

Material Information



PTFE

Introduction

PTFE, or Polytetrafluoroethylene, is a high-performance fluoropolymer known for its extremely high chemical resistance, very low coefficient of friction, excellent temperature resistance, and strong electrical insulation properties. Its unique combination of non-stick and self-lubricating characteristics makes it suitable for CNC-machined components used in demanding chemical, thermal, and sliding applications.

Advantages

Extremely high chemical resistance, very low friction, excellent temperature resistance, low surface energy, and excellent electrical insulation. PTFE also provides good resistance to moisture and many aggressive chemicals and can maintain useful performance across a wide temperature range.

Disadvantages

PTFE has relatively low strength and rigidity compared with many engineering plastics and metals. It also has a high coefficient of thermal expansion and can deform under sustained loads, making it less suitable for highly loaded structural components or applications requiring very tight dimensional stability.

Tolerance

3DSPRO can manufacture and inspect to tight tolerances, including sub +/- 0.001" tolerances, per your drawing specifications and GD&T callouts.

Recommendation

The combination of chemical resistance, low friction, temperature resistance, and electrical insulation makes PTFE suitable for CNC-machined seals, gaskets, bushings, bearings, valve components, fittings, and electrical insulating parts. It is particularly appropriate for applications involving aggressive chemicals, sliding contact, or elevated and cryogenic temperatures.

Material Specifications (For reference only.)	
Tensile strength	9 to 30MPa
Elongation at Break	300% to 400%

Hardness	55 to 65 HD
Heat deflection temperature	115°C
Melting temperature	330°C

Attention

PTFE is significantly more difficult to machine than many common engineering plastics because of its softness, toughness, high thermal expansion, and low dimensional stability. Machining can generate localized heat and dimensional changes, so suitable cutting parameters, sharp tooling, appropriate workholding, and careful temperature control are important. For close-tolerance components, PTFE machining should account for thermal expansion and material movement before final inspection.

Applications

3DSPRO finds people using PTFE to make functional parts and prototypes in the following industries and applications.

Chemical processing equipment:

Valves, pump components, fittings, gaskets, seals, linings, and other parts exposed to aggressive chemicals.

Mechanical and fluid-handling equipment:

Bearings, bushings, seals, valve seats, wear components, and other sliding or sealing parts requiring low friction and chemical resistance.

Food and pharmaceutical equipment:

Seals, gaskets, fittings, guides, valve components, and other parts requiring chemical resistance and low surface adhesion.

Electrical and laboratory equipment:

Insulators, electrical housings, connectors, laboratory components, and other CNC-machined parts requiring strong dielectric properties and chemical resistance.