



CFR

Complete Filtration Resources, Inc.

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NANOFILTRATION



APPLICATIONS

DAIRY NANOFILTRATION

- ✓ Convert salt whey to sweet whey
- ✓ Deash and desalt whey for specialty protein products
- ✓ Remove lactic acid from dairy products

MEAT NANOFILTRATION

- ✓ Recover and purify process brines
- ✓ Recover albumin from blood

PHARMACEUTICAL NANOFILTRATION

- ✓ Molecular separation and desalting
- ✓ Buffer exchange

WASTE TREATMENT NANOFILTRATION

- ✓ Lower BOD's and COD's in effluent
- ✓ Lower phosphate content
- ✓ Recover CIP solutions

CFR can design, fabricate, and install your membrane filtration process. CFR also provides controls, programming, full start up assistance, and training. You can rely on CFR to stand behind every system that we put in. Even more, you can rely on CFR to provide full after-start up service and support if problems occur or if system modification or expansion is desired..

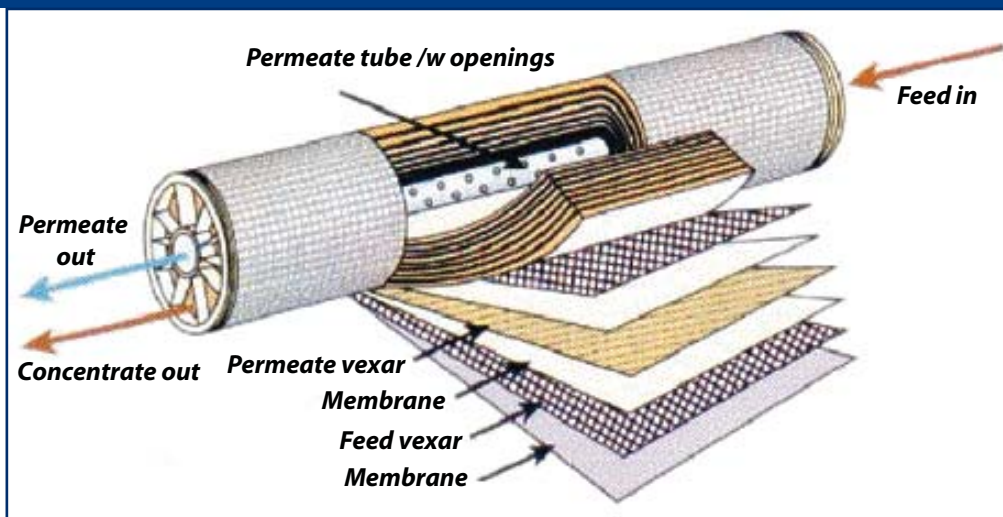


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Above is a view of a typical spiral wound nanofiltration element. The spiral wound element configuration is the most efficient membrane module when packing a large membrane area into a small volume. It leads to units which are highly efficient when viewed in terms of floor space requirements, energy efficiency, membrane replacement costs and initial capital investment.

CFR has access to membrane modules from a variety of manufacturers and this permits us to custom tailor the rejection properties of the membrane to the feed stream requirements; thereby optimizing the separations that result from nanofiltration processes. This flexibility in membrane choice allows us to choose the membrane that is best suited for your application.

Additional advantages in terms of final product concentration and properties together with savings on equipment capital costs may be obtained by combining nanofiltration with another membrane process such as reverse osmosis, ultrafiltration or microfiltration.

CFR has been involved with nanofiltration applications from the time that these membranes first appeared on the market. We have built more systems that combine nanofiltration with either RO or UF than any other manufacturer.

Nanofiltration is a pressure driven membrane process which permits water and monovalent ions to pass through the membrane. It has high rejection properties for multiply charged ions such as Ca^{++} and Mg^{++} ions and for most molecules with molecular weights greater than about 400 daltons.

The rejection properties of nanofiltration membranes arise from the existence of a charge on the membrane surface. Therefore, the rejection properties of nanofiltration membranes will change with external conditions such as the pH, temperature and concentration of the feed stream. In general the rejection properties of nanofiltration membranes for monovalent ions decrease as the concentration of the feed stream increases.

Nanofiltration membranes have many applications and some NF membranes are solvent resistant permitting their use in non-aqueous applications.