POLYVINYLIDENE FLUORIDE

Kynar® PVDF Components
Kynar® PVDF — Excellent Performance for Tough Chemical Service

Your investment in a Kynar® PVDF fluid handling system is an investment in the SAFETY, RELIABILITY and LONGEVITY of your process.

The Kynar® business & technical team speaks almost every day with process engineers, maintenance personnel and facility managers – people just like you. When discussing plastics, your most common concerns relate to the chemical resistance, high temperature performance, abrasion resistance, and physical strength of plastics. To be sure, most plastics can only handle non-corrosive chemicals at low temperatures.

But Kynar® PVDF is not “most plastics.” You may be surprised to discover that you can use Kynar® polyvinylidene fluoride (PVDF) high performance plastic in many of the applications you once thought were limited to specialty metal alloys or stainless steel.

Why you should consider components made from Kynar® PVDF instead of stainless steel or exotic metal alloys:

- While metals rust and rouge with age, Kynar® components do not corrode and do not need to be passivated
- Kynar® components are strong, tough and provide long-lasting, corrosion-free service
- Kynar® systems have installed costs comparable to stainless steel—without the maintenance costs
- Kynar® components are lighter weight and more abrasion resistant than stainless steel and are easily assembled with heat welding

Why you should consider components made from Kynar® PVDF instead of PVC, polypropylene or CPVC:

- Kynar® systems can operate at a much higher temperature – up to 150°C (302°F) in some chemical environments
- Kynar® components are more resistant to radiation and to a broader range of chemicals
- Kynar® PVDF contains no additives and is suitable for use in high purity applications
- Kynar® components exhibit excellent flame and smoke characteristics
- Kynar® systems exhibit greater mechanical strength
- A wide range of Kynar® components are available due to its ease of processing

Common Kynar® Applications:

<table>
<thead>
<tr>
<th>Application</th>
<th>Instead of:</th>
<th>Up to:</th>
<th>For:</th>
</tr>
</thead>
<tbody>
<tr>
<td>exposure to chlorinated &amp; brominated chemicals</td>
<td>titanium alloy 20 PTFE-lined steel PFA-lined steel</td>
<td>275°F (135°C)</td>
<td>lower cost easier installation lower permeation</td>
</tr>
<tr>
<td>exposure to hot acids (eg: HF, HCl, H₂SO₄, HNO₃, chromic, HBr)</td>
<td>titanium alloy 20 PTFE-lined steel</td>
<td>275°F (135°C)</td>
<td>lower cost easier installation chemical resistance to varied concentrations</td>
</tr>
<tr>
<td>alcohol + acids/chlorides/hydrocarbons</td>
<td>polypropylene HDPE</td>
<td>275°F (135°C)</td>
<td>broad chemical resistance to varied concentrations</td>
</tr>
<tr>
<td>high pressure + high temperature</td>
<td>PVC polypropylene CPVC</td>
<td>285°F (141°C) and 1000 psi at RT</td>
<td>high temperature rigidity high pressure rating broad chemical resistance</td>
</tr>
</tbody>
</table>

Kynar® PVDF just got stronger...

Introducing Glass filled Kynar® PVDF
**Some Common Chemicals Handled by Kynar® Components:**
- acetic acid (<60%)
- acid mixtures
- biodiesel
- bromine
- brominated salts
- chlorinated salts
- chlorine
- chlorine dioxide
- chlorobenzene
- chromic acid
- deionized (DI) water
- fuel mixtures
- hot sugars
- hydrobromic acid
- hydrochloric acid
- hydrofluoric acid
- iodoform
- metallic chlorides
- methyl alcohol
- methyl chloroform
- nitric acid
- ozone
- peracetic acid
- phosphoric acid
- plating chemistries
- salicylic acid
- salt water
- sodium hypochlorite
- sulfuric acid (<98%)
- Toluen

## Vessels

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Temperature</th>
<th>Pressure</th>
<th>Available Sizes</th>
<th>Polymer Layer Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheet-lined steel</td>
<td>fabric-backed Kynar® or Kynar Flex® sheet applied to all fluid contact surfaces and welded-in place to form a continuous corrosion and purity barrier</td>
<td>up to 107°C (225°F)</td>
<td>up to the limit of the steel vessel</td>
<td>any size tank can be lined</td>
<td>1.5 mm - 5 mm (60 mil - 200 mil)</td>
</tr>
<tr>
<td>spray-coated steel</td>
<td>Kynar® or Kynar Flex® powder is applied to the metal surface in layers and baked to form a continuous layer</td>
<td>up to 93°C (200°F)</td>
<td>full vacuum up to the limit of the steel vessel</td>
<td>up to 2 m x 6 m (6.5' x 20')</td>
<td>0.64 mm - 6.3 mm (25 mil - 250 mil)</td>
</tr>
<tr>
<td>dual-laminate</td>
<td>Kynar® or Kynar Flex® sheet is formed into the shape of the container and wrapped with fiberglass reinforced plastic (FRP)</td>
<td>up to 125°C (257°F)</td>
<td>up to 1.03 MPa (150 psi)</td>
<td>up to 6 m x 30.5 m (20' x 100')</td>
<td>1.5 mm - 5 mm (60 mil - 200 mil)</td>
</tr>
<tr>
<td>solid</td>
<td>solid Kynar® or Kynar Flex® vessels are either injection-molded (generally small sizes), welded or rotomolded</td>
<td>up to 150°C (302°F)</td>
<td>typically atmospheric</td>
<td>any size can be fabricated</td>
<td>3 mm - 101 mm (1/4&quot; - 4&quot;)</td>
</tr>
</tbody>
</table>

## Pipe, Valves & Fittings

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Temperature</th>
<th>Pressure</th>
<th>Available Diameters</th>
<th>Joining Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>solid</td>
<td>uncovered extruded, machined or injection-molded Kynar® or Kynar Flex® components, DWV and pressure systems available</td>
<td>up to 150°C (302°F)</td>
<td>full vacuum up to 6.9 MPa (1,000 psi)</td>
<td>20 - 400 mm (1/2&quot; - 16&quot;)</td>
<td>butt fusion, socket fusion, mechanical, threaded, flanged, IR, smooth inner bore, bead &amp; crevice free, electrofusion</td>
</tr>
<tr>
<td>FRP-wrapped</td>
<td>extruded or machined Kynar® or Kynar Flex® components, covered with a thick layer of fiberglass reinforced plastic (FRP)</td>
<td>up to 140°C (284°F)</td>
<td>full vacuum up to 1.03 MPa (150 psi)</td>
<td>almost any size can be fabricated</td>
<td>butt fusion, Ranged</td>
</tr>
<tr>
<td>lined steel</td>
<td>extruded Kynar Flex® lining surrounded by carbon steel or stainless steel</td>
<td>up to 140°C (285°F)</td>
<td>full vacuum up to 3.28 MPa (475 psi)</td>
<td>25 - 250 mm (1&quot; - 10&quot;)</td>
<td>welded, Ranged</td>
</tr>
<tr>
<td>RTP Pipe</td>
<td>extruded liner, reinforced layer and extruded jacket</td>
<td>up to 140°C (285°F)</td>
<td>up to 34 MPa (5,000 psi)</td>
<td>25.4 mm to 152.4 mm (1&quot; - 6&quot;)</td>
<td>Mechanically swaged metal fitting to provide compression to the reinforcement layer</td>
</tr>
</tbody>
</table>

Solid Kynar® valves and Kynar®-lined steel valves are available in many forms, such as ball, diaphragm, butterfly, ball check, relief, check and plug valves.

## Tubes & Fittings

<table>
<thead>
<tr>
<th>Type</th>
<th>Temperature</th>
<th>Pressure</th>
<th>Available Diameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible tubing</td>
<td>up to 107°C (225°F)</td>
<td>vacuum rating up to 2.07 MPa (300 psi)</td>
<td>1.6 - 152.4 mm (1/16&quot; - 6&quot;)</td>
</tr>
<tr>
<td>rigid tubing</td>
<td>up to 121°C (250°F)</td>
<td>vacuum rating up to 1.59 MPa (230 psi)</td>
<td>3.2 - 324 mm (1/8&quot; - 12.5/4&quot;)</td>
</tr>
</tbody>
</table>

Tubes are joined by compression or push-in fittings and are available in the following forms, among others:
- threaded adaptors, barbed elbows & nipples
- reduction couplers
- leak-proof adaptors, couplings, tee, Y's and threaded plugs

1. Note that the Kynar® component temperature, pressure and sizing data above are compiled from industry data and are for illustrative purposes only. The actual temperature and pressure ratings of your system, as well as its resistance to chemical attack, are dependent on many environmental factors. Higher operating temperatures may require increased component wall thickness. Consult your Kynar® component supplier about your system’s operating parameters before purchasing a Kynar® system.

2. Kynar® components can withstand continuous temperatures as low as –30°C (-22°F) under certain conditions. Please contact your Kynar® component supplier with specific information about your application to determine the lowest recommended operating temperature of your Kynar® system.

For more detailed information about the chemical resistance of Kynar® components, including corresponding operating pressures, temperatures, and chemical compositions, please visit the Literature section of www.kynar.com and download our Kynar® Chemical Resistance Chart.
Kynar® natural resins meet the following standards:

- Food & Drug Administration (FDA): FDA 177.2510 & 177.2600 Repeated Contact with Meat or Poultry Food Products
- 3A Sanitary Standards Inc. (3-A SSI): Multiple Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment
- United States Pharmacopeia (USP): USP Class VI
- Chicago Rabbinical Council (CRC): Kosher Certified
- United States Department of Agriculture (USDA): Use in Process or Storage Areas to Contact Meat or Poultry Food Products
- ASTM E84 (NFPA 255, UL 723): Surface Burning Characteristics of Building Materials
- Compliance with Halal requirements under Islamic law

For more information on Kynar® PVDF

Phone: 1-800-Kynar-50 (1-800-596-2750)
Fax: 1-610-205-7497