

Material Information



Unfilled PEEK

Introduction

Unfilled PEEK, or Polyether Ether Ketone, is a high-performance semi-crystalline engineering thermoplastic known for its excellent mechanical properties, high-temperature resistance, chemical resistance, and dimensional stability. Its combination of strength, low moisture absorption, and good machinability makes it suitable for CNC-machined precision components used in demanding environments.

Advantages

Excellent chemical resistance, high thermal resistance, high creep resistance, good dimensional stability, and good wear and sliding properties. Unfilled PEEK also maintains useful mechanical performance under thermal load and provides excellent resistance to hydrolysis, superheated steam, and many aggressive chemicals.

Disadvantages

Unfilled PEEK is significantly more expensive than common engineering plastics such as Nylon, POM, and Polycarbonate. Its high performance also comes with more demanding material processing requirements, and its mechanical and thermal performance may exceed what is necessary for general-purpose components.

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 high-temperature resistance, chemical resistance, mechanical strength, wear resistance, creep resistance, and dimensional stability makes Unfilled PEEK suitable for CNC-machined components used in aerospace, medical, chemical processing, semiconductor, automotive, and industrial applications. It is particularly appropriate for precision parts that must maintain reliable performance under thermal, chemical, or mechanical stress.

Material Specifications (For reference only.)	
Tensile strength	65 to 120MPa
Elongation at Break	2% to 110%
Hardness	62 to 89 HD
Heat deflection temperature	182°C to 210°C
Glass transition temperature	143°C to 155°C

Attention

Unfilled PEEK requires careful control during CNC machining because thermal expansion, residual stress, and machining heat can affect dimensional accuracy and surface quality. Sharp tooling, suitable cutting parameters, effective chip removal, and appropriate workholding are important for precision parts. For tight-tolerance components, the material's thermal history and conditioning should also be considered before final machining and inspection.

Applications

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

Aerospace components:

Bushings, seals, insulators, structural components, brackets, and other lightweight parts requiring high temperature and chemical resistance.

Medical and pharmaceutical equipment:

Medical device components, surgical equipment, laboratory components, and other precision parts requiring chemical resistance and dimensional stability.

Semiconductor and electronics equipment:

Insulating components, wafer-handling components, fixtures, housings, and other precision parts used in demanding processing environments.

Industrial and chemical equipment:

Gears, rollers, bushings, pump components, valve components, seals, and other CNC-machined parts requiring high thermal performance, wear resistance, and chemical stability.