7-3. Closing Vessel

Before closing vessel;

- Do not proceed to closing vessel steps until elements and adapters have been installed in vessel.
- Do not proceed to closing vessel steps until head has been checked for correct component assembly, and vessel has been shimmed to prevent movement of the elements if required

STEP 1 INSPECT SHELL INSIDE SURFACE

1. Inspect the vessel inside surface for any corrosion deposits or other foreign matter. If any are found, clean the surface as follows :

   Using a medium or finer grade of Scotchbirter and a mild soap solution, clean each end of the vessel liner surface up to 8" in from each end of vessel.

   Rinse away all loosened deposits from the shell inside surface using clean fresh water.
2. Inspect the vessel inside surface for scratches or other damage which could cause leaks. Vessels that leak must be replaced.
3. Inspect feed and concentrate port seals and attachments for internal and external damage or deterioration. Contact Advanced Structures, Inc. for guidance, if damage to the vessel's internal surface or feed / concentrate port, seals or attachments are discovered during inspection.

STEP 2 SHELL AND HEAD SEAL LUBRICATION

4. Work O-ring lubricant glycerin into the shell from half way up the bevel to approximately 1/2" in from the bevel. (See Figure 3)
5. Ensure the entire head seal is covered with a thin layer of O-ring lubricant, with no dirt or dust contamination. Use only glycerin for lubrication.

STEP 3 INSTALL HEAD

STEP 3A INSTALLATION BY HAND

6. Hold the head assembly square to axis of the shell and slide it straight in until a slight resistance is felt.

Do not rotate the head assembly after insertion into the vessel as this may cause the head seal to become detached.

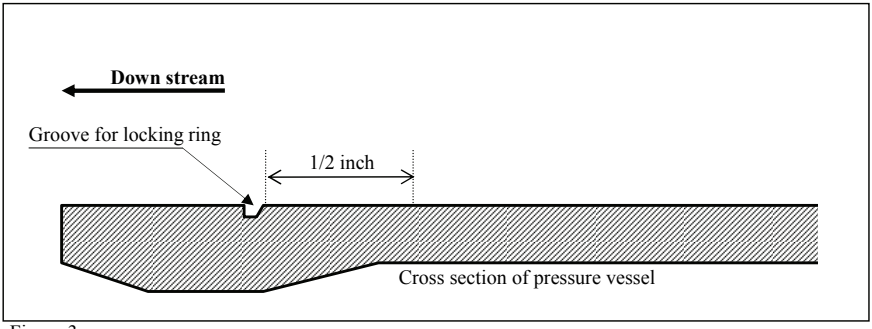

Figure 3

7. Using both hands, firmly push the head in as far as it will go. (A sharp, forceful thrust may be necessary to enter the head seal into the vessel bore). When the head is correctly positioned, approximately 1/2" of the locking ring groove will be exposed.

STEP 3B INSTALLATION USING TOOL

8. Hold the head assembly square to axis of the shell and slide it straight in until a slight resistance is felt.
9. Slide the head tool into the shell just behind the head. Do not engage threaded rods.
10. Give a sharp, forceful thrust on the head tool to enter the head into the vessel bore. Then push into the shell as far as it will go. When the head is correctly positioned, approximately 1/2" of the locking ring groove will be exposed.
11. Remove the tool by pulling straight out. Do not rotate.(The tool can be obtained from Advanced Structures, Inc.)

STEP 4 INSTALL INTERLOCK

12. Refer to Figure 1 for correct segment identification.
13. With the head assembly inserted into the shell, install segment B into the bottom of the shell groove,

with the stepped edge facing outwards.

14. Slide segment B counterclockwise making room to install segment C into the bottom of the shell groove.
15. Slide segments B & C in the shell groove until the square ends meet at the 3 o'clock position. Hold these in position while installing segment A (the key segment in the 9 o'clock position).
16. Rotate the installed locking ring set counterclockwise until the square ends of segments B&C are in the 12 o'clock position. (This will prevent the segments from falling out.) Locking ring segments must be installed with stepped edge facing outwards.
17. Install the yellow securing ring with its ends flush. Align the three mounting holes in the ring with their corresponding holes in the bearing plate. Insert the three securing screws and turn them in about two turns.
18. Press the securing ring in until it seats securely on the bearing plate. Before inserting of securing screws, it is advisable to lightly coat the screw threads with anti-seize compound, to ease later disassembly.
19. Tighten all three mounting screws until snug. Over-tightening may cause disassembly problems!
20. Visually inspect locking ring set to ensure it is correctly positioned between shell and bearing plate.
21. Verify that securing ring is fully seated and held in place by securing screws.

! WARNING

INTERLOCKING COMPONENTS MUST BE CORRECTLY INSTALLED. INCORRECT ASSEMBLY OR INSTALLATION CAN RESULT IN EXPLOSIVE HEAD FAILURE.

STEP 5 RECONNECT PERMEATE PIPING

22. Reconnect manifold piping to the vessel permeate port. Using Teflon tape on all threaded connections will help ensure a leak-free assembly.

Do not tighten a component into thermoplastic permeate port more than one turn past hand tight.

STEP 6 PRE-PRESSURIZATION CHECKS

23. It is vitally important that the following checks be carried out before any attempt is made to pressurize the vessel.

HEAD ASSEMBLY

Verify the following at each end of the vessel.

- Head assembly is in good condition, with no evidence of damage or corrosion.
- Locking ring set is properly in place and yellow securing ring is snugly held in place by the securing screws.

MEMBRANE ELEMENTS

Verify that;

- Elements are installed in the vessel.
- Elemen adapters are installed at each end of vessel.
- Thrust ring installed at downstream end of vessel.

PIPING CONNECTIONS

- Check all piping connections to ensure that they will provide a leak-free seal.

STEP 7 PRESSURIZATION

24. After following the above pre-pressurization checks, pressurize vessel in accordance with the element specifications.
25. Vessels should be filled slowly to assist trapped air to escape.
26. Vessels should be pressurized slowly to avoid damage to membrane elements and vessel components.