

Case Study  
TurboClean®  
Extreme (XT) UF  
Elements

# Case Study: Pilot TurboClean<sup>®</sup> Extreme (XT) UF Elements

TurboClean XT elements for high pH / high temperature cleaning rolled with 5 kDa and 10 kDa UF membrane for systems with no chlorine.



## PROBLEM

Restricted chlorine use, high pH, and high temperature cleaning



## SITE

Testing site



## OUTCOME

Comparable performance with competitive 10 kDa and 5 kDa membrane

## OBJECTIVE

In places where chlorine use is restricted due to concerns with chlorinated byproducts in wastewater streams, systems are cleaned using alkaline cleaning solutions at high pH and high temperature. In addition to our significant experience manufacturing specialty elements, MANN+HUMMEL Water & Fluid Solutions (WFS) offers 5 kDa and 10 kDa membranes to tolerate these extreme cleaning conditions. The objective of this test was to demonstrate that these membranes remain competitive at these conditions.

## MATERIALS & METHODS

MANN+HUMMEL WFS 5 kDa and 10 kDa membranes were tested in a plate-and-frame configuration using skim milk and whole milk as incoming feeds to determine each membrane's process flux and Total Solids passage. The membranes were also exposed to a high pH cleaning solution for a total of 333 hours at pH 13 (71 hours at 75-85°C and 262 hours at > 45°C) to test their ability to tolerate high pH and high temperature cleanings.

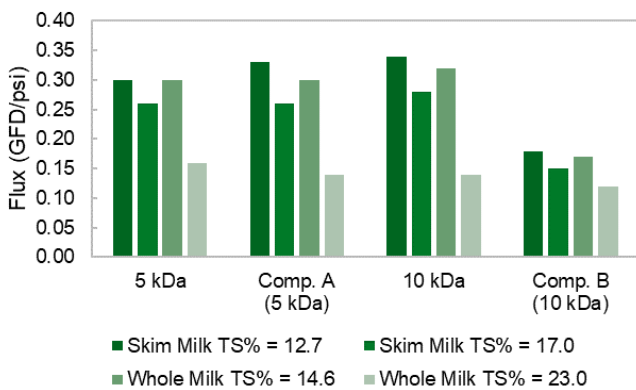


## RESULTS

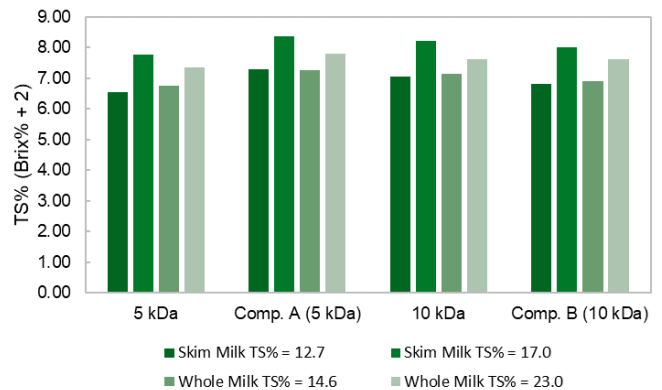
Process flux and total solids passage measurements with skim and whole milk revealed that the 10 kDa membrane had higher flux and similar solids passage as the competitive 10 kDa membrane (Figure 1). The 5 kDa membrane had similar process flux and incrementally less solids passage than the competitive 5 kDa membrane (Figure 2).

## CONCLUSION

The results of this study indicate that the 5 kDa and 10 kDa membranes are able to endure the high pH, high temperature cleaning regimen used in spiral-wound membrane element systems where chlorine is not used and perform similarly, if not better, than the competitive membranes.



**Figure 1** Average process flux with skim and whole milk at various Total Solids (TS%) feed concentrations.



**Figure 2** Average process flux with skim and whole milk at various Total Solids (TS%) feed concentrations.

