Fluorinated ethylene propylene (FEP)

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FEP

TECHNICAL DESCRIPTION

Because of its molecular structure, traditional PTFE cannot be processed by melting, but must be compressed into shapes and heated under pressure (sintered). In contrast, FEP and PFA are melt-processable by conventional thermoplastic processing methods, including injection, transfer, blow, and compression molding and by extrusion.

FEP DESCRIPTION

TetraFluorEthylene-Perfluorpropylene (FEP) is produced by copolymerization of tetrafluoroethylene and hexafluoropropylene. It is a relatively soft thermoplastic with lower tensile strength, wear resistance, and creep resistance than many other engineering plastics. However, it is chemically inert and has a low dielectric constant over a wide frequency range. FEP possesses a very high degree of stress crack resistance, a low coefficient of friction, exceptional dielectric properties, heat resistance, retention of properties after service at 400°F (204°C) with useful properties at -454°F (-270°C), and meets FDA 21CFR.177.1550.

FEP has high transparency (with good transmittance of UltraViolet and visible wavelengths.) It has long term weatherability and excellent resistance to ozone, sunlight and weather. FEP offers the lowest refractive index of all thermoplastics with low light reflection (the same as water.)

Important applications are linings for pipe and chemical processing equipment, roll covers, and numerous wire and cable applications, including aircraft wire, plenum cable, fire alarm cable, and well logging cable. Heat-shrinkable FEP tubing is available. FEP Film is used as glazing in solar energy collectors.

Common FEP tradenames include Daikin Neoflon®, Dupont Teflon®, and Hoechst Hostaflon®.

PFA DESCRIPTION

PerFluoroAlkoxy (PFA) offers similar properties to FEP, but is considered more of a premium resin. PFA is preferred when extended service is required in hostile environments involving chemical, thermal, and mechanical stress. PFA offers high melt strength, stability at high processing temperatures, excellent crack and stress resistance, a low coefficient of friction, and more than 10 times the Flex life of FEP.

It has high resistance to creep and retention of properties after service at 500°F (260°C), with useful properties at -320°F (95°C). PFA also meets FDA 21CFR.177.1550.

PFA is used in the same types of applications as those listed above for FEP.

Common PFA tradenames include Daikin Neoflon®, Dupont Teflon®, Hoechst Hostaflon®, and Ausimont Hyflon®.

TYPICAL PROPERTIES of SELECTED FLUOROPOLYMERS

ASTM or UL test	Property	PTFE (unfilled)	FEP	PFA
	PHYSICAL			
D792	Density (lb/in³) (g/cm³)	0.078 2.16	0.078 2.15	0.078 2.15
D570	Water Absorption, 24 hrs (%)	< 0.01	< 0.01	< 0.03
	MECHANICAL			
D638	Tensile Strength (psi)	3,900	3,400	3,600
D638	Tensile Elongation at Break (%)	300	325	300
D790	Flexural Strength (psi)	No break	No break	No break
D2176	Folding Endurance (cycles)	$> 10^6$	5-80 x 10^3	50-500 x 10^3
D790	Flexural Modulus (psi)	72,000	85,000	85,000
D785	Hardness, Shore D	D50	D56	D60
D256	IZOD Notched Impact (ft-lb/in)	3.5	-	-
	THERMAL			
D3418	Melting Temp (°F / °C)	635 / 335	500 / 260	582 / 305
-	Max Operating Temp (°F / °C)	500 / 260	400 / 204	500 / 260
UL94	Flammability Rating	V-0	V-0	V-0
	ELECTRICAL			
D150	Dielectric Constant at 1 MHz	2.1	2.1	2.1
D150	Dissipation Factor at 1 MHz	< 0.0002	0.0007	0.0001
D495	Arc Resistance (sec)	< 300	< 300	< 180
D257	Volume Resistivity (ohm-cm)at 50% RH	$> 10^{18}$	$> 10^{18}$	$> 10^{18}$

NOTE: The information contained herein are typical values intended for reference and comparison purposes only. They should NOT be used as a basis for design specifications or quality control. Contact us for manufacturers' complete material property datasheets.
All values at 73°F (23°C) unless otherwise noted.

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