



FLANGE TEST & WELDING PLUG OPERATING PROCEDURES



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PLEASE READ THROUGH ALL OPERATING PROCEDURES THOROUGHLY AND CAREFULLY BEFORE ATTEMPTING INSTALLATION. COMPLIANCE TO THESE INSTRUCTIONS CAN PREVENT SAFETY HAZARDS.

These operating instructions give step-by-step instructions on the use of the flange test and welding plug. This plug can be used in two different configurations as a test plug and a welding plug. The latter plug configuration allows the flange-to-pipe weld to be tested after welding. The weld plug configuration aids in the welding of the flange to pipe while monitoring upstream pressure and also allows the weld to be tested after welding. Follow steps labeled:

TP Test Plug configuration **WP** Weld Plug configuration **TP/WP** Test & Weld Plug configurations



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 WHEN PRESSURE TESTING. FOR SAFETY, AN INCOMPRESSIBLE LIQUID SUCH AS WATER SHOULD BE USED AS THE TEST MEDIUM. RESIDUAL AIR OR GAS IS TO BE EVACUATED FROM THE PIPE PRIOR TO TESTING.

1. Before Installation

- Verify stamping on compression ring is equivalent to the pipe size and schedule being tested. The compression ring should be stamped with the O.D., pipe size, and pipe schedule. **EXAMPLE:** For 1” schedule 80 the seal O.D. should be the same as the compression ring O.D.
- Inspect the raised face (gasket surface) of the flange plug and mating flange to be tested. Damage or surface imperfections may result in leakage and should be repaired prior to testing.
- Clean and dry the pipe I.D. Remove all moisture, debris and excessive scale.



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TP

1. Attachment of Test Plug to Mating Flange

- Any weld spatter or drops that protrudes into pipe I.D. more than clearance listed in table 1 must be removed to allow plug installation.
- If installation depth is limited in length of pipe, one comparison of tubes between the flange and seal can be moved to the opposite side of the flange to reduce the distance between seal and flange. For $\frac{3}{4}$ "-1" sizes, the compression tube that is being repositioned must be placed between the flange fill-vent port tube assembly and the upstream monitor port tube. (See diagram on page 3).
- Apply gasket to mating flange face and position flange plug against mating flange. Rotate plug as required locating purge vent at highest point and installing flange bolts. Tighten bolts in a cross-like pattern to properly seal the flange gasket.

WP

Attachment of Welding Plug Setup to Mating Flange

- The distance between the flange and the washer and seal assembly should be approx. 12". If not, check to see both compression tubes are installed between the flange, seal and compression ring assembly.
- Put the flange to be welded on the pipe using an alignment tool. (The flange test and welding plug is not designed to support or position flange to be welded). Apply gasket to mating flange face and insert the flange plug into the flange and pipe with the inert gas purge ports oriented at the top and bottom of the flange. Tighten bolts in a cross-like pattern to properly seal the flange gasket.

TP/WP

2. Tightening & Expansion of Seal Element

- Correct tightness of hex nut is critical to the operation of the flange test & welding plug. A leak of the seal is usually an indication the hex nut(s) was not adequately tightened. The normal torque listed in table 1 should be adequate for most installations. However, due to variations within pipe I.D. finishes the torque may need to be increased up to the maximum torque value listed in table 1. If at the maximum torque, the plug still leaks, verify the correct seal and compression rings are being used.

For Sizes $\frac{3}{4}$ " - 2-1/2"

- Tighten hex nut in normal installation torque listed in Table 1, using a calibrated torque wrench. If shaft spins while hex nut is being tightened, a crow's-foot and pipe wrench opened and wrench must be used. (See Table 1 for crow's-foot sizes).

For Sizes 3" - 8"

- For sizes 3" and larger, tighten the hex nut by hand to remove any slack from the parts. Then use a $\frac{3}{4}$ " drive or larger impact wrench capable of producing the torque values listed in Table 1. A deep impact socket is required, (see Table 1 for impact socket sizes). The use of an impact wrench will prevent the shaft from spinning and enable the counting of turns listed in Table 1 to reach the required torque.



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- If an impact wrench and deep socket are not available, two wrenches may be used. The second is required to hold the shaft while turning the hex nut the required number of times.
- The torque may be checked with a calibrated torque wrench and should be between the normal and maximum values listed in Table 1.

WP

3. Preparation for Welding

- Make connection to upstream monitor port that will clearly indicate an increase of pressure or the presence of dangerous gases. In addition, attaching approximately 50 ft. of hose to the vent port and locating the end of the hose downwind from the weld area may vent upstream vapors.

FOR NORMAL CONDITIONS WHERE INERT GAS PURGE IS NOT REQUIRED:

- Remove pipe plugs from fill and vent plugs on the flange or make connections to fill and vent ports as required by welding safety procedures.

IF INERT GAS PURGE IS REQUIRED:

- Remove pipe plugs from the fill and vent ports on the flange.
- Connect inert gas supply to fill port. Make connections to vent port as required to monitor or regulate the flow of inert gas.
- Initiate inert gas purge and adjust inert gas pressure regulator as required to maintain a slight positive pressure during welding. As welding proceeds, adjust inert gas flow as needed to insure weld quality.

WP

4. Welding



NOTE: DO NOT LET THE WELD PROTRUDE INTO THE PIPE I.D. BY MORE THAN THE VALUES LISTED IN TABLE 1 OR GRINDING OF THE PIPE I.D. MAY BE REQUIRED FOR PLUG REMOVAL.

- Begin welding the flange to the pipe while monitoring upstream pressure. Stop welding immediately if the upstream pressure increases which indicates flow in the line. During welding the pipe at the seal location must not become too hot to touch by hand, discontinue welding and allow pipe to cool.



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TP/WP 5. Hydrostatic Pressure Test



WARNING: Never attempt to adjust the flange test & welding plug while under pressure. Never exceed the test pressures in Table 2.

- Remove the vent plug
- Connect hydro pump to fill port on flange
- Slowly begin to fill the plug until water flows from the vent. Discontinue water input and install the vent plug leak tight. Refer to Table 2 for the maximum test pressure for the flange test plug. The test pressure must never exceed the desired pressure with pump for a minimum of five minutes prior to losing isolation valve. This will allow parts to settle. Continue holding the desired pressure to meet testing requirement. If pressure drops off a large amount or a leak between seal and tube I.D. is detected, tighten the hex nut until leak is sealed. (DO NOT exceed maximum installation torque). After the test is completed, release all pressure.
- Remove the fill and vent plugs to drain water
- Remove all testing equipment.
- Loosen the hex nut(s) to fully relax seal.
- Loosen and remove hex nuts and flange mounting boils.
- Withdraw the flange test plug from the pipe.

Inspect Plug After Use:

Surface imperfections on the flange face should be fixed prior to further testing. Replace worn or damaged flange gaskets and seals. Clean and dry prior to storage. Keep and store these instructions with flange test plug.

Table 1:

Size:	Clearance Between Plug & Pipe (in)	Normal Installation Torque (ft-lbs)	Maximum Installation Torque (ft-lbs)	Wrench Size (in)	Deep Impact Socket Size" (in)
3/4"	.035	50	Do Not Exceed Normal Torque	9/16"	9/16"
1"	.055	100	200	9/16"	9/16"
1-1/4"	.068	25	40	1/2"	15/16"
1-1/2"	.085	25	40	1/2"	15/16"
2"	.130	35	50	1/2"	15/16"
2-1/2"	.125	100	200	1"	2-5/8"



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Table 1:

Size:	Clearance Between Plug & Pipe (in)	Normal Installation Torque (ft-lbs)	Maximum Installation Torque (ft-lbs)	Estimated # of Turns of Hex Nut	Wrench Size to Hold Shaft (in)	Deep Impact Socket Size (in)
3"	.193	200	400	5	1	2-5/8"
3-1/2"	.204	200	400	5	1	2-5/8"
4"	.220	200	400	5	1	2-5/8"
6"	.250	400	900	6	1-5/8"	3-1/8"
8"	.250	400	900	6	1-5/8"	3-1/8"

Under normal conditions a 200-lb. Man would require at least a 1-ft. lever to achieve 200 ft.-lbs. The same man would require at least a 2-ft. lever to achieve 400 ft.-lbs.

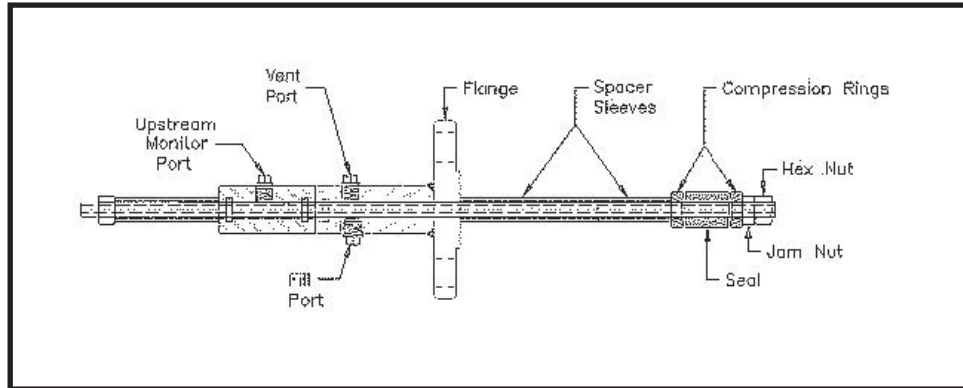
Table 2:

Class (lb)	Maximum Test Pressure (psi)	Bar:
150	450	31
300	1,125	77
400	1,500	103
600	2,250	155



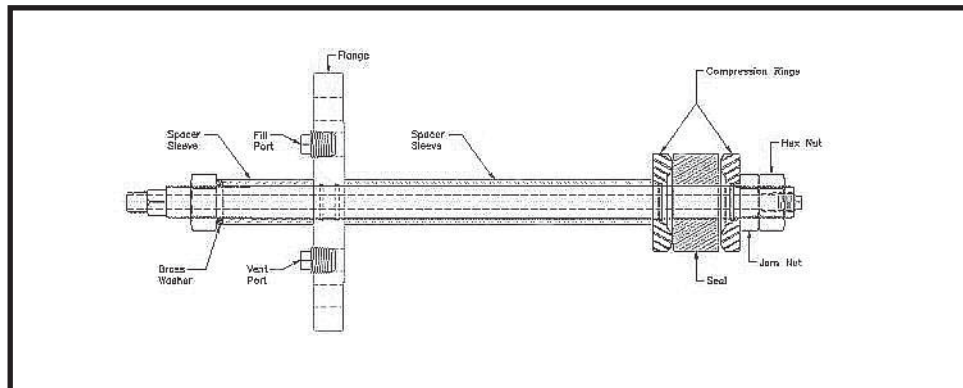
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For Sizes 3/4" - 1":



1. Remove hex nut and jam nut from bottom of shaft.
2. Remove compression rings and seal from shaft.
3. Install first compression ring, seal and second compression ring. Compression rings are stamped with the line size and schedule. Seals are color coded for your convenience and stamped with the line size and schedule.
4. Install jam nut onto shaft as far as possible. Install hex nut and tighten hex nut against jam nut with a wrench.
5. Plus is ready for testing.

For Sizes 1-1/4" - 3":

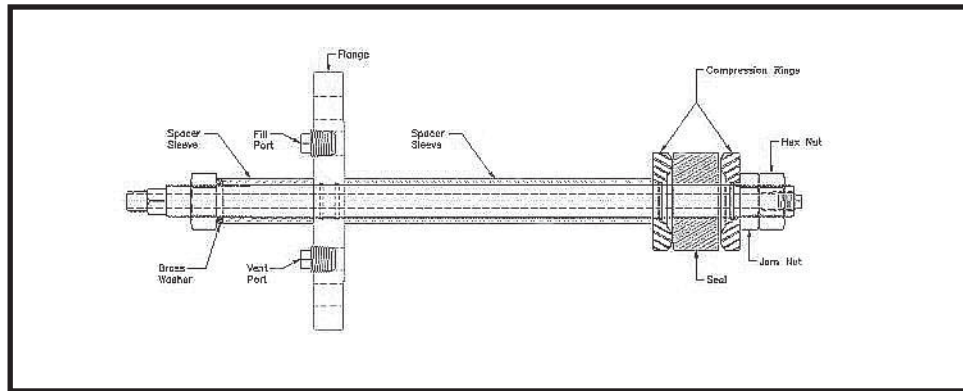


1. Remove hex nut and jam nut from shaft.
2. Remove compression rings with o-rings and seal from shaft taking care not to damage o-ring in I.D. of compression ring. Inspect o-ring and replace if worn or damaged.
3. Lubricate o-ring in I.D. of compression ring with grease and carefully install washer onto shaft. Compression rings are stamped with the line size and schedule. Seals are color coded for your convenience and stamped with the line size and schedule.



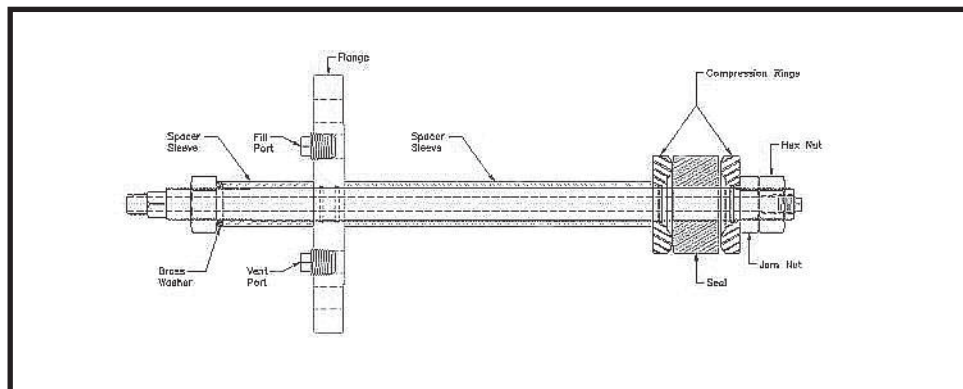
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For Sizes 1-1/4" - 3" Continued:



4. Install seal and compression ring.
5. Install jam nut onto shaft as far as possible. Install hex nut and tighten hex nut against jam nut with a wrench.
6. Plus is ready for testing.

For Sizes 3" - 8":



1. Remove hex nut and jam nut from shaft.
2. Remove compression ring, seal and o-ring compression ring from shaft, taking care not to damage o-ring in I.D. of compression ring. Inspect o-ring and replace if worn or damaged.
3. Lubricate o-ring in I.D. of washer with grease and carefully install washer onto shaft so that tapered side will be positioned against seal. Compression rings are stamped with the line size and schedule. Seals are color coded for your convenience and stamped with the line size and schedule.
4. Install seal and tapered washer so that tapered side will be positioned against seal.
5. Install jam nut onto shaft threads first as far as possible. Install hex nut and wrench tighten hex nut against jam nut.
6. Plug is ready for testing.