

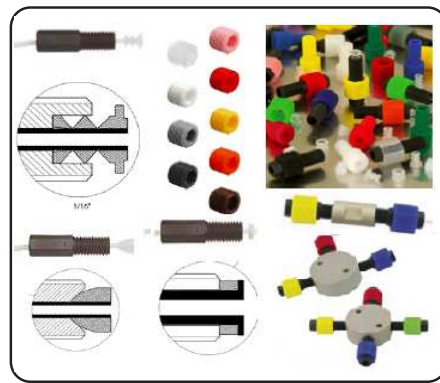
# Liquid Chromatography Fittings (HPLC)



**PEEK Fittings High Pressure**



**360um & 1/32 Fittings**



**PEEK/PPS Low Pressure**



**Stainless steel Fittings**



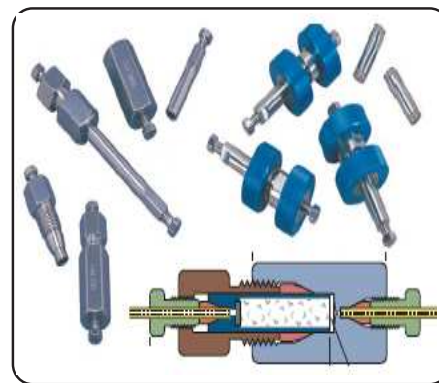
**Adaptors, Tees, Crosses**



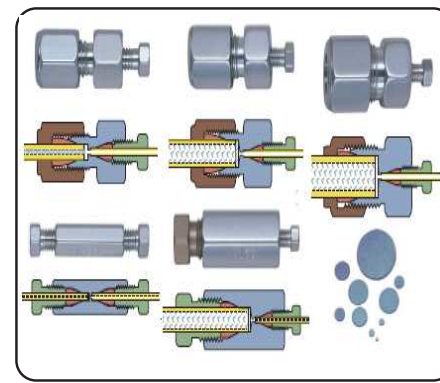
**Pipe Adaptors**



**Filters & Frits**



**PreColumns FT Cartridge**



**HPLC End-Fittings**



**Nuts M&F, Caps,Plugs**



**Ferrules/Reducers/FS**



**Injection Valves / Loops**



## Valco Fittings

The two piece compression fitting (**Figure 1**), in which a ferrule is compressed onto the tube as a nut is tightened, offers reliability in high pressure situations and in connecting metal tubing. Valco excels in all critical areas of the design and manufacture of such fittings. Quality considerations, which cannot be ignored if an analytical system is to reach and maintain optimum performance levels, include interchangeability, counterbore tolerances, ID/OD concentricity, mixing potential, cleaning procedures, and the method employed to “make up” the ferrule on the tube.

### No Tubing Deformation

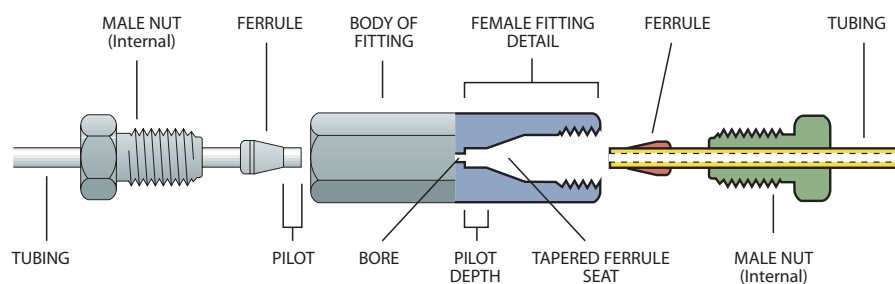
The basic concept of compression fittings carries the inherent danger of tube deformation (**Figure 2**). While some manufacturers emphasize this positively as a method of ensuring that the tubing doesn’t blow out of the ferrule, the flow anomalies introduced by the restricted ID make these fittings a poor choice for many instrument applications.

Valco metal ferrules cut a ring near the end of the tube (**Figure 3**), which prevents tube release at high pressures without significantly deforming and restricting the tube interior. Because our ferrules have a sharp edge at the ID near the nose, this usually takes only about 1/4 turn beyond the point where the ferrule first starts to grab the tubing. There is so little tube distortion that they are routinely used with glass-lined tubing! Only Valco’s polymer fittings rely on friction to hold a tube.

### CAUTION!

The analytical devices market has attracted numerous companies which copy Valco/Cheminert designs. Please exercise caution in the use of copies, which may not be compatible with the original versions in this catalog.

Because of VICI’s high volume production and dedicated machinery, our fittings are often less expensive and of consistently higher quality than competing copies.



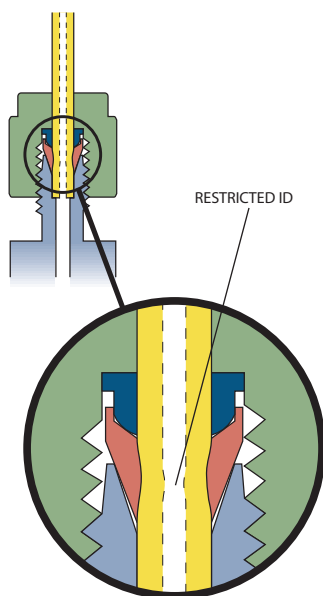
**Figure 1**  
Valco compression fitting

### TECH TIP

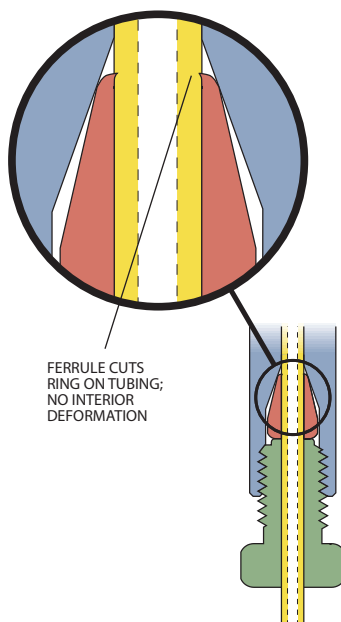
For optimal zero dead volume connections, make sure your tubing meets the best industry standards—OD tolerance should be nominal dimension  $\pm .002$ ".

Fractional dimension	Nominal dimension
1/32"	.031
1/16"	.062
1/8"	.125
1/4"	.250
3/8"	.375
1/2"	.500

CHROMalytic TECHNOlogy Pty Ltd AUSTRALIAN Distributors e-mail: [sales@chromtech.net.au](mailto:sales@chromtech.net.au) Tel: 03 9762 2034



**Figure 2**  
ID restriction  
in common compression fitting



**Figure 3**  
No ID restriction  
in Valco compression fitting

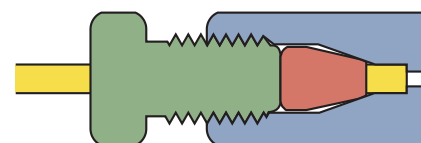
## Interchangeability

Valco fitting details are designed with a consistent pilot depth, permitting reliable interchangeability as connections are revised or fittings are replaced. This interchangeability extends throughout the Valco and Cheminert fitting and valve product lines. Indeed, the Valco standard has been so widely copied that Valco and Cheminert fittings are, in general, fully interchangeable with those of our major competitors. In initial installations, Valco ferrules will often improve other manufacturers' fitting connections.

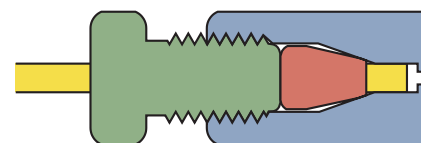
Because of variations in tubing OD and in pilot and taper designs from manufacturer to manufacturer, the amount of tubing extending beyond the made up ferrule can vary. (The most radical variation is in the fittings manufactured by Waters. Based on the old Swagelok design, they have a pilot depth considerably longer than standard.) **Figure 4a** shows a properly made up fitting. If that same fitting is installed in a detail which was designed for a slightly longer tube extension (as in **Figure 4b**), dead volume will be introduced. In the opposite case, with the pilot shorter than the pilot depth (**Figure 4c**), the tube will bottom out before the ferrule has sealed. However, our tests prove that except in the most extreme cases, a Valco ferrule will "creep" on the tubing until it reaches the bottom of the ferrule taper, making a proper seal.

## Reliably Clean

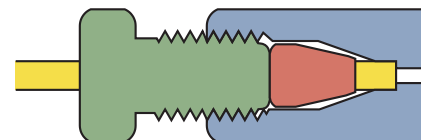
Most of our state of the art CNC machines use water-based lubricants. After each part comes off the machine, it is cleaned with water-soluble detergents and then rinsed in hot deionized water. Finally, every metal fitting that we make is given a thorough cleaning with steam from deionized water at 140°C. Any critical parts processed with oil-based lubricants are baked to remove all traces. The practical result of the extra effort is this: you don't have to be concerned about solvent residues.



a. Tubing seats correctly at bottom of detail



b. Tubing doesn't reach bottom of detail, introducing dead volume



c. Tubing reaches bottom of detail before ferrule seats

**Figure 4**



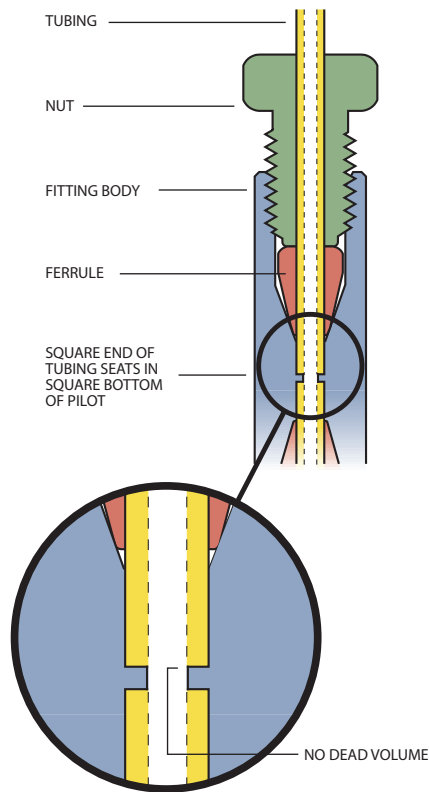
## Introduction

### Precision Machining, Finishing, and Tolerances

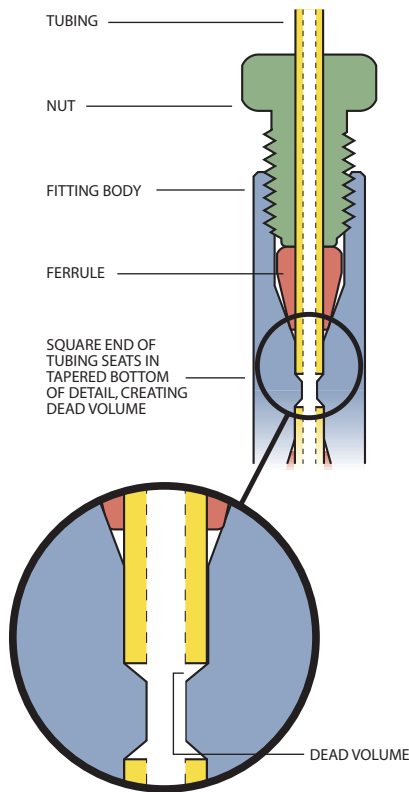
The machining methods used by different manufacturers to finish the detail of compression fittings vary in several ways that affect performance, as shown below. The fitting in **Figure 5** is the best choice for high performance fittings, as the tube fits squarely into the bottom of the detail. This is the detail used in Valco and Cheminert high pressure fittings.

Some fitting manufacturers omit a critical finishing operation which makes the bottom of the detail square, leaving the shape of the typical tapered drill bit instead. This results in the fitting shown in **Figure 6**, which introduces extra volume and mixing potential. VICI uses proprietary tooling specifically designed to produce the same high precision detail in every Valco and Cheminert fitting.

Although sometimes the tube end may seal in the bottom of the detail, the intent is for the seal to be made at the ferrule. This leaves the possibility of seepage up around the tube and into the minute cavities between the end of the ferrule and the bottom of the ferrule seat. The probability of this seepage increases when there is an excessive variance between the tubing OD and the diameter of the counterbored pilot in which it sits, and between the ferrule OD and the ferrule ID at the point where it "bites" or crimps the tubing. The possibility is virtually eliminated in VICI's fittings, which are manufactured with the precise dimensions that chromatographic applications demand. Use of VICI precut tubing, which is manufactured to quality standards in excess of most commercial tubing, further assures the best fitting connection.



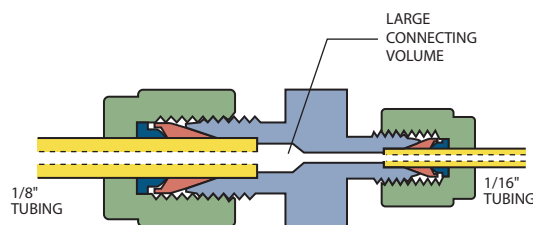
**Figure 5**  
Valco/Cheminert high pressure  
compression fitting



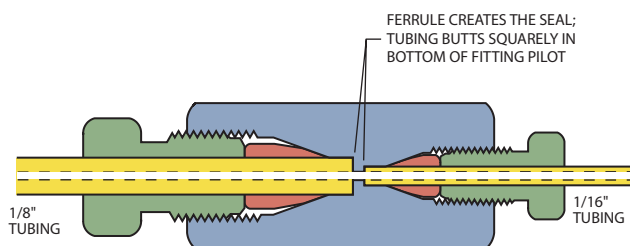
**Figure 6**  
Poor quality  
compression fitting

### Comparison of Compression Fitting Designs

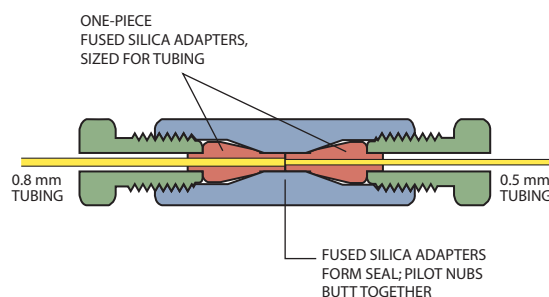
The potential for dead volume and mixing is a consideration in other aspects of fitting design as well, and varies considerably among manufacturers. For example, the common gas distribution reducing union in **Figure 7** illustrates two problems for instrumentation: a large connecting volume, and various steps and restrictions which cause mixing. While there are many uses for these fittings upstream of the analytical system (such as bulk gas distribution), they cause problems when used downstream in critical applications.



**Figure 7**  
Common commercial  
reducing union



**Figure 8**  
Valco zero dead volume  
reducing union



**Figure 9**  
Valco zero dead volume  
through-bore union

Additional difficulties may be encountered if this type of fitting is loosened and retightened repeatedly. The male threaded part can become flared to the point where it is impossible to get the nut on, and the tube end often flares out in the fitting detail so that it's difficult to remove the tube.

The Valco internal union (**Figure 8**) has a larger mass surrounding the ferrule, so that even with repeated remakes or overtightening, it's impossible to flare the fitting as in the external design. When a union is selected with a bore to match the ID of the connecting tubing, mixing and dead volume are virtually eliminated.

For connection of fused silica tubing of the same or differing sizes, the through-bore union shown in **Figure 9** is recommended. This fitting permits the use of our one-piece fused silica adapters to effect a true zero dead volume connection. The ferrule features an integrated pilot which adapts to the ID of the unions, resulting in an inert, zero volume connection.

Every Valco and Cheminert fitting is manufactured to exacting specifications. Fitting concentricity – the relationship of the center of one fitting to another – is held to within 10% of the bore size (0.05 mm in a typical 1/16" union with 0.5 mm bore), which is better than that of commonly used tubing. This results in fittings which contribute no "extra column effects" or loss of efficiency to the chromatographic system.

## Nuts

### Internal nuts – stainless steel

Nuts with product numbers starting with Z are for use with all standard Valco internal fittings and most valves. They may be used with fittings from other manufacturers as well. The L (long) and XL (extra-long) types are for situations where the fitting head may be otherwise inaccessible or where interference between fittings exists, as on many Valco multiposition valves. Standard material is 300 series stainless.

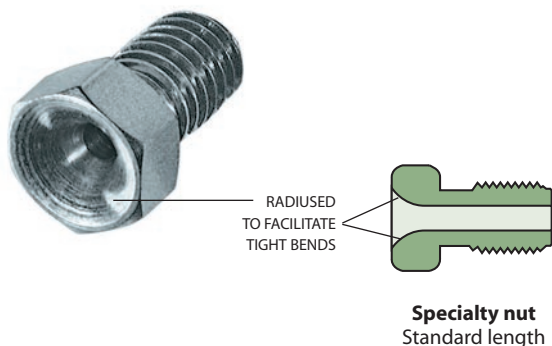
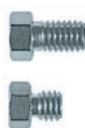
Stainless nuts			
Package of 10:	Length	Prod No	Price
1/32" nut	.30"	ZN.5-10	
1/32" nut	.45"	LZN.5-10	
1/16" nut	.43"	ZN1-10	
1/16" nut	.50"	MZN1-10	
1/16" nut	.75"	LZN1-10	
1/16" nut	1.00"	XLZN1-10	
1/8" nut	.57"	ZN2-10	
1/8" nut	.82"	LZN2-10	
1/8" nut	1.07"	XLZN2-10	
1/4" nut	.70"	ZN4-10	
1/4" nut	1.11"	LZN4-10	



### NEW Specialty nuts – stainless steel

These special purpose nuts facilitate a tight bend as the tube exits the fitting, and can also help prevent kinks in very thin wall tubing. Quick bend nuts are available in standard length (.43") and in a short version (.30") for certain custom applications. Note that the short version (ZSN1) can *only* be used in certain applications. Call for more information.

Stainless nuts			
Description	Length	Prod No	Price
1/16", standard	.43"	ZN1Q	
1/16", short	.30"	ZSN1	



#### MORE INFORMATION

PEEK nuts	page 63
HPLC column end fittings	43-46
Reducing unions	
Internal	29
External	30
External/internal	31
Internal/external	31
Unions	
Internal	26
External	27
External/internal	27

#### TECH TIP

Fittings for **360 micron** tubing are available on pages 57-58.

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



### External nuts – stainless steel

External nuts are used with external fittings, such as our column end fittings (ECEP series) and external unions (EZU and EZRU series). They may also be used with Valco ferrules on Parker CPI and Swagelok type fittings. Standard material is 300 series stainless.

\* PTFE-coated threads standard.

#### Description

1/32" external nut  
1/32" external nut, knurled  
1/16" external nut  
  
1/8" external nut  
1/4" external nut  
3/8" external nut  
  
1/2" external nut  
1" external nut

#### Stainless nuts

Prod No	Price
EN.5	
EN.5KN	
EN1	
EN2	
EN4 *	
EN6 *	
EN8 *	
EN1K *	



### Plugs – stainless steel and high pressure

Stainless plugs consist of a zero volume nut with a ferrule made up on a solid rod. For high pressure applications such as UHPLC, SFE, and SFC (>7000 psi), we recommend the special high pressure plugs with the ferrule and rod machined as a single, solid piece.

#### Description

#### Length of nut\*

1/32" .30"  
1/16" .43"  
1/16" .75"  
  
1/8" .57"  
1/8" .82"  
1/4" .70"

#### Stainless plugs

Prod No	Price
ZP.5	
ZP1	
LZP1	
ZP2	
LZP2	
ZP4	

#### High pressure

#### Stainless plugs

Prod No	Price
ZP.5H	
ZP1H	
LZP1H	
ZP2H	
LZP2H	
–	



### Caps – stainless steel

A cap is essentially a piece of hex stock with a zero volume fitting detail machined into it, but with no through-hole.

#### Description

#### Length of nut\*

1/32" .30"  
1/16" .43"  
  
1/8" .57"  
1/4" .70"

#### Stainless caps

Prod No	Price
ZC.5	
ZC1	
ZC2	
ZC4	

### MORE INFORMATION

PEEK plugs . . . pages 64, 71  
PEEK plugs for high  
pressure Cheminert  
valves . . . . . 64  
PEEK caps . . . . . 57, 64

## Ferrules

Valco metal ferrules cut a ring near the end of the tube, preventing tube release at high pressures without significantly deforming and restricting the tube interior. (However, if the hardness of the tubing is equal to or greater than that of the ferrule, deformation of the tube rather than a cut ring is likely.) Make up usually takes only about a 1/4 turn beyond the point where the ferrule first starts to grab the tubing. Polymeric ferrules seal by the increased friction from compression.

Valco zero volume ferrules may be used with all Valco fittings and with those of most other manufacturers. The maximum pressure limit is generally determined by the yield strength of the tubing. The maximum pressure for softer materials (such as brass and polymers) is lower, and depends on the tubing used. If in doubt about a particular combination, consult our technical staff.

For trace gas analysis, use gold-plated ferrules to achieve sealing with  $<10^{-9}$  cc/atm/sec leakage.



## MORE INFORMATION

For more detailed information on metals, refer to the discussion on pages 254-255.

## Metal ferrules

	Prod No	Price	Prod No	Price	Prod No	Price
<b>Package of 10:</b>	<b>Stainless, Type 303</b>		<b>Stainless, Type 316</b>		<b>Stainless, Gold-plated</b>	
1/32"	ZF.5-10		ZF.5S6-10	\$40	ZF.5GP-10	
1/16"	ZF1-10		ZF1S6-10	30	ZF1GP-10	
1/8"	ZF2-10		ZF2S6-10	22	ZF2GP-10	
1/4"	–		ZF4S6-10	19	ZF4GP-10	
<b>Sold individually:</b>	<b>Hastelloy C</b>		<b>Nickel</b>		<b>Titanium</b>	
1/32"	ZF.5HC		ZF.5NI	\$9	ZF.5TI	
1/16"	ZF1HC		ZF1NI	8	ZF1TI	
1/8"	ZF2HC		ZF2NI	8	ZF2TI	
1/4"	ZF4HC		ZF4NI	9	ZF4TI	
<b>Package of 10:</b>	<b>Brass</b>					
1/32"	ZF.5B-10					
1/16"	ZF1B-10					
1/8"	ZF2B-10					
1/4"	ZF4B-10					

– Not available

Larger sizes and/or specific materials may be available on special order.

METALS  
AT A GLANCE

Hastelloy C® .....HC  
Resistant to pitting;  
Resists oxidizing atmospheres

Nickel ..... NI  
Resistant to caustics,  
high temp halogens,  
and hydrogen halides

Stainless steel,  
Gold-plated ..... GP  
More inert than standard stainless

Stainless steel,  
Type 303  
GC, gas lines, general purpose

Stainless steel,  
Type 316 ..... S6  
LC with high chloride ion in solutions

Titanium ..... TI  
Outstanding resistance to most media except hydrofluoric acids

Brass ..... B  
Not recommended for most chromatographic applications

0.25 mm = .010"  
0.50 mm = .020"  
0.75 mm = .030"

1.0 mm = .040"  
1.5 mm = .060"  
2.0 mm = .080"

4.6 mm = .180"  
6.0 mm = .236"  
6.4 mm = .253"

7.0 mm = .275"  
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm  
1/16" = 1.6 mm  
1/8" = 3.2 mm

1/4" = 6.4 mm  
3/8" = 9.5 mm  
1/2" = 12.7 mm





### Polymeric ferrules

#### MORE INFORMATION

PEEK ferrules . . . . . page 63  
Grooved PEEK  
ferrules . . . . . 63

For more detailed  
information on polymers,  
refer to the discussion  
on page 256.

#### POLYMERS AT A GLANCE

CTFE . . . . . KF  
*Resists all inorganic  
corrosives.  
Produced as Kel-F®*

FEP . . . . . FEP  
*Chemical resistance  
equals PTFE, but lower  
creep and higher  
friction*

PTFE, Glass-filled . . . . . TFG  
*Inert, mechanically  
stable*

PTFE, Virgin . . . . . TF  
*Inert; very soft, easily  
cold flows.  
Produced as Teflon®*

Polyimide, Graphite . . . . . GV  
*Soft, easy to form fer-  
rules*

Polyimide, Valcon . . . . . V  
*High temp, graphite  
reinforced*

Polyimide, Virgin . . . . . V1  
*High temp, electrical  
insulator*

	Prod No	Price	Prod No	Price	Prod No	Price
<b>Package of 10:</b>	<b>PTFE, Virgin</b>		<b>PTFE, Glass-filled</b>		<b>FEP</b>	
1/32"	ZF5TF-10		ZF5TFG-10		ZF5FEP-10	
1/16"	ZF1TF-10		ZF1TFG-10		ZF1FEP-10	
1/8"	ZF2TF-10		ZF2TFG-10		ZF2FEP-10	
1/4"	ZF4TF-10		ZF4TFG-10		ZF4FEP-10	
3/8"	ZF6TF-10		ZF6TFG-10		ZF6FEP-10	
1/2"	ZF8TF-10		ZF8TFG-10		ZF8FEP-10	

<b>Package of 10:</b>	<b>PFA</b>	<b>CTFE</b>
1/32"	ZF5PFA-10	ZF5KF-10
1/16"	ZF1PFA-10	ZF1KF-10
1/8"	ZF2PFA-10	ZF2KF-10
1/4"	ZF4PFA-10	ZF4KF-10
3/8"	ZF6PFA-10	ZF6KF-10
1/2"	ZF8PFA-10	ZF8KF-10

<b>Package of 5:</b>	<b>Polyimide, Graphite</b>	<b>Polyimide, Valcon</b>	<b>Polyimide, Virgin</b>
1/32"	ZF5GV-5	ZF5V-5	ZF5V1-5
1/16"	ZF1GV-5	ZF1V-5	ZF1V1-5
1/8"	ZF2GV-5	ZF2V-5	ZF2V1-5
1/4"	ZF4GV-5	ZF4V-5	ZF4V1-5
3/8"	ZF6GV-5	ZF6V-5	ZF6V1-5
1/2"	ZF8GV-5	ZF8V-5	ZF8V1-5

#### FERRULE IDENTIFICATION

To differentiate among  
the most commonly  
ordered metal ferrules,  
ring(s) are engraved on  
the non-sealing surfaces.



## Reducing Ferrules

Reducing ferrules provide an inexpensive way to connect small temporary transfer lines to valves or fittings designed for larger tubing. For long term use, we recommend our reducing unions, internal reducers (IZRs), or external reducers (EZRs), as appropriate.

**Internal ZDV** (zero dead volume) reducing ferrules are designed for use with all standard Valco internal style fittings – that is, those with a male nut and female fitting detail. The ferrule features an integral pilot which fills the pilot cavity (the space between the end of the ferrule and the bottom of the detail), yielding a zero dead volume fitting.

**External ZDV** reducing ferrules are designed for use with all standard external style fittings – that is, those with a female nut and a male fitting detail. This ferrule has a slightly longer pilot than the internal version, to accommodate the longer external detail. The result is a zero dead volume fitting. A single groove indicates that the ferrule has the longer pilot and is for use in an external detail.

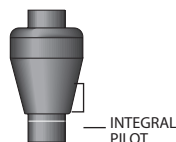
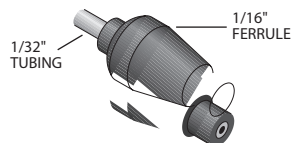
**Standard** reducing ferrules can be used where mixing is not a problem, such as with liquid or gas delivery. A 1/16" to 1/32" ferrule of this style is simply a 1/16" ferrule with a 1/32" hole.



### Internal reducing ferrules

Use these ferrules in internal type fitting details, with nuts that have external threads.

	Prod No	Price	Prod No	Price	Prod No	Price
<b>Package of 5:</b>	<b>PTFE, Glass-filled</b>		<b>PEEK</b>		<b>Polyimide, Valcon</b>	
1/16" to 1/32"	ZRF1.5TFG-5		ZRF1.5PK-5		ZRF1.5V-5	
1/8" to 1/32"	ZRF2.5TFG-5		ZRF2.5PK-5		ZRF2.5V-5	
1/8" to 1/16"	ZRF21TFG-5		ZRF21PK-5		ZRF21V-5	
1/4" to 1/16"	ZRF41TFG-5		ZRF41PK-5		ZRF41V-5	
1/4" to 1/8"	ZRF42TFG-5		ZRF42PK-5		ZRF42V-5	
<b>Package of 5:</b>	<b>CTFE</b>		<b>Polyimide, Virgin</b>			
1/16" to 1/32"	ZRF1.5KF-5		ZRF1.5V1-5			
1/8" to 1/32"	ZRF2.5KF-5		ZRF2.5V1-5			
1/8" to 1/16"	ZRF21KF-5		ZRF21V1-5			
1/4" to 1/16"	ZRF41KF-5		ZRF41V1-5			
1/4" to 1/8"	ZRF42KF-5		ZRF42V1-5			



**Internal reducing ferrule (ZRF)**



**PEEK reducing ferrule and internal nut**  
(Order nut separately.)

### MORE INFORMATION

Internal reducers (IZR)..... page 34  
External reducers (EZR) ..... 35  
Ferrule removal kits. ... 16

For 1/16" and 1/32" reducing ferrules with smaller ODs for use with fused silica, see the FS and FSR adapters on pages 16-17.

### TECH TIP

Fittings for **360 micron** tubing are available on pages 57-58.

### TECH TIP

If you are doing resistive heating of traps or columns, note that our virgin polyimide reducing ferrules are effective electrical insulators.

Virgin polyimide is produced as Vespel®.

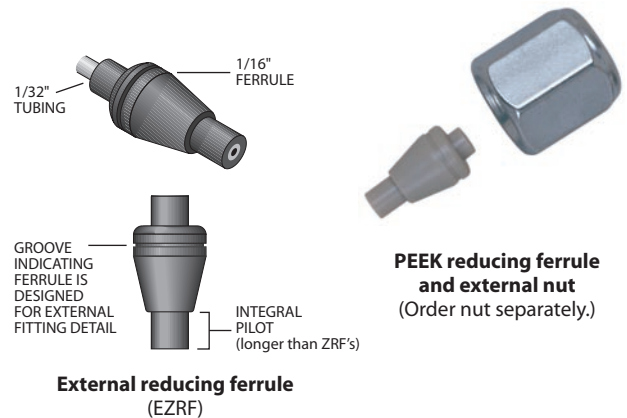
**OPTION**

Available in Virgin Polyimide.

**External reducing ferrules**

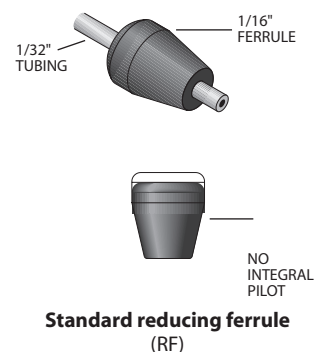
Use these ferrules in external type fitting details, with nuts that have internal threads.

	Prod No	Price	Prod No	Price	Prod No	Price
Package of 5:	<b>PTFE, Glass-filled</b>		<b>PEEK</b>		<b>Polyimide, Valcon</b>	
1/16" to 1/32"	EZRF1.5TFG-5		EZRF1.5PK-5		EZRF1.5V-5	
1/8" to 1/32"	EZRF2.5TFG-5		EZRF2.5PK-5		EZRF2.5V-5	
1/8" to 1/16"	EZRF21TFG-5		EZRF21PK-5		EZRF21V-5	
1/4" to 1/16"	EZRF41TFG-5		EZRF41PK-5		EZRF41V-5	
1/4" to 1/8"	EZRF42TFG-5		EZRF42PK-5		EZRF42V-5	
Package of 5:	<b>CTFE</b>					
1/16" to 1/32"	EZRF1.5KF-5					
1/8" to 1/32"	EZRF2.5KF-5					
1/8" to 1/16"	EZRF21KF-5					
1/4" to 1/16"	EZRF41KF-5					
1/4" to 1/8"	EZRF42KF-5					

**Standard reducing ferrules**

Use these ferrules for bulk distribution only, since the resulting connection will not be zero dead volume. These ferrules can be used in either internal or external type fitting details.

	Prod No	Price	Prod No	Price	Prod No	Price
Package of 5:	<b>PTFE, Glass-filled</b>		<b>PEEK</b>		<b>Polyimide, Valcon</b>	
1/16" to 1/32"	RF1.5TFG-5		RF1.5PK-5		RF1.5V-5	
1/8" to 1/32"	RF2.5TFG-5		RF2.5PK-5		RF2.5V-5	
1/8" to 1/16"	RF21TFG-5		RF21PK-5		RF21V-5	
1/4" to 1/16"	RF41TFG-5		RF41PK-5		RF41V-5	
1/4" to 1/8"	RF42TFG-5		RF42PK-5		RF42V-5	
Package of 5:	<b>CTFE</b>					
1/16" to 1/32"	RF1.5KF-5					
1/8" to 1/32"	RF2.5KF-5					
1/8" to 1/16"	RF21KF-5					
1/4" to 1/16"	RF41KF-5					
1/4" to 1/8"	RF42KF-5					



0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm

## Fused Silica Adapters

Fused silica adapters are available in Valcon polyimide for use up to 350°C and in PEEK for lower temperature applications (up to 175°C). Valcon polyimide is a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at high temperatures. Small blocks are subjected to extreme loads by a process known as hot isostatic pressing, with individual ferrules

subsequently machined from these blocks. The result of this two-step process is a fused silica adapter with high temperature stability which far exceeds that of parts produced by conventional molding. Note that the determining factor in adapter size selection is the fused silica tubing's outer diameter, or OD. Typical ODs for common columns are included in the product number tables.



### One piece fused silica adapter (FS)

The one piece FS adapter, essentially a reducing ferrule, is recommended for use in fittings where the polyimide ferrule will not be removed. Connections are made and disconnected by loosening the fitting nut and sliding the tube out.

Package of 5:

		Polyimide, Valcon		PEEK		Polyimide, Virgin	
		Prod No	Price	Prod No	Price	Prod No	Price
<b>1/32" Adapters</b>	Tubing OD:						
	< 0.25 mm	FS.25-5		FS.25PK-5		FS.25V1-5	
	0.25 ≤ 0.40 mm	FS.4-5		FS.4PK-5		FS.4V1-5	
	0.40 ≤ 0.50 mm	FS.5-5		FS.5PK-5		FS.5V1-5	
	0.50 ≤ 0.80 mm	ZF.5V-5		ZF.5PK-5		ZF.5V1-5	
<b>1/16" Adapters</b>	Tubing OD:						
	< 0.25 mm	FS1.2-5		FS1.2PK-5		FS1.2V1-5	
	0.25 ≤ 0.30 mm	FS1.25-5		FS1.25PK-5		FS1.25V1-5	
	0.30 ≤ 0.35 mm	FS1.3-5		FS1.3PK-5		FS1.3V1-5	
	0.35 ≤ 0.40 mm	FS1.4-5		FS1.4PK-5		FS1.4V1-5	
	0.40 ≤ 0.50 mm	FS1.5-5		FS1.5PK-5		FS1.5V1-5	
	0.50 ≤ 0.80 mm	FS1.8-5		FS1.8PK-5		FS1.8V1-5	
	0.80 ≤ 0.90 mm	FS1.9-5		FS1.9PK-5		FS1.9V1-5	
	0.90 ≤ 1.0 mm	FS11.0-5		FS11.0PK-5		FS11.0V1-5	

### TEMPERATURE RATINGS

Polyimide adapters can be used at temperatures up to 350°C.

PEEK adapters are not recommended for use above 175°C.

### TECH TIP

Virgin polyimide adapters are effective electrical insulators, making them the ideal choice for capillary electrophoresis.

Virgin polyimide is produced as Vespel®.

### TECH TIP

If a fused silica tube breaks off in a through-type union, remove the nuts and the tube opposite the broken one. Clear the fitting by passing a drill or wire of the appropriate diameter into the unbroken side and through the center of the fitting.

Our **ferrule removal kit**, left, can be used to remove ferrules from all types of fittings.

### Ferrule removal kit

These tapered tools have teeth designed to grip and remove fused silica adapters if they get stuck in a fitting detail. Each kit has two sizes of tools, so they can retrieve 1/32" and 1/16" adapters.

Prod No      Price  
FRK1          \$23

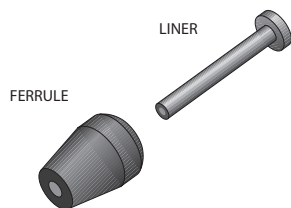


### WHICH ADAPTER FOR WHICH COLUMN?

Column ID	Typical column OD	1/32" adapter	1/16" adapter
< 0.20 mm	0.25 mm	FS.25	FS1.25
0.25 mm	0.4 mm	FS.4	FS1.4
0.32 mm	0.5 mm	FS.5	FS1.5
0.53 mm	0.8 mm	ZF.5V	FS1.8



## Fused Silica Adapters



## Removable fused silica adapters (FSR)

The FSR adapter is the only adapter recommended for use in valves. It consists of a liner which slides over the fused silica tubing and a ferrule which makes up on the liner. The polyimide liner has an enlarged diameter at one end which is captured by the nut, so the liner and the tube within it are removed as the nut is unscrewed from the valve. The 1/16" FSR adapter includes a special counter-bored 1/16" nut. The 1/32" FSR adapter uses standard Valco 1/32" nuts.

## MORE INFORMATION

Fused silica

Unions . pp 18-19, 58, 61

Fittings . . . . . 18-21

A pin vise and drill index are useful for enlarging the inner diameters of the FS adapters.

Pin vise and

drill index . . . . . 55

## REPLACEMENT PARTS

## Ferrules

(package of 5)

1/32" Polyimide ZF.5V-5 \$30

1/16" Polyimide ZF1V-5 25

(package of 10)

1/16" PEEK ZF1PK-10 33

## Nuts

(package of 10)

1/32" SS ZN.5-10 29

Special nuts for FSRs:

1/16" SS ZCN1-10 30

1/16" SS long LZCN1-10 45

100 µm = .004"

150 µm = .006"

0.25 mm = .010"

0.50 mm = .020"

0.75 mm = .030"

1.0 mm = .040"

1.5 mm = .060"

2.0 mm = .080"

4.6 mm = .180"

6.0 mm = .236"

6.4 mm = .253"

7.0 mm = .275"

10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm

1/16" = 1.6 mm

1/8" = 3.2 mm

1/4" = 6.4 mm

3/8" = 9.5 mm

1/2" = 12.7 mm

Package of 5:

**Polyimide, Valcon**

Prod No Price

**1/32"**

**Removable adapters**

Tubing OD:

< 0.25 mm

FSR.25-5

0.30 ≤ 0.35 mm

FSR.3-5

0.35 ≤ 0.40 mm

FSR.4-5

0.40 ≤ 0.50 mm

FSR.5-5

**1/32"**

**Replacement liners**

Tubing OD:

< 0.25 mm

FSL.25-5

0.25 ≤ 0.40 mm

FSL.4-5

0.40 ≤ 0.50 mm

FSL.5-5

Package of 5:

**Polyimide, Valcon**

Prod No Price

**PEEK**

Prod No Price

**1/16"**

**Removable adapters**

Tubing OD:

< 0.15 mm

—

FS1R.15PK-5

< 0.20 mm

FS1R.2-5

FS1R.2PK-5

0.20 ≤ 0.40 mm

FS1R.4-5

FS1R.4PK-5

0.40 ≤ 0.50 mm

FS1R.5-5

FS1R.5PK-5

0.50 ≤ 0.80 mm

FS1R.8-5

FS1R.8PK-5

0.90 ≤ 1.0 mm

FS1R1.0-5

FS1R1.0PK-5

**1/16"**

**Replacement liners**

Tubing OD:

< 0.15 mm

—

FS1L.15PK-5

< 0.20 mm

FS1L.2-5

FS1L.2PK-5

0.20 ≤ 0.40 mm

FS1L.4-5

FS1L.4PK-5

0.40 ≤ 0.50 mm

FS1L.5-5

FS1L.5PK-5

0.50 ≤ 0.80 mm

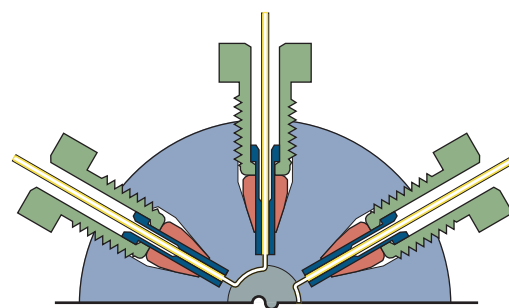
FS1L.8-5

FS1L.8PK-5

0.90 ≤ 1.0 mm

FS1L1.0-5

FS1L1.0PK-5



Removable FSR adapters in a valve

## Fused Silica Fittings

The patented design of our fused silica fittings ensures stable, leak-free connections at temperatures up to 400°C, and undistorted ferrules that are easily removed and reused. Columns may be changed without the risk of the leaks which can devastate systems such as mass spectrometers or atomic emission detectors. This is accomplished with a spring-loaded

self-compensating nut which provides a constant sealing force as the temperature varies.

Self-compensating nuts are currently employed in two basic designs: a fused silica-lined union and an injector/detector nut for Agilent 6890 and 5890 GCs.

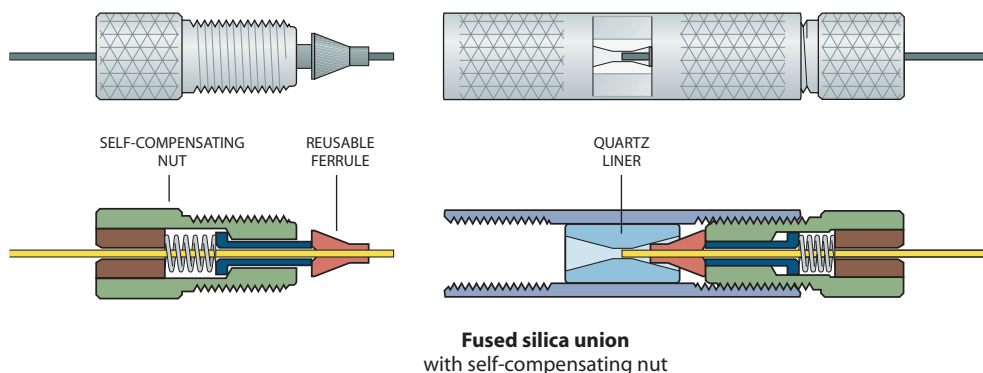
### Fused silica unions

The fused silica union\* has a quartz liner, providing an inert connection zone of minimal volume. Since the seal occurs only at the ferrule tip, the total sealing force is minimized, leaving the ferrule undistorted and reusable.

*Note:* The ferrules used in this union are unique, due to the seal at the tip. Standard ferrules will not work in this union.



Description	Prod No	Price
Fused silica union	FSKZU1	
Replacement liner	FSQ1	
Replacement nut	FSZN1	



### Replacement ferrules for fused silica unions and self-compensating nuts (Agilent injector nuts)

These reusable ferrules seal at the tip, and are different from standard ferrules. Order for use with FSKZU1 fused silica unions and FSZNA-HP nuts on these two pages.

Package of 10:	Prod No	Price
Column ID: .20-.25 mm	FS1.35-R10	
.32 mm	FS1.45-R10	
.53 mm	FS1.75-R10	

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

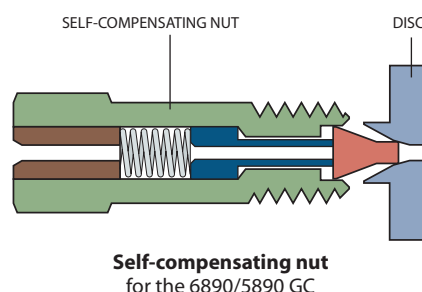
\*U.S. patent numbers 5,234,235 and 4,991,883.

### Injector nut for Agilent 6890 and 5890, Series I and II



This self-compensating nut is a direct replacement for the standard nut on the split/splitless injectors of Agilent 6890 and 5890 series GCs. This retrofit offers enhanced ferrule reusability and temperature stability, resulting in fingertight leak-free connections over the full programmed temperature range of mass spectrometry and gas chromatography. To use this nut, the split/splitless disk must also be upgraded; the new disk will also work with older HP nuts and ferrules.

	Prod No	Price
Injector nut system Includes nut and seal disk	FSZA-HP	
Replacement parts		
Self-compensating nut	FSZNA-HP	
HP-5890 split/splitless seal disk	SEAL1-HP	

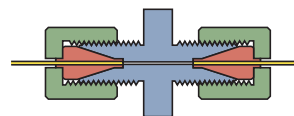


### 1/32" Ultra low mass external unions



The 1/32" external union is specially designed for use with capillary columns in GC. It has very low mass and does not require wrenches to seal. Use only with one-piece fused silica adapters, since metal ferrules will distort the detail. Order fused silica adapters separately (*see box at left*).

Bore	Prod No	Price
0.25 mm	EU.5	
0.50 mm	EU.5L	
1/32"	EU.5T	



#### MORE INFORMATION

1/32" fused silica adapter  
ferrules..... page 16

#### 1/32" FUSED SILICA FERRULES (package of 5)

Tubing OD:

	≤ 0.25 mm	FS.25-5	\$25
0.25 mm	≤ 0.4 mm	FS.4-5	25
0.4 mm	≤ 0.5 mm	FS.5-5	25
0.5 mm	≤ 0.8 mm	ZF.5V-5	25

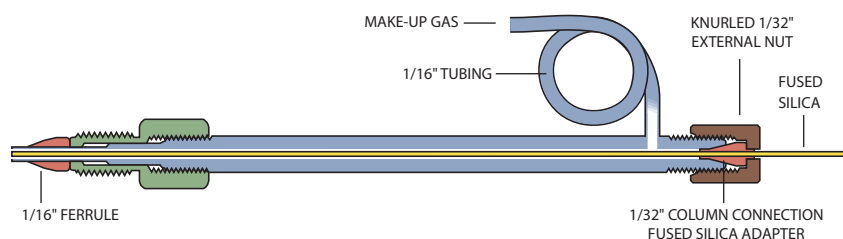
## Fused Silica Adapters

## Fused silica make-up adapters

The fused silica make-up adapter connects a fused silica capillary column to a valve or detector while adding a make-up gas. In the reverse mode it works like a splitter, without the uneven or erratic split seen with basic tees. Two lengths are available. Order 1/32" fused silica adapter ferrules separately (see box on facing page).



Description	Length	Bore	Prod No	Price
1/16" to 1/32"	1.5"	0.5 mm	FSMUAS1.5M	
	1.5"	0.75 mm	FSMUAS1.5	
	1.5"	1.0 mm	FSMUAS1.5L	
	3.5"	0.75 mm	FSMUA1.5	



**Fused silica make-up adapter**  
(FSMUA1.5)

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



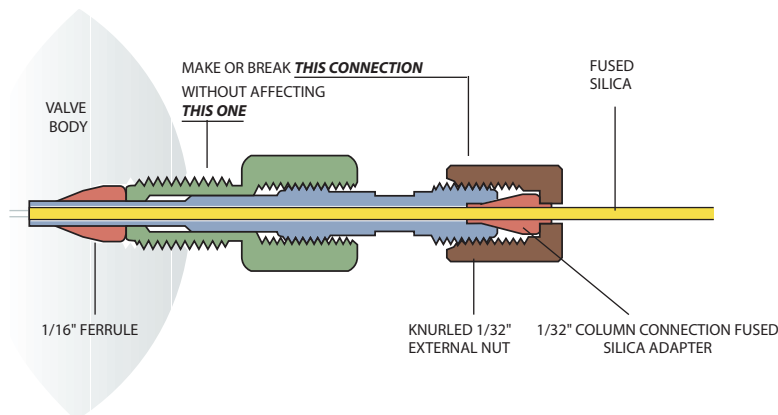
## Fused Silica Adapters



## Internal to external reducer/adapters

Internal fittings provide the smallest possible fitting volume. But there are situations, such as when you're using graphite ferrules which tend to become lodged in internal details, when an external fitting might be more desirable. A typical situation of that nature is the connection of a fused silica capillary to a valve. Our unique design permits the 1/32" nut to be tightened without affecting the 1/16" connection. Order 1/32" fused silica adapter ferrules separately (*see box below*).

Description	Bore	Prod No	Price
1/16" to 1/32"	0.25 mm	IZERA1.5C	
	0.5 mm	IZERA1.5M	
	1.0 mm	IZERA1.5	



**Internal to external FS adapter**  
(IZERA1.5)  
shown installed in a valve

## MORE INFORMATION

1/32" fused silica adapter  
ferrules..... page 16

## CAUTION

Polymeric ferrules are strongly recommended for 1/16" and 1/32" external details. Metal ferrules may distort the fitting.

## 1/32" FUSED SILICA FERRULES

(package of 5)

Tubing OD:

	≤ 0.25 mm	FS.25-5	\$30
0.25 mm	≤ 0.4 mm	FS.4-5	30
0.4 mm	≤ 0.5 mm	FS.5-5	30
0.5 mm	≤ 0.8 mm	ZF.5V-5	30

CHROMalytic TEChnology Pty Ltd AUSTRALIAN Distributors e-mail: [sales@chromtech.net.au](mailto:sales@chromtech.net.au) Tel: 03 9762 2034

## Microvolume Connectors

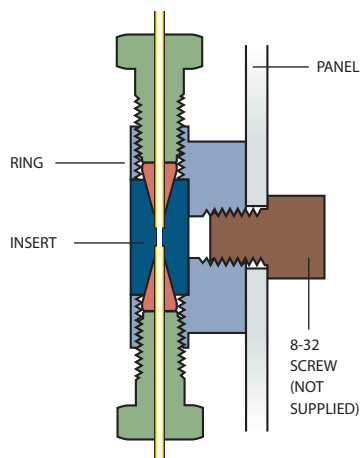
Micro-unions, -tees, -crosses, and -Y's have a unique two-piece design which allows us to provide an extremely small bore in a conventional ferrule and nut fitting. The actual connection area is separated from the nut threads, with the ferrule detail in a metal or polymer insert and the threads machined into a stainless steel or polymer ring. Since the insert has a much smaller diameter than a standard one-piece fitting, it can be drilled with much shorter tools; and, since a shorter drill has less tendency to wander or break, holes as small as .006" (0.15 mm) can be machined with the same high degree of concentricity found in all Valco fittings.

Valco microvolume fittings make it possible to couple 100 micron ID capillary GC, HPLC, or CZE columns without special nuts and ferrules. A stainless ring with one of the plastic

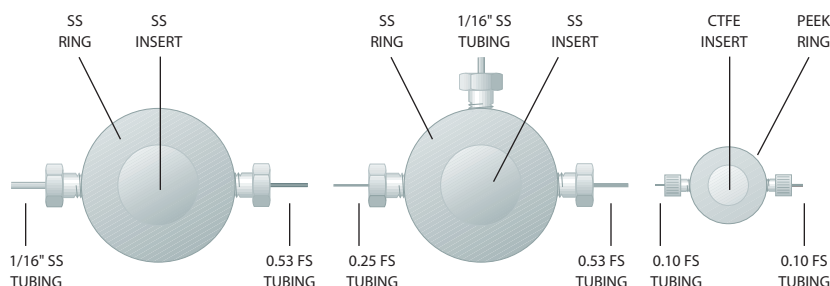
inserts provides electrical insulation within the insert, while the PEEK ring achieves total isolation.

The ring containing the threads is made from PEEK or stainless steel. Inserts are made of stainless steel, Hastelloy C, Titanium, PEEK, or CTFE. PEEK rings are not as robust as stainless steel, and are not usable above 75°C. The stainless steel ring with a metal insert can operate at up to 10,000 psi for HPLC or SFC.

All standard Valco zero dead volume reducing ferrules (ZRF, FS, and FSR) will work in these fittings. They are uniquely designed to fill the void between the fitting pilot and the smaller tubing OD, eliminating any dead volume in the fitting. (Reducing ferrules such as Valco's RF series should be avoided, since they leave dead volume.)



Panel mounting



**Stainless to fused silica union**  
1/16" fittings

**Make-up adapter**  
1/16" fittings

**CZE union**  
1/32" fittings

### MORE INFORMATION

FS fused silica  
adapters..... page 16  
FSR fused silica  
adapters..... 17  
ZRF internal reducing  
ferrules ..... 14

Ferrules  
Metal..... 12  
Polymeric ..... 13

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

## Microvolume Connectors

## 1/32" Microvolume connectors

Includes ring, nuts, and ferrules. With metal inserts: ferrules are the same material as the insert, and ring and nuts are stainless steel. With polymer inserts: ferrules are the same material as the insert, and ring and nuts are PEEK.

Insert Material:	Stainless steel		Hastelloy C		Titanium		PEEK		CTFE	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
<b>0.15 mm bore</b>										
Union	MU.5XCS6		MU.5XCHC		MU.5XCTI		MU.5XCPK		MU.5XCKF	
Tee	MT.5XCS6		MT.5XCHC		MT.5XCTI		MT.5XCPK		MT.5XCKF	
Y	MY.5XCS6		MY.5XCHC		MY.5XCTI		MY.5XCPK		MY.5XCKF	
Cross	MX.5XCS6		MX.5XCHC		MX.5XCTI		MX.5XCPK		MX.5XCKF	
<b>0.25 mm bore</b>										
Union	MU.5CS6		MU.5CHC		MU.5CTI		MU.5CPK		MU.5CKF	
Tee	MT.5CS6		MT.5CHC		MT.5CTI		MT.5CPK		MT.5CKF	
Y	MY.5CS6		MY.5CHC		MY.5CTI		MY.5CPK		MY.5CKF	
Cross	MX.5CS6		MX.5CHC		MX.5CTI		MX.5CPK		MX.5CKF	

## 1/16" Microvolume connectors

Includes ring, nuts, and ferrules. With metal inserts: ferrules are the same material as the insert, and ring and nuts are stainless steel. With polymer inserts: ferrules are the same material as the insert, and ring and nuts are PEEK.

Insert Material:	Stainless steel		Hastelloy C		Titanium		PEEK		CTFE	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
<b>0.15 mm bore</b>										
Union	MU1XCS6		MU1XCHC		MU1XCTI		MU1XCPK		MU1XCKF	
Tee	MT1XCS6		MT1XCHC		MT1XCTI		MT1XCPK		MT1XCKF	
Y	MY1XCS6		MY1XCHC		MY1XCTI		MY1XCPK		MY1XCKF	
Cross	MX1XCS6		MX1XCHC		MX1XCTI		MX1XCPK		MX1XCKF	
<b>0.25 mm bore</b>										
Union	MU1CS6		MU1CHC		MU1CTI		MU1CPK		MU1CKF	
Tee	MT1CS6		MT1CHC		MT1CTI		MT1CPK		MT1CKF	
Y	MY1CS6		MY1CHC		MY1CTI		MY1CPK		MY1CKF	
Cross	MX1CS6		MX1CHC		MX1CTI		MX1CPK		MX1CKF	

## Replacement components

Description	1/32" connectors		1/16" connectors	
	Prod No	Price	Prod No	Price
SS ring for union, tee, or cross	MRX.5S6		MRX1S6	
SS ring for Y	MRY.5S6		MRY1S6	
PEEK ring for union, tee, or cross	MRX.5PK		MRX1PK	
PEEK ring for Y	MRY.5PK		MRY1PK	
Nuts for SS ring	ZN.5		ZN1	
Nuts for PEEK ring	ZN.5FPK		ZN1FPK	

Inserts for any connector:

To order an insert, add an "I" after the "M" in the product number, and deduct \$5 from the connector price.

For example, to order an insert for a 1/16" microvolume union MU1CS6, order part number MIU1CS6.

## OPTIONS

0.50, 0.75, and 1.0 mm bores are available in most materials and configurations.

## NANOVOLUME CONNECTIONS

For 0.10 mm (100 µm) bore fittings, see pages 57- 60.

## Unions

Unions join two pieces of tubing of the same OD. Select the union with the bore that matches the ID of the tubing. If the IDs are different, choose the union with a bore which matches the smaller tube bore. Standard material is 300 series stainless steel.

- **Internal** unions have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- **External** unions have male threads, requiring a nut with internal threads.
- **External/internal** unions have male threads on one end and female threads on the other, for connecting a standard zero dead volume fitting to an existing tube which already has an external nut made up on it.

Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. In sizes larger than 1/8", external fittings are generally easier to make up because of less thread friction.

**Bulkhead** versions can be mounted through an instrument panel or on a bracket. The fitting body is undercut so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged environments. Typically the mounting nut goes inside the instrument, so that the long threaded portion will be out of sight. In the external/internal bulkhead unions, the mounting nut is on the side with the Valco internal fitting.

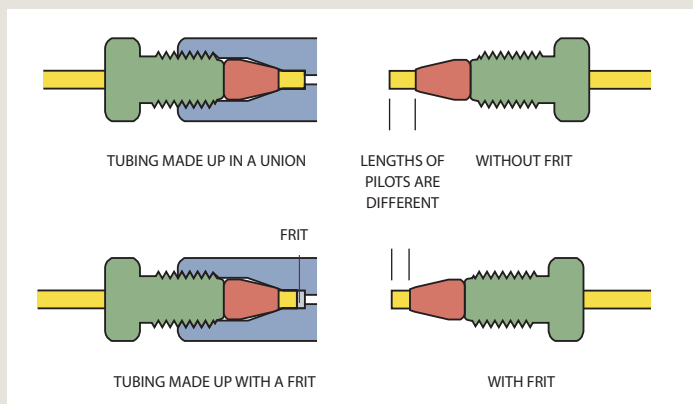


### TECH TIP

Filtering capability can be added to a union by inserting a screen or frit into it before making up the fittings. However, when a fitting detail has a screen or frit in it, the pilot depth is reduced, so that the ferrule makes up closer to the tube end than it otherwise would. If that tube is used in any other Valco fitting, it will introduce unswept volume. Our filter design takes this into account, allowing our fittings to remain truly interchangeable.

Filters . . . . . pages 50-52

Frits and screens. . . . . 53



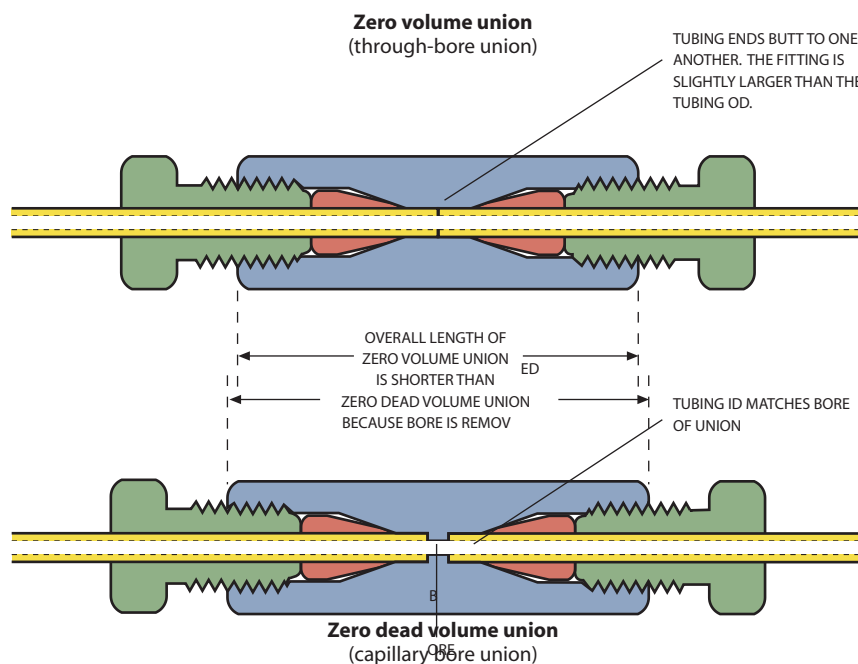
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



### Zero Volume vs. Zero Dead Volume

A true zero volume fitting is one in which no part of the fitting actually becomes a part of the flow path. The only Valco fittings which fit this description are our through-bore unions, which allow tubing to butt end-to-end. (So these are only zero volume if the tube ends are perfectly square.)

All other fittings are designed with zero *dead* volume: that is, there is no volume introduced by the fitting which is not cleanly swept.



#### MORE INFORMATION

Reducing unions to connect two tubes with different ODs . . . . . p 29-31  
Unions with 1/4-28 fittings . . . . . 72

#### TECH TIP

##### Through-bore Union Installation

Because the tubing will pass all the way through a through-bore union, we suggest making up the first tube in a standard Valco fitting to establish the proper length of tubing extending beyond the ferrule. Install this made-up connection in the through-bore union; then the second tube can be butted against it for a zero volume connection.

## Unions

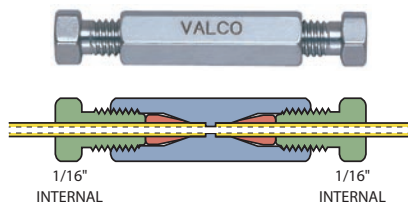
### Internal unions – stainless steel

Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

#### Standard internal unions

##### Tubing

OD	Bore	Prod No	Price
1/32"	0.15 mm	ZU.5XC	
	0.25 mm	ZU.5	
	0.50 mm	ZU.5L	
	1/32"	ZU.5T	
1/16"	0.15 mm	ZU1XC	
	0.25 mm	ZU1C	
	0.50 mm	ZU1M	
	0.75 mm	ZU1	
	1.0 mm	ZU1L	
	1/16"	ZU1T	
1/8"	0.75 mm	ZU2	
	2.0 mm	ZU2L	
	1/8"	ZU2T	
1/4"	0.75 mm	ZU4	
	4.6 mm	ZU4L	
	1/4"	ZU4T	



**Internal union – metal**  
Standard bore version  
(ZU1)  
Ends of tubing seat squarely  
at bottoms of fitting details

#### Bulkhead internal unions

##### Tubing

OD	Bore	Prod No	Price	Bulkhead panel hole diameter
1/32"	0.15 mm	ZBU.5XC		5/16"
	0.25 mm	ZBU.5		5/16"
	0.50 mm	ZBU.5L		5/16"
	1/32"	ZBU.5T		5/16"
1/16"	0.15 mm	ZBU1XC		5/16"
	0.25 mm	ZBU1C		5/16"
	0.50 mm	ZBU1M		5/16"
	0.75 mm	ZBU1		5/16"
	1.0 mm	ZBU1L		5/16"
	1/16"	ZBU1T		5/16"
1/8"	0.75 mm	ZBU2		7/16"
	2.0 mm	ZBU2L		7/16"
	1/8"	ZBU2T		7/16"
1/4"	0.75 mm	ZBU4		5/8"
	4.6 mm	ZBU4L		5/8"
	1/4"	ZBU4T		5/8"



**Bulkhead internal union – metal**  
(ZBU1)

#### MORE INFORMATION

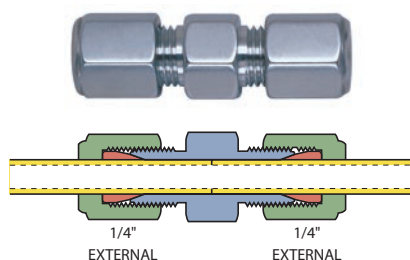
Internal unions, high  
pressure PEEK ... p 57,65

#### For special materials and/or smaller bores:

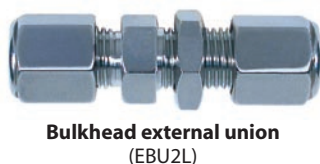
Microvolume connectors  
offer a complete range of  
1/32" and 1/16" unions  
in various metals and  
polymers, with bore sizes  
ranging from .006" (0.15  
mm) to .040" (1.0 mm).  
Refer to pages 22-23.

0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm

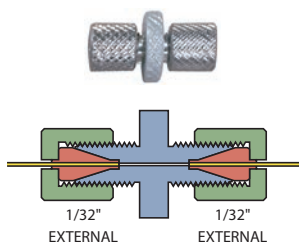
5/16"	=	.312"	=	7.9 mm
3/8"	=	.375"	=	9.5 mm
7/16"	=	.437"	=	11.1 mm



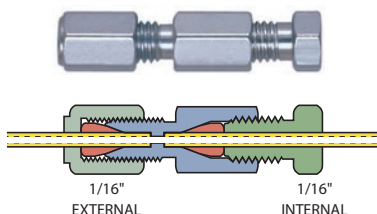
**External union**  
Through-bore version  
(EU4T)  
Ends of tubing butt together



**Bulkhead external union**  
(EBU2L)



**1/32" external union**  
(EU.5)  
For use with GC capillary columns



**External/internal union**  
Standard bore  
(EZU1)  
Adapts existing external fittings  
to Valco zero volume internal fittings



**Bulkhead external/internal union**  
(EZBU1)

### External unions

Standard material is 300 series stainless. Also available in Hastelloy C and gold-plated stainless.

*Note:* Because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. We recommend the use of external/internal unions (below) when connecting to an installed external nut.

Tubing OD	Bore	Standard		Bulkhead		Bulkhead panel hole diameter
		Prod No	Price	Prod No	Price	
1/16"	See note above					
1/8"	1.0 mm	EU2		—		—
	2.0 mm	EU2L		EBU2L		5/16"
	1/8"	EU2T		EBU2T		5/16"
1/4"	2.0 mm	EU4		EBU4		7/16"
	4.6 mm	EU4L		EBU4L		7/16"
	1/4"	EU4T		EBU4T		7/16"

### External unions – 1/32" ultra low mass

The 1/32" external union is specially designed for use with capillary columns in GC. It is very low mass and does not require wrenches to seal. Use *only* with one-piece fused silica adapters, since metal ferrules will distort the detail. Order fused silica adapters separately (*page 16*). Standard material is 300 series stainless.

Bore	Prod No	Price
0.25 mm	EU.5	
0.50 mm	EU.5L	
1/32"	EU.5T	

### External/internal unions

Standard material is 300 series stainless. Also available in Hastelloy C and gold-plated stainless.

Tubing OD	Bore	Standard		Bulkhead		Bulkhead panel hole diameter
		Prod No	Price	Prod No	Price	
1/32"	0.25 mm	EZU.5		—		—
	0.50 mm	EZU.5L		—		—
1/16"	0.25 mm	EZU1C		EZBU1C		5/16"
	0.50 mm	EZU1M		EZBU1M		5/16"
	0.75 mm	EZU1		EZBU1		5/16"
	1/16"	EZU1T		EZBU1T		5/16"
1/8"	1.0 mm	EZU2		EZBU2		7/16"
	2.0 mm	EZU2L		EZBU2L		7/16"
	1/8"	EZU2T		EZBU2T		7/16"

## Reducing Unions

Reducing unions join two tubes of different outside diameters. Standard material is 300 series stainless.

- Internal reducing unions have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- External reducing unions have male threads, requiring a nut with internal threads.
- External/internal and internal/external reducing unions have male threads on one end and female threads on the other. We recommend the use of external/internal fittings when connecting to an existing external nut.

Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls,

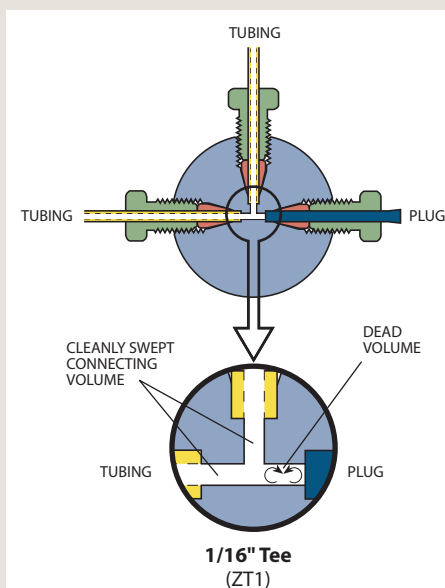
they are not as durable as 1/16" internal fittings. In sizes larger than 1/8", external fittings are generally easier to make up because of less thread friction.

**Bulkhead** versions can be mounted through an instrument panel or on a bracket. The fitting body is undercut so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged environments. Typically the mounting nut goes inside the instrument, so that the long threaded portion will be out of sight. In the external/internal bulkhead unions, the mounting nut is on the side with the Valco internal fitting.



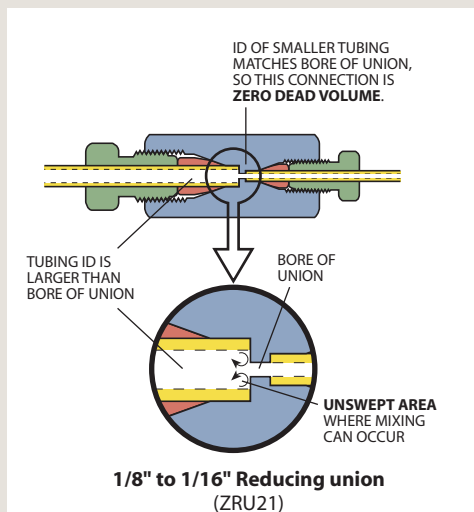
### DEAD VOLUME

"Dead volume" is created in obvious situations such as the one shown.

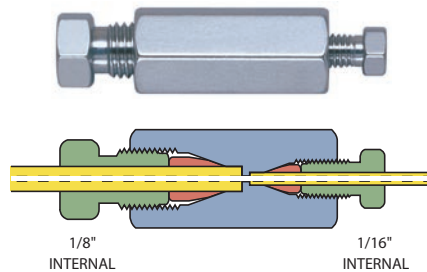


### UNSWEPT VOLUME

Even in connections which are by most definitions "zero dead volume", unswept volume may be created where large ID transitions occur. The amount of mixing depends on the amount of mismatch in the IDs.







**Internal reducing union – metal**  
Standard bore  
(ZRU21)

### Internal reducing unions – stainless steel

These unions connect two sizes of tubing, using zero dead volume internal fittings on each end. In the bulkhead version, the bulkhead nut is on the side with smaller tubing.

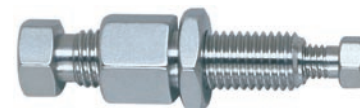
Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

#### Standard internal reducing unions

Tubing OD	Bore	Prod No	Price
1/16" to 1/32"	0.15 mm	ZRU1.5XC	
	0.25 mm	ZRU1.5	
	0.50 mm	ZRU1.5L	
	1/32"	ZRU1.5T	
1/8" to 1/32"	0.25 mm	ZRU2.5	
	0.50 mm	ZRU2.5L	
	1/32"	ZRU2.5T	
1/8" to 1/16"	0.25 mm	ZRU21C	
	0.75 mm	ZRU21	
	1/16"	ZRU21T	
1/4" to 1/16"	0.25 mm	ZRU41C	
	0.75 mm	ZRU41	
	1/16"	ZRU41T	
1/4" to 1/8"	0.75 mm	ZRU42	
	2.0 mm	ZRU42L	
	1/8"	ZRU42T	

#### Bulkhead internal reducing unions

Tubing OD	Bore	Prod No	Price	Bulkhead panel hole diameter
1/16" to 1/32"	0.25 mm	ZBRU1.5		5/16"
	0.50 mm	ZBRU1.5L		5/16"
	1/32"	ZBRU1.5T		5/16"
1/8" to 1/32"	0.25 mm	ZBRU2.5		5/16"
	0.50 mm	ZBRU2.5L		5/16"
	1/32"	ZBRU2.5T		5/16"
1/8" to 1/16"	0.25 mm	ZBRU21C		5/16"
	0.75 mm	ZBRU21		5/16"
	1/16"	ZBRU21T		5/16"
1/4" to 1/16"	0.25 mm	ZBRU41C		7/16"
	0.75 mm	ZBRU41		7/16"
	1/16"	ZBRU41T		7/16"
1/4" to 1/8"	0.75 mm	ZBRU42		7/16"
	2.0 mm	ZBRU42L		7/16"
	1/8"	ZBRU42T		7/16"



**Bulkhead internal reducing union – metal**  
(ZBRU21)

### MORE INFORMATION

Internal reducing unions,  
high pressure  
PEEK ..... page 65  
External/internal  
reducing unions ..... 31  
Internal/external  
reducing unions ..... 31  
Standard unions ..... 26  
Unions with  
1/4-28 fittings ..... 72

0.25 mm = .010"  
0.50 mm = .020"  
0.75 mm = .030"

1.0 mm = .040"  
1.5 mm = .060"  
2.0 mm = .080"

4.6 mm = .180"  
6.0 mm = .236"  
6.4 mm = .253"

7.0 mm = .275"  
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm  
1/16" = 1.6 mm  
1/8" = 3.2 mm

1/4" = 6.4 mm  
3/8" = 9.5 mm  
1/2" = 12.7 mm

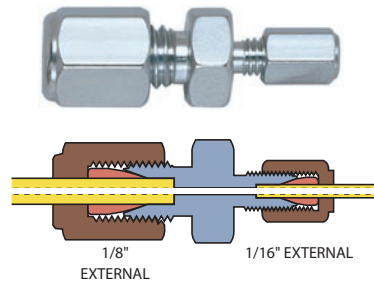
## Reducing Unions

### External reducing unions

These unions connect two sizes of tubing, using external fittings on each end. Standard material is 300 series stainless. Custom bulkhead versions are available in OEM quantities.

#### Standard external reducing unions

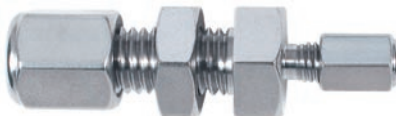
Tubing OD	Bore	Prod No	Price
1/8" to 1/16"	0.75 mm	ERU21	
	1.00 mm	ERU21L	
	1/16"	ERU21T	
1/4" to 1/16"	0.75 mm	ERU41	
	1/16"	ERU41T	
1/4" to 1/8"	1.0 mm	ERU42	
	2.0 mm	ERU42L	
	1/8"	ERU42T	



**External reducing union**  
Standard bore  
(ERU21)

#### Bulkhead external reducing unions

Tubing OD	Bore	Prod No	Price	Bulkhead panel hole diameter
1/8" to 1/16"	1.0 mm	EBRU12L		5/16"
	1/16"	EBRU12T		5/16"
1/4" to 1/16"	1.0 mm	EBRU14L		7/16"
	1/16"	EBRU14T		7/16"
1/4" to 1/8"	2.0 mm	EBRU24L		7/16"



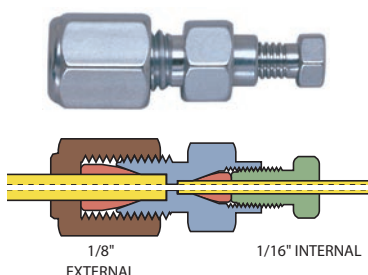
**Bulkhead external reducing union**  
(EBRU12L)

#### TECH TIP

**Note:** Because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. We recommend the use of 1/16" internal fittings when possible.

0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm

5/16"	=	.312"	=	7.9 mm
3/8"	=	.375"	=	9.5 mm
7/16"	=	.437"	=	11.1 mm



**External/internal reducing union**  
Standard bore  
(EZRU21)



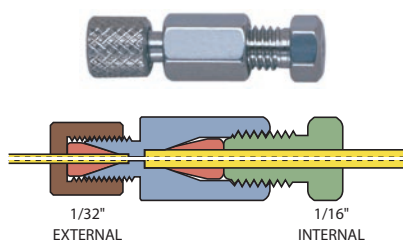
**Bulkhead external/internal reducing union**  
(EZBRU21)

### External/internal reducing unions

In these reducing unions, the larger size tubing is made up with an external fitting and the smaller size tubing is made up with an internal fitting. In the bulkhead version, the bulkhead nut is on the side with the internal fitting. Other configurations, such as an external nut on the locking nut side, are available on special request.

Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

Tubing OD	Bore	Standard		Bulkhead		Bulkhead panel hole diameter
		Prod No	Price	Prod No	Price	
1/16" to 1/32"	0.25 mm	EZRU1.5		—		—
	0.50 mm	EZRU1.5L		EZBRU1.5L		5/16"
	1/32"	EZRU1.5T		EZBRU1.5T		5/16"
1/8" to 1/32"	0.25 mm	EZRU2.5		—		—
	0.50 mm	EZRU2.5L		EZBRU2.5L		5/16"
	1/32"	EZRU2.5T		EZBRU2.5T		5/16"
1/8" to 1/16"	0.25 mm	EZRU21C		—		—
	0.75 mm	EZRU21		EZBRU21		5/16"
	1/16"	EZRU21T		EZBRU21T		5/16"
1/4" to 1/16"	0.25 mm	EZRU41C		—		—
	0.75 mm	EZRU41		EZBRU41		7/16"
	1/16"	EZRU41T		EZBRU41T		7/16"
1/4" to 1/8"	1.0 mm	EZRU42		EZBRU42		7/16"
	2.0 mm	EZRU42L		EZBRU42L		7/16"
	1/8"	EZRU42T		EZBRU42T		7/16"



**Internal/external reducing union**  
Standard bore  
(EZRU.51)



**Bulkhead internal/external reducing union**  
(EZBRU.51)

### Internal/external reducing unions

These reducing unions are the opposite of the ones above. The larger size tubing is made up with an internal fitting and the smaller size tubing is made up with an external fitting. In the bulkhead version, the bulkhead nut is on the side with the internal fitting. Standard material is 300 series stainless.

Internal/external reducing unions are typically used to connect 1/16" stainless steel tubing to fused silica tubing.

Only polymeric ferrules should be used with 1/32" external details – metal ferrules will distort them. These unions include a stainless steel ferrule for the 1/16" SS tube, but because of the variety of fused silica ODs and corresponding ferrules, a 1/32" fused silica adapter must be ordered separately. (See page 16.)

Tubing OD	Bore	Standard		Bulkhead		Bulkhead panel hole diameter
		Prod No	Price	Prod No	Price	
1/16" to 1/32"	0.25 mm	EZRU.51		EZBRU.51		5/16"
	0.50 mm	EZRU.51L		EZBRU.51L		5/16"
	1/32"	EZRU.51T		EZBRU.51T		5/16"

#### MORE INFORMATION

Fused silica adapters... page 16-17  
Polymeric ferrules ..... 13  
External unions..... 27  
Internal reducing unions ..... 29  
Internal unions ..... 26

## Tees and Crosses

### Tees

Tees connect three lines. Standard material is 300 series stainless. Also available in Hastelloy C, gold plated stainless, and titanium.

Tubing OD	Bore	Prod No	Price
1/32"	0.25 mm	ZT.5	
	0.50 mm	ZT.5L	
1/16"	0.25 mm	ZT1C	
	0.50 mm	ZT1M	
	0.75 mm	ZT1	
	1.00 mm	ZT1L	
1/8"	0.75 mm	ZT2	
	2.00 mm	ZT2L	
1/4"	1.00 mm	ZT4	
	4.60 mm	ZT4L	



### MORE INFORMATION

PEEK tees... pages 57, 64  
PEEK crosses ..... 57, 64

### Crosses

Crosses connect four lines. Standard material is 300 series stainless. Also available in Hastelloy C, gold plated stainless, and titanium.

Tubing OD	Bore	Prod No	Price
1/32"	0.25 mm	ZX.5	
	0.50 mm	ZX.5L	
1/16"	0.25 mm	ZX1C	
	0.50 mm	ZX1M	
	0.75 mm	ZX1	
	1.00 mm	ZX1L	
1/8"	0.75 mm	ZX2	
	2.00 mm	ZX2L	
1/4"	1.00 mm	ZX4	
	4.60 mm	ZX4L	



### SPECIAL METALS AND/OR SMALLER BORES

See microvolume connectors: 1/32" and 1/16" tees, crosses, Y's, and unions in various metals and polymers, with smaller bores.

Microvolume connectors ....pp 22-23  
High pressure PEEK connectors . . 63-66  
Nanovolume connectors ..... 57-61

### TECH TIP

To join tubes of different ODs, use the fitting sized for the largest tube along with IZR reducers for the smaller tubes.

IZR reducer. .... page 34

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

### 1/16" Manifolds

1/16" manifolds connect 4 - 16 inlet lines to a single outlet, and are often used to connect the outlets from several columns to a single detector. The unique angled entry of our design reduces dispersion to a minimum. Available with 1.00 mm inlet/outlet bore. Standard materials are PEEK or 300 series stainless.



	Inlet bore	Outlet bore	Material	Prod No	Price
4 inlets	0.25 mm	0.75 mm	Stainless steel	Z4M1	
	0.25 mm	0.75 mm	PEEK	Z4M1PK	
6 inlets	0.25 mm	0.75 mm	Stainless steel	Z6M1	
	0.25 mm	0.75 mm	PEEK	Z6M1PK	
8 inlets	0.25 mm	0.75 mm	Stainless steel	Z8M1	
	0.25 mm	0.75 mm	PEEK	Z8M1PK	
10 inlets	0.25 mm	0.75 mm	Stainless steel	Z10M1	
	0.25 mm	0.75 mm	PEEK	Z10M1PK	
12 inlets	0.25 mm	0.75 mm	Stainless steel	Z12M1	
	0.25 mm	0.75 mm	PEEK	Z12M1PK	
14 inlets	0.25 mm	0.75 mm	Stainless steel	Z14M1	
	0.25 mm	0.75 mm	PEEK	Z14M1PK	
16 inlets	0.40 mm	0.75 mm	PEEK	Z16M1PK	

### 1/8" Manifolds

1/8" manifolds connect 4 - 12 inlet lines to a single outlet, and are typically used in a gas distribution system to minimize the number of fitting connections. A manifold pipe fitting version is also available. (See page 37.) Standard material is 300 series stainless steel.

	Inlet bore	Outlet bore	Prod No	Price
4 inlets	2.00 mm	2.00 mm	Z4M2	
6 inlets	2.00 mm	2.00 mm	Z6M2	
8 inlets	2.00 mm	2.00 mm	Z8M2	
10 inlets	2.00 mm	2.00 mm	Z10M2	
12 inlets	2.00 mm	2.00 mm	Z12M2	



#### TECH TIP

A manifold used with an SD flowpath multiposition valve allows HPLC column selection with a single valve. See page 139 for an illustration.

SD UW valves. . . . .pg 132



## Internal Reducers

### NEW Internal reducers

for 360 µm tubing

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume. The same patented design as our larger internal reducers (below). Both versions have a stainless steel body.

Tubing OD	Nut/ferrule material	Prod No	Price
1/32" to 360 µm	Stainless	C360IZR.5S6	
	PEEK	C360IZR.5S6PKG	

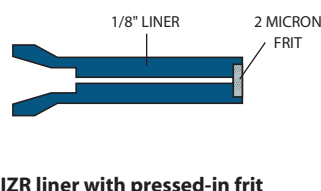
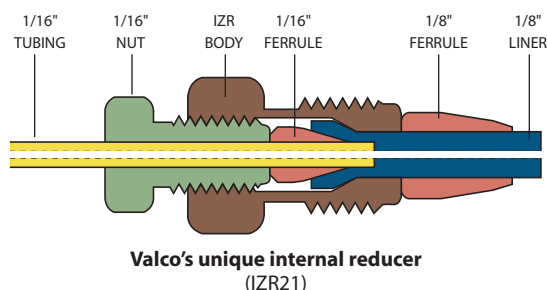
### Internal reducers

Valco's patented internal reducer (IZR) allows smaller tubing to be used in valves with fitting details for larger tubing, forming a positive leak-free seal with zero dead volume. The small line from your system goes directly into the IZR and the sample goes directly into the valve, without the short pieces of connecting tubing required if a reducing union was used instead. (A reducing ferrule would also work, but makes a seal of less integrity.) Once the fitting is installed, only one wrench is required to remove and reinstall it.

A second version has a 2 micron stainless steel frit pressed into the end of the liner, adding filtering capability. However, we suggest using these only as a final or backup filter, with a standard filter (see page 52) as the primary filter. Because IZR's have a much smaller surface area than the standard filter, they tend to plug too often if used in a stand-alone capacity.

Patent No. 4,173,363.

Tubing OD	Bore	Without frit		With 2µ frit	
		Prod No	Price	Prod No	Price
1/16" to 1/32"	0.25 mm	IZR1.5		IZR1.5F	
	0.50 mm	IZR1.5L		IZR1.5LF	
	1/32"	IZR1.5T		—	
1/8" to 1/16"	0.25 mm	IZR21C		IZR21CF	
	0.50 mm	IZR21		IZR21F	
	1.00 mm	IZR21L		IZR21LF	
	1/16"	IZR21T		—	
1/4" to 1/16"	1.00 mm	IZR41		IZR41F	
1/4" to 1/8"	1.00 mm	IZR42		IZR42F	
1/4" to 1/8"	2.00 mm	IZR42L		IZR42LF	



0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



## External to Internal Adapters

**External to internal adapters (injector/detector adapters)**

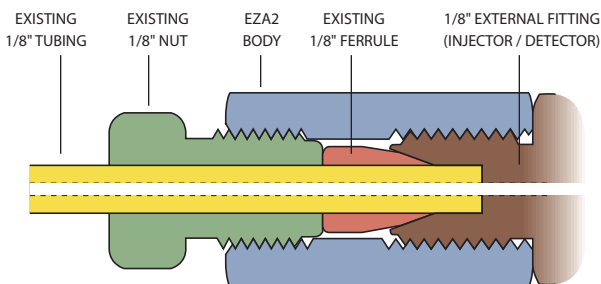
EZAs (external adapters) and EZRs (external reducers) adapt an external tee or union or the external type fittings common on injectors and detectors to Valco zero dead volume connections. Since EZAs are commonly used to connect an external fitting to an existing tube already made up with a Valco internal fitting, a nut and ferrule are not included.

Only one wrench is required to change tubes after the fitting is made up. While an external to internal union or reducing union plus a length of tubing can accomplish the same thing, these adapters do the trick with a single fitting.

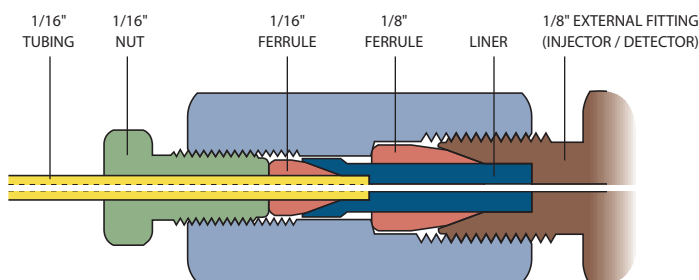
Standard material is 300 series stainless. The EZA does not include a nut or ferrule. The EZR includes a liner, one nut, and two ferrules.

Patent No. 4,173,363

<i>Description</i>	<i>Bore</i>	<i>Prod No</i>	<i>Price</i>
<b>External to internal adapters</b>			
1/16" ext. to 1/16" int.	–	EZA1	
1/8" ext. to 1/8" int.	–	EZA2	
<b>External reducers</b>			
1/16" ext. to 1/32" int.	0.25 mm 1/32"	EZR1.5 EZR1.5T	
1/8" ext. to 1/32" int.	0.25 mm	EZR2.5	
1/8" ext. to 1/16" int.	0.50 mm 1/16"	EZR21 EZR21T	
1/4" ext. to 1/16" int.	1.00 mm 1/16"	EZR41 EZR41T	
1/4" ext. to 1/8" int.	1.00 mm 1/8"	EZR42 EZR42T	



**External to internal adapter (EZA2)**



**External to internal reducer (EZR21)**

**MORE INFORMATION**

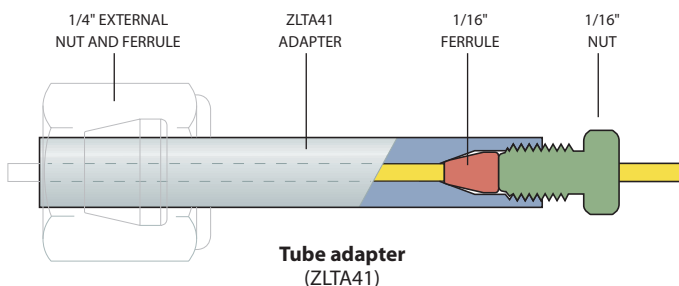
Ferrules ..... page 12  
Nuts ..... 10

## Special Fittings

### Tube adapters

These external adapters are ideal for connecting 1/16" tubing to a detector or injector with a 1/4" fitting. The shorter size is used with 1/4" external fittings while the longer works with 1/4" internal or external fittings. (1/16" nut and ferrule are included; 1/4" nut and ferrule are not.) Standard material is 300 series stainless.

Description	Bore	Prod No	Price
1/4" to 1/16"			
0.975" long	1/16"	ZTA41	
2.075" long	1/16"	ZLTA41	
2.800" long	1/16"	ZXLTA41	

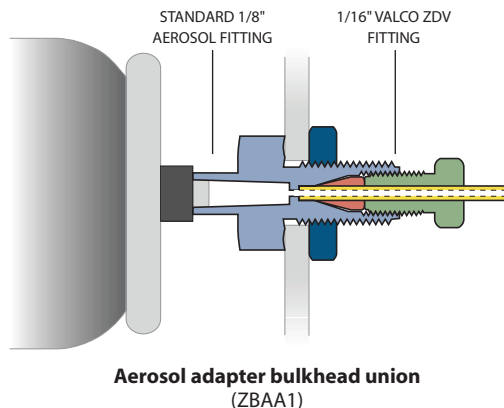


### Aerosol adapter bulkhead union

This unique fitting provides an easy, direct method of connecting the nozzle of a standard aerosol can to a 1/16" Valco zero dead volume fitting.

As with all Valco bulkhead fittings, the flange is undercut to act as a "lock nut" against the instrument wall. Standard material is 300 series stainless.

Description	Prod No	Price
Aerosol adapter bulkhead union	ZBAA1	



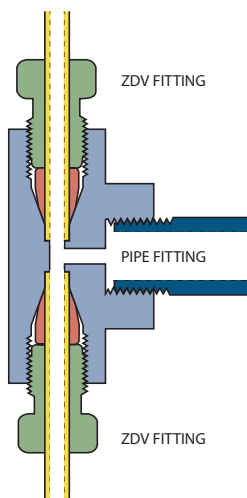
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

### Manifold pipe adapters

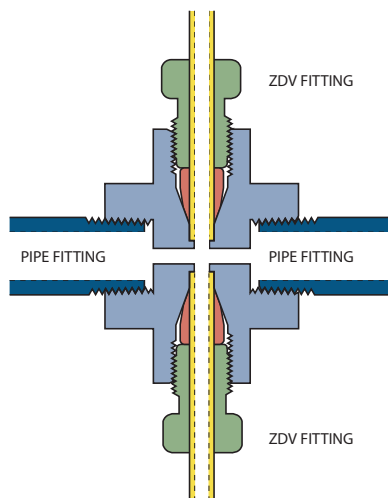
These manifolds, which go from one or two pipe fittings to three or more Valco zero dead volume fittings, minimize the number of connections between a regulator and the various carrier gas lines in a chromatographic system. The models with two pipe fittings go a step further, allowing the support of a gauge, a second regulator, or a valve leading to a separate system. Additional Valco zero dead volume fittings can be machined on a special order basis. Standard material is 300 series stainless. Also available in Hastelloy C and titanium by special order.



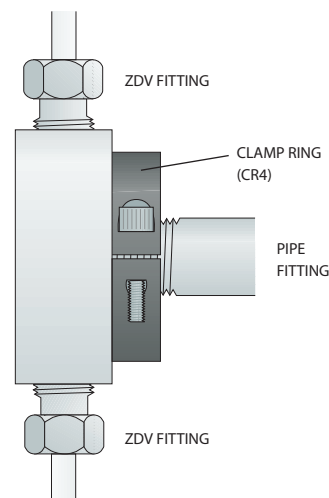
Description	Bore	Prod No	Price
One 1/8" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP1Z3M21	
three 1/8" ZDV fittings	2.0 mm	FP1Z3M22	
three 1/4" ZDV fittings	4.6 mm	FP1Z3M24	
One 1/4" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP1Z3M41	
three 1/8" ZDV fittings	2.0 mm	FP1Z3M42	
three 1/4" ZDV fittings	4.6 mm	FP1Z3M44	
Two 1/8" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP2Z3M21	
three 1/8" ZDV fittings	2.0 mm	FP2Z3M22	
three 1/4" ZDV fittings	4.6 mm	FP2Z3M24	
Two 1/4" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP2Z3M41	
three 1/8" ZDV fittings	2.0 mm	FP2Z3M42	
three 1/4" ZDV fittings	4.6 mm	FP2Z3M44	



**One pipe fitting**  
to Valco ZDV fittings



**Two pipe fittings**  
to Valco ZDV fittings



**Adapter with optional**  
**mounting clamp ring**

## Pipe Adapters

### Male pipe to Valco internal adapters

Male pipe adapters make a minimum volume connection from the female pipe fittings on pressure gauges and regulators to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.



Description	Bore	Prod No	Price
1/8" NPT male to:			
1/16" ZDV fitting	1.0 mm	PZA21	
1/16" ZDV fitting	1/16"	PZA21T	
1/8" ZDV fitting	1.0 mm	PZA22	
1/4" NPT male to:			
1/16" ZDV fitting	1.0 mm	PZA41	
1/8" ZDV fitting	1.0 mm	PZA42	
1/8" ZDV fitting	2.0 mm	PZA42L	
1/4" ZDV fitting	4.6 mm	PZA44L	
1/2" NPT male to:			
1/16" ZDV fitting	1.0 mm	PZA81	
1/8" ZDV fitting	1.0 mm	PZA82	
1/8" ZDV fitting	2.0 mm	PZA82L	
1/4" ZDV fitting	4.6 mm	PZA84L	

### Female pipe to Valco internal adapters

Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.

Description	Bore	Prod No	Price
1/8" NPT female to:			
1/16" ZDV fitting	1.0 mm	FPZA21	
1/8" ZDV fitting	1.0 mm	FPZA22	
1/8" ZDV fitting	2.0 mm	FPZA22L	
1/4" NPT female to:			
1/16" ZDV fitting	1.0 mm	FPZA41	
1/8" ZDV fitting	1.0 mm	FPZA42	
1/8" ZDV fitting	2.0 mm	FPZA42L	
1/4" ZDV fitting	4.6 mm	FPZA44L	
1/2" NPT female to:			
1/16" ZDV fitting	1.0 mm	FPZA81	
1/8" ZDV fitting	1.0 mm	FPZA82	
1/8" ZDV fitting	2.0 mm	FPZA82L	
1/4" ZDV fitting	4.6 mm	FPZA84L	

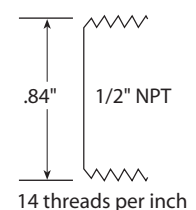
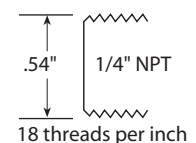
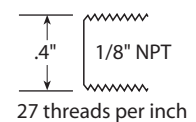


### MORE INFORMATION

Our manifold pipe adapters on page 37 allow you to connect one or two pipe fittings to three Valco zero dead volume fittings.

### TECH TIP

NPT, National Pipe Thread, is a standard developed a long time ago by people without rulers. 1/8" NPT is nowhere close to 1/8"! Measure the diameter of the fitting across the narrow end. You can also count the number of threads in a 1" section. Then look at the diagrams below to determine the correct size needed.





### Male pipe to Valco external adapters

Male pipe adapters make a minimum volume connection from the female pipe fittings typically found on pressure gauges and regulators to Valco external fittings. Standard material is 300 series stainless.

*Note:* We do not manufacture adapters with 1/16" external fittings because they have very thin, easily distorted walls. We recommend use of the PZAs on the facing page.

Description	Bore	Prod No	Price
1/8" NPT male to:			
1/8" external fitting	2.0 mm	PEA22	
1/4" external fitting	4.6 mm	PEA24	
1/4" NPT male to:			
1/8" external fitting	2.0 mm	PEA42	
1/4" external fitting	4.6 mm	PEA44	
1/2" NPT male to:			
1/8" external fitting	2.0 mm	PEA82	
1/4" external fitting	4.6 mm	PEA84	

### TECH TIP

Because of their dead volume and the risk of thread leaks, pipe fittings are a poor choice for trace gas analysis. Thread sealants, particularly PTFE tape, cannot boost their performance to adequate levels. For trace gas applications, choose Valco zero dead volume fittings with gold-plated stainless ferrules. (See page 12.)

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

### Female pipe to Valco external adapters

Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco external fittings. Standard material is 300 series stainless.

*Note:* We do not manufacture adapters with 1/16" external fittings because they have very thin, easily distorted walls. We recommend use of the FPZAs on the facing page.

Description	Bore	Prod No	Price
1/8" NPT female to:			
1/8" external fitting	2.0 mm	FPEA22	
1/4" external fitting	4.6 mm	FPEA24	
1/4" NPT female to:			
1/8" external fitting	2.0 mm	FPEA42	
1/4" external fitting	4.6 mm	FPEA44	
1/2" NPT female to:			
1/8" external fitting	2.0 mm	FPEA82	
1/4" external fitting	4.6 mm	FPEA84	





## Syringe Adapters

**NEW** Zero dead volume fill ports

The ZVISF-1 is a unique fill port fitting designed so that a leaktight seal is formed against the face of the bottom of the fitting detail instead of at the end of an angular ferrule, resulting in a true zero dead volume connection with no carry over or sample loss. The polymer bushing snaps into the knurled PEEK nut, providing the convenience of a one-piece fitting. An ultrathin metal sleeve surrounds and supports the portion of the bushing which extends into the pilot of the fitting detail, preventing the bushing from mushrooming and getting stuck in the pilot as the fitting is tightened.

For use with 22 gauge blunt tip needle.

*Description**Prod No**Price***For high pressure 1/16" Cheminert injectors with polymeric stators (C2, C3, C4, and C52 series)**

Most applications

PFA bushing

ZVISF-1PFAH

High throughput applications

High density polyethylene bushing

ZVISF-1PEH

**For low pressure 1/16" Cheminert injectors, fittings, and most Valco injectors**

Most applications

PFA bushing

ZVISF-1PFA

High throughput applications

High density polyethylene bushing

ZVISF-1PE

**Fill ports**

*for 1/16" polymeric Cheminert valves*

These fill ports provide direct syringe connections to polymeric valves and fittings. Since the fitting detail in the high pressure Cheminert valve is unique, be sure to order the high pressure version for polymeric HPLC injectors. For use with 22 gauge blunt tip needle.

*Description**Prod No**Price***For high pressure injectors (C2, C3, C4, and C52 series injectors)**

C-VISF-1H

**For fittings and low pressure injectors (C22Z and C62Z series injectors)**

C-VISF-1

**Replacement liners and ferrules**

Liner for C-VISF-1

VISL-1

Liner for C-VISF-1H

VISL-1H

Ferrule for C-VISF-1 (or 1H)

ZF1VISF

**Fill ports**

*for metal Valco and Cheminert valves*

Fill ports provide direct syringe connections to valves and fittings, with the polymeric ferrule compressing a liner to seal around the needle. These fill ports are for use with metal valves.

*Description**Prod No**Price***For use with blunt tip needle**

For 1/16" fittings and injectors - 22 ga

VISF-1



For 1/32" fittings and injectors - 26 ga

VISF.5FPK

**For use with 2" 22 gauge blunt tip needle**

For 1/16" fittings and injectors

VISF-2

For 1/8" fittings and injectors

VISF-A

**Replacement liners and ferrules**

Liner for VISF-1

VISL-1

Liner for VISF-2 or VISF-A

VISL-2

Ferrule for VISF-1 or VISF-2

ZF1VISF

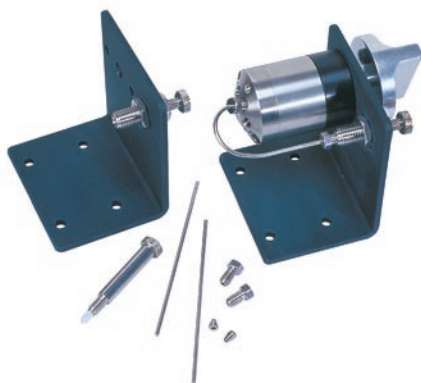
**TECH TIP**

When using Cheminert Nanovolume® CN2 injectors and valves, use fill ports designed just for them.



Nanovolume fill ports..... page 60

## Syringe Adapters



## Loop fill port assembly

for Cheminert C2  
and C4 valves

The loop fill port assembly, for use with Cheminert high pressure valves (C2 and C4 series), permits sample loading and manual injection from the front of the valve. It includes an aluminum bracket, two syringe fill ports (for 3/4" or 2" needles), a bulkhead union, and two pieces of stainless tubing: one piece is 0.013" ID with a volume of 7 µl, and the other is 0.50 mm ID and 17 µl.

Description	Prod No	Price
Loop fill port assembly	C-LFP	



## Female luer adapters

Female luer adapters provide direct syringe connections to zero dead volume fittings and valves.

Description		Prod No	Price
Female luer to:	1/32" fitting	ZLA-.5	
	1/16" fitting	ZLA-1	
	1/8" fitting	ZLA-2	



## Septum injector nuts

Septum injector nuts are a simple way to provide syringe access to any point of a gas or liquid system. The injector nut includes a Valcon T polyimide septum support which accepts a standard 1/4" GC septum. The nut's 1/8" external fitting detail can connect directly to common external type fittings, or can be adapted to Valco internal fittings using an external/internal union or reducing union.

Description	Prod No	Price
Septum injector nut with support	EN2SI	
Replacement support	ZF2SI	
Septum, low bleed, pka. of 10	SI4G	

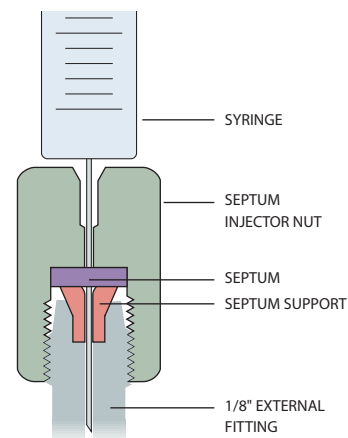
## MORE INFORMATION

External/internal  
reducing unions . . pg 31  
External/internal  
unions . . . . . 27

## Cheminert valves

Model C2 . . . . . 158, 161  
Model C4 . . . . . 159, 162

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



Septum injector nut  
with septum and support (EN2SI)

## HPLC Column End Fittings

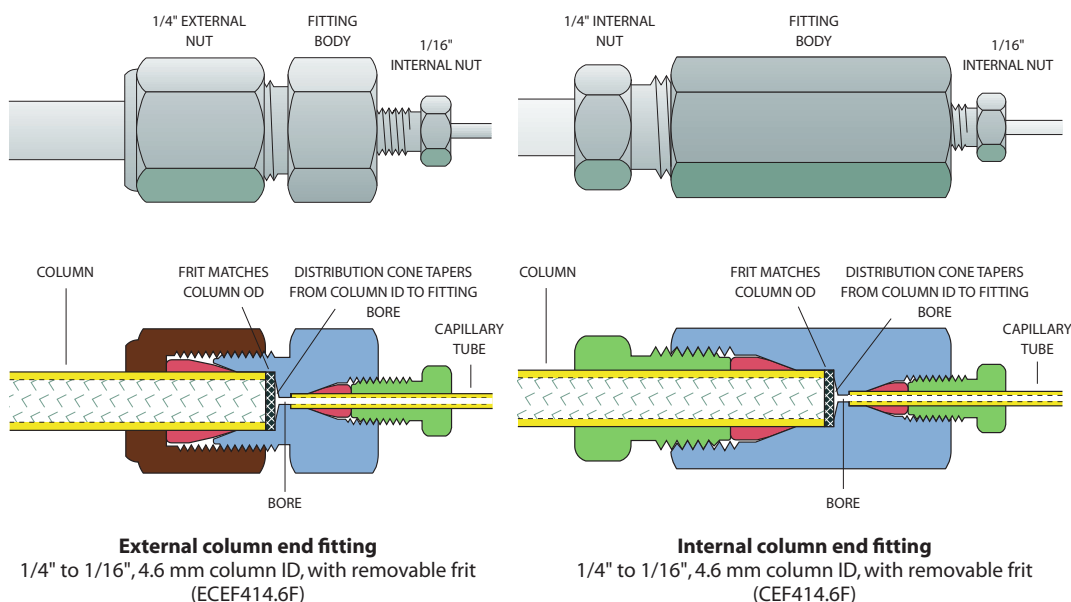
Although our column end fittings look like ordinary reducing unions, they are machined with a conical recess to match a specific column ID so that there are no abrupt or irregular diameter changes which can cause loss of theoretical plates. (See illustrations, below.) This optimization results in an assortment of column end fittings for each column OD. To receive full benefit of this design, use column end fittings only with the specific column ID for which they are intended. We can design special fittings for unusual sizes or OEM use.

If a temporary frit is used during column packing, the frit OD should match the column OD. Permanent frits should have an OD matched to the column ID, and should be pressed in to give the lowest dead volume. Our frits are available in a variety of pore sizes,

and we offer titanium and Hastelloy C frits for systems sensitive to exposed stainless steel.

All column end fittings are rated to 10,000 psi. However, the functional limit is dictated by the yield strength of the tubing used with the fitting. Standard 1/4", 3/8", and 1/2" columns are usually packed at 8,000-10,000 psi, which is right at the yield strength for the tubing commonly used. Columns with 1" ID have a yield strength of 6,000-8,000 psi, and the fitting will not hold if the system pressure exceeds that limit.

The newest addition to the line is the Nanovolume® column end fitting. (See page 62.) These all-PEEK fittings feature fingertight zero dead volume connections with 100 or 150 micron bore. PEEK sleeves permit use with any fused silica tubing.



**MORE INFORMATION**  
Frits..... page 45

**TECH TIP**  
Standard column end fittings are Type 316 stainless, but since the column wall and frit form over 99% of the column surface area, standard fittings with titanium frits can generally be used on inert columns.

**TECH TIP**  
When packing columns, use Valco "through-type" unions to couple the column to the packing reservoir.

Size	Prod No
1/16" union	ZU1T
1/8" union	ZU2T
1/4" union	ZU4T

Through-type unions for packing columns..... page 26

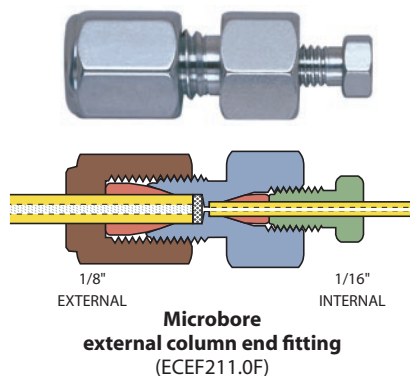
## HPLC Column End Fittings

## Microbore column end fittings

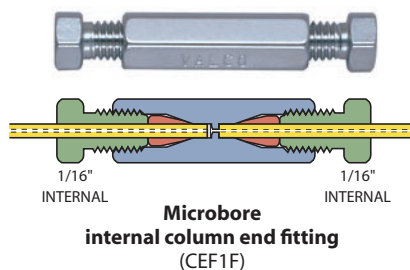
(1.0 mm – 2.0 mm column ID)

Standard material is Type 316 stainless steel.

	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
			<b>External column end fittings</b>			
1/16" to 1/16"	0.25 mm	1.0 mm	ECEF111.0		ECEF111.0F	
1/8" to 1/16"	0.25 mm	1.0 mm	ECEF211.0		ECEF211.0F	



	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
Internal column end fittings						
1/16" to 1/32"	0.25 mm	1.0 mm	CEF1.5		CEF1.5F	
1/16" to 1/16"	0.25 mm	1.0 mm	CEF1		CEF1F	
1/8" to 1/32"	0.25 mm	1.0 mm	CEF2.51.0		CEF2.51.0F	
1/8" to 1/16"	0.25 mm	1.0 mm	CEF211.0		CEF211.0F	
1/8" to 1/16"	0.25 mm	2.0 mm	CEF212.0		CEF212.0F	



## NANOBORE COLUMN END FITTINGS

See our complete line of 100 µm and 150 µm bore fittings on page 62.

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

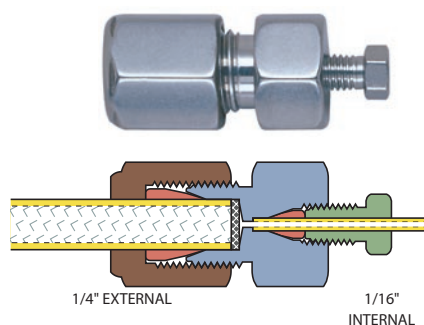
CHROMalytic TECHNOlogy Pty Ltd AUSTRALIAN Distributors e-mail: sales@chromtech.net.au Tel: 03 9762 2034

## HPLC Column End Fittings

### Analytical column end fittings *(2.0 mm – 4.6 mm column ID)*

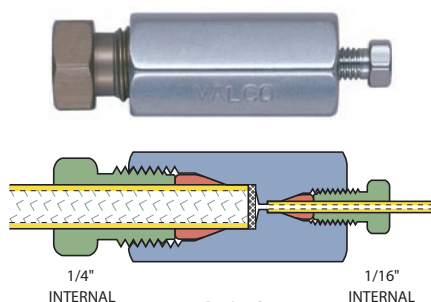
Standard material is Type 316 stainless steel.

	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
<b>External column end fittings</b>						
1/4" to 1/16"	0.4 mm	2.1 mm	ECEF412.1		ECEF412.1F	
1/4" to 1/16"	0.4 mm	3.0 mm	ECEF413.0		ECEF413.0F	
1/4" to 1/16"	0.4 mm	4.0 mm	ECEF414.0		ECEF414.0F	
1/4" to 1/16"	0.4 mm	4.6 mm	ECEF414.6		ECEF414.6F	



**Analytical  
external column end fitting  
with removable frit (ECEF414.6F)**

	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
<b>Internal column end fittings</b>						
1/4" to 1/16"	0.4 mm	2.1 mm	CEF412.1		CEF412.1F	
1/4" to 1/16"	0.4 mm	3.0 mm	CEF413.0		CEF413.0F	
1/4" to 1/16"	0.4 mm	4.0 mm	CEF414.0		CEF414.0F	
1/4" to 1/16"	0.4 mm	4.6 mm	CEF414.6		CEF414.6F	



**Analytical  
internal column end fitting  
with removable frit (CEF414.6F)**

### NANOBORE COLUMN END FITTINGS

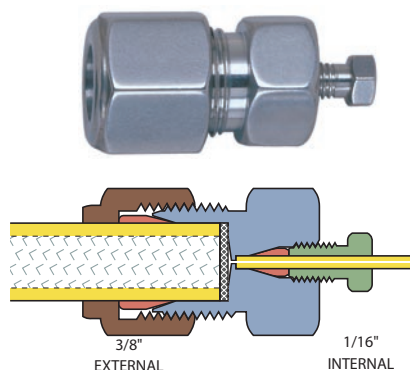
See our complete line  
of 100 µm and 150 µm  
bore fittings on page 62.

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

### Semi-preparative and preparative column end fittings

Standard material is Type 316 stainless.

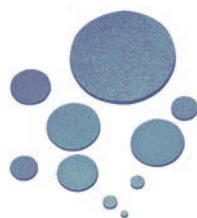
	Bore	Column ID	Without frit		Removable 2μ frit	
			Prod No	Price	Prod No	Price
External column end fittings						
3/8" to 1/16"	0.40 mm	6.0 mm	ECEF616.0		ECEF616.0F	
3/8" to 1/16"	0.40 mm	7.0 mm	ECEF617.0		ECEF617.0F	
1/2" to 1/16"	0.75 mm	9.0 mm	ECEF819.0		ECEF819.0F	
1/2" to 1/16"	0.75 mm	10.0 mm	ECEF8110.0		ECEF8110.0F	
1" to 1/16"	0.75 mm	20.0 mm	ECEF1K1		ECEF1K1F	



**Semi-preparative  
external column end fitting**  
(ECEF616.0F)

### Replacement frits

1/16", 1/8" and 1/4" frits are sold in packages of 10. 3/8", 1/2", and 1" frits are sold individually. Other sizes may be available or special-ordered in OEM quantities.



			Stainless steel		Hastelloy C		Titanium	
	Pore Size	Frit thickness	Prod No	Price	Prod No	Price	Prod No	Price
Package of 10:								
1/16" frits	0.5μ	0.75 mm	.5FR1-10		.5FR1HC-10		—	
	2μ	0.75 mm	2FR1-10		2FR1HC-10		2FR1TI-10	
	10μ	0.75 mm	10FR1-10		—		—	
1/8" frits	0.5μ	1.00 mm	.5FR2-10		—		—	
	2μ	1.00 mm	2FR2-10		2FR2HC-10		2FR2TI-10	
	10μ	1.00 mm	10FR2-10		—		—	
1/4" frits	0.5μ	1.00 mm	.5FR4-10		—		—	
	2μ	1.00 mm	2FR4-10		2FR4HC-10		2FR4TI-10	
	10μ	1.00 mm	10FR4-10		10FR4HC-10		—	
Each:								
3/8" frits	2μ	1.00 mm	2FR6		2FR6HC		2FR6TI	
1/2" frits	2μ	1.00 mm	2FR8		2FR8HC		2FR8TI	
1" frits	2μ	1.50 mm	2FR1K		2FR1KHC		2FR1KTI	

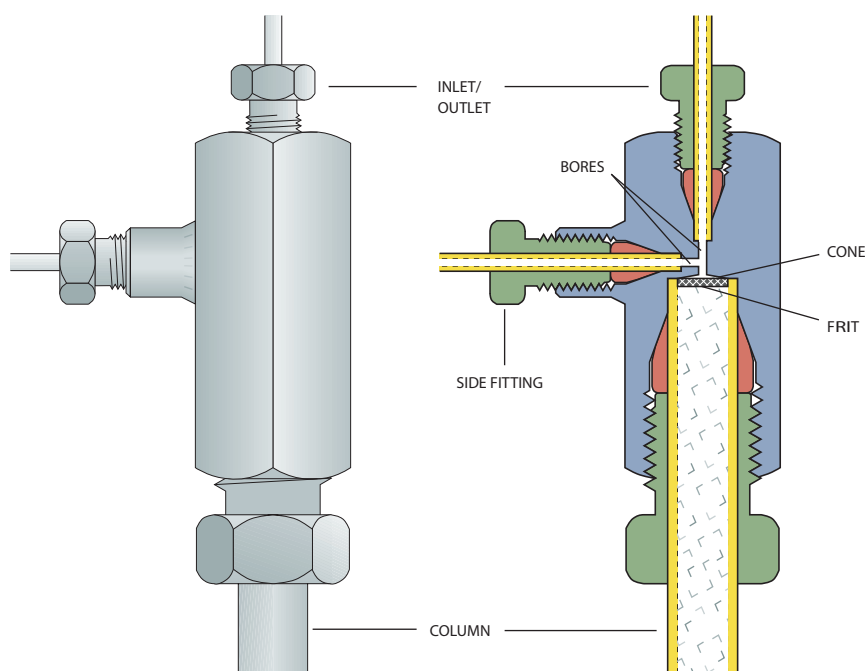
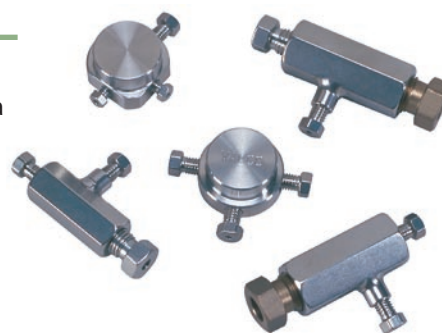


## Post-Column Reaction Tee Fittings

### Post-column reaction tee fitting

The tee column end fitting (TCEF) has a third connection perpendicular to the normal flowpath. The TCEF permits post-column derivation, or may be used as a curtain flow column inlet fitting. Standard material is Type 316 stainless.

Column OD	Cone OD	Inlet/outlet OD	Bore	Side OD	Bore	Prod No	Price
1/16"	1.0 mm	1/32"	0.25 mm	1/32"	0.25 mm	TCEF1.5.5C	
1/16"	1.0 mm	1/32"	0.90 mm	1/32"	0.25 mm	TCEF1.5.5T	
1/16"	1.0 mm	1/16"	0.25 mm	1/16"	0.25 mm	TCEF111	
1/8"	1.0 mm	1/16"	0.50 mm	1/16"	0.50 mm	TCEF211	
1/8"	1.0 mm	1/16"	1.65 mm	1/16"	0.40 mm	TCEF211T	
1/4"	4.6 mm	1/16"	0.25 mm	1/16"	0.25 mm	TCEF411C	
1/4"	4.6 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF411	
1/4"	4.6 mm	1/16"	1.65 mm	1/16"	0.75 mm	TCEF411T	
1/4"	4.6 mm	1/8"	0.75 mm	1/16"	0.75 mm	TCEF421	
3/8"	6.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF611	
3/8"	6.0 mm	1/16"	1.65 mm	1/16"	0.75 mm	TCEF611T	
1/2"	9.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF811	
1/2"	9.0 mm	1/16"	1.65 mm	1/16"	0.75 mm	TCEF811T	



Post-column reaction fitting  
(TCEF411)

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

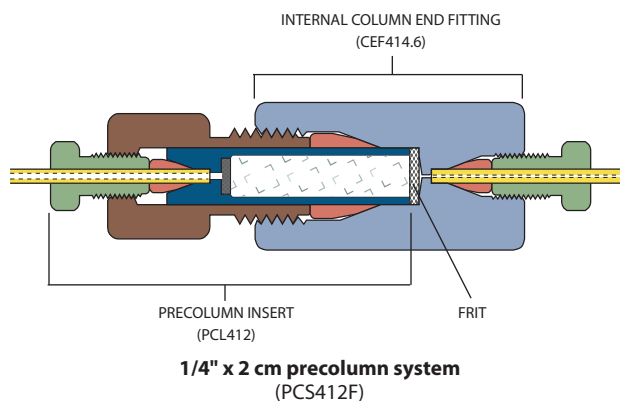
## Precolumns (Guard Columns)



## Precolumns (guard columns)

Precolumns are available in 2 cm and 5 cm lengths, and can be filled with either 5 $\mu$  packing or 37 - 44 $\mu$  pellicular packing. Both lengths are used in conjunction with a column end fitting. When packed for high efficiency they can be used as analytical columns, but a more typical use is as a guard column installed between the injector and the analytical column. Standard material is Type 316 stainless.

Description	Prod No	Price
1/4" x 2 cm precolumn system	PCS412F	
Includes:		
One precolumn insert		
One internal column end fitting		
One 2 $\mu$ frit		
1/4" x 5 cm precolumn system	PCS415F	
Includes:		
One precolumn insert		
One external column end fitting		
One 2 $\mu$ frit		
Precolumns (for use with existing column end fittings)		
1/4" x 2 cm precolumn insert	PCL412	
1/4" x 5 cm precolumn insert	PCL415	



## Fingertight HPLC cartridge precolumns

This cartridge-based system is designed for use as a precolumn or concentrator column in HPLC and FIA applications. It is particularly suited to applications requiring frequent changes: snap-on seals are replaceable, the cartridge is reusable, and the tubing connections are stable since the end fittings do not rotate as the assembly is tightened. Standard material is Type 316 stainless, with PEEK seals and 2 $\mu$  titanium frits.

Description	Prod No	Price
0.25 ml (4.0 mm ID x 2 cm)		
Fingertight cartridge assembly	SFECH412	
Replaceable cartridge	SFEC42	

**NOTE:**

As a courtesy to our OEM customers, VICI does not supply pre-packed columns.

## Filters

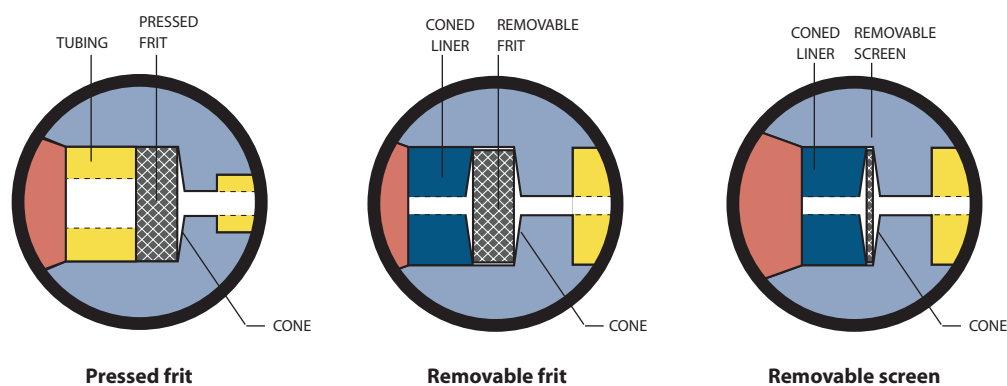
There are many flow elements of analytical instruments which require protection from foreign particles, such as orifices that may become plugged or surfaces that may get scratched. However, conventional filtering devices may have too large a volume to be consistent with good system performance – particularly in chromatographic applications.

Valco's unique patented\* filter design results in extremely low internal volume and simplifies filter element replacement. Filter bodies are "coned" for uniform flow and maximum filter surface area. The filters are made entirely of metal, so they can be used at any instrumentation temperature. While the standard metal is 316 series stainless, filters can be made from alloys that can be used in virtually any application.

We offer a choice of three different filtering elements. All styles are available in bulkhead configurations for mounting on a panel or instrument wall. (Please note that since frits and

screens have significantly different thicknesses, they cannot be used interchangeably in the same filter body.)

- **Pressed frits**, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2 $\mu$  stainless.
- **Removable frits** are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more mixing and tend to clog more than screens. A 2 $\mu$  frit is included with the filter, but 0.5, 2, and 10 $\mu$  replacement frits are available in three materials.
- **Removable screens** plug less rapidly and provide lower pressure drop than frits. Since they are thinner, there is less mixing and dispersal than might occur with a frit, but frits provide better filtration. A 2 $\mu$  screen is included with the filter, and 2 and 10 $\mu$  stainless replacement screens may be ordered.



Pressed frit

Removable frit

Removable screen

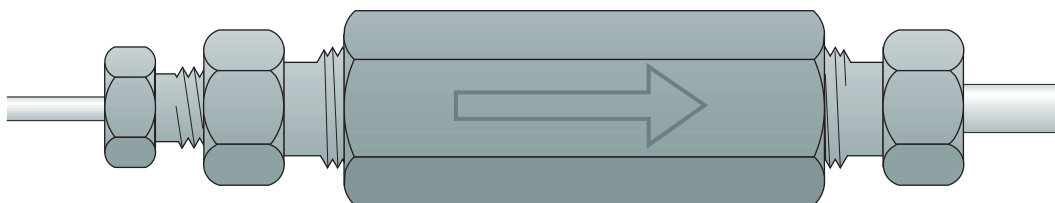
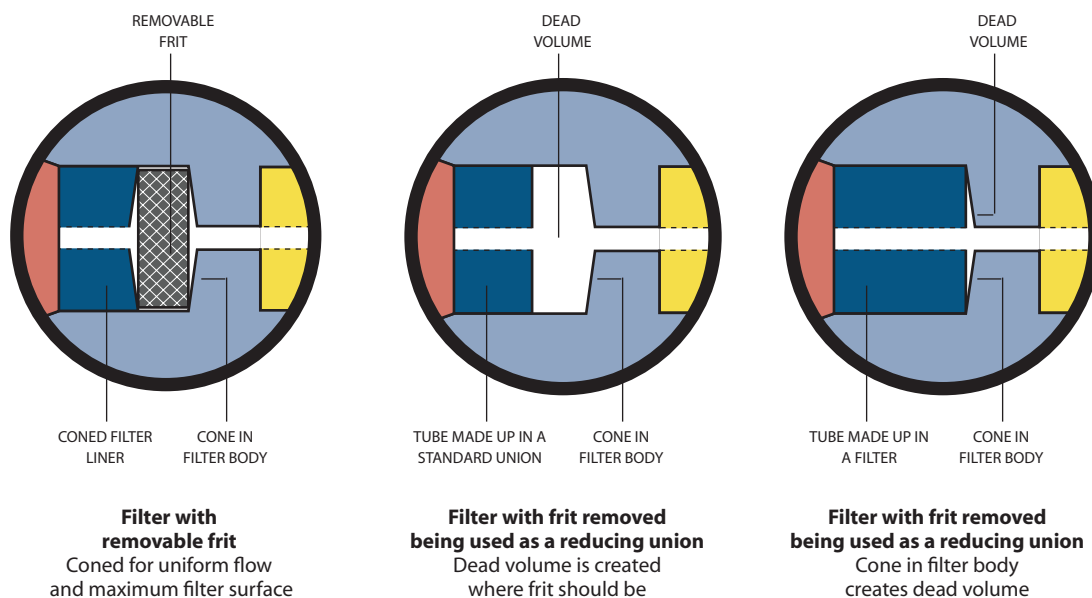
\* Patent Numbers 4,281,679 and 4,173,363

**MORE INFORMATION**  
 Biocompatible filter . p 78  
 In-line filters for  
 1/4-28 fittings ..... 78  
 Mobile phase  
 filters..... 79

Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of *made up* fittings. Therefore, although our filters look very much like our unions, they are not interchangeable with unions; a filter with its frit removed should not be substituted for a union,

because the space designed for the frit introduces dead volume into the system. In addition, since filter bodies are coned, they will have dead volume when used as a union even if the tubing is made up in the filter with a longer, non-standard pilot length.

An arrow imprinted on all filter bodies serves to differentiate them from unions and to indicate recommended flow direction.



Arrow imprinted on filter body showing recommended direction of flow

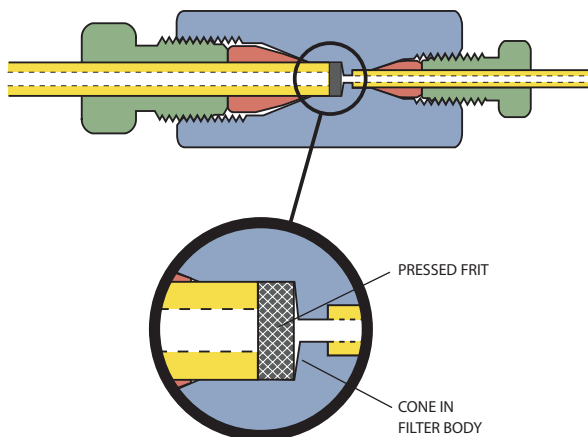
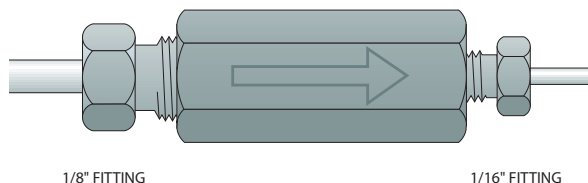
## Filters

## Filters with a pressed frit

Pressed frit filters contain a permanently installed stainless steel 2 $\mu$  frit, and are recommended for applications where contaminants are the exception and not the rule – that is, when the sample is generally clean but you wish to guard against the stray burr from a carelessly prepared tube end that might find its way into the flowpath. Standard material is Type 316 stainless steel.



Description	Bore	Standard		Bulkhead	
		Prod No	Price	Prod No	Price
1/16" to 1/32"	0.25 mm	ZRUF1.5		ZBRUF1.5	
1/16" to 1/16"	0.75 mm	ZUF1		ZBUF1	
1/8" to 1/16"	0.75 mm	ZRUF21		ZBRUF21	
1/8" to 1/8"	0.75 mm	ZUF2		ZBUF2	
1/4" to 1/8"	2.00 mm	ZRUF42		ZBRUF42	
1/4" to 1/4"	4.60 mm	ZUF4		ZBUF4	



**Reducing filter with a pressed frit**  
1/8" to 1/16"  
(ZRUF21)

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

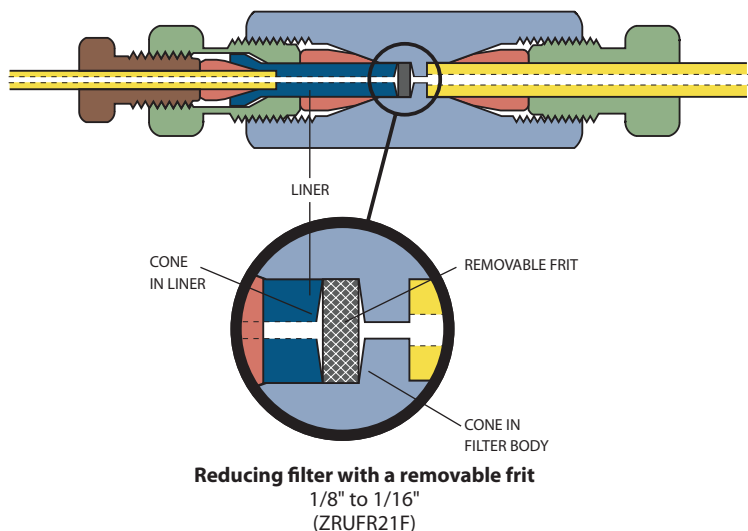
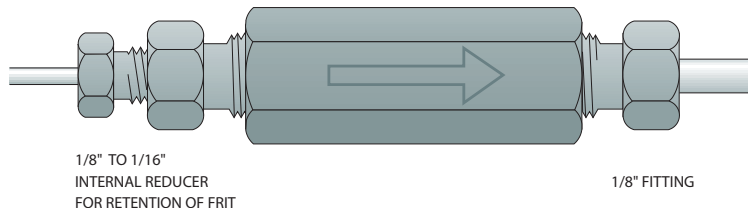
### Filters with a removable frit



These filters come with a removable 2 $\mu$  frit. The standard frit can be replaced with any frit of the proper diameter, *but not by a screen*. These filters are suitable for streams with frequent contamination, since the filtering element is easily changed. Standard material is Type 316 series stainless.

Patent Numbers 4,281,679 and 4,173,363

Description	Bore	Standard		Bulkhead	
		Prod No	Price	Prod No	Price
1/32" to 1/32"	0.25 mm	ZUFR.5F		ZBUFR.5F	
1/16" to 1/32"	0.25 mm	ZRUFR1.5F		ZBRUFR1.5F	
1/16" to 1/16"	0.25 mm	ZUFR1CF		ZBUFR1CF	
	0.50 mm	ZUFR1F		ZBUFR1F	
1/8" to 1/16"	0.75 mm	ZRUFR21F		ZBRUFR21F	
1/8" to 1/8"	2.00 mm	ZUFR2F		ZBUFR2F	
1/4" to 1/16"	1.00 mm	ZRUFR41F		ZBRUFR41F	
1/4" to 1/8"	2.00 mm	ZRUFR42F		ZBRUFR42F	



#### TECH TIP

#### Should you use a filter with a frit or one with a screen?

Screens have much higher flow capacity (Cv), but frits are the best choice for maximum filtration or if your application requires Hastelloy C or titanium. However, since they are thicker than screens, frits allow more mixing, and the downside of their superior filtration is that they clog more often than screens.

Note! The difference in thickness also means that frits and screens cannot be used interchangeably in the same fitting body:

**A frit must always be replaced with a frit.**

**A screen must always be replaced with a screen.**

Replacement  
frits ..... page 53



## Filters

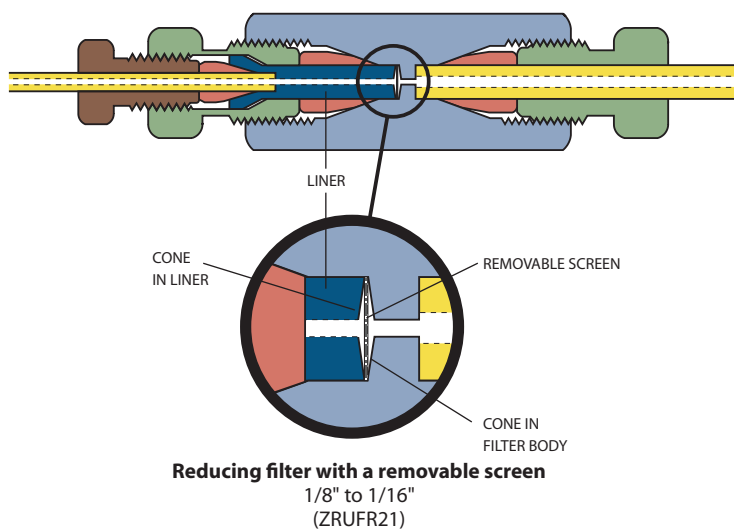
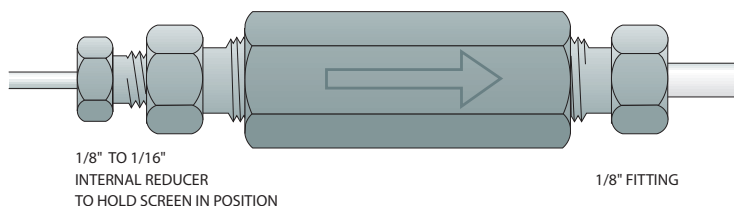
## Filters with a removable screen

These filters come with a removable 2µ screen. The standard screen can be replaced with any screen of the proper diameter, *but not by a frit*. These filters are suitable for streams with frequent contamination, since the filtering element is easily changed. Standard material is Type 316 series stainless.

Patent Numbers 4,281,679 and 4,173,363

P

Description	Bore	Standard		Bulkhead	
		Prod No	Price	Prod No	Price
1/32" to 1/32"	0.25 mm	ZUFR.5		ZBUFR.5	
1/16" to 1/32"	0.25 mm	ZRUFR1.5		ZBRUFR1.5	
1/16" to 1/16"	0.25 mm	ZUFR1C		ZBUFR1C	
	0.50 mm	ZUFR1		ZBUFR1	
1/8" to 1/16"	0.75 mm	ZRUFR21		ZBRUFR21	
1/8" to 1/8"	2.00 mm	ZUFR2		ZBUFR2	
1/4" to 1/16"	1.00 mm	ZRUFR41		ZBRUFR41	
1/4" to 1/8"	2.00 mm	ZRUFR42		ZBRUFR42	



#### TECH TIP

**Should you use a filter with a frit or one with a screen?**

Screens have much higher flow capacity (Cv), but frits are the best choice for maximum filtration or if your application requires Hastelloy C or titanium. However, since they are thicker than screens, frits allow more mixing, and the downside of their superior filtration is that they clog more often than screens.

Note! The difference in thickness also means that frits and screens cannot be used interchangeably in the same fitting body:

**A frit must always be replaced with a frit.**

**A screen must always be replaced with a screen.**

Replacement screens..... page 53

0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm

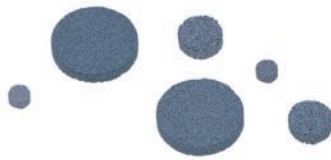
5/16"	=	.312"	=	7.9 mm
3/8"	=	.375"	=	9.5 mm
7/16"	=	.437"	=	11.1 mm

## Frits and Screens for Filters

## Replacement frits

Other sizes may be available or special ordered in OEM quantities.

Note: If a filter was ordered with a removable frit, the frit **cannot** be replaced with a screen.



### WHICH FRIT FITS MY FILTER?

#### 1/16" frit fits:

ZUFR.5F  
ZBUFR.5F  
  
ZRUF1.5F  
ZBRUF1.5F

#### 1/8" frit fits:

ZUFR1CF  
ZBUFR1CF  
  
ZUFR1F  
ZBUFR1F  
  
ZRUF21F  
ZBRUF21F

#### 1/4" frit fits:

ZUFR2F  
ZBUFR2F  
  
ZRUF41F  
ZBRUF41F  
  
ZRUF42F  
ZBRUF42F

Package of 10:	Pore Size	Frit Thickness	Stainless Steel		Hastelloy C		Titanium	
			Prod No	Price	Prod No	Price	Prod No	Price
1/16" frits	0.5μ	0.75 mm	.5FR1-10		.5FR1HC-10		—	
	2μ	0.75 mm	2FR1-10		2FR1HC-10		2FR1TI-10	
	10μ	0.75 mm	10FR1-10		—		—	
1/8" frits	0.5μ	1.00 mm	.5FR2-10		.5FR2HC-10		—	
	1μ	1.00 mm	1FR2-10		1FR2HC-10		—	
	2μ	1.00 mm	2FR2-10		2FR2HC-10		2FR2TI-10	
	10μ	1.00 mm	10FR2-10		—		—	
1/4" frits	0.5μ	1.00 mm	.5FR4-10		—		—	
	2μ	1.00 mm	2FR4-10		2FR4HC-10		2FR4TI-10	
	10μ	1.00 mm	10FR4-10		10FR4HC-10		—	

## Replacement screens

Other sizes may be available or special ordered in OEM quantities.

Note: If a filter was ordered with a removable screen, the screen **cannot** be replaced with a frit.



Package of 10:	Pore Size	Screen Thickness	Stainless Steel	
			Prod No	Price
1/32" screens	0.5μ	0.040 mm	.5SR.5-10	
	1μ	0.050 mm	1SR.5-10	
	2μ	0.075 mm	2SR.5-10	
	10μ	0.125 mm	10SR.5-10	
1/16" screens	0.5μ	0.040 mm	.5SR1-10	
	1μ	0.050 mm	1SR1-10	
	2μ	0.075 mm	2SR1-10	
	10μ	0.125 mm	10SR1-10	
1/8" screens	0.5μ	0.040 mm	.5SR2-10	
	1μ	0.050 mm	1SR2-10	
	2μ	0.075 mm	2SR2-10	
	10μ	0.125 mm	10SR2-10	
1/4" screens	0.5μ	0.040 mm	.5SR4-10	
	1μ	0.050 mm	1SR4-10	
	2μ	0.075 mm	2SR4-10	
	10μ	0.125 mm	10SR4-10	

### WHICH SCREEN FITS MY FILTER?

#### 1/16" screen fits:

ZUFR.5  
ZBUFR.5  
  
ZRUF1.5  
ZBRUF1.5

#### 1/8" screen fits:

ZUFR1C  
ZBUFR1C  
  
ZUFR1  
ZBUFR1  
  
ZRUF21  
ZBRUF21

#### 1/4" screen fits:

ZUFR2  
ZBUFR2  
  
ZRUF41  
ZBRUF41  
  
ZRUF42  
ZBRUF42

Tools

Custom socket wrench

This 1/4" socket wrench with a slot to slip over 1/16" tubing works great for all types of 1/4" hex nuts (such as Valco 1/16" ZDV fitting nuts). It's especially useful when nuts are difficult to access with an open end wrench.

Prod No	Price
SWH4	



Ferrule removal kit

When polymeric ferrules get stuck in a fitting detail, these little ferrule spears will save you from becoming so irritated that you tear up your entire lab in frustration. Each kit includes two sizes of tapered stabbers for retrieving capillary size ferrules.

Prod No	Price
FRK1	



Hex key set

The hex key set has a wrench to fit any socket head screw on any VICI valve or actuator. Includes the following sizes: .050", 1/16", 5/64", 3/32", 7/64", 1/8", 9/64", and 5/32".

Prod No	Price
HKS	



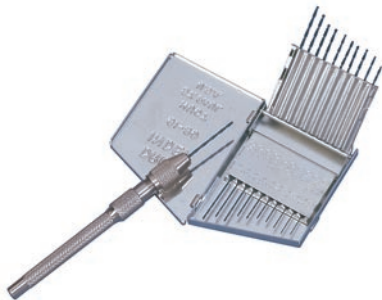
**TECH TIP**  
If a fused silica tube breaks off in a through-type union, remove the nuts and the tube opposite the broken one. Clear the fitting by passing a drill or wire of the appropriate diameter into the unbroken side and through the center of the fitting.

Our ferrule removal kit can be used to remove ferrules from tee and cross fittings.



Open end wrenches

Size	For use with	Prod No	Price
3/16" x 1/4"	1/32" and 1/16" nuts	OEW	
3/8" x 7/16"	1/8" nuts	OEW-2	
1/2" x 9/16"	1/4" nuts	OEW-3	



Pin vise and drill index

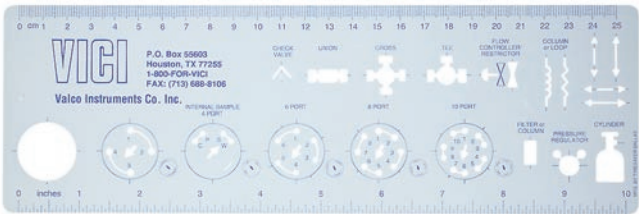
The drill index has drills sized from 0.0135" to 0.039" (0.34 to 1 mm). These are useful tools when a fused silica tube breaks in a union (see Tech Tip on the facing page) and for enlarging the inner diameter of fused silica adapters.

Prod No	Price
PV	

Template

This tool is just what you need when you're working out plumbing and valve switching schematics. It features templates for two position valves with 4, 6, 8, and 10 ports with indications of both positions, as well as various flow symbols. For added convenience, the sides are edged with metric and inch rulers.

Prod No	Price
TEMPLATE1	



**MORE INFORMATION**

Tools for valves

Pencil magnet . . . p 210

Valve spanner handle . . . . . 211

Tightening tools for PEEK fittings . . . . . 67

Tubing accessories . . . . . 90

# Cheminert® Fittings and Accessories

Cheminert fittings are ideally suited for applications requiring an inert, biocompatible, metal-free flowpath. Wetted materials are PFA, FEP, CTFE, or PEEK, and uniform flow passages minimize mixing. All connections have zero dead volume.

## High Pressure Fittings

Cheminert high pressure fittings are rated at 5000 psi with fingertight nuts, well beyond the burst strength of most PEEK tubing. These fittings are machined from high quality inert polymers to the same exacting tolerances as our popular Valco zero dead volume fittings, and the taper angle and detail design conform to the industry standard established by the Valco line.

## High Pressure Nanovolume® Fittings

Nanovolume generally refers to components with bore sizes of 100-150  $\mu\text{m}$  (.004" - .006"). The minimal transfer volume contributed by nanovolume components makes them especially beneficial in applications with flow rates in the  $\mu\text{l}/\text{min}$  range, when the transfer volume can be critical.

### NEW 360 Micron Nanovolume Fittings

Our newest high pressure fittings permit direct connection of 360 micron OD fused silica, PEEK, stainless, or electroformed nickel tubing without the use of liners. The ferrule snaps into the nut so that the fitting is "one-piece", but the ferrule remains free to rotate as the nut is tightened so that the tube doesn't twist. Because of the compact size and fine 2-56 threads, a leak-free connection that seals at pressures in excess of 20,000 psi can be easily formed with the available manual tool.

### 1/32" Nanovolume Fittings

1/32" Cheminert nanovolume fittings, with 100  $\mu\text{m}$  or 150  $\mu\text{m}$  bore, are ideal for high resolution capillary chromatography. Rated at 5,000 psi with fingertight nuts, they will remain leak-tight well beyond the burst strength of most PEEK tubing. These fittings are machined from high quality inert polymers to the same exacting tolerances as our popular Valco zero dead volume fittings, and the taper angle and detail design conform to the industry standard established by the Valco line.

### MORE INFORMATION

High pressure Cheminert fittings ..... pp 63-67  
Low pressure Cheminert fittings ..... 68-81  
Nanovolume fittings ..... 57-62  
Valco fittings ..... 6-55

### TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. OD tolerance should be nominal dimension  $\pm .002$ ".

Fractional dimension	Nominal dimension
1/32"	.031
1/16"	.062
1/8"	.125
1/4"	.250
3/8"	.375
1/2"	.500

10,000 psi = 689.5 bar  
20,000 psi = 1,378.9 bar

50 $\mu\text{m}$	= .002"
100 $\mu\text{m}$	= .004"
150 $\mu\text{m}$	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

CHROMalytic TECHNOlogy Pty Ltd AUSTRALIAN Distributors e-mail: [sales@chromtech.net.au](mailto:sales@chromtech.net.au) Tel: 03 9762 2034





- For direct connection of 360  $\mu$ m tubing
- Work with metal, fused silica, or PEEK
- Up to 20,000 psi with metal tubing
- Snap-in rotating ferrule for "one-piece" fitting with no tubing twist
- Eliminate use of troublesome liners

Our new high pressure fittings permit direct connection of 360 micron OD fused silica, PEEK, stainless, or electroformed nickel tubing without the use of liners. The ferrule snaps into the nut so that the fitting is "one-piece", but the ferrule remains free to rotate as the nut is tightened so that the tube doesn't twist. Because of the compact size and fine 2-56 threads, a leak-free connection that seals at pressures in excess of 20,000 psi can be easily formed with the available manual tool.

360  $\mu$ m fittings are dedicated for use with either fused silica, metal, or PEEK tubing; components cannot be mixed or used with a different tubing material.

Tees and crosses offer a choice of three bore sizes, and feature a "quick-mount" base with adhesive backing to make sure that the fitting is stable and fragile tubing doesn't get broken. There is also a quick-mount PEEK union.

#### MORE INFORMATION

Nanovolume fittings  
For fused silica tubing,  
10,000+ psi . . . . pg 58  
For metal tubing,  
up to 20,000 psi . . . . 58

1/32" Nanovolume  
fittings . . . . . 59-60  
Injectors with  
360 micron fittings. . 152

#### For PEEK or fused silica tubing — up to 10,000 psi

These fittings are constructed from premium grade natural PEEK material. They are intended for use with PEEK or fused silica tubing at pressures up to 10,000 psi, or the maximum pressure for which the tubing is rated, whichever is lower. Quick-mount versions have integral base with double stick tape to secure fittings to a surface.

#### Nut/ferrules, caps, plugs, tightening tool

*for 360  $\mu$ m tubing*

	Prod No	Price
Nut/ferrule	C360NFPKG	
Cap	C360CPKG	
Plug	C360PPK	
Tightening tool	C360ET	

#### Unions and reducing unions

*for 360  $\mu$ m tubing*



Bore size:	50 micron		100 micron		150 micron	
	Prod No	Price	Prod No	Price	Prod No	Price
Union, quick mount	C360QUPKG2		C360QUPKG4	\$65	C360QUPKG6	
Union	C360UPKG2		C360UPKG4	48	C360UPKG6	
Reducing union, 1/16" to 360 $\mu$ m	—		—		C360RU1PK6	

#### Tees and crosses

*for 360  $\mu$ m tubing*

Bore size:	50 micron		100 micron		150 micron	
	Prod No	Price	Prod No	Price	Prod No	Price
Tee, quick mount	C360QTPKG2		C360QTPKG4	\$82	C360QTPKG6	
Cross, quick mount	C360QXPKG2		C360QXPKG4	100	C360QXPKG6	



## NEW 360 µm Nanovolume Fittings



2009 #60

### For fused silica tubing — 10,000 psi and above

These fittings are constructed from HPLC grade stainless steel, with stainless steel nut and a special ferrule which is precision machined from electroformed nickel. For optimal sealing characteristics, the ferrule is gold plated.

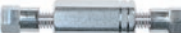


#### Nut/ferrules and caps

for 360 µm FS tubing

	Prod No	Price
 Nut/ferrule	C360NFFS	
 Cap	C360CFS	

#### Unions and reducing unions

for 360 µm FS tubing



	50 micron		100 micron		150 micron	
	Prod No	Price	Prod No	Price	Prod No	Price
 Union	C360UFS2		C360UFS4		C360UFS6	
 Reducing unions, 1/32" to 360 µm	C360RU.5FS2		C360RU.5FS4		C360RU.5FS6	
 Reducing unions, 1/16" to 360 µm	—		—		C360RU1FS6	

### For metal tubing — up to 20,000 psi

Our highest pressure Nanovolume fittings are constructed of HPLC grade stainless steel, including stainless steel nut and ferrule. These fittings are optimized for use with stainless or electroformed nickel tubing.




#### Nut/ferrules and caps

for 360 µm tubing

	Prod No	Price
 Nut/ferrule	C360NFS6	
 Cap	C360C	

#### Unions and reducing unions

for 360 µm tubing

	50 micron		100 micron		150 micron	
	Prod No	Price	Prod No	Price	Prod No	Price
 Union	C360US62		C360US64		C360US66	
 Reducing unions, 1/32" to 360 µm	C360RU.5S62		C360RU.5S64		C360RU.5S66	
 Reducing unions, 1/16" to 360 µm	—		—		C360RU1S66	

#### NEW INTERNAL REDUCERS FOR 360 µm TUBING

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume. The same patented design as our larger internal reducers (page 34). Both versions have a stainless steel body.

Tubing OD	Nut/ferrule material	Prod No	Price
1/32" to 360 µm	Stainless	C360IZR.5S6	\$34
	PEEK	C360IZR.5S6PK	34

#### MORE INFORMATION

360 µm fittings for use  
below 10,000 psi..... 57  
360 µm tubing  
Electroformed nickel. 87  
PEEK ..... 88  
1/32" Nanovolume  
fittings ..... 59-60

#### TECH TIP

Use these **metal 360 micron nuts** with nano injectors:  
C72MU ..... p 152  
C72MX ..... 152

50 µm	= .002"
100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



## Nanovolume Fittings for 1/32" Tubing

Designed for high resolution capillary HPLC, Cheminert nanovolume connectors include our one-piece 1/32" fingertight fittings, with a patented collapsible ferrule that makes fingertight nanovolume connections a snap. These fittings

work with a variety of tubing, including PEEK, fused silica, and 1/32" electroformed nickel. Liners adapt the fittings for use with fused silica.

To avoid potential confusion, all fittings utilizing the Cheminert collapsible ferrule are made of black PEEK; fittings with a standard Valco ZDV fitting detail are natural PEEK.



### Nuts and ferrules

for 1/32" tubing

Valves and fittings are supplied with the appropriate quantity of nuts and ferrules. However, if additional fittings are required, they may be ordered separately. The two internal nuts include collapsible ferrules as an integral part of the fitting; the external nut must be used with the separate ferrule listed below.



**Internal nut** with collapsible ferrule

Prod No      Price each:

C-NNFFPK

For use with:

Fittings on pages 60-62

6 port valve CN2-4346, page 154

4 port internal sampling injector CN4-4344, page 155



**Internal nut** with collapsible ferrule

C-NNFLPK

For use with:

10 port nanovolume valve CN2-4340, page 154



**External nut**

C-EN.5FPKB

For use with:

Unions on page 61

Column end fittings on page 62

Note: Requires collapsible PEEK ferrule, below



**Collapsible PEEK ferrule**

ZGF.5PK

For use with:

External nut, above

### MORE INFORMATION

360 µm fittings . . . pp 57-58

1/32" Nanovolume  
column end fittings . . 62

Tubing

PEEK . . . . . 88-89

Electroformed

nickel. . . . . 87

### TECH TIP

Use these **collapsible ferrule-nuts** with:

1/32" Nanovolume  
fittings . . . . . pp 60-62

and with injectors:

CN2 . . . . . 154

CN4 . . . . . 155

### Plugs

for 1/32" tubing



**Internal plug**

Prod No      Price each:

C-NPFPK

For use with:

Fittings on page 60

Nanovolume valves on pages 154-155

## Nanovolume Unions, Tees, Y's, and Crosses for 1/32" Tubing

2009 #60

### Unions

for 1/32" tubing

100 µm bore		150 µm bore	
Prod No	Price	Prod No	Price
C-NEU.5XFPK	\$43	C-NEU.5FPK	

Union for 1/32" PEEK or electroformed nickel tubing  
Does not require or include liners.



### Reducing unions

for 1/32" tubing

200 µm bore	
Prod No	
ZERU1.5FPK	

Reducing union, 1/32" to 1/16" tubing, natural PEEK



### Tees, y's, and crosses

for 1/32" tubing or FS\* tubing

100 µm bore		150 µm bore	
Prod No	Price	Prod No	Price
C-NTXFPK	\$105	C-NTFPK	
C-NYXFPK	105	C-NYFPK	
C-NXXFPK	120	C-NXFPK	

Tee 1/32" tubing or fused silica\*  
Y 1/32" tubing or fused silica\*  
Cross 1/32" tubing or fused silica\*

\*A liner is needed for use with fused silica. Order 27 mm length, page 61.



### Fill ports

for 1/32" nanovolume® valves

These fill ports provide direct syringe connections to Model CN2 nanovolume valves. For use with 26 gauge blunt tip needle.

Prod No
C-NVISF

Fill port for 1/32" CN2 series HPLC injectors



### 1/32" Nanovolume frits

These frits are the answer to filtration of 1/32" nanovolume fitting connections. A mere .25 mm (0.010") thin and 1/32" in diameter, they can be placed in any 1/32" fitting detail and add minimal volume. Price is for a package of 5 frits.

Pkg/5:	Pore size	Prod No
	0.2 micron	.2FR.5-5
	0.5 micron	.5FR.5-5

### MORE INFORMATION

Unions for fused silica  
... p. 18, 19, 57-58, 61

100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

### TECH TIP

Liners adapt nanovolume fittings for use with fused silica tubing. They are included with nanovolume **unions** for fused silica, but must be ordered separately for other fittings.



Liners ..... page 61



## Nanovolume Unions and Liners for FS Tubing

### Unions

for fused silica tubing



Union for fused silica tubing  
Includes liners.

FS tubing OD

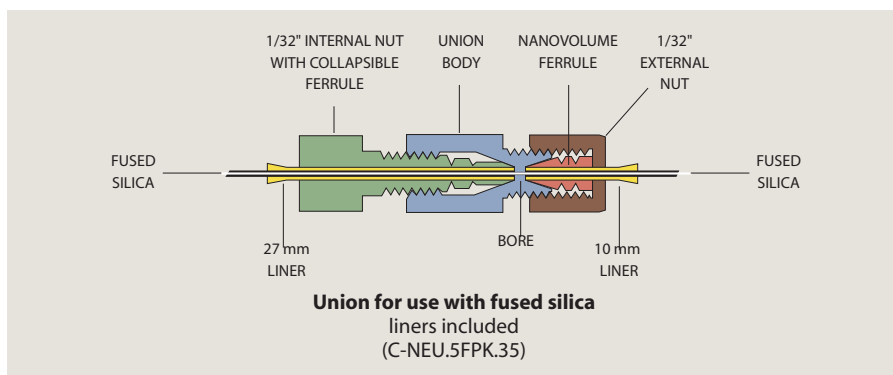
100  $\mu$ m bore  
Prod No

150  $\mu$ m bore  
Prod No

125 - 175  $\mu$ m  
175 - 225  $\mu$ m  
225 - 275  $\mu$ m  
275 - 325  $\mu$ m  
325 - 375  $\mu$ m

C-NEU.5XFPK.15  
C-NEU.5XFPK.20  
C-NEU.5XFPK.25  
C-NEU.5XFPK.30  
C-NEU.5XFPK.35

C-NEU.5FPK.15  
C-NEU.5FPK.20  
C-NEU.5FPK.25  
C-NEU.5FPK.30  
C-NEU.5FPK.35



### MORE INFORMATION

360  $\mu$ m fittings . .pp 57-58  
1/32" nanovolume  
Fittings . . . . . 59-60  
External nuts . . . . . 59  
Internal nuts with  
collapsible ferrules . 59  
Liners for column end  
fittings . . . . . 62

### TECH TIP

Use 27 mm liners

with internal nuts with  
collapsible ferrules:



Use 10 mm liners

with external nuts:



### Liners for 1/32" connectors

for use with fused silica tubing

Use these liners with nanovolume connectors to adapt to the most common sizes of fused silica tubing. Natural PEEK.

The 27 mm liners are for internal nuts with collapsible ferrules. 10 mm liners are for use with external nuts. Sold in packages of 5.

#### 27 mm liners

Use with internal nuts C-NNFFPK or C-NNFLPK

For tubing OD

Prod No



125 - 175  $\mu$ m  
175 - 225  $\mu$ m  
225 - 275  $\mu$ m  
275 - 325  $\mu$ m  
325 - 375  $\mu$ m

C-NL.15L-5  
C-NL.20L-5  
C-NL.25L-5  
C-NL.30L-5  
C-NL.35L-5

#### 10 mm liners

Use with external nut C-EN.5FPKB

For tubing OD

Prod No



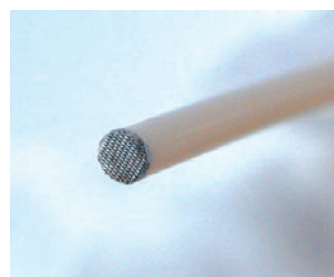
125 - 175  $\mu$ m  
175 - 225  $\mu$ m  
225 - 275  $\mu$ m  
275 - 325  $\mu$ m  
325 - 375  $\mu$ m

C-NL.15S-5  
C-NL.20S-5  
C-NL.25S-5  
C-NL.30S-5  
C-NL.35S-5

## Nanovolume Column End Fittings for FS Capillaries

Nanovolume column end fittings include two liners to adapt the 1/32" fitting to fused silica. The 27 mm liner, used inside the internal nut, has a 1 µm 316 stainless steel screen embedded in the PEEK to provide closure for fused silica columns. The 10 mm liner is used with the external nut.

Like other nanovolume fittings, they include our one-piece 1/32" fingertight fittings, with a patented\* collapsible ferrule. To avoid potential confusion, all fittings utilizing the Cheminert collapsible ferrule are made of black PEEK. The liners are natural PEEK.

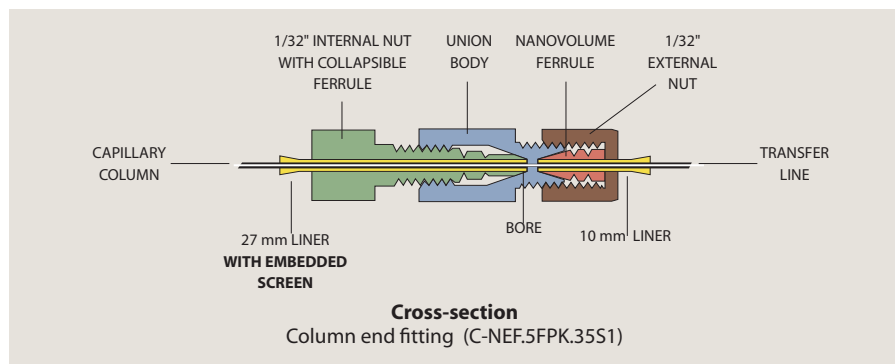


Screen embedded in end of liner for column end fittings

### Column end fittings

for 1/32" tubing

Each:	For tubing OD	100 µm bore Prod No	150 µm bore Prod No
Column end fitting	125 - 175 µm	C-NEF.5XFPK.15S1	C-NEF.5FPK.15S1
for fused silica tubing	175 - 225 µm	C-NEF.5XFPK.20S1	C-NEF.5FPK.20S1
Includes liners	225 - 275 µm	C-NEF.5XFPK.25S1	C-NEF.5FPK.25S1
	275 - 325 µm	C-NEF.5XFPK.30S1	C-NEF.5FPK.30S1
	325 - 375 µm	C-NEF.5XFPK.35S1	C-NEF.5FPK.35S1



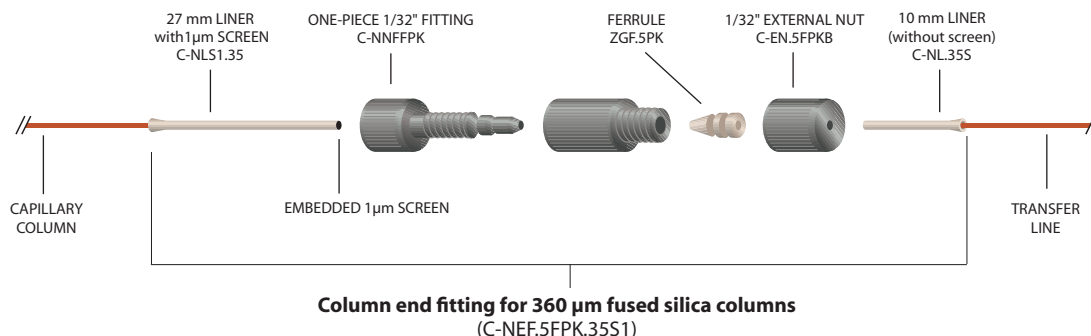
### Replacement liners for column end fittings

for FS capillaries

Use these liners with nanovolume column end fittings to adapt to the most common sizes of fused silica tubing. Natural PEEK, with embedded screen to provide full closure for fused silica capillaries. Sold individually.

#### 27 mm liners for column end fittings

	For tubing OD	Prod No
	125 - 175 µm	C-NL S1.15
	175 - 225 µm	C-NLS1.20
	225 - 275 µm	C-NLS1.25
	275 - 325 µm	C-NLS1.30
	325 - 375 µm	C-NLS1.35



\*U.S. patent no. 6,575,501.

**MORE INFORMATION**  
Liners for  
1/32" fittings .. page 61

#### TECH TIP

Liners with embedded screens are also available for 1/16" PEEK tubing. Consult the factory for sizes and product numbers.





### No twist one-piece fittings

10-32 for 1/16" tubing

These new fittings offer the convenience of a one-piece fitting while solving a problem inherent to such designs. In other one-piece designs, the ferrule rotates against the fitting detail, creating particulates. The no twist design has a separate ferrule that snaps into the nut, so it's attached but still free to avoid rotation during tightening.

Since the ferrule is not machined onto the nut, it can be made from a different material. PEEK nut with PEEK ferrule, or PEEK nut with CTFE ferrule – the possibilities are endless.

Package of 5:	Glass-filled PEEK ferrule	PEEK ferrule	CTFE ferrule
Nut type Length	Prod No	Prod No	Prod No
PEEK, hex short	ZNF1PKG-5	ZNF1PK-5	ZNF1KF-5
PEEK, hex medium	MZNF1PKG-5	MZNF1PK-5	MZNF1KF-5
PEEK, hex long	LZNF1PKG-5	LZNF1PK-5	LZNF1KF-5
PEEK, fingertight	ZNF1FPKG-5	ZNF1FPK-5	ZNF1FKF-5

Optional ferrule materials available – FEP, PFA, PTFE, and glass-filled PTFE. Call for availability.  
Some 1/32" versions are available. Call for details.

Patent No. 7,316,777

### Internal nuts – high pressure PEEK

PEEK nuts are used in Cheminert polymeric valves with zero dead volume fittings. They can also be used as alternatives to standard stainless steel Valco nuts when polymeric ferrules are used (up to approximately 175°C). Fingertight nuts have a knurled surface designed to provide sufficient sealing force on the ferrule without wrenches. Hex style nuts allow wrench tightening; however, since they are polymeric, they can break and are recommended for use only when space is limited and fingers won't fit.

**Caution:** PEEK nuts are intended for use only with polymeric ferrules, which seal with lower force than their stainless steel counterparts. Overtightening can result in breakage.

Package of 10:	Prod no	Length
1/32" fingertight	ZN.5FPK-10	.42"
1/32" fingertight	LZN.5FPK-10	.54"
1/16" fingertight	ZN1FPK-10	.88"
1/16" hex	ZN1PK-10	.45"
1/16" hex	MZN1PK-10	.62"
1/16" hex	LZN1PK-10	.87"
1/8" hex	ZN2PK-10	.62"



### Ferrules – high pressure PEEK

PEEK ferrules seal by the increased friction from compression.

Package of 10:	Prod No	Pkg of 10:
1/32"	ZF.5PK-10	1/4"
1/16"	ZF1PK-10	3/8"
1/8"	ZF2PK-10	1/2"



### Ferrules – grooved PEEK

These patented ferrules\* feature a grooved design that permits the ferrule to grip the tube in multiple places. They work great on tubing that is softer than the ferrule material. For example, PEEK grooved ferrules work well on PTFE or FEP tubing. They are not generally recommended if the tubing is the same material as the ferrule.

Package of 10:	Prod No
1/32"	ZGF.5PK-10
1/16"	ZGF1PK-10



#### MORE INFORMATION

Tightening tool for  
hex-head PEEK nuts. . 67

#### POLYMERS AT A GLANCE

PEEK .....PK

Chemical resistance;  
up to 225°C

100 µm = .004"  
150 µm = .006"

0.25 mm = .010"  
0.50 mm = .020"  
0.75 mm = .030"

1.0 mm = .040"  
1.5 mm = .060"  
2.0 mm = .080"

4.6 mm = .180"  
6.0 mm = .236"  
6.4 mm = .253"

7.0 mm = .275"  
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm  
1/16" = 1.6 mm  
1/8" = 3.2 mm

1/4" = 6.4 mm  
3/8" = 9.5 mm  
1/2" = 12.7 mm



## High Pressure PEEK Fittings



2009 #60

### Plugs and caps – high pressure PEEK

Polymeric plugs and caps are available in knurled finger-tight and wrench-tight hex nut designs, for use in valves or fittings. See discussion of PEEK nuts on page 63. PEEK caps include a PEEK nut and ferrule. For high pressure polymeric valve plugs, see below. For low pressure valve plugs, see page 71.



Description	Length of nut*	PEEK plugs	PEEK caps
		Prod No	Prod No
1/32" fingertight	.42"	ZP.5FPK	ZC.5FPK
1/32" fingertight	.54"	LZP.5FPK	---
1/16" fingertight	.87"	ZP1FPK	ZC1FPK
1/16" hex	.62"	MZP1PK	ZC1PK
1/16" long hex	.87"	LZP1PK	---
1/8" hex	.62"	ZP2PK	ZC2PK

### PEEK plugs for high pressure polymeric valves

These PEEK plugs are for use **only** in Cheminert HPLC polymeric valves (C1-C5 series) since the fitting detail in these valves is unique.

Description	Length of nut*	Prod No
1/16" hex	.62"	C-MZP1PK
1/16" long hex	.87"	C-LZP1PK
1/16" fingertight	.88"	C-ZP1FPK



### Tees and crosses – high pressure PEEK

Tees connect three lines. Crosses connect four lines. The 1/32" and 1/16" nuts are fingertight; 1/8" nuts are hex, for wrench tightening.

Tubing OD	Bore	PEEK tees	PEEK crosses
		Prod No	Prod No
1/32"	0.25 mm	ZT.5FPK	ZX.5FPK
	0.50 mm	ZT.5LFPK	ZX.5LFPK
1/16"	0.25 mm	ZT1CFPK	ZX1CFPK
	0.50 mm	ZT1MFPK	ZX1MFPK
	0.75 mm	ZT1FPK	ZX1FPK
	1.00 mm	ZT1LFPK	ZX1LFPK
1/8"	0.75 mm	ZT2PK	ZX2PK
	2.00 mm	ZT2LPK	ZX2LPK



#### POLYMERS AT A GLANCE

PEEK ..... PK  
Chemical resistance;  
up to 225°C

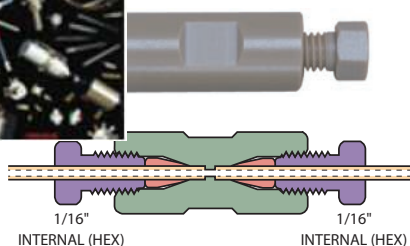
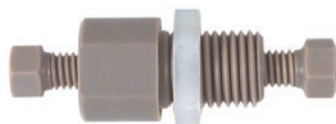
#### TECH TIP

Ferrules for high pressure PEEK fittings are available in PEEK and PFA.

PEEK ferrules .... page 63  
PFA ferrules ..... 13

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

2009 #60

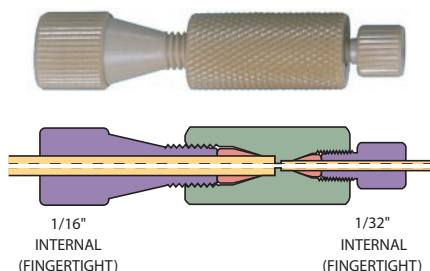
**Internal union – PEEK**Standard bore version  
(ZU1PK)**Bulkhead fingertight**internal union – PEEK  
(ZBU1FPK)**Bulkhead hex**internal union – PEEK  
(ZBU1PK)**Internal unions – high pressure PEEK**

The 1/32" nuts are fingertight; 1/16" nuts are available in a choice of fingertight or hex; and 1/8" nuts are hex, for wrench tightening.

Tubing OD    Bore	Standard Prod No	Bulkhead Prod No	Bulkhead panel hole diameter
1/32" fingertight 0.25 mm 0.50 mm 1/32"	ZU.5FPK	ZBU.5FPK	5/16"
	ZU.5LFPK	ZBU.5LFPK	5/16"
	ZU.5TFPK	ZBU.5TFPK	5/16"
1/16" fingertight 0.25 mm 0.50 mm 0.75 mm 1/16"	ZU1CFPK	ZBU1CFPK	3/8"
	ZU1MFPK	ZBU1MFPK	3/8"
	ZU1FPK	ZBU1FPK	3/8"
	ZU1TFPK	ZBU1TFPK	3/8"
1/16" hex 0.25 mm 0.50 mm 0.75 mm 1/16"	ZU1CPK	ZBU1CPK	3/8"
	ZU1MPK	ZBU1MPK	3/8"
	ZU1PK	ZBU1PK	3/8"
	ZU1TPK	ZBU1TPK	3/8"
1/8" hex 0.75 mm 2.0 mm 1/8"	ZU2PK	ZBU2PK	7/16"
	ZU2LPK	ZBU2LPK	7/16"
	ZU2TPK	ZBU2TPK	7/16"

**Internal reducing unions – high pressure PEEK**

These unions connect two different sizes of tubing, with zero dead volume internal fittings on each end. In the bulkhead version, the bulkhead nut is on the side with smaller tubing. The 1/32" and 1/16" nuts are fingertight; 1/8" nuts are hex, for wrench tightening. A version with 1/16" and 1/8" hex nuts is also available.

**Internal reducing union – PEEK**Standard bore  
(ZRU1.5FPK)**Bulkhead internal reducing union – PEEK**

(ZBRU1.5FPK)

Tubing OD	Bore	Standard Prod No	Bulkhead Prod No	Bulkhead panel hole diameter
1/16" to 1/32"	0.25 mm	ZRU1.5FPK	ZBRU1.5FPK	5/16"
	0.50 mm	ZRU1.5LFPK	ZBRU1.5LFPK	5/16"
	1/32"	ZRU1.5TFPK	ZBRU1.5TFPK	5/16"
1/8" to 1/32"	0.25 mm	ZRU2.5FPK	ZBRU2.5FPK	3/8"
	0.50 mm	ZRU2.5LFPK	ZBRU2.5LFPK	3/8"
	1/32"	ZRU2.5TFPK	ZBRU2.5TFPK	3/8"
1/8" to 1/16"	0.25 mm	ZRU21CFPK	ZBRU21CFPK	3/8"
	0.75 mm	ZRU21FPK	ZBRU21FPK	3/8"
	1.00 mm	ZRU21LFPK	ZBRU21LFPK	3/8"
	1/16"	ZRU21TFPK	ZBRU21TFPK	3/8"

## High Pressure Specialty PEEK Fittings

### One-piece fingertight fittings – color-coded PEEK

These molded fingertight fittings are rated to 5000 psi (350 bar), so they can be used in virtually any HPLC fitting detail with 10-32 threads. Six colors allow easy identification of tubing lines.

Package of 5:

Color	Prod No
Natural	JR-55020-5
Black	JR-55021-5
Red	JR-55022-5
Yellow	JR-55023-5
Blue	JR-55024-5
Green	JR-55025-5



### One-piece PEEK fingertight fittings – narrow hex-head

This natural PEEK machined fitting has a narrow hex head and 10-32 threads.

Package of 5:

Color	Prod No
Natural	JR-5508-5



### Color-It fingertight adapters

Use Color-It snap-on extensions to color-code our 1/4" hex-head nuts, and turn the nut into a fingertight fitting at the same time. Color-It adapters are available in six different colors, and can be used with PEEK and stainless hex-head nuts.

Package of 5:

Color	Prod No
Blue	JR-55010-5
Yellow	JR-55011-5
Green	JR-55012-5
Black	JR-55013-5
White	JR-55014-5
Red	JR-55015-5

Package of 12:

Color	Prod No
Multi-color	JR-55016-12 (2 of each color)



#### MORE INFORMATION

Color-coded  
PEEK tubing ... page 89

#### CAUTION

One-piece combination nuts and ferrules are not for high pressure gas service.

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm





### PEEK starter kit

In LC applications involving proteins, peptides, nucleic acids, or other samples of biological origin, metal systems may interact with samples or release transition metals that will deactivate columns. The PEEK starter kit facilitates replacement of stainless steel tubing, fittings, ferrules, mobile phase filters, etc., to create a biocompatible environment for samples and mobile phase.

*Prod No*

PEEK starter kit

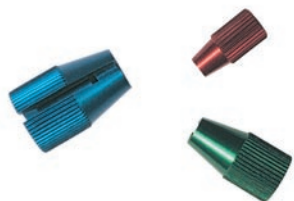
JR-35P

#### *Includes:*

- 1 Plastic box
- 10 PEEK one-piece fittings, 10-32
- 5 PEEK handtight fittings
- 5 PEEK nuts, hex-head long
- 20 PEEK ferrules, double-ended 1/16"
- 1 PEEK union, HP body only, 10-32
- 2 Tubing elbows 90°
- 2 Tubing elbows 180°
- 1 PEEK filter, in-line,  
incl. PAT frit 5 µm
- 1 Clean-cut tubing cutter
- 1 Last Drop PTFE filter 5 µm
- 3m PEEK tubing, 1/16" x 0.25 mm ID,  
blue stripe
- 3m PEEK tubing, 1/16" x 0.50 mm ID,  
orange stripe
- 1 Tweezers

### Tightening tools for PEEK fittings

These handy tools make it fast and easy to tighten PEEK hex-head fittings. The red version is for use with the C360 series fittings shown on page 57. The green tool is for any 1/32" PEEK fitting with a 3/16" hex head nut, and the blue version fits the 1/4" hex common in fittings for 1/16" tubing.



Color	For use with	Prod No
Red	360 µm fittings	C360ET
Green	1/32" fittings	CNFT
Blue	1/16" fittings	ZNFT

#### MORE INFORMATION

Hex-head PEEK fittings  
 360 µm..... page 57  
 1/32" .....63-65  
 1/16"  
 High pressure...63-65  
 Low pressure ..... 71



## Low Pressure Flangeless Tube End Fittings

Cheminert low pressure fittings are ideally suited for flow injection analysis, low pressure liquid chromatography, and stream sampling devices. They may be safely used at pressures up to 500 psi and temperatures to 50°C. Two designs of low pressure tube end fittings are available. *Flangeless* tube end fittings

utilize our new collapsible ferrule, which grips the tubing as the fitting is tightened without significantly reducing the tube ID. *Standard* tube end fittings are retained on polymeric tubing by a flange formed with a Cheminert flanging tool.

2009 #60

### Flangeless tube end fittings

1/4-28

Flangeless tube end fittings eliminate the flanging tool required with standard tube end fittings. The nut turns on the tubing as freely as with our flanged fitting, eliminating the possibility of cracking or unscrewing that can occur when plastic tubing is subjected to twisting as fittings are connected.

Cheminert flangeless fittings include our patented\* collapsible ferrule design. This innovative design utilizes a one-piece ferrule engineered to collapse as it is tightened. The collapse takes place in a very narrow area, resulting in a very effective seal with virtually no distortion of the tubing ID and no dead volume. The assembly is rated at 500 psi liquid when tightened by hand. Since only the tubing and the ferrule come into contact with the solution, the result is an inert system. Use CTFE ferrules for soft tubing (PTFE, FEP, etc.), but use PEEK ferrules for harder tubing (PEEK, ETFE, polyurethane, etc.)

Cheminert tube end fittings work with any 1/16" or 1/8" OD polymeric tubing, and come in twelve different colors for system color coding.



#### Flangeless fittings with CTFE ferrules

	1/16" OD		1/8" OD	
(pkg/5)	Prod No	Price	Prod No	Price
Black	CFL-1BK		CFL-2BK	
Blue	CFL-1BE		CFL-2BE	
Brown	CFL-1BR		CFL-2BR	
Dark gray	CFL-1DG		CFL-2DG	
Green	CFL-1G		CFL-2G	
Lavender/pink	CFL-1L		CFL-2L	
Natural	CFL-1N		CFL-2N	
Orange	CFL-1E		CFL-2E	
Purple	CFL-1P		CFL-2P	
Red	CFL-1R		CFL-2R	
White	CFL-1W		CFL-2W	
Yellow	CFL-1Y		CFL-2Y	

Assorted (pkg/12, one of each color)

with ferrule:

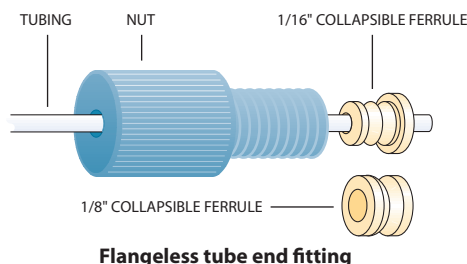
CTFE	CFL-1A	CFL-2A
PEEK	CFL-1A-PK	CFL-2A-PK

#### Replacements

PEEK ferrules (pkg/10)	CFL-CB1PK	CFL-CB2PK
CTFE ferrules (pkg/10)	CFL-CB1KF	CFL-CB2KF
PEEK nuts (pkg/5)	CFL-1PK	CFL-2PK

#### Setting tool

CST	CST
-----	-----



0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

Patent No. 6,575,501

CHROMalytic TECHnology Pty Ltd AUSTRALIAN Distributors e-mail: [sales@chromtech.net.au](mailto:sales@chromtech.net.au) Tel: 03 9762 2034

## Low Pressure Standard Tube End Fittings and External Nuts

## Standard flanged tube end fittings

1/4-28



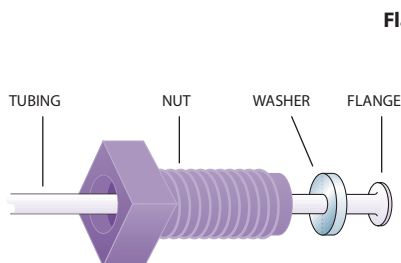
2009 #60



The basic component of the Cheminert system is the polypropylene nut, retained on PTFE or FEP tubing by a flange formed with a Cheminert flanging tool (*page 70*). This is an excellent method for connecting fluorocarbon tubing, as there is no reduction of the inside diameter and no binding or twisting of the tubing when the fitting is tightened. A mating of the parts is achieved with zero dead volume, making this an ideal fitting for biological systems.

Cheminert tube end fittings come in twelve different colors for system color coding, and are available for 1/16" or 1/8" OD fluorocarbon tubing. (While in theory other polymers could be molded to form a flange, only fluorocarbons such as PTFE or FEP have low-temperature malleability and good form retention at operating temperatures.) Tube end fittings attach directly to Cheminert valves and fittings, and are easily joined to each other with a union. Tightening by hand is all that is required to make a leak-free seal at 500 psi liquid, although for long term reliability a wrench could be used to apply an additional 1/8 turn.

Packages include the same number of washers as fittings.



Flanged tube end fitting

## MORE INFORMATION

High pressure fittings ..... pp 63-66  
PTFE and FEP tubing ..... 90

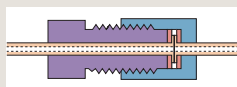
## TECH TIP

To make up standard flanged tube end fittings, use the flanging tool on *page 70*.

A flanging starter kit, complete with flanging tool, flanging tips, and an array of tubing and fittings, is also available. (*See page 70.*)

## TECH TIP

Use our external nut tube end fittings to make true zero volume butt connections without a coupling.



## Flanged fittings

(pkg/10)

## 1/16" OD

Prod No

Price

## 1/8" OD

Prod No

Price

Black

CF-1BK

CF-2BK

Blue

CF-1BE

CF-2BE

Brown

CF-1BR

CF-2BR

Dark gray

CF-1DG

CF-2DG

Green

CF-1G

CF-2G

Lavender/pink

CF-1L

CF-2L

Natural

CF-1N

CF-2N

Orange

CF-1E

CF-2E

Purple

CF-1P

CF-2P

Red

CF-1R

CF-2R

White

CF-1W

CF-2W

Yellow

CF-1Y

CF-2Y

Assorted (pkg/12, one of each color)

CF-1A

CF-2A

Washers

(pkg/10)

CF-W1

CF-W2

## External nuts for flanged tube ends

1/4-28

External nuts with female 1/4-28 threads are designed for use on tubing with a flanged end, just like the standard tube end fittings. Use them instead of a union or coupling to make a zero volume butt connection.

Package of 5:

PEEK

CTFE

Tubing  
OD

Prod No

Price

Prod No

Price

1/16"

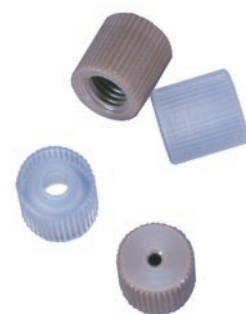
CEN1PK

CEN1KF

1/8"

CEN2PK

CEN2KF



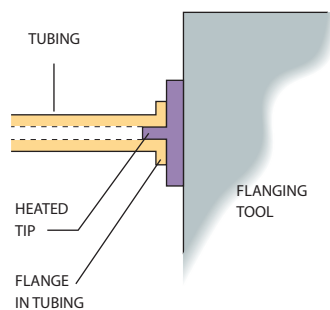


## Flanging Tool, Starter Kit

### Cheminert flanging tools

The flanging tool makes the flange which retains the standard 1/4-28 tube end fitting and washer on PTFE or FEP tubing. With this tool, lengths of tubing may be easily assembled to any required dimension. The time required is approximately 5 to 10 seconds per flange.

Flanging tools are available for 110 VAC or 230 VAC, and come complete with tips for 0.75 mm, 1.0 mm, and 2.00 mm ID tubing, a tubing holder for gripping the tubing during the flanging operation, a razor blade for tube cutting, and instructions.



Flange being made on tubing

	Prod No	Price
<b>Flanging tools</b>		
110 VAC	CFT-110	
230 VAC	CFT-220	
<b>Flanging tool accessories</b>		
Flanging tips		
for tubing ID $\leq 0.25$ mm	CFT-TXC	
for tubing ID $\leq 0.75$ mm	CFT-TC	
for tubing ID $\leq 1.00$ mm	CFT-TM	
for tubing ID $\leq 1.50$ mm	CFT-TL	
for tubing ID $\leq 2.00$ mm	CFT-TXL	
Razor blades (pkg /10)	CFT-R	
Tubing holder	CFT-H	



### Cheminert starter kits

Starter kits come in either 1/16" or 1/8" versions, with flanging tools for 110 VAC or 230 VAC.

	110 VAC		230 VAC	
	Prod No	Price	Prod No	Price
<b>Starter kits</b>				
1/16" tubing	CFT1K-110		CFT1K-220	
1/8" tubing	CFT2K-110		CFT2K-220	

The starter kit includes:

- 1 flanging tool with 3 flanging tips
- 1 tubing holder
- 20 standard tube end fittings
- 20 stainless steel washers
- 10 couplings
- 20 feet of PTFE tubing  
(1/16" OD x 0.030" ID  
or  
1/8" OD x .060" ID)
- 1 male luer adapter
- 1 female luer adapter
- 1 plug
- 1 tee
- 1 glass connector



### MORE INFORMATION

Standard tube end fittings .....	page 69
Stainless steel washers .....	69
Couplings .....	72
Male luer adapter.....	76
Female luer adapter ...	76
Plug.....	71
Tee .....	74
Glass connector .....	75





## Starter Kit, Low Pressure Plugs and Caps



### Easy-Flange kit

The Easy-Flange flange-rolling tool uses mechanical force to form a flange on 1/16" - 1/8" OD PTFE tubing, offering an excellent non-electric alternative to the heated flanging tool.

The quality of the flange is excellent, since it is formed without stressing the tubing by heat. The specially designed negative conical profile of the flange-forming component yields an ideal shape for maximum sealing properties.

	Prod No	Price
Easy-Flange kit	JR-201540	
<i>Includes:</i>		
Plastic box		
Flanging discs with:		
0.5 mm SS pin for PEEK tubing		
0.8 mm polymer pin		
0.8 mm titanium pin		
1.3 mm polymer pin		
1.3 mm titanium pin		
Clean-cut tubing cutter		
PTFE tubing, 1/16" x 0.75 mm ID, 6 ft.		

### Plugs

1/4-28

Plugs can be used to close off an unused port in a 1/4-28 valve or manifold.

	PEEK		CTFE	
Package of 5:	Prod No	Price	Prod No	Price
	CPPK		CPKF	

### Low pressure PEEK plugs

10-32

These all-PEEK plugs are for use in Cheminert PEEK fittings and low pressure polymeric valves (C20Z and C30Z series). For high pressure polymeric valves (C1-C5 series), use plugs on page 64.

			PEEK	
Package of 1: Length of nut*			Prod No	Price
1/16" hex	.62"		MZP1PK	
1/16" long hex	.87"		LZP1PK	
1/16" fingertight	.88"		ZP1FPK	

### Caps

1/4-28

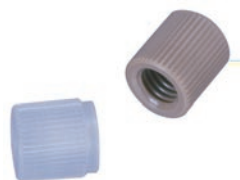
Caps are used to close off lines with 1/4-28 tube end fittings.

	PEEK		CTFE	
Package of 5:	Prod No	Price	Prod No	Price
	CCPK-5		CCKF-5	

### MORE INFORMATION

Clean-cut tubing  
cutter ..... page 90  
Tightening tool for  
hex-head PEEK nuts... 67

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



## Low Pressure Unions

2009 #60

### Unions *Cheminert to Cheminert* 1/4-28 to 1/4-28

Includes flangeless 1/4-28 fittings for tubing OD indicated. Polypropylene unions are for use with flanged tubing only.

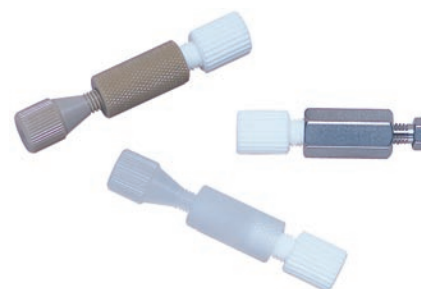
Tubing OD	Bore	PEEK		CTFE		Polypropylene	
		Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.25 mm	CUCPK		CUCKF		—	
1/16"	0.50 mm	CUPK		CUKF		—	
1/16"	0.75 mm	CUMPK		CUMKF		—	
1/8"	1.50 mm	CULPK		CULKF		—	
1/8"	Butt connection	CUTPK		CUTKF		CUTPP *	(* pkg/5)



### Unions *Cheminert to 1/16" ZDV* 1/4-28 to 10-32

Includes flangeless 1/4-28 and ZDV 10-32 fittings for 1/16" tubing.

Tubing OD	Bore	PEEK		CTFE		316 Stainless	
		Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.25 mm	CZUCPK		CZUCKF		CZUCS6	
1/16"	0.50 mm	CZUPK		CZUKF		CZUS6	
1/16"	0.75 mm	CZUMPK		CZUMKF		CZUMS6	



### Unions *Cheminert to 1/4" tubing* 1/4-28 to 1/2-20

Includes flangeless 1/4-28 and 1/2-20 fittings.

Tubing OD	Bore	PEEK		CTFE	
		Prod No	Price	Prod No	Price
1/8" to 1/4"	1.50 mm	CU4LPK		CU4LKF	

Components	Prod No	Price
1/2-20 nut, CTFE	CFL-4KF	
1/2-20 nut, Delrin	CFL-4D	
CTFE ferrule	CFL-CB4KF-S	



0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



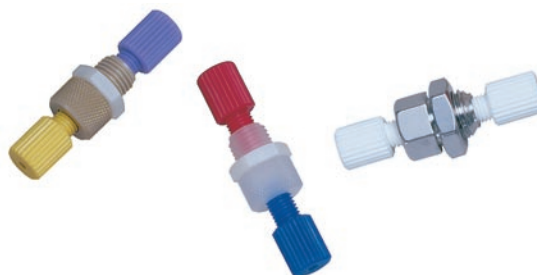
### Bulkhead unions

*Cheminert to Cheminert*

*1/4-28 to 1/4-28*

Includes flangeless 1/4-28 fittings for tubing OD indicated.

Tubing OD	Bore	PEEK		CTFE		316 Stainless	
		Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.25 mm	CBUCPK		CBUCKF		CBUCS6	
1/16"	0.50 mm	CBUPK		CBUKF		CBUS6	
1/16"	0.75 mm	CBUMPK		CBUMKF		CBUMS6	
1/8"	1.50 mm	CBULPK		CBULKF		CBULS6	



### Bulkhead unions

*Cheminert to 1/16" ZDV*

*1/4-28 to 10-32*

Includes flangeless 1/4-28 and ZDV 10-32 fittings for 1/16" OD tubing.

Tubing OD	Bore	PEEK		CTFE		316 Stainless	
		Prod No	Price	Prod No	Price	Prod No	Price
1/16"	0.25 mm	CZBUCPK		CZBUCKF		CZBUCS6	
1/16"	0.50 mm	CZBUPK		CZBUKF		CZBUS6	
1/16"	0.75 mm	CZBUMPK		CZBUMKF		CZBUMS6	



## Low Pressure Tees, Crosses, and Manifolds

2009 #60

### Tees

1/4-28

Includes flangeless 1/4-28 fittings for tubing OD indicated.

Tubing OD	Bore	PEEK		CTFE	
		Prod No	Price	Prod No	Price
1/16"	0.25 mm	CTCPK		CTCKF	
1/16"	0.50 mm	CTPK		CTKF	
1/16"	0.75 mm	CTMPK		CTMKF	
1/8"	1.50 mm	CTLPK		CTLKF	



### Crosses

1/4-28

Includes flangeless 1/4-28 fittings for tubing OD indicated.

Tubing OD	Bore	PEEK		CTFE	
		Prod No	Price	Prod No	Price
1/16"	0.25 mm	CXCPK		CXCKF	
1/16"	0.50 mm	CXPK		CXKF	
1/16"	0.75 mm	CXMPK		CXMKF	
1/8"	1.50 mm	CXLPK		CXLKF	



### Manifolds

1/4-28

Includes flangeless 1/4-28 fittings for tubing OD indicated.

Tubing		PEEK		CTFE	
OD	Bore	Prod No	Price	Prod No	Price
5 ports					
1/16"	0.75 mm	C5M1PK		C5M1KF	
1/8"	1.50 mm	C5M2PK		C5M2KF	
9 ports					
1/16"	0.75 mm	C9M1PK		C9M1KF	
1/8"	1.50 mm	C9M2PK		C9M2KF	



### MORE INFORMATION

Flangeless tube end fittings ..... page 68

0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm





## Mixing Tees and Glass Connectors



## Mixing tees

1/4-28

Includes flangeless 1/4-28 fittings for tubing OD indicated.

Tubing OD	Bore	PEEK		CTFE	
		Prod No	Price	Prod No	Price
1/16"	0.75 mm	CM1XPK		CM1XKF	
1/8"	1.50 mm	CM2XPK		CM2XKF	

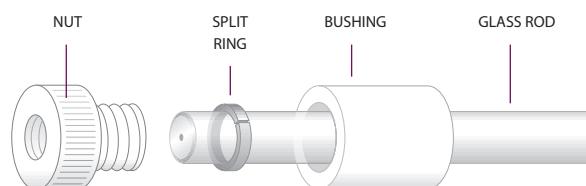


## Glass connectors

1/4-28 female to 1/4" glass tube

Glass connectors join a Cheminert tube end fitting to 1/4" OD glass tubing. They are available as individual components or as complete assemblies. Assemblies include a bushing and nut, a polypropylene or CTFE split ring, and a 1/4" OD x 3-1/4" long piece of 1 mm or 2 mm ID glass tube. This connector works only with our glass tubes.

Description	Acetal		CTFE	
	Prod No	Price	Prod No	Price
<b>Complete assembly</b>				
1 mm ID glass tubing	CGC41		CGC41KF	
2 mm ID glass tubing	CGC42		CGC42KF	
<b>Components</b>				
Bushing	CGCB		CGCBKF	
Nut	CGCN		CGCNKF	
Glass rod, 3-1/4" long				
1 mm ID	CGCG41		—	
2 mm ID	CGCG42		—	
Split rings (package of 5)	CGCR		CGCRKF	



Glass connector



## Adapters

2009 #60

### Tube adapters

1/4-28

Tube adapters have male 1/4-28 threads going to 1/4" or 1/8" OD tubing.

Tubing OD	Bore	PEEK		CTFE		316 Stainless	
		Prod No	Price	Prod No	Price	Prod No	Price
1/8"	1.5 mm	CTA2PK		CTA2KF		CTA2S6	
1/4"	1.5 mm	CTA4PK		CTA4KF		CTA4S6	



### Luer adapters

Luer to 1/4-28 or 10-32

Luer adapters make a leak-tight connection from male or female luer to 1/4-28 threads.

Description	Bore	PEEK		CTFE		PFA	
		Prod No	Price	Prod No	Price	Prod No	Price
Female luer to 1/4-28	1.50 mm	CFLAPK		CFLAKF		CFLAPFA	
to 10-32	0.75 mm	ZUFLPK		ZUFLKF		—	
Male luer to 1/4-28	1.50 mm	CMLAPK		CMLAKF		CMLAPFA	



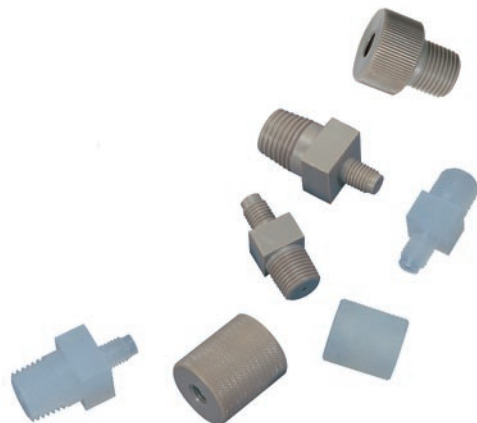
### Luer adapter bulkhead unions

Luer to 1/4-28 or 10-32

Our luer adapter bulkhead union connects a male or female luer to 1/4-28 or 10-32 fittings. These are the ideal fittings for through-the-panel syringe injections. The 1/4-28 versions include flangeless fittings for 1/16" OD tubing. Versions with 10-32 connections (for 1/16" OD tubing) include a fingertight PEEK nut and a ferrule of the same material as the union.



Description	Bore	PEEK		CTFE	
		Prod No	Price	Prod No	Price
Female luer to 1/4-28	1.50 mm	CBUFLPK		CBUFLKF	
to 10-32	1.00 mm	ZBUFLPK		ZBUFLKF	
Male luer to 10-32	1.00 mm	ZBUMLPK		ZBUMLKf	

**Pipe adapters***1/4-28 to NPT*

Versions adapt male or female 1/4-28 fittings to male or female NPT.

PEEK			CTFE		
<i>NPT</i>	<i>Bore</i>	<i>Prod No</i>	<i>Price</i>	<i>Prod No</i>	<i>Price</i>
<b>Female 1/4-28 to male NPT</b>					
1/8"	1.5 mm	CPA2PK		CPA2KF	\$18
1/4"	1.5 mm	CPA4PK		CPA4KF	
<b>Male 1/4-28 to male NPT</b>					
1/8"	1.5 mm	CEPA2PK		CEPA2KF	
1/4"	1.5 mm	CEPA4PK		CEPA4KF	
<b>Female 1/4-28 to female NPT</b>					
1/8"	1.5 mm	CFPA2PK		CFPA2KF	
1/4"	1.5 mm	CFPA4PK		CFPA4KF	



NUT NOT  
INCLUDED

**Cheminert 1/4-28 to Valco 10-32 ZDV adapter**

This adapter permits Valco 10-32 fittings to be installed into any 1/4-28 fitting detail. (Nut and ferrule are not included.)

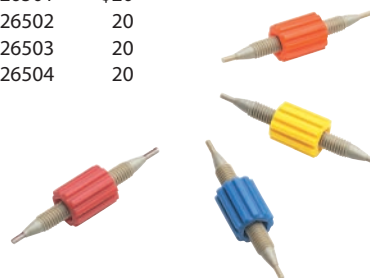
Description	Bore	Prod No	Price
Port adapter	0.50 mm	ZLCA1PK	

**One-piece fingertight column coupler**

Choose from a variety of coupler IDs, indicated by the color of the sleeve (which parallels the color-coding of our PEEK tubing on page 89). A unique feature of this column coupler is that it adapts automatically to fit all pilot lengths – Valco, Waters, Upchurch, Rheodyne, etc. Since the tubing bottoms out in any fitting detail, added void volume is minimal. Material is PEEK.

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm

Color	Bore	Prod No	Price
Red	0.13 mm ID	JR-26501	\$20
Yellow	0.17 mm ID	JR-26502	20
Blue	0.25 mm ID	JR-26503	20
Orange	0.50 mm ID	JR-26504	20



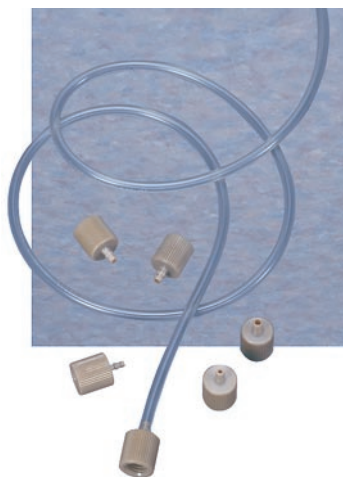
## Filters and Perifit Fittings



### Perifit fittings for peristaltic pump tubing

The Cheminert Perifit is a unique fitting with a barb on one end and a 1/4-28 female fitting on the other end, for connecting a FIA line with the most commonly used peristaltic tubing. The fitting is compact and easy to install while providing a secure, trouble-free connection. A Perifit can be used as a "stop" on standard inexpensive Tygon® tubing, eliminating the need to buy the more expensive pre-cut tubing with pre-installed stops. Unlike many competitive systems, Perifits are reusable as the tubing wears.

Three sizes of Perifits are available to cover the range of tubing most commonly used in FIA.



For use with tubing sizes	Prod No	Price
0.50 to 1.02 mm ID	C-PFS	
1.12 to 1.65 mm ID	C-PFM	
1.85 to 2.29 mm ID	C-PFL	
Kit with 2 of each size above	C-PF	

### In-line filters

1/4-28

These convenient filters can be simply dropped into any 1/4-28 fitting detail. Constructed of PTFE and CTFE, with 316 stainless low-pressure-drop screen. (Fitting shown is not included.)



Pore size	Prod No	Price
2 micron	CFE-S2	
10 micron	CFE-S10	
75 micron	CFE-S75	

### Biocompatible filter

This all-PEEK filter can be placed in any 1/16" line, providing filtration to 0.5 microns. The filter can be changed without tools, since both the filter housing and the fittings are designed to be hand tightened.

Tubing OD	Bore	Prod No	Price
1/16"	0.5 mm	ZU1FPK.5	



#### Replacement elements (PEEK-encapsulated titanium)

Pore size	Prod No	Price
0.5 micron	C-F1.5TI	

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



### Last Drop mobile phase filter

The Last Drop mobile phase filter allows more analyses per batch of mobile phase and helps reduce hazardous waste. The flat filter element sits parallel to the bottom of the reservoir, allowing the Last Drop to filter all but the last 2% of the mobile phase from the reservoir without drawing air into the system. Compare this with conventional cylindrical filters that can begin to draw air into the system when nearly 10% of the solvent remains in the reservoir.

The Last Drop mobile phase filter consists of a 316 stainless or PTFE filter element pressed into an inert PTFE housing. The top of the housing has a PEEK tripod which slips into 1.5, 2.2, or 3.5 mm ID pump inlet lines. It will also work with our 1/16" and 1/8" flangeless fittings.

Use the metal-free PTFE version for sensitive biochromatography applications where metal surfaces may corrode or interact with samples.

	Filter element	Prod No	Price
Last drop filter, 2.5µm	PTFE	JR-9000-0520	
	Stainless steel	JR-9000-0530	



### Last Drop filter/spargers

The Last Drop filter/sparger combines filtration and sparging in a single unit. The PTFE housing contains a mobile phase filter with either a stainless steel or a PTFE filter element. The filter/sparger features a PEEK tripod connector for the solvent line, and a nut and ferrule for the sparging line.

	Filter element	Prod No	Price
Last drop filter/sparger 2.5 µm filter, 10 µm sparger	PTFE	JR-9000-0602	
	Stainless steel	JR-9000-0640	

## Filters



### No-Met biocompatible mobile phase filter

Stainless steel in the flowpath is not acceptable in a growing number of applications involving the separation of biomolecules. High salt buffers can corrode stainless steel, and the metal ions released from metallic filters may contaminate or otherwise react with the biomolecules of interest.

The No-Met polyethylene filter is designed for these applications, with inert polymeric fittings and 20 µm filter effectively eliminating metal contamination from the fluid path. Use them for IC and biochromatography applications.

Because they are hydrophobic, No-Met filters may initially require some priming with methanol or acetonitrile.



	Prod No	Price
No-met mobile phase filter, 1/8"	JR-32178	
Replacement element	JR-32179	

### Stainless steel mobile phase filters and helium spargers

Mobile phase filters protect your HPLC system from small particles in the mobile phase. These filters are made from 316 stainless and PEEK or PTFE, and are suitable for use with most solvents.

Helium spargers offer an inexpensive way to prepare and maintain mobile phases free of dissolved gases. Connect these spargers to a regulated supply of helium gas (0-400 ml/min) to remove dissolved gases from the mobile phase. Spargers are made from 10 micron porosity stainless steel.



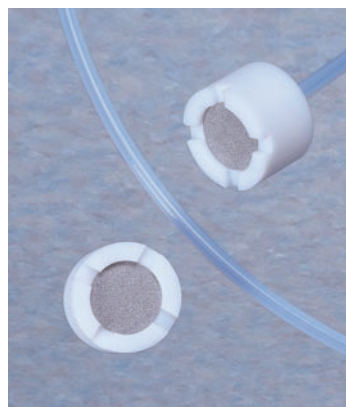
Tubing OD	Porosity	Suggested Max. Flow Rate (ml/min)	Prod No	Price
1/16"	2 µm	8	JR-367016-2	
1/16"	10 µm	20	JR-367016-10	
1/16"	20 µm	20	JR-367016-20	
1/8"	2 µm	8	JR-367008-2	
1/8"	10 µm	20	JR-367008-10	
1/8"	20 µm	20	JR-367008-20	

### Mobile phase filters

Direct connect

Cheminert mobile phase filters provide point-of-use filtering of common HPLC or FIA solvents. They are designed to connect directly to 1/8" OD PTFE or PEEK tubing using a simple press fit. The filter housing is PTFE and includes a 2 or 10 micron titanium frit.

Pore size	Prod No	Price
2 micron	C-MPFTI2	
10 micron	C-MPFTI10	



0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



**Mobile phase or solvent reservoirs**

1/4-28

These high density polyethylene reservoirs for in-line solvent use come with polypropylene caps, 1/4-28 flangeless fittings, and 1/8" PTFE tubes for one or two lines plus vent. Plugs are included for conversion to solvent storage when the reservoir is removed from the system. Optional PTFE filters with titanium frits are available on the facing page.

Capacity	Cap	Prod No	Price
0.5 liter	2-hole	C-MPR2	
0.5 liter	3-hole	C-MPR3	
0.5 liter	plain	C-BOT16	
1.0 liter	plain	C-BOT32	

**VICI-cap**

The VICI-cap is the most economical way to helium sparge and deliver HPLC mobile phases. The insert is manufactured from PTFE with an EPDM\* O-ring and a polypropylene screw cap.

The VICI-cap is available for either GL45 or S40 threaded bottles. It has a 1/4-28 female port and three ports for tubing insertion: two 1/8" tubing ports and a 1/16" tubing port. The tubing ports are made so that you push the tubing through the hole, while 1/4-28 fittings provide the best connection. Unused ports can be plugged as required.

	Prod No	Price
VICI-cap GL-45	JR-9000-0001	
VICI-cap S40	JR-9000-0006	

**Valves for vials**

The screw-cap Mininert is available in a variety of sizes. The crimp-top valve for 13 mm ID glassware slides into the neck of the vial and features a threaded flange, which is turned to provide a leak-tight fit.

Pkg/12:	Cap/thread size	Prod No	Price
	13 mm-425	PS-614158	
	15 mm-425	PS-614160	
	18 mm-400	PS-614161	
	20 mm-400	PS-614170	
	24 mm-400	PS-614163	
	Crimp top	PS-614250	

**MORE INFORMATION**

Bulkhead  
connectors . . . . page 73  
Flangeless fittings . . . . 68  
Plugs . . . . . 71  
Polymeric  
tubing . . . . . 90

**TECH TIP**

The VICI-cap is not usable for building up a helium atmosphere within the solvent bottle. It is only designed for continuous helium sparging.

\*Ethylene Propylene Diene Monomer