Kerasep® membranes and modules

High performance cross-flow filtration (CFF)

The best-in-class CFF industrial solution for micro, ultra and nanofiltration

- **The reference ceramic membranes with a large set of geometries and cut-offs deliver the best answers to your challenges**
- **Robust and optimized modules easy to operate, clean in place and maintain**
- **Benefit from responsive customer services to maintain and improve your process**

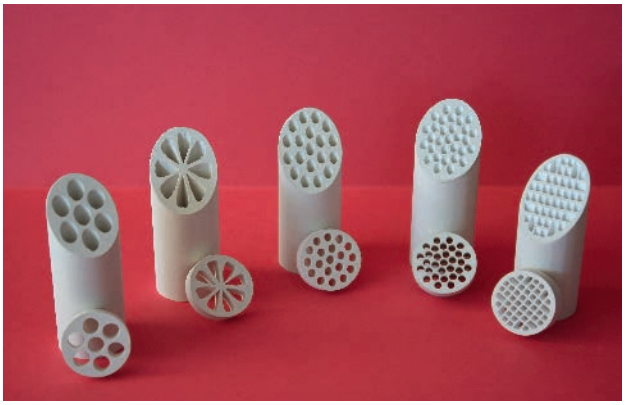
The reference membranes and systems

Kerasep® ceramic membranes are the industry reference for micro, ultra and nanofiltration.

The Kerasep® range offers a large choice of geometries and cut-offs to meet your process requirements in viscosity, molecule size, impurity profile, purity and yield target, etc. as well as cleaning and sanitization procedures.

Thanks to our 30-year experience with ceramic membrane manufacturing and utilization, the Kerasep® membranes are designed with the best compromise between filtration surface, hydraulic diameter and mechanical resistance. The ceramic monolith, together with individually engineered sub- and active- layers, ensures a high selectivity combined with high permeability for an excellent lifetime. The Kerasep® membrane range includes the Diamond II membrane featuring outstanding resistance to abrasion, with a guaranteed lifetime of up to 6 years.

The well-known Kerasep® module completes Novasep's CFF solution for the industry. Extremely robust, the Kerasep® module is designed to provide the user with high-performance, easy cleanability and maintenance.



The Kerasep® membrane range

novasep
passion & smart processes

More than consumables, we share expertise

With more than 30 years of experience in membrane design, CFF process development and industrial plant design, build and commissioning, the Novasep teams are able to provide you with complete and optimized CFF units. Thanks to process modelling and engineering expertise, we conceive CFF units at the crossroad of high-performance, efficient process integration and balanced CAPEX/OPEX. With our pilot units, and by performing in-depth feasibility studies focused on your objectives, we are able to deliver industrial solutions with guaranteed process performance.

Microfiltration unit

A solution for any CFF challenge

Kerasep® membranes and modules have been used for dozens of years in the food and bio-industries. The following examples illustrate the performance of the Kerasep® range and its ability to adapt to new challenges.

Microfiltration unit for molasses treatment

Sugar and sweeteners industries

Kerasep® membranes and modules are currently used for high-performance purification processes, including:

- Microfiltration of cane juice for high-quality cane sugar production
- Purification of molasses and vinasses for their valorization by extraction of sucrose and betaine
- Production of glucose syrup and sweeteners derivatives from corn, wheat or cassava

Filtration unit for antibiotics production

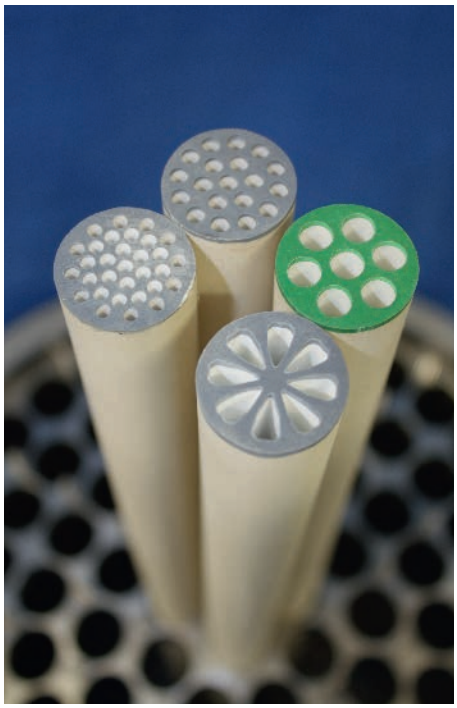
Dairy industries

Our CFF membranes are also used in the dairy industry for various applications including the production of standardized cheese milk, whey and milk permeates. Kerasep® products are also used for the separation of specialty products such as lactoferrin, lactoperoxidase, β-lactoglobuline and α-lactalbumine.

Fermentation Industries

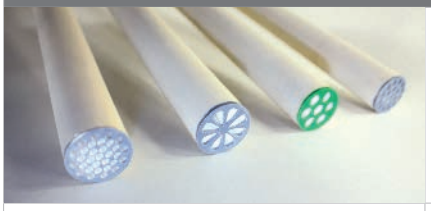
Kerasep® membranes can be used by the fermentation and bio-based chemical industries for multiple applications. They are currently used for the following:

- Organic acids from fermentation: lactic acid, succinic acid, citric acid, etc.
- Amino-acids (lysine, threonine, MSG, tryptophane, etc.), antibiotics and enzymes
- Products produced from the lignocellulosic biomass for the production of bio-based chemicals and building blocks



Thanks to our mobile piloting units available worldwide, we are able to perform feasibility studies on demand for your specific applications.

Ceramic membranes characteristics

Kerasep® range					
	 *	 *	 *	 *	 *
Name	BX	BE-Evolution	BW	BH	BK-Kompact
Number of Channels	7	8	19	31	52
Hydraulic Diameter (mm)	6	4.8	3.5	2.9	2.2
Filtration Area/Monolith (m^2)	0.15	0.21	0.25	0.34	0.50

Cut-offs available	Fine UF – 1 kD, 5 kD (only BW geometry) UF – 15 kD, 50 kD, 150 kD, 300 kD (all geometries) MF – 0.1µm, 0.2µm, 0.45µm, 0.8µm
Support	Monolithic TiO_2-Al_2O_3
External Diameter/Length (mm)	25 /1178
Layers	ZrO_2/TiO_2
Bursting Pressure (bar)	> 80
Standard Service Pressure (bar)	6
Chemical Resistance	pH: 0-14 Compatible with all organic solvents (e.g.: ethanol, methanol, phenol resistance)
Sterilization - SIP	High pressure hot water up to 121°C
CIP Conditions	NaOH, HNO_3, O_3, NaClO
Standard Process Temperature	up to 80°C
Quality	FDA approved materials, full documentation for cGMP

All membranes are compliant with FDA requirements
***Membranes are shown here at 80% of life size**

Best-in-class Kerasep® Modules

Kerasep® modules have been recognized for their quality and robustness by industry for decades. Their optimized design ensures a high cleanability and excellent performance in operations. Thanks to our smart single-piece gasket technology, Kerasep® modules are easy to check-up and maintain.

Kerasep® K99 module filled with membranes

Name of Module	K01					K07					K19				
Number of Membranes per Module	1					7					19				
Number of Channels per Membrane	7	8	19	31	44	7	8	19	31	44	7	8	19	31	44
Filtration Area (m^2)	0.15	0.21	0.25	0.34	0.50	1.08	1.47	1.72	2.38	3.50	2.95	4.00	4.65	6.46	9.50
Name of Module	K37					K99					K138				
Number of Membranes per Module	37					99					138				
Number of Channels per Membrane	7	8	19	31	44	7	8	19	31	44	7	8	19	31	44
Filtration Area (m^2)	5.70	7.80	9.10	12.58	18.50	15.30	20.80	24.30	33.66	49.50	21.40	29.00	33.80	46.92	69.00

Available with the following connections: clamps or standard flange. Housing and gaskets are compliant with FDA requirements.

Responsive and dedicated customer services

Our responsive customer service teams in France, the USA and China provide global support ensuring your CFF process is at its best.

Extensive technical support service to answer your questions. Our customer service teams provide on-going technical assistance and are dedicated to addressing your challenges (troubleshooting, audit, process optimization), when and where you need it. We can, for example, repair your CFF modules either in our workshop or directly on your site. Our team is also able to sample membranes on your site for analysis.

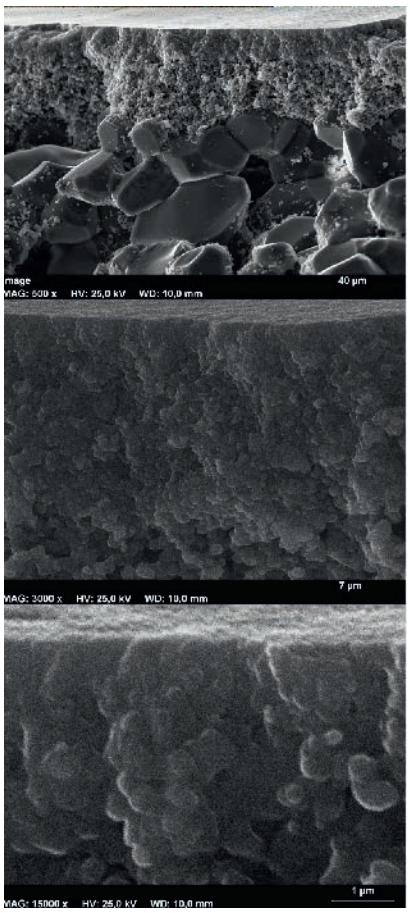
Membrane expertise to reduce costs and optimize operation of your plant. We can perform in our laboratory fouling measurements and membrane layer measurements using our dedicated scanning electron microscope. Membrane expertise enables us to monitor the aging of your membranes and provide recommendations on how to improve your process performance and membrane lifetime.

Training to keep optimum performance. Optimum performance is achieved with well-trained operators for all the different purification processes. Our experienced technical staff provides on-site training tailored to your needs.

Spare parts services to maintain productivity with minimum downtime. We maintain an inventory of standard parts for quick delivery. Based on your process, we select spare parts, which have been subject to in-depth evaluation, and establish your basic on-site inventory. All perfectly adapted to your process steps and meeting applicable international standards.

Upgrade to extend the system's operating life and meet your evolving requirements. Our engineering and service teams can extend your equipment operating life without the capital expense of purchasing new equipment. Upgrade may also be a cost-effective alternative to new equipment and our team can provide custom solutions to meet your new requirements.

Scanning Electron Microscope



Membrane layer analysis

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Services and technologies for the life science industries

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