Instrument Supplies

Leak Detectors
Split Injector Sleeves
Splitless Injector Sleeves
Sleeve Packing Material
CarboFrit Inlet Liners
Direct Injection Sleeves
Dual Column Analysis
Make-Up Gas Kits
ELCD Supplies
Purge & Trap Accessories
Inlet Supplies for HP
Detector Supplies for HP
Inlet Supplies for Varian GCs
Shimadzu GCs
Perkin Elmer GCs
Carlo Erba GCs
Fisons GCs

Low Cost Replacement Parts for HP, Varian, Perkin Elmer, Shimadzu, Carlo Erba , Fisons GCs

Restek supplies parts for many commercial GCs. These are similar to the original OEM parts and are designed to be a direct replacement often at much lower cost with equal and in many cases with improved performance and enhanced design features.

Please note : GC manufacturer's warranties and any OEM service contracts are not affected by customers using these parts by using Restek replacement parts as "consumable items".

Unique Restek parts include . . .

- CarboFrit* Inlet liners
- Vu-tight* Inlet Sleeves
- Uniliner* Sleeves
- Press-tight* connectors
- Silcosleeve* Metal Inlet sleeves
- Base deactivated Inlet sleeves
- "Improved" OEM parts . . .
- Restek Split/Splitless Injection Port for HP GCs
- MSD capillary conversion fitting

* Restek Trademarks

Restek Australian Distributors

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Table of Contents / Leak Detectors

■ *Table of Contents for Instrument Supplies:*

DETECTING LEAKS

Leaks in a GC system can cause problems such as increased detector noise, baseline instability, short column lifetime, and waste of expensive carrier gases. Electronic leak detectors, like Restek's Leak DetectiveTM, allow analysts to detect minute gas leaks undetected by liquid leak detectors without risk of contamination. Electronic leak detectors are an absolute necessity with capillary GC!

■ Restek's Leak Detective

- Compact, lightweight, hand-held design.
- Lowest-cost thermal conductivity leak detector available.
- Contamination-free leak
- detection.
- Detects helium or hydrogen trace leaks at ~3 x 10~4cc/sec. or ~200ppm.

Restek's Leak Detective electronic leak detector is the convenient and affordable solution for GC leak detection. It responds in less than 2 seconds to trace leaks of gases* with thermal conductivities different than air. Helium or hydrogen can be detected at 3 x 10-cc/sec. or at an absolute concentration less than 200ppm. Leaks are indicated by an audible alarm, as well as by an LED readout. Two 9-volt batteries provide 10- 12 hours of continuous operation.
The unit can also be used with an AC adaptor (both included).

(110 volts): cat.# 21607, / **(220 volts):** cat.# 21609,
* Not designed for use in explosive atmospheres.

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E-mail : jimjeffs@chromtech.net.au

Leak Detectors / Deactivated Sleeves

■ Gow-Mac Mini Gas Leak Detector

- Compact, portable, hand-held design.
- Rechargeable battery or line-operated.
- Probe: pen-type Teflon lined. Detects leaks of helium at >1 x 10-5cc/sec.
- Auto Zero -push button.
- Carrying case available.

In addition to Gow-Mac's standard leak detector, Restek offers Gow-Mac's mini leak detector. It is lightweight and offers simple, one-hand operation. It responds in less than 2 seconds to trace leaks of gases* with thermal conductivities different than air. Leaks are indicated by an LED bar graph.

Gow-Mac Mini Gas Leak Detector: (115 volts): cat.# 21640,

Caution
*NOT designed for determining leaks of combustible gases. A combustible gas detector should be used for determining combustible gas leaks in possible hazardous conditions.

■ Gow-Mac Leak Detector

- Identifies minute leaks that are undetectable by liquid leak detectors.**
- Contamination and residue-free leak detection.
- Audible alarm/Analog meter.
- Detects helium leaks 2 x 10-5 cc/sec.

This unit operates on line voltage or on a internal, rechargeable lead/acid gel battery. It is set for 115v/60Hz operating voltage, but is internally switchable to 230v/60Hz.

**Never use liquid leak detectors on a capillary system because liquids are actually drawn into the coil.

Gow-Mac Portable Gas Leak Detector: cat.# 20130

■ Deactivated Sleeves for Capillary Gas Chromatographs

Restek uses a unique deactivation procedure for deactivating sleeves. Our sleeves are evaluated with an endrin breakdown test to ensure complete inertness. We knew our process was exceptional when many analytical labs started buying pre-deactivated sleeves from our competitors, and then sending them to us for redeactivation! Compare your sleeve's deactivation to a Restek deactivated sleeve.

Every sleeve is dimensionally checked for a perfect fit and chromatographically tested to ensure proper deactivation.

For detailed technical information on using Restek's inlet sleeves, call our technical literature hotline and request ; *Operating Hints for Split/Splitless Injectors*

Also On this Website

Sleeve Quality Restek's sleeves are manufactured to demanding quality specifications that meet or exceed the original equipment's design. We guarantee each sleeve for a perfect fit. And remember, if a problem exists, satisfying your needs is our #1 priority!

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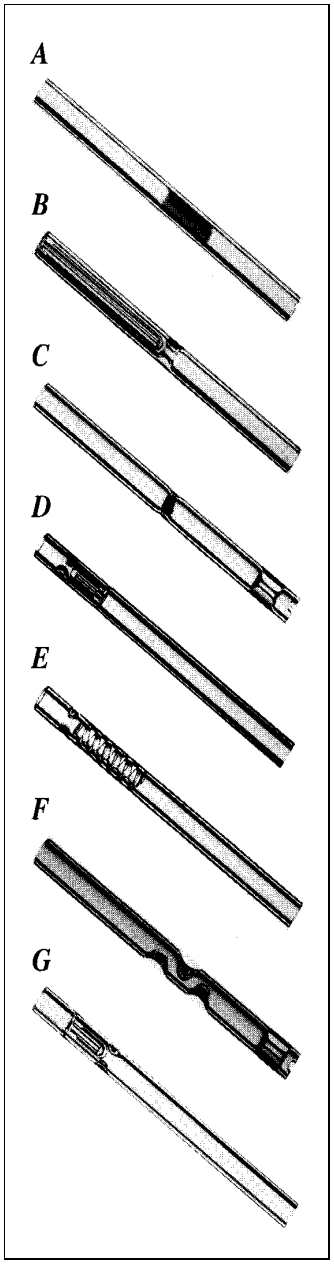
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Split Injector Inlet Sleeves



Inlet Sleeves for Split Injectors

Split sleeves are designed with mixing chambers and tortuous flow paths to fully vaporize the sample into a homogeneous vapor cloud before the sample reaches the split point. All Restek splitter sleeves are fully deactivated with a high temperature silanizing reagent to cap surface silanol groups so active compounds in the sample don't adsorb onto the hot glass surface.

Pack splitter sleeves with wool, fused silica beads, or CarboFrit™ inlet liners when analyzing dirty samples to trap non-volatile residue and prevent column contamination. Some of the more commonly used inlet sleeves are described:

A) Split Sleeve with Wool

The wool provides a high surface area to allow rapid vaporization of the sample and deliver a uniform vapor cloud to the split point. The low mass of the wool fiber prevents the Liedenfrost effect and yields energy to promote complete vaporization.

Benefits
- Low cost.
- Simple to manufacture.

Drawbacks:
- Glass wool can be adsorptive.
- High maintenance requirements.

[B) Laminar Cup Splitter

The sample flows through a small opening and smashes against the head of a glass cup. Then it travels around the outside of an elongated cup before the flow is inverted twice. Larger volume injections are possible because the liquid is trapped at the inner base and cannot escape until vaporized.

Benefits:
- Recommended by Grob'.
- Vaporizes up to 5ul samples.
- Best splitter sleeve for high molecular weight compounds.
- Laminar flow profile provides highest resolution.

Drawbacks:
- Costly to manufacture.

Frit Splitter

The sample must pass through the porous ceramic frit. The high surface area and tortuous flow path ensures complete vaporization.

Benefits:
- Traps septa particles and residue.

Drawbacks:
- Ceramic frit can be active.
- Difficult to clean.

D) Cup Splitter Sleeve

The sample flows through a mini funnel and smashes into a glass cup. The flow path then inverts twice before reaching the split point.

Benefits:
- Tortuous flow path aids in sample vaporization.
- Minimizes molecular weight discrimination.
- Can be packed with wool to trap particles,

Drawbacks:
- Difficult to clean.

E) Cyclosplitter (Patent#: 5,119,669)

This patented design incorporates a cylindrical glass screw in the sample pathway, providing a large area for sample vaporization.

Benefits:
- Ideal for dirty samples
- Allows many injections of dirty samples before cleaning is required.
- Easy to clean.
- **Drawback**
- Not recommended for large volume injections.

F) Baffle Splitter

The baffle deduces turbulent flow that directs the sample against the wall of the glass sleeve.

Benefits:
- Simple to manufacture

Drawbacks:
- Prone to molecular weight discriminaion.
- Septa particles / residue can enter column.
- Subject to Liedenfrost effect.

G) mini-Lam Split Sleeve

The flow principle is basically the same as in the laminar cup splitter. The *mini-Lam* sleeve's design utilizes a shortened, inverted laminar cup. It can be used for dual column analysis in a capillary injection port using a two-hole ferrule.

Benefits:
- Less expensive than the laminar cup.
- Vaporizes up to 4ul samples.
- Ideal for high molecular weight compounds.
- Similar to laminar cup splitter.

Easy to clean.

"'Injectors Providing Complete Sample Evaporation Above the Column Entrance in Vaporizing GC Injections", K. Grob and C. Wagner, *HRC & GC*, Vol. 16, pg. 429.

***See pages 251-272 for HP, Varian, Fisons arid Shimadzu* catalog numbers.**

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Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Splitless Injector Inlet Sleeves

■ *Inlet Sleeves for Splitless Injectors*

The residence time of the sample in a splitless sleeve is long, between 0.5 and 2 minutes. Therefore, splitless inlet sleeves do not require high surface areas (unless rapid-injecting autosamplers are used). Splitless sleeves are usually designed as straight tubes. Alternative splitless sleeve designs, such as a gooseneck restriction, help contain the sample cloud in the injector and minimize the breakdown of compounds sensitive to catalytic decomposition from metal inletparts. Double gooseneck sleeves workparticularly well with HP 5890 GCs because the column sits several millimeters above the hot metal inlet seal. The double gooseneck effectively isolates the sample from the metal inlet seal, increasing sensitivity by reducing breakdown and adsorption of active components. All splitless sleeves are fully deactivated with a silanizing reagent to cap surface silanol groups. Splitless sleeves should be packed with wool or fused silica beads when analyzing dirty samples to trap non-volatile residue and prevent column contamination. Some of the more commonly used splitless sleeves are described below.

A) Straight Tube Design

Use for samples containing a narrow molecular weight distribution and for those not prone to thermal decomposition. Wool is recommended. Packing with wool aids in vaporization of high molecular weight compounds and minimizes discrimination.

Benefits:

- Low cost.

Drawbacks:

Potential decomposition of active compounds such as endrin and DOT when packed with wool.

- Prone to high molecular weight discrimination.

■ B) Gooseneck

■ C) Recessed Gooseneck

Benefits

- Increases splitless efficiency.

Decreases breakdown of active compounds such as endrin and DDT.

Chamber contains sample vaporization cloud.

- Can be packed with wool.:
- **Drawbacks:** No known drawbacks.

■ GC Specific Sleeves

Restek offers inlet sleeves to fit a variety of gas chromatographs. For ordering information . . .

■ D) Double Gooseneck

■ E) Recessed Double Gooseneck

Best sleeve for catalytically labile or high molecular weight compounds. Isolates sample from metal injection port parts.

Use the cyclo-version for dirty samples.

Benefits:

- Highest splitless efficiency.
- Breakdown of active compounds decreased.
- Chamber contains vaporization cloud.

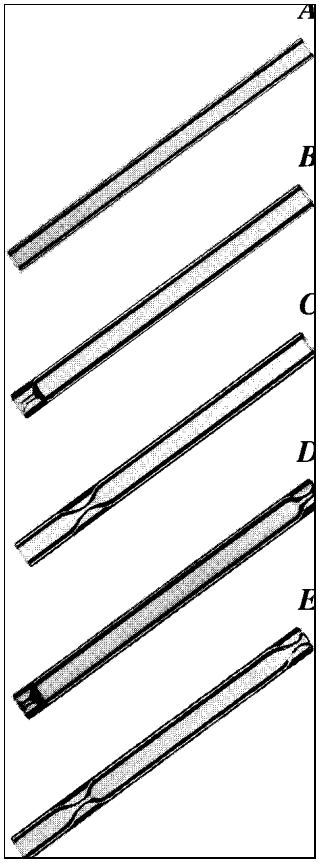
Drawbacks:

- Higher cost than straight splitless sleeves.

Only recessed double goosenecks can be packed with wool.

Note: Recessed goosenecks have the same benefits as the single or double gooseneck sleeves, except the base of the recessed gooseneck can be packed with wool and used for dual column analysis with a two-hole ferrule.

Sleeve Type	Endrin Breakdown	
	clean seal	dirty seal
splitless w/wool	6.0%	12.8%
double gooseneck	2.0%	2.4%



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Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Instrument Supplies

from the specialists in chromatography 238

Sleeve Packing Materials & Accessories

■ Why use deactivated wool?

- Ensure uniform vaporization in split or splitless sleeves.
- Recommended for autosamplers with fast injection rates.
- Prolong column life by trapping septa particles.
- Inertness tested for endrin breakdown calculations.

Wool serves two functions: to promote sample vaporization and to trap non-volatile residue from entering the column. Grob' showed that liquids don't actually touch hot glass sleeve surfaces but dance around like a water drop on a hot griddle. Not until the liquid can cool a small area of contact below its boiling point will the solvent evaporate. Wool facilitates this action by providing a low mass surface that rapidly cools below the solvent boiling point and allows complete evaporation.

■ Choosing Fused Silica or Borosilicate Wool:

Either fused silica or borosilicate wool can be used for most applications. However, fused silica is more inert for active compounds such as phenols. Regardless of whether fused silica or borosilicate wool is used, use wool sparingly. Too much wool will increase the adsorption of active compounds. A one centimeter plug of loosely bound wool is sufficient for most applications. Consult your GC instruction manual for its recommendations on placing wool inside inlet sleeves.

1 K. Grob and C. Wagner, "Injectors Providing Complete Sample Evaporation Above the Column Entrance in Vaporizing GC Injections", *HRC & CC*, Vol. 16, pg. 429

■ Deactivated Wool

Deactivated Fused Silica Wool: Purer and more inert than borosilicate glass wool.
cat.# 20790, /10 grams
Deactivated Glass Wool:
More flexible than fused silica wool.
cat.# 20789, /10 grams
Base Deactivated Fused Silica Wool:
cat.# 20999. /10 grams

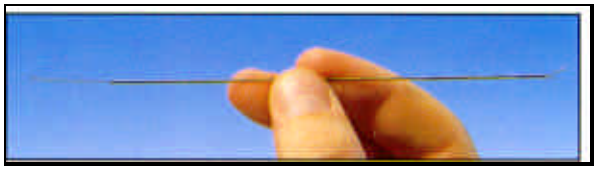
■ Deactivated Fused Silica Beads

- · Increase the sample vaporization surface and minimize splitter discrimination to improve quantitation of compounds with dissimilar boiling points.
- · Efficiently trap non-volatile or inorganic residue to prevent damage to the column inlet.
- · Purer than borosilicate glass beads
- · Deactivated, heat-treated, and tested to ensure complete inertness.*

Deactivated Fused Silica Beads:
cat.# 20791, /25 grams * Inertness testing includes endrin breakdown calculations.

■ Mini Wool Puller/Inserter Tool

One end of the tool is a hook for removing wool, and the other end is a fork for inserting wool. Because the body OD is 0.8mm, the tool can be used to msert or remove wool from our gooseneck sleeves.
{Not recommended for double gooseneck.)



cat.# 20114, each

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CarbocFrit Inlet Liners

■ CarboFrit Inlet Liners NEW !

- Highly inert.
- Extends analytical column lifetime.
- Enhances split and splitless injection reproducibility.
- Improves retention of high molecular weight contaminants.
- Consistent packing density.

Restek has developed an alternative material for packing inlet liners. CarboFrit™ inlet liner packings provide chromatographers with the same improved vaporization, low pressure drop, and trapping of non-volatile contaminants as glass wool but with superior inertness and higher temperature stability. The uniform pore size of these frits guarantees consistent flow through the sleeve. CarboFrit inlet liners are available prepacked in HP and Varian 4mm ID split and splitless liners or as replacement packing.

Highly Inert
CarboFrit
alternative packing for inlet liners

They are easy to install into any inlet sleeve with an ID >3.5mm.
* They can be removed easily and replaced if contaminated by "dirty" sample residue.

**Sleeves with IDs less than 3.5mm are difficult to pack but can be done on a custom basis.*

Prepacked sleeves		
4mm Splitless		4mm Gooseneck
for HP	for Varain	for HP
20772-209.1	20904-209.1	20798-209.1
20773-209.5	20904-209.5	20798-209.5
20774-209.25	20904-209.25	20798-209.25
".1"=single pack, ".5"=5-pack, and ".25"=25-pack		

To order other sleeves with >3.5mm ID prepacked with CarboFrit™ inserts, add the appropriate suffix to the inlet sleeve catalog number.
Each -209.1
5-pack -209.5
25-pack -209.25

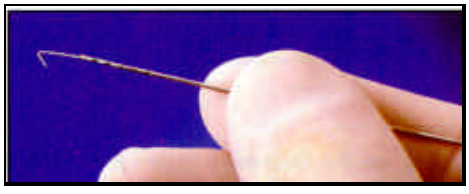
CarboFrit
Inlet Liners

Replacement Frits	Cat.#
CarboFrit (10-pack)	20295

STOPPING SAMPLE LIQUID BY PACKING MATERIAL

Recently, Restek sent us some carbon material (CarboFrit) with the suggestion to test it as liner : packing. Initially, I didn't even want to try it because carbon is usually highly retentive and catalytically active. As we nevertheless gave it a chance, we were highly surprised.
... it exhibited low retentive power and good inertness."
excerpt from :
"Sample Evaporation in Hotbed Injectors",
Dr. Konrad Grob,
The Restek Advantage, Winter 1996

■ CarboFrit Puller/Inserter Tool



- Hook end for removing CarboFrit inserts.
- Bent end (90°) for inserting CarboFrit inserts.**

CarboFrit Puiller/Inserter Tool:

** not recommended for use with double gooseneck sleeves

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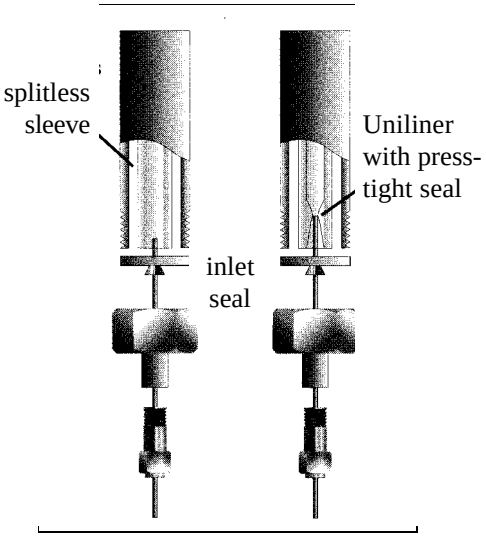
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

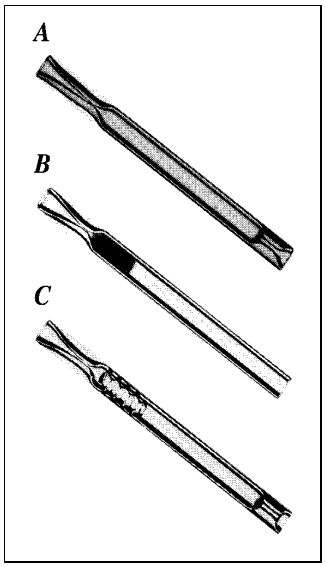
Direct Injection Sleeves

■ Direct Injection Mode Using a Uniliner Sleeve - An Alternative to Splitless!

Many problems associated with splitless analysis occur because the column inlet is not physically connected to the inlet sleeve. Because there is a gap around the outside of the column and inside of the sleeve, the sample vapors deposit on the metal inlet parts or fall below the tip of the column and are swept out of the split vent during the purge-on mode. The diagram below illustrates how the incorporation of a gentle presstight taper can eliminate contact with the hot catalytic metal disk surface (inlet seal) by making a leak-tight connection at the end of the column and sleeve.



A Unilinear sleeve prevents the sample from contacting metal parts at the base of a splitless injection port, which eliminates many problems such as reduced response of high molecular weigh/ compounds, adsorption, and catalytic Resorption in the inlet, providing overall higher sensitivity.



■ *(A* **) Standard Unilinear Sleeve**

The buffer volume chamber serves to contain the sample vaporization cloud and prevents contact with the metal injection port parts. Peak tailing is reduced and larger injection volumes can be made. Because of the hour glass design, samples should be relatively clean or dirt may be funneled into the column inlet.

■ **B) Open-top Unilinear Sleeve**

Open-top Unilinear sleeves are ideal for extremely dirty samples because they are packed with fused silica wool that traps dirt and sample residue.

Contaminated wool is easily replaced and the sleeve can be cleaned with nylon brushes or pipe cleaners.

A splitless injection mimics a direct injection while the inlet is configured to the purge-off mode by the action of a solenoid. The purge on mode simply sweeps from the inlet the sample vapors that may have contacted the metal inlet seal. Analysts canreplace splitless sleeves with Unilinear sleeves and obtain additional benefits over a traditional splitless analysis.

The adsorption of active compounds is greatly reduced, the area of higher molecular weight compounds is increased (i.e., less discrimination), and, because all of the sample is delivered to the head of the column, sensitivity over conventional splitless analysis is enhanced.

Unilinear sleeves can be used as direct replacements for splitless sleeves.

They are easily installed in a splitless inlet in almost the same manner as a splitless sleeve except that they must be operated continuously in the purge-off mode.

The tight seal between the column inlet and the press-tight taper prevents the sample from being lost out of the split vent.

Unilinear sleeves should be operated at column flow rates ranging between 5 and l0cc/min. to minimize peak tailing and to sharpen early eluting peaks.

The taper is designed to accomadate either 0.32 0r 0.53mm ID columns. Request Restek's Guide to Direct Inections for more information on operating and optimising direct injections

■ **Cyclo Unilinear Sleeve**

The glass screw provides an excellent vaporization surface for high and low molecular weight samples. Dirt is trapped on the first turn of the screw, reducing subsequent residue/sample interaction.

In comparison to liners packed with wool, Cyclo-Uniliner sleeves provide as many as five times the number of dirty sample injections before calibration curves degrade. Since Cyclo-Uniliner sleeves are deactivated as a unit, they are ideal for active samples.

See the following pages for instrument specific DI sleeves: Hewlett-Packard: 252, Variarz: 263, Shimadzu: 267, Perkin-Elmer: 271 and Carlo -Erba: 271.

Packed Column Inlet Conversions

■ Converting Packed Inlets to Capillary Column Use

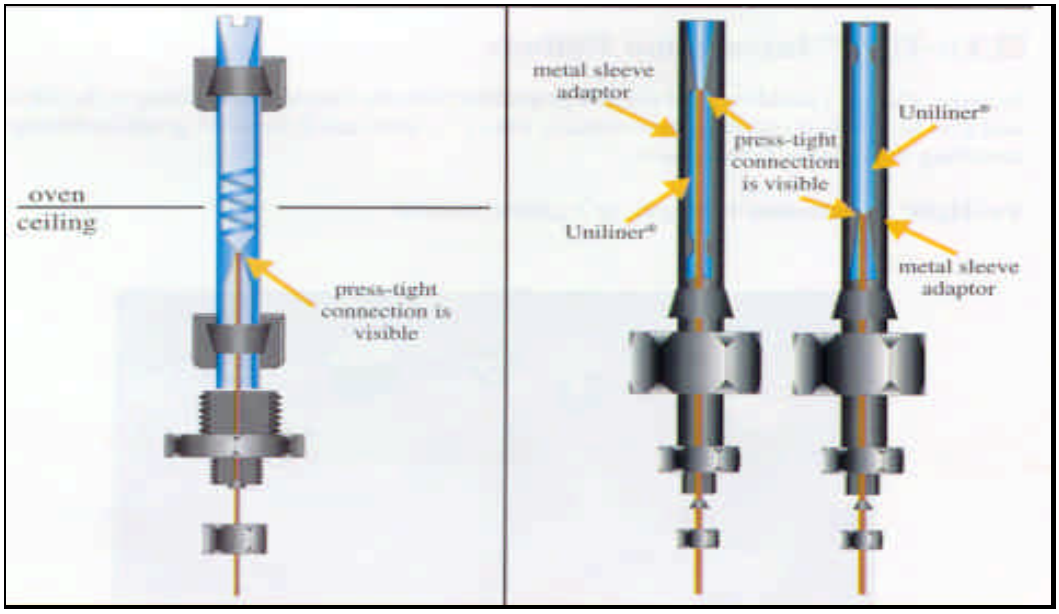
Two types of inlet conversion kits are available for a 1/4-inch packed column injection port to fit either 0.32 or 0.53mm ID capillary columns: the Vu-Tight sleeve and the Uniliner sleeve with adaptor. The Vu-Tight sleeve fits directly into the 1/4-inch injection port and allows visual confirmation of the connection between the column and the sleeve. The Uniliner and adaptor work together to allow either a direct or on-column injection when using 0.53mm ID columns. Both systems incorporate a press-tight connection between the sleeve and column inlet, minimize dead volume, and reduce solvent peak tailing. The leak-tight connection and expansion chamber deliver superior chromatographic performance over other direct injection inlet designs.

See page 253 for
Conversion Kits
designed specifically to fit HP GCs

■ Features of Both Conversion Kits:

- Fit HP, Varian, and other common GCs with 1/4-inch packed column injection ports (with max. insertion depth of 4 inches).
- Install easily within fifteen minutes.
- Accommodate either 0.32 or 0.53mm ID fused silica columns (tubing OD > 0.5mm).
- Deactivated and extremely inert sleeves.
- Sleeve designs to handle dirty samples are available for either system.
- Press-tight connections between the sleeve and column inlet minimize dead volume, reduce solvent peak tailing, and sharpen early eluting components.

Choose the appropriate kit depending on your labs specific needs. Both kits are easy to use and offer superior chromatography. Have questions about which kit to choose?
Call our technical service chemists at (800) 356-1688 and they will be happy to assist you.



Advantages of Vu-Tight Inlet Sleeves

The 1/4-inch Vu-Tight sleeve fits directly into a 1/4-inch injection port.
The connection between the sleeve and the column is in the GC oven, allowing visual confirmation of the seal. Problems such as a crushed column end in the press-tight taper can be easily detected making proper installation worryfree. The Cyclo Vu-Tight sleeve prevents non-volatile residue from contaminating the column

Advantages of Uniliner Sleeves

5mm Uniliner sleeves are designed to fit into the 1/4-inch Unilinear Sleeve Adaptor, which fits into a 1/4-inch injection port. The Unilinear sleeve can be inserted in one direction to allow direct injection or inverted to allow on-column injection. Since the 1/4-inch injection port ferrule seals against the metal sleeve adaptor surface, it is virtually impossible to crack the glass Uniliner sleeve during installation

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Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Packed Column Inlet Conversions

■ Vu-Tight Inlet Sleeves for l/4-inch Packed Injection Port Conversion

- Visually observe the press-tight connection between the column end and sleeve.
- Fits 0.32 and 0.53mm ID capillary columns (fits column ODs from 0.5mm to 0.8mm).
- Slotted top prevents obstruction of carrier gas flow.
- Two designs are available.
- Operates in the direct injection mode.

■ Vu-Tight Dl Sleeve 1/4-inch OD)

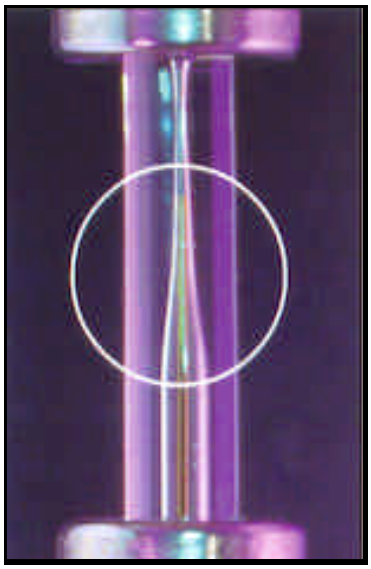
Can be easily packed with wool for dirty samples.
cat.# 20342, each
cat.# 20343, 5-pk
cat.# 20344, 25-pk

■ Cyclo Vu-Tight Dl Sleeve 1/4-inch OD)

Ideal for dirty samples. Prevents non-volatile residue from contaminating the column.
cat.# 20787, each
cat.# 20788, 5-pk

■ Vu-Tight Installation Fittings

Includes a 1/4-inch stainless steel nut and graphite ferrule for attaching the sleeve to the GC inlet and a 1/4 to 1/8-inch stainless steel reducer plus a 1/4-inch and 0.5mm ID



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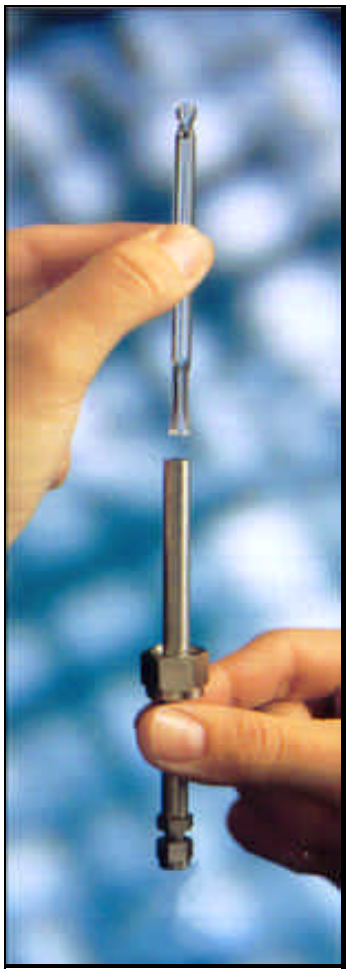
Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Packed Column Inlet Conversions

■ Uniliner Sleeves for l/4-inch Packed Injectior Port Conversion

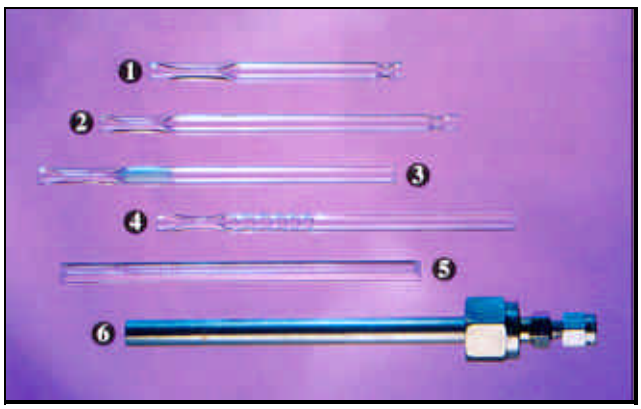
- Reduces solvent tailing.
- Versatile - 0.53mm ID version can be used in the direct or on-column injection mode.
- Incorporates a gentle taper that seals the column and reduces dead volume in the direct injection mode.
- Available in various designs.

On-column injections can only be performed with 0.53mm ID columns since 26-gauge needles do not fit into the bore of 0.32mm ID columns or the Unliner sleeve taper.



Uniliner Sleeve Description	Inj. Mode Column IDs	Individual cat.#	5-pack cat.#
1 Uniliner Sleeve (small buffer volume chamber 60mm longf or injections < 2u1)	0.53mm ID in DI or OC mode	20902	20903
2 Uniliner Sleeves (large buffer volume chamber - 85mm long for injections up to 4ul)	0.32 & 0.53mm Dl only 0.53mmDl or OC	20308 20301	20309 20305
3 Cyclo-Uniliner Sleeve (for active dirty samples)	0.32 & 0.53mm DI only	20319	20320
4 Open-top Utilizers Sleeve (packed with fused silica wool)	0.32 & 0.53mm DI only	20315	20316
5 Low Volume/Purge & Trap Uniliner Sleeve (Imm ID x 5mm OD- use 1/4" injection ports to troubleshoot purge & trap units)	0.25, 0.32, & 0.53mm DI	20307	20314
6 Utilizers Sleeve Adaptor (requiredfor installing Uniliner sleeves in 1/4 " injection ports)	Includes a 1/4-inch SS nut & graphite ferrule, a 1/16-inch SS nut, & a 0.8mm lD graphite ferrule. **For injection ports <8cm:** cat.# 20310, each **For injection ports 8-15cm:** cat.# 20311, each		

See the injection port conversion kit chart on page 244 for ordering assistance



Note: Uniliner sleeves must be used with a Uniliner Sleeve Adaptor (cat.# 20310 or 20311) for 1/4-inch injection ports. Remember to include a sleeve adaptor when ordering a Uniliner sleeve, unless purchasing replacement Uniliner sleeves.

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Packed Column Inlet Conversions

Injection Port Conversion Chart	Uniliner Set-up			Vu-Tight Set-up	
GC Instrument	**Uniliner Sleeve** # 20301, 20305, 20308, 20309,20315, 20316, 20319, 20320, 20902, 20903	**Sleeve Adaptor** # 20310,	**Sleeve Adaptor Fitting*** # 20312,	**Vu-Tight Sleeve** # 20342, 20343, 20344, 20787,	**Vu-Tight Fitting Kit** # 20504,
Hewlett-Packard GCs (1/4-inch injection ports)Models: 5700, 5710, 5711, 5712, 5830, 5840, 5880, 5890	*	*		*	*
Varian GCs (1/4-inch injection ports) Models: 1200, 1400, 2100, 2400, 3300-3700, 4400, 4600, 6000	*	*		*	*
Tracor GCs (1/4-inch injection ports) Models: 540, 550, 560, 565, 570	*	*		*	*
Packard Becker GCs (1/4--inch injection ports) Models: 427, 428, 429, 430, 433, 436, 437, 438	*	*		*	*
Gow-Mac GCs 1/4-inch injection ports) Models: 69-750, 69-550	*	*		*	*
HNU GCs (1/4-inch injection ports) Models: 301, 401, 421	*	*		*	*
Shimadzu Packed Column GCs (5mm injection ports)Models: GC-4, GC-6 thru 9, GC-14, GC-15, GC-16, GC-17, Mini	*		*		

* See page 268 for Smm Stainless Steel Adaptor Fitting description.

For Additional
Packed Column
Inlet Conversion for HP GCs
see page 253

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Dual Column Analysis

■ Dual Column Analysis:

Confirmational Analysis Using Dual Capillary Columns

Analyzing the same sample on two columns of different polarity can increase both the qualitative and quantitative reliability. However, having to repeat the analysis on a second column will significantly reduce sample throughput. The simple solution to improving analytical reliability without reducing sample throughput is to use a simultaneous dual column technique. This technique involves connecting two capillary columns to one GC inlet and connecting each column to its own detection system. Both columns are usually of the same internal diameter so the flow rates are balanced and similar amounts of the analyses are directed onto each column. This approach will result in confirmational analysis without reducing sample throughput. Simultaneous dual column analysis has become a more routine technique used by laboratories involved with complex analyses in complicated matrices.

Using Split or Splitless Injectors

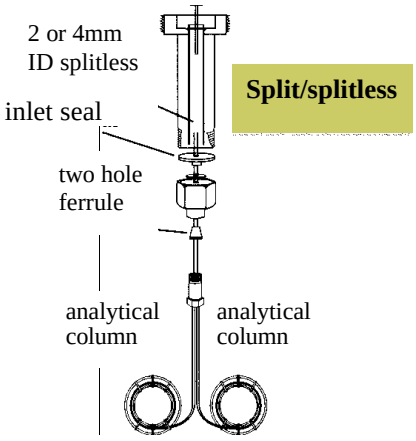
Split or splitless injections are the easiest dual column analyses to perform. Both columns can be inserted into the split/splitless inlet fitting and terminate in the inlet sleeve. Columns with internal diameters of 0.32mm ID or less (or 0.5mm OD) can be inserted directly into the 1/16-inch standard capillary fitting by using a two-hole capillary ferrule. Columns with internal diameters of 0.53mm ID cannot be inserted into a standard 1/16-inch capillary fitting because the outside column diameter (0.8mm) is too large for both to fit simultaneously. Special fittings that use a 1/8-inch fitting and 1/8-inch two-hole ferrule can be used for 0.53mm ID column.*

Using On-column or Direct Injectors

On-column or direct injections require a press-tight connection to the inlet sleeve. Usually a section of 0.53mm ID guard tubing is attached to one leg of a Press-Tight "Y" connector (cat.# 20405). Analysts must be careful that the flow through both legs of the "Y" is similar or the detector response will differ. Another approach is to use a Dual Column Direct Injection Tee (cat.# 20412) or mini-Lam™ Direct Injection Tee (cat.# 20436), that is installed into the injector, and each column can be connected to the remaining legs of the tee. The Dual Column Direct Injection Tee has a vaporization chamber to reduce sample backflash and a glass screw to ensure sufficient vaporization and to reduce discrimination of preferential splitting. The mini-Lam™ Direct Injection Tee is similar: it incorporates an inverted cup in place of the glass screw. More information on these types of injection tees is given on page 247.

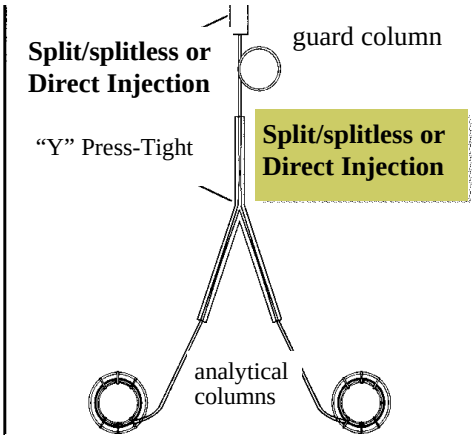
*Instrument specific fittings for performing dual column analyses can befound in the HP and Varian supplies section.

Two-hole ferrules allow dual column confirmational analysis in the same split/splitless inlet.



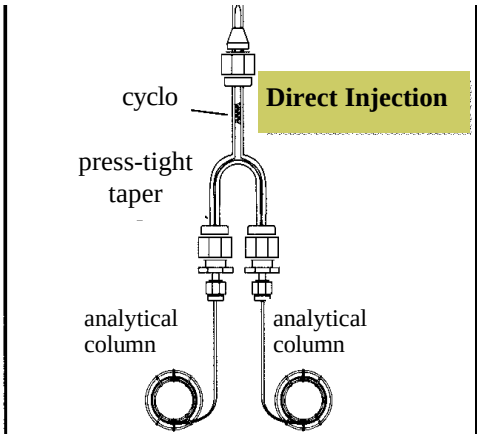
0.25 and 0.32mmID columns can be used with standard 1/16-inch inlet fittings. 0.53mm ID columns require 1/8-inch fittings to allow both columns to fit side by side in the injector. Use either straight or extended gooseneck splitless sleeve.

The "Y" Press-Tight configuration allows dual columns to be used in either a split/splitless or direct injection inlet.



The "Y" Press-Tight configuration offers versatility since it allows any diameter column or guard column to be connected to a split/ splitless or direct injection inlet.

The direct injection "T" allows two a 0.32 or 0.53mm ID columns to be connected to one 1/4-inch packed column inlet.



The direct injection "T" incorporates a glass screw to ensure complete to splitting the sample onto two columns. The dual sealing mechanisms increase the ease of use and the confidence over the "Y" PressTight configuration..

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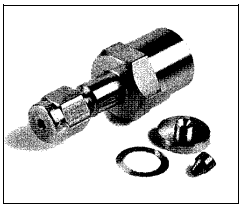
E-mail : jimjeffs@chromtech.net.au

Packed Column Inlet Conversions

■ Split/Splitless Fittings for 0.25mm and 0.32mm ID Columns

Two 0.25 or 0.32mm ID capillary columns can be inserted into a standard /6-inch type capillary fitting. The two-hole ferrule positions the column squarely inside 2 or 4mm ID splitless sleeves. (Use recessed taper double gooseneck sleeves for dual column analysis.)



■ Capillary Inlet Adaptor Fitting Kit for HP GCs:

- 1/16-inch fitting uses standard size two-hole capillary ferrules.
- Capillary columns install easily.
- Column insertion depth is identical to original equipment.
- Kit includes everything needed for dual column confirmational analysis using 0.25 and 0.32mm ID capillary columns (two-hole ferrules must be ordered separately).

Capillary Inlet Adaptor Fitting Kit: cat.# 20633, kit
Replacement Inlet Seal (1.2mm hole): cat.# 20390, 2-pk. / cat.# 20391, 10-pk.

■ Capillary Inlet Guide Kit for Varian GCs:

(cat.# 20502, $45/kit) Refer to page 265 of this catalog for details.

■ 14A Inlet Adaptor for Shimadzu GCs:

(cat.# 20349) Please refer to page 268 of this catalog for more information.

Fused Silica Guard Columns

5-meter length Guard Columns & Transfer Lines

Nominal ID	Nominal OD	cat.#
0.05mm	0.405mm	10040
0 10mm	0.405mm	10041
0.15mm	0.405mm	10042
0.18mm	0.405mm	10046
0.25mm	0.405mm	10043
0.32mm	0.49mm	10044
0.53mm	0.74mm	10045

6-packs (Buy 6 for the price of 5!)

Nominal ID	Nominal OD	cat.#
0.25mm	0.405	10043-600
0.32mm	0.49	10044-600
0.53mm	0.74	10045-600

Two-Hole Ferrules (I/16-inch fittings):

0.4 / 0.5mm ID graphite:
cat.# 20235, 5-pk.
0.4mm ID Vespel/graphite:
cat.# 20241, 5-pk.
0.5mm ID Vespel/graphite:
cat.# 20242, 5-pk.

■ Universal "Y" Press-Tight Connectors

An alternative method of performing dual column confirmational analyses!

- Split sample flow onto two different columns.
- Split a single column flow into two different detectors.
- Perform confirmational analysis with a single injection.
- Fits 0.18, 0.25, 0.32, & 0.53mm ID columns.

Universal "Y" Press-Tight Connector
(please see photo & detailed product listing on page 307):
cat.# 20405, ea.
cat.# 20406, 3-pk.

■ Universal Angled Press-Tight Connectors

- Ideal for onnecting guard columns to analytical columns.
- Made from inert fused silica
- Reduces strain on column end connections
- Designed at an angle approximating the radius of a capillary column.
- Seals all common izes (0.18 to 0.53mm ID) of fused silica tubing.

(please see photo & detailed product listing on page 307)

Universal Angled Press-Tight Connectors
cat.# 20446, 5-pk.
cat.# 20447, 25-pk.
cat.# 20448, 100-pk.
Universal Angled "Y" Press-Tight
cat.# 20403, ea.
cat.# 20404, 3-pk.

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Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

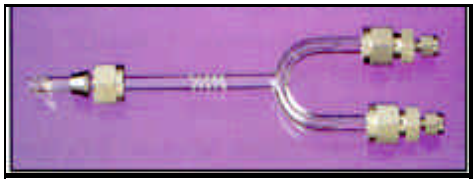
Dual Column Analysis

■ Packed Column Inlet Fittings

(Direct Injection into 0.32 or 0.53mm ID Capillary Columns)

♦ Dual Column Direct Injection Tee

A Dual Column Direct Injection Tee was developed for 1/4-inch packed column inlets. The tee is designed with a glass cyclo prior to the split point to promote sample vaporization and to provide even splitting between both columns. The glass cyclo also traps dirty sample residue and minimizes the need for a guard column. High molecular weight contaminants are trapped in the first turn of the screw, allowing up to four times more injections than conventional inlet sleeves packed with wool. Inlet maintenance and down time is significantly reduced. The tee incorporates a press-tight taper in each outlet leg to facilitate a perfect dead volume free connection for each analytical column (ODs ranging from 0.5 to 0.8mm) and to allow a visual confirmation of the column connection.



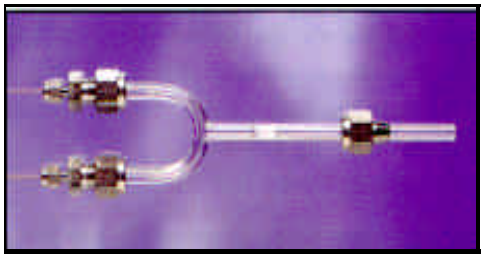
Dual Column Direct Injection Tee Kit: (includes all fittings/ferrules)
cat.# 20412, /kit
Replacement Tee: cat.# 20411, each

Graphite Replacement Ferrules		
ID	**cat.#**	**Quantity**
0.5mm	20201	10-pk
	20228	50-pk
0.8mm	20208	10-pk
	20224	50-pk
1/4-inch	20210	10-pk

■ Dual Column mini-Lam Direct Injection Tee for l/4-inch Packed Column Inlets

Based on Dr.Grob s work), we have a *mini*Lam™ direct injection tee that allows complete vaporization and permits larger sample volumes.

The *mini-Lam* direct injection sleeve is designed to fit 1/4-inch packed column injectors. The tee incorporates a press-tight taper in each outlet leg, which delivers a perfect, dead-volume-free connection to each analytical column (OD ranging from 0.5 to 0.8mm) and allows visual confirmation of the column connection. The open top design makes it easy to pack with glass wool to keep dirty sample residue form contaminating the cup.



A complete *mini-Lam* dual column direct injection kit is available that includes a deactivated 1/4-inch glass tee, 1/4-inch nut and ferrule, two 1/4-inch to 1/16-inch reducing unions, and ferrules. Deactivated replacement glass tees are also available.
mini-Lam Direct Injection Tee Kit: cat.# 20436, kit
mini-LamÔ Direct Injection Tee: cat.# 20435, each
K. Grob, *HRC & GC, 15 (1992)* 190.

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Dual Column Analysis

CAPILLARY CONVERSION TIPS:
Packed column conversion requires adding make-up gas to the detector. Since the detector expects about 30cc/min. from a packed column, and capillary column flow rates may range from 0.5 to 3.0cc/min., make-up gas is necessary for proper detector sensitivity and performance. The makeup gas also sweeps the outlet of the capillary column, reducing dead-volume effects in the detector fitting. Kits are available to fit all brands of GCs and all types of detectors requiring make-up gas.
High-performance design minimizes dead volume, resulting in sharper peaks. Select the correct kit based on detector port fitting size.

■ Universal 1/4 & 1/8-inch Make-up Gas Kit Includes:

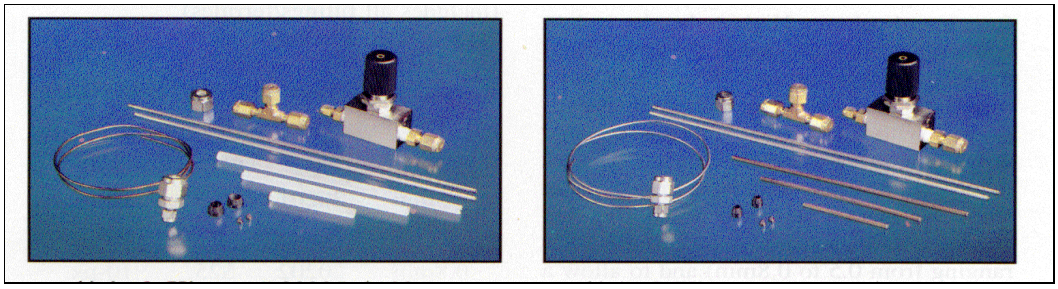
- Custom stainless steel make-up gas fittings.
- A high performance variable flow restrictor.

Standard 1/8-inch union tee and two 9-inch sections of 1/16-inch stainless steel tubing for connection to the GC bulkhead fitting.

- Three different sleeve lengths: 2-inch (5lmm), 4-inch (102mm), and 6-inch (153mm) .

The 1/4-inch kit contains 1/4-inch OD by lmm ID deactivated glass sleeves with one end slotted and one end chamfered. The 1/8-inch kit contains 1/8-inch by 2mm ID fused silica lined Silcosteel sleeves.

- All nuts and ferrules necessary for connecting the sleeve to the detector and the column to the make-up gas fitting.
- Complete step-by-step instructions.

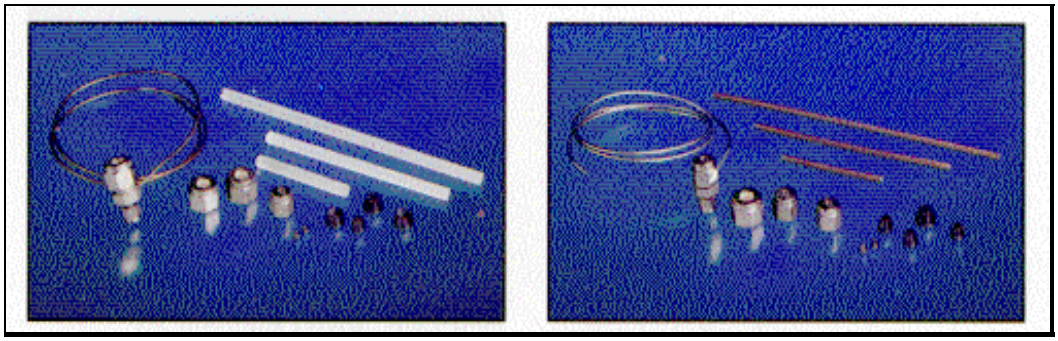


1/4-inch Kit: cat.# 20325, ea.

1/8-inch Kit: cat.# 20326, ea.

■ Complete l/4 & 1/8-inch Mini Make-up Gas Kit Includes:

- Custom-designed stainless steel make-up gas fittings.
- Three inlet sleeves: 2-inch (5lmm), 4-inch (102mm), and 6-inch (153mm). The 1/4-inch kit contains 1/4-inch OD by lmm ID deactivated glass sleeves - one end slotted and one end chamfered. The inch kit contains 1/8-inch OD by 2mm ID fusedsilica-lined Silcosteel sleeves.
- All nuts and ferrules necessary for connecting the sleeve to the detector and the column to the make-up gas fitting.
- Complete step-by-step instructions.



1/4-inch Mini Kit: cat.# 20324, ea.

1/8-inch Mini Kit: cat.# 20323, ea.

Replacement Make-up Gas Fittings (Stainless Steel):
1/4-inch: cat.# 20327, each
1/8-inch: cat.# 20328, each

**Not recommended for HP GCs. The ECD/FID Dual Purpose Make-up Gas Fitting listed on page 260 is for use with HP GCs*

see page 269 for
Make-up Gas Kits
designed specifically for Shimadzu

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Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
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Dual Column Analysis

1/4 & 1/8inch Make-up Gas Kit Replacement Sleeves			
Injection Port Size	Length 2-inch (51mm)	Length 4-inch (102mm)	Length 6-inch (153mm)
1/4~-inch	20763 /ea	20766 /ea	20769 /ea
1/4-inch	20764 /5-pk	20767 /5-pk	20770 /5-pk
1/8-inch	20560 /2-pk	20561 /2-pk	20562 /2-pk

■ Variable Flow Restrictor

This variable flow restrictor, included in the 1/4 and 1/8-inch Make-up Gas Kits pictured on page 248 can be purchased separately. It accurately controls flow rates between 0.5-l00cc/min. when source pressures are between 10-40psig. Includes 1/4-or 1/8-inch inlet and 1/16-inch outlet fittings.
1/4-inch Fittings: cat.# 20329, each
1/8-inch Fittings: cat.# 20330, each

■ Replacement Nickel Reaction Tubes

Pretreated for maximum sensitivity · Quality-controlled for reliability · Available for different models

To replace these instrument part numbers: ..... order the following Restek part

Fits ELCD						Restek	
Model	**Tremetrics**	**Varian**	**Perkin-Elmer**	**Shimadzu**	**O.I. Analytical**	**cat.#**	**qty.**
Hall 700A	115439-0()03	00-996724-14	0330-2675	N/A	N/A	21580	2-pk
Hall 1000	117459-0003	00-997625-12	N660-1072	220-90435-00	N/A	21581	2-pk
O.I. 4420	N/A	N/A	N/A	N/A	183780	21582	2-pk

■ Hall 1000 Replacement Accessories

ELCD Nickel Reaction Tube Nut
High-quality stainless steel screw mounts nickel reaction tube into ELCD.

ELCD Nickel Reaction Tube Nut:
cat.# 21584, /2-pk.
1/16-inch Vespel/Graphite Sealing Ring
This Vespel /graphite sealing ring installs onto the nickel reaction tube after the screw. The sealing ring easily compresses on the reaction tube to yield a leak-free seal and prevent detector oxidation.
1/16-inch Vespel/Graphite Sealing Ring:
cat.# 21583, /2-pk.

ELCD nickel reaction tubes, nuts, and Vespel/Graphite sealing rings

ELCD Supplies / purge & Trap Spargers

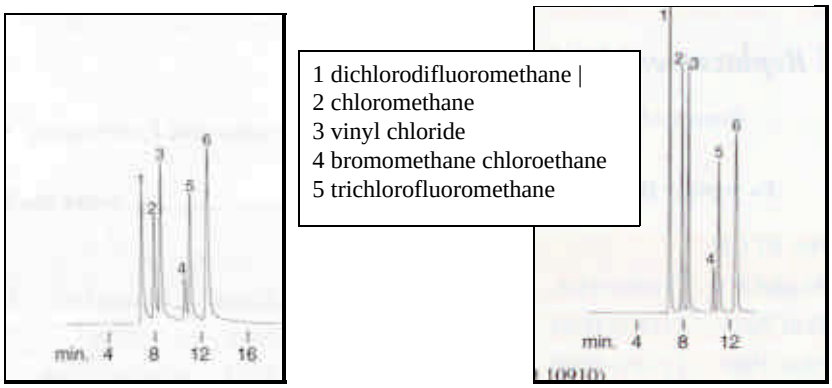
■ Cleaned Teflon Transfer Lines for ELCDs

Restek's ELCD Teflon transfer line is stringently cleaned with an HCI solution and then rinsed with methanol to remove any contaminants. Figure 1 shows the difference in peak symmetry and sensitivity of VOA-CYL~ III gases with a contaminated and a clean Teflon line.
The Teflon transfer line is conveniently sold in five 6.5-inch precut pieces that directly interface the nickel reaction tube and conductivity cell. It fits Tracor, Tremetrics, OI., and many other ELCDs.

Teflon Transfer Line for ELCDs cat.# 20121, 5-pk

Figure 1 A contaminated Teflon transfer line can cause peak tailing and decreased sensitivity of sample analyses.

Contaminated Teflon Line **Clean Teflon**



105m, 0.53mm ID, 3.0mm Rtx-502.2 (cat.# 10910)
100ml direct injection of VOA-CYL III at 2.5ug/ml
Oven temp: 35°C isothermal **Linear velocity:** 80cm/sec. (flow rate: l0cc/min.)
Carrier gas: Helium **Detector**: ELCD

■ Purge & Trap Spargers

- For Tekmar 2000, 3000 and ALS 2016/2032.
- Available in 5 and 25ml sizes.
- Uniform frits to ensure maximum purge efficiency.

Restek offers purge and trap frilled spargers forTekmar concentrators. These spargers provide maximum purge efficiency for water samples.
* Each sparger is manufactured with tight tolerances to ensure a leak-free seal.

5ml Fritted Sparger, l/2" mount:
cat.# 21150, each
25ml Fritted Sparger, 1/2"' mount:
cat.# 21151, each

**These spargers are not recommended for wastewater samples since the frit may become plugged*

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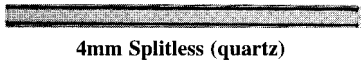
Deactivated & tested for guaranteed inertness
Low price/ high quality
Guaranteed perfect fit

Splitless Sleeves for HP	Benetits/Uses:	ID**/OD & length(mm)	cat.# each	5-pk,	25-pk.	Similar to HP part #
 **2mm Splitless**	trace samples <2ul	2.0 ID 6.5 OD x 78.5	20712	20713	20714	18740-80220 5181-8818
 **4mm Splitless**	trace samples >2ul	4.0 ID 6.5 OD x 78.5	20772	20773	20774	18740-80220 5181-8818
 **2mm Splitless (quartz)**	trace samples <2ul	2.0 ID 6.5 OD x 78.5	20914	20915		18740-80220 5181-8818
 **4mm Splitless (quartz)**	trace samples >2u	4.0 ID 6.5 OD x 78.5	20912	20913		18740-80220 5181-8818
 **Gooseneck Splitless (2mm)**	trace samples <upl	2.0 ID 6.5 OD x 78.5	20795	20796	20797	5181-3316***
 **Gooseneck Splitless (4mm)**	trace samples >2ul	4.0 ID 6.5 OD x 78.5	20798	20799	ZO&OG	5181-3316
 **Double Gooseneck Splitless (4mm)**	trace, active samples >2ul	4.0 ID 6.5 OD x 78.5	20784	20785	20786	5181-3315
 **Cyclo Double Gooseneck (2mm)**	trace, active, dirty samples <2ul	2.0 ID 6.5 OD x 78.5	20907	20908	—	5181-3315
 **Cyclo Double Gooseneck (4mm)**	trace, active, dirty samples >2ul	4.0 ID 6.5 OD x 78.5	2089.5	20896	—	5181-3315
 **Recessed Gooseneck (2mm)***	base easily packs with wool for dirty samples <2ul	2.0 ID 6.5 OD x 78.5	20980	20981	20982	5181-3316***
 **Recessed Gooseneck (4mm)***	base easily packs with wool for dirty samples >2ul	4.0 ID 6.5 OD x 78.5	20983	20984	20985	5181-3316***
 **Recessed Double Gooseneck (4mm)***	base easily packs with wool for dirty, active samples >2ul	4.0 ID 6.5 OD x 78.5	20986	20987	20988	5181.3315***

* Use with two-hole ferrule for dual column analysis.
** Nominal ID at syringe needle expulsion point.
***Design changes were made to improve performance over the original sleeve offered by the GC manufacturer.

Please turn the page for more Inlet Sleeves for HP GCs.

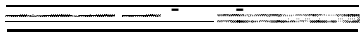
let Restek Pack Your inlet Sleeve

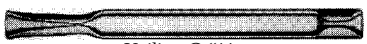
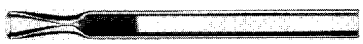
Order inlet sleeves prepacked with fused silica wool, fused silica beads, glass wool, or CarboFrit inserts (except standard double gooseneck sleeves or sleeves with necks less than lmm*) by adding the appropriate suffix to the inlet sleeve catalog number.

Prepacked Inlet Sleeves Suffix Numbers

quantity	FS wool#	FS beads#	glass	with CarboFrit"
each	-200.1	-201.1	-202.1	-209.1
5-pk.	-200.5	-201.5	-202.5	-209.5
25pk.	-200.25	-201.25	-202.25	-209.25

Carbofrit inserts require a neck greater than 2mm.

Split Sleeves for HP GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.#/price each	5-pk.	25-pk.	Similar to HP part #
 lmm Split	for purge & trap inlet splitting or sample <Iul	1.0 ID 6.3 OD x 78.5	20972	20973	— —	—
 **4mm Split with Wool***	universal, use with HP 7673 autosampler	4.0 ID 6.3 OD x 78.5	20781	20782	20783	19251-60540
 Laminar Cup Splitter	high MW compounds	4.0 ID 6.3 OD x 78.5	20801	20802	—	18740-80190
 ***mini*-Lam™ Split**	high MW compounds	4.0 ID 6.3 OD x 78.5	20990	20991	—	
 **Cup Splitter**	high & low MW compounds	4.0 ID **6.3** OD x **78.5**	20709	20710	—	18740-80190
 **CyclosplitteP**	dirty samples, many inj. before cleaning required	4.0 ID 6.3 OD x 78.5	20706	20707	—	

Direct Injection Sleeves for HP GCs (0.32/0.53mm ID)	Benefits/Uses:	ID**/OD & length (mm)	cat.#/price each	5-pk.	25-pk.	Similar to HP part #
 Uniliner@:"**	trace, active samples, high recovery & linearity	4.0 ID 6.3 OD x 78.5	20335	20336	—	—
 **Cycle-UnilineP*****	trace, dirty, high MW active samples, high recovery & linearity	4.0 ID 6.3 OD x 78.5	20337	20338	—	
 **Open-top UnilineP with Wool*****	trace, dirty active samples, high recovery & linearity	4.0 ID 6.3 OD x 78.5	20843 $38	20844 $152	— —	—

"This sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffix "-202" to the sleeve's catalog number.
Nominal ID at syringe needle expulsion point.
*** These UnilineP sleeves are for split/splitless injection ports.

Base Deactivated Inlet Sleeves for HP GCs

	Each	5-pack	25-pack
4mm split straight w/wool	20781-211.1	20782-211.5	20783-211.25
Cyclosplitter	20706-210.1	20707-210.5	
4mm splitless straight	20772-210.1	20773-210.5	
2mm gooseneck	20795-210.1	20796-210.5	20797-210.25
4mm gooseneck	20798-210.1	20799-210.5	20800-210.25

If you do not see the sleeve you need, orders can be placed on a custom basis with the appropriate suffix number added, For base deactivated: each (-210.1), 5-packs (-210.5), 25packs (-210.25). For base deactivated packed with base deactivated wool: each (-211.1), j-packs (-211..5), 25-packs (-211.25).

Inlet Supplies for HP GCs / Metal Inlet Sleeves

■ Silcosleeve Metal Inlet Sleeves

NEW !

SilcoSleeve

- Prepacked with deactivated fused silica wool.
- Equivalent inertness to glass sleeves.
- Excellent response for pesticides, phenols, and other active compounds.
- Won't crack, chip or break like glass sleeves.
- Inexpensive and cost-effective.

Restek has developed a new inlet sleeve for the HP 5890/6890 split/splitless injector. Advances made by our applied technology manufacturing group enable Restek to introduce a stainless steel inlet sleeve with inertness equivalent to deactivated glass.
Utilizing our advanced Silcosteel process, metal sleeves are coated with a fused silica like layer and then deactivated to offer the same inertness as our glass inlet sleeves.
These sleeves are ideal for split/splitless applications requiring frequent changing of inlet sleeves to keep the injector contamination free.
These sleeves are also excellent for portable GCs since they will not break during transportation or installation on site.

Silcosteel Metal Inlet Sleeve pre-packed with FS wool for HP GCs	
OD/ID & length	
5-pack	25-pack
21700	21701

**Add the following suffixes to the catalog number to order glass wool, fused silica beads, or Carbfirit inserts instead of fused silica wool:*

Qty	FS Beads	Glass Wool	CarboFrit
5-pk	-201.5	-202.5	209.5
25pk	-201.25	-202.25	-209.25

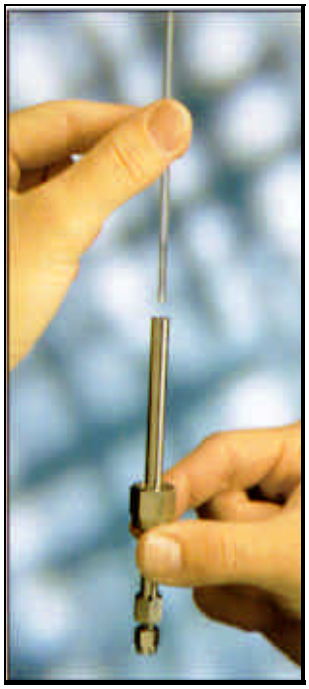
■ Direct Injection Inserts and Sleeve Adaptor for 1/4-inch Packed Column Injection Ports *(for 0.25, 032 and 0.53mm ID.columns)*

DI Glass Inserts for an HP 5890 Packed Column GC:

- Tolerances closely controlled.
- Can be removed from the septum nut weldment.
- Similar to HP part #5181 -3382 or #5080-8732.

cat.# 20967, /5-pk. / cat.# 20968, /25-pk. / cat.# 20969, /50-pk.
Deactivated and fully inert to active compounds!

Deactivated and fully inert to active compounds



DI Unilinear Sleeves for an HP 5890 Packed Column GC:
Press-tight taper forms dead-volume-free connection to column.
Minimizes solvent-and peak-tailing.

- Fits 0.25, 0.32, and 0.53mm ID capillary columns.
- Can be removed from the septum nut weldment.
- Fits same sleeve adaptor as HP part #5181-3382 or #5080-8732.

cat.# 20964, each / cat.# 20965, /5-pk. / cat.# 20966, /25-pk.

DI Sleeve Adaptor for an HP 5890 Packed Column GC:

- Uses standard '/16-inch capillary nut and ferrules.
- Convenient wrench pad at base.
- Includes '/4-inch graphite ferrule and stainless steel nut.
- Works with HP or Restek's DI glass inserts or Restek's DI Uniliner sleeves for an HP 5890 packed column GC.

Similar to HP part #19244-80540. **cat.# 21303 each**

Restek Australian Distributors

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Inlet Supplies for HP GCs / "Improved" Injection Port

■ Restek's Updated Split/Splitless Injection PortforHP5890 GCs

- Split/splitless weldment redesign allows the use of '/4-inch graphite or Vespel/graphite ferrules instead of rubber or graphite o-nngs for consistent, leak-free results.
- Locking pin and slot assembly eliminates the need for a metal bracket to prevent the inlet lines from snapping. Narrow weldment recess prevents trapped septa particles.
- Base inlet sealing disk eliminated and replaced with a standard '/16-inch ferrule.
- Sleeve supported with an easy-to-remove, inexpensive, slotted flat head stainless steel screw, utilized to maintain flow profile.
- Base fitting designed to use standard '/16-inch ferrules. Base fitting protrudes from the insulated cup, making column installation easier.
- Original sleeve dimensions and column insertion distances maintained.

Improved Split/ SplitlessWeldment Assembly

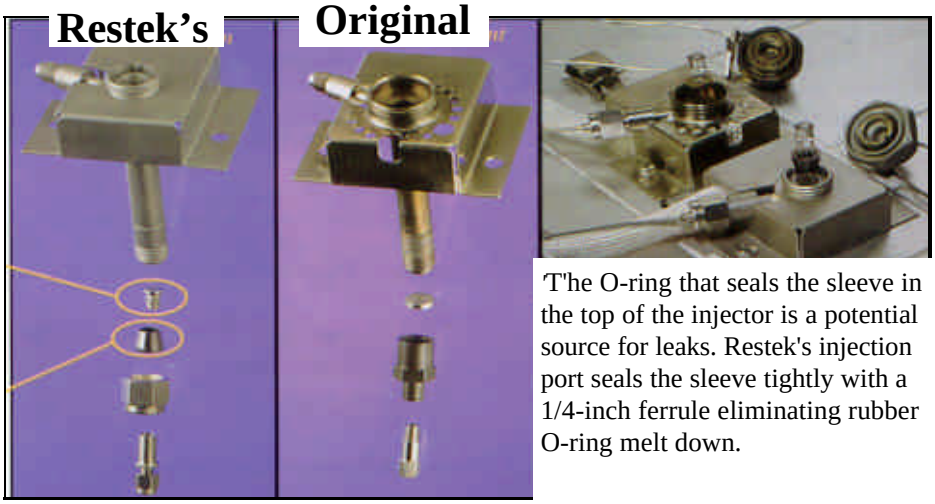
Redesigned Injector Base Improves Seal and Simplifies Column Installation

An inexpensive flat head machine screw achieves the same flow profile at the base of the injector. Standard '/4-inch ferrule seals the inlet basefitting with leakfree results.

Note: Standard 1/4-inch ID graphite and Vespel/graphite ferrules fit over split sleeves (OD 6.3mm) but a slightly enlarged ferrule ID is required for splitless sleeves (OD 6.5mm) and is available from Restek.

**Does not include inlet sleeve, 1/16" capillary ferrule, or split/splitless sleeve ferrules.*

Restek's **Original**



'T'he O-ring that seals the sleeve in the top of the injector is a potential source for leaks. Restek's injection port seals the sleeve tightly with a 1/4-inch ferrule eliminating rubber O-ring melt down.

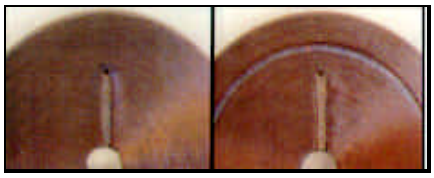
Product	Qty.	Cat.#
Complete Injection Port Assembly includes*: base fitting, split/splitless weldment, shell weldment, stainless steel basescrew, septum nut, 1/16" and All stainless steel nuts, All graphite ferrules		
Injection Port Kit for HP 5890 GCs	kit	21625
NEW ! Silcosteel-treated Injection Port for HP S890 GCs	kit	21624
Ferrules for split sleeves (6.3mm OD):	10-pk.	20210
1/4" graphite ferrules	10-pk	20211
1/4" Vespel/graphite ferrules	10-pk	20221
Ferrules for splitless sleeves (6.5mm OD):		
6.5mm ID graphite splitless ferrules (1/4"):	10-pk	20260
6.5mm ID Vespel~/graphite splitless ferrule (1/4")	10-pk	20261
Replacement Parts Flat head base screws:		
S.S. Base Screws for Restek 5890 Injection Port	10-pk	21633
Silcosteel Base Screws for Restek 5890 Injection Port	10-pk	21631
Gold-plated Base Screws for Restek 5890 Injection Port	2-pk	21629
Septum Nut	each	20631
Base Fitting for Restek 5890 Injection Port	each	21626
Split/Splitless Weldment for Restek 5890 Injection Port	each	21627
Shell Weldment for Restek 5890 Injection Port	each	21628

Inlet Supplies for HP GCs / Inlet Seals & O-Rings

■ Replacement Inlet Seals

(for HP 5890 Split/Splitless Injection Ports)

The inlet seal at the base of the HP 5890 GC injection port comes into contact with the sample and must be changed frequently to prevent adsorption of active compounds. In addition, sepia fragments and sample residue accumulate on the disk surface requiring replacement.



The seal occurs by deforming the disk against the injection port base when tightened, forming a micro ring (as the microphotograph shows). Originally, the disks were manufactured from 304 stainless steel which did not deform well when tightened, resulting in a small leak. Restek's disk design uses 203EZ stainless steel which is softer and deforms more easily, making a completely leak-tight seal. (Because of the deformation of the seating surface, we do not recommend reusing inlet seals.)

Restek's disk design increases column lifetime because oxygen cannot permeate into the carrier gas. Detector noise is also reduced with high-sensitivity detectors (i.e. ECDs or MSDs).

Stainless steel, gold-plated, and Silcosteel-treated inlet seals are available. Use the stainless steel seals for normal analysis. To reduce breakdown and adsorption of active compounds, use the gold-plated or Silcosteel-treated seals. The gold surface offers better inertness than standard stainless steel, and the Silcosteel-treated seals offer inertness similar to that of a fused silica capillary column.

Inlet Seal Type	Single Column Installation Opening Size 0.8mm ID		0.25/0.32 Dual Column Installation Opening Size 1.2mm ID		0.53 Dual Column Installation Opening Size 1/16-inch	
	2-pk.	10-pk.	2-pk.	10-pk.	2-pk.	10-pk.
Stainless Steel*	21315	21316	20390	20391	20392	20393
Gold-Plated**	21317	21318	21305	21306		
Silcosteel-treated	21319	21320	21307	21308		

See page 296 for all ferrule listings

* 0.8mm ID stainless steel inlet seal type is equivalent to HP part #18740-20880.

** 0.8mm ID gold-plated inlet seal type is equivalent to HP part #18740-20885

■ O-Rings

Rubber

Rubber)-Rings are universal. One size fits both split (6.3mm ID) and splitless (6.5mm ID) sleeves

	max. temp.	Similar to HP part #	Restek cat.#	Qty.
Silicone	250C	5080-4982	20376	25-pk
Viton (fluorocxarbon)	260C	5180-4182	20377	25-pk

Graphite

Graphite O-Rings have excellent thermal stability and be used at injection port temperatures up to 450C

		Restek cat.#	
	Similar to HP part #	10-pk	50-pk
6.3mm ID for Split Liners	5180-4168	20296	20297
6.55mm ID for Splitless Liners	5180-4173	20298	20299

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Chromalytic Technology Pty Ltd

Fax : +61 3 9761 1169 Phone : +61 3 9762 2034

E-mail : jimjeffs@chromtech.net.au

Inlet Supplies for HP GCs / Miscellaneous

Septum 1 - Coring from 100 manual injections with a standard HP septum nut

Septum 2 - Coring is reduced when a needle guide that closely matches the syringe OD is used

■ Needle Guide Septum Nut (Manual Injections)

Increase septa lifetime and decrease maintenance requirements will Restek's septum nut for 26 gauge needles. This septum nut direct the needle through the same hole, minimizing coring and leakage (Similar to HP part #18740-60835, except with a 26 gauge hole.)
Needle Guide Septum Nut: cat.# 21309, each

■ Septum Nut (Autosampler Injections)

This high-quality stainless steel nut ensures a leak-free injection port.
The thread design and needle guide allow easy penetration and prevent premature septum coring.
Septum Nut (Similar to HP part #18740-60835.): cat.# 20631, each

■ Septa for HP GCs

HP 5890 series capillary and packed purge injector: Both 10 and 11mm can be used. The 11mm provides a tighter fit. **HP 5700 series:** Both 9.5 or 10mm can be used. The 10mm provides a tighter fit.
Please see pages 294-295 for Thermolite and RedLite setia ordering information

.

■ 60psig Back Pressure Regulator Kit

Increase the versatility of your HP 5890 GC by replacing existing 30psig back pressure regulator and gauge with our 60psig kit. The high-quality 60psig kit can be used with longer 60-and 105-meter columns as well as with shorter 10-meter columns. Includes complete instructions.
Back Pressure Regulator Kit (Similar to HP part # 19246-60630.): cat.# 20634, kit

■ Replacement Chemical Trap

Restek has introduced a replacement chemical trap that is easy to install and attaches to the same fittings as the original equipment. It incorporates built-in frits and absorbents to remove both moisture and hydrocarbons. Additionally, this trap can be regenerated to remove contaminants and to restore it to its original performance.
Replacement Chemical Trap (Similar to HP part #05890-61260.): cat.# 21610, each

■ Finger-Tight Nut

- Rapidly tighten columns without wrenches.
- Avoid overtightened stripped threads.
- Two versions available.
- Both versions can be used with 0.25, 0.32, or 0.53mm ID columns.
- Wrench pad for Vespel~/graphite ferrules.
- 316 stainless steel body.

(Similar to HP part #5020-8293 and 5020-8292, except that Restek's can be used with Vespel ferrules.)

(Inlet) Finger-Tight Nut:
(for use with standard ferrules):
cat.# 21312, each
(for use with"short" HP-type ferrules):

■ Stainless Steel Capillary Nuts (for HP 5890 GCs)

(Inlet) Stainless Steel Capillary Nut (Similar to HP part # 05921-21170.):
*(for use with **standard ferrules**):* cat.# 20883, /2-pk.
*(for use with **"short" HP-type ferrules**):* cat.# 21884, /2-pk.

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Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Inlet Supplies for HP GCs / Dual Column Analysis

■ Dual-Column Analysis with HP GCs: Capillary Inlets

Capillary Inlet Adaptor Fitting Kit

(Split/splitless fitting for 0.25 and 0.32mm ID capillary columns)

Restek has specially engineered a high-precision 1/16-inch fitting that uses standard size twohole capillary ferrules. Our design makes it easier to install capillary columns since the nut protrudes further from the insulated injection port chamber. The column insertion depth is the same as the original equipment. The fitting kit comes with everything needed for dual column confirmational analysis using 0.25 and 0.32mm ID capillary columns (two-hole ferrules must be ordered separately).

Capillary Inlet Adaptor Fitting Kit: cat.# 20633, /kit
Replacement Inlet Seal (1.2mm hole): cat.# 20390, /2-pk. / cat.# 20391, /10-pk.

1/8-inch Capillary Inlet Adaptor Fitting Kit

(Split/splitless fitting for 0.53mm lD capillary columns)

Restek has specially engineered a high-precision 1/8-inch fitting that uses standard '1/8-inch two-hole capillary ferrules. Our design also makes column installation easier because the nut protrudes further from the insulated injection port chamber. The column insertion depth is the same as the original equipment. The fitting kit comes with everything needed for installation.

1/8-inch Capillary Inlet Adaptor Fitting Kit: cat.# 20645, /kit
Replacement Inlet Seal (1/16-inch hole): cat.# 20392, /2-pk. / cat.# 20393, /10-pk.

By inserting two columns in one split/splitless inlet, a single injection can provide double results. Use1/16-inch two-hole ferrules with the Capillary Inlet Adaptor Fitting (cat.# 20633) and 1/8-inch two-hole ferrules with the 1/8-inch Inlet Fitting (cat.# 20645).

■ Dual-Column Analysis with HP GCs: Packed Inlets

Replacement Ferrules for Dual Column Confirmational Analysis

Two-Hole Ferrule Size	Fits Column ID	Graphite	Vespel/graphite
0.4mm (1/16-inch)	0.25mm	20235 /5-pk.	20241 /5-pk.
0.5mm (1/16-inch)	0.32mm	20235 /5-pk.	20242 /5-pk.
0.8mm(1/8-inch)	0.53mm	20245 /5-pk	20246 /5-pk.

Dual-Column mini-Lam'Direct Injection Tee

(for l/4-inch packed column inlets)

The tee offers complete vaporization and permits larger sample volumes. It incorporates a press-tight taper in each outlet leg that delivers a perfect, dead-volume-free connection to each analytical column (ODs ranging from 0.4 to 0.8mm) and allows visual confirmation of the column connection.

The open-top design makes it easy to pack with glass wool, keeping dirty sample residue from contaminating the cup.

mini-Lam™ DI Tee Kit: (includes all fittings/ferrules) cat.# 20436, /kit
4mm mini-Lam DI Tee: cat.# 20435, each

Dual Column mini-Lam Direct Injection Tee

Dual-Column Direct Injection' Tee (for l/4-inch packed column inlets)

The tee is designed with a glass cycle to promote sample vaporization and to provide even splitting between both columns. The glass cyclo also traps dirty sample residue and minimizes the need for a guard column. The tee incorporates a press-tight taper in each outlet leg, facilitating a perfect dead-volume-free connection to each analytical column (ODs ranging from 0.4 to 0.8mm) and allowing visual confirmation of the column connection.

DI Tee Kit: (includes all fittings/ferrules) cat.# 20412, /kit
Replacement DI Tee: cat.# 20411, each

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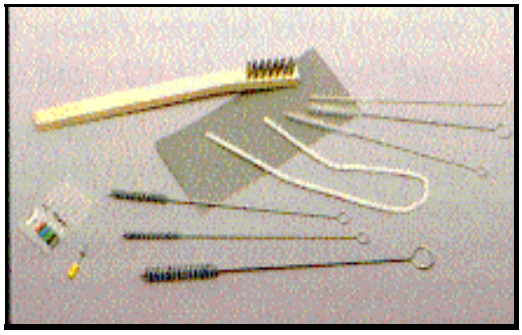
Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Inlet Supplies for HP GCs / Dual Column Analysis

Use Restek's Cleaning Kit with ANY injection port

■ FID/Injector Cleaning Kit



The FID/Injector Cleaning Kit includes everything needed to keep FIDs and injection ports clean:

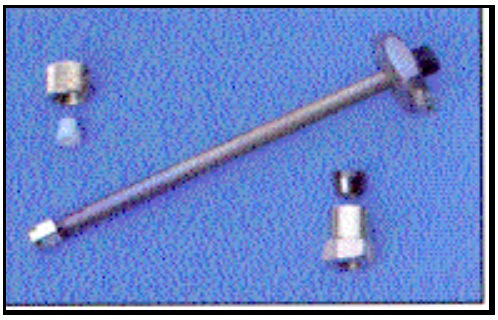
- Nylon tube brushes (1/8", 3/16, 1/4").
- Pipe cleaners.
- Stainless steel tube brushes ('1/8", 3/16", 1/4").
- Stainless steel surface brush.
- Stainless steel jet reamers.

■ Low-Volume Injector for HP 5890 Septum Packed Purge Port

- Allows syringe injections on to the column for purge & trap troubleshooting or calibration.
- Silcosteel treatment eliminates adsorption of active compounds.
- Attaches to GC inlet without cutting injection port lines.

Everything you need for installation is provided, including a 1/16-inch nut, 1/16-inch ferrule, base nut and 1/4-inch Vespel/graphite ferrule, a 1/16-inch capillary nut, 5-pack low-bleed plug sepia, and a special low-mass septa nut.
Order appropriate capillary ferrules separately.
LVI for HP 5890 Septum Packed Purge Port: cat.# 21698, /kit

■ Low-Volume Injector

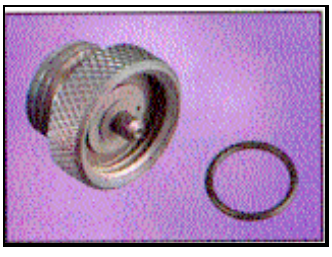


- Fits HP split/splitless injectors.
- Attaches to the GC inlet without cutting existing injection port lines.
- Allows syringe injections on to the column for purge & trap troubleshooting or calibration.
- Silcosteel treatment eliminates adsorption

Low Volume Injector for Varian injection ports is listed on page 263Use Restek's

The Restek LVI can be installed in a matter of minutes. Remove the septum nut or splitless weldment and insert the Restek LVI through the split injector. Tighten the base nut and you re ready! Includes a 1/16-inch nut, 1/16-inch ferrule, base nut and 1/4-inch Vespel/graphite ferrule, a 1/16-inch capillary nut, 5-pack of low-bleed plug septa, and a special low-mass septum nut.
Order appropriate capillary ferrules separately.
LVI for HP Split/Splitless GC Inlets: cat.# 21692, /kit

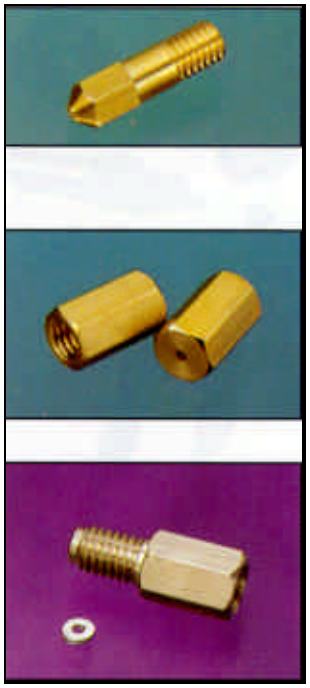
■ Silcosteel Septum-Purged Packed Column Port Weldment for HP 5890 GCs



Silcosteel treatment eliminates adsorption of sensitive compounds (i.e. DDT and endrin).
Similar to HP part # 19243-80570.
Order Viton O-rings and septa separately.
Packed Purge Port Weldment: cat.# 21691, ea.
Viton Replacement O-rings: cat.# 21685, /10-pk.

Inlet Supplies for HP GCs / Dual Column Analysis

■ Detector Plug Nut



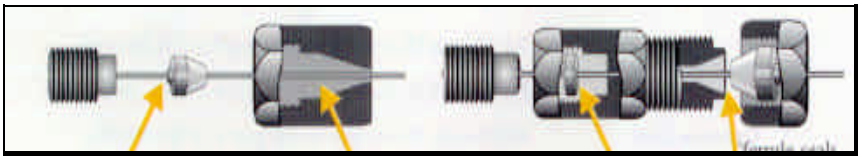
Use Restek's detector plug nut to cap off or thermally clean a dirty detector, check detector or make-up gas flow rates, and prevent H2 from accidentally diffusing into the oven from an unused detector base. (Similar to HP part #5020-8294.)
Detector Plug Nut: cat.# 21883, /2-pk.

■ MSD Source Nut

The nut bore has been changed from 0.8mm to 1.2mm to permit easy removal of ferrules with a standard tapered needle file (cat.# 20106). The nuts still match the manufacturer's original part specifications and are made of brass to prevent thread-stripping on the transfer line. (Similar to HP part #05988-20066.)
(Detector) MSD Source Nut: cat.# 20643, /2-pk.

■ MSD Conversion Fitting

Restek's MSD conversion fitting uses a flat, soft aluminum sealing ring to deform and buttseal with the flat surface of the MSD interface (see figure below). The aluminum crunch washer forms a leak-tight seal under high vacuum even while thermally cycling the oven. Once the MSD conversion fitting is sealed to the transfer line, a standard Vespel ferrule can be used to seal the column and 1/16-inch stainless steel nut.



butt seal | only column seals at taper | crunch washer forms leak free | ferrule seals against both column and

HP's MSD interface requires a butt-seal at the base of a Vesper ferrule which is prone to leakage. Restek's MSD conversion fitting uses a standard ferrule design which simultaneously seals the fitting and capillary tubing with compressive forces.

The fitting is constructed of nickel-plated brass for longevity and softness. The nickel-coated brass cannot seize or strip the expensive MSD interface. It provides many trouble-free tightening cycles with the 1/16-inch stainless steel nut. MSD conversion fittings will use any standard Vespel or Vespel/graphite 1/16-inch ferrule and include a 1/16-inch stainless steel nut and two replacement sealing rings. Order ferrules separately.
MSD Conversion Fitting: cat. #21314, ea.
MSD Conversion Fitting Replacement Ring Seal: cat. #21313, /2-pk.

■ Channeltron 5778 Electron Multiplier

(for the HP 5971A, 5972A MSD, and new GCD)

- Increases sensitivity through superior signal collection and reduction of unwanted noise.
- Sensitivity allows detection of sub picogram and femtogram levels from complex mixtures.
- Separate input and booster stages provide a linear response and dynamic range, that exceeds the limits of the instrument and of other available multipliers.
- Plug-in, ceramic board-mounted design allows easy installation and assures alignment of the critical ion optics.

Available for other mass-selective detectors upon request.
Galileo Channeltron 5778 Electron Multiplier: cat.# 21608, each

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Detector Supplies for HP GCs: Miscellaneous

■ FID/NPD Adaptor Fitting

- Easy to use, sturdy, compact stainless steel fitting
- 1/16-inch nut uses standard graphite or Vespel/graphite ferrules
- Wrench pad won t turn when installing a capillary column.

(Similar to HP part #19244-80610 & 05921-21170)

FID/NPD Adaptor Fitting: cat.# 20884 /kit

Capillary FID Replacement Jets

■ Capillary FID Replacement Jet (0.011-inch ID tip)

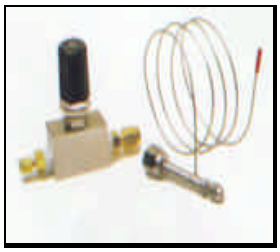
- **Standard Version:** Engineered with a fluted tip to guide the capillary column into the jet.
- **High-Performance Version:** Identical to the standard version, except that it has been Silcosteel-treated. Extremely inert, use with active compounds.

Capillary Replacement FID Jets (Similar to HP part #019244-80560)		
Standard	cat.# 20670 /each	cat.# 20671 /3-pk
High Performance	cat.# 20672 /each	cat.# 20673 /3-pk

■ Packed Column Replacement Jets

- **0.018-inch ID jets:** Used for most general-purpose packed column applications.
- **0.030-inch ID jets:** For packings that exhibit high bleed and that frequently clog the tip of smaller 0.018-inch jets.
- Both jets have small tails that fit inside '1/8-inch packed or standard glass columns.
- Standard version for non-active compounds and Silcosteel version for active compounds.

Standard Stainless Steel Packed Column Jets		**0.018-inch ID (similar to HP part# 18710-20119**	
		cat.# 21694 /each	cat.# 21694 /3-pk
		0.030-inch ID (similar to HP part# 18789-80070	
		cat.# 21688 /each	cat.# 21689 /3-pk
High Performance Silcosteel Packed Column FID Jets	0.018-inch ID	cat.# 21696 /each	cat.# 21697 /3-pk
	0.030-inch ID	cat.# 21686 /each	cat.# 21687 /3-pk



■ ECD/FID Dual-Purpose Make-up Gas Kit

Incorporates a better make-up gas flow profile and uses a straight section of inert Silcosteel tubing as the capillary guide. To add make-up gas to FIDs, remove tubing guide and insert an FID jet tail.
A direct replacement fitting with a special end connector is available for GCs factory-equipped with make-up gas. A complete kit is available for plumbing GCs not factory equipped with make-up gas.
Complete Kit (includes make-up gas fitting, 1/4" nut and ferrules, 1/16" nut, 0.4mm ID graphite ferrule, and a fine metering valve): cat.# 21300, /kit
ECD/FID Replacement Fitting for Restek Make-up Gas Kit: cat.# 21324, each
Replacement ECD/FID Silcosteel Guide: cat.# 21302, /2-pk.
ECD/FID Direct Replacement Fitting (includes l/4" nut, graphite ferrule, 1/16" nut, and a 0.4mm ID graphite ferrule): cat.# 21301, each

■ Gauge Pack

Restek s Gauge Pack simplifies GC installation by incorporating pressure regulators and gauges for both air and hydrogen in a single enclosure. The gauge pack conveniently mounts onto the side of the GC. The '/s-inch bulkhead fittings allow easy hook-up to instrument and supply lines. This unit is rated for inlet pressures up to 250psi and for outlet pressures from 0 to 60psi.
Gauge Pack: cat.# 20129, each

Restek
Australian
Distributors

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Detector Supplies for HP GCs: Cables

■ Replacement Cables

(for HP GCs, Integrators, & Autosamplers)

- Priced less than original equipment.
- Tested for 100% signal integrity.
- Instructions and wiring diagrams included.
- Manufactured with only the highestquality components.
- Custom cables available.
-

A) Connect an HP 5890 GC to an HP integrator (for second Inet integrator). Similar to HP part #35900-60610.
cat.# 20650, each
cat.# 20651,/2-pk.

B) Connect an HP 5890 GC to an HP 3396 integrator to enable remote starts (non-lnet connection from GC to integrator). Similar to HP part #03394-60560.
cat.# 20654, each

C) Connect an HP 3396 integrator to remote start either another piece of equipment or to start the HP 3396 integrator from that other piece of equipment. Similar to HP part #03394-60540.
cat.# 20655, each
cat.# 20656,/2-pk.

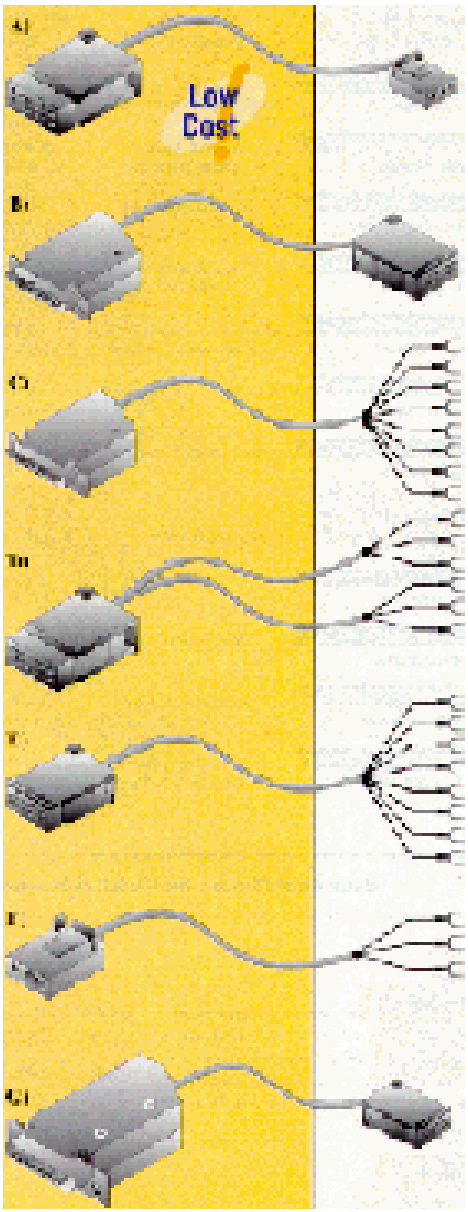
D) Connect an HP 5890 GC to a non-HP integrator or standard strip chart recorder. Similar to HP part #05890-60800.
cat.# 20652, each
cat.# 20653, /2-pk.

E) Connect an HP 5890 GC to remote start another piece of equipment or to start the HP 5890 GC from that piece of equipment. Similar to HP part #05890-61080.
cat.# 20657, each

F) Connect an HP 3396 integrator to another non-HP type of GC. Similar to HP part #35900-60630.
cat.# 20658, each
cat.# 20659,/2-pk.

G) Connect an HP 5890 GC to an HP 35900C Interface or to an HP 7673A Autosampler to enable remote starts. Similar to HP part #35900-60700.
cat.# 20660, each
cat.# 20661 /2-pk

A
B
C
D
E
F
G



Restek can also supply custom cables Please Enquire !

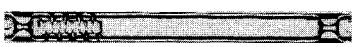
Restek provides Pin Schematics on all Cables

Low COST Cables for Hewlett-Packard GCs
Integrators
Autosamplers

Restek Australian Distributors

Chromalytic Technology Pty Ltd
Fax : +61 3 9761 1169 Phone : +61 3 9762 2034
E-mail : jimjeffs@chromtech.net.au

Split Sleeves for Varian GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.#/price each	5-pk.	25-pk.	Similar to Varian part #
 **1mm Split**	for purge & trap inlet splitting or samples <1µl	1.0 ID 6.3 OD x 72	20970 $30	20971 $120		
 **Splitter with Wool***	universal, use with rapid autosamplers	4.0 ID 6.3 OD x 72	20792 $37	20793 $148	20794 $625	01-900109-01
 Laminar Cup Splitter	high MW compounds	4.0 ID 6.3 OD x 72	20803	20804	—	01-900109-02
 Cup Splitter	high & low MW compounds	4.0 ID 6.3 OD x 72	20724	20725		
 Cyclosplitter	dirty samples, many injections before cleaning required	4.0 ID 6.3 OD x 72	20727	20728		
 **Frit Splitter**	dirty, non-active compounds	4.0 ID 6.3 OD x 72	20715	20716	20717	01-900109-03
 **Baflle Splitter**	close boiling compounds	4.0 ID 6.3 OD x 72	20718	20719	20720	01-900109-04

Splitless Sleeves for Varian GCs	Benefits/Uses	ID**/ODmm & length (mm]	cat.#/ each	5-pk.	25-pk,	Similar to Varian part #
 **2mm** Splitless	trace samples<2ul	2.0 ID 6.3 OD x 74	20721	20722	20123	01-900109-05
 **4mm Splitless**	trace sample>2ul	4.0 ID 6.3 OD x 74	20904	209OS	20906	01-900109-05
 **Double Gooseneck**	trace, active samples up to 4ul	4.0 ID 6.3 OD x 74	20847	20848	20849	
 Cyclo Double Gooseneck	trace, dirty, active samples up to 4ul	4.0 ID 6.3 OD x 74	20897	20898		

* Sleeves come packed with fused silica wool.
** Nominal ID at syringe needle expulsion point.

More Inlet Sleeves for Varian GCs continued on next page.

let Restek Pack Your Inlet Sleeve

Order inlet sleeves prepacked with fused silica wool, fused silica beads, glass wool, or CarboFrit" inserts (except standard double gooseneck sleeves or sleeves with necks less than lmm*) by adding the appropriate suffix to the inlet sleeve catalog number.

Prepacked Inlet Sleeves Suffix Numbers

quantity	FS wool#	FS beads#	glass wool#	CarboFrit #
each	-200.1	-201.1	-202.1	-209. I
5-pk.	-200.5	-201.5	-202.5	-209.5
25-pk.	-200.25	-201.25	-202.25	-209.25

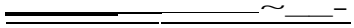
**Carbofrit" inserts require a neck greater than 2mm.*

Inlet Supplies for Shimadzu GCs: Sleeves

Deactivated & tested for guaranteed inertness

Low price/high quality

Guaranteed perfect fit

Split Sleeves for Shimadzu GCs	Benefits/Uses	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to Shimadzu part #
 **94mm SDlit with Wool***	universal, for most common analyses	3.5 ID 5.0 OD x 94	20955	20956	20957	221-41444-00
 **128mm Split**	universal, for most common analyses	3.5 ID 5.0 OD x 128	20751	20752	20753	221-25822-01
 **128mm CvcloSpitter**	dirty samples, max. injections before cleaning required	3.5 ID 5.0 OD x 128	20754	20755	—	221-25822-01
 **128mm Cup Splitter**	high & low MW compounds	3.5 ID 5.0 OD x 128	20757	20758	—	221-25822-01
 **128mm Laminar Cup Splitter**	high MW compounds	3.5 ID 5.0 OD x 128	20807	20808	—	221-25822-01
 **99mm Split**	universal for most common analyses	3.5 ID 5.0 OD x 99	20860	2086 1	20862	22 l-32544
 **99mm Cyclosplitter®**	high & low MW compounds	3.5 ID 5.0 OD x 99	20870	20871	—	221-32544
 **99mm CupSplitter**	high MW compounds	3.5 ID 5.0 OD x 99	20866	20867	—	22 l-32544
 **99mm Laminar Cup Splitter**	dirty samples, max. injections before cleaning required	3.5 ID 5.0 OD x 99	20868	20869		221-32544

Splitless Sleeves for Shimadzu GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to Shimadzu part #
 **94mm Splitless with Wool***	trace samples	3.5 ID 5.0 OD x 94	20955	20956	209S7	221-41544-00
 **128mm Splitless (3mm ID)**	trace samples	3.0 ID 5.0 OD x 128	20748	20749	20750	221-25440-03
 **99mm Splitless (3mm ID)**	trace samples	3.0 ID 5.0 OD x 99	20863	20864	20865	221-32544
 **94mm Double Gooseneck**	reduces backflash and catalytic decomposition	3.5 ID 5.0 OD x 94	20958	20959	20960	
 **94mm Single Gooseneck**	reduces backflash, also operates in DI mode	3.5 ID 5.0 OD x 94	20961	20962	20963	221-41599-00

* Sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffix "-202" to the sleeve's catalog number.

** Nominal ID at syringe needle expulsion point.

More Inlet Sleeves for Shimadzu GCs p267 - Australian Distributors : Chromalytic Technology Pty Ltd

Direct Injection Sleeves for Shimadzu GCs	Benefits/Uses:	ID**/OD& length {mm)	cat.# each	5-pk.	25-pk.	Similar to Shimadzu part#
 128mm Uniliner	trace, active samples, high recovery & linearity	3.0 ID 5.0 OD x 128	20872	20873		
 128mm Cyclo-Uniliner	trace, dirty, high MW active samples, linearity	3.5 ID 5.0 OD x 128	20814	20875		
 99mm Uniliner®	trace, active samples, high recovery & linearity	3.0 ID 5.0 OD x 99	20876	20877		
 99mm Cyclo-Uniliner	trace, dirty, high MW active samples, high recovery & linearity	3.0 ID 5.0 OD x 99	20893	20894		

17A PTV Sleeve for Shimadzu GCs	Benefits/Uses	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to Shimadzu part #
NEW!  17A PTV Sleeve*	trace, dirty, high & low MW active samples	1.85 ID 4.0 OD x 95	21705	21706	21707	225-09212-01

Make-up Sleeve for Shimadzu GCs	Benefits/Uses:	lD**/OD & length (mm)	cat.#/ each	5-pk.	25-pk.	Similar to Shimadzu part #
 Detector Make-up Sleeve	FIDs, ECDs & misc. detectors	1.0 ID 5.0 OD x 75	20760	20761		

* Sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffix "-202" to the sleeve's catalog number.
** Nominal ID at syringe needle expulsion point.

let Restek Pack Your Inlet Sleeve

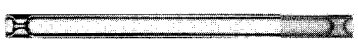
Order inlet sleeves prepacked with fused silica wool, fused silica beads, glass wool, or CarboFrit" inserts (except standard double gooseneck sleeves or sleeves with necks less than 1 mm*) by adding the appropriate suffix to the inlet sleeve catalog number.

Prepacked Inlet Sleeves Suffix Numbers

quantity	FS wool#	FS beads glass wool#	CarboFrit #
each	-200.1	-201.1	-202.1	-209.1
5-pk.	-200.5	-201.5	-202.5	-209.5
25-pk.	-200.25	-201.25	-202.25	-209.25

**Carbofrit inserts require a neck greater than 2mm.* *NEW!*

Split Sleeves for Perkin-Elmer GCs	Benefit/Uses:	ID/OD & length (mm)	Cat.# each	5-pk.	25pk.	Similar to PE part #
 Baffle Splitter	universal, for most common analyses	3.5 ID 5.0 OD x 100	2013 6	20731		0330-5181
 Cup Splitter	high & low MW compounds	3.5 ID 5.0 OD x 100	20739	20740	—	0330-5181
 Cyclosplitter	dirty samples, max. injections before cleaning required	3.5 ID 5.0 OD x 100	20745	20746	—	0330-5181
 Laminar Cup Splitter	high MW compounds	3.5 ID 5.0 OD x 100	20805	20804	—	0330-5181
 Auto SYS Splitter with Wool*	universal for most common analyses	3.5 ID 6.2 OD x 92.1	20832	2083 3	20834	N6101052
 Auto SYS Cup Splitter	high & low MW compounds	4.0 ID 6.2 OD x 92.1	20835	20836	—	N6101052
 Auto SYS Cyclosplitter@	dirty samples, max. injections before cleaning required	4.0 ID 6.2 OD x 92.1	20910	20911	—	N6101052
 Auto SYS Laminar Cup Splitter	high MW compounds	4.0 ID 6.2 OD x 92.1	20827	20828	—	N6101052

Splitless Sleeves for Perk&Elmer GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.#/price each	5-pk.	25-pk.	Similar to PE part#
 Splitless (2mm ID)	trace esamples	2.0 ID 5.0 OD x 100	20730	20731	20732	0330-5180
 Auto SYS Splitless with Wool (2mm ID)*	trace samples	2.0 ID 6.2 OD x 92.1	20829	20830	20831	N6101372
 Auto SYS Double Gooseneck	trace, active samples up to 4ul	3.5 ID 6.2 OD x 92.1	20853	20854		
 Auto SYS Cycle Double Gooseneck	trace, dirty, active samples, up to 4ul	3.5 ID 6.2 OD x 92.1	20899	20900		

* Sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffi "-202" to the sleeve's catalog number.
** Nominal ID at syringe needle expulsion point.

More Inlet Sleeves for Perkin-Elmer GCs On page. 271 - Australian Distributors Chromalytic Technology Pty Ltd

let Restek Pack Your Inlet Sleeve

Order **inlet sleeves prepacked with** fused silica wool, fused silica beads, glass wool, or CarboFrit" inserts (except standard double gooseneck sleeves or sleeves with necks less than lmm*) by adding the appropriate suffix to the inlet sleeve catalog number.

Prepacked Inlet Sleeves Suffix Numbers

quantity	FS wool#	FS bead&	glass wool#	CarboFrit"#
each	-200.1	-201.1	-202.1	-209.1
5-pk.	-200.5	-201.5	-202.5	-209.5
25pk.	-200.25	-201.25	-202.25	-209.25

**Carbofrit inserts require a neck greater than 2mm.*

Direct Injection Sleeves for Perkin-Elmer GCs	Benefits/Uses	ID**/OD & length (mm)	Cat.# each	5-pk,	25-pk.	Similar to PE part #
 Uniliner@	trace, active samples, high recovery & linearity	3.5 ID 5.0 OD x 100	20855	20856		–
 Cyclo-Uniliner®	trace, dirty, active samples, linearity	3.5 ID 5.0 OD x 100	20897	20858	—	—
 Auto SYS Open-top Uniliner w/Wool*	trace, dirty, active samples, high recovery & linearity	4.0 ID 6.2 OD x 92.1	20837	20838	—	—
 Auto SYS Cyclo-Uniliner®	trace, dirty, high MW active namples., linearity	4.0 ID 6.2 OD x 92.1	20839	20840	—	—

PTV Sleeves for Perkin-Elmer GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.#/price each	5-pk.	25-pk.	Similar to PE part #
PTV Press-Tight@	high linearity for 0.25,0.32, & 0.53mm ID columns	1.0 ID 2.0 OD x 88	20733	20734	20735 $280	—
 PTV Injector	high linearity	1.0 ID 2.0 OD x 88	20742	20743 $44	20744 $176	—

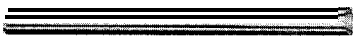
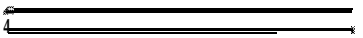
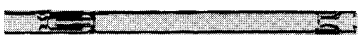
Thermolite® and RedLite™ septa for Perkin-Elmer GCs are available. Perkin-Elmer Sigma Series, 900, 990, 8000, and Autosys use 11mm septa. See page 294–295 in the Column Installation section of this catalog for ordering information.

Split Sleeves for Carlo-Erba GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.# each	5-pk.	25pk	Similar to CEpart#
 Laminar Cup Splitter	high MW compounds	4.0 ID 5.5 OD x 79.5	20809	20810	—	45300400
 Cyclosplitter	dirty samples, max. injections before cleaning required	4.0 ID 5.5 OD x 79.5	20817	20818	—	45300400
 Cup Splitter	high & low MW compounds	4.0 ID 5.5 OD x 79.5	20885	25886	—	45300400

Splitless Sleeves for Carlo-Erba GCs	Benefits/Uses:	ID**/OD & length (mm)	cat# each	5-pk.	25-pk	Similar to CE part #
 Splitless (2mm ID)	trace samples	2.0 ID 5.5 OD x 79.5	20811	20812	20813	45300300
 Splitless (4mm ID)	trace samples	4.0 ID 5.5 OD x 79.5	20814	20815	20816	45300400

Direct Injection Sleeves for Carlo-Erba GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to CE part#
 Open-top Uniliner" w/Wool*	trace, dirty, active samples, high recovery & linearity	4.0 ID 5.5 OD x 79.5	20841	20842		

* Sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffix "-202" to the sleeve's catalog number.
** Nominal ID at syringe needle expulsion point.

Split Sleeves for CE (Fisons) GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to Fisons part#
 3mm Split	universal	3.0 ID 8.0 OD x 105	20936	20937	20938	453 20031
 5mm Split	universal	5.0 ID 8.0 OD x 105	20939	20940	20941	453 20030
 Laminar Cup Splitter	high MW compounds	4.0 ID 8.0 OD x 105	20948	20949		
 Cup Splitter	high & low MW compounds	4.0 ID 8.0 OD x 105	20950	20951		

Splitless Sleeves for Fisons GCs	Benefits/Uses:	ID**/OD & length (mm)	cat.# each	5-pk.	25-pk.	Similar to Fisons part #
 Splitless (3mm ID)	trace samples	3.0 ID 8.0 OD x 105	20942	29943	20944	453 20032
 Splitless (Smm ID)	trace samples	5.0 ID 8.0 OD x 10.5	20945	20946	20947	453 20033
 Double Gooseneck	trace samples up to 4ul	4.0 ID 8.0 OD x 105	20952	20953		—

* Sleeve is prepacked with fused silica wool. To order glass wool instead, add the suffix "-202" to the sleeve's catalog number.
** Nominal ID at syringe needle expulsion point.

Graphite Sealing Rings for Fisons 8000 GCs:
Fison GCs use graphite ferrules encased in a metal ring. This design prevents the graphite from extruding and flaking into the carrier gas stream.

Graphite Sealing Ring for 8mm Inlet Liner: (Similar to Fisons part #290-03406) cat.# 21898, / cat.# 21899, 2-pk.

17mm Septa for CE (Fisons) GCs

Thermolite" Septa			RedLite" Septa		
cat.#	Quantity	FREE	cat&	Quantity	FREE
20384	25-pk.	coffee mug	22312	25-pk.	travel mug
20385	50-pk.	glass stein	22313	50-pk.	tote bag
20386	100-pk.	pen/pencil set	22314	100-pk.	mini-mag light

Both septa offer low bleed-even with sensitive detectors!

RedLite'" septa are made from soft, high-temperature silicone which improves puncturability and reduces fragmentation.

Helpful Hints *for Fisons 8000 GCs*

The critical inlet seal is located at the top of the sleeve and is made by a 8mm ID graphite ferrule encapsulated in metal. It can be reused several times until it no longer forms a tight seal around the sleeve. Fisons 8000 inlet sleeves are chamfered at the base, which rests against a slotted conical fitting. The angle of the chamfer is critical to prevent occlusion of split-vent flow.

Fisons uses large-volume inlet sleeves (up to 5 mm ID) to contain the sample vapor cloud and to prevent loss out the septum purge. The column insertion distance is 40 mm for split sleeves and 64 mm for splitless sleeves. Needle lengths of 5 cm are recommended for split analysis and 7 cm for splitless analysis to minimize discrimination and backflash.