

## PEEK Fittings and Stainless Steel Tubing - HPLC Primer

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### Using PEEK Fittings with Stainless-Steel Tubing in HPLC Systems

Pairing PEEK (polyether ether ketone) fittings with stainless-steel HPLC tubing is common in analytical laboratories, but it must be done with an understanding of pressure limits and material behavior. WE confirm that this combination is both effective and safe, as long as analysts account for the manufacturer-specified pressure rating of the PEEK fitting and the maximum operating pressure of the HPLC system.

PEEK is a high-performance engineering polymer valued for its chemical compatibility, dimensional stability, and ease of installation. Its ability to deform slightly under compression allows it to form strong, leak-tight seals against stainless-steel tubing when used properly. This makes PEEK fittings a practical choice for a wide range of HPLC workflows.

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### Pressure Considerations: The Key to Safe Operation

While PEEK fittings work extremely well on stainless-steel tubing, the limiting factor is always the pressure rating of the PEEK fitting, not the metal tubing.

In general:

- PEEK fittings are suitable for most HPLC applications up to ~5,000 psi.
- Operating beyond the pressure limit may cause the fitting to creep, deform, or fail, potentially leading to leaks or abrupt line disconnection.
- Stainless-steel tubing itself typically tolerates significantly higher pressures than the fitting; therefore, the fitting is the determining component for system safety.

Selecting the appropriately rated fitting ensures consistent sealing and prevents premature wear or deformation under repeated compression cycles.

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### Why Stainless-Steel Fittings Must *Never* Be Used on PEEK Tubing

Unlike stainless-steel tubing, PEEK tubing is relatively soft and compressible, which makes it extremely vulnerable to damage when paired with rigid stainless-steel fittings. Using a steel fitting on PEEK tubing can:

- Cut, gouge, or distort the tubing's outer diameter
- Create unsafe or inconsistent sealing
- Permanently deform the tubing, making it impossible to reseal
- Cause sudden leaks during pressurized operation
- Accelerate failure under thermal cycling or extended runs

For these reasons, we explicitly advise that stainless-steel fittings should NEVER be used on PEEK tubing, regardless of pressure.

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## **Advantages of Using PEEK Fittings on Stainless-Steel Tubing**

When used within their pressure specifications, PEEK fittings offer several technical benefits:

### **1. Gentler sealing mechanics**

PEEK ferrules compress smoothly and achieve reliable seals without scratching or damaging stainless-steel tube surfaces.

### **2. Reduced risk of thread galling**

PEEK avoids the metal-on-metal friction issues that can occur with all-metal fittings.

### **3. Excellent chemical compatibility**

PEEK is inert to most mobile phases and solvents commonly used in HPLC, including strong organic phases.

### **4. Easier installation and re-use**

PEEK fittings typically do not require torque wrenches or excessive tightening. They are convenient for modular systems, prototype setups, or frequent column changes.

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## **Best Practices for Using PEEK Fittings on SS Tubing**

To ensure optimal performance:

- Verify the fitting's maximum pressure rating—never exceed it.
  - Use clean, burr-free stainless-steel tubing cuts to avoid damaging the polymer ferrule.
  - Tighten the PEEK fitting until finger-tight plus a small additional turn, avoiding excessive torque.
  - Inspect fittings periodically for signs of creep or deformation during long-term high-pressure operation.
  - Replace PEEK fittings after extended high-temperature or high-pressure exposure whenever sealing integrity is in question.
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## **Conclusion**

PEEK fittings and stainless-steel HPLC tubing are a compatible and widely used combination in modern chromatography laboratories. When the pressure rating of the PEEK fitting is respected, the pairing provides reliable, leak-free performance.

However, the reverse pairing—stainless-steel fittings on PEEK tubing—must never be used, as it can permanently damage the tubing and compromise system safety.

For most applications up to 5,000 psi, PEEK fittings remain the recommended choice for flexible, chemically resistant, user-friendly operation.

[Click here to view our HPLC fittings](#)

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