



# 40E60 Brackish RO Pressure Vessels

## User's Guide

### DANGER-HIGH PRESSURE DEVICE

This vessel may cause loss of life, severe bodily harm, or property damage if not correctly installed, operated and maintained. Read and understand all guidelines given in this bulletin before attempting to open, operate or service this vessel. Failure to follow these guidelines and observe every precaution will result in malfunction and could result in catastrophic failure. Misuse, incorrect assembly, or use of damaged or corroded components can result in high-velocity release of the end closure. We recommend that only a qualified technician experienced in servicing high-pressure hydraulic systems open, close and service this vessel.

### Important Safety Precautions

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| <p><b>Do...</b> read, understand, and follow every guideline in this bulletin. Failure to take every precaution may void warranty and could result in catastrophic failure.</p> <p><b>Do...</b> install in an area where a vessel or piping malfunction that results in water leakage would not damage sensitive or expensive equipment, such as electronic components.</p> <p><b>Do...</b> verify that head locking components are properly placed and secured.</p> <p><b>Do...</b> inspect end closures regularly, replace deteriorated components, and correct causes of corrosion.</p> <p><b>Do...</b> follow membrane element manufacturer's recommendations for loading elements into vessel (see <i>Replacing Elements</i>).</p> | <p><b>Do not...</b> operate vessel at pressures and temperatures in excess of their specific rating.</p> <p><b>Do not...</b> service any component until you verify that pressure is fully relieved from the vessel.</p> <p><b>Do not...</b> Use corroded components. Use of such components may result in catastrophic failure.</p> <p><b>Do not...</b> pressurize vessel until after visually inspecting to ensure that the spiral retaining ring is correctly installed.</p> <p><b>Do not...</b> tolerate leaks or allow end closures to be routinely wetted in any way.</p> <p><b>Do not...</b> use excessive silicone lubricant.</p> <p><b>Do not...</b> pressurize vessel without element in place unless permeate ports are plugged internally.</p> <p><b>Do not...</b> overtighten fittings in ports.</p> |
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### General Information

The 40E60 RO Pressure Vessel Housings are designed to be used in water desalination systems. Any make of 4-inch nominal diameter spiral-wound element may be used. The vessels utilize a fiberglass reinforced plastic shell for superior corrosion resistance. However, metallic parts of the vessel may be subject to corrosion, which can result in an unsafe condition. The fiberglass shell can be damaged by rigid clamping, impact, scratches or abrasion.

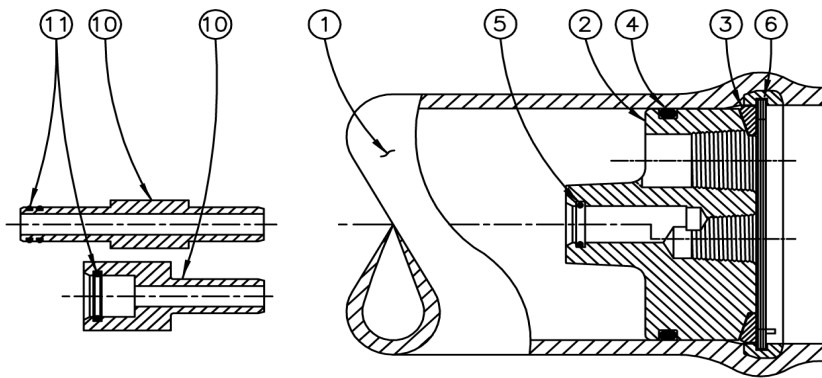
The information and guidelines incorporated in this User's Guide are intended only as a supplement to good industrial practice. Full responsibility for correct operation and maintenance of vessel remains with the user. This guide should be used in conjunction with drawing number 518017.

When properly installed and maintained, 40E60 vessels can be expected to provide safe operation over a long service life.

# Installation

Regardless of when or by whom your vessel may have been installed, there are a few quick checks you should make before use. Check that each vessel is:

- Mounted with compliant material (polyurethane saddle) between the fiberglass shell and any rigid frame.
- Free to expand under pressure - shell not clamped rigidly in place, no rigid piping connections to port fittings.
- Not used in any way to support other components, such as piping manifolds hanging from ports.



SECTION THROUGH END CLOSURE

Dwg Ref	Qty Per	Item #	Description	Materials
<b>Shell</b>				
1	1		Shell	Filament Wound epoxy /glass composite. Head locking grooves internally wound in place. Shell exterior coated with white high gloss polyurethane paint.
<b>Head</b>				
2	2	50420	End Plug	PVC
3	2	50440	Bearing Ring	Nickel Plated Alloy Steel
4	2	45317	Plug Seal	Ethylene Propylene O-ring
5	2	45294	Adapter Seal	Ethylene Polypropylene )-Ring
<b>Head Interlock</b>				
6	2	45260	Retaining Ring	302 SST
<b>Element Interface</b>				
10	2	As Required	Adapter	Engineering Thermoplastic
11	2	As Required	PWT Seal	Ethylene polypropylene O-ring

## Opening The Vessel

### WARNING

*Relieve pressure from vessel before beginning this procedure.*

### Contamination Removal

Metal oxidation products and mineral deposits can interfere with vessel disassembly. Remove all foreign matter from both ends of vessel as follows.

1. Remove contaminants using a small wire brush or suitable abrasive (such as medium- grade ScotchBrite™).
2. Flush away loosened deposits with clean water.

### Removing the Head

*The head assembly is shown in figure 1.*

Remove head as follows:

1. Disconnect permeate piping as required at nearest convenient joint, being careful not to place undue stress on the threaded connections in the plastic end plug.
2. Lift the tabbed end of the retaining ring up out of the stainless steel groove in the shell and then away from the head so that it rests in the end margin of the vessel. This is best accomplished by using CodeLine Removal Tool, part number 50303, which is available from your supplier. This can also be accomplished using a screwdriver and a pair of pliers if the tool is not readily available.
3. Remove the 4" retaining ring from stainless groove in the shell by rotating your finger behind the ring as it continues to exit the groove.
4. Once the retaining ring has been removed, examine the area for burrs or dings which could damage the head or membrane. If necessary, use ScotchBrite™ or 600 grade sandpaper to smooth the area.
5. Grasp the feed/concentrate port and pull the necessary head assembly straight out. It may be necessary to give a sharp forceful tug or to rock the head from side to side in order to start the head moving. Take care to avoid damaging the permeate port. It is made of PVC or other engineering thermoplastic (occasionally stainless steel or other metal) and is not designed to withstand mistreatment.
6. Remove and discard plug seal, taking care not to scratch or otherwise damage the sealing surfaces.
7. Repeat above procedures for opposite end of vessel.

With the removal tool the retaining ring can be lifted upward by simply rotating the tool counterclockwise after inserting it over the tab on the retaining ring. (Use the smaller hole.) Hold the tool flat against the end margin and parallel to the vessel bore. It is then possible to pull the end of the retaining ring straight out. The retaining ring may snap back into the groove if this alignment is not closely adhered to. If the retaining ring is difficult to remove, try soaking with a release agent such as LPS™ or WD40™, being careful to avoid any contamination of a membrane element.

When using screwdriver and pliers, pry the tabbed end of the retaining ring out of the stainless steel groove with the tip of the screw driver. Once the end of the retaining ring is clear of the groove, grab the tab with the pliers and pull towards the end of the vessel until the end of the ring is resting in the end margin of the shell.

### CAUTION

*DO NOT tap on fittings as this could damage ports.*

## Replacing Elements

The following procedures are provided for information only. Elements should be installed in accordance with the element manufacturer's recommendations. Where conflicts exist, contact the element manufacturer or CodeLine for clarification. To replace elements, proceed as follows.

4. Insert each element with the brine seal (typically a u-cup seal) installed on the upstream end with its lip facing upstream.

### CAUTION

*System malfunctions and element damage may result if elements are installed in the wrong direction.*

## Removing Elements

1. Remove heads from both ends of vessels as described in *Opening the Vessel*.

### Note

*Always remove and install element in the direction of feed flow. The feed end (upstream end) is the end plumbed most directly to the pump.*

2. Push element(s) out of vessel from the upstream end.
3. For multi-element element vessels, remove the interconnectors and retain for reinstallation

5. Install interconnectors between multiple elements as each succeeding element is inserted.
6. Push each element downstream into shell as it is installed until elements fully engage with the downstream head. If elements are hard to push, make sure the brine seal is properly installed and you are pushing from the upstream end.
7. When all elements are installed, close the vessel as described in the following section.

## Inserting Elements

1. Ensure that element exterior and shell bore are in clean, as-new condition before proceeding (See *Refurbishing Shell*, Page 6)
2. Reinstall head assembly at the downstream end as described in *Closing the Vessel*, with adapter fitted (if required)
3. Lubricate element seals sparingly with the manufacturer's recommended lubricant or with glycerine (a commercially available lubricant that will not foul elements)

### CAUTION

*DO NOT lubricate element seals with a silicone-based material (such as Parker Super O-lube™, the recommended lubricant for end plug seals)*

## Closing the Vessel

Prepare and install head assemblies as described below.

1. Refurbish or replace head components as required to ensure as-new condition. (See *refurbishing Parts*.) O-rings should be replaced each time

2. Cover O-rings with a thin, even layer of Parker Super O-Lube™ silicone lubricant or the lubricant recommended by your supplier.

### NOTE

*Glycerine is a commercially available lubricant that will not foul elements. However silicone lubricant is recommended for this application*

3. Remove any residual lubricant from the vessel bore and work a fresh, thin film of Parker Super O-Lube™ silicone lubricant into the lead-in chamfer and an area approximately 1/2 inch in width from the chamfer.

### CAUTION

*When lubricating vessel chamfer, wear protective gloves or finger cots to prevent cuts or penetration by fiberglass*

4. Install small O-ring groove inside small end of plastic end plug.

5. Install large O-ring(s) in external groove(s) of end plug. (Some plugs take two external O-rings.)

6. Install adapters, if required, into end plugs. Insert one end plug into downstream end of vessel. Using both thumbs, apply equal pressure on opposite sides of end plug to force plug into vessel so that steel bearing ring clears retaining ring groove.

7. Carefully insert retaining ring into its groove. This is done by inserting the lead end of the spiral retaining ring (end without the bent tab) into the stainless steel retaining ring groove located in the shell, and slowly pushing the remaining turns into the shell.

8. Check that spiral retaining ring is fully seated in groove. If it is not, remove and check for materials causing the spiral ring not to fully seat.

### Caution

*DO NOT pressurize vessel without element(s) properly installed.*

9. Insert elements, then install upstream head, (with adapter if required).

10. Reconnect piping to vessel, as described in *Refurbishing Parts* (Page 6)

11. If threading fittings into end plug, avoid overtightening. Hand tight plus approximately 1/4 turn should produce a satisfactory seal. If leaks occur on pressurization, a small amount of further tightening may be required.

12. Pressurize vessel. Inspect for leaks at connections to the vessel and all around the vessel itself. If any leaks occur, release pressure from vessel and tighten fittings as necessary. then pressurize vessel and check for leaks again.

### Caution

*DO NOT tolerate any leaks. Leaks can result in corrosion and eventual catastrophic vessel failure.*

## Refurbishing Parts

### Inspecting Parts

**Plastic parts:** examine for cracking, softening, or discoloring. This may indicate chemical attack of the material. Defective parts must be replaced. Alternate materials may be required. Contact your supplier or CodeLine for assistance.

**Metal parts:** check for corrosion, scratches, dents, cracks or other damage to anodized surface of the bearing plate, bearing ring and spiral locking ring.

#### Note

*Epoxy paint can be used to seal slightly damaged anodized areas while waiting a replacement part*

Carefully inspect each component for any damage that could affect structural strength or sealing properties. The following examples show some of the situations in which parts or vessel should be replaced.

**Vessel Locking Ring Groove**-corroded, damaged (chipped or gouged)

**Bearing Ring** - nickel plated surface pitted, corroded, chipped or flaking

**End Plug** - cracked, discolored, sealing areas damaged (chipped or gouged), port threads stripped.

**Spiral Retaining Rings** - sole means of end plug retention. Parts bent, corroded, cracked or damaged in any way must not be used. Carefully check for hairline cracks.

### Refurbishing Shell

#### NOTE

*Take care not to remove the anodized finish from the aluminium*

1. Using a fine wire brush, remove any large deposits from locking ring groove in the vessel.
2. Using a medium or finer grade of ScotchBrite™ and mild soap solution, clean the inside of the vessel at least 4 inches in from each end.
3. Use clean water to rinse away all loosened deposits and soap residue.
4. Examine inside of vessel for scratches, gouges, or other imperfections that could prevent proper sealing. If such areas exist and leaks are observed when the vessel is placed back in service, the shell may need to be replaced.

### Refurbishing Other Parts

1. Remove any large deposits from metal parts using a wire brush.
2. Scrub the entire surface with medium grade ScotchBrite™ until all contaminants are removed.
3. Rinse parts clean with fresh water and dry
4. Inspect all parts for serviceability as specified above.

### Remaking Pipe Connections to End Plug

1. Use a wire brush to remove all foreign matter from threads on pipe fittings.
2. Apply non-hardening thread sealant or Teflon™ tape to fittings and install into end plug. Tighten each fitting a maximum one quarter turn past hand tight; the plastic end plug could be damaged if fittings are overtightened.
3. Fit end plug and retaining ring as described in *Closing the Vessel* (page 5)

### Part Replacement

Replace all parts that cannot be restored to as-new condition.

Replace any parts showing signs of structural damage or corrosion.

#### CAUTION

*Use of components damaged by corrosion can result in catastrophic failure.*

Seals should be replaced as necessary each time the vessel is serviced. Any parts that need to be replaced are available from your supplier or from CodeLine.