

Nuts, Plugs, and Caps

Most Valco fittings and valves are supplied with the appropriate quantity of nuts and ferrules. However, if additional nuts are required, they may be ordered separately. Use a plug to close off an unused port in a valve, manifold, or HPLC column. Use a cap to close off a tube with a ferrule and internal nut already made up.

Internal nuts – stainless steel

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



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

Further reference

PEEK nuts	page 83
HPLC column end fittings	68-72
Reducing unions	
Internal	55
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External/internal	57
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Unions	
Internal	52
External	53
External/internal	53



External nuts – stainless steel

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

* PTFE-coated threads standard.

<i>Description</i>	Stainless nuts <i>Prod No</i>
1/32" external nut	EN.5
1/32" external nut, knurled	EN.5KN
1/16" external nut	EN1
1/8" external nut	EN2
1/4" external nut	EN4 *
3/8" external nut	EN6 *
1/2" external nut	EN8 *
1" external nut	EN1K *



Plugs – stainless steel and high pressure

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

<i>Description</i>	<i>Length of nut*</i>	Stainless plugs <i>Prod No</i>	High pressure Stainless plugs <i>Prod No</i>
1/32"	.30"	ZP.5	ZP.5H
1/16"	.43"	ZP1	ZP1H
1/16"	.75"	LZP1	LZP1H
1/8"	.57"	ZP2	ZP2H
1/8"	.82"	LZP2	LZP2H
1/4"	.70"	ZP4	-



Caps – stainless steel

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

<i>Description</i>	<i>Length of nut*</i>	Stainless caps	
		<i>Prod No</i>	<i>Price</i>
1/32"	.30"	ZC.5	\$9
1/16"	.43"	ZC1	8
1/8"	.57"	ZC2	8
1/4"	.70"	ZC4	10



Further reference

PEEK plugs	page 84
PEEK plugs for high pressure Cheminert valves	84
PEEK caps	84

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"
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

Ferrules

METALS AT A GLANCE

Hastelloy C® HC

*Resistant to pitting;
Resists oxidizing
atmospheres*

Nickel NI

*Resistant to caustics,
high temp halogens,
and hydrogen halides*

Stainless steel,
Gold-plated GP

*More inert than
standard stainless*

Stainless steel,
Type 303

*GC, gas lines, general
purpose*

Stainless steel,
Type 316 S6

*LC with high chloride ion
in solutions*

Titanium TI

*Outstanding resistance
to most media except
hydrofluoric acids*

Brass B

*Not recommended for
most chromatographic
applications*

FERRULE IDENTIFICATION

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



316 STAINLESS 303 STAINLESS



HASTELLOY C TITANIUM

Further reference

For more detailed information on metals, refer to the discussion on pages 238-239.



Ferrules

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

Valco zero volume ferrules may be used with all Valco fittings and with those of most other manufacturers. The maximum pressure limit is generally determined by the yield strength of the tubing. The exception is for very narrow bore Type 316 stainless steel tubing, where the maximum operational limit of Valco ferrules and fittings is 10,000 psi, regardless of the tubing strength. The maximum pressure for softer materials (such as brass and polymers) is lower, and depends on the tubing used. If in doubt about a particular combination, consult our technical staff.

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

Metal ferrules

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

- Not available

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



Polymeric ferrules



	Prod No	Prod No	Prod No
Package of 10:	PTFE, Virgin	PTFE, Glass-filled	FEP
1/32"	ZF.5TF-10	ZF.5TFG-10	ZF.5FEP-10
1/16"	ZF1TF-10	ZF1TFG-10	ZF1FEP-10
1/8"	ZF2TF-10	ZF2TFG-10	ZF2FEP-10
1/4"	ZF4TF-10	ZF4TFG-10	ZF4FEP-10
3/8"	ZF6TF-10	ZF6TFG-10	ZF6FEP-10
1/2"	ZF8TF-10	ZF8TFG-10	ZF8FEP-10
Package of 10:	PFA	CTFE	
1/32"	ZF.5PFA-10	ZF.5KF-10	
1/16"	ZF1PFA-10	ZF1KF-10	
1/8"	ZF2PFA-10	ZF2KF-10	
1/4"	ZF4PFA-10	ZF4KF-10	
3/8"	ZF6PFA-10	ZF6KF-10	
1/2"	ZF8PFA-10	ZF8KF-10	
Package of 5:	Polyimide, Graphite	Polyimide, Valcon	Polyimide, Virgin
1/32"	ZF.5GV-5	ZF.5V-5	ZF.5V1-5
1/16"	ZF1GV-5	ZF1V-5	ZF1V1-5
1/8"	ZF2GV-5	ZF2V-5	ZF2V1-5
1/4"	ZF4GV-5	ZF4V-5	ZF4V1-5
3/8"	ZF6GV-5	ZF6V-5	ZF6V1-5
1/2"	ZF8GV-5	ZF8V-5	ZF8V1-5

POLYMERS AT A GLANCE

- CTFE KF
*Resists all inorganic corrosives.
Produced as Kel-F®*
- FEP FEP
Chemical resistance equals PTFE, but lower creep and higher friction
- PTFE, Glass-filled TFG
Inert, mechanically stable
- PTFE, Virgin TF
*Inert; very soft, easily cold flows.
Produced as Teflon®*
- Polyimide, Graphite GV
Soft, easy to form ferrules
- Polyimide, Valcon V
High temp, graphite reinforced
- Polyimide, Virgin V1
High temp, electrical insulator

Further reference

- PEEK ferrules page 83
- Grooved PEEK ferrules 83

For more detailed information on polymers, refer to the discussion on pages 239-240.

0.25 mm	= .010"
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3/8"	= 9.5 mm
1/2"	= 12.7 mm

Reducing Ferrules

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



- Internal ZDV** (zero dead volume) reducing ferrules are designed for use with all standard Valco internal style fittings – that is, those with a male nut and female fitting detail. The ferrule features an integral pilot which fills the pilot cavity (the space between the end of the ferrule and the bottom of the detail), yielding a zero dead volume fitting.
- External ZDV** reducing ferrules are designed for use with all standard external style fittings – that is, those with a female nut and a male fitting detail. This ferrule has a slightly longer pilot than the internal version, to accommodate the longer external detail. The result is a zero dead volume fitting. A single groove indicates that the ferrule has the longer pilot and is for use in an external detail.
- Standard** reducing ferrules can be used where mixing is not a problem, such as with liquid or gas delivery. A 1/16" to 1/32" ferrule of this style is simply a 1/16" ferrule with a 1/32" hole.

Internal reducing ferrules

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

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

TECH TIP

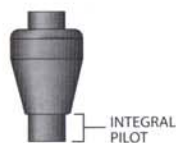
If you are doing resistive heating of traps or columns, note that our virgin polyimide reducing ferrules are effective electrical insulators.

Virgin polyimide is produced as Vespel®.

Further reference

Internal reducers (IZR) page 60
 External reducers (EZR) 61
 Ferrule removal kits 80

For 1/16" and 1/32" reducing ferrules with smaller ODs for use with fused silica, see the FS and FSR adapters on pages 42-43.



Internal reducing ferrule (ZRF)



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



External reducing ferrules

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

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

Package of 5:	Prod No
	CTFE
1/16" to 1/32"	EZRF1.5KF-5
1/8" to 1/32"	EZRF2.5KF-5
1/8" to 1/16"	EZRF21KF-5
1/4" to 1/16"	EZRF41KF-5
1/4" to 1/8"	EZRF42KF-5



OPTION

Available in Virgin Polyimide.

Standard reducing ferrules

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

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

Package of 5:	Prod No
	CTFE
1/16" to 1/32"	RF1.5KF-5
1/8" to 1/32"	RF2.5KF-5
1/8" to 1/16"	RF21KF-5
1/4" to 1/16"	RF41KF-5
1/4" to 1/8"	RF42KF-5



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