Brine recovery system

Combining the Alfa Laval Membrane Filtration Hybrid solution with AlfaVap evaporation or sugar decolourization with near-zero discharge

Dealing with brine waste in sugar refineries
In cane sugar refineries all over the world, the raw sugar is remelted, and then purified in several stages – either through polymeric media (ion exhange resins) or activated carbon – before being crystallized still further into white sugar.

One of the key purification stages is the decolourization process, designed to remove undesirable colourants that develop during cane processing. Decolourization is normally combined with demineralization in a mixed-bed system, using ion-exchange resins (IER) based on styrenic and acrylic structures.

A solution of NaCl and NaOH is then used to regenenerate this IER system. Unfortunately, this usually results in large volumes of brine waste that have to be disposed of, at considerable expense. In addition to limiting production capacity, these high waste disposal costs also increase overall sugar production costs.

Near-zero liquid discharge solution
Using a unique combination of the Alfa Laval Hybrid Membrane Filtration solution and Alfa Laval evaporation technologies, this breakthrough solution makes it possible to reduce these substantial brine waste volumes by as much as 90%, as well as recycling the brine solution effectively so that hardly any liquid is actually discharged from the process.

Nanofiltration (NF) membranes allow the NaCl content to pass through into the permeate while holding back the colour bodies (the retentate).

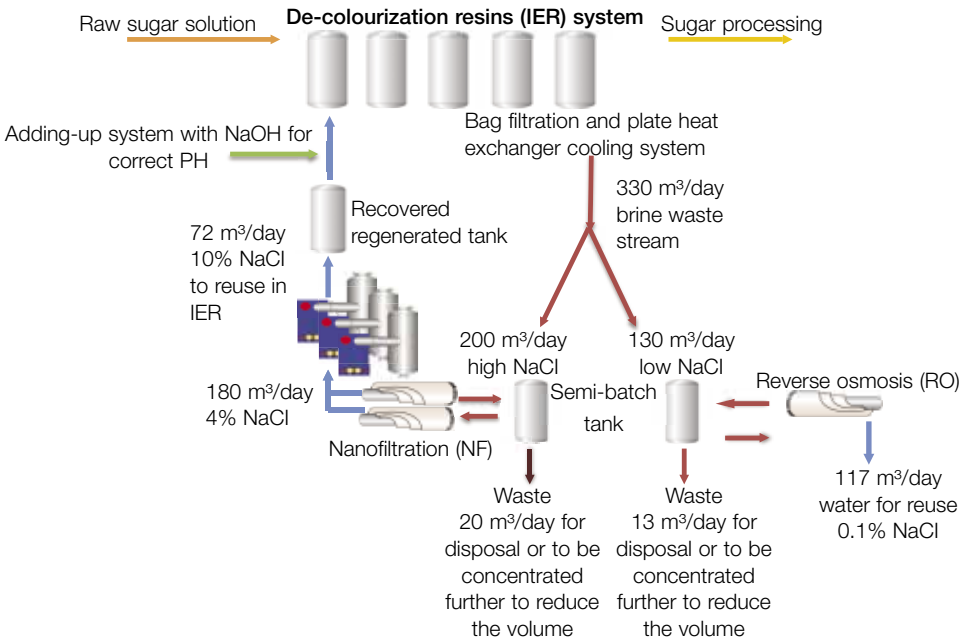
At the same time, this unique solution also provides a clean, clear flow of water with an NaCl concentration of less than 0.1%. This is ideal for reuse in a wide range of other sugar refining processes.

Effective colour removal – samples showing NF retentate (10x concentrated colour) and average NF permeate (purified NaCl solution) for reuse.

Combining the advantages of nanofiltration and reverse osmosis
The used brine entering the system is normally a mixture of rinse water and regenerants, with an NaCl concentration of 3–5%.

This used brine is purified using nanofiltration membranes, which also effectively concentrates the colour at the same time. Energy-efficient AlfaVap evaporation technology is then used to concentrate the brine still further up to 10% so that this now-purified brine can be reused in the IER regeneration process.

In order to increase the NaCl concentration and reduce the overall waste volume still further, the Alfa Laval Hybrid Membrane Filtration solution also includes a reverse osmosis filtration setup to concentrate the low-NaCl brine solution at the beginning and end of the IER regeneration process. This combination is unique to the Alfa Laval brine recovery system.



Operating benefits

- Normally able to recover as much as 90% of the brine from an IER regeneration waste flow
- Approx. 30% water recovery
- Excellent colour reduction to provide reusable brine
- Membrane filtration installation and evaporator from the same manufacturer ensures maximum compatibility and operational reliability

Standard system

	NF2M8-4	NF3M8-4	NF4M8-4
Volume per day, m³	120	180	240
Average flow rate, m³/hour	6	9	12
Energy, kWh	20	30	40

Experience

Alfa Laval provides solutions for multiple production steps in the sugar industry, and has worked with membrane filtration in this specialist industry since 1965.

Alfa Laval plate-and-frame evaporator technology is in service in more than 100 sugar refinery plants worldwide.

"Plug-and-play" skid-mounted systems available, as well as individually customized systems.

AlfaVap evaporator system, featuring fully automatic operation with no manpower requirements.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com