

Material Information



High-Density Polyethylene

Introduction

High-Density Polyethylene (HDPE) is a lightweight thermoplastic known for its high strength-to-weight ratio, excellent chemical resistance, low moisture absorption, and good impact resistance. Its combination of durability and ease of machining makes it suitable for CNC-machined components used in industrial, medical, automotive, and fluid-handling applications.

Advantages

Excellent chemical and corrosion resistance, low moisture absorption, good impact resistance, low density, and good machinability. HDPE also provides good durability in demanding environments and is available in grades suitable for applications involving food, medical, and fluid-handling components.

Disadvantages

HDPE has relatively low stiffness and hardness compared with many engineering plastics, which can allow thin or unsupported sections to deflect during CNC machining. Its heat resistance is also limited, and its relatively soft surface can make visible tool marks more noticeable on machined parts.

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 low weight, impact resistance, chemical resistance, low moisture absorption, and machinability makes High-Density Polyethylene suitable for CNC-machined tanks, fluid-handling components, guides, wear strips, housings, fixtures, and functional prototypes. It is particularly appropriate for applications where corrosion resistance, toughness, and lightweight construction are important.

Material Specifications (For reference only.)	
Tensile strength	20 to 30MPa
Elongation at Break	>500%
Hardness	60 to 70 HD

Heat deflection temperature at 0.45MPa	45°C to 60°C
Melting point	130°C to 137°C

Attention

HDPE is relatively soft and flexible, so thin walls, long unsupported sections, and other flexible geometries may deflect under machining forces. Additional fixturing and support may be required to maintain dimensional accuracy. Proper cutting parameters and chip evacuation should also be used to limit heat buildup and achieve a consistent surface finish.

Applications

3DSPRO finds people using High-Density Polyethylene to make functional parts and prototypes in the following industries and applications.

Fluid-handling equipment:

Tanks, piping components, reservoirs, manifolds, fittings, and other parts requiring chemical and moisture resistance.

Medical and laboratory equipment:

Fluid-handling components, laboratory fixtures, containers, orthotic and prosthetic components, and other lightweight parts.

Industrial equipment:

Guides, wear strips, machine components, liners, fixtures, and other parts requiring impact resistance and chemical durability.

Automotive and consumer products:

Reservoirs, ducting, housings, containers, bins, protective covers, and other lightweight CNC-machined parts.