FEP (20% milled glass fiber)

General information

Designation

Fluorinated ethylene propylene (20% Milled Glass Fiber)

Tradenames

Dyneon

Typical uses

Valves; electrical components and equipment for chemical plant.

Composition overview

Compositional summary

Copolymer of hexafluoropropylene and tetrafluoroethylene + glass filler

Material family	Plastic (thermoplastic, semi-crystalline)	
Base material	FEP (Fluorinated ethylene propylene)	
% filler (by weight)	20	%
Filler/reinforcement	Glass	
Filler/reinforcement form	Short fiber (<5mm)	
Polymer code	FEP-GF20	

Composition detail (polymers and natural materials)

Polymer	80	%
Glass (fiber)	20	%

Price

Price	*	8.93	-	13.4	USD/lb

Physical properties

Density	*	0.0788	-	0.0816	lb/in^3

Mechanical properties

Young's modulus	*	0.244	-	0.255	10^6 psi
Yield strength (elastic limit)	*	1.83	-	2.02	ksi
Tensile strength		2.29	-	2.52	ksi
Elongation		4.65	-	5.38	% strain
Compressive modulus	*	0.244	-	0.255	10^6 psi
Compressive strength	*	2.2	-	2.42	ksi
Flexural modulus		0.244	-	0.255	10^6 psi
Flexural strength (modulus of rupture)		3.81	-	4.21	ksi
Shear modulus	*	0.0866	-	0.0907	10^6 psi
Bulk modulus	*	0.438	-	0.46	10^6 psi
Poisson's ratio	*	0.399	-	0.415	
Shape factor		9.8			
Hardness - Vickers	*	3.8	-	4.2	HV
Hardness - Rockwell M	*	38	-	42	
Hardness - Rockwell R		60	-	70	
Fatigue strength at 10^7 cycles	*	0.845	-	1.1	ksi
Mechanical loss coefficient (tan delta)	*	0.0269	-	0.0278	

Impact & fracture properties

Fracture toughness	*	0.625	-	1.88	ksi.in^0.5
Impact strength, notched 23 °C		0.00978	-	0.011	BTU/in^2

Thermal properties

Melting point		486	-	523	°F
Glass temperature	*	163	-	189	°F
Heat deflection temperature 0.45MPa		280	-	284	°F
Heat deflection temperature 1.8MPa		120	-	180	°F
Maximum service temperature	*	385	-	419	°F
Minimum service temperature		-337	-	-319	°F
Thermal conductivity		0.144	-	0.156	BTU.ft/hr.ft^2.°F
Specific heat capacity	*	0.238	-	0.248	BTU/lb.°F
Thermal expansion coefficient		21.6	-	22.4	µstrain/°F

Electrical properties

Electrical resistivity		3.3e23	-	3e24	µohm.cm
Dielectric constant (relative permittivity)	*	2	-	2.2	
Dissipation factor (dielectric loss tangent)	*	2.85e-4	-	3.15e-4	
Dielectric strength (dielectric breakdown)	*	508	-	584	V/mil

Optical properties

Transparency	Opaque

Magnetic properties

Magnetic type	Non-magnetic

Bio-data

RoHS (EU) compliant grades?	✓

Absorption & permeability

Water absorption @ 24 hrs		0.0091	-	0.011	%

Processing properties

Polymer injection molding		Limited use			
Polymer extrusion		Limited use			
Polymer thermoforming		Unsuitable			
Linear mold shrinkage		0.6	-	1	%
Melt temperature		529	-	700	°F
Mold temperature		122	-	392	°F
Molding pressure range		9.98	-	20	ksi

Durability

Water (fresh)	Excellent
Water (salt)	Excellent
Weak acids	Excellent
Strong acids	Excellent
Weak alkalis	Excellent
Strong alkalis	Excellent
Organic solvents	Excellent
Oxidation at 500C	Unacceptable
UV radiation (sunlight)	Good
Flammability	Non-flammable

Primary production energy, CO2 and water

Embodied energy, primary production	*	7.87e4	-	8.68e4	BTU/lb
CO2 footprint, primary production	*	9.92	-	10.9	lb/lb
NOx creation	*	0.0441	-	0.0488	lb/lb
SOx creation	*	0.118	-	0.13	lb/lb

Processing energy, CO2 footprint & water

Polymer extrusion energy	* 2.51e3	-	2.77e3	BTU/lb
Polymer extrusion CO2	* 0.437	-	0.483	lb/lb
Polymer molding energy	* 8.13e3	-	8.98e3	BTU/lb
Polymer molding CO2	* 1.42	-	1.57	lb/lb
Coarse machining energy (per unit wt removed)	* 234	-	258	BTU/lb
Coarse machining CO2 (per unit wt removed)	* 0.0407	-	0.045	lb/lb
Fine machining energy (per unit wt removed)	* 497	-	550	BTU/lb
Fine machining CO2 (per unit wt removed)	* 0.0868	-	0.0959	lb/lb
Grinding energy (per unit wt removed)	* 791	-	874	BTU/lb
Grinding CO2 (per unit wt removed)	* 0.138	-	0.152	lb/lb

Recycling and end of life

Recycle	✗			
Recycle fraction in current supply	0.1			%
Downcycle	✓			
Combust for energy recovery	✗			
Heat of combustion (net)	* 1.61e3	-	1.69e3	BTU/lb
Combustion CO2	* 0.687	-	0.722	lb/lb
Landfill	✓			
Biodegrade	✗			

Recycle mark

Geo-economic data for principal component

Principal component	Fluorocarbon

Links

ProcessUniverse

Producers

Reference

Shape