Biopharmaceutical products represent one of the fastest growing segments of the pharmaceutical industry today. Breakthroughs in biotechnology, especially in genetic engineering, have resulted in rapid development of new therapeutics based on existing human molecules. Production of these unique biopharmaceuticals is based on fermentation or cell culture processes that require significant purification, separation, and concentration steps before the high value product is obtained.

Pharmaceutical professionals are challenged to consistently produce high purity products at exceptionally high yields. Purification, separation and concentration objectives can be performed simply and reliably with the Desal® Process PHARMA family of spiral wound membrane elements. Desal Process elements are known worldwide for their successful use in many difficult process applications. The Desal Process PHARMA family of elements exceeds expectations by improving your application, simplifying sanitary procedures and enhancing overall system performance.

**Fermentation Broth Clarification.**
Fermentation is often required to produce products such as proteins, enzymes, antibiotics, and other active pharmaceutical ingredients (API). This process involves growing living microorganisms that will eventually produce and release the desired compound, or alternatively, the microorganism can be “split” in order to release the product. In either case, the desired products must be isolated from the rest of the whole cells and/or cell debris. Microfiltration (MF) is a standard separation technique for this very important step in biopharmaceutical production.

**Protein and Enzyme Concentration.** Once separated from cells and debris, proteins and enzymes must be separated from the salts and low molecular weight metabolites found in fermentation broths. Ultrafiltration (UF) membrane can be used for this process in which the shape, charge, flexibility and molecular weight determine a molecule’s ability to pass through the membrane.

**Antibiotic Purification.** Since the concentration of antibiotics and other APIs is quite low in these production processes, nanofiltration (NF) and reverse osmosis (RO) are used to concentrate and purify the highly valued final product.
### Desal Process PHARMA Elements Product Line

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MEMBRANE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHARMA MF</td>
<td>PVDF</td>
<td>Designed for high crossflow, daily CIP and the ability to handle suspended solids. Typically used for fermentation broth clarification.</td>
</tr>
<tr>
<td>PHARMA UF</td>
<td>PES</td>
<td>Polyethersulfone membrane that is tolerant of extremes in pH and temperature. Typically used for protein and enzyme concentration.</td>
</tr>
<tr>
<td>PHARMA UF</td>
<td>TFM®</td>
<td>Smooth, fouling-resistant membrane that has a molecular weight cutoff of 3,500 daltons. Typically used for protein and enzyme concentration.</td>
</tr>
<tr>
<td>PHARMA NF</td>
<td>TFM®</td>
<td>Smooth, fouling-resistant membrane with the ability to operate at feed pressures below that of reverse osmosis (RO). Typically used for antibiotic and contrast media concentration and polysaccharide desalting.</td>
</tr>
<tr>
<td>PHARMA RO</td>
<td>TFM®</td>
<td>Smooth, fouling-resistant membrane with high sodium chloride rejection. Typically used for concentration of antibiotics.</td>
</tr>
<tr>
<td>PHARMA RO-HT</td>
<td>TFM®</td>
<td>Smooth, fouling-resistant membrane featuring Duratherm® construction suitable for a range of high temperature operations and hot water sanitization up to 90°C.</td>
</tr>
</tbody>
</table>

### Sanitary Durasan® Outer Wrap

All Desal Process PHARMA elements feature GE Osmonics patented Durasan® outer wrap. Durasan is a rigid, tubular plastic “cage” that contains and protects the spiral-wound element. This design maintains a controlled bypass around the outside of the element that eliminates the voids and dead spaces conducive to bacterial growth and adhesion. Proven in sensitive applications, Durasan is a sanitary design that provides quick rinse ability ideal for CIP sanitary systems.

### Process Validation

Product performance and quality control measures are understandably important in the evaluation of prospective suppliers. Validated processes require validated systems and components. GE Osmonics maintains regimented quality and document controls as well as validation support services, including Certificates of Quality. Customer assurance is solidified by the standard practices of GE Osmonics in verifying product quality and performance through rigorous testing.

### The GE Osmonics Advantage

Beyond the manufacturing capabilities of membranes, filters, components and systems for fluid purification, GE Osmonics delivers over 30 years of experience in pioneering and supporting process technology worldwide. GE Osmonics is with you – wherever you are – to provide service, maintenance and support. We are your single-source provider for all your membrane application needs.
TECHNOLOGIES
- Reverse Osmosis
- Nanofiltration
- Ultrafiltration
- Microfiltration
- Ion Exchange
- Ozonation

COMPONENTS
- Softener/Filter Control Valves
- Process Control Instrumentation
- Membrane Elements
- Depth & Pleated Cartridge Filters
- Centrifugal Pumps
- Laboratory Products
- Filters & Element Housings
- Reverse Osmosis Kits
- Membrane Equipment Skids

For More Information:
Call Filtration and Separations Group at (760) 598-3334 or (800) 423-3725 in the U.S., or visit www.osmonics.com

GE Osmonics

North American Sales
760 Shadowridge Drive
Vista, CA
92083-7986
USA
(760) 598-3334 Phone
(760) 598-3335 Fax

Euro/Africa Sales
230 rue Robert Schuman
ZA des Uselles
F-77350 Le Mée sur Seine
FRANCE
+33 1 64 10 2000 Phone
+33 1 64 10 3747 Fax

Asia/Pacific Sales
1044/8 SOI 44/2
Sukhumvit Road Prakanong
Bangkok 10110
THAILAND
+66 2 38 14213 Phone
+66 2 39 18183 Fax

© Copyright 2003 GE Osmonics
Printed in USA, P/N 1235902 Rev. A