HYDRANAUTICS
High Performance Membrane Products
A Nitto Denko Corporation

Comparison

LFC1 membrane with X-20 membrane

LENNTECH
info@lenntech.com Tel. +31-152-610-900
www.lenntech.com Fax. +31-152-616-289

ISO 9001 Quality System Certified

Comparison LFC1 with X-20

TriSep X-20 membrane has been evaluated by Hydranautics. The performance was compared with CPA2 membrane. The test results indicated that, at the same test conditions, the X-20 had twice the salt passage of CPA2, lower specific flux and its tolerance to exposure to free chlorine was about 60% that of CPA2.

The chemistry of the X-20 membrane barrier polymer is different than that of CPA2. CP2 polymer consists of symmetric, pure polyamide links between the two building chemical compounds: TMC and MPD. These links result in the unique stability and chemical durability of this polymer. Conversely, one out of every three links in the X-20 polymer is different. X20 contains an additional nitrogen bond which is formed from the urea group. This additional bond deforms the symmetry of the polymer web and weakens its structure to some extent. The presence of this bond results in increased susceptibility of X-20 membrane to hydrolysis at extreme pH and a higher rate of chlorine substitution. This is most likely one of the reasons for the somewhat inferior stability and performance of X-20 as compared to CPA2.

Hydranautics low fouling LFC1 membrane has the same polymer chemistry as CPA2 membrane. The polymer structure is of a pure aromatic polyamide. Therefore, stability is the same as CPA2.

During the manufacturing process of LFC1 membrane sheet, the physical property of the membrane surface is permanently modified to provide a hydrophilic character. The hydrophilic character of the LFC1 membrane surface results in significantly lower affinity to organic matter dissolved in the feedwater, as compared to conventional polyamide membrane material. Absorption of organic compounds on the membrane surface is the major factor responsible for permeate flux decline and the subsequent need to increase feed pressure.

The X-20, LFC1 and NF70 were tested in a parallel operation on Hillsborough River feedwater in Florida. The tests were part of a prequalification screening for a field test program conducted by the University of Central Florida. During these initial tests the specific permeate flux of LFC1 decreased by 15% but was recovered by cleaning. The Trisep X-20 membrane suffered irreversible loss of 20% of specific flux. Also, the initial specific permeate flux of the X-20 membrane was only 50% of the specific permeate flux of LFC1. The NF-70 membrane has lost 50% of the initial flux. As a result of the initial screening, LFC1 membranes have been selected for the project continuation.

LFC1 membrane continues to operate with very stable performance as shown in the enclosed Fig 1.

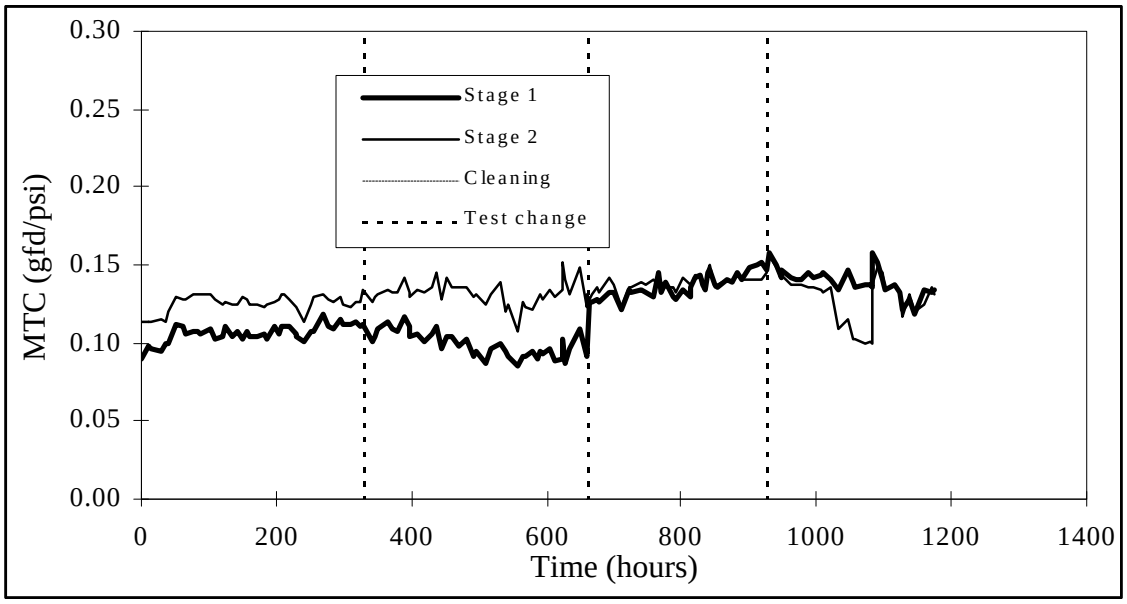
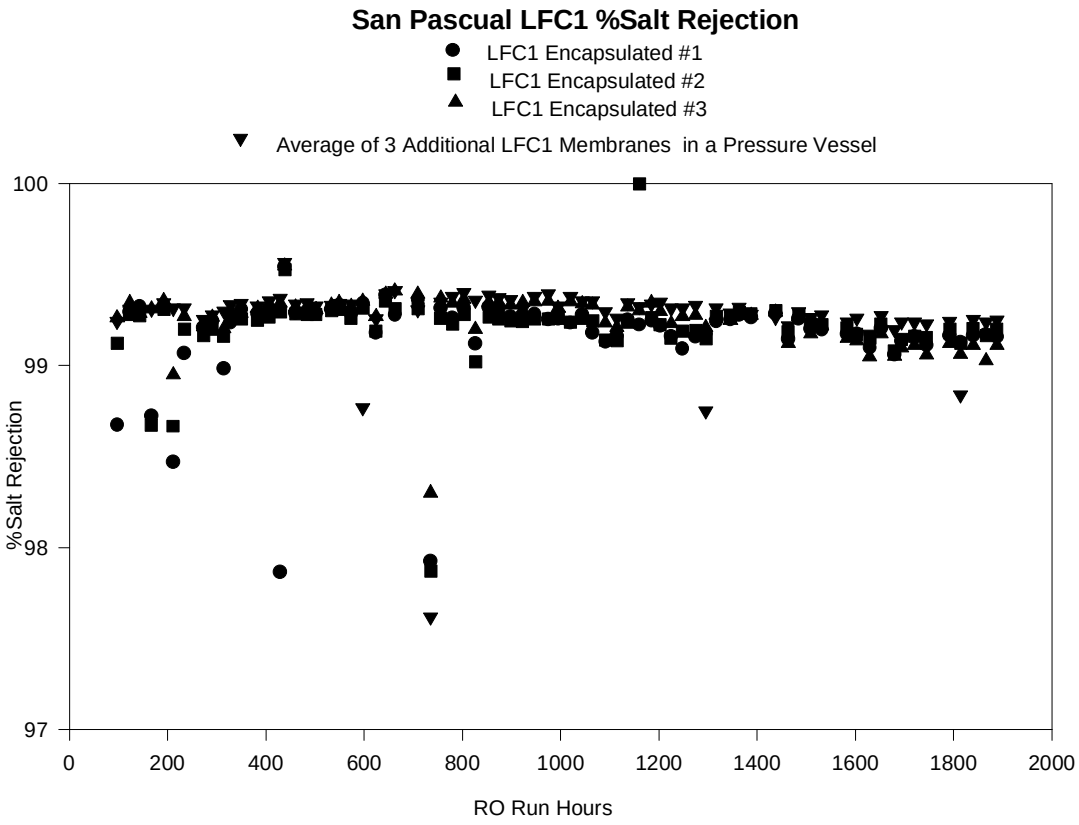
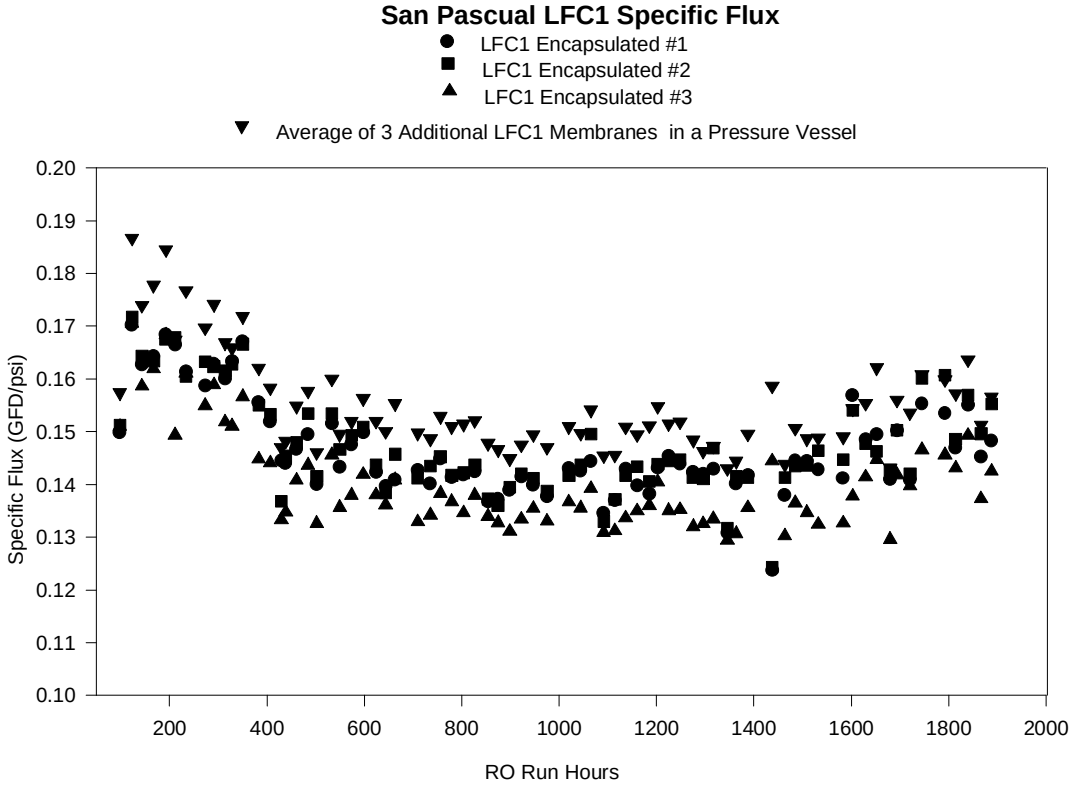


Figure 1: Specific Flux of the LFC1 membrane versus time at 20° C

LFC1 membrane is also operating on tertiary municipal effluent at the wastewater treatment plant at San Pasqual, CA. Even on such a heavy fouling feedwater, the performance is very stable as shown in Fig 2 and Fig 3.


San Pascual LFC1 %Salt Rejection
LFC1 Encapsulated #1
LFC1 Encapsulated #2
LFC1 Encapsulated #3
Average of 3 Additional LFC1 Membranes in a Pressure Vessel
100
99
98
97
%Salt Rejection
0
200
400
600
800
1000
1200
1400
1600
1800
2000
RO Run Hours


San Pascual LFC1 Specific Flux
LFC1 Encapsulated #1
LFC1 Encapsulated #2
LFC1 Encapsulated #3
Average of 3 Additional LFC1 Membranes in a Pressure Vessel
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
Specific Flux (GFD/psi)
200
400
600
800
1000
1200
1400
1600
1800
2000
RO Run Hours