FK-800 Resin

Description
3M™ FK-800 Resin is a copolymer of chlorotrifluoroethylene (CTFE) and vinylidene fluoride (VF₂). FK-800 is soluble in conventional solvents and therefore may be used in lacquers, paints and putties, as well as binders for plastic bonded explosives, pyrotechnics, propellants and other matrices. FK-800 is resistant to acids and most bases, and has very low permeability to moisture.

Typical Properties
Form ................................................................Free-flowing, off-white granule
Volatiles, % ......................................................0.3
Specific Gravity ...............................................2.00
Dilute Solution Viscosity, cs ...........................0.50
Composition by Chlorine Analysis
  (Mole % CTFE) ...............................................75
  (Mole % VF₂).............................................Remainder
Transition Temperature, Tg…………………………30°C (86°F)
Transition Temperature, Tm…………………………105°C (220°F)
Flammability ....................................................Nonflammable
Maximum Continuous Use Temperature........82°C (180°F)

Physical Properties
Durometer Hardness, Shore D 64 ASTM D1706
Tensile Strength at Yield, psi 1500-3000 ASTM D638
Elongation at Yield, % 250-350 ASTM D638
Elastic Modulus in Tension, 10¹ psi 0.23-0.25 ASTM D638
Impact Strength, Izod, Notched No Break ASTM D256
Coefficient of Linear Thermal Expansion, 10⁻⁶ in./in./°C 6.5 ASTM D696
3M™ FK-800 Resin can be molded into thin, clear sheets that are extremely flexible and stress-free at ambient temperatures. FK-800 may also be calendared on conventional equipment. Processing temperature for FK-800 is 300-400°F.

**Molding and Calendaring**

Optical and Electrical Properties

The optical and electrical properties of FK-800 make this polymer well-suited for fiber optic components; moisture-resistant coatings on printed circuits and wire; and coatings for electrical braid, wire, cable and harnesses.

<table>
<thead>
<tr>
<th>Color and Clarity</th>
<th>Water white, transparent</th>
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<tbody>
<tr>
<td>Refractive Index 25</td>
<td>1.416</td>
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<tr>
<td>Water Absorption</td>
<td>0.01</td>
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<tr>
<td>Dielectric Constant</td>
<td></td>
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<tr>
<td>10⁴ cps</td>
<td>3.00</td>
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<tr>
<td>10⁶ cps</td>
<td>2.56</td>
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<tr>
<td>10⁹ cps</td>
<td>2.29</td>
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<tr>
<td>Dissipation Factor</td>
<td></td>
</tr>
<tr>
<td>10⁴ cps</td>
<td>0.029</td>
</tr>
<tr>
<td>10⁶ cps</td>
<td>0.032</td>
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<tr>
<td>10⁹ cps</td>
<td>0.010</td>
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</tbody>
</table>
**Chemical Resistance**

3M™ FK-800 Resin has excellent chemical resistance to:

- $\text{H}_2\text{SO}_4$ — concentrated and dilute
- $\text{HCl}$ — concentrated and dilute
- Red fuming nitric acid
- Hydrogen peroxide — 90%
- NaOH
- Hydrocarbon fuels
- Inorganic salt solutions

**Lacquer**

FK-800 can be formulated into a clear, air-drying lacquer which is easy to apply by brush, dip or spray techniques. Solutions may be prepared by dissolving 10-30% of the FK-800 Resin in ketone or acetate solvents.

The resultant coating is transparent, flexible, and highly resistant to acids, bases, salt solutions, hydrocarbon fuels and water. To ensure good adhesion of the FK-800 lacquer to aluminum, steel, copper, base and certain plastics, the use of an epoxy-type primer is required. The FK-800 coating has shown the ability to protect metals and woods against salt spray and weathering.

FK-800 may be compounded with such curing agents as benzoyl peroxide. Vulcanization will change this material from a thermoplastic to a cross-linked structure having the advantage of greater mechanical strength at higher temperature and improved chemical resistance.

FK-800 has the highest specific gravity of any known commercially-available polymer that is soluble in conventional solvents. This high specific gravity plus its high fluorine content (51%), low coefficient of thermal expansion and high elastic modulus make FK-800 a strong candidate for certain applications in the field of solid propellants, pyrotechnics and plastic-bonded explosives. Compositions have been prepared in which the FK-800 binder amounts to less than 5% of total ingredients.

**Safety and Toxicology**

3M™ FK-800 Resin is considered to be low in toxicity and irritation potential, and no adverse health effects are expected during normal handling. Highly irritating and toxic decomposition products, including hydrogen fluoride, may be generated when FK-800 is heated to temperatures greater than 500°F. Good ventilation, preferably local exhaust, should be used when FK-800 is heated at elevated temperatures. Do not smoke if dusting occurs. Wash hands after handling FK-800.
Important Notice to Purchaser: The information in this publication is based on tests that we believe are reliable. Your results may vary due to differences in test types and conditions. You must evaluate and determine whether the product is suitable for your intended application. Since conditions of product use are outside of our control and vary widely, the following is made in lieu of all express or implied warranties (including the warranties of merchantability or fitness for a particular purpose): 3M’s only obligation and your only remedy is replacement of product that is shown to be defective when you receive it. In no case will 3M be liable for any special, incidental, or consequential damages based on breach of warranty or contract, negligence, strict tort, or any other theory.