Ultra filtration (UF)

Ultra filtration or UF is a pressure driven membrane separation process that separates particulate matter from soluble components in the carrier fluid (such as water). UF membranes typically have pore sizes in the range of 0.01 - 0.10 µm and have a high removal capability for bacteria and most viruses, colloids and silt (SDI). The smaller the nominal pore size, the higher the removal capability. Most materials that are used in UF are polymeric and are naturally hydrophobic. Common polymeric materials used in UF include: Polysulfone (PS), Polyethersulfone (PES), Polypropylene (PP), or Polyvinylidenefluoride (PVDF). Although these materials can be blended with hydrophilic agents, they can reduce the membranes ability to be cleaned with high strength disinfectants such as hypochlorite that impacts removal of bacterial growth.

The Ultra filtration module utilizes a double-walled hollow fiber (capillary) PVDF membrane which has a very small nominal pore diameter for PVDF material that allows for the removal of all particulate matter, bacteria and most viruses and colloids. Despite the small pore diameter, the membrane has a very high porosity resulting in a flux similar to that of micro-filtration (MF) and can effectively replace MF in most cases.

Systems designed with Ultra filtration use an outside-in flow configuration which allows for less plugging, higher solids loading, higher flow area and easy cleaning. The primary flow design is dead-end filtration but the module can be operated using a concentrate bleed. Dead-end filtration uses less energy and has a lower operating pressure than the concentrate bleed, therefore reducing operating costs.

Typically, Ultra filtration is operated at a constant permeate flow. The Tran membrane pressure (TMP) will naturally increase over time and the module can be cleaned periodically by back flushing and air scouring to remove the fouling layer. Disinfectants and other cleaning agents can be used to fully remove and prevent performance loss due to biological growth as well as other foulants.