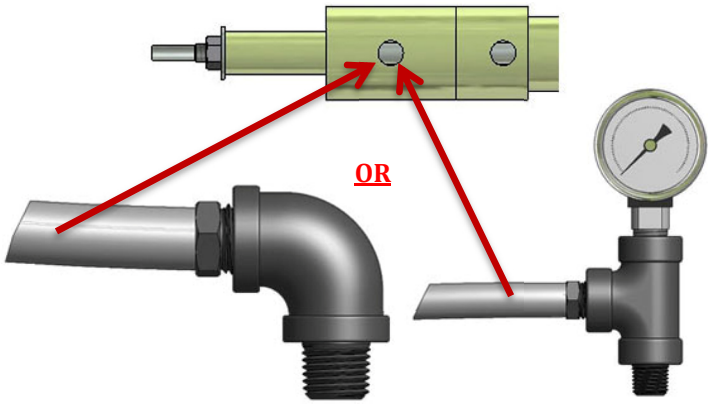
1. Test Preparation

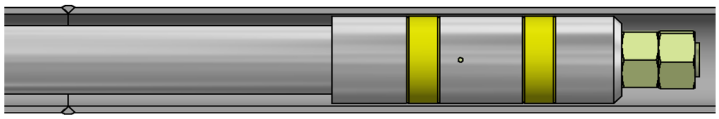
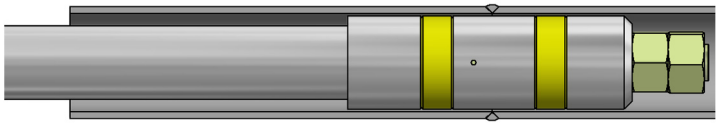
Perform the steps outlined below prior to performing your pressure test.

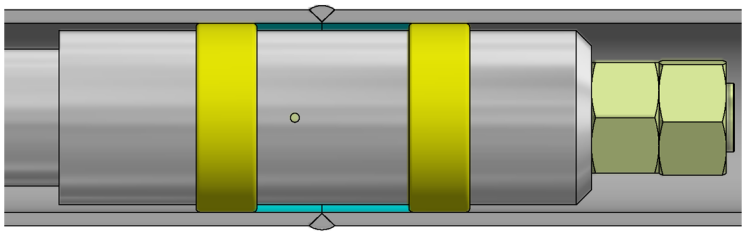
Step/Action	*Additional Action/Information/Result*
1. Visually inspect the plug for worn or damaged components including any cuts, scores and deformations.	Replace worn or damaged components as needed
2. Verify that the pipe size and schedule stamped on the plug is equivalent to pipe size you are testing.	**NOTE:** The stamp **2P80** indicates that the plug is suitable for use in 2" SCH 80 pipe size. See Table 1 for pipe size and schedule of plugs. The seal OD must agree with the Plug OD listed in Table 1 for the corresponding pipe size.
3. Clean and dry the pipe ID.	All moisture, debris and excessive scale must be removed from the pipe ID to ensure proper seal is established during the pressure test.
4. Liberally spread antiseize over both sides of the hardened washer and threads of the shaft.	 **Figure 2:** Doing this ensures that all installation torque is transmitted to the seal. **CAUTION** Special caution must be taken when applying lubricant and handling the test plug. The lubricant must not come in contact with the seals or tube ID. Failure to properly use antiseize on the shaft threads and hardened washer may cause an incomplete torque transmittal resulting in a decrease in pressure rating.
5. Complete Site safety standard checklist.	

2. Performing the Pressure Test

Perform the steps outlined below when conducting a pressure test.

Step/Action	*Additional Action/Information/Result*
1. Attach hoses to the pressure and upstream monitor connections plug. (1/4 NPT ports)	 **Figure 3:** • Upstream Monitor Connection: Upstream vapors may be vented by attaching approximately 50 ft. of hose to the port and locating the open end of the hose well downwind from the hot work area. If upstream vapors are to be vented, a tee fitting should be used such that the hose and the pressure gauge are both connected to the Upstream Monitor Connection. • Pressure Connection: Connect pressure source to pressurize between seals for isolation and/or testing purposes.

Step/Action	*Additional Action/Information/Result*
2. Place plug so both seals are inside the pipe you are testing. **NOTE:** The maximum temperature exposure for urethane seals is 180°F (82°C). It may be necessary to monitor pipe temperatures during hot work to ensure seals are not damaged. Contact EST Group Customer Service if high temperature seal materials are needed.	 **Figure 4:** *If* / *then* using the plug as an isolation and/or welding plug, / position the plug so the seals are an appropriate distance from the weld location.  **Figure 5:** *If* / *then* using the plug to test a weld, / position the plug so that the seals straddle the weld or area you are testing.
3. Remove residual air between the seals, if necessary.	a. Ensure the port between the seals is in the six o'clock position. b. Tighten the hex nut on the plug until the plug is barely able to slide within the pipe. c. Apply slight pressure of the test medium until a small amount of the medium escapes past the seals. At this point, the majority of residual air is removed between the seals.
4. Hand tighten the hex nut until the test plugs grip the pipe ID. Slight wiggling of the plug may allow for further hand tightening of the hex nut.	• The normal torque values listed in Table 1 should be adequate for most installations, however due to variations within internal pip finishes, the torque may need to be increased up to the maximum torque values listed in Table 1. If at the maximum torque the plug still leaks, verify the correct seal and washers are being used, correct if necessary, reinstall and torque the plug in increasing increments starting at the normal installation torque.
5. Using a calibrated torque wrench, tighten the hex nut to the normal installation torque (see Table 1).	• If shaft spins while hex nut is being tightened, a crowsfoot and a pipe wrench/open end wrench must be used (see Table 1 for crowsfoot sizes) After initial tightening it may be possible to use a deep socket as the friction created when the seals contact the pipe ID will prevent the shaft from spinning during further tightening of the hex nut.

Step/Action	*Additional Action/Information/Result*
6. Slowly introduce the test pressure. If performing a pressure drop test, hold the desired pressure with pump for a minimum of 5 minutes to allow parts to settle prior to closing the isolation valve.	 **Figure 6:** **NOTE:** During pressurization, some settling of the plug may occur. If the plug moves more than a total of 0.125" (3 mm) during pressurization or testing, then you must halt and release the pressure immediately. Inspect the test plug and pipe ID for damage and review installation steps taken prior to reinstalling the plug and retesting. If situation continues, contact EST Group Customer Service for technical assistance.
7. After isolation or testing application is complete, release all pressure from the pipe.	**CAUTION** Never remove a plug if upstream pressure is present.
8. Loosen the hex nut until the top of the nut is at the top of the threads.	• The seal is relaxed. Permanent seal deformation may occur if the seal is left partially compressed.
9. Remove the plug from the tube end.	
10. Inspect the plug for wear and replace any worn components.	a. Visually inspect seals for damage including cuts, scores and deformations. b. Visually inspect O-rings (internal) for damage including cuts, scores and deformations if leakage or a pressure drop occurred during the pressure test. c. Verify proper operation of grippers by tightening the hex nut to expand the gripper assembly. Apply a light lubricant if necessary. Wipe away excess. d. Liberally spread antiseize over both sides of the hardened washer and threads of the shaft. Wipe away any excess. Contact EST Group Customer Service for replacement of worn or damaged parts identified.

3. Part Replacement – Disassembly

When performing the steps outlined below, be sure to keep track of the assembly order of component parts. Occasionally a flathead screwdriver may be needed to pry seals away from washer face to facilitate removal. If this is the case, be sure not to damage any components while using the flathead screwdriver.

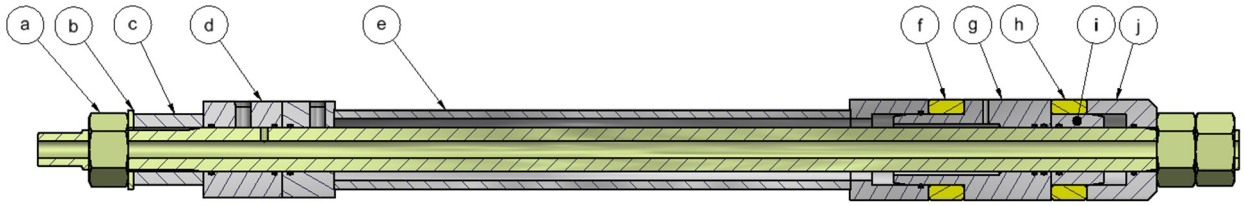


Figure 7: Double Block and Bleed Isolation Plug Component Parts

Step/Action	*Additional Action/Information/Result*
1. Disassemble the plug in assembly order.	Component parts of the plug must be removed in the following order: a. Hex Nut b. Hardened Washer c. Short Comp Tube d. Upstream Monitor e. Between Seal Fill Port/Long Comp Tube Assembly f. Seal g. Cavity Bushing with port h. Seal i. Bottom Seal Collar (Type 2 only) j. Bottom Washer
2. Visually inspect component parts for damages.	*If* / *then* damaged components are identified, / contact EST Group Customer Service for replacement parts. no damaged components are identified, / reassemble the plug (see Figure 7) and prep for storage.

4. Storage

Prior to storing, clean and dry the plug. Re-lubricate the shaft threads and between the hex nut and mating surface as previously described. Store plug in an area out of direct exposure to sun, UV light or temperature extremes. Excessive heat or UV light will damage and prematurely degrade the seal elements.

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- On the Internet: www.cw-estgroup.com

EST Group provides a complete range of repair products, services and replacement parts covering the life cycle of heat exchangers and condensers; additionally EST Group provides products and services to facilitate pressure testing pipe, piping systems, pressure vessels and their components. Visit EST Group on the Internet at www.cw-estgroup.com .

Table 1: Double Block & Bleed Installation Torque Specifications, Sizes ¾" to 3"

Sales Part Number	Nominal Plug Size	SCH	Plug OD [in (mm)]	Clearance Between Plug & Pipe [in (mm)]	Length [in (mm)]	Distance Between Seals [in (mm)]	Normal Install. Torque [ft-lbs (N-m)]	Maximum Install. Torque [ft-lbs (N-m)]	Crow-foot Size (in)	Maximum Pressure Between Seals [PsiG (BarG)]	Maximum Upstream Pressure [PsiG (BarG)]
DBB-75P80	3/4"	80	0.65 (16.5)	0.09 (2.3)	22-5/8 (575)	1.50 (38)	2.5 (3.4)	5.0 (6.8)	7/16	2250 (155)	10 (0.7)
DBB-75P10	3/4"	10	0.78 (19.8)	0.10 (2.5)	22-5/8 (575)	1.50 (38)	4.0 (5.4)	7.0 (9.5)	7/16	2250 (155)	10 (0.7)
DBB-1PXXS / 75P160	1" 3/4"	XXS 160	0.54 (13.7)	0.06 (1.5) 0.07 (1.8)	21-1/4 (540)	1.25 (32)	1.5 (2.0)	3.0 (4.1)	7/16	2250 (155)	10 (0.7)
DBB-1P160 / 75P40	1" 3/4"	160 40	0.72 (18.3)	0.10 (2.5)	22-5/8 (575)	1.50 (38)	3.5 (4.7)	6.5 (8.8)	7/16	2250 (155)	10 (0.7)
DBB-1P80	1"	80	0.84 (21.3)	0.12 (3.0)	22-5/8 (575)	1.50 (38)	4.0 (5.4)	7.0 (9.5)	7/16	2250 (155)	10 (0.7)
DBB-1P40	1"	40	0.93 (23.6)	0.12 (3.0)	22-5/8 (575)	1.50 (38)	5.0 (6.8)	7.0 (9.5)	7/16	2250 (155)	10 (0.7)
DBB-1P10	1"	10	0.98 (24.9)	0.12 (3.0)	22-5/8 (575)	1.50 (38)	5.0 (6.8)	7.5 (10.2)	7/16	2250 (155)	10 (0.7)
DBB-125P160	1-1/4"	160	1.01 (25.7)	0.15 (3.8)	23-7/8 (606)	1.50 (38)	8.0 (10.8)	12 (16.3)	1/2	2250 (155)	10 (0.7)
DBB-125P80	1-1/4"	80	1.13 (28.7)	0.15 (3.8)	23-7/8 (606)	1.50 (38)	10 (13.6)	13 (17.6)	1/2	2250 (155)	10 (0.7)
DBB-125P40	1-1/4"	40	1.23 (31.2)	0.15 (3.8)	23-7/8 (606)	1.50 (38)	11 (14.9)	14 (19.0)	1/2	2250 (155)	10 (0.7)
DBB-125P10	1-1/4"	10	1.29 (32.8)	0.15 (3.8)	23-7/8 (606)	1.50 (38)	12 (16.3)	14 (19.0)	1/2	2250 (155)	10 (0.7)
DBB-15P160	1-1/2"	160	1.19 (30.2)	0.15 (3.8)	26-3/4 (679)	2.50 (64)	15 (20)	20 (27)	3/4	2250 (155)	10 (0.7)
DBB-15P40	1-1/2"	40	1.46 (37.1)	0.15 (3.8)	26-3/4 (679)	2.50 (64)	15 (20)	20 (27)	3/4	2250 (155)	10 (0.7)
DBB-2PXXS / 15P80	2" 1-1/2"	XXS 80	1.35 (34.3)	0.15 (3.8)	26-3/4 (679)	2.50 (64)	15 (20)	20 (27)	3/4	2250 (155)	10 (0.7)
DBB-2P160 / 15P10	2" 1-1/2"	160 10	1.53 (38.9)	0.16 (4.1) 0.15 (3.8)	26-3/4 (679)	2.50 (64)	20 (27)	30 (41)	3/4	2250 (155)	10 (0.7)
DBB-2P80	2"	80	1.76 (44.7)	0.18 (4.6)	28-1/2 (724)	2.50 (64)	30 (41)	50 (68)	7/8	2250 (155)	10 (0.7)
DBB-2P40	2"	40	1.89 (48.0)	0.18 (4.6)	28-1/2 (724)	2.50 (64)	30 (41)	50 (68)	7/8	2250 (155)	10 (0.7)

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DBB-2P10	2”	10	1.98 (50.3)	0.18 (4.6)	29-1/4 (743)	2.50 (64)	35 (47)	60 (81)	7/8	2250 (155)	10 (0.7)
DBB-25P160	2-1/2"	160	1.95 (49.5)	0.18 (4.6)	28-1/2 (724)	2.50 (64)	35 (47)	60 (81)	7/8	2250 (155)	10 (0.7)
DBB-25P40	2-1/2"	40	2.29 (58.2)	0.18 (4.6)	29-1/4 (743)	2.50 (64)	60 (81)	90 (122)	1-1/4	2250 (155)	10 (0.7)
DBB-3PXXS / 25P80	3” 2-1/2”	XXS 80	2.13 (54.1)	0.17 (4.3) 0.19 (4.8)	29-1/4 (743)	2.50 (64)	60 (81)	90 (122)	1-1/4	2250 (155)	10 (0.7)
DBB-3P160 25P10	3” 2-1/2”	160 10	2.46 (62.5)	0.17 (4.3) 0.18 (4.6)	34-1/4 (870)	2.50 (64)	100 (136)	150 (203)	1-13/16	2250 (155)	10 (0.7)
DBB-3P80	3”	80	2.69 (68.3)	0.21 (5.3)	34-1/4 (870)	2.50 (64)	150 (203)	200 (271)	1-13/16	2250 (155)	10 (0.7)
DBB-3P40	3”	40	2.86 (72.6)	0.21 (5.3)	34-1/4 (870)	2.50 (64)	150 (203)	200 (271)	1-13/16	2250 (155)	10 (0.7)
DBB-3P10	3”	10	3.04 (77.2)	0.22 (5.6)	34-1/4 (870)	2.50 (64)	175 (237)	250 (339)	1-13/16	2250 (155)	10 (0.7)

NOTE: A high strength crowfoot may be required when using plugs that require an installation torque greater than 91 ft-lbs. Contact EST Group Customer Service to purchase high strength crowfoot wrenches.

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