

# Degassing Sea Water Has Never Been This Compact, Efficient, and Adaptable



**Figure 1:** 3M™ Liqui-Cel™ Membrane Contactor modules that can process 75,000 - 125,000 BPD

3M™ Liqui-Cel™ Membrane Contactors offer a modular skid option for off-shore oil platforms that is significantly smaller and lighter than traditional vacuum towers.

Utilizing compact Liqui-Cel degassing contactors on platforms is now a viable option based on the new high-pressure degassing modules designed for ASME code-stamped RO vessels. High-pressure RO vessels are already proven and accepted on platforms; now they can be utilized to greatly

reduce the footprint and the weight of degassing technology.

Compared to vacuum towers, Liqui-Cel contactors have 10 times the surface area per volume, which is a huge advantage on an offshore platform. The smaller, lighter design simplifies and lowers the cost of supporting a liquid-full vacuum tower.

Table 1 captures the expandable nature of these Liqui-Cel membrane contactor systems. For example, an initial system accommodating 75,000 BPD can easily be expanded to handle 200,000 BPD if future needs arise. It can also be turned down to meet smaller demands.

Liqui-Cel membrane contactors have been used around the world for over 20 years. They are field-proven in diverse applications such as nuclear and coal-fired power plants, boiler feed water applications, and in the food and beverage, pharmaceutical,

**Table 1:** System scenarios using 3M™ Liqui-Cel™ Membrane Contactors.

Design Criteria	Option 1	Option 2	Option 3
Contactor Size	8 x 80	8 x 80	8 x 80
Membrane Type	X-40	X-40	X-40
Feed Flow (BPD)	75,000	125,000	200,000
Feed Flow (USGPM)	2188	3646	5833
Temperature (°F)	64	64	64
Temperature (°C)	18	18	18
<b>Component Concentrations (ppb)</b>			
Inlet O <sub>2</sub>	9,415	9,415	9,415
Inlet N <sub>2</sub>	15,443	15,443	15,443
Average Outlet O <sub>2</sub>	5	6	6
Maximum Outlet O <sub>2</sub>	9	10	10
Minimum Gas Removal O <sub>2</sub>	99.90%	99.89%	99.89%
Number of Contactors Required	32	52	84
Number of Parallel Trains	32	52	84
Number in Series	1	1	1
Min. Pressure Drop through train, less pipe loss (psi)	25.7	26.9	26.4
Operating Mode	Combo/N <sub>2</sub>	Combo/N <sub>2</sub>	Combo/N <sub>2</sub>
Total Sweep Rate, scfm	16	26	42
<b>Sweep Composition</b>			
Oxygen	0.010%	0.010%	0.010%
Nitrogen	99.990%	99.990%	99.990%
Carbon Dioxide	0.000%	0.000%	0.000%
Vacuum Volume Flow (acfm)	429	702	1131
Liquid Ring Vacuum Level (mm Hg abs)	50	50	50



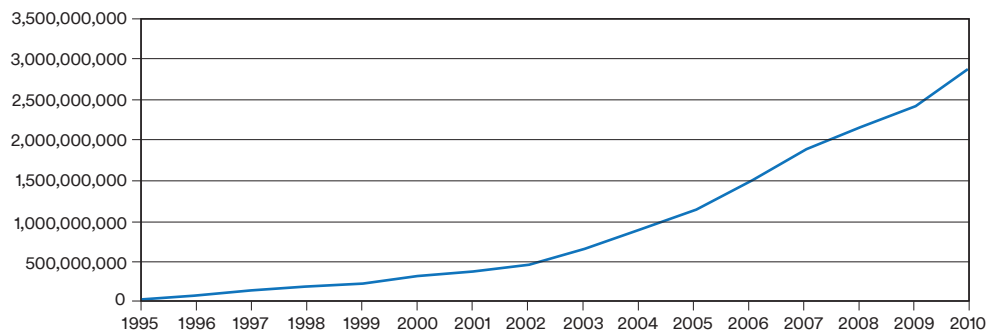
**Figure 2:** 3M™ Liqui-Cel™ EXF-8x80 Series high pressure ASME code-rated degassing system

semiconductor and digital printing sectors for O<sub>2</sub> and CO<sub>2</sub> removal.

Figure 3 demonstrates the increased acceptance of 3M™ Liqui-Cel™ Membrane Contactors with the growth of installed systems over the years. Most systems that were installed over a decade ago are still reliably degassing the water streams they were installed to manage.

To learn more about Liqui-Cel technology and how it can be integrated into existing or new platforms, please contact your 3M representative or visit [3M.com/Liqui-Cel](http://3M.com/Liqui-Cel).

**Figure 3: Liquid Processed with 3M™ Liqui-Cel™ Membrane Contactors (GPD)**



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**3M Company**  
**3M Separation and Purification Sciences Division**  
13840 South Lakes Drive  
Charlotte, North Carolina  
28273 USA  
Phone: +1 980 859 5400

**3M Deutschland GmbH**  
**3M Separation and Purification Sciences Division**  
Önder Straße 28  
42289 Wuppertal Germany  
Phone: +49 202 6099 - 0

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