



WATER TREATMENT ENERGIZED BY

LANXESS
Energizing Chemistry

LEWABRANE®

Reverse osmosis (RO) membrane elements for industrial and potable water treatment

LEWABRANE® PREMIUM PRODUCTS FOR WATER TREATMENT

LANXESS has designed **Lewabrane®** RO membranes for state-of-the-art desalination of seawater, brackish waters, and low-salinity waters in industrial and potable water applications.

These water treatment applications increasingly require the most highly technical, high-performance separation products to achieve treated water quality at the lowest cost of water production. LANXESS offers two product lines to meet the stringent water treatment requirements in today's modern world. The new **Lewabrane®** RO membrane elements and the well-established **Lewatit®** ion exchange resins complement each other in providing the user with high-performance polymers and equipment/system configurations for advanced water treatment.

The **Lewabrane®** RO membrane elements family consists of spiral-wound, thin-film composite membrane elements designed specifically for water treatment applications. The RO membrane chemistry and element construction is de-

signed to provide optimized, low-cost of operation for downstream unit operations, like separate-bed or mixed-bed ion exchange units.

We manufacture our **Lewabrane®** RO products in a modern, fully automated state-of-the-art production facility in Bitterfeld (Germany). The chemistry approach for our RO membrane places the emphasis on higher cross-linking of the polyamide layer, and therefore, higher durability to cleaning chemicals, more stable rejection of mixed ion salt solutions, and lower surface charge on the membrane to reduce the fouling tendency.

In addition, **Lewabrane®** comes with a full service package that includes RO system design with our innovative **LewaPlus™** software tool, plus RO membrane element testing and autopsy in our laboratory, as necessary, to keep your water treatment facility online. We are your reliable partner for your water treatment-related needs!



Industrial water application areas for RO membranes

The desalination of water by reverse osmosis membrane technology has seen remarkable development over recent years. This development has made RO the preferred solution for salt removal for a wide variety of waters, for both industrial and potable applications. Each water type is, in many ways, unique. Each user has specific requirements for system permeate capacity, permeate quality, and the capital and operating cost to meet these needs. Our **Lewabrane®** family of RO membranes offers a variety of membrane performances to allow the user to optimize the RO system performance as a stand-alone system, or jointly with high-performance **Lewatit®** ion exchange resins.

- Production of boiler feed water in power stations
- Demineralization and particle removal in microchip manufacture
- Water desalination for light industry (car wash, laundries, and marine application)
- Wastewater treatment, including post membrane bioreactor (MBR) application
- Groundwater remediation and recharge



Potable water application

An important application area for RO membranes is the preparation of potable water from both brackish and seawater supplies. This application is applied on a large scale in the case of cities and municipalities, and on a small scale for application within restaurants, hotels, cruise ships, and other smaller facilities. The preparation of potable water often requires NSF certification, or equivalent, attesting to the evaluation and conformance of an RO element manufacturing process for potable water application.

LANXESS has completed the process for NSF certification, and has received full NSF certification for usage of **Lewabrane®** RO elements from the HR, HF, FR, and LE membrane families for the preparation of potable water.



EFFICIENT DESALINATION WITH LEWABRANE® BRACKISH WATER RO ELEMENTS

Lewabrane® product portfolio

The Lewabrane® RO product family was designed to meet and exceed the nominal performance standards for both potable and industrial water treatment applications. The RO elements have a standard length of 40 inches (1,016 mm) and a diameter of 8 inches (201 mm) suitable for use within standard RO membrane equipment. The product family also includes a 4-inch (101 mm) RO element suitable for smaller applications. All 8-inch diameter elements meet today's industry standards for RO membrane surface area at 370, 400, and 440 square feet per 8-inch by 40-inch element. The RO elements have standard fiberglass outer wrap, brine seal, interconnectors, and ATDs universal to all 8-inch and 4-inch diameter elements.

Lewabrane® RO products available

- High rejection type (HR) for the best permeate quality
- High flow type (HF) for the best balance of flow and salt rejection
- Fouling resistant type (FR) for fouling resistance via 0.86 mm (34 mil) feed-water spacer
- Low energy type (LE) for energy savings from low pressure operation

The Lewabrane® RO membrane elements for standard pressure (15.5 bar test pressure) application are offered in both HR (high rejection) and HF (high flow) product types. The HR-type elements are designed to provide extremely low salt passage in normal operation with > 99.7% salt rejection measured at standard test conditions. The high rejection for critical ions like calcium, boron, and silica is also remarkable. The HF-type elements offer increased water productivity coupled with a small increase in permeate salinity.



The membranes are based on a three-layer composite structure that is manufactured in several production stages. A single Lewabrane® RO element consists of a package with more than 20 layers. This is assembled into a spiral-wound element and then fixed.



For quality assurance purposes each individual Lewabrane® product is checked in an element tester.



LANXESS produces Lewabrane® RO membrane elements for industrial and potable water treatment in Bitterfeld, Germany.

The product portfolio also includes fouling resistant (FR) types. FR-type membrane elements are designed for water with a higher organic or biological fouling rate. In addition to the low-charged membrane, which provides a lower fouling rate, the elements have with a 0.86 mm (34 mil) feed spacer a thicker feed channel, allowing improved movement of solutes and particles through the feed channel and enhancing the cleanability of the element. The thicker feed channel also results in a lower pressure drop through the RO membrane element. The FR membrane products are based on a 15.5 bar test pressure, and are available in both 4- and 8-inch diameter elements. These FR elements are recommended for surface water and wastewater treatment applications.

The Lewabrane® RO membrane elements of the low energy (LE) product type are recommended for low salinity applications or in applications where low energy consumption is an important consideration. These LE-type membrane elements are designed with a highly efficient polyamide membrane barrier layer, providing high flow productivity combined with excellent salt rejection. Since LE elements in general tend to have a higher fouling tendency from their higher productivity, the LE elements are offered with a 0.86 mm (34 mil) feed spacer to reduce the fouling and to improve the cleanability. The LE membrane products are based on a 10.3 bar test pressure and are available in 85, 90, and 400 sq ft membrane surface area. The LE elements with 440 sq ft area are designed for second-pass applications using a 28 mil feed channel spacer. Typical applications for the LE-type of membrane are the treatment of surface water, the pretreatment in front of an ion exchange system, or in the second pass.

Performance advantages of Lewabrane® RO brackish water elements

- Low salt passage, typically > 99.7% at standard conditions
- High flow productivity
- Improved barrier layer chemistry (lower charge and higher cross-linkage) providing lower membrane fouling rates
- More stable salt rejection during operating lifetime (as the rejection mechanism is based more on solution diffusion than ionic repulsion)
- Improved organic compound rejection
- More durable to allow less frequent, more aggressive cleaning

Make your Lewatit® ion exchange applications more efficient

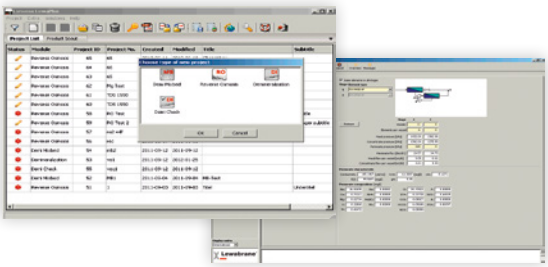
Another important benefit of the new Lewabrane® RO membrane elements is the preparation of feed water for downstream Lewatit® ion exchange or electrodeionization (EDI) applications. The Lewabrane® RO membrane elements are designed to provide stable, lower salinity permeate to minimize the load on the downstream ion exchange and EDI operations, thus improving cost performance. The use of Lewabrane® RO membrane elements can provide a lower total cost of operation from reduced chemical regeneration and improvement in ion exchange resin life.

LEWAPLUS™
DESIGN SOFTWARE

The LewaPlus™ design software is a comprehensive software design tool for RO membrane and ion exchange resin (IX) systems and available in several languages. It combines the Lewabrane® RO membrane design with the existing Lewatit® ion exchange resin design, allowing the designer to move seamlessly from RO design to ion exchange design all within the same design software. A novel data management process allows the designer to load the RO permeate flow and composition directly to an ion exchange module, and vice versa.

LewaPlus™ software includes the following modules:

- Demineralization with ion exchange resins
- Mixed-bed demineralization with ion exchange resins
- Calculation of current operating ion exchange resins performance (Demi check)
- Brackish water and seawater desalination with reverse osmosis



Test conditions:

* 2,000 mg/l NaCl, 15.5 bar (225 psi), 25 °C (77 °F), pH 7, recovery rate 15%

** 2,000 mg/l NaCl, 10.3 bar (150 psi), 25 °C (77 °F), pH 7, recovery rate 15%

*** 32,000 mg/l NaCl, 55.2 bar (800 psi), 25 °C (77 °F), pH 8, recovery rate 8%

Dimensions:

L = length ID = center pipe diameter, 8" element

Ø = diameter OD = outer diameter, 4" element

A more detailed description of our Lewabrane® RO elements is presented on our data sheets available online at: www.lewabrane.com

TECHNICAL DETAILS
OF THE LEWABRANE®
PRODUCT FAMILY

Lewabrane® – product data

RO Element Model	Permeate Flow	Salt Rejection	Membrane Area	Feed Spacer Thickness	Dimensions (L/Ø/ID)
High Rejection (HR)*					(L/Ø/ID)
B370 HR	35.3 m³/day	99.7%	34.4 m²	0.8 mm	1,016/201/29 mm
	9,300 gpd	99.7%	370 ft²	31 mil	40/7.9/1.125 inch
B400 HR	37.9 m³/day	99.7%	37.2 m²	0.8 mm	1,016/201/29 mm
	10,000 gpd	99.7%	400 ft²	31 mil	40/7.9/1.125 inch
B440 HR	41.7 m³/day	99.7%	40.9 m²	0.7 mm	1,016/201/29 mm
	11,000 gpd	99.7%	440 ft²	28 mil	40/7.9/1.125 inch
High Flow (HF)*					(L/Ø/ID/OD)
B085 HF 4040	8.9 m³/day	99.5%	7.9 m²	0.8 mm	1,016/100/19 mm (OD)
	2,400 gpd	99.5%	85 ft²	31 mil	40/3.9/0.75 inch
B370 HF	37.2 m³/day	99.5%	34.4 m²	0.8 mm	1,016/201/29 mm
	9,800 gpd	99.5%	370 ft²	31 mil	40/7.9/1.125 inch
B400 HF	39.9 m³/day	99.5%	37.2 m²	0.8 mm	1,016/201/29 mm
	10,500 gpd	99.5%	400 ft²	31 mil	40/7.9/1.125 inch
B440 HF	43.9 m³/day	99.5%	40.9 m²	0.7 mm	1,016/201/29 mm
	11,600 gpd	99.5%	440 ft²	28 mil	40/7.9/1.125 inch
Fouling Resistant (FR)*					(L/Ø/ID/OD)
B085 FR 4040	8.9 m³/day	99.5%	7.9 m²	0.86 mm	1,016/100/19 mm (OD)
	2,400 gpd	99.5%	85 ft²	34 mil	40/3.9/0.75 inch
B370 FR	37.2 m³/day	99.5%	34.4 m²	0.86 mm	1,016/201/29 mm
	9,800 gpd	99.5%	370 ft²	34 mil	40/7.9/1.125 inch
B400 FR	39.9 m³/day	99.5%	37.2 m²	0.86 mm	1,016/201/29 mm
	10,500 gpd	99.5%	400 ft²	34 mil	40/7.9/1.125 inch
Low Energy (LE)**					(L/Ø/ID/OD)
B085 LE 4040	7.4 m³/day	99.5%	7.9 m²	0.86 mm	1,016/100/19 mm (OD)
	2,000 gpd	99.5%	85 ft²	34 mil	40/3.9/0.75 inch
B400 LE	34.8 m³/day	99.5%	37.2 m²	0.86 mm	1,016/201/29 mm
	9,200 gpd	99.5%	400 ft²	34 mil	40/7.9/1.125 inch
B440 LE	38.3 m³/day	99.5%	40.9 m²	0.7 mm	1,016/201/29 mm
	10,100 gpd	99.5%	440 ft²	28 mil	40/7.9/1.125 inch
Seawater (S) High Rejection (HR)***					(L/Ø/ID/OD)
S085 HR 4040	5.2 m³/day	99.8%	7.9 m²	0.8 mm	1,016/100/19 mm (OD)
	1,380gpd	99.8%	85 ft²	31 mil	40/3.9/0.75 inch
S400 HR	24.6 m³/day	99.8%	37.2 m²	0.8 mm	1,016/201/29 mm
	6,500 gpd	99.8%	400 ft²	31 mil	40/7.9/1.125 inch
S440 HR	27.3 m³/day	99.8%	40.9 m²	0.7 mm	1,016/201/29 mm
	7,200 gpd	99.8%	440 ft²	28 mil	40/7.9/1.125 inch
Seawater (S) High Flow (HF)***					(L/Ø/ID/OD)
S085 HF 4040	7.2 m³/day	99.8%	7.9 m²	0.8 mm	1,016/100/19 mm (OD)
	1,910 gpd	99.8%	85 ft²	31 mil	40/3.9/0.75 inch
S400 HF	34.1 m³/day	99.8%	37.2 m²	0.8 mm	1,016/201/29 mm
	9,000 gpd	99.8%	400 ft²	31 mil	40/7.9/1.125 inch
S440 HF	37.5 m³/day	99.8%	40.9 m²	0.7 mm	1,016/201/29 mm
	9,900 gpd	99.8%	440 ft²	28 mil	40/7.9/1.125 inch



TECHNOLOGY ENERGIZED BY

LANXESS
Energizing Chemistry

Lewabrane® RO membrane elements – premium products for many water treatment applications. www.lanxess.com | www.lewabrane.com

LANXESS Deutschland GmbH, Business Unit Liquid Purification Technologies
Kennedyplatz 1, 50569 Cologne, Germany
© 2014 LANXESS AG. All rights reserved
Edition 2014-12

This information and our technical advice – whether verbal, in writing, or by way of trials – are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to check its validity and to test our products as to their suitability for the intended processes and uses. The application, use, and processing of our products, and the products manufactured by you on the basis of our technical advice, are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Terms and Conditions of Sale and Delivery.