

Temperature Range of PEEK Laboratory Products - HPLC Primer

Date: 12-MAY-2012 Last Updated: 19-FEBRUARY-2026

Overview

PEEK (PolyEtherEtherKetone) is a high-performance polymer used extensively in chromatography systems because of its chemical resistance and dimensional stability.

However, its mechanical and pressure-handling characteristics change significantly with temperature. MICROSOLV provides specific guidance on how PEEK tubing, fittings, and related components perform under heat.

Recommended Temperature Limits

PEEK Tubing

- Safe useful temperature rating: **up to 100 °C**
- At temperatures above this level, tubing strength decreases and burst pressure can drop significantly.

PEEK Fittings

- Useful up to **125 °C** for most PEEK fittings.
- Beyond this temperature, mechanical stability declines, and sealing reliability can be affected.

General Note on Higher Temperature Ratings

- While PEEK is sometimes cited as stable **up to 250 °C**, this does **not** apply to chromatography use because:
 - Tubing burst pressure decreases at elevated temperatures
 - Solvent interactions may become more aggressive
 - Dimensional stability is reduced compared to room-temperature conditions

Overall Recommendation

- PEEK should be used with caution at any elevated temperature.
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Why Temperature Matters for PEEK Components

Mechanical Considerations

- Higher temperatures soften PEEK, reducing tensile strength and compressive stability.
- Fittings may deform under mechanical load, leading to leaks.

Pressure Concerns

- Tubing burst strength declines as temperature rises, even with non-aggressive solvents.
- Systems operating near their pressure limits should stay well below maximum temperature recommendations.

Solvent Compatibility Effects

- Certain solvents interact more strongly with PEEK at higher temperatures, potentially leading to:
 - Swelling
 - Stress cracking
 - Chemical weakening

Practical Usage Guidance

When Operating Near Temperature Limits

- Reduce system pressure to prevent tubing failure.
- Avoid aggressive or swelling solvents at high temperatures.
- Inspect tubing and fittings regularly for softening or distortion.

Best Practice

- Prefer temperatures ≤ 100 °C for PEEK tubing and ≤ 125 °C for fittings unless absolutely necessary.
- For higher-temperature applications, consider alternative materials such as stainless steel or titanium hardware.

NOTE: PEEK has to be used with caution with higher temperatures.

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