Nanofiltration

Nanofiltration (NF) membranes are similar to reverse osmosis in design that employs a semipermeable membrane. An applied pressure is used to overcome osmotic pressure. This process can remove many types of molecules and ions from solutions, and is used in both industrial processes and the production of potable water. The result is that the solute is retained on the pressurized side of the membrane and the pure solvent (known as permeate) is allowed to pass to the other side.

Most Nanofiltration membranes are spiral-wound whereby leaves of membrane that are cast onto a backing material are then wound around a permeate (filtrate) collection tube separated by a diamond-patterned spacer.

Nanofiltration systems are typically used for:
- Water softening
- Color removal from surface water sources including removal of disinfection pre-cursors
- Retention of humic and fulvic acids in landfill leachate to improve UV transmissivity
- Pharmaceutical solvent recovery and management
- Removal of tar compounds in petroleum industry
- TDS reduction


Nanofiltration systems are also used for a wide variety of applications, some of which are listed on the left. They operate at lower pressures than reverse osmosis so when they apply to any particular application, energy costs are lower than the equivalent reverse osmosis systems.

Typical operating pressures are in the range 50 – 250 psi, although in some applications, can be as high as 600 psi.

Dynatec builds unique nanofiltration systems especially for water recycling and reuse.
System Requirements:

The successful operation of Nanofiltration systems relies on good pretreatment and careful design.

Dynatec’s designs include features not normally found in other systems for surface water or city water pretreatment. Features such as automatic permeate flow control, internal recycling and accurate chemical control provide systems that are more reliable in long-term operation than simpler designs. Rigorous control of reject streams contribute to optimizing reject volumes, particularly critical in recycling operations.

Dynatec’s designs include installed CIP (Clean-in-Place) systems to ensure the cleaning operations are as simple as possible.

Pretreatment includes:

- Removal of suspended solids to essentially zero. Dynatec typically recommends ultrafiltration pretreatment.
- Accurate control of treatment chemistries.

System Design:

Comprehensive data is required in order to provide a good system design. Dynatec can provide the details required. Benchtop and pilot treatability studies are also available to confirm predicted system designs.

System designs can take a variety of forms that might include one and two pass system, the latter used when high removal of particular influent components is required. A typical case might be treatment to essentially zero dissolved solids for rinses in industrial applications.

Typical of Dynatec’s systems is illustrated. These two systems provide up to 75,000 gallons per day of treatment of landfill leachate after treatment with Membrane Bioreactor Technology.