



Loading of Pressure Vessels

The following guide is intended to provide information on safely loading with Membrania® reverse osmosis (RO) elements. For additional loading instructions, please contact DC Solutions Technical Service or the individual pressure vessel manufacturer.

SAFETY EQUIPMENT

Having proper equipment is essential for safely executing the following start-up procedure. Appropriate gloves, shoes and safety glasses should be worn at all times. Additional equipment may be necessary depending on specific system design.

EQUIPMENT

- Silicone lubricant* (i.e. Dow Corning Molykote 111)
- Glycerin*
- Permeate quality water to flush vessel
- Sponge/swab, long stick or PVC pipe, and rope to clean vessel
- Spare o-rings to replace any damaged o-rings during loading
- Shims (please refer to Membrania' Element Loading Guide – Shimming Elements (TSG-O-008) for guidelines)
- Instructions and tools recommended by the pressure vessel manufacturer for removing and installing end cap assemblies

**Note: When loading elements into a system, use a silicone based gel or glycerin to lubricate o-rings and brine seals. Do not use oil, grease, or petroleum based compounds as they may cause damage to the membrane or element.*

INSTALLATION PREPARATION

1. Check that all items (membrane elements, interconnectors, adapters, and o-rings) are present and in the correct quantities.
2. Carefully remove all dust, dirt, and foreign matter from the pressure vessels before opening them.
3. Disassemble and wash all end cap parts (o-rings, adapters, etc.) with fresh water and keep parts clean for re-installation.



4. Flush permeate or fresh water through the open pressure vessels to remove any dust or debris present in the vessels. If additional cleaning is necessary, create a sponge/swab large enough to fill the inside diameter of the pressure vessel. Soak the sponge or swab in a 50-75% glycerin/water solution and move it back and forth through the pressure vessel with a piece of rope or long PVC pipe until the vessel is clean and lubricated. Be sure to avoid scraping the inside of the pressure vessel.

ELEMENT LOADING

1. Stage the elements prior to loading and record each element's serial number by position so that each element location within the pressure vessel is known.
2. Open the element bag in a well-ventilated area and remove the element. Refer to the Safety Equipment section and minimize direct contact with the storage solution.
3. Gently place the first element into the feed end of the first pressure vessel and slide the element in approximately one-half to three-quarters of the way. Always load elements into the feed end of the pressure vessel because the brine seal makes it difficult to install the element in the opposite direction. Be sure that the U-cup brine seal (if present) is properly seated in the groove of the ATD of the element such that the brine seal opens in the upstream direction.
4. To load elements, lubricate the o-ring seals on the interconnector and the inside of the permeate tube with a thin layer of lubricant and insert the interconnector into the permeate tube of the element. *Note: When installing o-rings, expand them slightly, do not roll them into position.*
5. If a lubricant is required to ease the loading of elements, apply a thin layer of lubricant to each brine seal to avoid drag.
6. Lift the next element into position and install the previous element into the interconnector to connect elements. Hold the next element with care so that the weight is not supported by the interconnector, and push the element into the pressure vessel until about one-half of the element extends outside the vessel.
7. Repeat steps 2 through 6 until all elements are loaded into the pressure vessels.
8. After all the elements have been loaded, install the downstream end cap assembly on the end of the pressure vessel. Carefully position the downstream end cap assembly in the vessel and push the end cap assembly as a unit squarely into the end of the element. Avoid pinching or rolling of the o-rings when seating the o-ring seal on the adapter. Rotate the end cap assembly to ensure proper alignment with the connecting piping.
9. Gently push the element stack from the feed end (upstream) towards the downstream end
10. After the elements have been installed, determine if it is necessary to add shims before re-installing the upstream end cap. Shims reduce the amount of "freeboard", or space between the face of the lead element and the face of the adapter hub. Shimming helps prevent elements from moving during system start-up and shutdown. Please refer to **Element Loading Guide – Shimming Elements** (TSG-O-008) for additional detail.
11. Continue steps 8 through 10 for each pressure vessel in the train or system.
12. Re-install the feed end cap assembly on each of the pressure vessels. Close each pressure vessel with the clean parts from Step 4 in *Installation Preparation* above.