

## HPLC Fitting Differences Explained - HPLC Primer

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### Overview

Although many HPLC fittings look similar, they are not universally interchangeable. Each fitting is designed with specific geometry, thread style, materials, and performance characteristics that must match the system's ports, tubing, and operating conditions.

Using the wrong fitting can lead to leaks, poor chromatography, and potential hardware damage.

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### Key Factors That Differentiate HPLC Fittings

#### Receiving Port Geometry

- The shape and depth of the receiving port—such as coned, flat-bottom, or specialized proprietary designs—must match the fitting.
  - If the ferrule and port geometry are mismatched, sealing quality, alignment, and pressure tolerance are compromised.
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#### Thread Specifications

- Fittings differ in:
  - Thread pitch
  - Threads per inch
  - Thread length
- Even two fittings with the same nominal size (e.g., 10-32) may not seal properly if the thread length or port depth differs.

#### Material Composition

- HPLC fittings are manufactured from materials chosen for:
    - Chemical inertness
    - Temperature resistance
    - Mechanical strength
  - Common materials include:
    - PEEK – chemically inert, temperature-limited
    - Carbon-PEEK (Endure™) – higher temperature and mechanical stability
    - Stainless steel – high pressure capability
    - Hybrid materials (PEEK with metal supports)
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## Pressure Rating Requirements

- Different fittings are engineered for different pressure ranges.
  - High-pressure LC and UHPLC systems often require stainless-steel or hybrid fittings.
  - Finger-tight PEEK fittings may be limited to moderate pressures depending on design.
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## Tubing Size Compatibility

- Fittings vary by:
    - Tubing outer diameter (OD)
    - Tubing inner diameter (ID)
    - Required ferrule size and shape
  - Incorrect sizing leads to poor gripping force, tubing slippage, or leaks.
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## Manufacturing Quality

- Precision in machining and molding impacts:
    - Seal reliability
    - Repeatability
    - Longevity
    - Ability to withstand torque and over-tightening
  - Higher-quality fittings maintain proper tolerances, ensuring consistent chromatography.
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## Why These Differences Matter

### Chromatographic Performance

- Incompatible or poor-quality fittings can create extra-column dead volume, degrading peak shape and efficiency.

### Pressure Safety

- Under-rated fittings may fail or leak when used in high-pressure applications.

### Instrument Longevity

- Wrong threads or mismatched ferrules can damage expensive receiving ports.

### Flow Path Integrity

- Proper fittings ensure a uniform, leak-free flow path, critical in LCMS, UHPLC, and trace-level quantitation.

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

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