FK-800 Resin

Product Information

Description

3M™ FK-800 Resin is a copolymer of chlorotrifluoroethylene (CTFE) and vinylidene fluoride (VF_2). 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

Not for specification purposes

All measurements at 25°C, 1 atm unless noted

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 % VF_2)	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

Not for specification purposes

All measurements at 25°C, 1 atm unless noted

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, 10^5 psi	0.23-0.25	ASTM D638
Impact Strength, Izod, Notched	No Break	ASTM D256
Coefficient of Linear Thermal Expansion, 10^{-5} in./in./°C	6.5	ASTM D696

Molding and Calendaring

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.

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.

Color and Clarity	Water white, transparent	
Refractive Index 25	1.416	ASTM D542
Water Absorption	0.01	ASTM D570
Dielectric Constant		
10^3 cps	3.00	
10^6 cps	2.56	
10^9 cps	2.29	
Dissipation Factor		
10^3 cps	0.029	ASTM D150
10^6 cps	0.032	ASTM D150
10^9 cps	0.010	ASTM D150

Chemical Resistance

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

- H_2SO_4—concentrated and dilute
- 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.

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