

## GC Inlet Resource Guide

Optimize the performance of your Agilent GC system.



Agilent Technologies



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This icon denotes a video that is available to view on our web site. Just visit [www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies) to view videos and obtain more information about how to replace inlet liners and gold seals and install columns.

- 4 Introduction
- 5 Septa
  - 6 Troubleshooting
  - 9 Ordering Information
- 10 Ferrules
  - 11 Troubleshooting
  - 14 Ordering Information
- 15 Liners
  - 18 Troubleshooting
  - 20 Ordering Information
- 21 Instrument Inlet Parts and Supplies

When you purchase an Agilent instrument, part or supply, you're not only purchasing a superior product, you're gaining more than three decades of knowledge and experience. Agilent is committed to providing total solutions to its customers — every day.

Part of Agilent's total solutions commitment is a guarantee of successful chromatography. Successful chromatography is dependent upon optimal functionality of every component of a system from the instrument to the supplies. Each component adds to, or detracts from, overall system performance, so you need to do regular maintenance and use only Agilent supplies. By using Agilent inlet supplies with your Agilent GC system, you are guaranteed a PerfectFit for peak performance and reduced downtime.



It is vital to replace key parts of the inlet including the septum, liner, and ferrule on a regular basis. The information within this resource guide describes the role of inlet supplies and the problems that may occur if maintenance is not done regularly. It covers models 4890, 5890, 6850 and 6890. In addition, we have included ordering information for your convenience. You can purchase Agilent parts and supplies through our online store by visiting [www.agilent.com](http://www.agilent.com) or by calling your local sales office or authorized distributor.

Whether it's specifying the perfect liner or solving the most challenging application problem, rely on Agilent, the industry leader, for all of your chromatography needs.

# Septa

One of the key components of sample introduction is the inlet septum. All columns must have carrier gas head pressure to establish flow through the column. Septa maintain the leak-free seal and exclude air from the inlet. They come in many different sizes and are made from many different types of material specific to inlet type and analysis needs.

Septa are usually available according to their recommended upper temperature limits. Lower temperature septa are usually softer, seal better, and can withstand more punctures (injections) than their high-temperature counterparts. If used above their recommended temperatures, however, they can leak or decompose. This causes sample losses, lower column flow, decreased column life and ghosting.



## What is the Function

The septum isolates the sample flow path from the outside world. It must provide a barrier that is readily penetrated by the injector needle while maintaining internal pressure without contaminating the analysis. They are generally made of special high-temperature, low-bleed silicone rubber formulations.

## Why Replace

Septa should be replaced regularly to avoid:

- leaks
- decomposition
- sample loss
- reduced column or split vent flow
- ghost peaks
- column degradation

## How to Minimize Problems

Avoid problems by:

- using within the recommended temperature range
- changing regularly
- installing “hand tight”
- using septum purge when available
- using autoinjectors
- using sharp syringe needles

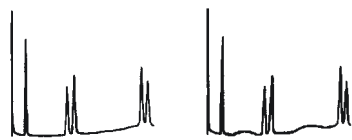
# Septa Troubleshooting

Symptom	Possible Cause	Remedy
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**Extra Peaks/Humps**

Septum bleed.

Turn off injector heater. If extra peaks disappear, use septum specified for higher temperature or analyze at lower inlet temperature.



Normal

Problem

**Baseline Change After Large Peak**

Large leak at septum during injection and for a short time thereafter (common with large diameter needles).

Replace septum and use smaller diameter needles.



Normal

Problem  
(flow increase)

Problem  
(flow decrease)

**Retention Times Prolonged**

Carrier gas leaks at septum or column connection.

Check for leaks. Replace septum or tighten connections if necessary.



Normal

Problem

Problem

**Summary of Inlet Septum Characteristics**

SEPTUM TYPE	BLEED	LIFETIME	TEMPERATURE LIMIT
BTO (Bleed and Temperature Optimized)	✓✓✓ (optimized for high temperature)	✓	to 400 °C
Long Life	✓	✓✓✓	to 350 °C
Advanced Green	✓✓	✓✓	to 350 °C

✓✓✓ = best    ✓✓ = very good    ✓ = good

## Premium Septa

### Agilent Premium CenterGuide Septa for Improved Performance

Our premium septa have a recess on the injection side, to guide the syringe needle to the same point with every injection.

- Center point guides the needle for easy penetration and less coring
- Reduce needle bending
- Precision molding assures accurate fit in the inlet
- Each batch tested on an Agilent 6890 GC-FID for bleed



p/n 5183-4757



p/n 5183-4761



p/n 5183-4759

### Agilent Bleed and Temperature Optimized Septa (BTO)

- Extended Temperature Range, Low-Bleed
- Maximum Injection Port Temperature 400 °C
- Virtually eliminates injection-port sticking
- Pre-conditioned; packaged in glass to prevent contamination
- Ideal for use with low-bleed, "Mass Spec" capillary columns

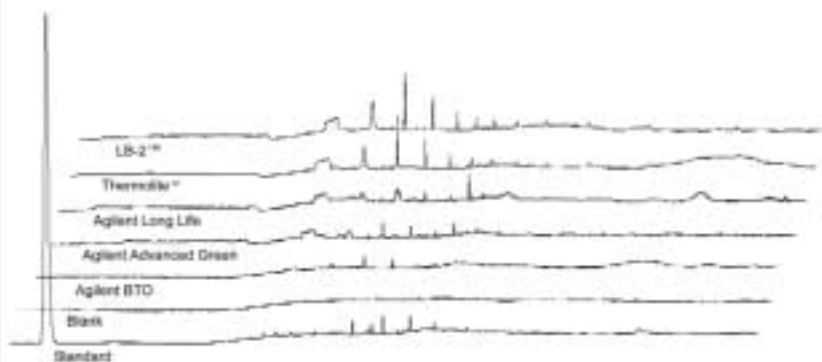
### Agilent Long-Life Septa

- Pre-pierced for extended life and reduced coring
- The preferred Septum for Autosamplers
- Ideal for Overnight Runs
- Up to 400 Injections Per Septum injection
- Maximum Injection Port Temperature 350 °C
- Soft, 45 Durometer, Easy On Autosampler Needles

### Agilent Advance Green Septa

- True Long-Life, High Temperature Green Septum
- More Injections per Septum
- Reduced Injection Port Sticking
- Maximum Injection Port Temperature 350 °C
- Packaged in glass vials for high purity
- Economical alternative to competitor's "Green" Septa

### Bleed Test - Comparison of GC Septa



GC conditions, all chromatograms

Instrument: Agilent 6890  
 Column: DB-5  
 15 m X 0.53 mm I.D., 1.5 µm film  
 P/N: 125-5012  
 Carrier: Helium at 4 mL/min constant flow  
 Oven: 50 °C for 15 minutes  
 50 - 250 ° at 20 °C/min  
 250 °C for 15 min  
 Injector: Splitless, 250 °C  
 10 minute purge activation time  
 Detector: FID, 280 °C



## General Purpose Septa

Agilent's General Purpose Septa are made from an enhanced injection-molded silicone rubber material. The septa material, dark red or gray in color, is specified to withstand over 200 automatic injections at an injection port temperature of 350 °C. You can have confidence in your chromatographic results knowing that each lot of septa is placed through a demanding QC test to ensure that only the highest quality product is delivered to your laboratory.

### Agilent's General Purpose red/gray septa are cost-effective choices which provide:

- Low bleed for reduced instrument maintenance downtime and increased laboratory productivity
- Less frequent replacement for long lifetime and the ability to withstand more than 200 injections at maximum injection port temperatures
- Easy penetration and the durability to remain resistant to coring and leaking from multiple injections
- Convenient packs of 24 or 25 in airtight jar to minimize risk of contamination and the need for septa reconditioning



## The Merlin Microseal Septa

- Low bleed, longer life alternative to standard septa for split/splitless injection
- Has a lifetime of more than 2000 injections, depending on samples and operating conditions
- Greatly reduced instrument downtime for septa changes and injection port liner changes due to septa particulates
- Two distinct sealing mechanisms: double O-ring type seal around the syringe needle and spring-assisted duckbill to seal the injection port

# Septa Ordering Information

PART NO.

## Premium Septa

### Bleed and Temperature Optimized Septa

11-mm septa for 5880, 5890, 6850 and 6890 GCs (50/pk)	5183-4757
5-mm septa through-hole for on-column (50/pk)	5183-4758

### Agilent Advanced Green Septa

11-mm septa for 5880, 5890, 6850 and 6890 GCs (50/pk)	5183-4759
5-mm septa through-hole for on-column (50/pk)	5183-4760

### Agilent Long-Life Septa

11-mm septa for 5880, 5890, 6850 and 6890 GCs (50/pk)	5183-4761
5-mm septa through-hole for on-column (50/pk)	5183-4762

## General Purpose Septa

### Low-Bleed Gray Septa

9.5-mm (3/8") for Agilent GCs (24/pk) for 5700 series and 5830/40 GCs	5080-8728
11-mm for 5880, 5890, 6850 and 6890 GCs (24/pk)	5080-8896
11-mm for 5880, 5890, 6850 and 6890 GCs (144/pk)	5080-8894
9.5-mm (3/8") for 5700 series and 5830/40 Agilent GCs (144/pk)	5080-8726

### Low-Bleed Red Septa

11-mm solid for 5880, 5890, 6850 and 6890 GCs (25/pk)	5181-1263*
11-mm with partial through-hole for 5880, 5890, 6850 and 6890 GCs (25/pk)	5181-3383*
5-mm through-hole for on-column inlets, automatic or manual injections (25/pk)	5181-1260*
5-mm solid (25/pk) for high column backpressure, column inlets	5181-1261*
9.5-mm (3/8") for 5700 series and 5830/40 Agilent GCs (24/pk)	5181-1283*

\*Quantity Discounts Available

### Blue Septa

11-mm for 5880, 5890, 6850 and 6890 series GCs (5/pk)	9301-1083
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### White Septa

9.5-mm (3/8") teflon backed (12/pk) for 5700 series and 5830/40 GCs	5080-8745
9.5-mm (3/8") teflon backed (100/pk) for 5700 series and 5830/40 GCs	5080-8707

## Merlin Microseal Septa

### High Pressure Septa

High pressure Merlin Microseal starter kit (microseal septa and nut)	5182-3442
Microseal high pressure septum*	5182-3444
Microseal high pressure nut	5182-3445
High sample volume septum kit contains: Merlin high pressure Microseal, six 23-gauge syringes, 500 vials and caps	5181-8839

### Standard Pressure Merlin Microseal Septa

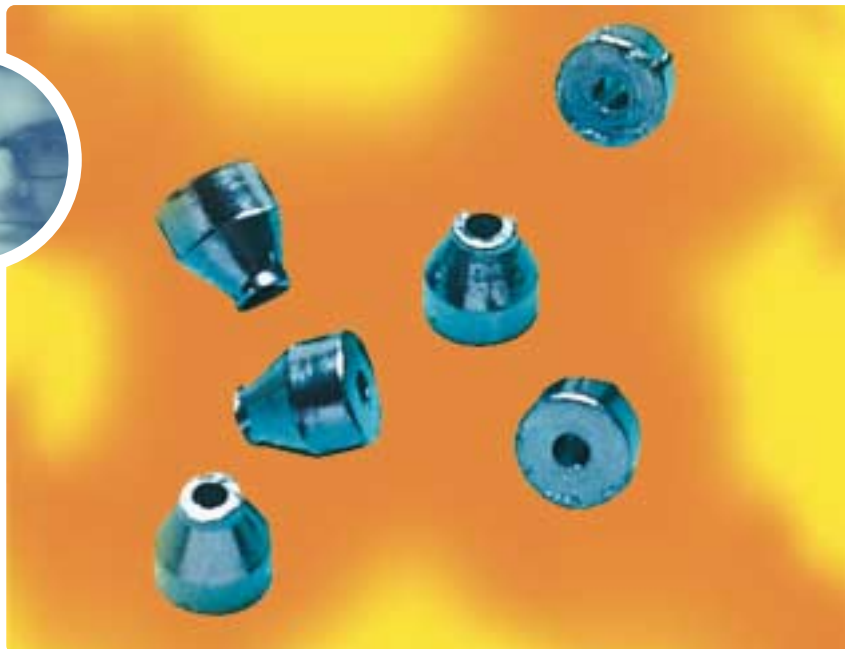
Microseal septum, stainless steel, rubber (30 psi)	5181-8815
Microseal PTFE nut liners 2/pk	5182-0853
Merlin Microseal Kit original low pressure system includes nut and septum	5181-8816
Merlin Microseal Kit original low pressure system includes nut and 2 septum	5181-8833

\*Not interchangeable with older version.



# Ferrules

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance. For optimum performance, ferrules should be replaced every time the column is replaced and when performing column maintenance.



At Agilent, we offer a comprehensive selection of ferrules made of different materials and configurations for a PerfectFit with your instrument and a leak-free connection between the column and injector.

Three main types of ferrules are used with capillary GC columns: graphite, Vespel and Vespel-graphite composites. Graphite ferrules can withstand temperatures as high as 450 °C, and Vespel and Vespel-graphite ferrules are rated to 280 °C and 350 °C, respectively.

## Column Ferrule Types

	Advantages	Limitations
Graphite	Easy-to-use, stable seal Higher temperature limit	Soft, easily deformed or destroyed • possible system contamination • not for use with GC/MS transfer-lines
Vespel or Vespel-graphite	Mechanically robust Long lifetime	Flows at elevated temperature • must retighten frequently • prone to leakage Polymer bleed problematic with some detectors (NPD and ECD)

### What is the Function

Ferrules seal the connection of the column or liner to the system. The ideal ferrule provides a leak-free seal, accommodates various column outer diameters, seals with minimum torque, will not stick to the column or fittings, and will tolerate temperature cycling.

### Why Replace

Signals that a ferrule is damaged include:

- background noise from oxygen diffusing into the system
- column bleed catalyzed by oxygen
- sample degradation
- loss of sample
- increase in detector signal/noise
- poor retention time reproducibility

### How to Minimize Problems

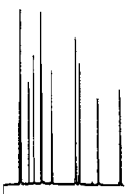
General technique for installing ferrules:

- don't overtighten – fingertighten column nut, then use wrench to tighten
- maintain cleanliness
- bake out ferrules prior to use
- avoid contamination – fingerprints, oils
- inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them
- change ferrules when new columns or injector/detector parts are installed

# Ferrule Troubleshooting

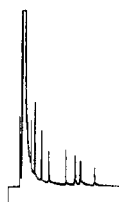
## Problems possible after changing ferrules

Normal Peaks



Correct column positioning in both injection port and FID

Tailing Solvent Peaks



Column positioned incorrectly in the injection port or possible ferrule particle in the carrier gas flow path

Wrong Peak Ratios



Column positioned incorrectly in the inlet (either too far or not far enough; verify 4-6mm installation distance)

## 100% Graphite Ferrules

All Agilent graphite containing ferrules are made with the highest purity graphite available. This material is free of sulfur and other contaminants that can interfere with certain detectors.

Pure graphite ferrules are very soft and can be easily deformed to make an effective seal with fused silica or glass columns without generating excess graphite flashing – that can contaminate detectors and inlets. Proper installation requires a finger-tight turn on the nut, then an additional  $\frac{1}{4}$  turn with a wrench.

Two different types of Agilent column nuts can be used with these ferrules.

- The universal column nut (p/n 5181-8830) has a hexagonal head requiring the use of a wrench to tighten it completely.
- The finger-tight column nut (p/n 5020-8293 for 530um columns and p/n 5020-8292 for columns 320um or less) does not require a wrench to tighten. It can only be used with the 100% graphite ferrules.

Due to the softness of graphite, 100% graphite ferrules are not recommended for use with GC/MS transfer-lines.



## Vespel/Graphite (85%/15%) Ferrules

The combination of graphite and Vespel results in a ferrule having low oxygen diffusion rates which does not shrink to the same extent as pure Vespel. These ferrules are recommended for use with GC/MS or other oxygen sensitive detectors, like the ECD, but are also compatible with other detectors like FID and NPDs.

In addition, the Vespel/graphite ferrules provide added confidence of leak-free connections when installed correctly. Proper installation requires a finger-tight turn on the nut, then an additional  $\frac{1}{4}$  turn with a wrench.

These ferrules are very hard and cannot be deformed sufficiently to seal a variety of column diameters. The ferrule hole must match the column OD exactly to ensure a leak-free seal. For capillary column applications, there is a specific ferrule for each column diameter. Choosing a ferrule with a larger hole than is specified for a given column dimension results in a large leak. If left unchecked, an improper seal at the injector will result in high column bleed and a shortened column lifetime. An improper seal at the detector can result in increased detector signal/noise. In the case of the MSD it can also contribute to oxidation of the ion source which can increase the frequency of detector maintenance.



Two different dimensions of Vespel/graphite ferrules are available for capillary column use. The standard sized ferrule is compatible with the universal column nut. The second ferrule size is slightly longer and is specifically designed to fit with the MS interface nut used for the GC/MS transfer line connection. The larger ferrule can also be used to make column connections to inlets and other detectors but requires a specially designed column nut (p/n 05988-20066) to accommodate the longer ferrule.

When using Vespel/graphite ferrules, Agilent recommends tightening the column nut to a  $\frac{1}{4}$  turn after the first temperature program runs. Even preconditioned ferrules can exhibit some shrinkage after a temperature programmed run.

### Vespel/Graphite Nut & Ferrule Combinations

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#### Standard ferrule and standard nut

Universal Column Nut	+	Vespel/Graphite Ferrules
5181-8830		5181-3323 (0.1, 0.2, 0.25 mm ID columns)
		5062-3514 (0.32 mm)
		5062-3512 (0.45 and 0.53 mm)

#### Longer ferrule with MS interface nut

MS Interface Column Nut	+	Vespel/Graphite Ferrules
05988-20066		5062-3508 (0.1, 0.2, and 0.25 mm ID columns)
		5062-3506 (0.32 mm)
		5062-3538 (0.45 and 0.53 mm)

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## 100% Vespel Ferrules

Vespel is a high-temperature polyimide based material which is very hard. This material has the lowest permeability to oxygen, making it an excellent sealing material when making metal or glass connections. These ferrules do not deform easily. So, it is important to match the ferrule hole size to the proper column diameter. These ferrules are reusable and can be repositioned for easy mounting to other injectors and detectors.

The main disadvantage of 100% Vespel ferrules is the shrinkage of the material when exposed to temperature cycling conditions.



[www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)

### Agilent Ferrule Selection Recommendations

Ferrule/Seal Type	Upper Temperature Limit	Usages	Limitations
Graphite (100%)	450 °C	General purpose for capillary columns. Suitable for FID and NPD. Recommended for high temperature and cool on-column applications. Can be removed easily.	Not for MS or oxygen sensitive detectors.
Vespel/Graphite (85%/15%)	350 °C	General purpose for capillary columns. Recommended for MS or oxygen sensitive detectors. Most reliable leak free connection.	Not reusable.
Vespel (100%)	280 °C	Isothermal operation. Can be reused or removed easily.	Leaks after temperature cycle.

# Ferrule Ordering Information

	FERRULE ID (mm)	COLUMN ID (mm)	QUANTITY	PART NO.
<b>General Purpose Graphite Ferrules (Short Ferrules)</b>				
	0.5	0.1, 0.2, 0.25, 0.32	10/pk	5080-8853
	1.0	0.53	10/pk	5080-8773
	0.4	0.05-0.25	10/pk	500-2114
	0.8	0.45, 0.53	10/pk	500-2118
<b>85% Vespel, 15% Graphite Ferrules (Short Ferrules)</b>				
	0.4	0.1, 0.2, 0.25	10/pk	5181-3323
	0.5	0.32	10/pk	5062-3514
	0.8	0.45, 0.53	10/pk	5062-3512
<b>Preconditioned 85% Vespel, 15% Graphite Ferrules (Long Ferrules)</b>				
	0.3	0.1	10/pk	5062-3507
	0.4	0.1, 0.2, 0.25	10/pk	5062-3508
	0.5	0.32	10/pk	5062-3506
	0.8	0.53	10/pk	5062-3538

These ferrules are recommended for use with GC/MS.

<b>100% Vespel High-Performance Ferrules (Short Ferrules)</b>				
	0.4	0.1, 0.2, 0.25	10/pk	5181-3322
	0.5	0.32	10/pk	5062-3513
	0.8	0.45, 0.53	10/pk	5062-3511

These ferrules are recommended for use in isothermal analysis only.

<b>Specialty Ferrules, 85% Vespel, 15% Graphite</b>				
Two Hole	0.4 ID holes	0.1, 0.2, 0.25	10/pk	5062-3580
	0.5 ID holes	0.32	10/pk	5062-3581
No Hole			10/pk	5181-3308

## Column Nuts

### Short Nuts

Universal column nut, 1/16 in. hex	2/pk	5181-8830
Finger-tight column nut for 0.53 mm columns*	1 ea	5020-8293
Finger-tight column nut for 0.32 mm columns* and smaller	1 ea	5020-8292
Blanking plug, finger-tight style	1 ea	5020-8294
6850 Column Nut	2/pk	5183-4732

### Long Nuts

MS interface column nut	1 ea	05988-20066
Column nut for GC/MS ferrules	1 ea	05921-21170
Column nut wrench, 1 /4 in. and 5 /16 in.	1 ea	8710-0510

\* For use with graphite ferrules only.

Always match short nuts with short ferrules and long nuts with long ferrules for a PerfectFit.

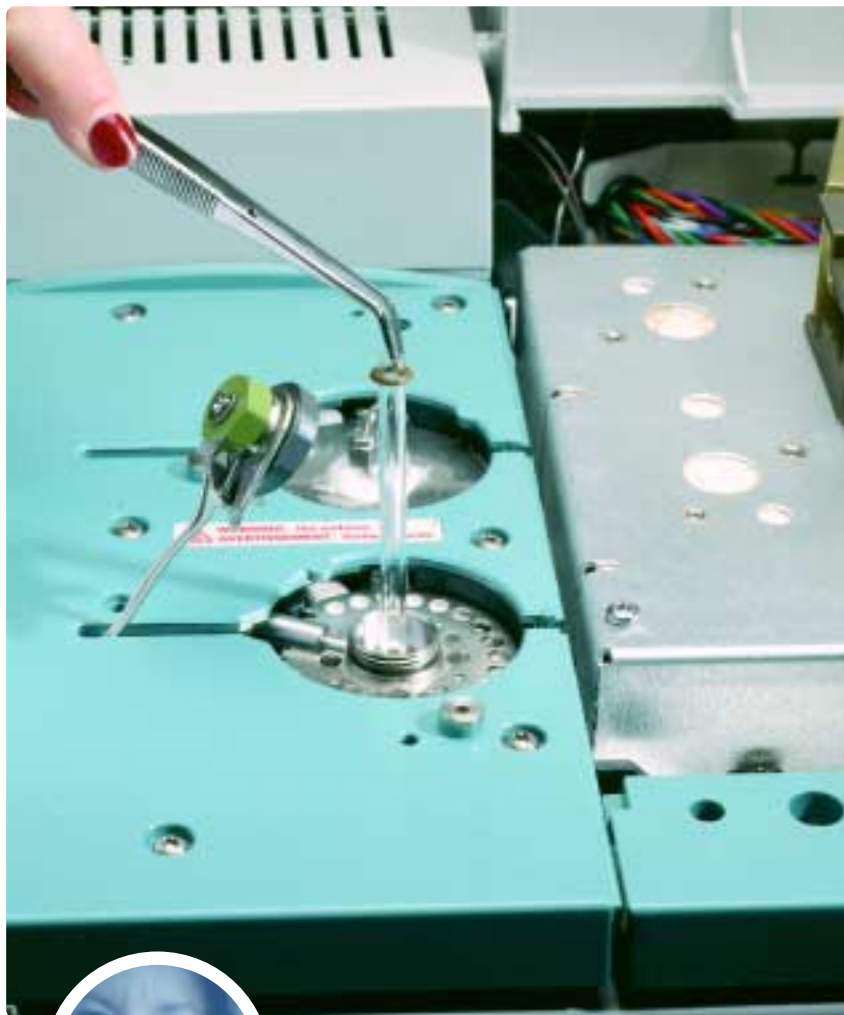
## Liners

Agilent offers a complete selection of liners for your Agilent GC's split/splitless inlet. These liners are designed and engineered to meet strict Agilent specifications for dimensional accuracy and inertness towards demanding compounds.

For example, the biggest difference between Agilent splitless liners versus competitor designs, is the OD of our splitless liners are ground and polished to exacting dimensional tolerances. This ensures a perfect fit into our inlets and optimum splitless injection performance.

Choosing the proper liner for a specific application can be a difficult and challenging task. The three liner characteristics that must be considered for each application are:

- Liner volume
- Liner treatments or deactivation
- Any liner design features that might affect carrier gas flow through the inlet or sample vaporization



[www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)

### What is the Function

Liners are the centerpiece of the inlet system in which the sample is evaporated and brought into the gas phase.

### Why Replace

These problems will occur if the liner is not changed on a regular basis or if the correct liner is not used:

- peak shape degradation
- solute discrimination
- poor reproducibility
- sample decomposition
- ghost peaks

### How to Minimize Problems

Change liners on a regular basis determined by:

- previous use pattern
- sample cleanliness
- chromatographic abnormalities such as:
  - peak shape changes
  - peak discrimination
  - poor reproducibility
  - sample pyrolysis

# Discussion of Liner Characteristics

## Liner Volume

The purpose of the injection port is to allow the introduction of a sample into the gas chromatograph in an accurate, reproducible manner. The vaporized sample should be a true representation of the liquid sample and, unless specifically desired, should be injected without chemical change. The elevated temperatures used in the inlet vaporize the liquid sample to a gas for transfer to the head of the column. This phase transition is accompanied by a very significant volume change. The volume of the resulting vapor must be small enough to fit within the volume of the liner. If the volume is too great for the liner, reproducibility and sensitivity can be compromised, due to backflash and loss of the sample into the septum purge or split lines. Backflash also frequently results in sample carryover.

Larger volume liners ( $> 800 \mu\text{L}$ ) are characterized by larger inside diameters (ID) and are typically used with injection sizes of  $1 \mu\text{L}$  or more. The small volume liners have a smaller ID and are usually used with small injection sizes ( $< 1 \mu\text{L}$ ), fast  $100 \mu\text{m}$  ID columns, gas samples, or when using external sampling devices like headspace and purge and trap.

Note about Vapor Volume Calculator Tool: Agilent offers a software tool (Vapor Volume Calculator) that you can use to determine the vapor volume of an extended list of common solvents for any user-chosen set of inlet temperatures and pressures for a given Agilent inlet liner. The software is free and can be downloaded from the web by going to the Agilent web site at [www.agilent.com/chem](http://www.agilent.com/chem). Click "Technical Support", "User Contributed Software", and click on "GC Pressure/Flow Calculator".



## Liner Deactivation

Active sites on inlet liners can adsorb sample components and cause peak tailing, with potential loss of sensitivity and reproducibility. Deactivation agents are used to cover or react with active sites on the glass surface of the liner. Agilent liners are deactivated using deactivation procedures that produce reproducible and inert liners, with long lifetimes. For splitless applications or when even slightly polar compounds must be analyzed, a deactivated liner should be used.

With use, even deactivated liners can begin to exhibit activity. When this occurs, the liner should be replaced. Liners can be cleaned to remove particulate material or solvent rinsed to remove less volatile components. However, choosing the proper liner cleaning procedure can be difficult. Some solvents may remove the deactivation layer or tools might scratch the glass surface of the liner, resulting in the generation of unwanted active sites.

# Liner Design Features

## Dimensions

- The outside diameter (OD) of the liner determines if the liner is more effectively used in split or splitless mode
- Larger OD liners are designed for splitless operation, fit tightly and limit sample contact with metal parts of the inlet
- Larger OD liners improve analyte recovery by retaining more sample inside the liner
- Agilent splitless liners are all designed with exacting dimensional tolerances to fit tightly in the inlet and minimize sample contact with metal surfaces
- Smaller OD liners are designed for split injection because they produce less resistance to carrier and split flow through the inlet
- Large volume liners are used for split injections with enforced dimensional stability for a wide range of split ratios

## Tapers

Tapering or narrowing the liner internal diameter (ID) is done for a number of purposes:

- Bottom taper focuses sample onto the head of the column
- Bottom taper minimizes contact with metal parts of the inlet
- Center taper positions glass wool correctly
- Top taper minimizes sample backflash

To operate properly, the column must be installed correctly in the injection port with the tip of the column ideally located about halfway into the taper, or about 6 mm from the column tip to the top of the ferrule (See Figure 1). Some applications will work better with different column installation depths. Therefore, you should check the instrument manual for proper installation distances and determine which distance is appropriate for your application. Reproducible positioning is important for repeatable quantitative results.



## Packing

### Glass Wool

Many liner designs use deactivated glass wool packing. The glass wool is positioned or held in place near the center of the liner to:

- Provide additional surface area for complete volatilization of the sample to minimize thermal discrimination
- Trap non-volatile components and septum particles before they reach the column
- Wipe any sample from the syringe needle, thereby increasing reproducibility and preventing sample residue build-up at the septum or Merlin Microseal

Glass wool liners that have glass wool near the center of the liner, such as Agilent Part Nos. 5183-4647 and 5183-4711, are recommended for automatic injections or when using the Merlin Microseal septum.

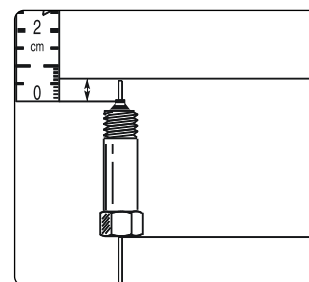
If glass wool is positioned at the bottom of the liner, its main purpose is simply to trap non-volatile components. Glass wool is generally not recommended for the following analytes:

- phenols
- organic acids
- pesticides
- amines
- drugs of abuse
- reactive polar compounds
- thermally labile compounds


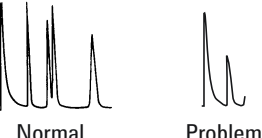
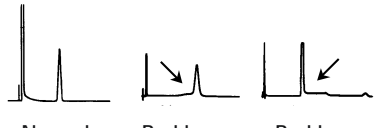
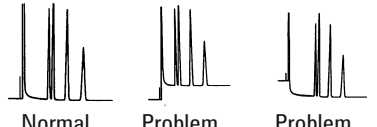
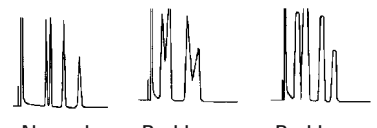
### Glass Cups

Another design feature used to help volatilize the sample and provide good mixing is the incorporation of a glass cup inside the liner. Glass cup liners are also available with additional glass wool and inert packing to increase reproducibility and limit sample discrimination. Not recommended for use with Electronic Pressure Control Inlets.

Figure 1.



# Liner Troubleshooting

Symptom	Possible Cause	Remedy
<p>Tailing Peaks</p>  <p>Normal      Problem</p>	<p>Sample components adsorbed by column, inlet liner or contaminated gold inlet seal.</p> <p>Needle hitting and breaking packing in inlet liner.</p> <p>Column end poorly cut (sample absorption).</p> <p>Broken or chipped inlet liner.</p>	<p>Use new, deactivated liner or clean old liner and replace glass wool.</p> <p>Partially remove packing from liner or use without packing.</p> <p>Remove column. Make a clean, square cut using a reliable capillary fused silica cutting tool (such as a ceramic wafer or the Agilent Column Cutter), then reinstall column.</p> <p>Make sure total flow in inlet is above 40 mL/min.</p>
<p>Leading Peaks</p>  <p>Normal      Problem</p>	<p>Sample decomposing.</p>	<p>Remove inlet liner and check cleanliness. Use new, deactivated liner or replace glass wool and packing.</p>
<p>Baseline Rise Before or After Peak</p>  <p>Normal      Problem      Problem</p>	<p>Sample decomposing.</p>	<p>Remove inlet liner and check cleanliness. Use new, deactivated liner or replace glass wool and packing.</p>
<p>Baseline Change After Large Peak</p>  <p>Normal      Problem      Problem</p>	<p>Column and inlet liner misaligned.</p>	<p>Check installation of column end and inlet liner; adjust if necessary.</p>
<p>Unresolved Peaks</p>  <p>Normal      Problem      Problem</p>	<p>Column or inlet liner contaminated or column deteriorating.</p>	<p>Use a guard column to prolong column life. Remove inlet liner and check cleanliness. Use new, deactivated liner or replace glass wool and packing. Trim the front end of the column a minimum of 6 inches.</p>

## Agilent Choice Liners

Our engineering and testing efforts focus on these parameters when designing liners for Agilent inlet systems. Intensive liner development and testing have resulted in a set of liners that we recommend whenever new methods are being developed, when methods are being optimized, or when problems with existing methods are encountered. These liners are:

### Split injection:

Agilent split liner with glass wool, bottom taper, glass bead for easy positioning, and deactivated, Agilent Part No. 5183-4647 (with extraordinarily tight dimensional control for optimum split performance).

### Splitless injection:

Single tapered liner without glass wool, deactivated, Agilent Part No. 5181-3316.



### General purpose split/splitless injection:

Similar design to Agilent Part No. 5183-4647, but with a different deactivation and outer diameter that compromises for both split and splitless injections, Agilent Part No. 5183-4711.

### Direct injection:

Straight liner without glass wool, deactivated, Agilent Part No. 5181-8818 (use only for gas samples, headspace, or purge and trap applications).

### Direct Connect

The Direct Connect liners provide an Agilent solution to customers running highly sensitive compounds or that are interested in getting the highest performance from their GC or GC/MS without sample exposure to inlet related degradation. These liners are included in our new 8270 EPA Applications kit designed specifically for optimizing a 6890/5973 GC/MSD to this method.

The liners are deactivated, come in either a single or double taper, and utilize a press fit connection to the column. In addition, there is a small drilled hole in the side of the liner whose size and placement was optimized by Agilent R&D engineers to allow them to work with EPC.

### Focus Liner
















Improve reproducibility, improve results. The Focus Liner traps a precisely controlled amount of glass wool in the ideal position in the injection port liner. At the point of injection, the glass wool provides extra surface area for vaporization, traps nonvolatile sample residue, and wipes any residual sample from the sample needle – reproducibility is the result.

In addition to these liners we offer a broad selection of liners for your specific application needs.

### Liner O-Rings

Liners are sealed in the inlet with O-rings or graphite seals. O-ring seals are easier to remove and to replace than graphite that deforms and flakes apart. The graphite seals should be used when inlet temperatures exceed 350 °C.

# Liner Ordering Information

	Application	Liner Volume(μl)	Single Liner	5/pk	25/pk
<b>Agilent Choice Liners</b>					
	Liner, split, low press. drop, glass wool, taper, deactivated	For split injection	870	5183-4647	5183-4701 5183-4702
	Liner, splitless, single-taper, no glass wool, deactivated	For splitless injection	900	5181-3316	5183-4695 5183-4696
	Liner, direct, 2 mm ID, deactivated	For direct injection (use for gas samples, headspace, or purge and trap applications)	250	5181-8818	5183-4703 5183-4704
	Liner, general purpose split/splitless, glass wool, taper, deactivated	For split/splitless injection	870	5183-4711	5183-4712 5183-4713
<b>Splitless Inlet Liners</b>					
	Liner, splitless, single-taper, glass wool, deactivated		900	5062-3587	5183-4693 5183-4694
	Liner, splitless, double-taper, no glass wool, deactivated		800	5181-3315	5183-4705 5183-4706
<b>Direct Inlet Liners</b>					
	Liner, direct, 2 mm ID, non-deactivated, quartz		250	18740-80220	5183-4707 5183-4708
	Liner, direct, 1.5 mm ID, non-deactivated [use for gas samples, headspace, or purge and trap applications]		140	18740-80200	5183-4709 5183-4710
	Liner, straight, splitless 4.0 mm ID		990	210-3003	210-3003-5
	Split Inlet Liner Liner, split, glass wool, non-deactivated		990	19251-60540	5183-4691 5183-4692
	Split Inlet Liners For Manual Injection Liner, split, with cup, no glass wool		800	18740-80190	5183-4699 5183-4700
	Liner, split, with cup, glass wool, and packing [not recommended for use with electronic pressure control (EPC)], for manual injection		800	18740-60840	5183-4697 5183-4698
<b>Direct Connect Liners</b>					
	Single taper direct connect liner, 4 mm ID, deactivated				<b>Part No.</b> G1544-80730
	Dual taper direct connect liner, 4 mm ID, deactivated				G1544-80700
<b>Focus Liners</b>					
	Focus liner	<b>ID</b>	<b>Wool</b>	<b>Dimensions</b>	<b>Part No.</b>
	Focus liner	4.0 mm	Yes	6.3 mm X 78.5 mm	210-4004-5
	Focus liner	4.0 mm	Yes	6.3 mm X 78.5 mm	210-4022-5
<b>Liner O-Rings</b>					
	Fluorocarbon O-ring (12/pk)				<b>Part No.</b> 5180-4182
	Graphite O-ring for splitless liner (10/pk)				5180-4173
	Graphite O-ring for split liner (10/pk)				5180-4168

# Instrument Inlet Parts and Supplies



When it comes to inlet replacement parts for your Agilent GCs, don't settle for an imitation; use genuine Agilent parts. Our inlets are designed, tested and manufactured by Agilent engineers to work perfectly with our instruments and give you superior performance. Plus, we supply every replacement part you would ever need for your entire system, not just a few select pieces. So keep your instrument running at its very best with Agilent consumables and replacement parts—the PerfectFit for optimum performance.

## 6890/6850 Series GC Split/Splitless Inlet Supplies

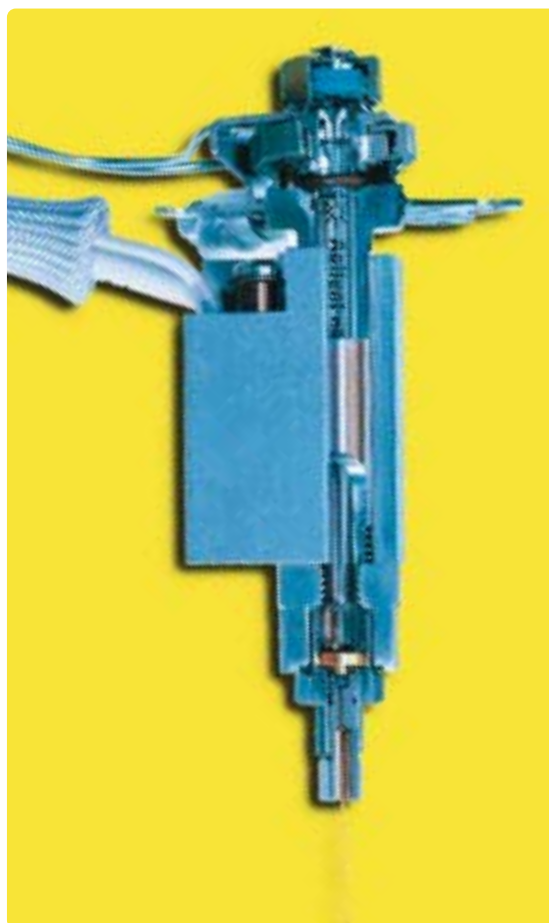
### Description

Retainer nut for headspace  
Septum retainer nut  
Shell weldment  
Retaining nut  
Reducing nut

### Part No.

18740-60830  
18740-60835  
G1544-80570  
G1544-20590  
18740-20800

For a complete parts breakdown, see the 5890, 6890 and 6850 series GC Instrument User and/or Service Manuals, or visit [www.agilent.com/chem](http://www.agilent.com/chem).



**Part No.****6890/6850 Split/Splitless Insert Assemblies**

Standard manual pneumatics	19251-60575
Original standard EPC using 1/4" split vent filter.	G1544-60575
Similar to G1544-60575 except allowed insertion for 1/4" chemical filters to clean carrier gas for ECD operation.	G1544-80580
S/SL insert weldment. Used with large charcoal canister type filter, for 6890/6850.	G1544-60585
Similar to G1544-60575 except carrier lines separated for interface to valved systems of a G1540A instrument.	G1580-60575
S/SL insert assembly for G1540A with valved system option. This insert assembly uses the large charcoal canister split vent filter, for 6890/6850.	G1580-60585

**5890 Split/Splitless Multimode Inlet Supplies**

Septum retainer nut	18740-60835
Retainer nut for headspace sampling	18740-60830
Retaining nut	19251-20620
Reducing nut	18740-20800

\* For a complete parts breakdown, see the 5890, 6890 and 6850 series GC Instrument User and/or Service Manuals.

**Liner Seals**

Stainless steel	18740-20880
Gold-plated seal	18740-20885
Gold-plated seal with cross	5182-9652



Gold-plated seal p/n 18740-20885



[www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)



Gold-plated seal with cross p/n 5182-9652

**www.agilent.com/chem**  
**800 227 9770**

**For more information:**

For detailed information about GC inlet supplies from Agilent, please call your local Agilent sales office or your authorized distributor. Or, visit us on the Internet at:  
[www.agilent.com/chem](http://www.agilent.com/chem)

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