

PTFE (Polytetrafluoroethylene)

Technical Datasheet



Low Friction, Chemical Resistant, Engineering Plastic

Service. Quality. Value.

Typical Applications

Chemical engineering, and general machinery construction

- Bearings and bushes. Laboratory equipment. Measuring & control technology. Pipe supports. Expansion bellows. Glandless valves & pumps, valve seats. Piston rings in hydraulic systems. Piston rod packings used in compressor plunger pumps & valves.

Electrical

- Communications, radio & television engineering, cable insulation. Electrical plant construction & electronics industry (connectors & terminals). General electrical equipment (PTFE is an excellent electrical insulating material). Power plant installations (switchgear).

Food industry –

Dynamic & shaft seals in food processing equipment. Linings & coatings.

Product Description

A high performance, low friction, engineering plastic with exceptional resistance to a wide variety of chemicals. It is used in some of the most arduous industrial applications.

Technical Description

PTFE (polytetrafluoroethylene) is a material with several unique properties. It is manufactured using very specialised plant and process controls.

Smiths extruded PTFE rod is produced to BS EN ISO13000 and is ground to a plus tolerance, but with the option of tighter tolerances if required.

Smiths' standard stock range is made from virgin PTFE (not reprocessed) but several other application specific grades are available to order. See below.

Grade	Modification	Purpose
PTFE, natural (white)	None.	Base material for general applications.
PTFE, G15	With 15% graphite	Low friction, improved wear, best with 'soft shafts.
PTFE, C25	With 25% carbon/coke	Excellent dry wear resistance, best wear in water.
PTFE, B60	With 60% bronze	Improved hardness, lowest creep.
PTFE, GL15 & G25	With 15% or 25% glass fibre	Improved stability and creep resistance in high load applications. Glass fibre is abrasive so run bearings against hardened surfaces.

Product Attributes

Lowest static and dynamic coefficient of friction - no 'stick-slip' behaviour.

Maximum chemical resistance.

Excellent electrical characteristics

Very wide operating temperature range.

Very high oxygen index.

Product sourced from longstanding manufacturer with ISO accreditation.

Customer Benefits

Ideal for many bearing applications requiring precise movements.

May be used in contact with almost any chemical.

Ideal for electrical insulation applications.

Can be used in cryogenic or high temperature environments. ($\pm 250^{\circ}\text{C}$)

Does not burn.

Consistent quality ensures uniform characteristics in machining and performance.

Product Availability *

Extruded round bar	3mm to 100mm in lengths $\leq 2\text{m}$.
Moulded round bar	25mm to 275mm in lengths $\leq 500\text{mm}$
Film/sheet/plate	Film from 0.5mm thk x 1.2m wide. Sheet/plate 1.0mm to 50mm thk in 1200mm squares, or cut panels. Modified grades – please call for quotation.
Tube extruded or moulded	From 10mm od to 300mm od

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

Chemical Resistance

Un-filled PTFE is inert to almost all chemicals. Attack is only evident from molten or dissolved alkali metals, and some fluorine compounds at higher temperatures. Some fluorinated refrigerants cause reversible swelling.

Machinability

PTFE is a soft material but it can be machined into precise components. As with all fluoropolymer materials, care must be taken to avoid PTFE coming into contact with smoking materials. Full machining instructions may be supplied on request.

Electrical Properties

Excellent electrical properties make PTFE highly specified in arduous electrical environments.

PTFE - unfilled

Mechanical Properties		
Density	2.13 - 2.19	g/cc
Tensile strength (Moulding direction)	15 - 35	MPa
Elongation @ break (Moulding direction)	150 - 350	%
Hardness (Shore D)	57 - 64	Shore D
Deformation under load @ 1 hr, 23°C, 14.2 MPa	11.8	%
@ 24 hrs, 23°C, 14.2 MPa	14.3	
@ Permanent deformation	7.9	
@ 1 hr, 150°C, 5 MPa	10.0	
Compressive modulus @ 0.2% off-set, 23°C	600 - 700	MPa
Flexural modulus @ 0.2% off-set, 23°C	690	MPa
Electrical Properties		
Volume resistivity	10^{18}	Ohm cm
Surface resistivity	10^{17}	Ohm
Dielectric constant @ 60 Hz	2.1	-
@ 10^6 Hz	2.1	
Dissipation factor @ 60 Hz	<0.0003	-
@ 10^{18} Hz	<0.0003	
Dielectric strength - in air (tape)	60 - 80	Kv/mm
- in oil (extruded or moulded)	35 - 24	
Thermal Properties		
Melting temperature (DSC point of fusion)	327	°C
Coefficient of thermal expansion (TMA) (23 - 200 °C)		
- in moulding direction (MD)	142	$10^{-6}/^{\circ}\text{C}$
- at right angles to MD		
Thermal conductivity - in moulding direction	0.24	W/(m · K)
Max. working temperature	260	°C
Max. working temperature - short term	300	°C
Min. working temperature	-200	°C
Flammability	Does not burn	-
Flash point	530	°C
Limiting oxygen index	>95	%
Friction Properties		
Coefficient of friction, dry sliding		
- static	0.08	-
- dynamic	0.06	

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.