



# **Two Properties That Define "High Temperature" Plastics**

When a plastic is labeled "high temperature," most people think of one figure: Continuous Use Temperature (CUT). However, getting a clear picture of how a material handles heat requires more nuance than a single datapoint. There are two key measurements to consider:

#### 1. Continuous Use Temperature (CUT)

The highest temperature a material can withstand over time without losing half its strength. Industry standard testing runs for 100,000 hours. That's more than 11 years of exposure!

#### 2. Heat Deflection Temperature (HDT)

The temperature at which the material softens under load as measured by ASTM D648.

## **Melting Point and Glass Transition**

Some figures matter more during processing than design, but they're still an important part of the conversation:

- Melting Temperature (Tm): The point at which
- semicrystalline polymers melt
- Glass Transition Temperature (Tg): The temperature at which amorphous polymers soften

**FYI:** Semicrystalline materials like PEEK also have a Tg that influences HDT, but you won't always see it on datasheets.





### **High CUT + High HDT = Better Results**

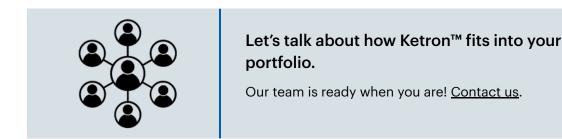
The best heat-resistant plastics combine high CUT and high HDT. But not every material can deliver both. Some polymers can handle high temperatures up to 500°F but only under low stress. That's fine for things like electrical and thermal insulators, but not for load-bearing parts. Other materials may offer high stiffness but break down fast as heat climbs. Many thermoset resins fall into this category, degrading as temperatures near 300°F.

The good news? PEEK gives you both:

- High service temperature for long life
- High softening temperature for parts under stress

In the chart below, notice that adding 30% glass reinforcement (GF) causes PEEK's HDT to jump by 130°F. That means glass-filled PEEK can handle loads right up to 32°F below its CUT.

Measurement	Nylon	PPS	PEEK	GF PEEK
HDT	200°	250°	320°	450°
CUT	194°	428°	482°	482°
Tm	420°	540°	644°	644°



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