

Dual-Column Analysis: Which technique is right for you?



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Split/Splitless Injection	Split/Splitless or Direct Injection	Direct Injection
<p>Two-hole ferrules allow dual-column confirmational analysis in the same split/splitless inlet.</p>	<p>The "Y" Press-Tight® configuration allows dual columns to be used in either a split/splitless or direct injection inlet.</p>	<p>The direct injection "T" allows two 0.32 or 0.53mm ID columns to be connected to one 1/4-inch packed column inlet.</p>
<p>2 or 4 mm ID splitless liner inlet seal two-hole ferrule analytical column analytical column</p>	<p>split/splitless or direct injection liner guard column "Y" Press-Tight® analytical columns</p>	<p>cyclo Press-Tight® taper analytical column analytical column</p>
<p>0.25 and 0.32mm ID columns can be used with standard 1/16-inch inlet fittings (cat. # 20633). 0.53mm ID columns require 1/8-inch fittings (cat. # 20645) to allow both columns to fit side by side in the injector. Use either straight or extended gooseneck split/splitless liners.</p>	<p>The "Y" Press-Tight® configuration offers versatility because it allows any diameter column or guard column to be connected to a split/splitless or direct injection liner.</p>	<p>The direct injection "T" incorporates a glass spiral to ensure complete vaporization prior to splitting the sample onto two columns. The dual sealing mechanisms increase ease of use and confidence in the connection relative to the "Y" Press-Tight® configuration.</p>

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 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 analytes 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.

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 liner. Columns with internal diameters of 0.32mm or less (or 0.5mm OD) can be inserted directly into the 1/16-inch standard capillary fitting (cat.# 20633, page 202) by using a two-hole capillary ferrule. Columns with internal diameters of 0.53mm 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 (cat.# 20645, page 202).*

On-column or Direct Injections

On-column or direct injections require a Press-Tight® connection to the inlet liner. Usually a section of 0.53mm ID guard tubing is attached to one leg of a Press-Tight® "Y" connector (cat.# 20405, page 203). Analysts must use columns of equivalent length and ID so 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, page 201) or *mini-Lam* Direct Injection Tee (cat.# 20436, page 201), that is installed into the injector, with each column 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 spiral to ensure sufficient vaporization and to reduce discrimination or preferential splitting. The *mini-Lam* Direct Injection Tee is similar—it incorporates an inverted cup in place of the glass spiral. More information on these types of injection tees is given on the facing page.

*Instrument-specific fittings for performing dual column analyses can be found in the Supplies for Agilent and Supplies for Varian sections.

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 spiral prior to the split point to promote sample vaporization and to provide even sample distribution to the two columns. The glass spiral also traps dirty sample residue and minimizes the need for guard columns. High molecular weight contaminants are trapped in the first turn of the spiral, allowing up to four times more injections than conventional inlet liners packed with wool. Inlet maintenance and downtime are significantly reduced. A Press-Tight® taper in each outlet leg facilitates a perfect dead-volume-free connection to each analytical column (OD ranging from 0.4 to 0.8mm) and allows visual confirmation of the column connection.

Description	qty.	cat.#
DI Tee Kit (includes all fittings/ferrules)	kit	20412
Replacement Tee	ea.	20411

Graphite Replacement Ferrules

ID	fitting size	qty.	cat.#
0.5mm	1/16"	10-pk.	20201
	1/32"	50-pk.	20228
0.8mm	1/16"	10-pk.	20202
	1/32"	50-pk.	20224
1/4-inch	1/4"	10-pk.	20210



DI Tee Kit



Dual-Column mini-Lam Direct Injection Tee for 1/4-Inch Packed Column Inlets

Based on Dr. Konrad Grob's work, we manufacture a *mini-Lam* direct injection tee that allows complete vaporization and permits larger sample volumes.¹

The *mini-Lam* Direct Injection Liner is designed to fit 1/4-inch packed column injectors. A Press-Tight® taper in each outlet leg makes a perfect, dead-volume-free connection with each analytical column (OD 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 to keep sample residue from contaminating the cup. The complete *mini-Lam* Dual Column Direct Injection Kit 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 also are available.

Description	qty.	cat.#
mini-Lam DI Tee Kit (Includes all fittings and ferrules)	kit	20436
Replacement 4mm mini-Lam DI Tee	ea.	20435

¹K. Grob, HRC & CC, 15 (1992), 190.



mini-Lam DI Tee Kit

Dual-Column Analysis: Split/Splitless Fittings



1/16-Inch Capillary Inlet Adaptor Fitting Kit

1/16-Inch Capillary Inlet Adaptor Fitting Kit

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

We have specially engineered a high-precision, 1/16-inch split/splitless fitting that accepts standard, two-hole capillary ferrules. Our design makes it easier to install capillary columns because the nut protrudes farther from the insulated injection port chamber. The column insertion depth is the same as the original equipment.

Kit includes adaptor fitting, capillary nut, stainless steel inlet seal, washer, and one 0.4mm ID ferrule.

Description	qty.	cat.#
1/16-Inch Capillary Inlet Adaptor Fitting Kit	kit	20633
0.25/0.32mm ID Dual-Column Installation (1.2mm Opening)		
Replacement Inlet Seal	2-pk.	20390
0.25/0.32mm ID Dual-Column Installation (1.2mm Opening)		
Replacement Inlet Seal	10-pk.	20391



1/8-Inch Capillary Inlet Adaptor Fitting Kit

1/8-Inch Capillary Inlet Adaptor Fitting Kit

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

Our specially engineered high-precision, 1/8-inch split/splitless fitting accepts standard two-hole capillary ferrules and a standard 1/8-inch nut. This design makes column installation easy because the nut protrudes farther from the insulated injection port chamber. The column insertion depth is the same as the original equipment.

Kit includes adaptor fitting, capillary nut, stainless steel inlet seal, washer, and one 0.8mm ID two-hole ferrule.

Description	qty.	cat.#
1/8-Inch Capillary Inlet Adaptor Fitting Kit	kit	20645
0.53mm ID Dual-Column Installation (1/16-inch Opening)		
Replacement Inlet Seal	2-pk.	20392
0.53mm ID Dual-Column Installation (1/16-inch Opening)		
Replacement Inlet Seal	10-pk.	20393

ordering note

For replacement ferrules, see pages 217-219.



Save time and money with our inlet splitter guide for Varian GCs!

Capillary Inlet Guide Kit for Varian GCs

- Use as a replacement for Varian 1075 and 1077 split/splitless injectors.
- Use inexpensive 1/16-inch fittings instead of a non-standard nut.
- Quick and simple installation.
- Ideal for two-hole ferrule installation.

Complete kit includes splitter guide, 1/4-inch nut, 1/4-inch Vespel®/graphite ferrule, and a 1/16-inch nut and ferrule.

Description	Similar to Varian part #	qty.	cat.#
Inlet Guide Kit	03-908358-00	kit	20502

Two-Hole Ferrules—For 1/8-Inch and 1/16-Inch Compression-Type Fittings

Fitting Size	Ferrule ID	Fits Column ID	qty.	Vespel®/Graphite
1/16"	0.4mm	0.25/0.28mm	5-pk.	20241
1/16"	0.5mm	0.32mm	5-pk.	20242
1/8"	0.8mm	0.45/0.53mm	5-pk.	20246



also available

Please see a detailed gc column ferrule product listing on pages 217-219.



Universal Angled Press-Tight® Connectors

- Ideal for connecting a guard column to an analytical column.
- Made from inert fused silica.
- Angle approximates the curvature of a capillary column, reduces strain on column-end connections.
- Deactivated Press-Tight® connectors assure better recovery of polar and non-polar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).

Description	5-pk.	25-pk.	100-pk.
Universal Angled Press-Tight® Connectors	20446	20447	20448
Deactivated Universal Angled Press-Tight® Connectors	20446-261	20447-261	20448-261
Siltek® Treated Universal Angled Press-Tight® Connectors	20482	20483	20484

also available

For added confidence, use a SeCure™ “Y” connector—see page 223.

**Universal “Y” Press-Tight® Connectors**

An alternative method of performing dual-column confirmational analyses!

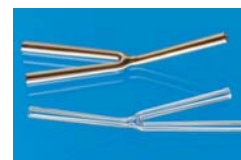
- Split sample flow onto two columns.
- Split a single column flow to two detectors—perform confirmation analysis with a single injection.
- Deactivated Press-Tight® connectors assure better recovery of polar and non-polar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).

Description	ea.	3-pk.
Universal “Y” Press-Tight® Connector	20405	20406
Deactivated Universal “Y” Press-Tight® Connector	20405-261	20406-261
Siltek® Treated Universal “Y” Press-Tight® Connector	20485	20486

**Universal Angled “Y” Press-Tight® Connectors**

- Perform confirmation analysis with a single injection.
- Made from inert fused silica.
- Inlet and outlet ends conform to the column curvature—alleviates column-end connection strain.
- Deactivated Press-Tight® connectors assure better recovery of polar and non-polar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).

Description	ea.	3-pk.
Universal Angled “Y” Press-Tight® Connector	20403	20404
Deactivated Universal Angled “Y” Press-Tight® Connector	20403-261	20404-261
Siltek® Treated Universal Angled “Y” Press-Tight® Connector	20487	20469

**also available**

See the complete connector product listing on pages 220–227.

Polyimide Resin

- Permanently connects a Press-Tight® connector to a fused silica column.

Description	qty.	cat.#
Polyimide Resin	5 grams	20445

**Fused Silica Guard Columns****5-Meter Guard Columns & Transfer Lines (Single-Pack)**

Nominal ID	Nominal OD	cat.#
0.05mm*	0.363 ± 0.012mm	10040
0.10mm*	0.363 ± 0.012mm	10041
0.15mm	0.363 ± 0.012mm	10042
0.18mm	0.37 ± 0.04mm	10046
0.25mm	0.37 ± 0.04mm	10043
0.32mm	0.45 ± 0.04mm	10044
0.53mm	0.69 ± 0.05mm	10045

5-Meter Guard Columns & Transfer Lines (Six-Pack)

Nominal ID	Nominal OD	cat.#
0.25mm	0.37 ± 0.04mm	10043-600
0.32mm	0.45 ± 0.04mm	10044-600
0.53mm	0.69 ± 0.05mm	10045-600

Add suffix “-600” to any guard column to order a six-pack.

also available

See pages 26–30 for a complete listing of guard columns.