



Liqui-Cel™
Membrane Contactors

3M™ Liqui-Cel™ EXF-14×28 and 14×40 Series Membrane Contactor

Assembly and Disassembly Instructions

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SAFETY INFORMATION

Read, understand, and follow all safety information contained in these instructions prior to the use of this 3M™ Liqui-Cel™ Membrane Contactor. Retain these instructions for future reference.

Intended Use:

This Liqui-Cel Membrane Contactor is intended to add to or remove dissolved gases from non-dangerous liquid streams. It is expected that all users be fully trained in the safe operation of membrane contactors. Membrane contactors are intended for installation and operation by qualified installers and operators in accordance with all operating guidelines, installation instructions, and any other industry requirements. Use in any other application may not have been evaluated by 3M and may lead to an unsafe condition.

WARNING

To reduce the risks associated with explosion:

- Only use replacement parts supplied by 3M for this product.

To reduce the risks associated with crush or impact related injuries:

- Always ensure the membrane contactor is properly secured. Be sure the membrane contactor cannot tip, roll, fall, slide or make any movement that may cause injury or damage to other system components.
- No liquid, vacuum or sweep gas should be running through the contactor when changing cartridges or other parts. Membrane contactors should be completely drained of liquid before attempting to service.
- Care must be taken not to hit or jar (shock) the membrane contactor.

To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.
- Drain liquid from the contactor before moving. **Do not** move a membrane contactor while it contains liquid.

CAUTION



To reduce the risks associated with environmental contamination:

- At the end of useable life, dispose of the membrane contactor or cartridges in accordance with local regulations and laws.





NOTICE

- The membrane contactor(s) should not be stored where they are exposed to direct sunlight. Membrane contactors should always be stored in sealed bags or shrink wrap material and in the original box or other opaque box.
- Store dry membrane contactor(s) at temperatures <49°C (120°F) with low to moderate humidity levels (<60% relative humidity).
- Avoid contact with surfactants/solvents or oxidants (e.g. ozone, chlorine) to prevent wet-out or oxidation of the hydrophobic membrane.
- To avoid contamination, gloves are recommended when handling the membrane cartridges.
- **Do not** use dope or metal connections to connect to plastic connections of the membrane contactor.
- Failure to follow any instructions in this guide will void any warranty, if any exists.

EXPLANATION OF SIGNAL WORD CONSEQUENCES

 WARNING	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage.
 CAUTION	Indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury and/or property damage.
NOTICE	Indicates a potentially hazardous situation, which, if not avoided, could result in property damage.

EXPLANATION OF SAFETY AND RELATED SYMBOLS

	Warning: Explosion
	Warning: Crush or Impact
	Caution: Lifting or Moving Hazard
	Caution: Possible Environmental Impact

I. REQUIRED MATERIALS

- 3-4 plastic wedges
- mallet

II. DISASSEMBLY: REMOVING THE END CAPS

WARNING

To reduce the risks associated with crush or impact related injuries:

- Always ensure the membrane contactor is properly secured. Be sure the membrane contactor cannot tip, roll, fall, slide or make any movement that may cause injury or damage to other system components.
- No liquid, vacuum or sweep gas should be running through the contactor when changing cartridges or other parts. Membrane contactors should be completely drained of liquid before attempting to service.
- Care must be taken not to hit or jar (shock) the membrane contactor.

To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.
- Drain liquid from the contactor before moving.
Do not move a membrane contactor while it contains liquid.

SAFETY NOTE: WEAR SAFETY SHOES AND SAFETY GLASSES

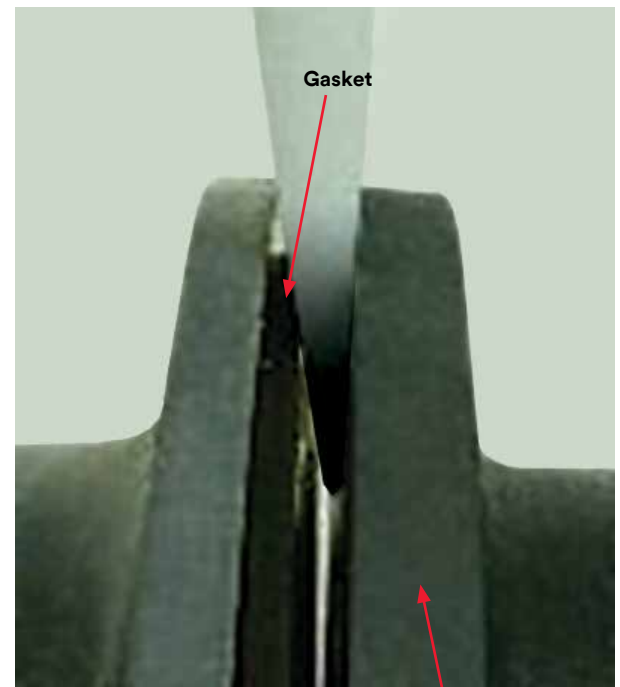
REMOVING THE END CAP STEPS

- Begin by loosening the 12 bolts in a star-shaped pattern to reduce the stress on the plastic parts.
- Remove all of the hardware (nuts, bolts, backing rings, lifting rings, etc.). Even with the hardware removed, the end cap should remain in place because of the O-rings which are still seated on the center nozzle.
- Place a wedge between the gasket and the end cap. The flat side of the wedge should face toward the end cap.
- Using a mallet, gently tap the wedge until there is enough space between the gasket and the end cap for a second wedge to be placed 90° apart from the first wedge. (See Figure 1)

NOTE: Placing the wedge between the gasket and the vessel can lead to wedge or vessel damage when the wedge hits internal parts of the contactor. Tap gently to avoid damage.

- Insert a second wedge between the gasket and the end cap at 90° from first one. Gently tap the second wedge until there is a large enough gap for a third wedge at 90°. (See Figure 2)
- Repeat this process for a third wedge. If needed, repeat the process again for a fourth wedge. A fourth wedge may not be needed as three may sufficiently loosen the end cap.
- Once all of the wedges are in place, gently tap each one to evenly move the end cap away from the vessel.
- When the wedges bottom out and can go no further, the first O-ring may come free. It will no longer be seated on the center tube.
- Gently and evenly pull the end cap off to get past the second O-ring. Move slowly so the end cap does not suddenly come loose and fall.

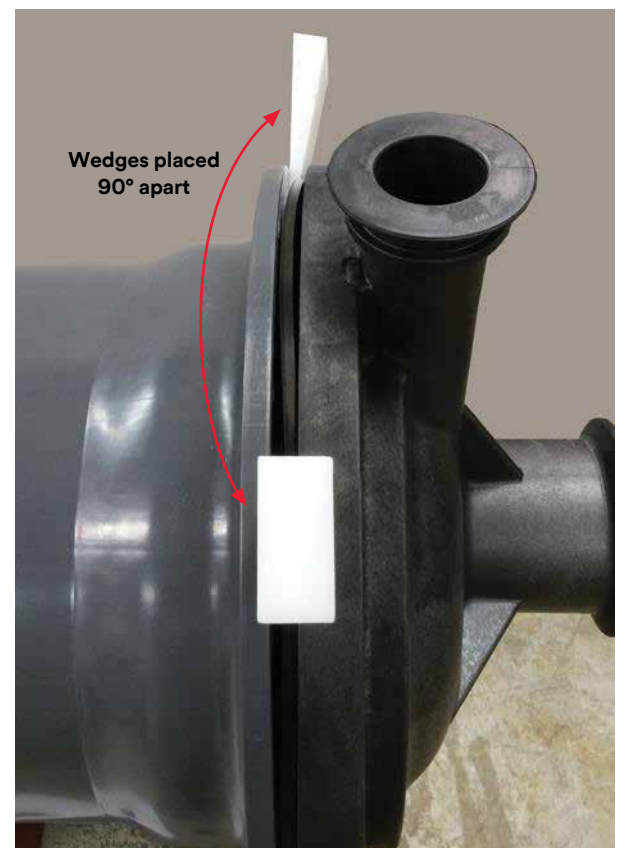
Figure 1



Vessel Side

End Cap Side

Figure 2



II. ASSEMBLY: INSTALLING THE END CAPS – BACKING RING ON VESSEL SIDE

WARNING



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- Care must be taken not to hit or jar (shock) the membrane contactor.



To reduce the risks associated with lifting or moving:

- Always consult the product datasheet or operating guide for membrane contactor weights. Use appropriately rated lifting equipment for lifting or moving heavy membrane contactors.

NOTICE

- To avoid contamination, gloves are recommended when handling the membrane cartridges.

INSTALLING THE END CAPS STEPS

- Each flange has a backing ring that is made up of 4 sections.
- Link two backing ring sections together at the puzzle joint (A). Hold the inner diameter corner radius side towards you.
- Assemble these two sections of backing rings on the vessel side of the flange and then add the remaining 2 backing ring sections to complete the full backing ring assembly.
- The backing ring joints must be located as shown in Figure 4. Tie bars and lifting rings are placed over the indicated puzzle joints, and bolts are placed through the bolt holes to hold the backing rings in place.

PROCESS NOTE: The position of the lifting rings, tie bars, and puzzle joints are critical to product strength. Do not deviate from the positions shown in the picture. When adding the tie bar, make sure it curves the same way as the backing ring/vessel flange.

- Place the gasket over the bolts with the raised lip (B) on the gasket facing toward the vessel. See Figures 5-7.
- Put 2 O-rings (C) into grooves on the center nozzle on both end caps. See Figure 7. Lubricate O-rings with DI water.
- Make sure the bolts are sticking out so they will hold the end cap, then line up holes in end cap with bolts in the vessel flange and press end cap into center tube as far as it will go.

SAFETY NOTE: DO NOT DROP THE END CAP. THIS MAY CAUSE DAMAGE. USE A SECOND PERSON IF NEEDED TO KEEP BOLTS IN PLACE DURING THIS STEP.

If the first O-ring will not go into the center tube by hand:

- Put a nut on every fourth bolt.
- Use an impact wrench set to 30 ft-lbs. Slowly tighten each bolt in a star pattern. Be sure that the O-ring does not roll out of the groove in the center nozzle or get pinched.
- When the second O-ring gets to the center tube, take off these four nuts.

Figure 3



Figure 4



Lifting rings are secured over the backing ring joint in two places at 180°.

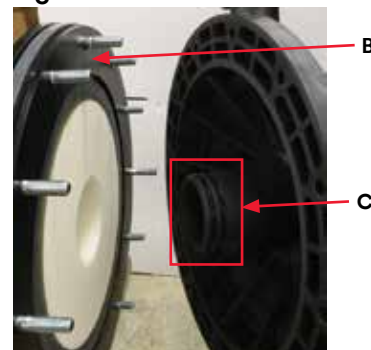
Figure 5



Figure 6

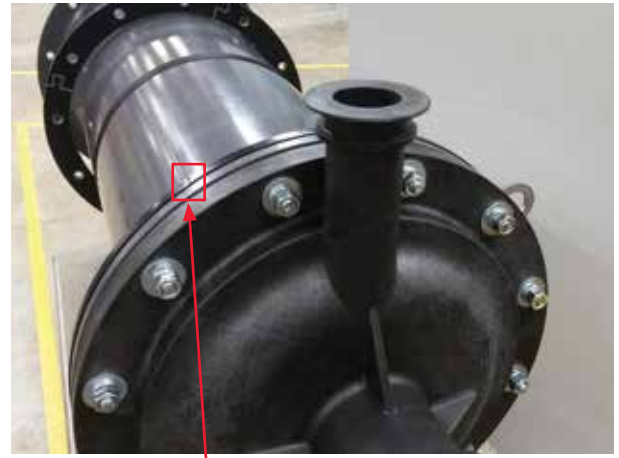


Figure 7



III. ASSEMBLY: INSTALLING THE END CAPS – BACKING RING ON END CAP SIDE

- Add a large flat washer, a lock washer, and a nut to each bolt, and tighten by hand.
- Use an impact or torque wrench, set to 30 ft-lbs, in a star pattern to tighten the nuts. This will evenly pull the end cap into the center tube. Use a wrench on the bolt head to prevent the bolt from rotating during tightening.
- Set calibrated torque wrench to 45 ft-lbs. With the wrench on the bolt and the torque wrench on the nut, turn until the torque wrench starts clicking. Repeat this action for each bolt in a star pattern to equalize the flange stresses.
- Double check torque on all bolts.
- Repeat the end cap assembly process (sections III and IV) for the other end of the contactor.



Position of backing ring joint on vessel side

Note: Be sure puzzle joints are in positions shown.

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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