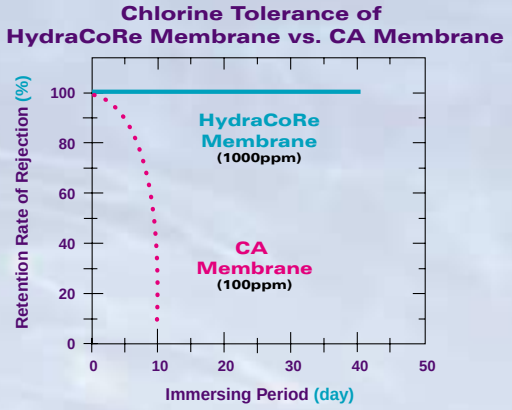
Nanofiltration

HYDRACoRe™

Color Removal Membrane Elements

- **HydraCoRe 50 - Chlorine tolerant, spiral wound nanofiltration membrane elements for effective color removal**

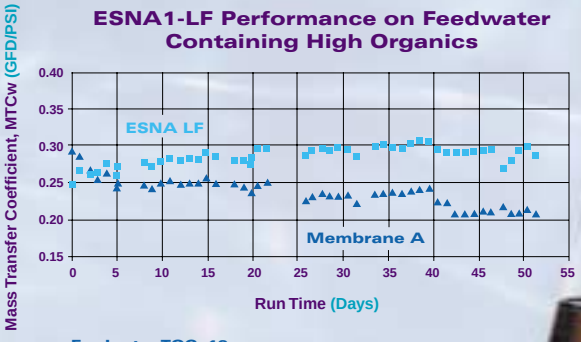


HYDRACoRe membranes are ideal for potable applications requiring color reduction, and minimal removal of dissolved salts. HYDRACoRe's performance remains stable when used to treat chlorinated feedwater, or when cleaned with a chlorine solution. HYDRACoRe technology has also proven highly effective for industrial wastewater treatment, including highly colored streams from pulp and paper manufacturing, and food applications for sugar fractation and color removal.

ESNA

High Performance Elements

- **ESNA1-LF - Significantly reduces operating costs and provides optimum hardness rejection for softening applications**
- **ESNA1-LF2 - Ideal for removing organics that form disinfection by-products while providing partial water softening**



Feedwater TOC: 12 ppm

Test results courtesy of Dr. Curtis A. Kiefer, "Optimizing New Low Fouling Nanofiltration Membrane Performance for Deerfield Beach."

ESNA is a high performance nanofiltration membrane ideal for softening applications and the removal of pesticides, bacteria or viruses. It provides 50%-90% salt rejection with ultra-low-pressure operation, increased energy savings, and significantly lower installation and operating costs.

HYDRANAUTICS
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www.membranes.com

Nanofiltration Specifications

HYDRACoRe™

Test Conditions

NaCl Solution, PPM 500
Applied Pressure, psig (MPa) 75 (0.52)
Operating Temperature, °F (°C) . . . . . .77° (25°)
Permeate Recovery 15%
Feed pH 6.5

Application Data

Maximum Applied Pressure, psig (MPa) 600 (4.14)
Maximum Feed Flow, GPM (m^3/h) 75 (17.0)
Maximum Operating Temperature, °F (°C) . . . . . .104° (40°)
Feedwater pH Range . . . . . .2.0 - 11.0
Maximum Feedwater Turbidity, NTU 1.0
Maximum Feedwater SDI (15 mins) 5.0
Maximum Continuous Chlorine Concentration, PPM 10
Maximum Chlorine Concentration for Cleaning, PPM . .100
Maximum Pressure Drop for Each Element, psig 10

Element Performance

Element Type	Min. Salt Rej.,%	Nom. Salt Rej.†,%	MWCO*, Daltons**	Permeate Flow, GPD	(m^3/d)
HYDRACoRe 50	**.50.0**	**.35.0**	**.1,000**	**.8,200**	**.(31.0)**

† Typical rejection for brackish water

* Molecular Weight Cut-Off measurement based on Cytochrome C

** Salt rejection of this membrane varies significantly depending on concentration, pressure and ion species. Contact Hydranautics' technical support for more information.

Selected Project References for Hydranautics' HydraCoRe Membranes

Irvine Ranch, California . . . . . .7.35 MGD (27,800 m^3/d) of potable water from a ground water source

ESNA

Test Conditions

NaCl Solution, PPM 500
$CaCl_2$ Solution ESNA1-LF, PPM 500
Applied Pressure, psig (MPa) 75 (0.52)
Operating Temperature, °F (°C) . . . . . .77° (25°)
Permeate Recovery 15%
pH Range . . . . . .6.5 - 7.0

Application Data

Maximum Applied Pressure, psig (MPa) 600 (4.14)
Maximum Feed Flow, GPM (m^3/h) . . . . . .4040-16(3.6), 8-inch -75(17.0)
Maximum Operating Temperature, °F (°C) . . . . . .113° (45°)
Feedwater pH Range . . . . . .3.0 - 10.0
Maximum Feedwater Turbidity, NTU 1.0
Maximum Feedwater SDI (15 mins) 5.0
Maximum Chlorine Concentration, PPM . . . . . .<0.1
Maximum Ratio of Concentrate to Permeate Flow . . . . . .for Any Element, 5:1
Maximum Pressure Drop for Each Element, psig 10
Feed TOC, PPM . . . . . .<3
Feed TOC ESNA1-LF, PPM . . . . . .<30

Element Performance

Element Type	Min. Salt Rej.,%	Nom. Salt Rej.,%	Typical Rej. Brackish Water	Permeate Flow, GPD	(m^3/d)
ESNA1-LF	**.73.0**	**.80.0**	**.96.0**	**.7,500**	**(28.0)**
ESNA1-LF2	**.70.0**	**.77.0**	**.93.0**	**.8,300**	**(30.9)**

Selected Project References for Hydranautics' ESNA Membranes

Hollywood, Florida . . . .18 MGD (68,000 m^3/d) of potable water from a well water source

Collier County, Florida . .12 MGD (45,500 m^3/d) of potable water from a well water source

City of Fort Myers, Florida . . . .12 MGD (45,400 m^3/d) of potable water from a well water source

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