

PVDF and E-CTFE

Technical Datasheet

High Performance Fluoropolymer Plastics Service. Quality. Value.

Typical Applications

PVDF: -
For chemical, food, and semiconductor industries- e.g. gaskets, seals, valve and pump components, gears and parts for equipment construction.

E-CTFE: -
For aggressive chemical, electrical, food and semiconductor industries- e.g. seals, valve and pump components, tank linings and pipe fittings.

Product Description

PVDF - high-quality fluoropolymer material (chemical name is polyvinylidene fluoride) with higher strength, pressure resistance and dimensional stability than PTFE.

E-CTFE (Halar®) - a very pure fluoropolymer material (chemical name is ethylen-chlorotrifluorethylene) with excellent corrosion and weather resistance, outstanding fire-safe properties and a particularly smooth surface. E-CTFE also has permeation resistance to oxygen, carbon dioxide, chlorine gas and hydrochloric acid that is 10 to 100 times better than PTFE.

Technical Description

Smiths' range of extruded PVDF and E-CTFE materials includes the following grade options -

Grade	Modification	Purpose
PVDF - natural (off-white) and black.	None.	Component identification - both natural and black versions have high resistance to UV radiation.
PVDF - ELS, black	With carbon black.	Improved electrical conductivity.
E-CTFE - natural (off-white)	None	The purest form used, for example, in semicon applications.

Machinability

The machining of polypropylene is uncomplicated, provided the component tolerances allow for polypropylene's relatively high co-efficient of thermal expansion and tensile elongation values. Full machining instructions can be supplied on request.

Chemical Resistance

PVDF - very resistant to acids, oxidising agents, halogens, alcohols, chlorinated solvents, aliphatic hydrocarbons and fuels. At high temperature, it is not resistant to alkaline solutions or amines.

E-CTFE - resistant to strong mineral and oxidizing acids, alkalis, liquid oxygen and organic solvents. It is attacked by molten metallic sodium and potassium.

Product Attributes	Customer Benefits
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Range of grades available.	Correct grade selection for each application is optimised.
PVDF	
High mechanical strength and rigidity	
High chemical resistance	Very good candidate material for aggressive chemical applications operating under load at elevated temperatures
High UV resistance	
Low friction and high wear resistance	
E-CTFE	
Self-extinguishing	
Extremely high impact strength - even down to minus 73°C	
High resistance to radiation	
High wear resistance	Long life in aggressive environments. Does not contaminate media being handled or processed
Excellent chemical resistance	
Very pure material	
Low permeability	
Product sourced from longstanding manufacturer with ISO accreditation	Consistent quality ensures uniform machining & performance

Product Availability *

Extruded round bar	
PVDF -	Natural colour made up to 300mm dia, black to 30mm.
PVDF-ELS- E-CTFE-	Up to 60mm dia From 1" to 5" dia
Extruded sheet/plate	
PVDF -	From 1mm to 60mm in natural.
E-CTFE -	30mm only
Other products	
PVDF -	Welding rods in natural colour.

* Sizes not stocked are available on relatively short delivery time. 1, 2 or 3m lengths supplied or cut to customer requirements.

Physiological Safety

The raw materials for both products have food use approvals from European or USA authorities. Check for any specific limitations they require.

	PVDF	PVD-ELS	E-CTFE	
Mechanical Properties				
Density at 20°C	1.78	1.78	1.68	g/cm ³
Tensile strength @ yield	50	40	30	MPa
@ break	46	-	54	MPa
Elongation @ yield	9	9	-	%
@ break	≥ 50	≥ 20	250	%
Tensile modulus of elasticity	2000	1600	1690	MPa
Flexural strength	80	-	49	MPa
Impact strength	252	-	No break	kJ/m ²
Notched impact strength (Charpy)	22	8	No break	kJ/m ²
Ball indentation hardness / Rockwell	80	-	R90	N/mm ²
Hardness (Shore D)	78	76	85	Scale D
Electrical Properties				
Volume resistivity	≥ 10 ¹³	≤ 10 ⁶	≥ 10 ¹⁵	Ohm cm
Surface resistivity	≥ 10 ¹⁴	≤ 10 ⁶	≥ 10 ¹²	Ohm
Dielectric constant @ 1 MHz	7.25	-	2.6	-
Dielectric loss factor @ 1 MHz	0.18	-	-	-
Dielectric strength	22	-	21	Kv/mm
Tracking resistance - IEC 60112	CTI 300	-	CTI ≥600	V
Thermal Properties				
Vicat softening point -VST/B/50	150	-	-	°C
-VST/A/50	-	-	-	°C
Heat deflection temperature -HDT/B	145	-	90	°C
-HDT/A	104	-	63	°C
Coefficient thermal expansion	1.20	-	0.80	10 ⁻⁴ .K ⁻¹
Thermal conductivity at 20°C	0.13	-	0.15	W/(m - K)
Service temperatures - upper limit	150	150	150	°C
without high mech. load - lower limit	-30	-30	-76	°C
Other Physical Properties				
Moisture absorption - ISO 62	≤ 0.04	-	≤ 0.04	%
Suitability for bonding	0	0	0	(with pre-treatment)
Physiological indifference according to FDA or EEC 90/128 - natural colour	+	-	+	
Friction coefficient	0.34	-	0.30	
Flammability according to UL94	V-0	-	V-0	
UV stability without additives	+	+	+	

Technical Assistance

Our knowledgeable staff backed up by our resident team of qualified metallurgists and engineers, will be pleased to assist further on any technical topic.

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