

Swagelok® Fittings (Brass & Stainless Steel)

Restek is pleased to offer one of the premier lines of fittings available for chromatographers in the market today. We can supply the entire line of Swagelok® fittings. If you don't see the exact product you're looking for, please call us for a quote.



nut



front ferrule



back ferrule



nut & ferrule set



plug



union



reducing union



tee



cross



tube end reducer



port connector



male connector



female connector



male quick coupling



female quick coupling

Fitting Type	Size	Swagelok #	qty.	Brass		316 Grade Stainless Steel		
				cat.#	price	qty.	cat.#	price
Nut	1/16"	102-1	20-pk.	23100		5-pk.	23150	
	1/8"	202-1	40-pk.	23101		10-pk.	23151	
	1/4"	402-1	40-pk.	23102		10-pk.	23152	
Front Ferrule	1/16"	103-1	20-pk.	23103		10-pk.	23153	
	1/8"	203-1	40-pk.	23104		20-pk.	23154	
	1/4"	403-1	40-pk.	23105		20-pk.	23155	
Back Ferrule	1/16"	104-1	20-pk.	23106		10-pk.	23156	
	1/8"	204-1	40-pk.	23107		20-pk.	23157	
	1/4"	404-1	40-pk.	23108		20-pk.	23158	
Nut & Ferrule Set	1/16"		10-pk.	23109		2-pk.	23159	
	1/8"		20-pk.	23110		5-pk.	23160	
	1/4"		20-pk.	23111		5-pk.	23161	
Plug	1/16"	100-P	5-pk.	23112		2-pk.	23162	
	1/8"	200-P	10-pk.	23113		4-pk.	23163	
	1/4"	400-P	10-pk.	23114		4-pk.	23164	
Union	1/16"	100-6	3-pk.	23115		ea.	23165	
	1/8"	200-6	5-pk.	23116		2-pk.	23166	
	1/4"	400-6	5-pk.	23117		2-pk.	23167	
Reducing Union	1/8" to 1/16"	200-6-1	5-pk.	23118		ea.	23168	
	1/4" to 1/16"	400-6-1	5-pk.	23119		2-pk.	23169	
	1/4" to 1/8"	400-6-2	5-pk.	23120		2-pk.	23170	
Tee	1/16"	100-3	2-pk.	23121		ea.	23171	
	1/8"	200-3	2-pk.	23122		ea.	23172	
	1/4"	400-3	2-pk.	23123		ea.	23173	
Cross	1/8"	200-4	2-pk.	23124		ea.	23174	
	1/4"	400-4	2-pk.	23125		ea.	23175	
Tube End Reducer	1/8" to 1/16"	100-R-2	5-pk.	23126		2-pk.	23176	
	1/4" to 1/16"	100-R-4	5-pk.	23127		2-pk.	23177	
	1/8" to 1/4"	400-R-2	5-pk.	23128		2-pk.	23178	
	1/4" to 1/8"	200-R-4	5-pk.	23129		2-pk.	23179	
Port Connector	1/8"	201-PC	5-pk.	23130		2-pk.	23180	
	1/4"	401-PC	10-pk.	23131		2-pk.	23181	
	1/8" to 1/4"	401-PC-2	5-pk.	23132		2-pk.	23182	
Male Connector	1/8" to 1/8" NPT	200-1-2	10-pk.	23133		2-pk.	23183	
	1/4" to 1/4" NPT	400-1-4	10-pk.	23134		2-pk.	23184	
	1/16" to 1/8" NPT	100-1-2	5-pk.	23135		2-pk.	23185	
	1/8" to 1/4" NPT	200-1-4	10-pk.	23136		2-pk.	23186	
	1/4" to 1/8" NPT	400-1-2	10-pk.	23137		2-pk.	23187	
Female Connector	1/8" to 1/8" NPT	200-7-2	5-pk.	23138		2-pk.	23188	
	1/4" to 1/4" NPT	400-7-4	5-pk.	23139		2-pk.	23189	
	1/4" to 1/8" NPT	400-7-2	5-pk.	23140		2-pk.	23190	
Male & Female Quick Couplings	1/8" male*	QC4D-200	—	—		ea.	23191	
	1/8" male	QC4S-200	—	—		ea.	23192	
	1/8" female*	QC4B-200	—	—		ea.	23193	
	1/4" male*	QC4D-400	—	—		ea.	23194	
	1/4" male	QC4S-400	—	—		ea.	23195	
	1/4" female*	QC4B-400	—	—		ea.	23196	

*Includes self-sealing shut-off valve.

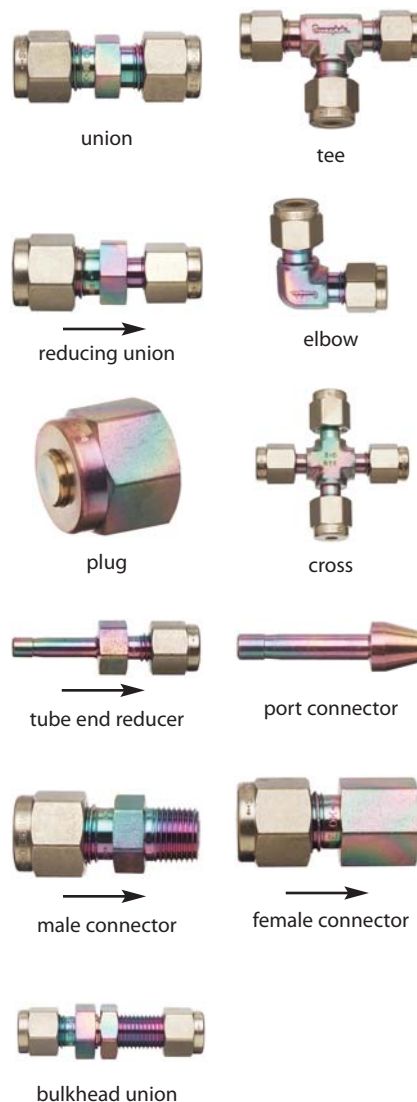
also available

Restek also carries specialized tools for Swagelok® fittings. See page 325.

Swagelok® Fittings (Siltek®/Sulfinert® & Silcosteel®-CR Treated)

- Full line of treated $1/16$ ", $1/8$ ", and $1/4$ " fittings.
- Silcosteel®-CR treatment enhances corrosion resistance by 10x, or more.
- Custom treatment available for any Swagelok® fitting, or other system parts not listed here (call for details).
- Description of custom Restek coatings listed below.

Fitting Type	Size	Swagelok #	Siltek/Sulfinert Treated			Silcosteel-CR Treated		
			qty.	cat.#	price	qty.	cat.#	price
Union	$1/16$ "	SS-100-6	ea.	22540		ea.	22575	
	$1/8$ "	SS-200-6	ea.	22541		ea.	22576	
	$1/4$ "	SS-400-6	ea.	22542		ea.	22577	
	$3/8$ "	SS-600-6	ea.	22909		ea.	22904	
Tee	$1/16$ "	SS-100-3	ea.	22543		ea.	22578	
	$1/8$ "	SS-200-3	ea.	22544		ea.	22579	
	$1/4$ "	SS-400-3	ea.	22545		ea.	22580	
	$3/8$ "	SS-600-3	ea.	22910		ea.	22905	
Reducing Union	$1/8$ " to $1/16$ "	SS-200-6-1	ea.	22546		ea.	22581	
	$1/4$ " to $1/16$ "	SS-400-6-1	ea.	22547		ea.	22582	
	$1/4$ " to $1/8$ "	SS-400-6-2	ea.	22548		ea.	22583	
	$3/8$ " to $1/4$ "	SS-600-6-4	ea.	22911		ea.	22906	
Elbow	$1/8$ "	SS-200-9	ea.	22549		ea.	22584	
	$1/4$ "	SS-400-9	ea.	22550		ea.	22585	
Plug	$1/8$ "	SS-200-P	ea.	22573		ea.	22620	
	$1/4$ "	SS-400-P	ea.	22574		ea.	22597	
Cross	$1/8$ "	SS-200-4	ea.	22551		ea.	22586	
	$1/4$ "	SS-400-4	ea.	22552		ea.	22587	
Tube End Reducer	$1/8$ " tube to $1/16$ "	SS-100-R-2	ea.	22553		ea.	22588	
	$1/4$ " tube to $1/16$ "	SS-100-R-4	ea.	22554		ea.	22589	
	$1/8$ " tube to $1/4$ "	SS-400-R-2	ea.	22555		ea.	22590	
	$1/4$ " tube to $1/8$ "	SS-200-R-4	ea.	22556		ea.	22591	
Port Connector	$1/8$ "	SS-201-PC	ea.	22557		ea.	22592	
	$1/4$ "	SS-401-PC	ea.	22558		ea.	22593	
	$1/8$ " tube to $1/4$ "	SS-401-PC-2	ea.	22559		ea.	22594	
Male Connector	$1/8$ " to $1/8$ " NPT	SS-200-1-2	ea.	22561		ea.	22595	
	$1/4$ " to $1/4$ " NPT	SS-400-1-4	ea.	22562		ea.	22596	
	$1/16$ " to $1/8$ " NPT	SS-100-1-2	ea.	22563		ea.	22610	
	$1/8$ " to $1/4$ " NPT	SS-200-1-4	ea.	22564		ea.	22611	
	$1/4$ " to $1/8$ " NPT	SS-400-1-2	ea.	22565		ea.	22612	
	$3/8$ " to $3/8$ " NPT	SS-600-1-6	ea.	22912		ea.	22907	
Female Connector	$1/8$ " to $1/8$ " NPT	SS-200-7-2	ea.	22566		ea.	22613	
	$1/4$ " to $1/4$ " NPT	SS-400-7-4	ea.	22567		ea.	22614	
	$1/4$ " to $1/8$ " NPT	SS-400-7-2	ea.	22568		ea.	22615	
	$1/8$ " to $1/4$ " NPT	SS-200-7-4	ea.	22569		ea.	22616	
Bulkhead Union	$1/8$ "	SS-200-61	ea.	22570		ea.	22617	
	$1/4$ "	SS-400-61	ea.	22571	\$68	ea.	22618	

**Custom Restek Coatings**

- **Siltek®**—The ultimate passivation of treated surfaces, from glass to high nickel alloys of steel; ideal for sulfurs, automotive exhaust testing, or stack gas sampling.
- **Sulfinert®**—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.
- **Silcosteel®-CR**—A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, or seawater.

For more information on our custom coatings, see page 318.



Parker® Fittings (Brass & Stainless Steel)

Parker's (A-Lok®) two-piece ferrules and NPT fittings are ideal for installing new equipment, modifying existing instrumentation, or replacing worn connections. Restek offers both brass and stainless steel fittings. If there is a particular Parker® fitting that you are looking for and it is not listed here, please contact us to inquire about availability.

Fitting Type	Size	Parker #	qty.	Brass		316 Grade Stainless Steel		
				cat.#	price	qty.	cat.#	price
Nut	1/16"	1 Nu 1	20-pk.	21800		5-pk.	21900	
	1/8"	2 Nu 2	40-pk.	21801		10-pk.	21901	
	1/4"	4 Nu 4	40-pk.	21802		10-pk.	21902	
Front Ferrule	1/16"	1 FF 1	20-pk.	21803		10-pk.	21903	
	1/8"	2 FF 2	40-pk.	21804		20-pk.	21904	
	1/4"	4 FF 4	40-pk.	21805		20-pk.	21905	
Back Ferrule	1/16"	1 BF 1	20-pk.	21806		10-pk.	21906	
	1/8"	2 BF 2	40-pk.	21807		20-pk.	21907	
	1/4"	4 BF 4	40-pk.	21808		20-pk.	21908	
Nut & Ferrule Set	1/16"	—	10-pk.	21809		2-pk.	21909	
	1/8"	—	20-pk.	21810		5-pk.	21910	
	1/4"	—	20-pk.	21811		5-pk.	21911	
Plug	1/16"	1 BLP 1	5-pk.	21815		2-pk.	21915	
	1/8"	2 BLP 2	10-pk.	21816		4-pk.	21916	
	1/4"	4 BLP 4	10-pk.	21817		4-pk.	21917	
Union	1/16"	1 SC 1	3-pk.	21818		ea.	21918	
	1/8"	2 SC 2	5-pk.	21819		2-pk.	21919	
	1/4"	4 SC 4	5-pk.	21820		2-pk.	21920	
Reducing Union	1/8" to 1/16"	2 RU 1	5-pk.	21823		ea.	21923	
	1/4" to 1/16"	4 RU 1	5-pk.	21824		2-pk.	21924	
	1/4" to 1/8"	4 RU 2	5-pk.	21825		2-pk.	21925	
Tee	1/16"	1 ET 1	2-pk.	21826		ea.	21926	
	1/8"	2 ET 2	2-pk.	21827		ea.	21927	
	1/4"	4 ET 4	2-pk.	21828		ea.	21928	
Cross	1/8"	2 ECR 2	2-pk.	21829		ea.	21929	
	1/4"	4 ECR 4	2-pk.	21830		ea.	21930	
Tube End Reducer	1/8" tube to 1/16"	2 TUR 1	5-pk.	21831		2-pk.	21931	
	1/4" tube to 1/16"	4 TUR 1	5-pk.	21832		2-pk.	21932	
	1/8" tube to 1/4"	2 TUR 4	5-pk.	21833		2-pk.	21933	
	1/4" tube to 1/8"	4 TUR 2	5-pk.	21834		2-pk.	21934	
Port Connector	1/8"	2 PC 2	5-pk.	21835		2-pk.	21935	
	1/4"	4 PC 4	10-pk.	21836		2-pk.	21936	
	1/8" tube to 1/4"	2 PC 4	5-pk.	21837		2-pk.	21937	
Male Connector	1/8" to 1/8" NPT	2 MSC 2N	10-pk.	21841		2-pk.	21941	
	1/4" to 1/4" NPT	4 MSC 4N	10-pk.	21842		2-pk.	21942	
	1/16" to 1/8" NPT	1 MSC 2N	5-pk.	21843		2-pk.	21943	
	1/8" to 1/4" NPT	2 MSC 4N	10-pk.	21844		2-pk.	21944	
	1/4" to 1/8" NPT	4 MSC 2N	10-pk.	21845		2-pk.	21945	
Female Connector	1/8" to 1/8" NPT	2 FSC 2N	5-pk.	21846		2-pk.	21946	
	1/4" to 1/4" NPT	4 FSC 4N	5-pk.	21847		2-pk.	21947	
	1/4" to 1/8" NPT	4 FSC 2N	5-pk.	21848		2-pk.	21948	
Male & Female Quick Couplings	1/8" male*	2A-Q4VN	—	—		ea.	21957	
	1/8" male	2A-Q4P	—	—		ea.	21958	
	1/8" female*	2A-Q4CN	—	—		ea.	21959	
	1/4" male*	4A-Q4VN	—	—		ea.	21960	
	1/4" male	4A-Q4P	—	—		ea.	21961	
	1/4" female*	4A-Q4CN	—	—		ea.	21962	

*Includes self-sealing shut-off valve.

Parker® Fittings (Siltek®/Sulfinert® Treated & Silcosteel®-CR Treated)

A broad line of 1/16", 1/8" and 1/4" fittings are available with Siltek®/Sulfinert® or Silcosteel®-CR treatment. Because of expanding applications for these coatings, we have received many requests for a broader product offering. If you do not see everything you need, contact us for information on custom coating services.

Fitting Type	Size	Parker #	Siltek/Sulfinert Treated			Silcosteel-CR Treated		
			qty.	cat.#	price	qty.	cat.#	price
Union	1/16"	1 SC 1	ea.	22520		ea.	22863	
	1/8"	2 SC 2	ea.	22521		ea.	22864	
	1/4"	4 SC 4	ea.	22522		ea.	22865	
Tee	1/16"	1 ET 1	ea.	22526		ea.	22866	
	1/8"	2 ET 2	ea.	22527		ea.	22867	
	1/4"	4 ET 4	ea.	22528		ea.	22868	
Reducing Union	1/8" to 1/16"	2 RU 1	ea.	22523		ea.	22869	
	1/4" to 1/16"	4 RU 1	ea.	22524		ea.	22870	
	1/4" to 1/8"	4 RU 2	ea.	22525		ea.	22871	
Elbow	1/4"	2 EE 2	ea.	22530		ea.	22875	
	1/4"	4 EE 4	ea.	22531		ea.	22876	
Plug	1/8"	2 BLP 2	ea.	21540		ea.	22878	
	1/4"	4 BLP 4	ea.	21541		ea.	22879	
Cross	1/8"	2 ECR 2	ea.	21542		ea.	22872	
	1/4"	4 ECR 4	ea.	21543		ea.	22873	
Tube End Reducer	1/8" tube to 1/16"	2 TUR 1	ea.	21544		ea.	22880	
	1/4" tube to 1/16"	4 TUR 1	ea.	21545		ea.	22881	
	1/8" tube to 1/4"	2 TUR 4	ea.	21546		ea.	22882	
	1/4" tube to 1/8"	4 TUR 2	ea.	21547		ea.	22883	
Port Connector	1/8"	2 PC 2	ea.	21548		ea.	22884	
	1/4"	4 PC 4	ea.	21549		ea.	22885	
	1/8" tube to 1/4"	2 PC 4	ea.	21550		ea.	22886	
Male Connector	1/8" to 1/8" NPT	2 MSC 2N	ea.	21551		ea.	22887	
	1/4" to 1/4" NPT	4 MSC 4N	ea.	21552		—	—	
	1/16" to 1/8" NPT	1 MSC 2N	ea.	21553		ea.	22889	
	1/8" to 1/4" NPT	2 MSC 4N	ea.	21554		ea.	22890	
	1/4" to 1/8" NPT	4 MSC 2N	ea.	21555		ea.	22891	
Female Connector	1/8" to 1/8" NPT	2 FSC 2N	ea.	21556		ea.	22892	
	1/4" to 1/4" NPT	4 FSC 4N	ea.	21557		ea.	22893	
	1/4" to 1/8" NPT	4 FSC 2N	ea.	21558		ea.	22894	
	1/8" to 1/4" NPT	2 FSC 4N	ea.	21559		—	—	
Plug Valve, 2-Way	1/8"	2A PR4 VT SS	ea.	21586		—	—	
	1/4"	4A PR4 VT SS	ea.	21587		—	—	
Ball Valve, 2-Way	1/8"	2A B2LJ2 SSP	ea.	21588		—	—	
	1/4"	4A B2LJ2 SSP	ea.	21589		—	—	

Please note: Nuts and ferrules are not treated unless requested (custom parts). Nuts and ferrules normally are not in contact with sample pathway, and thus do not require coating.

Ball and plug valves are also available in brass and stainless steel. See **page 322**.



union



tee



reducing union



elbow



plug



cross



tube end reducer



port connector



male connector



female connector



plug valve, 2-way



ball valve, 2-way

Valco® Fittings (Siltek®/Sulfinert® Treated)

Fitting Type	Size	Siltek/Sulfinert Treated		
		qty.	cat.#	price
Zero Dead Volume Tee	1/16"	ea.	22534	
	1/8"	ea.	22535	
Zero Dead Volume Union	1/16"	ea.	22532	
	1/8"	ea.	22533	

zero dead volume
teezero dead volume
union

**Zero-Dead-Volume Valco® Internal Union**

Ends of tubing seat squarely at bottoms of fitting details. 300 series stainless steel. For 1/16" OD tubing. Stainless steel ferrules included.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Union	0.15mm	ZU1XC	ea.	20147	
Internal Union	0.25mm	ZU1C	ea.	20148	
Internal Union	0.75mm	ZU1	ea.	20149	
Internal Union	1/16"	ZU1T	ea.	20150	

**Zero-Dead-Volume Valco® Internal Reducing Union**

Connect two sizes of tubing, using zero-dead-volume fittings on each end. For 1/8" to 1/16" OD tubing. Stainless steel ferrules included.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Reducing Union	0.25mm	ZRU21C	ea.	20151	
Internal Reducing Union	0.75mm	ZRU21	ea.	20152	
Internal Reducing Union	1/16"	ZRU21T	ea.	20153	

**Zero-Dead-Volume Valco® Internal Tee**

Connect three lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Tee	0.25mm	ZT1C	ea.	20154	
Internal Tee	0.75mm	ZT1	ea.	20155	

**Zero-Dead-Volume Valco® Internal Cross**

Connect four lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Cross	0.25mm	ZX1C	ea.	20156	
Internal Cross	0.75mm	ZX1	ea.	20157	

**Male Pipe to Valco® Internal Adapter**

Makes a minimum volume connection from a female pipe fitting on a pressure gauge or regulator to a Valco® zero-dead-volume fitting. 300 series stainless steel; stainless steel ferrules included.

Description	Fitting Size	Bore	Valco #	qty.	cat.#	price
Male Pipe to Valco	1/4" NPT Male					
Internal Adapter	to 1/16" ZDV	1.0mm	PZA21	ea.	20158	
Male Pipe to Valco	1/4" NPT Male					
Internal Adapter	to 1/16" ZDV	1.0mm	PZA41	ea.	20159	

**Nuts & Ferrules (1/16-Inch Stainless Steel) for Valco® Connectors**

Description	Valco #	qty.	cat.#	price
Ferrules, 1/16" Stainless Steel	ZF1-10	10-pk.	20286	
Nuts, 1/16" Stainless Steel	ZN1-10	10-pk.	20287	

**1/16-Inch Valco® Adaptor Ferrules**

Tubing OD	Tubing ID	Valco #	qty.	Valcon Polyimide		Polyimide	
				cat.#	price	cat.#	price
0.25–0.4mm	0.1–0.25mm	FS1.4-5	5-pk.	20142		2-pk.	21015
0.4–0.5mm	0.32mm	FS1.5-5	5-pk.	20143		2-pk.	21016
0.5–0.8mm	0.53mm	FS1.8-5	5-pk.	20144		—	—
0.8mm (1/32")	—	FS1.9-5	5-pk.	20145		—	—

also available**Treated Fittings!**

See pages 313-317 for our Siltek®/Sulfinert® treated and Silcosteel®-CR treated fittings, as well as many more brass and stainless steel fittings from Swagelok® and Parker®.



MXT®-Union Connector Kits for Fused Silica Columns

- Low-dead-volume, leak-tight connection.
- Reusable.
- Siltek® treatment ensures maximum inertness.
- Ideal for connecting a guard column or transfer line to an analytical column.
- Use to oven temperatures of 360 °C.
- Available in union and "Y" configurations.
- Can also be used for fused silica to metal connections.

These MXT® connectors can be used with fused silica tubing, because of a Valcon polyimide 1/32-inch one-piece fused silica adaptor. This unique graphite-reinforced composite allows a capillary column to slide into the adaptor and be locked in place simply by loosening and tightening the fitting.

MXT®-Union Connector Kits for Fused Silica Columns

Each kit contains the MXT® union, two 1/32-inch nuts and two one-piece fused silica adaptors.



Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21386	
For 0.32mm ID Fused Silica Columns	kit	21385	
For 0.53mm ID Fused Silica Columns	kit	21384	

MXT® "Y"-Union Connector Kits for Fused Silica Columns

Each kit contains the MXT® union, three 1/32-inch nuts and three one-piece fused silica adaptors.



Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21389	
For 0.32mm ID Fused Silica Columns	kit	21388	
For 0.53mm ID Fused Silica Columns	kit	21387	



Adaptor Ferrules



20389

1/32-Inch Valco® Adaptor Ferrules (Valcon Polyimide)

Fused silica adaptor ferrules are Valcon polyimide, a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at temperatures to 350 °C. The determining factor for selecting adaptor ferrule size is the fused silica tubing OD.

Tubing OD	Tubing ID	Valco #	qty.	cat.#	price
0.25 ≤ 0.40mm	0.25mm	FS.4-5	5-pk.	20137	
0.40 ≤ 0.50mm	0.32mm	FS.5-5	5-pk.	20140	
0.50 ≤ 0.80mm	0.53mm	ZF.5V-5	5-pk.	20141	
1/8" Replacement Nut			5-pk.	20389	

MXT® Low-Dead-Volume Connector Kits for Metal Columns

These low-dead-volume connectors are Siltek® treated to make them inert to active compounds, just like our MXT® columns. They can be used at temperatures up to 430 °C without degrading the deactivated layer. Purchase the appropriate ferrules for connecting 0.28, 0.32 or 0.53 mm ID tubing.

MXT® Low-Dead-Volume Connector Kits for Metal Columns

- Connect a guard column/transfer line to an MXT® stainless steel column.
- Low thermal mass tracks rapid oven temperature programming.
- Stainless steel ferrules and nuts.
- Available in "Y" and union configurations.
- Siltek® treatment ensures ultimate inertness.



Each kit contains the MXT® union, two 1/32-inch ferrules and nuts.

Description	qty.	cat.#	price
For 0.28mm ID MXT Columns	kit	20397	
For 0.32mm ID MXT Columns	kit	20536	
For 0.53mm ID MXT Columns	kit	20394	

MXT® Low-Dead-Volume "Y" Connector Kits for Metal Columns

Connect two MXT® columns to one inlet or one MXT® column to two detectors.



Each kit contains the MXT® union, three 1/32-inch ferrules and nuts.

Description	qty.	cat.#	price
For 0.28mm ID MXT Columns	kit	20396	
For 0.32mm ID MXT Columns	kit	20537	
For 0.53mm ID MXT Columns	kit	20395	

Replacement Ferrules (1/32-Inch Stainless Steel) for MXT® Connectors



Ferrule ID	Fits Column ID	qty.	cat.#	price
0.59mm	0.28mm	10-pk.	20398	
0.53mm	0.32mm	10-pk.	20535	
0.79mm	0.53mm	10-pk.	20399	



20427

Vacuum Vu-Union® Connector for GC/MS Applications

- Connects analytical column to MS transfer line.
- Use under vacuum conditions.
- Use only with Vu-Union® Vespel®/graphite ferrules (order ferrules separately).
- Includes metal housing body, one deactivated tapered glass insert, and Vu-Union® Helping Hand.
- Fits column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).

A specifically designed Vu-Union® glass insert permits more torque to be applied to the ferrules without fear of cracking the insert. The hex end nuts enable you to use wrenches to tighten the end fittings.

Vu-Union® Helping Hand

The Helping Hand is designed to hold in place the metal housing of the Vacuum Vu-Union® connector. This allows you to easily assemble the columns in the glass insert and tighten the nuts. The Helping Hand is included with the Vacuum Vu-Union® connector.



Description	qty.	cat.#	price
Vacuum Vu-Union Connector (with the Helping Hand)	ea.	20427	
Replacement Inserts	3-pk.	20428	



20422

Vu-Union® Vespel®/Graphite Ferrules

- Use with Vacuum Vu-Union® connectors.
- 60% Vespel®/40% graphite.
- 400 °C maximum operating temperature.

Ferrule ID	Fits Column	qty.	cat.#	price
0.3mm	< 0.22mm ID/ < 0.4mm OD	10-pk.	20423	
0.4mm	0.25mm ID/0.4mm OD	10-pk.	20420	
0.5mm	0.32mm ID/0.5mm OD	10-pk.	20421	
0.8mm	0.45/0.53mm ID/0.8mm OD	10-pk.	20422	

**Coupling GC Columns**

An MXT® connector is a good alternative to a glass connector when coupling GC columns. This connector is constructed from stainless steel and will not break; it uses ferrules for sealing. The design ensures low dead volume, and Siltek® treatment ensures the MXT® connector is inert—both features help minimize peak tailing. MXT® connectors can be used to connect metal-to-metal, metal-to-fused silica, or fused silica-to-fused silica tubing. When connecting metal tubing, use 1/32-inch stainless steel ferrules (listed above); for fused silica tubing, use Valcon polyimide adaptor ferrules (see page 292).



20272



20270

Gerstel GRAPHPACK® 3D/2 Connectors & Ferrules

GRAPHPACK® technology provides a complete system that quickly and reliably makes a leak-tight, low-dead-volume connection. The central component is a metal-jacketed graphite ferrule—the ideal seal for GC applications.

Gerstel GRAPHPACK® 3D/2 Connectors

Description	Fits Column ID	qty.	cat.#	price
GRAPHPACK 3D/2 Connector*	0.25mm to 0.32mm ID	ea.	20272	
GRAPHPACK 3D/2 Connector*	0.45mm to 0.7mm ID	ea.	20273	

GRAPHPACK® 3D/2 Ferrules

Ferrule ID	Fits Column ID	qty.	cat.#	price
0.4mm	0.25mm	10-pk.	20271	
0.5mm	0.32mm	10-pk.	20270	
0.8mm	0.45/0.53mm	10-pk.	20274	

*Use only with GRAPHPACK 3D/2 ferrules.

GRAPHPACK® 2m Ferrules

Fits Column ID	Similar to Gerstel part #	qty.	cat.#	price
0.25mm	001805-040-00	10-pk.	22223	
0.32mm	001805-045-00	10-pk.	22224	
0.53mm	001805-007-00	10-pk.	22225	



20146

Ferrule Removal Kit

The tapered tools in this kit have teeth designed to grip and remove fused silica adaptor ferrules that have become stuck in the fitting detail. Each kit has two tools: one for removing 1/32-inch adaptor ferrules and one for removing 1/16-inch adaptor ferrules.

Description	Valco #	qty.	cat.#	price
Ferrule Removal Kit	FRK1	kit	20146	



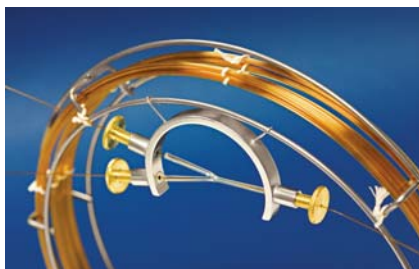
20388

1/4-Inch–3/16-Inch Open-End Wrenches

High-quality miniature wrenches to use with MXT® low-dead-volume connectors.

Description	qty.	cat.#	price
1/4"-3/16" Open-End Wrenches	2-piece set	20388	

restek
innovation!



Fit both Restek cage designs.



Patent pending.

Secure, reliable
column-to-column
connections!

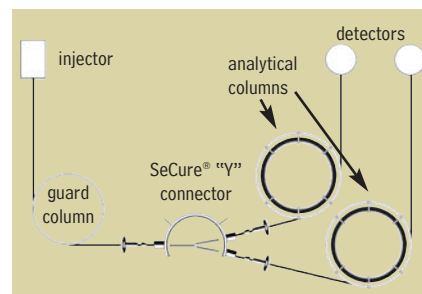
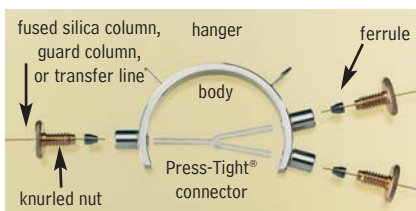
SeCure® "Y" Connector Kits

- Connect two analytical columns to a transfer line or guard column.
- Use standard "Y" Press-Tight® connectors and 1/16" graphite ferrules.
- Reliable seal integrity, will not unexpectedly disconnect during temperature-programmed analyses.
- Open design allows visual confirmation of the seal for added confidence in the connection.
- Fit both Restek cage designs.

Combine the simplicity of a "Y" Press-Tight® connector with the strength of a metal union. The ferrules and knurled nuts hold the fused silica tubing in place, which prevents the tubing from unexpectedly disconnecting, even at temperatures as high as 400 °C.

The SeCure® "Y" Connector's open design allows visual confirmation of the seal.

Dual-column confirmational analysis with a single injection—one of the SeCure® "Y" connector's many uses.



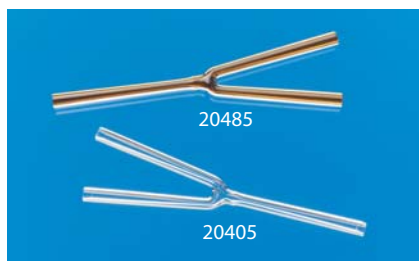
Kits include: SeCure® "Y" connector body, 3 knurled nuts, "Y" Universal Press-Tight® union, 3 ferrules.

Description	Ferrules Fit Column ID	qty.	cat.#	price
SeCure "Y" Connector Kit	0.18/0.25/0.28mm	kit	20276	
SeCure "Y" Connector Kit	0.32mm	kit	20277	
SeCure "Y" Connector Kit	0.45/0.53mm	kit	20278	
Knurled nut		3-pk.	20279	

Universal "Y" Press-Tight® Connectors

An alternative method of performing dual-column confirmational analyses!

- Split sample flow onto two columns.
- Split a single column flow to two detectors—perform confirmation analysis with a single injection.
- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).



Description	ea./price	3-pk./price
Universal "Y" Press-Tight Connector	20405 \$78	20406
Universal "Y" Press-Tight Connector, Deactivated	20405-261 \$79	20406-261
Universal "Y" Press-Tight Connector, Siltek Treated	20485 \$80.50	20486

Graphite Ferrules

for SeCure® "Y" Connectors

- Preconditioned to minimize out-gassing.
- High-purity, high-density graphite.
- Stable to 450 °C.
- No binders that can off-gas or adsorb analytes.
- Smooth surface and clean edges.



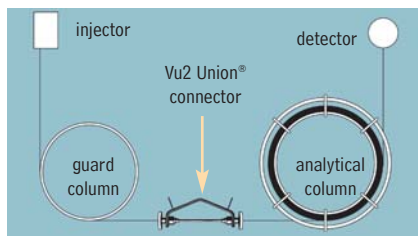
Ferrule ID	Fits Column ID	Graphite 10-pk./price	Graphite 50-pk./price
0.4mm	0.10/0.15/0.18/0.25/0.28mm	20200 \$32	20227
0.5mm	0.32mm	20201 \$32	20228
0.8mm	0.45/0.53mm	20202 \$32	20224

Vu2 Union® Connectors

- Connect a guard column to an analytical column.
- Connect a column to a transfer line.
- Connect two columns in series.
- Repair a broken column.
- Fit both Restek cage designs.

Restek's Vu2 Union® connector combines the simplicity of a Press-Tight® union with the strength of a metal union.

A guard column connected to an analytical column by a Vu2 Union® connector.



Fit both Restek cage designs.



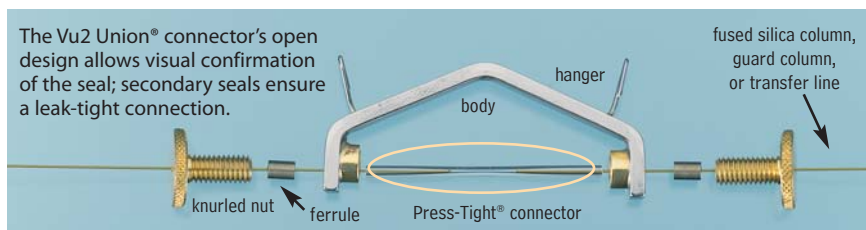
Patent pending.

How does a Vu2 Union® connector work?

A Press-Tight® union in the Vu2 Union® connector joins the fused silica ends together; the ferrule and knurled nut at each end of the connector hold the tubing in place via a secondary seal between the ferrule and the Press-Tight® union. Each knurled nut applies independent pressure to each ferrule, to make a leak-tight seal with the column end. These ultra-strong connections will not unexpectedly disconnect under temperature changes, vibrations, or other stresses normally encountered in GC analyses. The open design allows visual confirmation of the seal between the column and the Press-Tight® union, to ensure confidence in the connection. Hang the connector from the column cage, to minimize stress on the connections.

Who will benefit from using Vu2 Union® connectors?

Any analyst using guard columns, transfer lines, or restrictor tubing, performing a dual-column analysis with columns connected in series, or seeking to repair a broken column will find Vu2 Union® connectors the simple, reliable, easy-to-use solution to their connection needs.



Secure, reliable
column-to-column
connections!

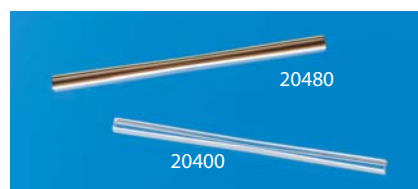
NOTE: This product is not recommended for GC column-to-MS connections—use the Vacuum Vu-Union®. See page 291.

Kits include: Vu2 Union® body, 2 knurled nuts, 2 Press-Tight® unions, and 4 ferrules

Description	Ferrules Fit Column ID	qty.	cat.#	price
Vu2 Union Connector Kit	0.10/0.15mm	kit	22220	
Vu2 Union Connector Kit	0.18/0.28mm	kit	21105	
Vu2 Union Connector Kit	0.32mm	kit	21106	
Vu2 Union Connector Kit	0.45/0.53mm	kit	21107	
Knurled nut		2-pk.	21108	

Universal Press-Tight® Connectors

Description	5-pk./price	25-pk./price	100-pk./price
Universal Press-Tight Connectors	20400 \$49.50	20401 \$198	20402
Universal Press-Tight Connectors, Deactivated	20429 \$57.50	20430 \$228	
Universal Press-Tight Connectors, Siltek Treated	20480 \$62	20449 \$259	

**Graphite Ferrules**

for Vu2 Union® Connectors

- High-purity, high-density graphite.
- Stable to 450 °C.
- No binders that can off-gas or adsorb analytes.
- Smooth surface and clean edges.

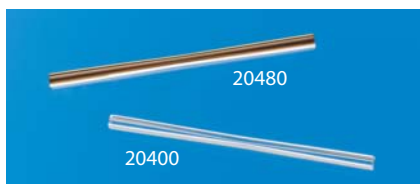
Ferrule ID	Fits Column ID	Graphite 2-pk./price	Graphite 10-pk./price
0.3mm	0.10/0.15mm	22221 \$23	22222
0.4mm	0.18/0.28mm	20280 \$23	20281
0.5mm	0.32mm	20282 \$23	20283
0.8mm	0.45/0.53mm	20284 \$23	20285





Press-Tight® Connectors

- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).



Universal Press-Tight® Connectors

- Connect a guard column to an analytical column.
- Repair a broken column.
- Connect a column outlet to a transfer line.

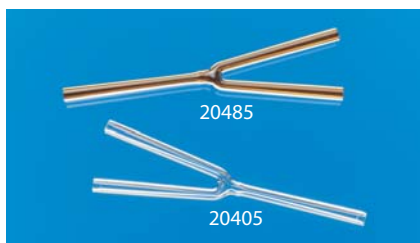
Description	5-pk./price	25-pk./price	100-pk./price
Universal Press-Tight Connectors	20400	20401	20402
Universal Press-Tight Connectors, Deactivated	20429	20430	
Universal Press-Tight Connectors, Siltek Treated	20480	20449	



Universal Angled Press-Tight® Connectors

- Ideal for connecting a guard column to an analytical column.
- Angle approximates the curvature of a capillary column, reduces strain on column-end connections.

Description	5-pk./price	25-pk./price	100-pk./price
Universal Angled Press-Tight Connectors	20446	20447	20448
Universal Angled Press-Tight Connectors, Deactivated	20446-261	20447-261	20448-261
Universal Angled Press-Tight Connectors, Siltek Treated	20482	20483	20484



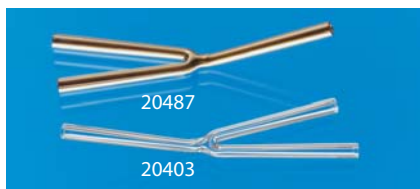
Universal “Y” Press-Tight® Connectors

An alternative method of performing dual-column confirmational analyses!

- Split sample flow onto two columns.
- Split a single column flow to two detectors—perform confirmation analysis with a single injection.

Description	ea./price	3-pk./price
Universal “Y” Press-Tight Connector	20405	20406
Universal “Y” Press-Tight Connector, Deactivated	20405-261	20406-261
Universal “Y” Press-Tight Connector, Siltek Treated	20485	20486

Single injection confirmational analyses!



Universal Angled “Y” Press-Tight® Connectors

- Perform confirmation analysis with a single injection.
- Inlet and outlet ends conform to the column curvature—alleviates column-end connection strain.

Description	ea./price	3-pk./price
Universal Angled “Y” Press-Tight Connector	20403	20404
Universal Angled “Y” Press-Tight Connector, Deactivated	20403-261	20404-261
Universal Angled “Y” Press-Tight Connector, Siltek Treated	20487	20469



Polyimide Resin

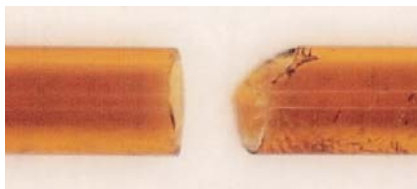
Securely connects a Press-Tight® connector to a fused silica column.

Description	Max. Temp.	qty.	cat.#	price
Polyimide Resin	350°C	5 grams	20445	

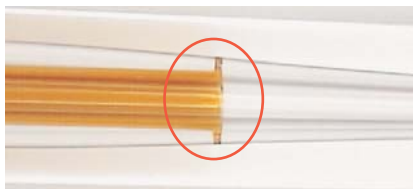
Restek Press-Tight® Connectors

Press-Tight® connectors are lightweight, quickly installed, and easy to use. They connect fused silica tubing having outside diameters ranging from 0.33 to 0.74 mm (Restek 0.1 to 0.53 mm ID). Press-Tight® connectors do not cause solvent tailing, or adsorb active compounds.

Press-Tight® connectors most often are used to connect a guard column to an analytical column. They also are used to connect columns differing in polarity, for unique separations, or to repair a broken column.



Make a clean, square cut for optimum connector performance. The cut on the right will produce a poor seal.



A brown ring indicates a proper seal.

Obtaining a leak-tight seal:

To achieve optimum performance from these connectors, begin with a properly cut fused silica column or retention gap end. Even if you use polyimide resin (cat.# 20445, page 288) for extra insurance, a poorly cut capillary column will make an inadequate seal.

Press the cut ends into the connector, then establish a flow, and leak-check the seal with a Restek Electronic Leak Detector (cat.# 22839, page 273) before heating the system. The seal is made permanent as the polyimide resin coating on the column bonds to the inner surface of the connector after several thermal cycles to 200 °C.

What is the maximum temperature for a Press-Tight® connector?

Press-Tight® connectors are effective at oven temperatures to 325 °C, the temperature at which the polyimide coating on the column decomposes and the connection will begin to leak. We strongly recommend using a Vu2 Union® (page 289) or SeCure® “Y” Connector (page 290) connector if oven temperatures will exceed 325 °C for prolonged periods of time.

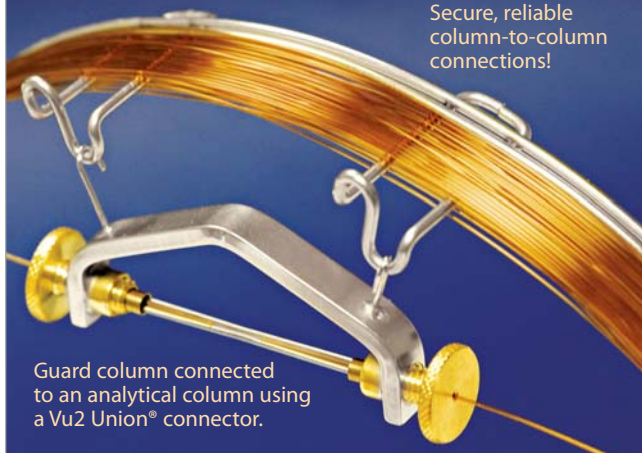
Can Press-Tight® connectors be used with MXT® columns?

No. To achieve a leak-tight fused silica to stainless steel connection, we recommend an MXT® connector (see page 292).

Turn the page for a complete list of Restek Press-Tight® Connectors.

**Let Restek Make the Connection!**

Secure, reliable column-to-column connections!



Guard column connected to an analytical column using a Vu2 Union® connector.

Restek will connect a guard column/transfer line to any analytical column, using a Vu2 Union® connector. We will leak-check the connection and confirm analytical integrity by analyzing a test mixture. To order a preconnected guard column/transfer line, add the three-digit suffix from the chart below to any analytical column catalog number. Example: A 5 m, 0.32 mm ID guard column connected to a 30 m, 0.32 mm ID, 1.0 µm Rtx®-5 column is cat.# 10254-163.

5m Guard Column	cat.# suffix	Additional Cost*
0.15mm ID	-160	
0.18mm ID	-161	
0.25mm ID	-162	
0.32mm ID	-163	
0.53mm ID	-164	
10m Guard Column	cat.# suffix	Additional Cost*
0.25mm ID	-165	
0.32mm ID	-166	
0.53mm ID	-167	

Guard columns listed are intermediate polarity (IP) deactivated.

For more information about guard columns and other deactivations, see pages 31–35.

*Additional cost will be added to the price of the column.

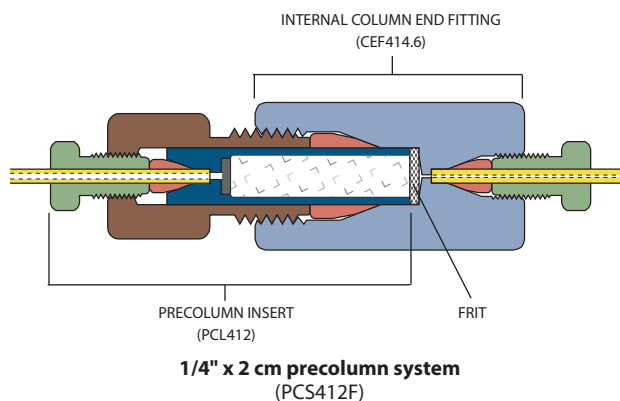
Precolumns (Guard Columns)



Precolumns (guard columns)

Precolumns are available in 2 cm and 5 cm lengths, and can be filled with either 5 μ packing or 37 - 44 μ 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 μ frit		
1/4" x 5 cm precolumn system	PCS415F	
Includes:		
One precolumn insert		
One external column end fitting		
One 2 μ 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 μ titanium frits.

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

NOTE:

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

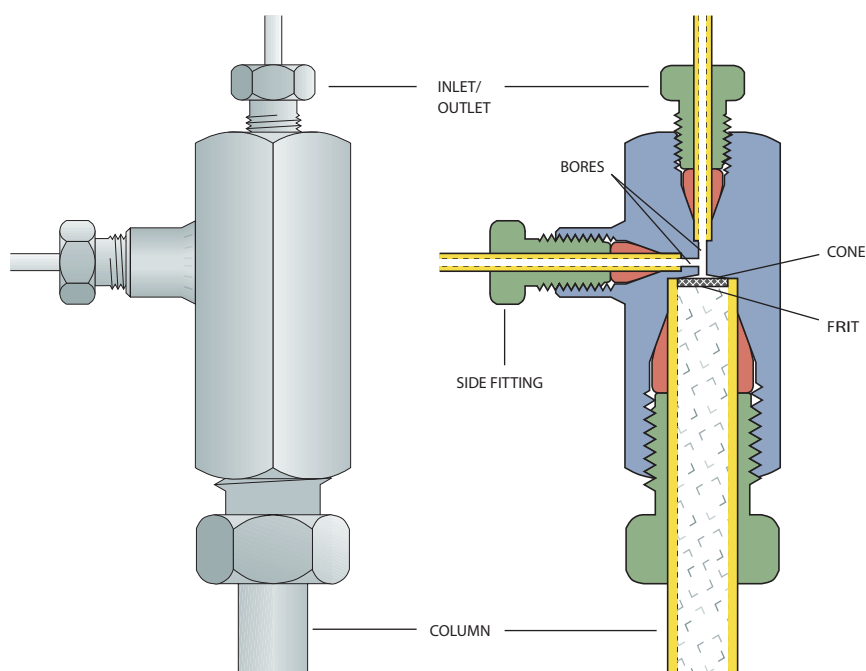
Post-Column Reaction Tee Fittings

2009 #60

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

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

HPLC Column End Fittings

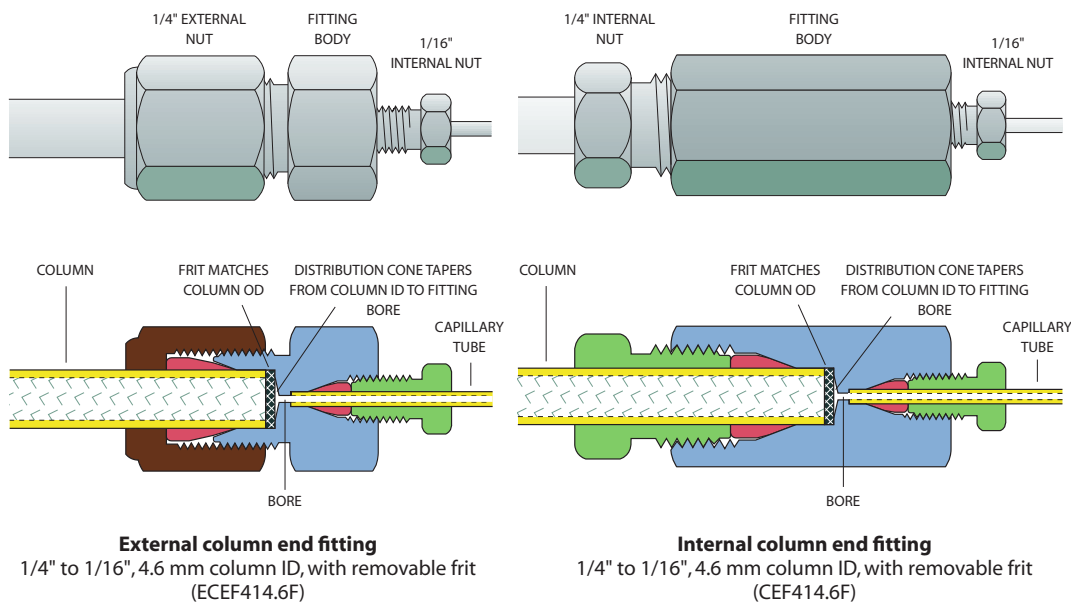
Although our column end fittings look like ordinary reducing unions, they are machined with a conical recess to match a specific column ID so that there are no abrupt or irregular diameter changes which can cause loss of theoretical plates. (See illustrations, below.) This optimization results in an 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



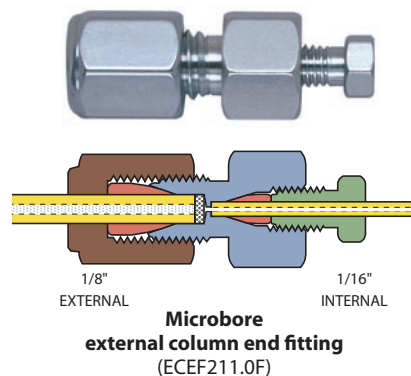
2009 #60

Microbore column end fittings

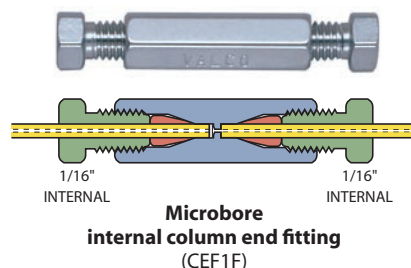
(1.0 mm – 2.0 mm column ID)

Standard material is Type 316 stainless.

	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
External column end fittings						
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

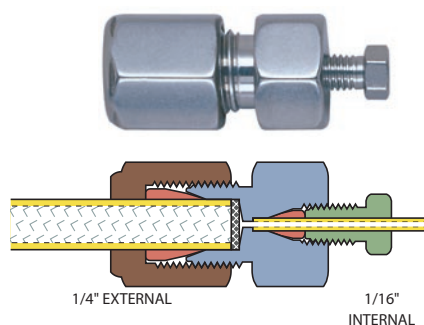
HPLC Column End Fittings

2009 #60

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

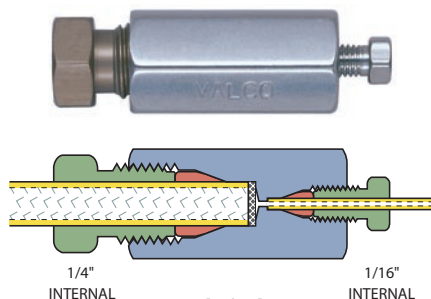
Standard material is Type 316 stainless.

	Bore	Column ID	Without frit		Removable 2µ frit	
			Prod No	Price	Prod No	Price
External column end fittings						
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
Internal column end fittings						
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.

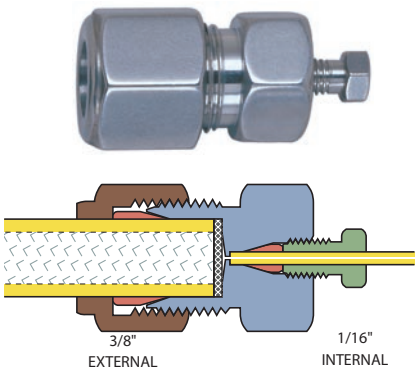
100 µm	= .004"
150 µm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



Semi-preparative and preparative column end fittings

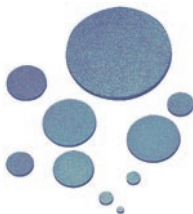
Standard material is Type 316 stainless.

			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	
			Prod No	Price	Prod No	Price	Prod No	Price
<i>Package of 10:</i>								
1/16" frits	Pore Size	Frit thickness						
	0.5µ	0.75 mm	.5FR1-10		.5FR1HC-10		—	
	2µ	0.75 mm	2FR1-10		2FR1HC-10		2FR1TI-10	
1/8" frits	10µ	0.75 mm	10FR1-10		—		—	
	0.5µ	1.00 mm	.5FR2-10		—		—	
	2µ	1.00 mm	2FR2-10		2FR2HC-10		2FR2TI-10	
1/4" frits	10µ	1.00 mm	10FR2-10		—		—	
	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		—	
<i>Each:</i>								
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	

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.

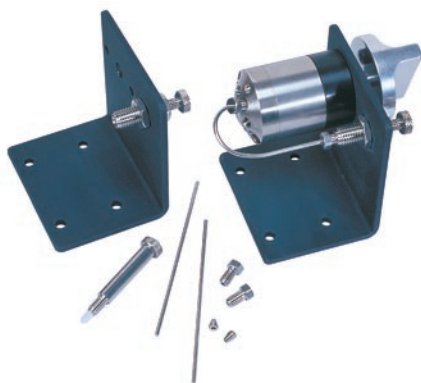


Nanovolume fill ports..... page 60



Syringe Adapters

2009 #60



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.

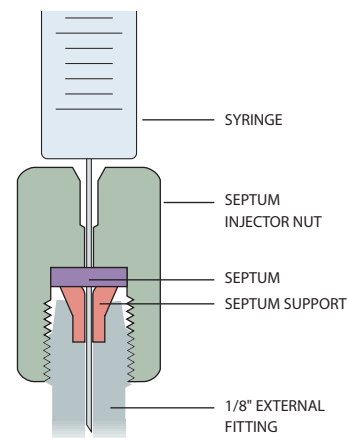
Description		Prod No	Price
Female luer to:	1/32" fitting	ZLA-.5	
	1/16" fitting	ZLA-1	
	1/8" fitting	ZLA-2	



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	



Septum injector nut
with septum and support (EN2SI)

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

Pipe Adapters

2009 #60

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	

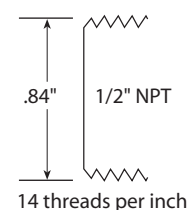
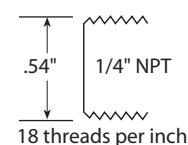
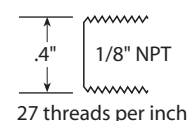


MORE INFORMATION

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	

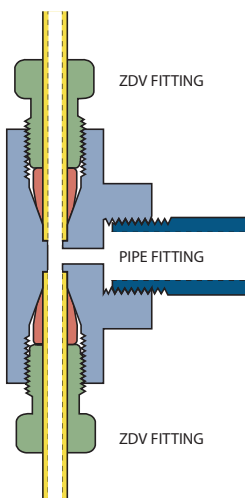


Manifold pipe adapters

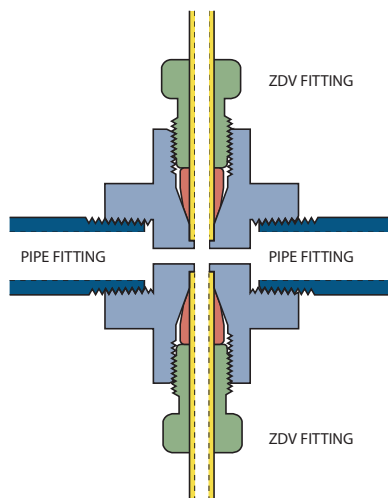
These manifolds, which go from one or two pipe fittings to three or more Valco zero dead volume fittings, minimize the number of connections between a regulator and the various carrier gas lines in a chromatographic system. The models with two pipe fittings go a step further, allowing the support of 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.



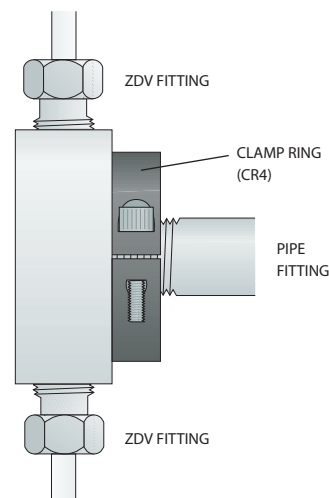
Description	Bore	Prod No	Price
One 1/8" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP1Z3M21	
three 1/8" ZDV fittings	2.0 mm	FP1Z3M22	
three 1/4" ZDV fittings	4.6 mm	FP1Z3M24	
One 1/4" female pipe to:			
three 1/16" ZDV fittings	1.0 mm	FP1Z3M41	
three 1/8" ZDV fittings	2.0 mm	FP1Z3M42	
three 1/4" 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

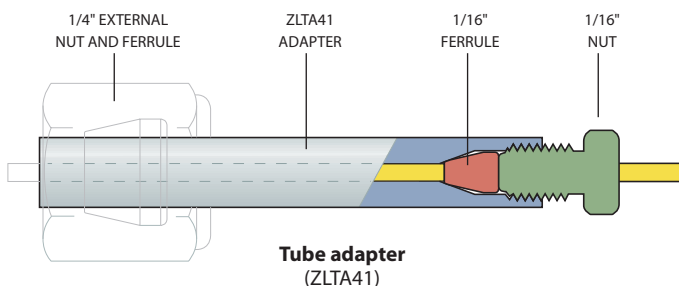
Special Fittings

2009 #60

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	

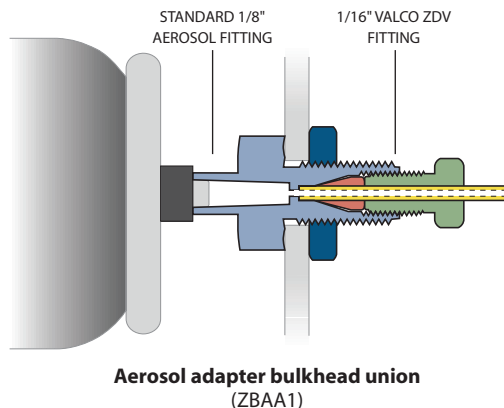


Aerosol adapter bulkhead union

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

Internal Reducers

2009 #60

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	

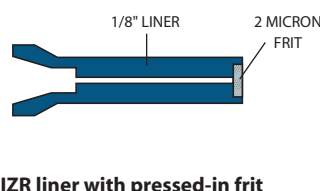
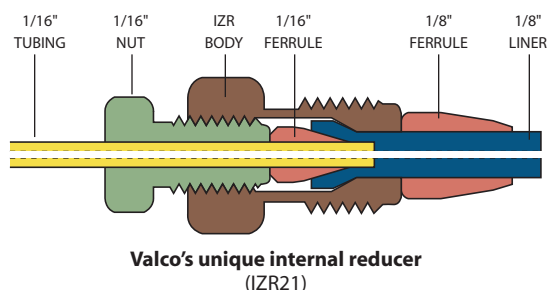
Internal reducers

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

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External to internal adapters (injector/detector adapters)

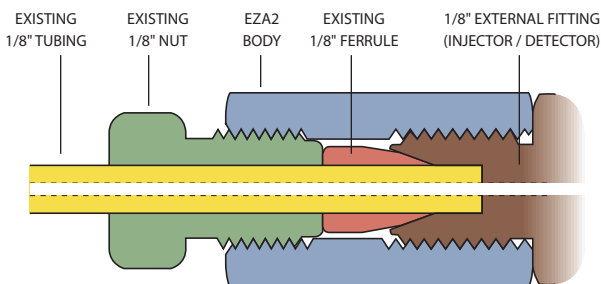
EZAs (external adapters) and EZRs (external reducers) adapt an external tee or union or the external type fittings common on injectors and detectors to Valco zero dead volume connections. Since EZAs are commonly used to connect an external fitting to an existing tube already made up with a Valco internal 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.

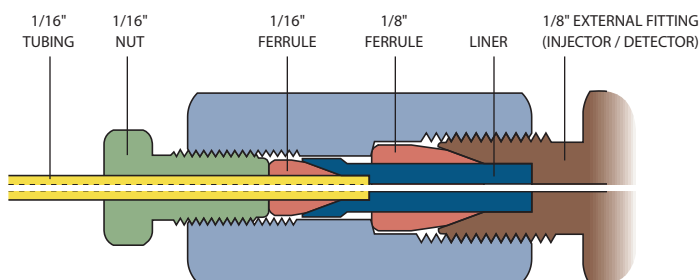
Standard material is 300 series stainless. The EZA does not include a nut or ferrule. The EZR includes a liner, one nut, and two ferrules.

Patent No. 4,173,363

Description	Bore	Prod No	Price
External to internal adapters			
1/16" ext. to 1/16" int.	–	EZA1	
1/8" ext. to 1/8" int.	–	EZA2	
External reducers			
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

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 connectorspp 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.



	<i>Inlet bore</i>	<i>Outlet bore</i>	<i>Material</i>	<i>Prod No</i>	<i>Price</i>
4 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z4M1 Z4M1PK	
6 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z6M1 Z6M1PK	
8 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z8M1 Z8M1PK	
10 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z10M1 Z10M1PK	
12 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z12M1 Z12M1PK	
14 inlets	0.25 mm 0.25 mm	0.75 mm 0.75 mm	Stainless steel PEEK	Z14M1 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.

	<i>Inlet bore</i>	<i>Outlet bore</i>	<i>Prod No</i>	<i>Price</i>
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

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,

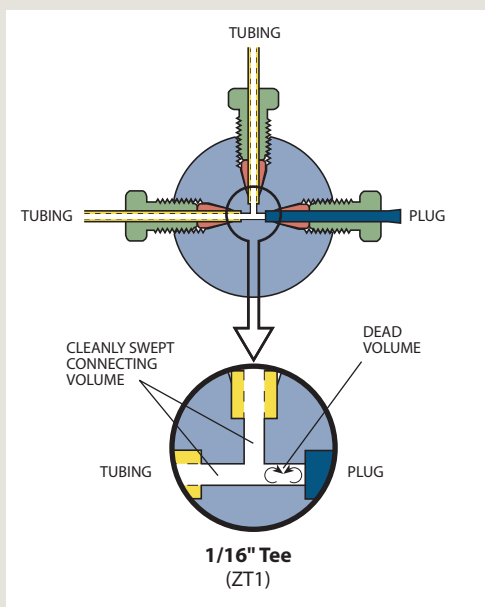
they are not as durable as 1/16" internal fittings. In sizes larger than 1/8", external fittings are generally easier to make up because of less thread friction.

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.



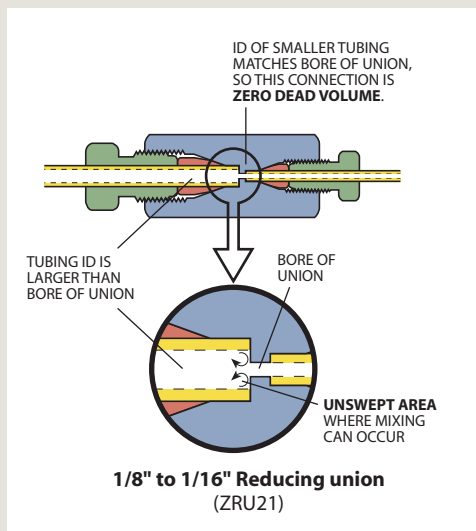
DEAD VOLUME

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

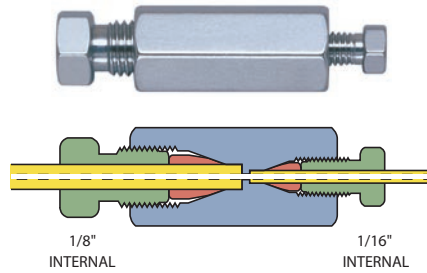


UNSWEPT VOLUME

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.



2009 #60



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.

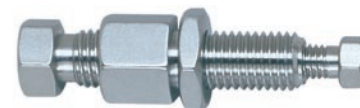
Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

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

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Reducing Unions

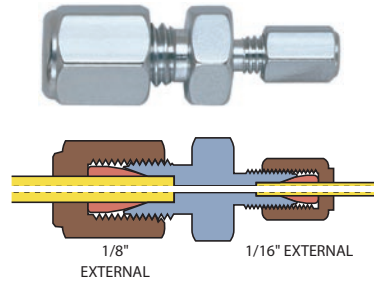
2009 #60

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

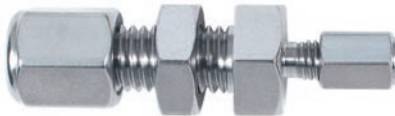
Tubing OD	Bore	Prod No	Price
1/8" to 1/16"	0.75 mm	ERU21	
	1.00 mm	ERU21L	
	1/16"	ERU21T	
1/4" to 1/16"	0.75 mm	ERU41	
	1/16"	ERU41T	
1/4" to 1/8"	1.0 mm	ERU42	
	2.0 mm	ERU42L	
	1/8"	ERU42T	



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)

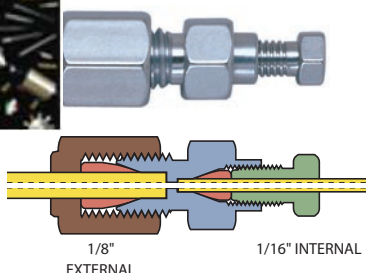
TECH TIP

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

2009 #60



External/internal reducing union
Standard bore
(EZRU21)

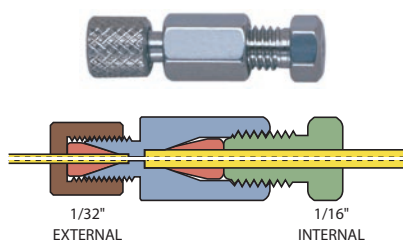


External/internal reducing unions

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)



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

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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.



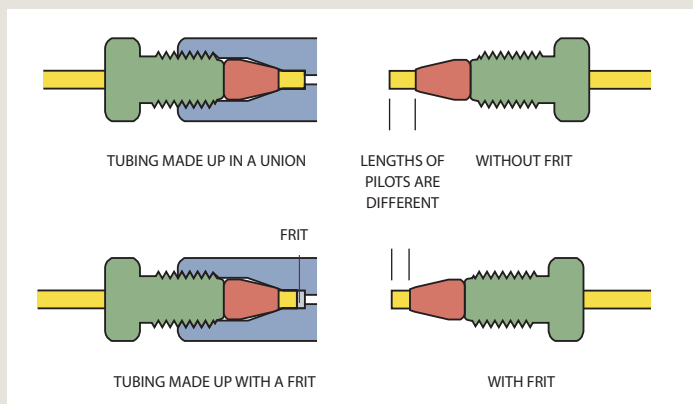
Bulkhead versions can be mounted through an instrument panel or bracket. The fitting body is under so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged environments. 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



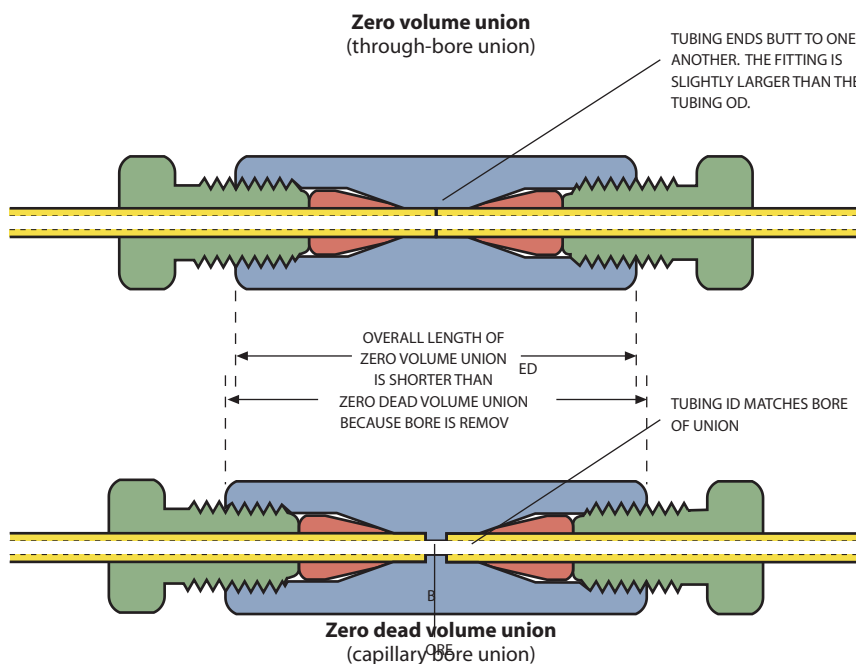
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32"	= 0.8 mm
1/16"	= 1.6 mm
1/8"	= 3.2 mm
1/4"	= 6.4 mm
3/8"	= 9.5 mm
1/2"	= 12.7 mm



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

2009 #60

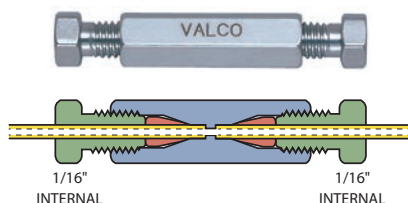
Internal unions – stainless steel

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"

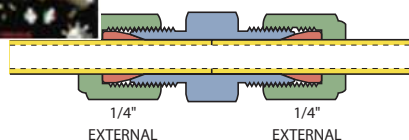
4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"
7.0 mm = .275"
10.0 mm = .400"

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

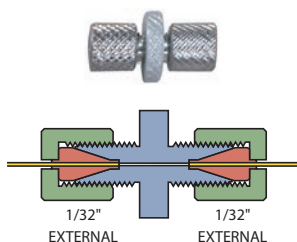
2009 #60



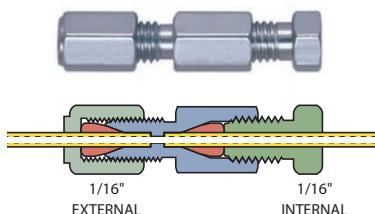
External union
Through-bore version
(EU4T)
Ends of tubing butt together



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"

Microvolume Connectors

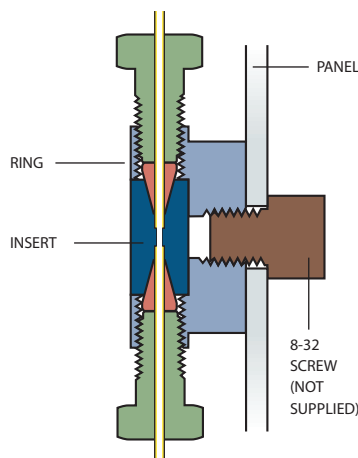
Micro-unions, -tees, -crosses, and -Y's have a unique two-piece design which allows us to provide an extremely small bore in a conventional ferrule and nut fitting. The actual connection area is separated from the nut threads, with the ferrule detail in a metal or polymer insert and the threads machined 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

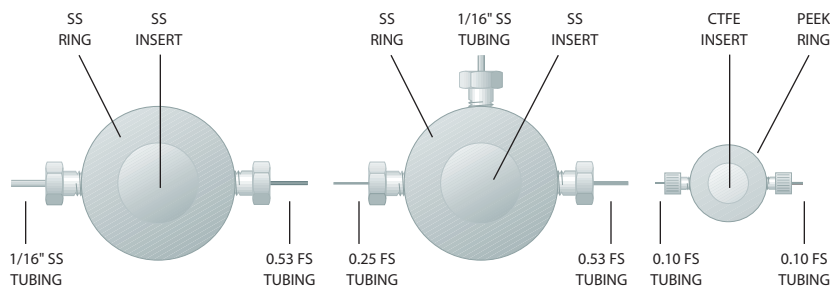
inserts provides electrical insulation within the insert, while the PEEK ring achieves total isolation.

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



Microvolume connectors

Union 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.

	Stainless steel		Hastelloy C		Titanium		PEEK		CTFE	
	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price	Prod No	Price
0.15 mm bore										
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	
0.25 mm bore										
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
0.15 mm bore										
Union	MU1XCS6		MU1XCHC		MU1XCTI		MU1XCPK		MU1XCKF	
Tee	MT1XCS6		MT1XCHC		MT1XCTI		MT1XCPK		MT1XCKF	
Y	MY1XCS6		MY1XCHC		MY1XCTI		MY1XCPK		MY1XCKF	
Cross	MX1XCS6		MX1XCHC		MX1XCTI		MX1XCPK		MX1XCKF	
0.25 mm bore										
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.

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.



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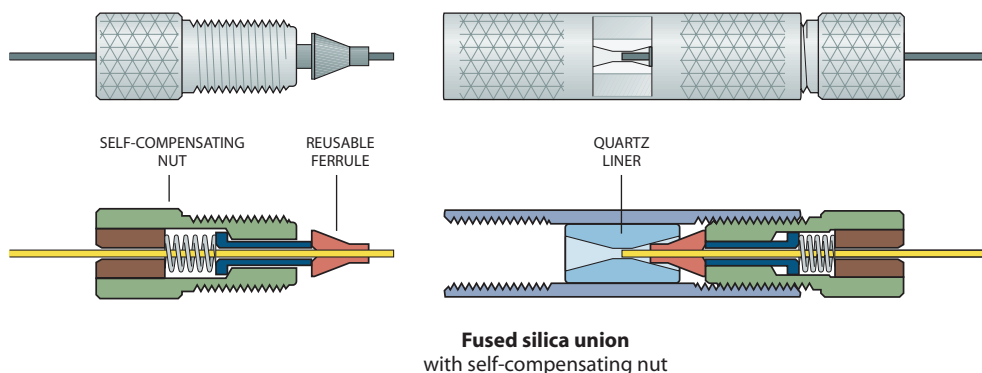
Fused silica unions

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.

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

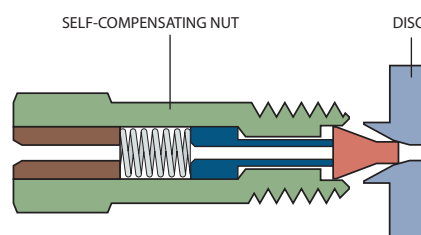


Injector nut for Agilent 6890 and 5890, Series I and II



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	



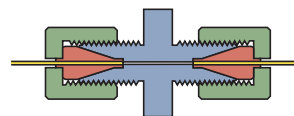
Self-compensating nut
for the 6890/5890 GC

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	



1/32" external union
for use with capillary columns in GC

MORE INFORMATION

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

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

Tubing OD:

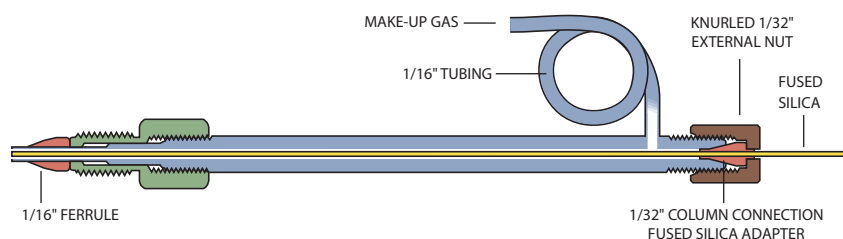
	≤ 0.25 mm	FS.25-5	\$25
0.25 mm	≤ 0.4 mm	FS.4-5	25
0.4 mm	≤ 0.5 mm	FS.5-5	25
0.5 mm	≤ 0.8 mm	ZF.5V-5	25

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

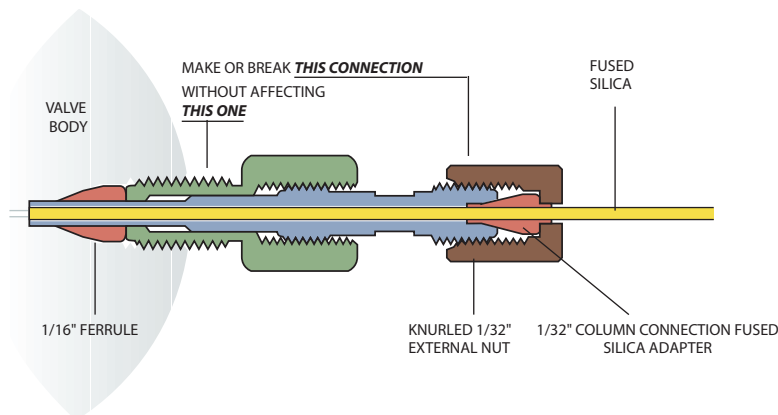


Internal to external reducer/adapters



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

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.



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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
1/32" Adapters	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	
1/16" Adapters	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.

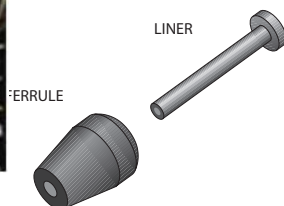
Prod No Price
FRK1 \$23



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

2009 #60



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 ZF5V-5 \$30

1/16" Polyimide ZF1V-5 25

(package of 10)

1/16" PEEK ZF1PK-10 33

Nuts

(package of 10)

1/32" SS ZN5-10 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

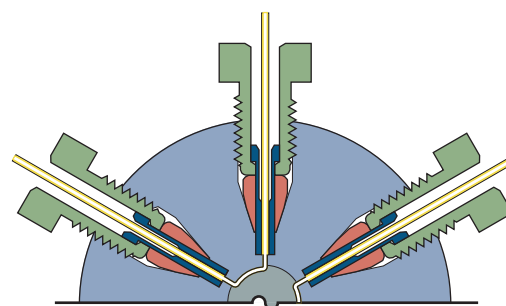
FS1L.8-5

FS1L.8PK-5

0.90 ≤ 1.0 mm

FS1L1.0-5

FS1L1.0PK-5



Removable FSR adapters in a valve