High-Performance Polymers for Durable Membranes
Polymers for Microfiltration (MF) and Ultrafiltration (UF) Membranes

**Solef® PVDF**
- Easy to form MF membranes
- Excellent chlorine resistance
- Stable at pH levels from 1–11
- Global agency approvals
- Processable by DIPS and TIPS technology
- Excellent flowability of the powder
- Strict quality consistency lot by lot

**Udel® PSU, Veradel® PESU and Radel® PPSU**
- Excellent mechanical properties
- Easy to form MF and UF membranes
- Outstanding hydrolytic stability
- Stable at pH levels from 2–13
- Excellent caustic resistance
- Global agency approvals
- Processable by DIPS technology

**Halar® ECTFE**
- Outstanding chemical resistance from pH 1–14
- Processable by TIPS technology only

**Algoﬂon® DF PTFE**
- Suitable for manufacturing expanded PTFE membranes
- Outstanding chemical resistance
- Lightweight membranes with better uniformity
- Processable by Paste Extrusion and Stretching only

Technologies

**Diffusion Induced Phase Separation (DIPS)**
- The polymer is dissolved at 25–80 °C, then precipitated in a bath containing a non-solvent, typically water.

**Thermal Induced Phase Separation (TIPS)**
- The polymer is melted and blended with a plasticizer, then extruded into the desired shape and cooled; the plasticizer is removed with another solvent.
- Membranes manufactured by TIPS technology are free of macrovoids, have improved tensile properties and narrow pore size distribution.

**Paste extrusion and stretching**
- The polymer powder is blended with a lubricant, formed in a ram extruder, then calendered and uniaxially or biaxially stretched.

Applications

**Water treatment membranes**
- Support layer for reverse osmosis membranes (Udel® PSU)
- Membranes for reverse osmosis pre-treatment (Veradel® PESU, Solef® PVDF)
- Membrane bio-reactors for industrial and municipal wastewater (Solef® PVDF, Halar® ECTFE)
- Drinking water (Udel® PSU, Veradel® PESU, Solef® PVDF)

**Hemodialysis**
- Fine hollow fiber membranes for blood purification (Udel® PSU, Veradel® PESU)

**Bio-pharma separation**
- Filter cartridges for concentration and solution clarification (Veradel® PESU, Solef® PVDF, Algoﬂon® PTFE, Halar® ECTFE)
- Filters for syringes, bottles, funnels and stirred cells (Veradel® PESU, Solef® PVDF, Algoﬂon® PTFE, Halar® ECTFE)

**Food & beverage processing**
- MF and UF membranes for concentration and clarification of juice and dairy products (Udel® PSU, Veradel® PESU, Solef® PVDF)

**Gas separation**
Udel® PSU and Hyflon® AD are the materials of choice for:
- Production of O₂ and N₂ from air
- Carbon dioxide removal or sequestration
- Natural gas liquids removal and dehydration
- Hydrogen recovery from refinery wet gas and fuel gas streams
- Olefin/paraffin separations