HIGH LIFT FLANGE TEST & WELDING PLUG OPERATING INSTRUCTIONS

These operating instructions give step-by-flange test & welding plug. This plug can be used in two different configurations as a test plug and a welding plug. The test 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** for test plug configuration, **WP** for weld plug configuration, and **TP WP** for both.

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 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 VENTED FROM THE PIPE PRIOR TO TESTING.

PRIOR TO USE:

- Verify stamping on washer is equivalent to the pipe size being tested. The washer should be stamped with the flange size and pipe schedule.
  Example: The stamp "1P80" should be interpreted as 1" SCH 80 pipe sizes. The seal OD should be the same as the washer OD.
- 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 ID. Remove all moisture, debris, and excessive scale.

STEP 1

TP ATTACHMENT OF TEST PLUG TO MATING FLANGE

- Any weld droop or spatter that protrudes into pipe ID more than clearance listed in Table 1 must be removed to allow plug installation.
- If sufficient installation depth is not available in the pipe and flange, one of the compression 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 ¾" – 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 5)*
- Apply gasket to mating flange face and position Flange Plug against mating flange. Rotate the plug as required to position the vent port at the highest point and install using flange bolts. Tighten bolts in a cross-like pattern to properly seal the flange gasket.

WP ATTACHMENT OF WELDING PLUG SET-UP TO MATING FLANGE

- The distance between the flange, washer, and seal assembly should be approx. 12". If not, check to see both compression tubes are installed between the flange, seal, and washer assembly.
- Locate the flange to be welded on the pipe using an alignment tool *(The Flange Test & 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 vent and fill ports oriented at the top and bottom of the flange. Tighten bolts in a cross-like pattern to properly seal the flange gasket.

STEP 2

TP WP TIGHTENING AND 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 id 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 washers are being used.

For Sizes 3/4" to 2-1/2":

Tighten hex nut to normal installation torque listed in Table 1 using a calibrated torque wrench. If shaft spins while hex nut is being tightened, a crowfoot and a pipe wrench/opened end wrench must be used. *(See Table 1 for crowfoot sizes.)*

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For Sizes 3" - 4":

- For sizes 3" and larger, tighten the hex nut by hand to remove any slack from the parts. Then use a ¾" 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.
- If an impact wrench and deep socket are not available, two adjustable crescent wrenches may be used. The second is required to hold the shaft while turning the hex nut the estimated number of turns in Table 1.
- The torque may be checked with a calibrated torque wrench and should be between the normal and maximum values listed in Table 1.

NOTE: The torque required to seal plug sizes 3" to 4" is greater than the torque used to bolt up a 300lb flange when using a spiral wound metal gasket.

STEP 3

WP 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 upstream vapors may be vented by attaching approximately 50 ft. of hose to the vent port and locating the end of the hose downwind from the weld area.

For normal conditions where Inert Gas Purge is not required:

- Remove pipe plugs from fill and vent ports 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 ensure weld quality.

STEP 4

WP WELDING

- **NOTE: Do not let the weld protrude into the pipe ID by more than the values listed in Table 1 or grinding of the pipe ID 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. Should the pipe in the seal location become too hot to touch by hand, discontinue welding and allow pipe too cool.

STEP 5

TP WP 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 strength of the weakest component in the system being tested. Slowly introduce the test pressure. If a pressure decay test will be conducted, hold at desired pressure with pump for a minimum of 5 minutes prior to closing isolation valve. This will allow parts to settle. Continue holding the desired pressure to meet testing requirements. If pressure drops off a large amount or a leak between seal and tube id is detected, tighten the hex nut until leak is sealed. *(Do not exceed max. 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 bolts. Withdraw the Flange Test Plug from the pipe.

INSPECT PLUG AFTER EACH USE

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

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TABLE 1: High Lift Flange Weld Test Plug Clearance & Suggested Installation Torque Values

Nominal Plug Size	Clearance Between Plug & Pipe		Nominal Installation Torque (*)		Maximum Installation Torque		Estimated Number of Turns of Hex Nut	Hex Flat Size to Hold Shaft
	in	mm	Ft-lbs	N-m	Ft-lbs	N-m		in
3/4”	0.07	1.8	50 in-lbs	5.6	Do Not Exceed Normal Torque		9/16	No Hex Flats
1”	0.11	2.8	100 in-lbs	11.3	200 in-lbs	22.6	9/16	No Hex Flats
1-1/4”	0.13	3.3	25	33.9	40	54.2	1/2	15/16
1-1/2”	0.17	4.3	25	33.9	40	54.2	1/2	15/16
2”	0.26	6.6	35	47.5	50	67.8	1/2	15/16
2-1/2”	0.25	6.4	100	136	200	271	7/8	2

Nominal Plug Size	Clearance Between Plug & Pipe		Nominal Installation Torque (*)		Maximum Installation Torque		Estimated Number of Turns of Hex Nut	Hex Flat Size to Hold Shaft	Hex Nut Size
	in	mm	Ft-lbs	N-m	Ft-lbs	N-m		in	In
3”	0.38	9.7	200	271	400	542	5	7/8	2
4”	0.44	11.2	200	271	400	542	5	7/8	2

TABLE 2: Flange Weld Test Plug Working Pressures

CLASS	MAXIMUM TEST PRESSURE	
	PSIG	BARG
150 LBS.	450	31.0
300 LBS.	1,125	77.6
600 LBS.	2,250	155

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REPLACEMENT SEAL & WASHER PROCEDURE

¾" – 1" Plug Sizes (refer to Figure 1)

1. Remove hex nut & jam nut from bottom of shaft.
2. Remove bottom washer, seal, and washer from shaft.
3. Install first washer, seal, and second washer. Note: The washer must be placed on the shaft so that the serrated (non-smooth) surface of the washer contacts the seal. The ¾" Schedule 160 and 1" Schedule XXS plugs do not have serrated washers.
4. Install jam nut onto shaft as far as possible. Install hex nut and wrench tighten hex nut against jam nut.
5. Plug is ready for testing.

1-1/4" To 3" Plug Sizes (refer to Figure 2)

1. Remove hex nut & jam nut from shaft.
2. Remove seal and both O-ring washers from shaft, taking care not to damage either O-ring's in the ID of washers.

Note: Inspect the O-ring's and replace if worn or damaged

3. Lubricate both O-rings in ID of washers with grease.
4. Carefully install one O-ring washer onto shaft. Note: The O-ring washer must be placed on the shaft so that the serrated (non-smooth) surface of the washer contacts the seal.
5. Install seal and second O-ring washer. Note: The O-ring washer must be placed on the shaft so that the serrated (non-smooth) surface of the washer contacts the seal.
6. Install jam nut onto shaft as far as possible. Install hex nut and wrench tighten hex nut against jam nut.
7. Plug is ready for testing.

4" Plug Sizes (refer to Figure 3)

1. Remove hex nut & jam nut from shaft.
2. Remove seal and both O-ring washers from shaft, taking care not to damage either O-ring's in the ID of washers.

Note: Inspect the O-ring's and replace if worn or damaged.

3. Lubricate both O-rings in ID of washers with grease.
4. Carefully install on O-ring washer onto shaft. Note: The O-ring washer must be placed on the shaft so that the serrated (non-smooth) surface of the washer contacts the seal.
3. Install seal and second O-ring washer. Note: The O-ring washer must be placed on the shaft so that the serrated (non-smooth) surface of the washer contacts the seal.

Note: Make sure that the tapered side for both O-ring washers will be positioned against the seal

4. Install jam nut onto shaft threads first as far as possible. Install hex nut and wrench tighten hex nut against jam nut.
5. Plug is ready for testing.

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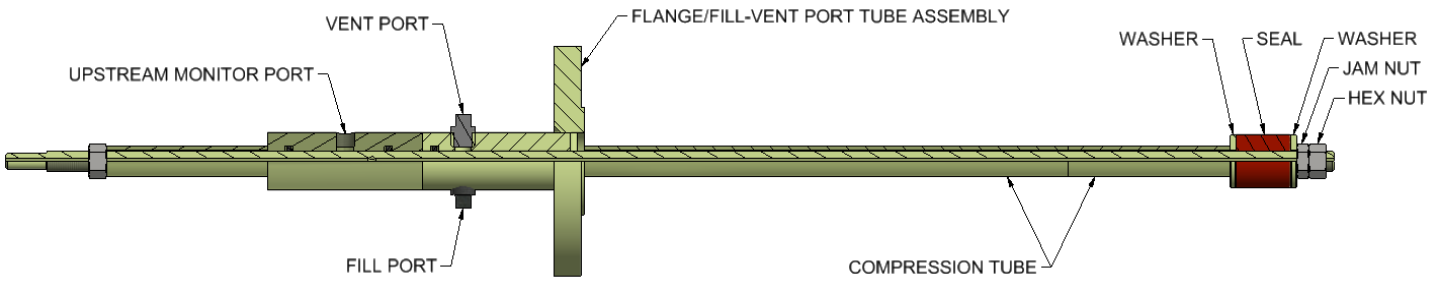

Figure 1: High Lift Flange Weld Test Plug, ¾" and 1" Plug Sizes, Shown in WP Configuration

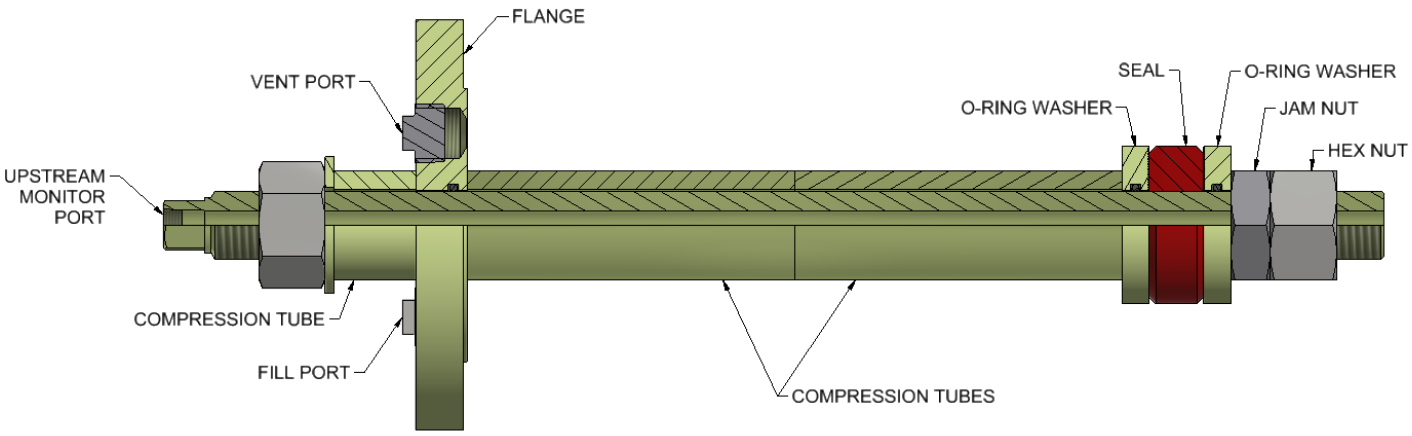

Figure 2: High Lift Flange Weld Test Plug, 1-1/4" Through 3" Plug Sizes, Shown in WP Configuration

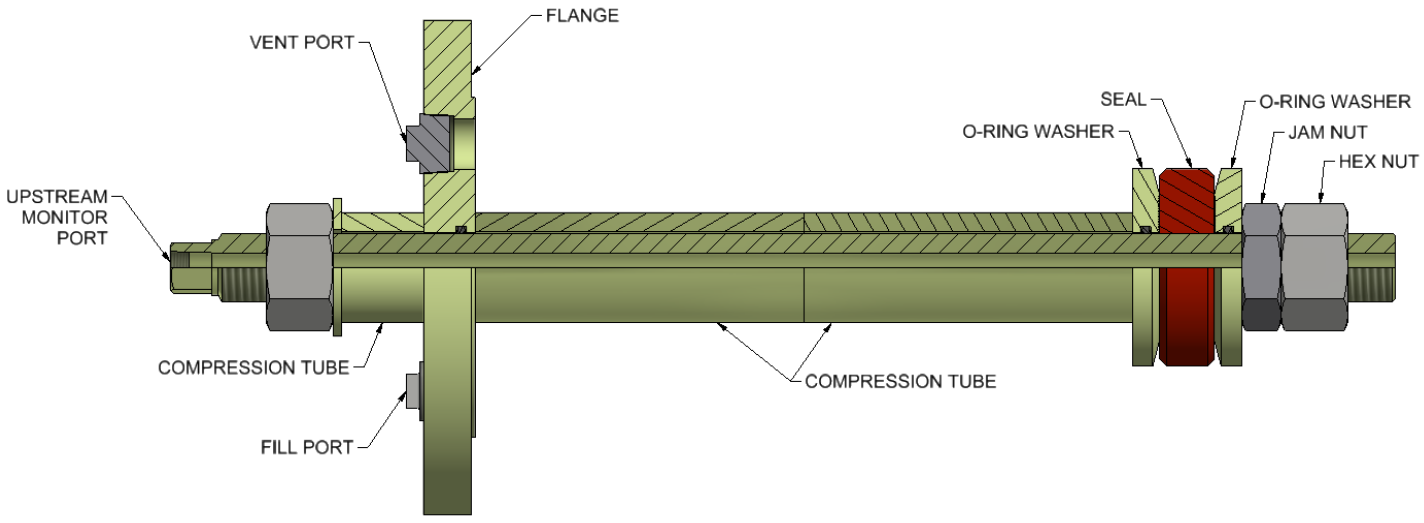

Figure 3: High Lift Flange Weld Test Plug, 4", Shown in WP Configuration

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