FILMTEC™ Membranes

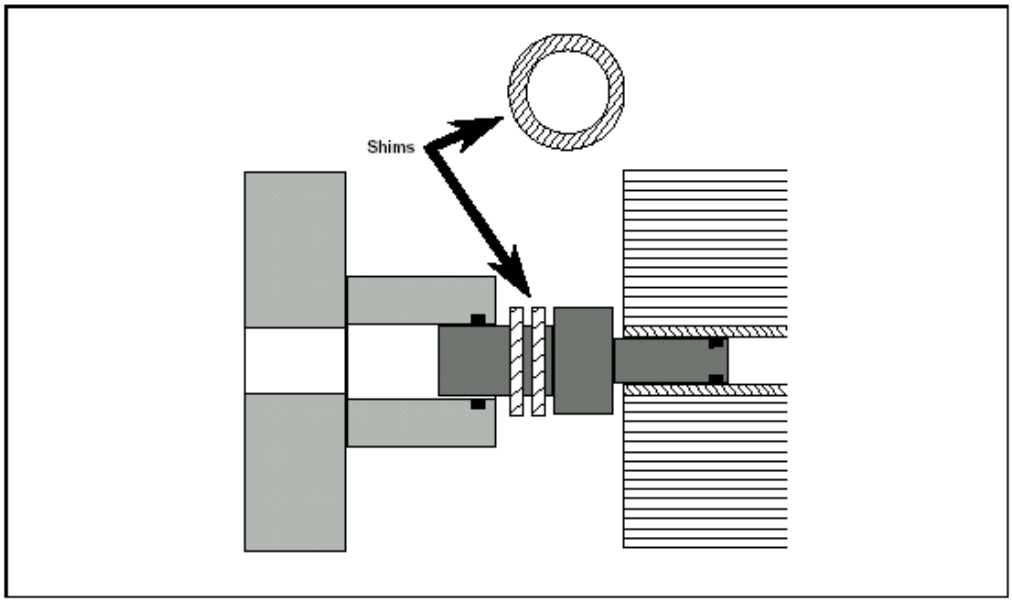
Loading of Pressure Vessels: Shimming Elements

Shimming Elements

Pressure vessels for membrane elements are all built with a tolerance to allow for slight variations in the length of the elements. This is referred to as freeboard. In operation, the elements can slip back and forth during start-up and shutdown, causing wear to the internal seals. Additionally, the pressure vessel elongates when pressurized, which in the most extreme case could push the whole stack of elements off of the lead end adapter, resulting in a severe feed-to-permeate leak. Shimming the elements in a pressure vessel at the time they are loaded will minimize the shifting that occurs during start-ups and shutdowns and ensures that the adapters are properly seated in the permeate tubes of the lead and tail elements.

Shims themselves are plastic spacer rings (like washers), usually about 0.20 inches (5 mm) thick with an inside diameter slightly larger than the pressure vessel head end of the adapter. Figure 4.1 shows a drawing of a typical shim and the placement of multiple shims on the adapter between the adapter hub and the pressure vessel head. Shims are always placed on the feed end adapter, keeping the stack of elements tight against the thrust ring and end plug on the brine end of the pressure vessel.

Figure 4.1 Shim and placement on feed end adapter



Shims can be purchased from your pressure vessel manufacturer. An alternative is to cut shims from an appropriately sized piece of polyvinylchloride (PVC) pipe. If cut from pipe, the shims must be free of burrs and must be cut parallel and flat to work correctly.

Shimming Elements (cont.)

The process of shimming is performed after the membrane elements have been loaded. The element stack should be pushed completely into the vessel such that the downstream element is firmly seated against the thrust ring at the brine end of the vessel. Refer to the pressure vessel manufacturer's instructions on loading elements. From this point the procedure is as follows:

1. Remove the adapter o-ring and head seal from the feed end of these vessel components. This will assure that there is no interference from any of the sealing components and minimize the force required to "seat the head."
2. Remove the end plate and slide spacers over the head end of the adapter that fits into the permeate port. Add enough spacers so it is not possible to install the retaining rings after seating the head.
3. Remove one spacer at a time until you can just install the retaining rings. The slight remaining movement is acceptable.
4. Remove the head and reinstall the adapter o-ring and head seal.
5. Close the vessel according to the manufacturer's instructions.

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