Filters with Membranes Capabilities

Membrane Protection Matters
For more than 100 years, GE has been in the business of providing solutions for global customers, helping them address some of the world’s most demanding challenges. Today, we are committed to protecting our most precious natural resources, and helping our customers run more proficient and responsible businesses.

To that end, GE offers a broad portfolio of solutions to address the wide-ranging needs of our customers. For example, to better protect your membrane treatment system, GE offers a line of the industry’s best pre-filters. By providing the whole solution and not just portions of it, GE helps our customers extend membrane life and reduce operating costs.

We’ve invested in the Minnetonka, Minnesota Center of Excellence to meet customer demands for top quality filters with membranes. We substantially expanded and upgraded the equipment in the plant to create an automated, streamlined facility to help support the growing needs of customers around the world.

GE is a world leader in filters with membranes. The combination of our filters with membranes offers you optimal systems performance. We offer a broad portfolio of filters and membranes.

**Filters**

**Depth cartridge filters**
- Hytrex*, high-strength graded density filters
- Z.Plex* technology filters, superior particle holding capacity, longer filter life

**Pleated cartridge filters**
- Flotrex* and Memtrex*, precise micron ratings with exceptional particle holding capacity in micofiber and membrane versions
- Filters available in standard and sterilizing grade versions

**Membranes**
- Multiple configurations, including brackish, low energy, low fouling, high temperature, seawater and wastewater
- High salt rejection as well as energy saving models
- Ease of replacement and upgrade
- Multiple configurations available
- Complete spectrum of membranes and spiral elements, including Microfiltration (MF), Ultrafiltration (UF), Nanofiltration (NF) and Reverse Osmosis (RO)

**Key applications for filters with membranes**

**Seawater desalination** – SWRO.Z depth filters effectively protect GE seawater RO membranes to ensure greater membrane efficiency and life.

**Municipal and tertiary water treatment** – Muni.Z depth filters are designed specifically for municipal and tertiary water treatment. When used in combination with our Muni RO LE membranes, customers can expect superior membrane protection, longer membrane life, and lower operating costs.

**Boiler feed applications** – ROSave.Zs depth filters are ideal for boiler feedwater applications. High quality feedwater is imperative for boilers to prevent corrosion and boiler inefficiency. GE’s ROSave.Zs depth filter, in combination with the brackish water AG Series, provides the high quality of water needed for boiler applications.

GE offers world-class filters and membranes because we believe that a sound membrane water treatment solution includes both good pre-filtration and world-class membranes. Proper pre-treatment is critical to maintaining a fully optimized water treatment operation. Good pre-filtration offers protection against membrane fouling and thus leads to a reduction in energy costs, downtime, and CIP frequency. All of this translates to reducing operating costs over the life of the plant. GE continues to invest in both filtration and membrane technology development to remain the filters with membranes leader and better serve our customers.
Purtrex* Depth Cartridge Filters

Description and Use

The Purtrex depth filter (Figure 1), is an exceptional value for general applications where long life, high purity and low change-out frequency are required. Produced through GE’s patented melt blown micro-fiber technology, Purtrex is a 100% pure polypropylene depth filter with exceptional dirt-holding capacity.

Purtrex’ true-graded density filter matrix (lower density at the surface of the filter with progressively higher density toward the center) captures particles throughout the entire filter depth. This translates to longer life and fewer change-outs than existing string-wound or resin-bonded filters.

Purtrex contains no wetting agents, solvents, anti-static agents or binders, and meets the requirements of the FDA for food and beverage contact. The filter incinerates to trace ash for easy disposal.

Typical Applications

- Potable water filtration
- Chemical filtration - wide chemical compatibility
- Plating baths
- Amine Filtration
- Meets FDA requirements for food and beverage contact

General Properties

Purtrex filters are available with a variety of nominal pore size ratings: 1, 3, 5, 10, 20, 30, 50 and 75 microns. Tables 1, 2, 3 and 4 provide additional details on materials of construction, dimensions, operating limits and flow performance.

Table 1: Materials of Construction

<table>
<thead>
<tr>
<th>Description</th>
<th>Material of Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtration Media</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>End caps and Adapters</td>
<td>Polypropylene</td>
</tr>
</tbody>
</table>

Table 2: Dimensions

<table>
<thead>
<tr>
<th>Description</th>
<th>Material of Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Outside Diameter</td>
<td>2.50 inch (6.4 cm)</td>
</tr>
<tr>
<td>Nominal Inside Diameter</td>
<td>1 inch (2.5 cm)</td>
</tr>
</tbody>
</table>

Table 3: Operating Limits

<table>
<thead>
<tr>
<th>Description</th>
<th>Operating Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Differential Pressure</td>
<td>35psi (2.4bar) at ≤100°F (38°C)</td>
</tr>
<tr>
<td>Maximum Temperature</td>
<td>160°F (71°C) at ≤15psid (1.0bar)</td>
</tr>
<tr>
<td>Recommended Maximum Water Flow</td>
<td>5 gpm (19L/min) per 10-inch length</td>
</tr>
</tbody>
</table>

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Hytrex* Depth Cartridge Filters

Description and Use
The purity and reliability of Hytrex* cartridge filters (Figure 1) ensure consistent results, time after time. Thermally bonded micro fibers create a strong secure cartridge that traps particles throughout its depth. Hytrex combines efficiency, long life and purity to create a high performance depth filter.

- Pure polypropylene construction
- Fast rinse-up in high purity applications
- Meets the FDA requirement for food and beverage use
- Wide chemical compatibility
- Automated packaging for a clean finished product
- NSF Standard 42 certified
- Patented, continuous process assures consistent product performance. Lot-to-lot, order-to-order, strict quality control assures repeatability and reliability.

Typical Applications
- High Purity Chemicals
- Bottled Water
- Pre-treatment for Reverse Osmosis
- Oil & Gas
- Electronics

General Properties
Hytrex Filters are available in a wide range of nominal pore sizes: 1, 2, 5, 10, 20, 30, 50, 75 and 100 microns. Tables 1, 2, 3 and 4 provide additional details on filter construction and performance.

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</thead>
<tbody>
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</tr>
</tbody>
</table>

Table 4: Flow Performance in Clean Water

<table>
<thead>
<tr>
<th>psid (mbar)</th>
<th>1, 3, 5 Microns</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1.0 (0.2)</td>
</tr>
<tr>
<td>2</td>
<td>2.0 (0.4)</td>
</tr>
<tr>
<td>3</td>
<td>3.0 (0.9)</td>
</tr>
<tr>
<td>4</td>
<td>4.0 (2.0)</td>
</tr>
<tr>
<td>5</td>
<td>5.0 (2.5)</td>
</tr>
</tbody>
</table>

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Selex* Depth Cartridge Filters

Description and Use

The Selex* (SX) cartridge filter (Figure 1) is a high precision graded density cartridge constructed of 100% pure polypropylene. Selex provides a very high particle retention efficiency that equates to the performance of absolute rated filters. The patented Selex manufacturing process controls the density and fiber size, which are key to the filter’s performance and long life. Selex cartridge filters have sharp efficiency cutoff, fast rinse up for exceptional purity, and continuous, weld free lengths up to 40 inches (101.6 cm).

Typical Applications

- Magnetic Media (CMP) – solvents, slurry/dispersion, Pre-Filter and Final Filter at Coater
- Photographic – Incoming Water, Liquid Chemicals, Developer, Fixer, Stopper Solutions
- Petrochemicals – Waterflood, Completion, Enhanced Oil Recovery, Amines
- Chemical Process Industry – Reagent Grade Chemicals, Process Water

- Pure Water – Pre-RO, Post- DI Resin Trap
- Food and Beverage – Clarification, Process Water, Polishing Filter
- Metal Finishing – Electrodeposition Paint, Precision Electroplating
- Potable Water – Polishing Filter
- Pharmaceuticals – Clarify Production Broths, Prefiltration
- Oil and gas – well protection

General Properties

Selex filters are available the following absolute pore size micron ratings: 1, 3, 5, 10, 20 and 30 microns. Tables 1, 2, 3 and 4 show further details on materials of construction, dimensions, flow performance and performance specifications.

Table 1: Materials of Construction

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<th>Material of Construction</th>
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</thead>
<tbody>
<tr>
<td>Filtration Media</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Endcaps and Adapters</td>
<td>Polypropylene</td>
</tr>
</tbody>
</table>

Table 2: Dimensions

<table>
<thead>
<tr>
<th>Nominal O.D.</th>
<th>Nominal I.D.</th>
<th>Maximum Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.75” (70 mm)</td>
<td>1.25” (31 mm)</td>
<td>140°F (60°C)</td>
</tr>
</tbody>
</table>

Table 3: Flow Performance in Clean Water

- Data based on 10" length filter

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ZCore Depth Filters
Featuring patented Z.Plex* Technology

Features and Benefits

ZCore is manufactured using patented Z.Plex* filter technology and is engineered specifically for high strength filtration. (See Figure 1) The patented filter matrix of the ZCore provides unmatched performance in these applications.

The ZCore filter composition incorporates small diameter fibers and an innovative 3-dimensional fiber matrix. The filter matrix maintains structural integrity while greatly increasing the filter’s particle holding capacity and reducing pressure drop. An additional polypropylene support core enhances strength and temperature resistance. This unique construction allows for excellent removal efficiency, high contaminant capacity and long life.

Benefits:
• Greater contaminant capacity compared to filters with equivalent removal efficiency (Note: 90% removal efficiency at rating using ASTM F-795 Retention based on GE efficiency test protocol)
• High Temperature Capability (see Table 3)
• Melt-bonded exterior ensures no media migration and helps prevent premature surface blinding
• Provides lower total cost of filtration operations
• FDA compliant
• Product meets criteria for USP Class VI
• High strength polypropylene core
• Resists contaminant unloading even at high differential pressures

Typical Applications

• Elevated temperature uses such as hotwater sanitizing in food and beverage processes, process and chemical streams
• High viscosity fluids that require filter strength under heavy loading and high pressure conditions
• Applications that experience high pressure drop

General Properties

Tables 1, 2, 3 and 4 provide information on dimensions and flow performance.

Table 1: Materials of Construction

<table>
<thead>
<tr>
<th>Core</th>
<th>Polypropylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Adapters</td>
<td>Polypropylene</td>
</tr>
</tbody>
</table>

Table 2: Nominal Outside Diameter

<table>
<thead>
<tr>
<th>Micron</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5, 1.0, 3.0</td>
<td>2.75in (6.99 cm)</td>
</tr>
<tr>
<td>5.0 to 200</td>
<td>2.55 in (6.48 cm)</td>
</tr>
</tbody>
</table>
Z.Plex* Filter Cage

Filter Cage with Z.Plex Technology Filters

Features and Benefits

- All Polypropylene cage holds 15 cartridges filter
- 30 filter seals reduced to one
- Thermally bonded micro fibers create a strong secure cartridge that traps particles throughout its depth.
- Z.Plex filters combine combines efficiency, long life and purity to create a high performance depth filter.
- Integral eyehook for handling by mechanical equipment
- Eliminates handling of individual filters
- Fits housings accepting cages 13 ½ inches in diameter (34 cm)
- Flow Rate up to 225 gpm (0.85 m³/h) per cage

Typical Applications

- High Purity Chemicals
- Oil and Gas
- Municipal Drinking Water
- Bottled Water

Z.Plex Revolutionary Technology

- Up to 100% Longer Life
- Up to 50% decreased Pressure Drop
- Up to 100% greater dirt holding capacity

Materials of Construction

- All polypropylene cartridge filters
- All polypropylene cage
- EPDM o-ring connection

Options Available

- 5 micron
- Polypropylene center cores
Absolute.Za*  
Absolute Rated Depth Cartridge Filter with Z.Plex* Filter Technology

Features and Benefits

Absolute.Za (Abs.Za) is manufactured using patented Z.Plex filter technology and is engineered specifically for absolute filtration. (See Figure 1.) The patented filter matrix of the Absolute.Za provides unmatched performance in these applications.

The Absolute.Za filter composition incorporates small diameter fibers and an innovative 3-dimensional fiber matrix. The filter matrix maintains structural integrity while greatly increasing the filter's particle holding capacity and reducing pressure drop. This unique construction allows for absolute filtration and long life.

- Optimized performance for absolute filtration.
- Superior particle holding capacity
- Long filter life
- Low pressure drop
- Melt-bonded exterior ensures no media migration
- High strength polypropylene core
- NSF 61 certified, FDA compliant

Typical Applications

- Chemicals
- Food and Beverage
- Oil and gas
- Pharmaceuticals

General Properties

Absolute.Za filters are made of polypropylene construction. Tables 1, 2, 3 and 4 provide information on dimensions and flow performance.

Table 1: Materials of Construction

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Media</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Adapters</td>
<td>Polypropylene</td>
</tr>
</tbody>
</table>

Table 2: Dimensions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Outside Diameter</td>
<td>2.5in (6.4 cm)</td>
</tr>
<tr>
<td>Nominal Inside Diameter</td>
<td>1.1in (2.5 cm)</td>
</tr>
</tbody>
</table>

Table 3: Operational Limits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum forward differential pressure</td>
<td>15 psid (1.03 bar) at 180°F (82°C)</td>
</tr>
<tr>
<td></td>
<td>25 psid (2.07 bar) at 150°F (66°C)</td>
</tr>
<tr>
<td></td>
<td>60 psid (4.14 bar) at 86°F (30°C)</td>
</tr>
<tr>
<td>Maximum recommended change-out pressure</td>
<td>35 psid (2.41 bar)</td>
</tr>
</tbody>
</table>

Fig 1:  Patented Z.Plex Filter Technology

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Hypure* AF
Resin Bonded Filter Cartridge

The Hypure AF filter (Figure 1) is a resin- bonded filter cartridge suitable for a wide range of applications. Hypure utilizes phenolic impregnated acrylic and polyester fibers for efficiency and long life. Uses for Hypure include adhesives, coatings, inks and many more applications for both aqueous and solvent based fluids.

Features and Benefits
- High dirt holding capacity
- Wide range of micron retention
- Faster flow rates
- High efficiency
- Less change-outs
- Consistent quality

Applications
- Printing inks
- Water
- Hot, non-aqueous fluids
- Adhesives
- Antifreeze
- Insecticides
- Photo resists
- Solvents
- Paints and varnishes
- Thinners
- Fuels and Lubricating oils
- Coolants
- Coatings

Figure 1: Hypure AF filters

General Properties
Tables 1, 2, 3 and 4 provide information on dimensions and flow performance.

Table 1: Materials of Construction

<table>
<thead>
<tr>
<th>Media</th>
<th>Phenolic impregnated acrylic and polyester fibers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapters</td>
<td>Nylon, Polypropylene</td>
</tr>
</tbody>
</table>
Key site examples for our three key markets

**Municipal Water Treatment**
Through our local distributor, GE has installed Muni.Z depth filters in over 20 municipal water treatment plants treating brackish water in the state of Florida. The operators of these plants are under constant budget constraints and have implemented the use of the Muni.Z filters after positive results from pilot trials to improve the feedwater quality of their RO membranes and to optimize the replacement frequency of the cartridge filters themselves.

**Seawater Desalination**
Through our local distributor, GE has installed SWRO.Z depth filters at several seawater desalination plants in Spain as pretreatment to the SWRO membranes. This product fits the needs of the customer because of the strong product capabilities, including high particle retention and low pressure drop, competitive pricing, and industry leading delivery times.

**Boiler Feedwater**
GE manufactures and delivers fully engineered reverse osmosis systems called PRO-Series machines into the boiler feedwater market space. These systems utilize our ROSaves.Z depth cartridge filters as pretreatment to our brackish water RO membrane elements to ensure our customers receive the best water treatment solution.

When you use GE filters as pretreatment to your GE membranes, you reduce membrane fouling and increase the cost efficiency of your water treatment solution. If you would like more information about how GE filters with membranes can provide you with the same, please contact your GE account representative or visit www.ge.com/water.