

Making good UHPLC column connections

Avoiding extra column volume and unwanted peak dispersion

High resolution UHPLC systems are extremely sensitive to the introduction of extra column volume (dead volume), which will adversely affect your chromatography and result in unwanted peak dispersion. Therefore, when installing any UHPLC column, it is vital to ensure that the high pressure inlet tubing is fitted into the column port to the correct depth to avoid the introduction of any extra column volume.

Figure 1, 2 and 3 below illustrate correctly and incorrectly fitted tubing and result.

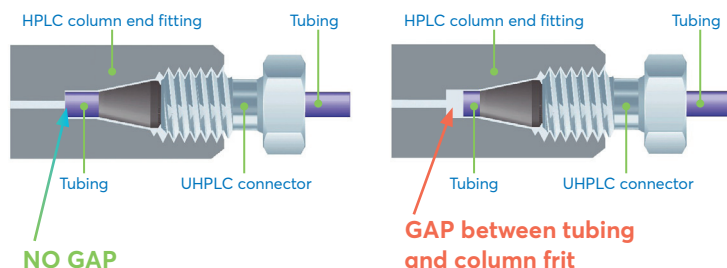


Figure 1. Tubing correctly fitted no gap between tubing and column frit no extra volume introduced.

Figure 2. Tubing incorrectly fitted (or tubing that has experienced slippage due to incorrect tightening) gap between tubing and column frit extra volume introduced.

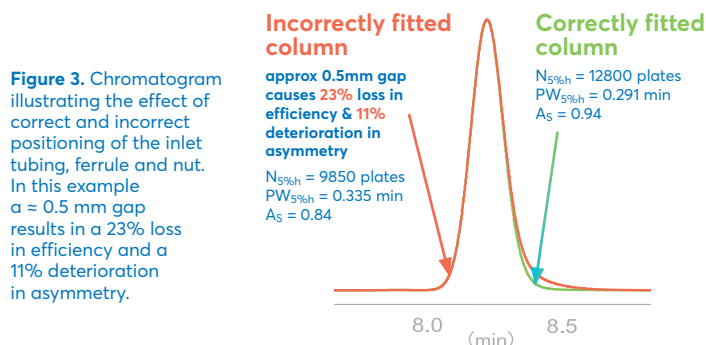


Figure 3. Chromatogram illustrating the effect of correct and incorrect positioning of the inlet tubing, ferrule and nut. In this example a ≈ 0.5 mm gap results in a 23% loss in efficiency and a 11% deterioration in asymmetry.

INSTALLING UHPLC COLUMNS CORRECTLY

For all UHPLC columns, correct installation is vital to get the most out of your column.

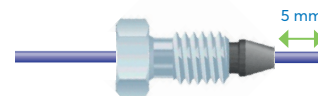
When you install your UHPLC column (and every time you change a UHPLC column) a "fresh connection" should always be made between the tubing and the UHPLC connector. Avoid UHPLC connectors that have already been swaged onto the tubing, as these do not allow free movement between the tubing and the connector and may lead to a gap between the tubing and the column and the introduction of extra column volume (dead volume) into the system (as described previously).

For a "fresh connection" every time, we recommend the use of ACE® UHPLC reusable column connectors (Part no. EXL-CC (1/pk) or EXL-CC10 (10/pk). These fittings are suitable for use with 1/16" OD tubing and virtually all manufacturers' UHPLC systems and all brands of UHPLC columns. They are rated for use up to 25,000psi (1,720 bar) and are also suitable for use up to 100°C. Correctly used, these fittings will provide a "fresh connection" for approximately 10 column installations.

The following simple guidelines will help you install your UHPLC column correctly.

Installation using ACE® UHPLC reusable column connectors (Part no. EXL-CC)

- 1 Slide the fitting onto the UHPLC tubing (approximately 5 mm (1/4") from the end).
- 2 Insert the assembly into the receiving female port of the column, pushing the tubing in until it 'bottoms out'.
- 3 Whilst maintaining pressure on the tubing (to ensure that it continues to 'bottom out'), finger tighten the fitting into the column until snug.
- 4 Using the Avantor® ACE® Torque Wrench (Part no. EXL-TW), tighten the fitting to the correct torque (while continuing to maintain pressure on the tubing).



Instructions for the correct use of the Avantor® ACE® Torque Wrench are provided with the torque wrench. A starter kit containing 1 x Avantor® ACE® Torque Wrench and 4 x Avantor® ACE® UHPLC reusable column connectors is available (Part no. EXL-CCSK).

Installation Using Other UHPLC Connectors

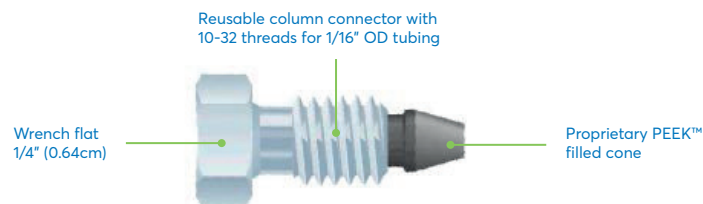
When installing UHPLC columns using other manufacturers UHPLC connectors, it is also vital that you ensure that the tubing bottoms out in the column port to avoid dead volume (as previously described). Please refer to the manufacturers instructions for further details.

UHPLC COLUMN OUTLET END CONNECTIONS

Avantor® ACE® UHPLC reusable column connectors (EXL-CC) are suitable for use at both the column inlet and the column outlet, to make good UHPLC connections. Alternatively, at the column outlet end an Avantor® ACE® reusable PEEK finger-tight column connector (ACE-CC, suitable for use up to 5,000psi, 345 bar) can be used to make a good connection. To avoid extra column volume and unwanted peak dispersion, it is additionally important to make good connections at the outlet end of your UHPLC column. Similar principles as previously described for the inlet end connection should be employed.

Avantor® ACE® UHPLC Reusable Column Connectors

- Compact, one-piece, easy to use connector
- Pressure rated to 25,000psi (1,720 bar)
- Usable at elevated temperatures (up to 100°C)
- Fits virtually all manufacturers' UHPLC systems
- Fits all brands of UHPLC columns
- Reusable, non-permanent swaging design
- 10 make and break cycles*

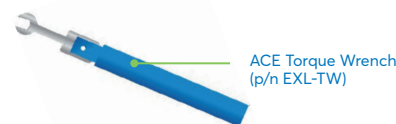


*Actual make and break cycles achieved depends on the tubing and torques used. Using the same connector with different column hardware geometries may also shorten the lifetime. If connecting your UHPLC column directly to an instrument part (rather than HPLC tubing) we recommend early replacement of the connector as a preventative maintenance measure.

Avantor® ACE® UHPLC reusable column connectors are designed to connect your UHPLC column to your UHPLC system (and make other similar connections). They are suitable for use with 1/16" OD tubing and virtually all manufacturers' UHPLC systems and all brands of UHPLC columns. These compact, one-piece design fittings are simple and easy to use. Installed correctly these fittings are non-permanent swaging, protecting your valuable time and equipment.

Avantor® ACE® Torque Wrench

For optimum connector lifetime and to avoid accidental permanent swaging of the connector to the tubing by over tightening, the use of an Avantor® ACE® Torque Wrench p/n EXL-TW is required. The Avantor® ACE® Torque Wrench (p/n EXL-TW) delivers exactly the required tightening torque to produce a good seal, without the risk of over tightening.



AVANTOR® ACE® UHPLC COLUMN INLET / OUTLET CONNECTORS

- suitable for use up to 25,000psi, 1,720 bar

Description	Pack	Part number
Avantor® ACE® Excel UHPLC reusable column connector	1	EXL-CC
	10	EXL-CC10
Avantor® ACE® Torque Wrench	1	EXL-TW
Avantor® ACE® Excel UHPLC reusable column connectors starter kit (contains 4 * EXL-CC & 1 * EXL-TW)	1	EXL-CCSK

AVANTOR® ACE® UHPLC COLUMN OUTLET CONNECTORS

- suitable for use up to 5,000psi, 345 bar

Description	Pack	Part number
Avantor® ACE® reusable PEEK™ fingertight column connector	1	ACE-CC
	10	ACE-CC10

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