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HPLC Fittings - Get Connected Correctly

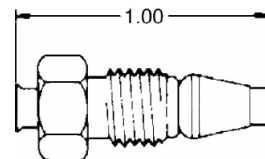
Technical Note CS08

Fittings are used to connect the various components of an HPLC system together while maintaining a leak-free flowpath. Using the correct fitting eliminates dead volume that can contribute to peak broadening, decreased resolution, split peaks, sample carry-over and gas collection. No matter how sophisticated the instrumentation, it cannot compensate for poor fittings.

Fitting Types:

Stainless Steel Compression Fittings

Stainless steel compression fittings consist of an external threaded nut and a tapered ferrule that compresses onto the outer wall of the tubing as the nut is tightened inside a tapered port. The nut provides the driving force that compresses the ferrule enough to grip the tubing. Since the fitting becomes permanently swaged onto the tubing, it can maintain a leak-free seal even at high pressures. The major disadvantage of conventional compression fittings is that its permanence only allows you to use the fitting and tubing in the one port that it was swaged into.

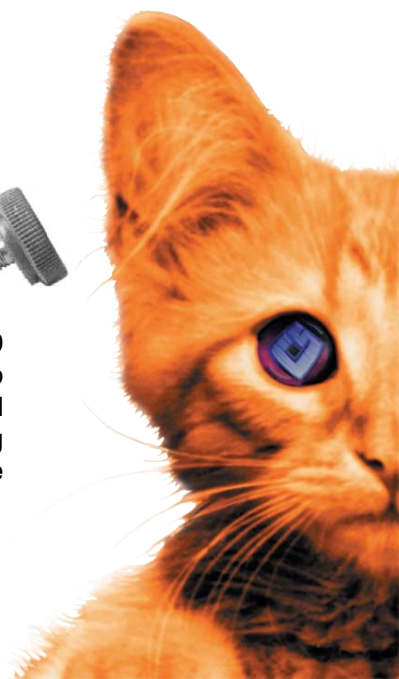


The ferrule locking distance or “stop depth” is the length of tubing that protrudes past the end of the ferrule and butts up against the end of the female port. This length requirement varies from one manufacturer’s hardware to another and is the reason column manufacturers recommend that their nuts and ferrules be used with their corresponding hardware. Failure to achieve the correct ferrule locking distance can result in leaks and increased dead volume. However, it is possible to make substitutions, such as universal fingertight fittings, that have little or no detrimental effect on chromatography.

To correctly install a conventional compression fitting, slide the nut then the ferrule (with the tapered end towards the port) over the tubing. Slide the tubing into the port until it butts up against the bottom of the port. Holding the tubing securely in place, finger-tighten the nut completely, then, using a wrench, tighten the nut another 3/4 of a turn. Do not over tighten the nut because it can damage the tubing. When you remove the tubing, the ferrule should be swaged onto the tubing, if not, reinsert tubing and tighten again.

Universal Fingertight Fittings

These solvent resistant polymeric compression fittings are compatible with all internal 10-32 threaded ports including HPLC column end fittings. Unlike metal fittings, fingertight fittings do not crimp or cut into the HPLC tubing causing tube deformation. The fitting slides freely on the tubing, facilitating the interchange of HPLC columns, guard columns, sample loops and inline filters. Most fingertight fittings are manufactured from PEEK (polyether ether ketone) which is capable of withstanding operating pressures up to 6000 psi. PEEK is compatible with most commonly used solvents, but avoid prolonged exposure to chlorinated solvents, acids, THF and DMSO. Polymeric universal fingertight fittings can be used with either polymer or metal tubing so long as the fitting can withstand the specified operating pressures and temperatures. Avoid using a metal fitting on plastic tubing because it can damage the polymeric tubing.



One Piece vs. Two Piece Fingertight Fittings

Universal fingertight fittings are available in a convenient one piece design with the nut and ferrule molded as a single unit for easy manipulation. Because the ferrule rotates on the tubing as the fitting is tightened, leaking can sometimes occur. In two piece fittings, the nut and ferrule are separate parts, allowing the ferrule to seal independent of the rotation of the fitting. Double tapered ferrules are also available which grip the tubing in two places for unsurpassed reliability.

Installing a universal fingertight fitting is very similar to steel compression fittings except no tools are required for tightening. Slide the nut /ferrule over the tubing and insert into the port until the tubing stops, finger-tighten the nut while holding the tubing securely in place. If installed correctly the ferrule can be reused several times before replacement is needed.

Secure-Fit Fittings and Tubing

Restek's Secure-Fit connectors ensure a consistent, leak-free seal and eliminate voids. An internal spring mechanism holds the capillary tube at the proper depth in the female fitting. This seal is maintained while finger-tightening the nut. Available in both stainless steel and PEEK, these fittings come in a variety of tubing lengths and internal diameters.

Push the Secure-Fit fitting into the port until the threads engage. Turn the Secure-Fit fitting until it is finger-tight. Secure-Fit fittings seal easily, so only a light tightening is required to obtain a leak-free seal. The tubing penetration depth is automatically set.



Troubleshooting Tips if a Leak Develops

- Check to make sure that the tubing is correctly seated in the female port
- For stainless steel fittings, use a wrench and tighten 1/4 turn at a time until the leak stops
- Make sure the nut and ferrule are compatible with one another
- Inspect nut and ferrule. Over time the ferrule can become deformed.
- Check the receiving port for the presence of scratches or other visible damage. If detected, the receiving port will need to be replaced.
- Review chemical compatibility of mobile phase with fittings

Available Literature

JR01 VICI Jour Catalogue features a selection of polymeric and stainless fittings for high pressure, nanovolume fittings and polymeric fittings for low pressure

This technical note applies to fittings (nuts and ferrules) used in high pressure HPLC applications, with 10-32 threads.

For more information on these fittings or fittings for low pressure chromatography, contact our knowledgeable Technical Support Team at 1-800-267-8103 or by email at tech@chromspec.com.

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