

Improved Design Graphite Ferrules Help Ensure Leak-Free Connections for Capillary GC

To ensure leak-free connections for capillary gas chromatography, a ferrule should be made of materials compatible with the column, must precisely fit the column and fitting, and will resist deformation and the effects of high temperatures. For a wide range of capillary GC applications, to temperatures of 450°C, graphite CapSeal Bullet™ ferrules offer the best combination of these characteristics. (ChromFax: 394016)

Key Words:

ferrules • GC ferrules • GC column installation

With so many kinds of ferrules available for capillary gas chromatography systems, making the best selection can be confusing and can involve wasted time and unnecessary expense. Yet settling for less than the best ferrule for leak-free connections can jeopardize your analyses.

To assure leak-free connections, the ferrule must precisely fit the column and fitting, and should be made of materials compatible with the column. In multiple-use applications, the ferrule must resist deformation and the effects of high temperatures. For a wide range of capillary gas chromatography applications, graphite CapSeal Bullet™ ferrules* (Figure A) offer the best combination of these characteristics.

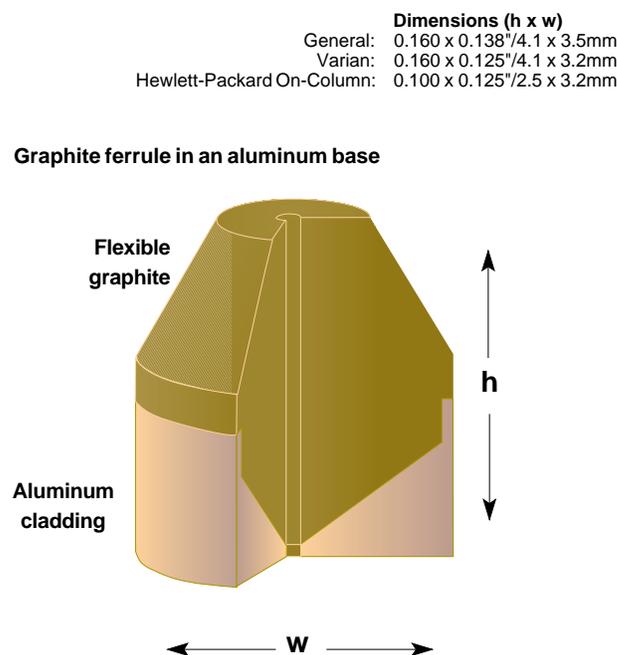
Graphite is one of the most thermally stable and chemically resistant materials known. In a neutral, reducing, or vacuum environment it does not melt when heated, but sublimates from solid to gas at temperatures above 3000°C (5400°F) – temperatures well above the melting points of metals. In the presence of oxygen and temperatures above 450°C (850°F), graphite can oxidize.▼

In capillary GC, graphite ferrules offer several important advantages in addition to heat resistance. They provide unsurpassed sealability, ensuring leak-tight seals for extended periods at high temperatures. Because graphite ferrules are resilient, non-hardening, and non-aging, even ferrules used many times will not crush a column when tightened into place. Graphite has natural lubricating characteristics, so the ferrules will not stick to fittings or columns.

▼Because the rate and degree of oxidation depend on many variables (oxygen concentration, the extent of exposure, gas velocity, and others), 450°C should be considered only a guideline maximum use temperature for graphite ferrules in air.

*Patent pending.

Figure A. CapSeal Bullet Ferrule



712-0455

Through research and development in our own laboratories, we have refined the graphite ferrule to the point that we feel, on the basis of both materials and design, we offer the best quality ferrule available. CapSeal Bullet ferrules have a clean, sharp profile, with minimal flashing, to ensure maximum sealing surface and minimal possibility of column contamination during installation. Their unique design – a graphite body in an aluminum base (see illustration) – makes it easy to remove these ferrules from any fitting. The special end taper reduces graphite extrusion into the fitting. The composition and design of these ferrules also ensure low-torque sealing characteristics – they seal effectively at only 1/8 turn past fingertight. CapSeal Bullet ferrules have a 450°C temperature limit in isothermal or temperature programmed use, under normal conditions.

Ferrule/Column Installation Tips: Before installing a new ferrule of any composition, be sure to remove all projecting particles, scale, and flashing of old material from the chromatograph fitting. This residue can bleed or adsorb sample components. Handle the new ferrule carefully, to avoid damaging or contaminating the sealing surfaces, or producing fragments. When placing the ferrule onto the column, point the column end downward and slide the ferrule far enough onto the column to allow removal of 2-3cm of the column end. These precautions will ensure that small fragments shaved off the ferrule will not fall into the column bore, where they can bleed or adsorb sample components.

Tighten the connections according to recommended specifications, then check the connections with a **non-liquid** leak detector (e.g., a GOW-MAC® thermal conductivity unit). Leaks will reduce the sizes of the peaks in your chromatogram, and will prolong analyte retention. Worse, they can allow oxygen to enter the

carrier gas line and possibly react with the stationary phase in the column, reducing column lifetime. Leaks in a mass spectrometer high vacuum system will increase the background signal and reduce sensitivity. If you detect a leak at the ferrule connection, use minimal torque to seal it. Overtightening can deform the ferrule and increase the leak problem. If this happens, you might have to replace the ferrule.

Even if you have not recently installed your column, periodic leak checks are a good habit – normal vibrations in the laboratory, accidental bumping of the column, or numerous temperature cycles can cause seals to loosen over time.

Selecting the best ferrule for your analyses need not be a complicated issue. If you want to reduce the possibility of leaking connections, and minimize your experience at digging stuck ferrules out of fittings, we recommend CapSeal Bullet ferrules.

Ordering Information:

CapSeal Bullet Graphite Ferrules

Column ID	Ferrule ID	Qty.	General	Varian	Hewlett-Packard On-Column Injection [¶]	
			Cat. No.	Cat. No.	Qty.	Cat. No.
0.20-0.25mm fused silica	0.4mm	12	23480-U	23488	10	23864
		48	23485	23493	50	23867
0.32mm fused silica	0.5mm	12	23481	23489	10	23865
		48	23486	23494-U	50	23868
0.53mm fused silica	0.8mm	12	23482	23490	10	23866
		48	23487	23495	50	23869
0.50-0.75mm glass	1.0mm	12	23483	23491-U	—	—
0.75mm glass	1.2mm	12	23484	23492	—	—

[¶]For capillary injection ports in HP 5890 Series II.

Contact our Technical Service Department (phone 800-359-3041 or 814-359-3041, FAX 814-359-5468) for expert answers to your questions.

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GOW-MAC — GOW-MAC Instrument Co.

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