

Graphite Ferrules

the "PERFECT" Connection for GC and Glass Tubes

also Graphite/Polyimide for GC/MS (Vacuum Application)

500degC in air
"unlimited" in inert gas
Soft and Malleable
No phase transitions
like plastics

Graphite Ferrules - ALL sizes from 2mmOD to 2.0 in ID

- have been proven in over 25 years production by **Chromalytic Technology** with "millions" being sold "world-wide" mainly through some of the leading chromatography distributors and OEMs.

Full range of sizes from 0.3mm ID for capillary columns right up to 2.0-in for preparative columns and industrial applications;

Industrial Applications : **glass/ceramic tube** reactor/catalyst tubes, pump glands.
there is a size to fit ALL applications !

If we haven't got it already we will guarantee to make it for you !

- Maximum temperature use to 500 deg-C or much higher in a "capture fitting" or if protected in an inert atmosphere.
- They are soft and malleable and extrude into shape to fill minor imperfections in tubing and "distorted fittings".
- They have an ideal "feel" for use with glass and fused silica capillary tube to help avoid crushing on over-tightening.
- They will not stick or bind to tubing and the nut/ferrule can simply be slid off the tubing for re-use.

Specifically for GC . . . ALL types of GCs are catered for including OEM specific ferrules; for example HP/Agilent inlet seals, injector liner O-rings; 8mm, 1/4, 5mmOD for Carlo Erba / Fisons /Thermo / Shimadzu; capture type cup GC column seals. etc

OEM Enquiries Welcome

3 basic Profiles are available . . .

- **SF** - Single (Piece) Ferrule for **Swagelok** and similar fittings eg **Parker. GF** - Front ferrule design for use with a "backing ferrule" or in Chromalytic "butt-type" connection fittings, injection systems.
- **Short profile** - "short" specially designed for HP/Agilent GC capillary GC column inlet seals.

Also . . .

Graphite O-rings (6.35mm and 6,5mm ID) for HP/Agilent GC injector liners.

Cup Graphite Seals for CE/Fisons/ThermoQuest , Shimadzu

and the NEW **CT** graphite capture fittings - **Enquire !**

Capture Ring graphite seal for 8mm OD Fisons/CE/TQ liners.

Graphite/Polyimide Ferrules - 1/8"ID max

: material tends to be cost prohibitive - Other Sizes to special Order

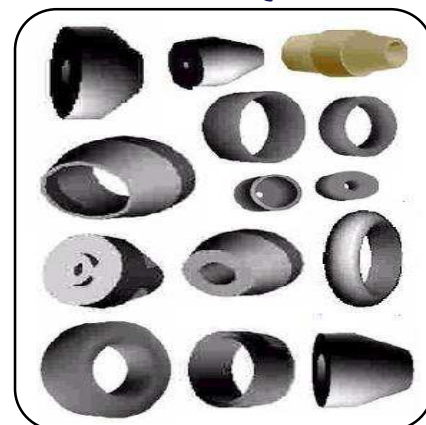
These are precision machined (and NOT moulded) to give a perfect fit in all Swagelok and Parker 1/16-in fittings.

Temperature use is limited to about 320 deg-C.(phase transition)

They are made from **15% graphite/polyimide** selected by . . .

Chromalytic Technology as being the best compromise in "softness", non-stickability and crack resistance. They are preferred over **Graphite Ferrules** for vacuum operation or use in GC/MS for reduced air diffusion.

For long term use - they may tend to "dry out" and may crack on re-tightening after use at high temperature.



Single Piece	
Ferrule Size / Cat.#	
1/16" to :	
0.3mm	SF100/0.3G
0.4mm	SF100/0.4G
0.5mm	SF100/0.5G
0.8mm	SF100/0.8G
1.0mm	SF100/1.0G
1.2mm	SF100/1.2G
1/16"	SF100G
1/8" to :	
0.4mm	SF200/0.4G
0.5mm	SF200/0.5G
0.8mm	SF200/0.8G
1.0mm	SF200/1.0G
1.2mm	SF200/1.2G
1/16"	SF200/100G
1/8"	SF200G
3/16"	SF300G
1/4" to :	
0.5mm	SF400/0.5G
0.8mm	SF400/0.8G
1/16"	SF400/100G
1/8"	SF400/200G
6mm	SF400/M6G
1/4"	SF400G
3/8"	SF600G
1/2"	SF800G
5/8"	SF1000G
3/4"	SF1200G
7/8"	SF1400G
1.0-in	SF1600G
1-1/4-in	SF2000G
1-1/2-in	SF2400G
1-3/4-in	SF2800G
2.0-in	SF3200G
Metric	
5mm	SFM5G
10mm	SFM10G
12mm	SFM12G
14mm	SFM14G
16mm	SFM16G
18mm	SFM18G

Front Ferrule Type	
Ferrule Size / Cat.#	
1/16" to :	
0.4mm	GF100/0.4
0.5mm	GF100/0.5
0.8mm	GF100/0.8
1.0mm	GF100/1.0
1/16"	GF100
1/8"	GF200
1/4" to 3/16"	GF400/300
1/4 to 6mm	GF400/M6
1/4"	GF400
"Specials"	
Agilent O-rings	GFO-6.35HP
6.35mm	GFO-6.5HP
6.5mm	
Inlet Seals (Short)	
0.3mm	GF0.3HP
0.4mm	GF0.4HP
0.5mm	GF0.5HP
0.8mm	GF0.8HP
1.0mm	GF1.0HP
1.2mm	GF1.2HP
(standard)	
0.3mm	GF100/0.3HP
0.4mm	GF100/0.4HP
0.5mm	GF100/0.5HP
0.8mm	GF100/0.8HP
1.0mm	GF100/1.0HP
1.2mm	GF100/1.2HP
Fisons/CE/	
0.3mm	CF0.3Fis
0.4mm	CF0.4Fis
0.5mm	CF0.5Fis
0.8mm	CF0.8Fis
1.0mm	CF1.0Fis
8mm	CF8.0Fis

Graphite/Polyimide 1/16"OD . . . Tube Fitting

0.3mm	SF100/0.3VG1
0.4mm	SF100/0.4VG1
0.5mm	SF100/0.5VG1
0.7mm	SF100/0.7VG1
0.8mm	SF100/0.8VG1
1.0mm	SF100/1.0VG1
1.2mm	SF100/1.2VG1
1/16"	SF100VG1
1/8"	SF200VG1
3/16"	SF300VG1
1/4"	SF400VG1

ANY size
to your
specifications
Generous Discounts
apply to OEMs
and for
"bulk" orders

Other Specials - for small "runs" a tooling cost may apply

Double-Hole Ferrules	No-Hole Ferrules (Blanks)
1/16" Double-hole	1/16" SF100/00G
SF100/2x0.5G	1/8" SF200/00G
GF2x0.5HP, GF100/2x0.5G	3/16" SF300/00G
1/8" Double-hole	1/4" SF400/00G
SF200/2xM0.5G	3/8" SF400/00G
SF200/2xM0.8G	1/2" SF800/00G

Note : **Teflon** and **PEEK** ferrules are also available for HPLC / LC / FIA applications . . . **Enquire !**

Graphite Ferrules

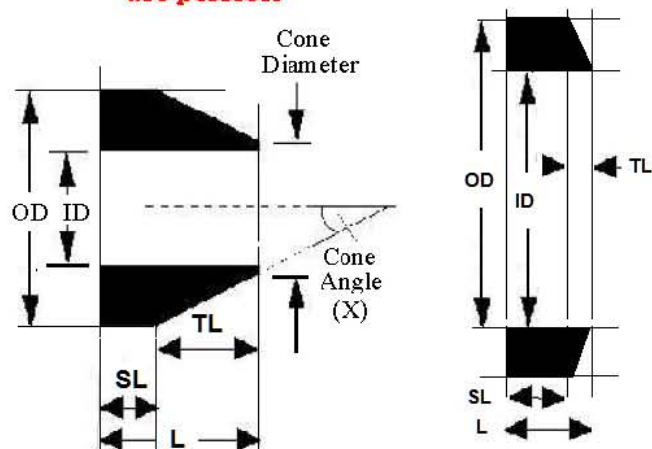
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CUSTOM Specifications

**"Not ALL Things
are possible"**

"pseudo" O-RING

To Order Custom-made "Specials" ... Ferrule Specifications required		
Size in ... Inches <input type="checkbox"/> or ... mm <input type="checkbox"/>		
Material	Required	Tolerance Required
- Graphite	<input type="checkbox"/>	
- Graphite/Polyimide 15%	<input type="checkbox"/>	
- Teflon (PTFE)	<input type="checkbox"/>	
- PEEK	<input type="checkbox"/>	
- Kel-F / Tefzel	<input type="checkbox"/>	
Other (specify)		
ID		
OD		
Length (L)		
= (ShoulderLength + TaperLength) SL TL		
Cone diameter (CD)	ID + 0.3 to 0.6 mm for TIP strength	
Quantity Required		



One-Piece Swagelok Cone Ferrule SF400G

SF30.0/25.4/6.0-4.2-1.8G

The **Cone Angle** is generally incidental in production - but typically for the SF type ferrules (X)=17 degrees +1 deg
The shape is actually determined by all other dimensions
The **Overall Length** is the easiest parameter to vary in production simply by varying the **Shoulder Length** (SL) whilst retaining a constant **Cone Angle** (X)

for Specials - a tooling set-up cost of \$75 to \$150 may apply for small quantities depending on the actual size.

Typical Ferrule Dimensions and Tolerances (sizes in inches)

Catalog #	ID	L	SL	CD	OD	ID	Min	Max
SF100/...G	0.3mm-1/16"	0.170	0.100	0.075	0.125	0.3mm	0.0125	0.0135
GF...HP	0.3mm-1/16"	0.090	0.050	0.072	0.125	0.4mm	0.160	0.0175
GF100/...HP	0.3mm-1/16"	0.120	0.080	0.072	0.125	0.5mm	0.020	0.0215
GF100/...	0.3mm-1/16"	0.135	0.095	0.075	0.125	0.7mm	0.027	0.0285
SF200/...G	0.4mm-1/8"	0.250	0.120	0.135	0.250	0.8mm	0.310	0.320
SF400/...G	0.5mm-1/4"	0.255	0.120	0.260	0.375	1.0mm	0.040	0.042
HP O-ring	6.35mm, 6.5mm	0.100	-	-	0.375	1.2mm	0.047	0.049
SF600G	3/8"	0.320	0.160	0.390	0.500	1/16"	0.063	0.0645
SF800G	1/2"	0.375	0.160	0.520	0.675	1/8	0.125	0.1265
SF1000G	5/8"	0.400	0.160	0.660	0.815	1/4	0.250	0.252
SF1200G	3/4"	0.450	0.180	0.790	0.945	3/8	0.375	0.387
SF1400G	7/8"	0.525	0.200	0.780	1.125	Graphite Ferrules will squash into shape and actual sizes are far less critical than for metal ferrules.		
SF1600G	1.00"	0.575	0.250	1.040	1.25			
SF2400G	1-1/2"	0.875	0.340	1.560	1.75			
SF3200G	2.00"	1.100	0.275	2.090	2.60			

Typical Manufacturing Tolerances	L	+ 0.005	- 0.005
	SL	+ 0.005	- 0.005
	ID	+ 0.002	- 0.000
	CD	+ 0.002	- 0.000
	OD	+ 0.000	- 0.002
Cone Angle(X)			
* tighter tolerance is possible but generally at extra cost			

ANY Size - IF it is practical !
... **THEN** we can make it !
Types include "capture type" and "cup seals" and "encapsulated" ferrules ... **Enquire !**
BUT ! We suggest YOU draw it exactly to scale first to PROVE it is feasible in principle in the first place !

Custom Precision Machining

- Metal ... in ANY material Stainless Steel - any grade 303 / 304 / 316 / Inconel, Brass
- ANY type of plastics ... Vespel / Graphite/polyimide / Teflon / PEEK / Kel-F / Nylon / polypropylene etc etc
- "small" runs a specialty ... **We do NOT try and compete with large auto-repetition shops**
... If you can buy mass-produced / cast or moulded products we can't compete ... we "specialise in specials"



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Australian Distributors
Importers & Manufacturers
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Website : www.chromtech.net.au E-mail : info@chromtech.net.au TelNo : 03 9762 2034 ... in AUSTRALIA

Australian / International **FERRULES** - Price List July 2014 -16+

Graphite Ferrules - Straight - in USD / AUD *

Custom GFs

Catalog #	Fitting Size	Hole ID	Description	USD/AUD *	QTY
* In AUSTRALIA Prices are the same but in AUD *					
SF100G	1/16"	1/16"	Ferrules, Graphite, 1/16"ID	25.00	10-pk
GF100	1/16"	1/16"	Ferrules, Graphite, FRONT, 1/16"ID	25.00	10-pk
SF200G	1/8"	1/8"	Ferrules, Graphite, 1/8"ID	25.00	10-pk
GF200	1/8"	1/8"	Ferrules, Graphite, FRONT, 1/8"ID	25.00	10-pk
SF300G	3/16"	3/16"	Ferrules, Graphite, 3/16mmID	25.00	10-pk
SFM5G	5mm	5mm	Ferrules, Graphite, Varian 5mmID	25.00	10-pk
GF400	1/4"	1/4"	Ferrules, Graphite, FRONT, 1/4"ID	25.00	10-pk
SF400G	1/4"	1/4"	Ferrules, Graphite, 1/4"ID	25.00	10-pk
SF400SPEC	1/4"	1/4"	Ferrules, Graphite, 1/4"ID	30.00	10-pk
SF600G	3/8"	3/8"	Ferrules, Graphite, 3/8"ID	36.00	10-pk
SFM10G	10mm	10mm	Ferrules, Graphite, 10mmID Metric	36.00	10-pk
SFM12G-1	12mm	12mm	Ferrules, Graphite, 12mmID Metric	4.20	ea
SF800G	1/2"	1/2"	Ferrules, Graphite, 1/2"ID	42.00	10-pk
SFM14G-1	14mm	14mm	Ferrules, Graphite, 14mmID Metric	4.80	ea
SF1000G-1	5/8"	5/8"	Ferrules, Graphite, 5/8"ID	4.80	ea
SF1200G-1	3/4"	3/4"	Ferrules, Graphite, 3/4"ID	5.60	ea
SF1400G-1	7/8"	7/8"	Ferrules, Graphite, 7/8"ID	6.80	ea
SF1600G-1	1.0"	1.0"	Ferrules, Graphite, 1.0"ID	8.10	ea
SFM25G-1	25mm	25mm	Ferrules, Graphite, 1-1/4"ID	8.10	ea
SF2000G-1	1-1/4"	1-1/4"	Ferrules, Graphite, 1-1/4"ID	12.00	ea
SF2400G-1	1-1/2"	1-1/2"	Ferrules, Graphite, 1-1/2"ID	15.00	ea
SF2800G-1	1-3/4"	1-3/4"	Ferrules, Graphite, 1-3/4"ID	18.00	ea
SF3200G-1	2.0"	2.0"	Ferrules, Graphite, 2.0"ID	21.00	ea

NOTES : Graphite Ferrules

2 Sizes of HP ferrules for HP/Agilent 5890

GF100/- - HP size to fit standard HP inlet seal nut (0.125-in long)

GF- - HP a short version to fit shallow recess HP nut (0.090-in Long

Custom Ferrules : ANY size to order - providing it is physically feasible for us to make.

We need accurate dimension "specs" OD / ID / Overall Length / Shoulder Length and OD

at Cone Tip. Note : For Swagelok Ferrule shapes the cone angle is normally 17-deg

There may be a "one-off" tooling charge of USD90(<1/2"ID) to- \$150 depending on size

- if this is required for a "special" ie not a stock item.

Discounts : apply depending on **Total \$ Order** value or on Qty(each) . . . at **your** best rate!

Also OEM and Distributor Discounts : . **Enquire !**

Qty Discount

USD & AUD *

\$25-400 less 0%

\$400-1500 - 15%

\$1500-2500 - 20%

Distributors ASK!

Int'l Courier Frt 2020+

Min \$115 per 500g

plus \$30 /kg

Delivery Times : Availability - most standard sizes are ex stock in reasonable Qty's

Production Lead Time : most sizes are ex-stock or 4-5 days production for **qty to 500** each;

larger qty approx 7+ days from date of order . . . **PLUS transit time**

Shipping :

In Australia via Local Courier : **in Melb \$25.00, to 10kg : Interstate Toll-Air > 5kg Max ~\$35 varies as per Mals Cart**

International - Air Express Courier Door-to-door.

USA

Transit time : approx 3 to 5 days (most countries eg. UK, USA, Canada . . .)

Other Countries - **please enquire !**

Payment by Bank Transfer or Credit Card via on-line PayPal (we send a separate PP Invoice on request)

. . . **plus Company Name; Street Delivery address; Contact Phone Number required.**

Prices include packing in plastic vials 10-pk unless specified otherwise. Also available "bulk-packed" for large quantities.
-1 suffix designates order qty : each - 50 for a 50-pk at 20% Discount . . . packed in plastic vials or separately for large sizes

Australian / International FERRULES - Price List July 2014-16

Graphite Ferrules - Reducing Prices per 10-pk - in USD / AUD

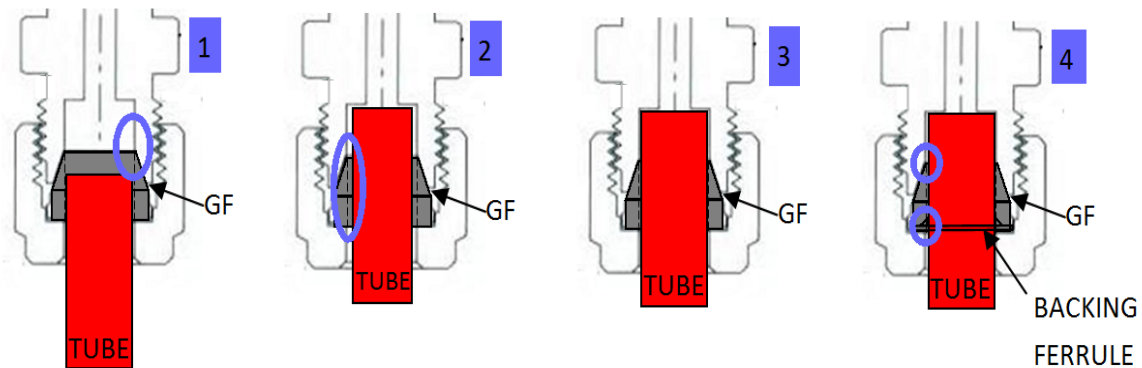
Custom GFs

Cat.#	Size	Hole ID	Description	USD/AUD	QTY
<i>In AUSTRALIA Prices are the same but in AUD</i>					
SF100/0.3G	1/16"	0.3mm	Ferrules, Graphite, 1/16"x0.3mmID	30.00	10-pk
SF100/0.4G	1/16"	0.4mm	Ferrules, Graphite, 1/16"x0.4mmID	25.00	10-pk
SF100/0.5G	1/16"	0.5mm	Ferrules, Graphite, 1/16"x0.5mmID	25.00	10-pk
SF100/0.8G	1/16"	0.8mm	Ferrules, Graphite, 1/16"x0.8mmID	25.00	10-pk
SF100/00G	1/16"	No-Hole	Ferrules, Graphite, 1/16"xNo-Hole	25.00	10-pk
SF100/1.0G	1/16"	1.0mm	Ferrules, Graphite, 1/16"x1.0mmID	25.00	10-pk
SF100/1.2G	1/16"	1.2mm	Ferrules, Graphite, 1/16"x1.2mmID	25.00	10-pk
SF100/2xM0.5G	1/16"	Dble-Hole	Ferrules, Graphite, 1/16"xDouble0.5mmID	35.00	10-pk
GF200/100	1/8"	1/16"	Ferrules, Graphite, FRONT, 1/8x1/16"ID	25.00	10-pk
SF200/0.4G	1/8"	0.4mm	Ferrules, Graphite, 1/8"x0.4mmID	25.00	10-pk
SF200/0.5G	1/8"	0.5mm	Ferrules, Graphite, 1/8"x0.5mmID	25.00	10-pk
SF200/0.8G	1/8"	0.8mm	Ferrules, Graphite, 1/8"x0.8mmID	25.00	10-pk
SF200/00G	1/8"	No-Hole	Ferrules, Graphite, 1/8"xNo-Hole	25.00	10-pk
SF200/1.0G	1/8"	1mm	Ferrules, Graphite, 1/8"x1.0mmID	25.00	10-pk
SF200/1.2G	1/8"	1.2mm	Ferrules, Graphite, 1/8"x1.2mmID	25.00	10-pk
SF200/100G	1/8"	1/16"	Ferrules, Graphite, 1/8"x1/16"ID	25.00	10-pk
SF200/2x0.5G	1/8"	Dble-Hole	Ferrules, Graphite, 1/8"xDouble0.5mmID	35.00	10-pk
SF200/2x0.8G	1/8"	Dble-Hole	Ferrules, Graphite, 1/8"xDouble0.8mmID	35.00	10-pk
SF300/100G	3/16"	1/16"	Ferrules, Graphite, 3/16"ID	25.00	10-pk
SFM8.5/5/4.5G	5mm	5mm	Ferrules, Graphite, Shimadzu 5mmID	25.00	10-pk
GF400/200SP	1/4"	1/8"	Ferrules, Graphite, 1/4-1/8" Flat	25.00	10-pk
SF400/00G	1/4"	No-Hole	Ferrules, Graphite, 1/4"xNo-Hole	25.00	10-pk
SF400/100G	1/4"	1/16"	Ferrules, Graphite, 1/4"x1/16"ID	25.00	10-pk
SF400/0.8G	1/4"	0.8mm	Ferrules, Graphite, 1/4"x0.8mmID	25.00	10-pk
SF400/0.5G	1/4"	0.5mm	Ferrules, Graphite, 1/4"x0.5mmID	30.00	10-pk
SF400/200G	1/4"	1/8"	Ferrules, Graphite, 1/4"x1/8"ID	25.00	10-pk
SF400/300G	1/4"	3/16"	Ferrules, Graphite, 1/4"x3/16"ID	25.00	10-pk
SF400/M6G	1/4"	6mm	Ferrules, Graphite, 1/4"x6mmID	25.00	10-pk
GF400/200	1/4"	1/8"	Ferrules, Graphite, FRONT, 1/4"x1/8"	25.00	10-pk
GF400/100	1/4"	1/16"	Ferrules, Graphite, FRONT, 1/4"x1/16"	25.00	10-pk
GF200/100	1/8"	1/16"	Ferrules, Graphite, FRONT, 1/8"x1/16"	25.00	10-pk
SF600/00G	3/8"	No-Hole	Ferrules, Graphite, 3/8"xNo-Hole	42.00	10-pk
CF0.3FIS	1/16"	0.3mm	Ferrules, Graphite Capture Cup 0.3mmID	85.00	10-pk
CF0.4FIS	1/16"	0.4mm	Ferrules, Graphite Capture Cup 0.4mmID	85.00	10-pk
CF0.5FIS	1/16"	0.5mm	Ferrules, Graphite Capture Cup 0.5mmID	85.00	10-pk
CF0.8FIS	1/16"	0.8mm	Ferrules, Graphite Capture Cup 0.8mmID	85.00	10-pk
CF1.0FIS	1/16"	1.0mm	Ferrules, Graphite Capture Cup 1.0mmID	85.00	10-pk
GF0.3HP	1/16"	0.3mm	Ferrules, Graphite, 0.3mm ID HP Short	25.00	10-pk
GF0.4HP	1/16"	0.4mm	Ferrules, Graphite, 0.4mm ID HP Short	25.00	10-pk
GF0.5HP	1/16"	0.5mm	Ferrules, Graphite, 0.5mm ID HP Short	25.00	10-pk
GF0.8HP	1/16"	0.8mm	Ferrules, Graphite, 0.8mm ID HP Short	25.00	10-pk
GF1.0HP	1/16"	1.0mm	Ferrules, Graphite, 1.0mm ID HP Short	25.00	10-pk
GF1.2HP	1/16"	1.2mm	Ferrules, Graphite, 1.2mm ID HP Short	25.00	10-pk
GF100/0.4	1/16"	0.4mm	Ferrules, Graphite, FRONT, 1/16"IDx0.4mmID	25.00	10-pk
GF100/0.5	1/16"	0.5mm	Ferrules, Graphite, FRONT, 1/16"IDx0.5mmID	25.00	10-pk
GF100/0.8	1/16"	0.8mm	Ferrules, Graphite, FRONT, 1/16"x0.8mmID	25.00	10-pk
GF100/1.0	1/16"	1.0mm	Ferrules, Graphite, FRONT, 1/16"x1.0mmID	25.00	10-pk
GF100/1.2	1/16"	1.2mm	Ferrules, Graphite, FRONT, 1/16"x1.2mmID	25.00	10-pk
GF100/0.3HP	1/16"	0.3mm	Ferrules, Graphite, 0.3MM ID HP Standard	30.00	10-pk
GF100/0.4HP	1/16"	0.4mm	Ferrules, Graphite, 0.4MM ID HP Standard	25.00	10-pk
GF100/0.5HP	1/16"	0.5mm	Ferrules, Graphite, 0.5mm ID HP Standard	25.00	10-pk
GF100/0.8HP	1/16"	0.8mm	Ferrules, Graphite, 0.8mm ID HP Standard	25.00	10-pk
GF100/1.0HP	1/16"	1.0mm	Ferrules, Graphite, 1.0mm ID HP Standard	25.00	10-pk

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-1 suffix designates order qty : each - 50 for a 50-pk at 20% Discount . . . packed in plastic vials or separately for large sizes

Graphite Ferrules - Troubleshooting Hints

some Engineering oversights for Chromtech Graphite Ferrules > 2008



Generally, but not exclusively, issues with the utilisation of our **Graphite Ferrules** can occur if the ferrule is damaged or scarred prior to installation.

Our ferrules are produced under significant pressures so as to conform to specs, and if installed correctly should give proper seals under normal expected stated conditions.

Common issues that have been previously presented by some customers are such as;

Fig 1. Tube not fully inserted damaging the ferrule cone tip when locking nut pressure is applied.

Fig 2. If the tube Outside Diameter is significantly smaller or different to the ferrule ID, it is quite possible that a ferrule that is over manipulated due to incorrect component sizes can become inefficient in sealing the way it should. Ideally the diameter tolerances should not stray outside 0.010"inch to be acceptably effective.

Fig 3. Shows what the normal expectation looks like meaning that the stated sizes on any of your schematics should comply and function within our requirements.

Fig 4. If all your sizes and dimensions are correct as stated another thing you may want to try is to drop the Swagelok supplied metal backing ferrule into the nut prior to inserting the ferrule, meaning it can enable concentrated pressure both at the front and back of the ferrule due to the angled profiles.

to be updated !