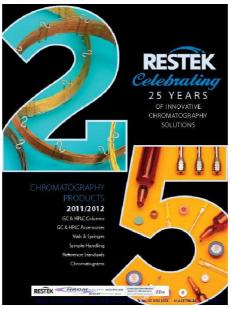
GC/HPLC Columns 2011/12

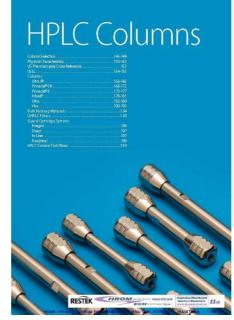


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Fused Silica

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11/12



Fused Silica GC Columns

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Custom Packed/Micropacked Columns
Custom Coated Packing Materials
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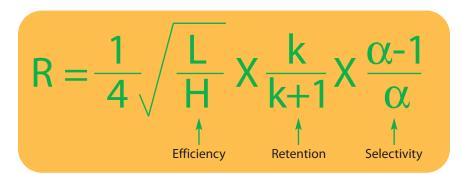


GC COLUMNSFUSED SILICA COLUMNS



Selecting a GC Column

Strategic column choices can improve lab productivity by assuring that speed and resolution are optimized. While the number of choices available can be daunting, consideration of the resolution equation variables—selectivity, retention (capacity), and efficiency—simplifies the decision. Selectivity determines which stationary phase is most appropriate, and it can be approximated using retention indices or existing applications. Once the phase has been chosen, physical dimensions (internal diameter, film thickness, length) can be selected based on retention and efficiency. Understanding how selectivity, retention, and efficiency influence separations allows analysts to make effective, informed choices and quickly select the best column for specific separations.



R = resolution L = column length H = HETP k = capacity factor α = selectivity

Selectivity, α

The selectivity of the capillary column is directly related to how the analyte molecule interacts with the stationary phase being considered. If the analyte strongly interacts with the stationary phase, it can be said that strong intermolecular forces exist. These intermolecular forces of attraction between the analyte and the stationary phase are a function of the structure of both the analyte molecule and the stationary phase. If these two structures are similar, then the attractive forces are strong. If they are dissimilar, then analyte to stationary phase attraction is weak, and less retention is observed. Therefore, when selecting a stationary phase, knowledge of the structure of the analytes of interest and the stationary phase is crucial. The reference table on page 27 provides the chemical structure of Restek's most common stationary phases.

An example of selectivity can be shown using benzene and butanol (both have nearly the same boiling point) eluting through the 20% diphenyl/80% dimethyl polysiloxane stationary phase (Rtx®-20). The benzene molecule will dissolve into the stationary phase more readily than the butanol based on the concept that "likes dissolve likes". Since benzene solvates more readily with the stationary phase, it has more interactions with the stationary phase as it elutes through the column. Therefore, the elution order of these two compounds on the Rtx®-20 stationary phase will be butanol first and benzene second.

As methyl groups are replaced by different functionalities such as phenyl or cyanopropyl pendant groups, the selectivity of the column shifts towards compounds that will have a better solubility in the stationary phase. For example the Rtx®-200 stationary phase provides high selectivity for analytes containing lone pair electrons, such as halogens, nitrogen, or carbonyl groups. Polyethylene glycol columns, such as the Stabilwax® and Rtx®-Wax columns are highly selective towards polar compounds such as alcohols. Again using the example above, the butanol more readily solvates into the polyethylene glycol stationary phase; therefore, the butanol will have more interaction with the phase and elute after benzene.

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Description	qty.	cat.#	price
Pro ezGC Method Development			
Software CD-ROM	ea.	21487	\$201

Table I lists the Kovats retention indices for the more common stationary phases. Assigning a retention index to each probe listed provides a basis for comparing several stationary phases and their relative retention to one another for a set of molecular probes. For example, when Kovats indices are identical on two column phases, then the resulting separations will be identical. If, however, a Kovats value of one probe varies significantly from the value on another phase for the same probe, then the resulting compound elution order will differ. Thus, the Kovats indices are useful for comparing column selectivity for different types of compounds among different phases.

Table I Retention indices for Restek phases

Phase	Benzene	Butanol	Pentanone	Nitropropane
Rtx-1	651	651	667	705
Rtx-5/Rtx-5MS	667	667	689	743
Rtx-20	711	704	740	820
Rtx-1301/Rtx-624	689	729	739	816
Rtx-35	746	733	773	867
Rtx-200	738	758	884	980
Rtx-50	778	769	813	921
Rtx-1701	721	778	784	881
Rtx-65TG	794	779	825	938
Rtx-225	847	937	958	958
Stabilwax	963	1158	998	1230

Retention, k

The capacity of the column relates to how much material can be injected onto a column without adversely affecting peak shape. If the amount of a compound (mass) exceeds the capacity of a column (WCOT), the peak will front, which sometimes can look like a "shark fin". The goal is to select a column with sufficient capacity such that peak shape will not suffer. Peak symmetry is typically used to calculate the degree of sample overload. There are two primary column-related dimensions that affect capacity, assuming the proper column phase was selected: column internal diameter (ID) and phase film thickness (μ).

When selecting column ID, consideration should include the type of injection, the detector being used, and the concentration of sample (amount on-column). The injection technique is an important consideration because the ID of the column may need to be selected based on whether a split, splitless, cool on-column injection, or other sample transfer to the column is being used. The second consideration is the detector and how much flow it can optimally work under. For example, some MS detectors can only handle column flow rates of up to 1.5 mL/min.; therefore, a 0.53 mm ID column, which requires higher flows for proper chromatography, is not an option for this detector. The third consideration is sample capacity of the column. If the concentration of the sample exceeds the column capacity, loss of resolution, poor reproducibility, and peak distortion will result. Table II shows several typical column characteristics for various column IDs.

Table II Typical characteristics for columns with the same phase ratio, such as 0.10 mm ID x $0.10 \text{ }\mu\text{m}$ and 0.18 mm ID x $0.18 \text{ }\mu\text{m}$, etc.

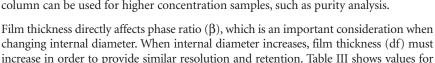
	Column ID					
Characteristic	0.10mm	0.15mm	0.18mm	0.25mm	0.32mm	0.53mm
Helium Flow						
(@ 20cm/sec.)	0.16mL/min.	0.3mL/min.	0.3mL/min.	0.7mL/min.	1.2mL/min.	2.6mL/min.
Hydrogen Flow						
(@ 40cm/sec.)	0.32mL/min.	0.6mL/min.	0.6mL/min.	1.4mL/min.	2.4mL/min.	5.2mL/min.
Sample Capacity						
(max load per component)	<10ng	<40ng	<50ng	50-100ng	400-500ng	1000-2000ng
Theoretical Plates/Meter	8000	4000	3500	3200	2500	1800







Film thickness (μ) has a direct effect on the retention and elution temperature for each sample component. Extremely volatile compounds should be analyzed on thick-film columns to increase the time the compounds spend in the stationary phase, allowing them to separate. High molecular weight compounds must be analyzed on thinner film columns. This reduces the length of time the analytes stay in the column, and minimizes bleed at required higher elution temperatures. Film thickness also affects the amount of material that can be injected onto the column without overloading. A thicker film column can be used for higher concentration samples, such as purity analysis.



common dimensions of columns. Similar values indicate similar elution for different IDs.

Table III Phase ratio (β) values for common column dimensions.*

Film Thickness (df) / β Value

Column ID	0.10µm	0.25µm	0.50µm	1.0µm	1.5µm	3.0µm	5.0µm
0.18mm	450	180	90	45	30	15	9
0.25mm	625	250	125	63	42	21	13
0.32mm	800	320	160	80	53	27	16
0.53mm	1325	530	265	128	88	43	27

^{*} β = r/2df (r=internal radius of tubing; df = phase film thickness)

Efficiency, N

Column efficiency (N) is the column length divided by the height equivalent to a theoretical plate (HETP). The effective theoretical plates are affected by how well the phase has been coated onto the column walls and is measured by how narrow the peaks are when they are eluted at the end of the column. Therefore, the higher the column efficiency (N), the better resolution power the column will have.

Capillary columns are made in various lengths, typically in standard lengths of 10, 15, 30, 60, and 105 meters. Longer columns provide more resolving power, but increase analysis time. Doubling the column length increases resolution by approximately 41% (note: the column length is under the square root function). However, under isothermal conditions, it will double analysis time. In temperature-programmed analyses, retention times are more dependent on temperature than column length, with a marginal increase (approx. 10-20%) in analysis time upon doubling the column length.

Conclusion

A basic understanding of the resolution equation allows analysts to make more effective column choices. Phase choice is influenced primarily by selectivity, which can be approximated by considering phase and analyte structures, as well as by referencing retention indices or existing applications. Column retention (capacity) and efficiency also affect separations and should influence decisions on column internal diameter, film thickness, and length. By considering these factors, analysts can simplify the column selection process and increase lab productivity by optimizing separations.



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Selection of Capillary Column Summary

Selecting a capillary column for an analysis can be done by following these basic steps:

1) Choose the proper phase for the compounds being chromatographed

- a. Review the application section of this catalog or www.restek.com/chromatograms for similar compound list.
- Call Restek's experienced technical support team (800-356-1688, ext. 4) or e-mail us at:
 - support@restek.com (in the USA)
 - intltechsupp@restek.com (international)
 - · or contact your Restek representative.

2) Select column ID, film thickness, and length

- a. Base choice on:
 - Injection technique (split, splitless, cool on-column, etc.)
 - Detector type (is low flow required?)
 - Amount of analyte being injected onto column (sample capacity)

3) Set optimum parameters for your analysis

- a. Optimize column flow (mL/min.)
- b. Choose appropriate carrier gas (hydrogen, helium, or nitrogen)
- c. Optimize oven temperature program

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms



What Are the Operating Temperatures for My Column?

All Restek columns have published minimum and maximum operating temperatures that establish the working range for the stationary phase. Note that these ranges vary with the thickness of the coating.

Rtx®-VMS (fused silica)

ID	df (µm)	temp. limits	
0.25mm	1.40	-40 to 240/260°C —)
0.32mm	1.80	-40 to 240/260°C	
0.45mm	2.55	-40 to 240/260°C	
0.53mm	3.00	-40 to 240/260°C	_

The minimum operating temperature defines the lowest usable temperature before the stationary phase solidifies. Operating the column below the minimum temperature will not harm the phase, but poor peak shape and other chromatography problems may occur.

Many phases list 2 maximum operating temperatures. The first temperature is the maximum isothermal operating temperature. This is the temperature to which the columns are guaranteed to meet the minimum bleed specification (i.e., lowest bleed level). The second temperature is the maximum temperature-programmed operating temperature, the temperature to which the column can be heated for short periods of time (i.e., during a temperature-programmed analysis). If only one temperature is listed, it is both the isothermal and the maximum temperature.





Structures, polarities, properties, and uses for Restek capillary column phases, in order of increasing polarity

Rxi®-1ms, Rxi®-1HT, Rtx®-1

100% dimethyl polysiloxane

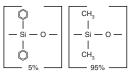


nonpolar

solvents, petroleum products pharmaceutical samples, waxes [G1]

Rxi®-5ms,, Rxi®-5HT, Rtx®-5, Rtx®-5MS

5% diphenyl/95% dimethyl polysiloxane

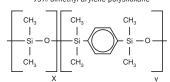


Polarity: slightly polar

flavors, environmental, aromatic hydrocarbons

Rxi®-5Sil MS

5% phenyl 95% dimethyl arylene polysiloxane

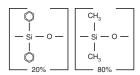


Polarity: slightly polar

flavors, environmental, pesticides, PCBs, aromatic hydrocarbons

20% diphenyl

80% dimethyl polysiloxane



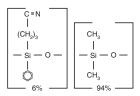
Polarity: slightly polar

volatile compounds, alcohols Uses:

[G32]

Rtx®-1301, Rtx®-624, Rtx®-G43

6% cyanopropylphenyl 94% dimethyl polysiloxane

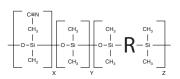


Polarity: slightly polar

volatile compounds, insecticides, residue solvents in pharmaceutical products

Rxi®-624Sil MS

6% cyanopropylphenyl 94% dimethyl arylene polysiloxane

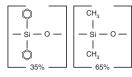


Polarity: intermediately polar

volatile compounds, insecticides, residue solvents in pharmaceutical products

Rtx®-35

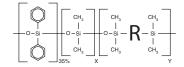
35% diphenyl 65% dimethyl polysiloxane



Polarity: intermediately polar
Uses: pesticides, Aroclor PCBs, amines, nitrogen-containing herbicides [G42]

Rxi®-35Sil MS

35% phenyl 65% dimethyl arylene polysiloxane



intermediately polar

pesticides, Aroclor PCBs, amines, nitrogen-containing herbicides

Rtx®-200

trifluoropropylmethyl polysiloxane



Polarity: selective for lone pair electrons environmental, solvents, Freon® gases, drugs, ketones, alcohols

[G6]

Rtx®-50

50% phenyl 50% methyl polysiloxane

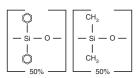


Polarity: intermediately polar FAMEs, carbohydrates

[G3]

Rxi®-17

50% diphenyl 50% dimethyl polysiloxane

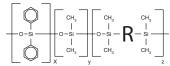


Polarity: intermediately polar

triglycerides, phthalate esters, steroids, phenols [G3]

Rxi®-17Sil MS

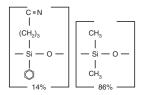
50% phenyl 50% dimethyl arylene polysiloxane



Polarity: intermediately polar triglycerides, phthalate esters, steroids, phenols

Rtx®-1701

14% cyanopropylphenyl 86% dimethyl polysiloxane



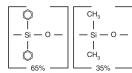
Polarity: intermediately polar

oxygenates [G46]

pesticides, Aroclor PCBs, alcohols,

Rtx®-65, Rtx®-65TG

65% diphenyl 35% dimethyl polysiloxane

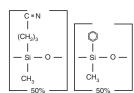


Polarity: intermediately polar

triglycerides, rosin acids, free fatty acids

Rtx®-225

50% cyanopropylmethyl 50% phenylmethyl polysiloxane

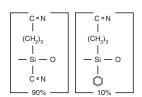


Polarity: polar

FAMEs, carbohydrates [G7]

Rt®-2330

90% biscyanopropyl 10% cyanopropylphenyl polysiloxane



Polarity: polar

cis/trans FAMEs, dioxin isomers,

Stabilwax®, Rtx®-Wax

Carbowax® PEG



FAMEs, flavors, acids, amines, [G16] solvents, xvlene isomer

note

Structures, polarities, and properties also apply to metal MXT® stationary phases.





GC COLUMNS | CAPILLARY COLUMNS Column Cross-Reference





Columns by Pha	ise	USP		Varian-			Macherey-			
Restek	Phase Composition	Nomenclature*	Agilent	Chrompack	SGE	Phenomenex	Nagel	Supelco	Alltech	Quadrex
Rtx-1 (p. 49)	100% dimethyl polysiloxane	G1, G2, G38	HP-1 / DB-1	CP Sil 5 CB	BP-1	ZB-1	Optima-1	SPB-1	AT-1	007-1
Rxi-1HT (p. 47)	100% dimethyl polysiloxane		DB-1HT	VF-1HT		ZB-1HT			EC-1, AT-1HT	
Rxi-1ms (p. 41)	100% dimethyl polysiloxane (low bleed)		HP-1/ HP-1ms DB-1/ DB-1ms Ultra-1	VF-1ms / CP-Sil 5 CB Low Bleed/MS	BP-1	ZB-1, ZB-1ms	Optima-1ms, Optima-1ms Accent	SPB-1, Equity-1	AT-1	007-1
Rtx-5 (p. 50)	5% diphenyl 95% dimethyl polysiloxane	G27, G36	HP-5/ DB-5	CP Sil 8 CB	BP-5	ZB-5	Optima-5	SPB-5	EC-5, AT-5	007-5
Rxi-5HT (p. 47)	5% diphenyl 95% dimethyl polysiloxane		DB-5HT	VF-5HT		ZB-5HT				
Rxi-5ms (p. 41)	5% diphenyl 95% dimethyl polysiloxane (low bleed)	G27, G36	HP-5/ HP-5ms DB-5, Ultra-2	CP-Sil 8 CB	BP-5	ZB-5, ZB-5ms	Optima-5, Optima-5ms	SPB-5, Equity-5	AT-5ms	007-5
Rxi-5Sil MS (p. 42, 87, 95, 97)	5% phenyl/95% dimethyl arylene polysiloxane		DB-5ms, DB-5ms UI	VF-5ms / CP-Sil 8 CB Low Bleed/MS	BPX-5	ZB-5ms	Optima-5ms Accent	SLB-5ms		007-5MS
Rxi-XLB (p. 44, 94)	Arylene/methyl modified polysiloxane		DB-XLB	VF-XMS		MR1	Optima-XLB			
Rtx-20 (p. 51)	20% diphenyl 80% dimethyl polysiloxane	G28, G32						SPB-20	EC-20, AT-20	007-20
Rtx-35 (p. 51)	35% diphenyl 65% dimethyl polysiloxane	G42	HP-35, DB-35		BPX-35, BPX-608	ZB-35		SPB-35, SPB-608	AT-35	007-35
Rxi-35Sil MS (p. 44)	35% phenyl/65% dimethyl arylene polysiloxane		DB-35ms	VF-35ms	BP-35	MR2	Optima-35ms			
Rtx-50 (p. 52)	50% phenyl 50% methyl polysiloxane	G3	HP-50		AT-50		Optima-17	SPB-50	AT-50	007-17
Rxi-17 (p. 44)	50% diphenyl 50% dimethyl polysiloxane		HP-50+, HP-17, DB-17, DB-608	CP-Sil 24 CB		ZB-50	Optima-17			
Rxi-17Sil MS (p. 45, 73, 98)	50% phenyl/50% dimethyl arylene polysiloxane		HP-17, DB-17, DB-17ms	CP-Sil 24 CB, VF-17ms	BPX-50	ZB-50	Optima-17ms			
Rtx-65 (p. 52)	65% diphenyl 35% dimethyl polysiloxane	G17								007-65HT
Rxi-624Sil MS (p. 46, 83, 103)	6% cyanopropyl phenyl/94% dimethyl arylene polysiloxane	G43	HP-624, DB-624	VF-624ms	BP-624	ZB-624	Optima-624			
Rtx-1301 (p. 55) Rtx-624 (p. 55)	6% cyanopropyl phenyl 94%dimethyl polysiloxane	G43	HP-1301, HP-624, DB-1301, DB-624	CP-1301, VF-1301ms, VF-624ms	BP-624	ZB-624	Optima-1301, Optima-624	SPB-1301	AT-624, AT-1301	007-1301
Rtx-1701 (p. 56)	14% cyanopropyl phenyl 86%dimethyl polysiloxane	G46	HP-1701, PAS- 1701, DB-1701	CP Sil 19 CB, VF-1701ms	BP-10	ZB-1701, ZB-1701P	Optima-1701	SPB-1701	AT-1701	007-1701
Rtx-200 (p. 54)	trifluoropropyl methyl polysiloxane	G6	DB-210, DB-200	VF-200ms			Optima-210		AT-210	007-210
Rtx-200ms (p. 54)	trifluoropropyl methyl polysiloxane (low bleed)			VF-200ms						
Rtx-225 (p. 56)	50% cyanopropyl 50% phenylmethyl polysiloxane	G7, G19	HP-225, DB-225	CP Sil 43 CB	BP-225		Optima-225	SPB-225	AT-225	007-225
Rtx-440 (p. 53)	modified polysiloxane (unique phase)					unique	column			
Rt-2330 (p. 57)	90% biscyanopropyl 10% cyanopropyl phenyl polysiloxane	G48			BPX-70			SP-2330, SP-2331, SP-2380	AT-Silar	
Rt-2560 (p. 57, 69)	bicyanopropyl polysiloxane		HP-88	CP Sil 88				SP-2560		
Rtx-Wax (p. 58)	polyethylene glycol	G14, G15, G16, G20, G39	HP-Wax, DB-Wax	CP Wax 52 CB	BP-20	ZB-Wax	Optima Wax		AT-Wax	
Stabilwax (p. 59, 84)	polyethylene glycol	G14, G15, G16, G20, G39	Innowax	CP Wax 52 CB, VF-WAX MS		ZB-WAX Plus		Supelcowax-10		
Restek PLOT Columns	Phase Composition	USP Nomenclature	Agilent	Varian	SGE	Phenomenex	Macherey- Nagel	Supelco	Alltech	Quadrex
Rt-Alumina BOND/Na;SO; (p. 108) MXT-Alumina BOND/Na;SO;	Na ₂ SO ₄ deactivation		GS-Alumina, HP PLOT S	CP-AL ₂ O ₃ / Na ₂ SO ₄				AluminaSulfate- PLOT	AT-Alumina	
Rt-Alumina BOND/KCI (p. 108, 76)	KCI deactivation		GS-Alumina/KCl, HP-PLOT Al ₂ 0 ₃ /KCl	CP-Al ₂ O ₃ /KCl				AluminaChloride -PLOT		
Rt-Alumina BOND/CFC (p. 108, 74)						unique	column			
Rt-Msieve 5A (p. 109) MXT-Msieve 5A			GS-Msieve, HP PLOT Molsieve	CP-Molsieve 5A				Molsieve 5A	AT-Molsieve	PLT-5A
Rt-Q-BOND (p. 110) MXT-Q-BOND	100% divinylbenzene			CP-PoraPLOT Q, CP-PoraBond Q				Supel-Q-PLOT	AT-Q	
Rt-QS-BOND (p. 110)	porous divinyl benzene homopolymer		GS-Q							
Rt-S-BOND (p. 110) MXT-S-BOND	divinylbenzene 4-vinylpyridine			CP-PoraPLOT S						
Rt-U-BOND (p. 110)	divinylbenzene ethylene		HP-PLOT U	CP-PoraPLOT U,						

*See pag **28**







Columns by Application/Industry

Restek	Applications	Agilent	Supelco	Macherey-Nagel	SGE	Varian-Chrompack	Phenomene
Specially deactivated phases			·				
Rtx-Volatile Amine (p. 63)	Volatile amines					CP-VolAmine	
Rtx-5Amine (p. 64)	Amines					CP-Sil 8 CB	
Rtx-35Amine (p. 65)	Amines			unique co	lumn		
Stabilwax-DB (p. 66)	Amines	CAM	Carbowax Amine			CP WAX 51	
Stabilwax-DA (p. 67)	Free fatty acids	HP-FFAP, DB-FFAP	Nukol	Permabond FFAP, Optima FFAP	BP-21	VF-DA, CP WAX 58 CB	ZB-FFAP
Chiral Columns							
Rt-βDEXm, Rt-βDEXsm,							
Rt-βDEXse, Rt-βDEXsp, Rt-βDEXsa, Rt-βDEXcst, Rt-γDEXsa (p. 68)	Chiral compounds						
Foods, Flavors, & Fragrances							
Rt-2560 (p. 69)	cis/trans FAMEs	HP-88	SPB-2560				
. ,	Marine oils	ПР=00					
FAMEWAX (p. 70)	Marine ons	UD 20m	Omegawax				
Rt-CW20M F&F (p. 71)	Flavors & fragrance	HP-20m, CarboWax 20			BP-20M		
Rtx-1 F&F (p. 71)	Flavors & fragrance						
Rtx-65 TG (p. 72)	Triglycerides			unique co	lumn		
Petroleum & Petrochemical							
Rt-Alumina BOND/CFC (p. 74)	Chlorinated fluorocarbons (CFCs)						
Rtx-DHA (p. 75)	Detailed hydrocarbon analysis	HP-PONA, DB-Petro	Petrocol DH		BP1-PONA	CP Sil PONA CB	
Rtx-2887 (p. 77)	Hydrocarbons - ASTM 2887	DB-2887	Petrocol 2887, Petrocol EX2887				
MXT-2887 (p. 77)	Hydrocarbons - ASTM 2887						
D3606 (p. 128)	Ethanol - ASTM 3606			unique co	lumn		
Rt-TCEP (p. 80)			TCEP			CP-TCEP	
MXT-1HT SimDist (p. 77)	Simulated distillation	DBHT-SimDist				CP-SIMDIST	ZB-1T SimDi
MXT-1 SimDist (p. 79)	Simulated distillation	DBHT-SMD				CP-SIMDIST	Ultimetal
MXT-500 SimDist (p. 79)	Simulated distillation	-		unique co	lumn		
Rtx-Biodiesel TG (p. 81)				•	_		
MXT-Biodiesel TG (p. 81)	Triglycerides in biodiesel			unique co	lumn		
Clinical/Forensic - Blood Alcoh	ol Testing						
Rtx-BAC1 (p. 82)	ol Testing Blood alcohol testing	DB-ALC1					ZB-BAC1
	-	DB-ALC1 DB-ALC2					ZB-BAC1 ZB-BAC2
Rtx-BAC1 (p. 82)	Blood alcohol testing						
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82)	Blood alcohol testing						
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard	Blood alcohol testing Blood alcohol testing		OVI-G43				
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467		OVI-G43		BP-624	VF-624	
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86) Rxi-G43 w/IntegraGuard (p. 86) Rxi-624Sil MS (p. 83)	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467 Organic volatile impurities (OVI) - USP 467 Organic volatile impurities (OVI) - USP 467	DB-ALC2 HP-624, DB-624		Optima-1301.			ZB-BAC2 ZB-624
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86)	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467 Organic volatile impurities (OVI) - USP 467	DB-ALC2	OVI-G43 SPB-5, Equity-5	Optima-1301, Optima-624	BP-624 BP-5	VF-624 CP-Sil 8, CP Sil 8 CB	ZB-BAC2
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86) Rxi-G43 w/IntegraGuard (p. 86) Rxi-624Sil MS (p. 83)	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467 Organic volatile impurities (OVI) - USP 467 Organic volatile impurities (OVI) - USP 467	DB-ALC2 HP-624, DB-624				CP-Sil 8,	ZB-BAC2 ZB-624 ZB-5
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86) Rxi-624Sil MS (p. 83) Rtx-5 (G27) (p. 85)	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467	DB-ALC2 HP-624, DB-624 HP-5/ DB-5	SPB-5, Equity-5		BP-5	CP-Sil 8, CP Sil 8 CB	ZB-BAC2 ZB-624 ZB-5
Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86) Rxi-624Sil MS (p. 83) Rtx-5 (G27) (p. 85) Stabilwax (G16) (p. 84) Environmental	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467	DB-ALC2 HP-624, DB-624 HP-5/ DB-5	SPB-5, Equity-5		BP-5	CP-Sil 8, CP Sil 8 CB	ZB-BAC2 ZB-624 ZB-5
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Rtx-BAC1 (p. 82) Rtx-BAC2 (p. 82) Pharmaceutical Rtx-G27 w/IntegraGuard (p. 86) Rtx-G43 w/IntegraGuard (p. 86) Rxi-624Sil MS (p. 83) Rtx-5 (G27) (p. 85) Stabilwax (G16) (p. 84) Environmental Rxi-5Sil MS (p. 87, 95, 97) Rtx-VMS (p. 100)	Blood alcohol testing Blood alcohol testing Organic volatile impurities (OVI) - USP 467 Semivolatiles - EPA Methods 8270, 625, 525	DB-ALC2 HP-624, DB-624 HP-5/ DB-5 Innowax	SPB-5, Equity-5 Supelcowax-10	Optima-624 Optima-5ms	BP-5 BP-624	CP-Sil 8, CP Sil 8 CB CP Wax 52 CB	ZB-BAC2 ZB-624 ZB-5 ZB-WaxPlus
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GC Column Installation Checklist

The Restek Innovations and Technical Services specialists have found this to be a reliable sequence for avoiding problems when installing a capillary GC column.

Instrument Preparation & Column Installation

- 1. Cool all heated zones.
- 2. Visually inspect indicating oxygen and moisture traps. Replace saturated traps.
- 3. Examine the inlet and the detector. Clean or replace all dirty or corroded parts.
- 4. Replace the inlet liner and septum, and the injector seals (O-rings, inlet seals, ferrules, etc.).
- 5. Mount the column in the oven with a support that protects it from scratches. Center the column in the oven. This ensures uniform heat exposure generating consistent retention times.
 - Restek has two types of cages for fused silica columns, an 11-pin cage and the original cage that uses
 high temperature string to hold the column in place. If you have the cage with high temperature
 string, do not remove the string that holds the column in the cage!
- Uncoil the ends to make sure the ends are long enough to reach the injector and detector. Cut a few centimeters from each end of the column.
 - To cut a fused silica column, use the smooth edge of a ceramic scoring wafer (cat.# 20116).
- 7. While pointing the inlet end of the column downward (to prevent shards from falling into the column), slide the nut and appropriate size ferrule onto the inlet end of the column. Cut an additional 2 cm from the end of the column to remove any material scraped from the ferrule onto the edge of the column.
- 8. Install the column the appropriate distance in the injector, as indicated in your instrument manual.
- 9. Set the carrier gas to the flow rate or inlet pressure recommended for the column or to your method flow rate/pressure. Confirm presence of column flow by immersing the column outlet in a vial of solvent.
- 10. Flush the column at ambient temperature with carrier gas: at least 5 minutes for a 25-30 m column and 10 minutes for a 50-60 m column.
- 11. Set the injector temperatures. Do not exceed the column's maximum operating temperature (listed on the column tag). Check inlet for leaks.
- 12. Install the column into the detector as described in the instrument manual. Set the detector gases and temperatures to proper settings.
- 13. Check the detector connections for leaks, using a Restek Electronic Leak Detector (cat.# 22839).
- 14. Verify the carrier gas flow is at the rate you intend to use for your analysis. (Use the Restek ProFlow 6000 flowmeter, cat.# 22656, to ensure accurate flow measurement.) Set the split vent, septum purge, and any other applicable gas rates as appropriate.
- 15. Inject an unretained compound, to verify the column is installed correctly and to determine the dead volume time for checking column flow. The type of detector and column type will determine which compound to inject. A symmetric peak indicates the column is installed correctly. Adjust the carrier gas flow as necessary.
- 16. Condition the column 20 °C above the final analysis temperature of your method. Do not exceed the column's maximum operating temperature. For most applications, 1 hour of conditioning is sufficient. For sensitive detectors or low level analysis, longer conditioning times or conditioning the column at the maximum temperature may be beneficial. Extended time at high temperatures will not adversely affect column performance as long as precautions are taken to make sure the carrier gas is clean and is filtered for oxygen and water.
- 17. To check instrument performance, analyze a column test mix for a new method, or a known standard to confirm proper column and system performance.
- 18. Your GC system is now ready to be calibrated and acquire samples.

Note 1: For some types of sensitive detection systems, like MS, PID and PDD, it is recommended to condition the column as listed in Step 16 without making the connection to the detector. In this case, plug off the detector during conditioning. After conditioning, continue with Step 12.

Note 2: Also, when you intend to condition thick-film coated columns (film thickness $> 1 \,\mu m$) at temperatures near the maximum operation temperature, it is recommended to do the initial 1-2 hrs conditioning without a connection to the detector and repeat procedure above, starting at Step 12.

Standby Conditions

Short-Term: leave the column in the GC with carrier gas flowing at an oven temperature of 100-150°C.

Long-Term: remove the column from the GC and seal the ends by gently and carefully pushing each end into the curved edge of a septum. Store the column in the original box away from strong lighting.

If you have any questions or problems installing a Restek column, visit **www.restek.com/gcinstall** or call Technical Service at 800-356-1688 or 814-353-1300, ext. 4, or contact your Restek representative.



Scott Grossman, Applications Chemist Checking for leaks, using a thermal conductivity leak detector (step 13).







Guard Columns and Retention Gaps

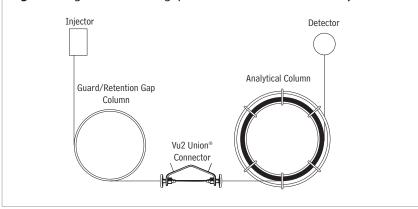
Guard columns and retention gaps are widely used in gas chromatography. The concept of the guard column is to trap nonvolatile material at the head of the column, not allowing the material to reach the analytical column. The concept of the retention gap is to help focus the compounds transferred from the inlet to a small band at the head of the analytical column in order to reduce chromatographic peak broadening. Both concepts (trapping nonvolatile material and refocusing the target analytes) may take place when a piece of deactivated tubing is connected to an analytical column as in Figure 1.

did you know?

We test our guard columns/ transfer lines with a comprehensive test mix to ensure high inertness.



Figure 1 A guard/retention gap column connected to an analytical column



please note

For superior inertness, try our Siltek® guard columns!

See page 33 for details.

Having trouble making a leak-free connection? Try our "built in" Integra-Guard® columns! See page 35 for details.

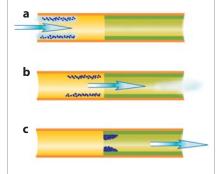
Analyte Focusing

There are two injection techniques where the retention gap is used to help focus target analytes at the beginning of the analytical column, cool on-column injection and splitless injection.

For cool on-column injection, the purpose of a retention gap is to help focus the sample components when introducing a liquid sample directly into the retention gap. The cool on-column injection is performed by inserting the syringe needle into the retention gap (this can be accomplished with a 0.53mm ID retention gap and a 26s gauge syringe) and transferring the liquid sample directly into the retention gap. The injection is made with the injector and column oven set below the boiling point of the solvent. As the solvent is evaporated, the volatile target analytes migrate in the solvent towards the analytical column, and the heavier analytes will be distributed over the retention gap. As the oven temperature increases, the target analytes vaporize and move unretained down the retention gap column until the compounds reach the liquid stationary phase of the analytical column. At this juncture, the target analytes are trapped/focused by the liquid phase forming a narrow injection band.

The retention gap may also be useful in hot vaporization injections when the transfer of the compounds from the inlet to the column does not form a focused band. Typical applications include water injections or injections using small ID columns, where split or tailing peaks would indicate an unfocused band. In these applications, the target analytes are trapped in a nonuniform or longitudinally diffuse band at the head of the retention gap (Figure 2a). As the oven temperature is increased, the solvent and target compounds are vaporized and move unretained through the retention gap (Figure 2b). When the target compounds come in contact with the stationary phase, they are refocused in a narrow band (Figure 2c), improving the chromatography.

Figure 2 Retention gaps are used to focus components in a tight band at the beginning of the analytical column.



- a) Sample introduction: a liquid film of solvent and sample is deposited in the first length of capillary.
- **b)** As oven temperature increases, the solvent evaporates and the target compounds elute unretained through the retention gap until they contact the analytical column.
- c) When target compounds come in contact with the stationary phase, they are refocused on the analytical column, resulting in a narrow initial band width.









it's a fact

To eliminate connections that may leak and to ensure longer column lifetime, use our unique Integra-Guard® Column. See **page 35**.

Connectors for Fused Silica Columns



Vu2 Union® Connector (See page 289.)



Press-Tight® Connectors (See pages 287-288.)



MXT[®] Union Connector Kit for Fused Silica (See page 292.)

Protecting the Analytical Column

The concept of a guard column is to protect the analytical column from becoming contaminated with nonvolatile compounds. The guard column is used to retain nonvolatile material, usually in the first 10-20 cm, not allowing this material to elute onto the liquid phase of the analytical column. As the oven temperature increases, the more volatile target compounds vaporize, elute down the guard column, and refocus at the head of the analytical column without interference from the nonvolatile material left behind.

Using guard columns is advantageous, because they prevent contamination that can cause active sites as well as change the conditions of the focusing zone of the analytical column. Another advantage is that the resolution of closely eluting compounds will not be affected when the column is trimmed during maintenance, because the guard column does not contribute to the resolving power of the analytical column. Using guard columns is a simple, cost-effective way to extend analytical column lifetime.

In summary, the retention gap and guard column are essentially the same products, but are used for different purposes. The deactivated tubing helps focus target analytes at the head of the analytical column for on-column and splitless injections, and also prevents nonvolatile material from contaminating the head of the analytical column.

What type of guard column should be used?

When using a guard column, it is important to match the polarity of the solvent and the polarity of the surface deactivation. Rxi® Guard tubing is good for a wide variety of applications and allows most common solvents (methylene chloride, hexane, isooctane, toluene) to easily wet and create a uniform film on the tubing surface.

If more polar solvents such as methanol or water are used, a polar-deactivated guard column is recommended to allow the solvent to wet the tubing surface. However, polar-deactivated guard columns are not resistant to harsh "water vaporization", which occurs when water in the liquid state is injected into the tubing and rapidly vaporizes (such as in steam cleaning). Hydroguard® deactivation is an alternative for direct aqueous injections. However, a Hydroguard®-deactivated guard column will not allow polar solvents to wet the tubing surface, and may cause solvent beading if the oven temperature is 20°C below the solvent boiling point. Siltek® deactivation creates a highly inert surface for very active compounds such as chlorinated and organophosphorus pesticides. Basedeactivated guard columns reduce adsorption and tailing for amines and other basic compounds.

How is a guard column connected to the analytical column?

To connect the guard column to the analytical column, Vu2-Union®, Press-Tight®, and other connectors are available. MXT® unions, typically used for connecting metal columns together, are now available for fused silica columns. See pages 287 to 292 for information about these connectors.





Rxi® Guard/Retention Gap Columns (fused silica)

- · Extend column lifetime.
- Excellent inertness—obtain lower detection limits for active compounds.
- · Sharper chromatographic peaks by utilizing retention gap technology.
- Maximum temperature: 360 °C.

Nominal ID	Nominal OD	5-Meter	5-Meter/6-pk.	10-Meter	10-Meter/6-pk.
0.25mm	0.37 ± 0.04 mm	10029	10029-600	10059	10059-600
0.32mm	0.45 ± 0.04 mm	10039	10039-600	10064	10064-600
0.53mm	0.69 ± 0.05 mm	10054	10054-600	10073	10073-600

Intermediate-Polarity Deactivated Guard/Retention Gap Columns/Transfer Lines (fused silica)

- Tested with a comprehensive test mix, to ensure high inertness.
- Useful for a wide range of applications.
- · Use with most common solvents.
- Maximum temperature: 325 °C

Nominal ID	Nominal OD	1-Meter	5-Meter	5-Meter/6-pk.	
0.025mm	0.363 ± 0.012 mm	10097			
0.05mm	0.363 ± 0.012 mm	10098	10040	10040-600	
0.075mm	0.363 ± 0.012 mm	10099			
0.10mm	0.363 ± 0.012 mm	10100	10041		
0.15mm	0.363 ± 0.012 mm	10101	10042		
0.18mm	0.37 ± 0.04 mm	10102	10046		
0.25mm	0.37 ± 0.04 mm		10043	10043-600	
0.28mm	0.37 ± 0.04 mm		10003	10003-600	
0.32mm	0.45 ± 0.04 mm		10044	10044-600	
0.45mm	0.69 ± 0.04 mm		10005	10005-600	
0.53mm	0.69 ± 0.05 mm		10045	10045-600	

Nominal ID	Nominal OD	10-Meter	10-Meter/6-pk.	30-Meter*	60-Meter*†
0.25mm	0.37 ± 0.04 mm	10049	10049-600	10012	10013
0.32mm	0.45 ± 0.04 mm	10048	10048-600	10022	10023
0.53mm	0.69 ± 0.05 mm	10047		10032	10033

Siltek®-Deactivated Guard/Retention Gap Columns/Transfer Lines

- Tested with a comprehensive test mix, to ensure high inertness.
- Revolutionary deactivation process for superior inertness.
- Analyze active samples accurately; ideal for chlorinated pesticide analysis (reduces endrin breakdown to less than 1%).
- Maximum temperature: 380 °C.

Nominal ID	Nominal OD	5-Meter	10-Meter
0.25mm	0.37 ± 0.04 mm	10026	10036
0.32mm	0.45 ± 0.04 mm	10027	10037

Polar-Deactivated Guard/Retention Gap Columns (fused silica)

- Tested with a comprehensive test mix, to ensure high inertness.
- · Polyethylene glycol deactivation layer provides optimum wettability for polar compounds.
- Minimize peak splitting when using polar solvents such as methanol or water.
- Compatible with Stabilwax®, Rtx®-225, and Rt®-2330 capillary columns.
- · Maximum temperature: 280 °C.

Nominal ID	Nominal OD	5-Meter	10-Meter	30-Meter*	60-Meter*†
0.25mm	0.37 ± 0.04 mm	10065	10068	10014	10015
0.32mm	0.45 ± 0.04 mm	10066	10069	10024	10025
0.53mm	0.69 ± 0.05mm	10067	10070	10034	10035

^{*30-} and 60-meter lengths are banded in 5-meter sections.

†Recommendation: Cut 60m guard columns into shorter lengths. Using full length may cause peak distortion.



To eliminate connections, use an Integra-Guard® Column. See page 35.



also available

Metal MXT® Guard/Retention Gap Columns Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 114.



it's a fact

Use guard columns to:

- · Reduce effects of dirty samples on column performance.
- Reduce downtime and maintenance.



did you know?

Siltek®-deactived guard columns minimize breakdown and improve recovery of analytes!

best choice

Siltek® treated tubing (cat.# 22505, page 320) is recommended for purge and trap transfer lines.







Fused Silica Guard/Retention Gap Columns





- · Tested with a basic amine test mix.
- Excellent inertness for basic compounds.
- Recommended for use with Rtx®-5 Amine, Rtx®-35 Amine, Rtx®-Volatile Amine, and Stabilwax®-DB capillary columns.
- · Batch test chromatogram included.
- Maximum temperature: 315 °C.

Chemists using guard columns in the analyses of basic compounds frequently observe peak tailing and low recovery. This happens because conventionally deactivated tubing surfaces can be adsorptive to basic compounds. Restek offers base-deactivated guard columns, as well as base-deactivated inlet liners, for completely inert sample pathways.

Nominal ID	Nominal OD	5-Meter	5-Meter/6-pk.	
0.25mm	0.37 ± 0.04 mm	10000	10000-600	
0.32mm	0.45 ± 0.04 mm	10001	10001-600	
0.53mm	0.69 ± 0.05mm	10002	10002-600	

also available

Base-deactivated inlet liners See page 213.

did you know?

We test our guard columns/transfer lines with a comprehensive test mix to ensure high inertness.

also **available**

Metal MXT® Guard Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 114**.

Hydroguard® Water-Resistant Guard/Retention Gap Columns/Transfer Lines (fused silica)

- Extend analytical column lifetime by preventing degradation from harsh "steam-cleaning" water injections.
- Tested with a comprehensive test mix, to ensure high inertness.
- Maximum temperature: 325 °C.

When transfer lines from purge & trap systems, air monitoring equipment, or other instruments carry condensed water vapor, deactivated column tubing quickly becomes active because of the creation of free silanol groups. These silanol groups adsorb active oxygenated compounds, such as alcohols and diols.

Restek chemists have addressed this concern and found a solution—the Hydroguard® deactivation process. A unique deactivation chemistry creates a high-density surface that is not readily attacked by aggressive hydrolysis. The high-density surface coverage of the Hydroguard® deactivation layer effectively prevents water vapor from reaching the fused silica surface beneath. Use Hydroguard® tubing for connecting GCs to:

- Headspace analyzers.
- Air analysis equipment and concentrator units.

Nominal ID	Nominal OD	5-Meter	5-Meter/6-pk.	10-Meter	30-Meter*	60-Meter*†
0.05mm	0.363 ± 0.012 mm	10075				
0.10mm	0.363 ± 0.012 mm	10076				
0.15mm	0.363 ± 0.012 mm	10077				
0.18mm	0.37 ± 0.04 mm	10078				
0.25mm	0.37 ± 0.04 mm	10079	10079-600	10082	10085	10088
0.32mm	0.45 ± 0.04 mm	10080	10080-600	10083	10086	10089
0.53mm	0.69 ± 0.05 mm	10081	10081-600	10084	10087	10090

^{*30-} and 60-meter lengths are banded in 5-meter sections.

†Recommendation: Cut 60m guard columns into shorter lengths. Using full length may cause peak distortion.





Fused Silica Guard/Retention Gap Columns

Innovative Integra-Guard® Columns

· No leaks for a more robust method.

Dagariation

- · No column connections for easier, faster maintenance.
- No peak distortions due to connector dead volume and thermal capacity.

For analysts who find it inconvenient to make a leak-free connection between the guard column and the analytical column, we offer Integra-Guard® columns. These innovative columns incorporate both guard column and analytical column in a continuous length of tubing, eliminating the connection and all connection-associated problems! The guard column section is marked separately from the analytical column, using high-temperature string.

A wide variety of our Integra-Guard® capillary columns are listed below. The Integra-Guard® column is so economical that we challenge you to compare our price against that of a conventional connection, even if you assemble it yourself. If you are currently using a guard column, or are considering using one, call today and ask about Integra-Guard® columns.

Description	qty.	cat.#	price
Rtx-1			
30m, 0.25mm ID, 0.25µm Rtx-1 w/5m Integra-Guard Column	ea.	10123-124	
30m, 0.53mm ID, 1.00µm Rtx-1 w/5m Integra-Guard Column	ea.	10155-126	
30m, 0.53mm ID, 5.00µm Rtx-1 w/5m Integra-Guard Column	ea.	10179-126	
Rtx-5			
30m, 0.25mm ID, 0.25µm Rtx-5 w/5m Integra-Guard Column	ea.	10223-124	
30m, 0.25mm ID, 0.25µm Rtx-5 w/10m Integra-Guard Column	ea.	10223-127	
30m, 0.25mm ID, 1.00µm Rtx-5 w/5m Integra-Guard Column	ea.	10253-124	
30m, 0.32mm ID, 0.25µm Rtx-5 w/5m Integra-Guard Column	ea.	10224-125	
30m, 0.32mm ID, 1.00µm Rtx-5 w/5m Integra-Guard Column	ea.	10254-125	
30m, 0.53mm ID, 5.00µm Rtx-5 w/5m Integra-Guard Column	ea.	10279-126	
60m, 0.32mm ID, 0.25µm Rtx-5 w/5m Integra-Guard Column	ea.	10227-125	
Rbx-5MS			
15m, 0.25mm ID, 0.25µm Rtx-5MS w/5m Integra-Guard Column	ea.	12620-124	
15m, 0.25mm ID, 0.50µm Rtx-5MS w/10m Integra-Guard Column	ea.	12635-127	
30m, 0.25mm ID, 0.10µm Rtx-5MS w/5m Integra-Guard Column	ea.	12608-124	
30m, 0.25mm ID, 0.25µm Rtx-5MS w/5m Integra-Guard Column	ea.	12623-124	
30m, 0.25mm ID, 0.25µm Rtx-5MS w/10m Integra-Guard Column	ea.	12623-127	
30m, 0.25mm ID, 0.50µm Rtx-5MS w/5m Integra-Guard Column	ea.	12638-124	
30m, 0.25mm ID, 0.50µm Rtx-5MS w/10m Integra-Guard Column	ea.	12638-127	
30m, 0.32mm ID, 0.25µm Rtx-5MS w/5m Integra-Guard Column	ea.	12624-125	
30m, 0.32mm ID, 1.00µm Rtx-5MS w/5m Integra-Guard Column	ea.	12654-125	
Rxi-5Sil MS			
15m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13620-127	
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13623-124	
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13623-127	
15m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13635-124	
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13638-124	
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13638-127	
30m, 0.32mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13639-125	
30m, 0.32mm ID, 1.00µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13654-125	
Rtx-624			
30m, 0.25mm ID, 1.40µm Rtx-624 w/5m Integra-Guard Column	ea.	10968-124	
30m, 0.32mm ID, 1.80µm Rtx-624 w/5m Integra-Guard Column	ea.	10970-125	
30m, 0.53mm ID, 3.00µm Rtx-624 w/5m Integra-Guard Column	ea.	10971-126	
Rtx-1301			
30m, 0.53mm ID, 3.00µm Rtx-1301 w/5m Integra-Guard Column	ea.	16085-126	
Rtx-1701			
30m, 0.25mm ID, 0.25µm Rtx-1701 w/5m Integra-Guard Column	ea.	12023-124	
Stabilwax			
30m, 0.25mm ID, 0.25µm Stabilwax w/5m Integra-Guard Column	ea.	10623-124	
30m, 0.32mm ID, 1.00µm Stabilwax w/5m Integra-Guard Column	ea.	10654-125	
30m, 0.53mm ID, 1.00µm Stabilwax w/5m Integra-Guard Column	ea.	10655-126	

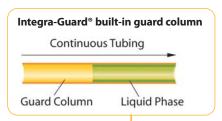
restek innovation!

Integra-Guard® Columns: guard columns WITHOUT connections—protecting your analytical column has never been this easy!



similar products

DuraGuard, EZ-Guard, Guardian





String indicates where the analytical column begins.



Tag indicates guard column end.

Integra-Guard® columns are available for all phases listed, for columns with 0.25, 0.32 or 0.53mm ID. If you don't see what you need here, contact us.

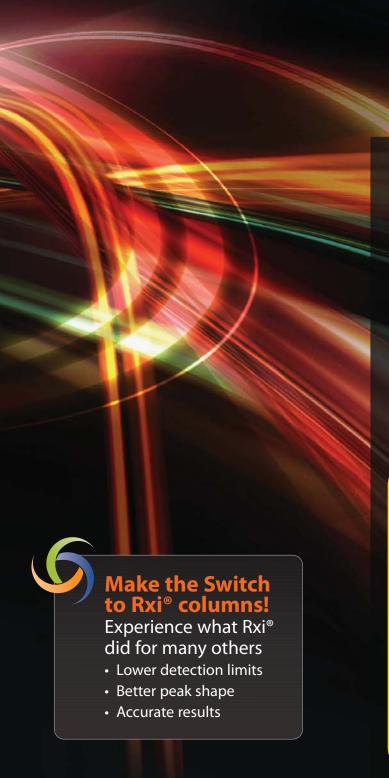






3-IN-1 TECHNOLOGY

Highest Inertness • Lowest Bleed • Exceptional Reproducibility



Lower Detection Limits with Ground-Breaking Column Technology

Rxi® technology unifies outstanding inertness, low bleed, and high reproducibility into a single high performance column line. Take variation out of the equation and get the most consistent results for trace level analysis with Rxi® columns.

Visit us at www.restek.com/rxi

phases available

- Rxi®-1ms (p. 41)
 - Rxi®-1HT (p. 47)
 - Rxi®-5ms (p. 41)
 - Rxi®-5Sil MS (p. 42)
 - Rxi®-5HT (p. 47)
 - Rxi®-XLB (p. 44)
 - Rxi®-624Sil MS (p. 46)
 - Rxi®-35Sil MS (p. 44)
 - Rxi®-17 (p. 44)
 - Rxi®-17Sil MS (p. 45)
 - Rxi® guard/retention gap columns (p. 40)



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11/12



Highest Inertness • Lowest Bleed • Exceptional Reproducibility

Lower Detection Limits with Ground-Breaking Column Technology

Rxi® columns deliver more accurate, reliable trace-level results than any other fused silica column on the market. To ensure the highest level of performance, all Rxi® capillary columns are manufactured and individually tested to meet stringent requirements for exceptional inertness, low bleed, and unsurpassed column-to-column reproducibility.

Highest Inertness

Inertness is one of the most difficult attributes to achieve in an analytical column, but it is one of the most critical as it improves peak shape, response, and retention time stability. Rxi® technology produces the most inert columns available, providing:

- Increased signal-to-noise ratios to improve low-level detection.
- Reproducible retention times for positive identifications.
- Improved response for polar, acidic, and basic compounds.

Increased Signal and Reproducible Retention Times

When capillaries are not sufficiently deactivated, peaks become asymmetric, resulting in reduced signal and unpredictable retention times. As column activity increases, peak tailing becomes more pronounced, reducing peak height and causing retention time to drift (Figure 1). In practice, this means that sensitivity is lost and trace-level analytes cannot be reliably determined. In addition, even compounds at higher concentrations may be misidentified, due to retention time shifting.

A more significant problem for sample analysis is that retention time can vary with analyte concentration if the column is not highly inert. Since the amount of target analyte in samples is unknown, retention times on a poorly deactivated column can easily vary enough to move compounds outside of the retention time window (Figure 2). This can result in inaccurate identifications and the need for manual integration and additional review or analysis before results can be reported. Using inert Rxi® columns ensures that compounds elute with good signal-to-noise ratios at expected retention times, regardless of analyte concentration.

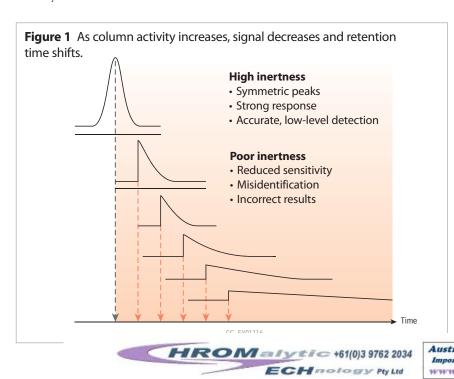








Figure 3 An Rxi®-5ms column gives the highest response for both basic and acidic compounds.

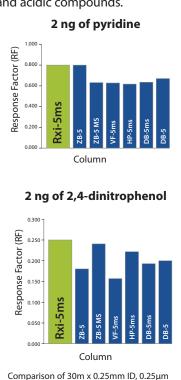
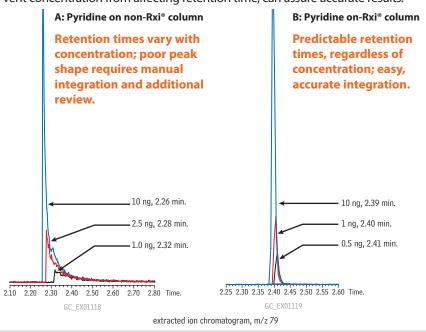


Figure 2 Analyte levels in samples are unknown; only inert columns, which prevent concentration from affecting retention time, can assure accurate results.



Improved Response for Difficult Compounds

Another reason column inertness is important for trace-level analysis is that many acidic, basic, and polar compounds will tail significantly and become difficult to analyze if the column contains active sites. The remarkable neutrality of Rxi® columns solves this problem and allows a wide range of compounds to be analyzed with high sensitivity, often on a single column. All Rxi® columns are exceptionally inert as demonstrated in Figure 3 by high response factors for both pyridine (basic) and 2,4-dinitrophenol (acidic). Rxi® columns reliably produce highly symmetric peaks and improved responses for difficult compounds, indicating greater inertness than columns produced by other manufacturers (Figure 4).

Innovation & Service

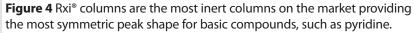
columns.

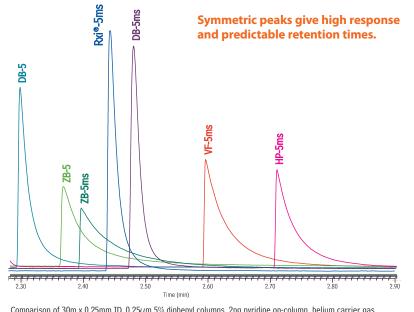
"When my research group needed a GC column for a chiral separation, Restek was the only company that offered to provide us with test columns to evaluate. The willingness of Restek to work with us to find a solution to our separation problem is exceptional."

Joe Dinnocenzo, Professor of Chemistry Director, Center for Photoinduced Charge Transfer University of Rochester

How can we help you today?

Contact support@restek.com or your local Restek representative for helpful, knowledgeable technical support.



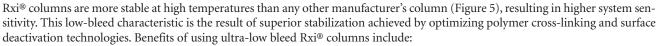


Comparison of 30m x 0.25mm ID, 0.25 μ m 5% diphenyl columns, 2ng pyridine on-column, helium carrier gas, Oven temp.: 50°C (3 min.) to 180°C @ 35°C/min. (5 min.), Det.: FID @ 250°C



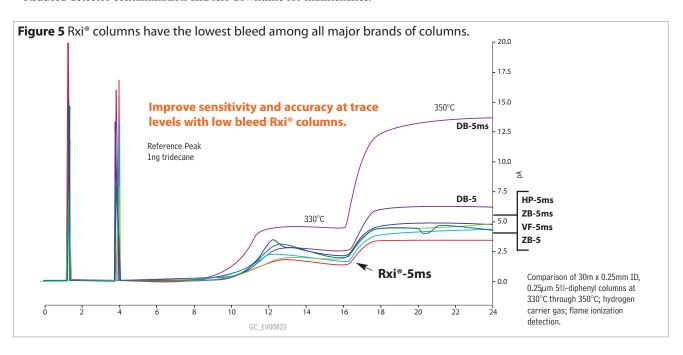


Lowest Bleed



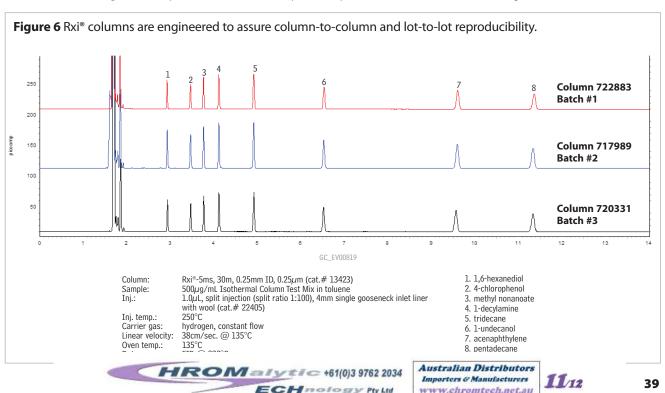


- Increased sensitivity, for lower detection limits and better matches to mass spectral libraries.
- · Faster system stabilization.
- · Reduced detector contamination and less downtime for maintenance.



Exceptional Reproducibility

Chromatographers today need to know that every column they receive is going to perform the same way as the column it replaces. Unmatched manufacturing precision and stringent quality control mean Rxi® columns exceed industry standards, resulting in the best column-to-column reproducibility available as measured by efficiency, retention, bleed, and inertness (Figure 6).



GC COLUMNS | HIGH-PERFORMANCE Rxi COLUMNS Rxi® Columns Overview





Column Cross-Reference Table

Rxi® columns produce the same selectivity as competitor columns, but are much more inert, exhibit lower bleed, and offer exceptional reproducibility. For more accurate, reliable trace-level results, choose Rxi® columns.

_	Restek	Phase Composition	Agilent	Varian/ Chrompack	SGE	Phenomenex	Machery-Nagel	Supelco
non-pola	Rxi-1ms	100% dimethyl polysiloxane	HP-1ms UI, DB-1ms UI, HP-1, HP-1ms, DB-1 DB-1ms, Ultra-1	VF-1ms CP-Sil 5 CP Sil 5 CB Low Bleed/MS	BP-1	ZB-1 ZB-1ms	Optima-1 Optima-1ms Optima-1ms Accent	SPB-1 Equity-1
_	Rxi-1HT	100% dimethyl polysiloxane	DB-1HT	VF-1HT		ZB-1HT		
	Rxi-5ms	5% diphenyl/ 95% dimethyl polysiloxane	HP-5ms UI, HP-5, HP-5ms, DB-5, Ultra-2	CP-Sil 8 CP Sil 8 CB	BP-5	ZB-5 ZB-5ms	Optima-5 Optima-5ms	SPB-5 Equity-5
T	Rxi-5Sil MS	5% phenyl, 95% dimethyl arylene polysiloxane	DB-5ms UI, DB-5ms	VF-5ms CP-Sil 8 CB Low Bleed/MS	BPX-5	ZB-5ms	Optima-5ms Accent	SLB-5ms
JLARI	Rxi-5HT	5% diphenyl/95% dimethyl polysiloxane	DB-5HT	VF-5HT		ZB-5HT		
POI	Rxi-XLB	arylene/methyl modified polysiloxane	DB-XLB	VF-Xms		MR1	Optima-XLB	
	Rxi-624Sil MS	6% cyanopropylphenyl, 94% dimethyl arylene polysiloxane	DB-624, HP-624	VF-624ms	BP-624	ZB-624	Optima-624	
ar	Rxi-35Sil MS	35% phenyl, 65% dimethyl arylene polysiloxane	DB-35ms	VF-35ms	BP-35	MR2	Optima-35ms	
polai	Rxi-17	50% diphenyl/50% dimethyl polysiloxane	HP-17, DB-17, DB-608, HP-50+	CP-Sil 24 CB		ZB-50	Optima-17	
+	Rxi-17Sil MS	50% phenyl, 50% dimethyl arylene polysiloxane	DB-17ms, HP-17, DB-17	VF-17ms CP-Sil 24 CB	BPX-50	ZB-50	Optima-17ms	

Visit www.restek.com/rxi for detailed comparisons and to learn how exceptional Rxi® inertness, bleed, and reproducibility can improve your data.

Use Rxi® Guard/Retention Gap Columns to protect your analytical column and help focus analytes.

Rxi® Guard/Retention Gap Columns (fused silica)

- · Extend column lifetime.
- Excellent inertness—obtain lower detection limits for active compounds.
- Sharper chromatographic peaks by utilizing retention gap technology.
- Maximum temperature: 360°C.

Nominal ID	Nominal OD	5-Meter	5-Meter/6-pk.	10-Meter	10-Meter/6-pk.
0.25mm	0.37 ± 0.04 mm	10029	10029-600	10059	10059-600
0.32mm	0.45 ± 0.04 mm	10039	10039-600	10064	10064-600
0.53mm	0.69 ± 0.05 mm	10054	10054-600	10073	10073-600





GC

Rxi®-1ms Columns (fused silica)

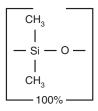
(nonpolar phase, Crossbond® 100% dimethyl polysiloxane)

- General purpose columns for drugs of abuse, essential oils, hydrocarbons, pesticides, PCB congeners (e.g. Aroclor mixes), sulfur compounds, amines, solvent impurities, simulated distillation, oxygenates, gasoline range organics (GRO), refinery gases.
- Tested and guaranteed for ultra-low bleed—improved signal-to-noise ratio, for better sensitivity and mass spectral integrity.
- Temperature range: -60 °C to 330/350 °C (bleed tested temperature/maximum operating temperature).
- Equivalent to USP G2 phase.

ID df	temp. limits	15-Meter	30-Meter	60-Meter
0.25mm 0.25µm	1 -60 to 330/350°C	13320	13323	13326
0.50µm	1 -60 to 330/350°C	13335	13338	13341
1.00μm	1 -60 to 330/350°C	13350	13353	13356
0.32mm 0.25µm	1 -60 to 330/350°C	13321	13324	13327
0.50µm	1 -60 to 330/350°C	13336	13339	13342
1.00μm	1 -60 to 330/350°C	13351	13354	13357
4.00μm	1 -60 to 330/350°C		13396	
0.53mm 0.50µm	1 -60 to 330/350°C	13337	13340	
1.00μm	1 -60 to 330/350°C	13352	13355	
1.50µm	1 -60 to 330/350°C	13367	13370	13373

ID	df	temp. limits	10-Meter	12-Meter	20-Meter	25-Meter	50-Meter
0.10mm	0.10µm	-60 to 330/350°C	13301				
0.18mm	$0.18\mu m$	-60 to 330/350°C			13302		
	0.36µm	-60 to 330/350°C			13311		
0.20mm	0.33µm	-60 to 330/350°C		13397		13398	13399

Rxi®-1ms Structure



similar phases

DB-1, DB-1ms, HP-1, HP-1ms, Ultra-1, SPB-1, Equity-1, VF-1ms, CP-Sil 5 CB Low Bleed/MS

free literature



Rxi®-1ms: The Ultimate High Performance Fused Silica Capillary Column

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lit. cat.# 580075B

Rxi®-5ms Columns (fused silica)

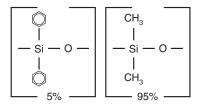
(low polarity phase, Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

- General purpose columns for semivolatiles, phenols, amines, residual solvents, drugs of abuse, pesticides, PCB congeners (e.g. Aroclor mixes), solvent impurities.
- · Most inert column on the market.
- Tested and guaranteed for ultra-low bleed—improved signal-to-noise ratio, for better sensitivity and mass spectral integrity.
- Temperature range: -60 °C to 330/350 °C (bleed tested temperature/maximum operating temperature).
- · Equivalent to USP G27 phase.

ID df	temp. limits	15-Meter	30-Meter	60-Meter
0.25mm 0.25µm	-60 to 330/350°C	13420	13423	13426
0.40μm	-60 to 330/350°C		13481	
0.50μm	-60 to 330/350°C	13435	13438	13441
<u>1.00μm</u>	-60 to 330/350°C	13450	13453	13456
0.32mm 0.25µm	-60 to 330/350°C	13421	13424	13427
0.50μm	-60 to 330/350°C	13436	13439	13442
1.00μm	-60 to 330/350°C	13451	13454	13457
0.53mm 0.25µm	-60 to 330/350°C	13422	13425	
0.50μm	-60 to 330/350°C	13437	13440	
1.00μm	-60 to 330/350°C	13452	13455	
1.50µm	-60 to 330/350°C	13467	13470	

ID	df	temp. limits	10-Meter	12-Meter	20-Meter	25-Meter	50-Meter
0.10mm	0.10µm	-60 to 330/350°C	13401				
0.18mm	0.18µm	-60 to 330/350°C			13402		
	0.30µm	-60 to 330/350°C			13409		
	0.36µm	-60 to 330/350°C			13411		
0.20mm	0.33µm	-60 to 330/350°C		13497		13498	13499

Rxi®-5ms Structure



similar phases

DB-5, HP-5, HP-5ms, Ultra-2, SPB-5, Equity-5, CP-Sil 8



free literature

Rxi®-5ms Columns
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lit. cat.# 580046A



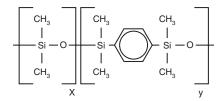








Rxi®-5Sil MS Structure



similar phases

DB-5ms, VF-5ms, CP-Sil 8 Low-Bleed/MS, DB-5ms UI, Rtx-5Sil MS

tree literature



Rxi®-5Sil MS: Exceptionally Inert Columns for GC/MS and Trace Level Analyses

lit. cat.# GNFL1061



Developing New Methods for Pesticides in Dietary Supplements

lit. cat.# PHAN1242

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Rxi®-5Sil MS Columns (fused silica)

(low polarity Crossbond® silarylene phase; selectivity close to 5% phenyl/ 95% dimethyl arylene polysiloxane)

- Engineered to be a low bleed GC/MS column.
- Excellent inertness for active compounds.
- General purpose columns—ideal for GC/MS analysis of polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Temperature range: -60 °C to 350 °C.

The Rxi®-5Sil MS stationary phase incorporates phenyl groups in the polymer backbone. This improves thermal stability, reduces bleed, and makes the phase less prone to oxidation. Rxi®-5Sil MS columns are ideal for GC/MS applications requiring high sensitivity, including use in ion trap systems.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	$0.10 \mu m$	-60 to 330/350°C	13605	13608		
	0.25µm	-60 to 330/350°C	13620	13623	13626	
	0.50µm	-60 to 330/350°C	13635	13638		
	$1.00 \mu m$	-60 to 325/350°C	13650	13653	13697	
0.32mm	0.25µm	-60 to 330/350°C	13621	13624		
	$0.50\mu m$	-60 to 330/350°C		13639		
	$1.00 \mu m$	-60 to 325/350°C		13654		
0.53mm	1.50µm	-60 to 310/330°C		13670		

ID	df	temp. limits	10-Meter	20-Meter	40-Meter
0.10mm	$0.10 \mu m$	-60 to 330/350°C	43601		
0.18mm	0.10µm	-60 to 320/350°C			
	$0.18\mu m$	-60 to 330/350°C		43602	43605
	0.36µm	-60 to 330/350°C		43604	

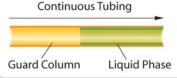
Rxi®-5Sil MS with Integra-Guard®

Get the protection without the connection!

- · Extend column lifetime.
- · Eliminate leaks with a built-in retention gap.
- · Inertness verified by isothermal testing.

Description	qty.	cat.#	price
15m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13620-127	
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13623-124	
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13623-127	
15m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13635-124	
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13638-124	
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13638-127	
30m, 0.32mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13639-125	
30m, 0.32mm ID, 1.00µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13654-125	

Integra-Guard® built-in guard column



Phases currently available as Integra-Guard® columns



Rtx*-1 Rtx*-5 Rtx*-5MS Rxi*-5Sil MS Rtx*-624 Rtx*-1301

Rtx[®]-1701 Stabilwax[®]

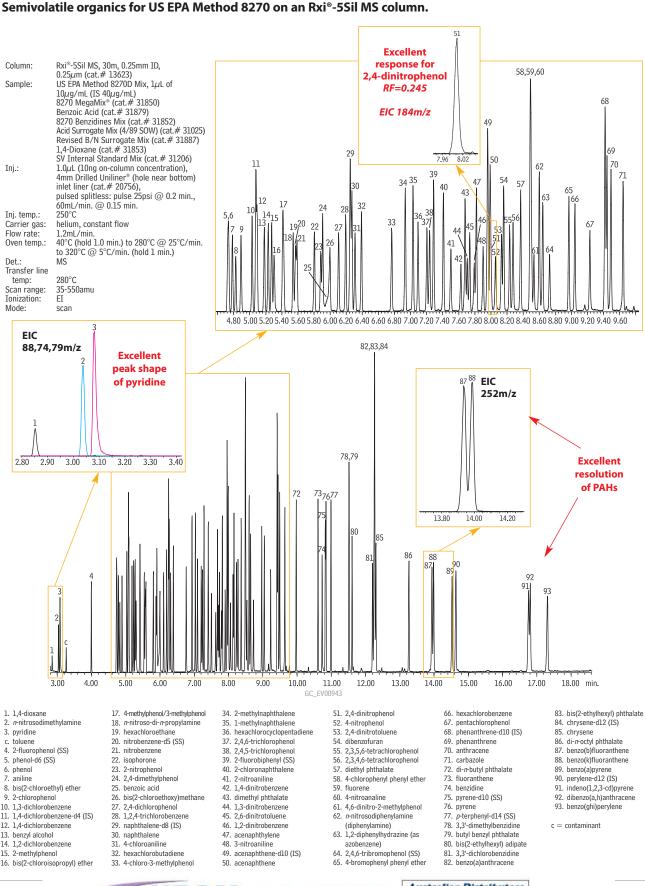
See page 35 for more information.

Integra-Guard® columns are available for all phases listed, for columns with 0.25, 0.32 or 0.53mm ID. If you don't see what you need

















similar phases

DB-XLB, VF-Xms



In combination with an Rxi®-XLB column, simple adjustments to the injection conditions can greatly improve sensitivity for active and high molecular weight Method 525.2 target compounds.

By eliminating contact between the sample and the hot metal surfaces in the injection port, a Drilled Uniliner® inlet liner prevents analytes from degrading in the injection port.

Rxi®-XLB Columns (fused silica)

(low polarity proprietary phase)

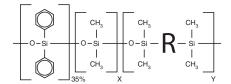
- General purpose columns exhibiting extremely low bleed. Ideal for many GC/MS applications, including pesticides, PCB congeners (e.g. Aroclor mixes), PAHs.
- · Unique selectivity.
- Temperature range: 30 °C to 360 °C.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter
0.25mm	0.10µm	30 to 340/360°C	13705	13708	
	0.25µm	30 to 340/360°C	13720	13723	13726
	$0.50\mu m$	30 to 340/360°C		13738	
	$1.00 \mu m$	30 to 340/360°C	13750	13753	
0.32mm	$0.10\mu \mathrm{m}$	30 to 340/360°C		13709	
	$0.25\mu m$	30 to 340/360°C	13721	13724	13727
	0.50µm	30 to 340/360°C		13739	
	$1.00 \mu m$	30 to 340/360°C		13754	
0.53mm	0.50µm	30 to 340/360°C		13740	
	1.50µm	30 to 320/340°C	13767	13770	

ID	df	temp. limits	10-Meter	20-Meter	
0.10mm	$0.10\mu m$	30 to 340/360°C	43701		
0.18mm	0.18µm	30 to 340/360°C		43702	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

Rxi®-35Sil MS Structure



similar phases

DB-35ms, MR2, VF-35ms

Rxi®-35Sil MS Columns (fused silica)

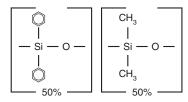
(midpolarity phase; equivalent to 35% phenyl/65% dimethyl arylene polysiloxane)

- Special selectivity and excellent inertness for substituted polar compounds, such as drugs, pesticides, herbicides, PCBs, phenols, etc.
- Very low bleed phase for GC/MS analysis.
- Extended temperature range: 50 °C to 340/360 °C.

ID	df	temp. limits	15-Meter	30-Meter
0.25mm	0.25μm	50 to 340/360°C	13820	13823
	0.50µm	50 to 340/360°C	13835	13838
	1μm	50 to 320/340°C	13850	13853
0.32mm	0.25µm	50 to 340/360°C	13821	13824
	0.50µm	50 to 340/360°C	13836	13839
	1μ m	50 to 320/340°C	13851	13854
0.53mm	0.50µm	50 to 320/340°C	13837	13840
	1µm	50 to 320/340°C	13852	13855



Rxi®-17 Structure



similar phases

DB-17, DB-608, CP-Sil 24 CB, HP-50+

Rxi®-17 Columns (fused silica)

(midpolarity phase; Crossbond® 50% diphenyl/50% dimethyl polysiloxane)

- General purpose columns for pesticides, herbicides, rosin acids, phthalate esters, triglycerides, sterols.
- Temperature range: 40 °C to 320 °C.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.25µm	40 to 280/320°C	13520	13523	
	0.50µm	40 to 280/320°C	13535	13538	
	$1.00\mu m$	40 to 280/320°C	13550	13553	
0.32mm	0.25µm	40 to 280/320°C	13521	13524	
	0.50µm	40 to 280/320°C	13536	13539	
	$1.00\mu m$	40 to 280/320°C	13551	13554	
0.53mm	0.25µm	40 to 280/320°C	13522	13525	
	0.50µm	40 to 280/320°C	13537	13540	
	0.83µm	40 to 280/320°C		13569	
	1.00µm	40 to 280/320°C	13552	13555	
	1.50µm	40 to 280/320°C	13567	13570	

	ат	temp. Ilmits	10-Meter	2U-Meter	
0.10mm	$0.10\mu m$	40 to 280/320°C	13501		
222	0.70	40 - 000 (00000		30500	







Rxi®-17Sil MS

Rxi®-17Sil MS Columns (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 50% phenyl/50% dimethyl arylene polysiloxane)

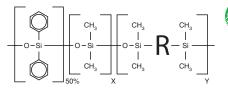
- 340/360 °C upper temperature limits.
- · Excellent inertness and selectivity for active environmental compounds, such as PAHs.
- Equivalent to USP phase G3.
- · Low-bleed for use with sensitive detectors, such as MS.
- Excellent separation of EU-PAHs, including fluoranthenes.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	40 to 340/360°C	14120	14123	14126	
0.32mm	0.25µm	40 to 340/360°C	14121	14124		

ID	df	temp. limits	10-Meter	20-Meter	
0.10mm	0.10μm	40 to 340/360°C	14101		
0.18mm	0.18µm	40 to 340/360°C		14102	
	0.36µm	40 to 340/360°C		14111	

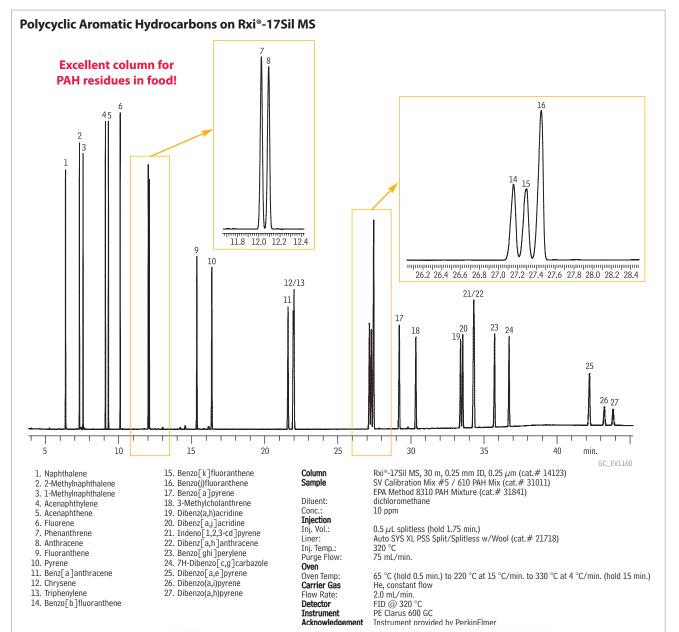
^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

Rxi®-17Sil MS Structure





DB-17ms, VF-17ms, BPX-50





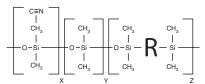






Rxi®-624Sil MS Structure





similar phases

DB-624, HP-624, VF-624, BP-624, ZB-624, AT-624, 007-1301, G43R

Rxi®-624Sil MS Columns (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 6% cyanopropylphenyl/ 94% dimethyl arylene polysiloxane)

- Low bleed, high thermal stability column—maximum temperatures up to 320 °C.
- Inert—excellent peak shape for a wide range of compounds, including acidic and basic compounds.
- Selective—highly selective for residual solvents, great choice for USP<467>.
- Manufactured for column-to-column reproducibility—well-suited for validated methods.

ID	df	temp. limits	20-Meter	30-Meter	60-Meter	
0.18mm	$1.00 \mu m$	-20 to 300/320°C	13865			
0.25mm	1.40µm	-20 to 300/320°C		13868		
0.32mm	1.80µm	-20 to 300/320°C		13870	13872	
0.53mm	3.00µm	-20 to 280/300°C		13871		

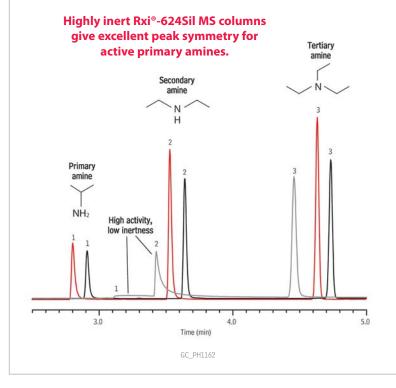


free literature

Rxi®-624Sil MS: The "Go To" GC Column for Fast, **Effective Volatile Impurities Method Development**

Download your free copy from www.restek.com lit. cat.# PHFL1245

Inertness comparison (basic compounds): primary, secondary, and tertiary amines on an Rxi®-624Sil MS column.



Peaks	Conc. (µg/mL
1. Isopropylamine	100
Diethylamine	100
3. Triethylamine	100

Column Rxi®-624SilMS, 30 m, 0.32 mm ID, 1.8 μ m (cat.# 13870)

Sample DMSO Diluent: $100\,\mu\mathrm{g/mL}$ Conc.:

Injection

Inj. Vol.: 1 µL split (split ratio 20:1)

5mm Single Gooseneck with Wool (cat.# 22973-200.1) Liner:

Inj. Temp.:

Oven Oven Temp: 50 °C (hold 1 min.) to 200 °C at 20 °C/min. (hold 5 min.)

Carrier Gas He, constant flow 37 cm/sec. FID @ 250 °C Linear Velocity: Detector Agilent/HP6890 GC Instrument

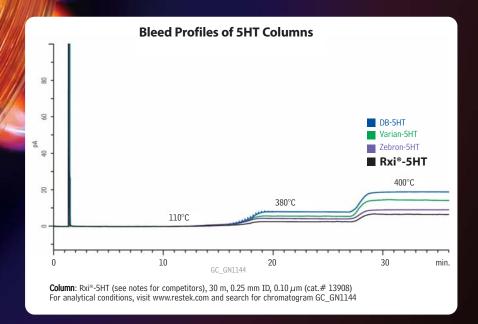








High temperature columns have thin films so they need to be thoroughly deactivated. Restek's Rxi® process offers better inertness and lower bleed than any other manufacturer.



Replace DB-5ht, ZB-5HT, and VF-5ht and benefit from better data and lower bleed!

Rxi®-5HT Columns (fused silica)

(low polarity phase; 5% diphenyl/95% dimethyl polysiloxane)

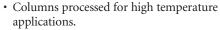
- 40% longer lifetime from specially designed fused silica tubing.
- Columns processed for high temperature applications.
- Temperature range: -60 to 400 °C*.

_		_		
ID	df	temp. limits	15-Meter	30-Meter
0.25mm	0.10µm	-60 to 400°C	13905	13908
	0.25µm	-60 to 400°C		13923
0.32mm	$0.10 \mu m$	-60 to 400°C	13906	13909
	0.25µm	-60 to 400°C		13924
0.53mm	0.15µm	-60 to 400°C		13910

*Column is capable of going to 430°C, but column lifetime will be reduced.

Rxi®-1HT Columns (fused silica)

(100% dimethyl polysiloxane)



• Temperature range: -60 to 400 °C*.

ID	df	temp. limits	15-Meter	30-Meter
0.25mm	$0.10\mu \mathrm{m}$	-60 to 400°C	13950	13951
	0.25μm	-60 to 400°C		13952
0.32mm	$0.10\mu m$	-60 to 400°C	13953	13954
	0.25µm	-60 to 400°C		13955
0.53mm	0.15 μ m	-60 to 400°C		13956
*Column i	s capable	of going to 43	30°C, but colum	n lifetime will be reduced.





General Purpose Columns



Chemically bonded capillary columns

- Allow for direct solvent injection onto column.
- · Columns can be solvent rinsed.

Extensive GC column selection

- Available in many dimensions, including variations in length, internal diameter, and film thickness.
- Internal diameters include 0.10mm and 0.18mm for faster analysis time and greater resolution.

Broad range of stationary phases

 Columns based on polysiloxane backbone; functional groups added to the polymers to vary selectivity:



Rtx°-1, Rtx°-5, Rtx°-5MS, Rtx°-20, Rtx°-35, Rtx°-50, Rtx°-65, Rtx°-440, Rtx°-200, Rtx°-200MS, Rtx°-1301, Rtx°-624, Rtx°-1701, Rtx°-225, Rtx°-2330, Rtx°-Wax, Stabilwax°

visit **www.restek.com** for complete product listings

Rtx®-1 Columns (fused silica)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane)

- General purpose columns for solvent impurities, PCB congeners (e.g. Aroclor mixes), simulated distillation, drugs of abuse, gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semivolatiles, pesticides, oxygenates.
- Temperature range: -60 °C to 350 °C.
- Equivalent to USP G1, G2, G38 phases.

Rtx®-1 columns exhibit long lifetime and very low bleed at high operating temperatures. A proprietary synthesis process eliminates residual catalysts that could cause degradation and increase bleed.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	105-Meter
0.25mm	$0.10\mu\mathrm{m}$	-60 to 330/350°C	10105	10108	10111	
	0.25µm	-60 to 330/350°C	10120	10123	10126	10129
	$0.50\mu\mathrm{m}$	-60 to 330/350°C	10135	10138	10141	10144
	1.00μm	-60 to 320/340°C	10150	10153	10156	10159
0.32mm	$0.10 \mu \mathrm{m}$	-60 to 330/350°C	10106	10109	10112	
	0.25µm	-60 to 330/350°C	10121	10124	10127	10130
	0.50μm	-60 to 330/350°C	10136	10139	10142	
	$1.00 \mu m$	-60 to 320/340°C	10151	10154	10157	10160
	$1.50\mu \mathrm{m}$	-60 to 310/330°C	10166	10169	10172	10175
	3.00µm	-60 to 280/300°C	10181	10184	10187	10190
	4.00µm	-60 to 280/300°C		10198		
	5.00μm	-60 to 260/280°C	10176	10178	10180	
0.53mm	0.10µm	-60 to 320/340°C	10107	10110		
	0.25μm	-60 to 320/340°C	10122	10125	10128	
	0.50µm	-60 to 310/330°C	10137	10140	10143	
	1.00µm	-60 to 310/330°C	10152	10155	10158	
	1.50µm	-60 to 310/330°C	10167	10170	10173	
	3.00µm	-60 to 270/290°C	10182	10185	10188	10189
	5.00µm	-60 to 270/290°C	10177	10179	10183	10194
	7.00µm	-60 to 240/260°C	10191	10192	10193	

ID	df	temp. limits	10-Meter	20-Meter	40-Meter	
0.10mm	$0.10 \mu m$	-60 to 330/350°C	41101	41102		
	0.40µm	-60 to 320/340°C	41103	41104		
0.18mm	0.20µm	-60 to 330/350°C	40101	40102	40103	
	0.40µm	-60 to 320/340°C	40110	40111	40112	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

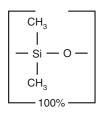
Rtx®-1 with Integra-Guard® Column

Get the protection without the connection!

- Extend column lifetime.
- Eliminate leaks with a built-in retention gap.
- Inertness verified by isothermal testing.

Description	qty.	cat.#	price
30m, 0.25mm ID, 0.25µm Rtx-1 w/5m Integra-Guard Column	ea.	10123-124	
30m, 0.53mm ID, 1.00μm Rtx-1 w/5m Integra-Guard Column	ea.	10155-126	
30m, 0.53mm ID, 5.00 μ m Rtx-1 w/5m Integra-Guard Column	ea.	10179-126	

Rtx®-1 Structure





similar phases

DB-1, DB-1MS, HP-1, HP-1MS, Ultra-1, SPB-1, Equity-1, MDN-1, VF-1ms, CP-Sil 5 CB

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 115** for our MXT®-1 columns.

it's a fact

For exceptional inertness, ultra-low bleed, and unsurpassed performance, choose Rxi®-1ms columns! See **pages 36-41**.

crossbond® technology

reduces bleed, prolongs column lifetime, and allows rejuvenation through solvent rinsing.



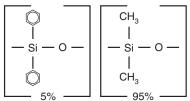








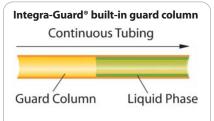
Rtx®-5/Rtx®-5MS Structure



similar phases

DB-5, HP-5, HP-5MS, Ultra-2, SPB-5, Equity-5, MDN-5, CP-Sil 8 CB

NOTE: DB-5MS is a silarylene based polymer, similar to Rxi-5Sil MS.



Get the protection without the connection! For Rtx®-5 and Rtx®-5MS columns with built-in Integra-Guard® guard columns, see **page 35**.

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 116** for our MXT®-5 columns.

Rtx®-5 Amine Columns See page 64.

it's a fact

For exceptional inertness, ultra-low bleed, and unsurpassed performance, choose Rxi®-5ms columns! See **pages 36-41**.

Rtx®-5/Rtx®-5MS (fused silica)

- General purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g. Aroclor mixes), essential oils, semivolatiles.
- Temperature range: -60 °C to 350 °C.
- Equivalent to USP G27 and G36 phases.

The 5% diphenyl/95% dimethyl polysiloxane stationary phase is the most popular GC stationary phase and is used in a wide variety of applications. All residual catalysts and low molecular weight fragments are removed from the Rtx®-5 polymer, providing a tight mono-modal distribution and extremely low bleed.

Rtx®-5 Columns (fused silica)

(low polarity phase; Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	105-Meter
0.25mm	0.10µm	-60 to 330/350°C	10205	10208	10211	10214
	0.25µm	-60 to 330/350°C	10220	10223	10226	10229
	0.50µm	-60 to 330/350°C	10235	10238	10241	10244
	1.00µm	-60 to 320/340°C	10250	10253	10256	10259
0.32mm	0.10µm	-60 to 330/350°C	10206	10209	10212	10215
	0.25µm	-60 to 330/350°C	10221	10224	10227	10230
	0.50µm	-60 to 330/350°C	10236	10239	10242	10245
	1.00µm	-60 to 330/350°C	10251	10254	10257	10260
	1.50µm	-60 to 310/330°C	10266	10269	10272	10275
	3.00µm	-60 to 280/300°C	10281	10284	10287	10290
0.53mm	0.10µm	-60 to 320/340°C	10207	10210	10213	
	0.25µm	-60 to 320/340°C	10222	10225	10228	
	0.50µm	-60 to 310/330°C	10237	10240	10243	
	1.00µm	-60 to 310/330°C	10252	10255	10258	
	1.50µm	-60 to 310/330°C	10267	10270	10273	
	3.00µm	-60 to 270/290°C	10282	10285	10288	
	5.00µm	-60 to 270/290°C	10277	10279	10283	

ID	df	temp. limits	10-Meter	20-Meter	40-Meter	
0.10mm	0.10µm	-60 to 330/350°C	41201	41202		
	0.40µm	-60 to 320/340°C	41203	41204		
0.18mm	0.20µm	-60 to 325/340°C	40201	40202	40203	
	0.40µm	-60 to 315/330°C	40210	40211	40212	

	6-pack	6-pack	price if bought	savings
30-meter	cat.#	price	separately	of
0.25mm ID, 0.25µm	10223-600			
0.25mm ID, 0.50µm	10238-600			
0.32mm ID, 1.00µm	10254-600			
0.53mm ID, 1.50µm	10270-600			

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

Six columns for the price of five!

Other phases and configurations available on request.

Rtx®-5MS—Low-bleed GC/MS Columns (fused silica)

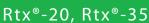
(low-polarity phase; Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

Column specifically tested for low bleed performance.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter
0.25mm	0.10µm	-60 to 330/350°C	12605	12608	12611
	0.25µm	-60 to 330/350°C	12620	12623	12626
	0.50µm	-60 to 330/350°C	12635	12638	12641
	1.00µm	-60 to 325/350°C	12650	12653	
0.32mm	0.10µm	-60 to 330/350°C	12606	12609	12612
	0.25µm	-60 to 330/350°C	12621	12624	12627
	0.50µm	-60 to 330/350°C	12636	12639	12642
	1.00µm	-60 to 325/350°C	12651	12654	
0.53mm	0.50µm	-60 to 320/340°C	12637	12640	
	1.00µm	-60 to 320/340°C	12652	12655	







Rtx®-20 Columns (fused silica)

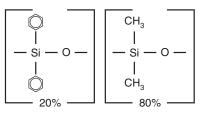
(low to midpolarity phase; Crossbond® 20% diphenyl/80% dimethyl polysiloxane)

- · General purpose columns for volatile compounds, flavor compounds, alcoholic beverages.
- Temperature range: -20 °C to 320 °C.
- · Equivalent to USP G28, G32 phases.

Rtx®-20 polymer is synthesized to exacting standards. All residual catalysts and low molecular weight fragments are removed from the polymer, providing a tight monomodal distribution and extremely low bleed.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.25µm	-20 to 300/320°C	10320	10323	
	0.50µm	-20 to 290/310°C	10335	10338	
	1.00µm	-20 to 280/300°C	10350	10353	
0.32mm	0.25µm	-20 to 300/320°C	10321	10324	
	0.50µm	-20 to 290/310°C	10336	10339	
	1.00µm	-20 to 280/300°C	10351	10354	
0.53mm	0.25µm	-20 to 260/280°C	10322	10325	
	$1.00 \mu m$	-20 to 260/280°C	10352	10355	

Rtx®-20 Structure





similar phase

SPB-20, AT-20, 007-7

Rtx®-35 Columns (fused silica)

(midpolarity phase; Crossbond® 35% diphenyl/65% dimethyl polysiloxane)

- General purpose columns for organochlorine pesticides, PCB congeners (e.g. Aroclor mixes), herbicides, pharmaceuticals, sterols, rosin acids, phthalate esters.
- Temperature range: 40 °C to 320 °C.
- · Equivalent to USP G42 phase.

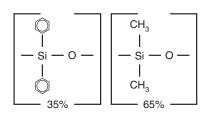
An Rtx®-35 column is a popular confirmation column for pesticides and herbicides, in conjunction with an Rtx®-5 or Rtx®-1701 column. The higher phenyl content causes useful elution order and retention time changes.

15-Motor

20-Motor

שנ	ат	temp. iimits	To-Meter	30-Weter	
0.25mm	0.25µm	40 to 320°C	10420	10423	
	0.50µm	40 to 310°C	10435	10438	
	$1.00 \mu m$	40 to 290°C	10450	10453	
0.32mm	0.25µm	40 to 320°C	10421	10424	
	0.50µm	40 to 310°C	10436	10439	
	1.00µm	40 to 290°C	10451	10454	
0.53mm	0.25µm	40 to 260/280°C	10422	10425	
	0.50µm	40 to 300°C	10437	10440	
	$1.00\mu m$	40 to 290°C	10452	10455	
	1.50µm	40 to 280°C	10467	10470	
	3.00µm	40 to 240/260°C	10482	10485	
ID	df	temp. limits	10-Meter	20-Meter	
0.18mm	0.20µm	40 to 300/320°C	40401	40402	
	0.40µm	40 to 290/310°C	40410	40411	

Rtx®-35 Structure



similar phases

DB-35, HP-35, SPB-35, SPB-608

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 116 for our MXT®-20 columns and page 117 for our MXT®-35 columns.

Rtx®-35 Amine Columns See page 65.

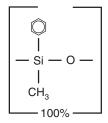








Rtx®-50 Structure



similar phases

HP-50, SPB-50, SP-2250

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 117 for our MXT®-50 columns.

Rtx®-50 Columns (fused silica)

(midpolarity phase; Crossbond® 50% phenyl/50% methyl polysiloxane)

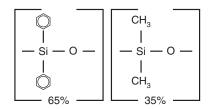
- General purpose columns for pesticides, herbicides, rosin acids, phthalate esters, triglycerides, sterols.
- Temperature range: 40 °C to 320 °C.
- · Equivalent to USP G3 phase.

The high thermal stability of Rtx®-50 columns makes possible dual-column analysis with common phases such as Rtx®-1MS or Rtx®-5MS. Between analyses, high temperatures can be used to drive less volatile contaminants off of the column.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.25µm	40 to 300/320°C	10520	10523	
	0.50µm	40 to 290/310°C	10535	10538	
	1.00µm	40 to 280/300°C	10550	10553	
0.32mm	0.25µm	40 to 300/320°C	10521	10524	
	0.50µm	40 to 290/310°C	10536	10539	
	1.00µm	40 to 280/300°C	10551	10554	
0.53mm	0.25µm	40 to 280/300°C	10522		
	0.50µm	40 to 270/290°C	10537	10540	
	0.83µm	40 to 270/290°C		10569	
	1.00µm	40 to 260/280°C	10552	10555	
	1.50µm	40 to 250/270°C	10567	10570	
ID	df	temp. limits	10-Meter	20-Meter	
0.18mm	0.20µm	40 to 310/330°C	40501	40502	

ID	df	temp. limits	10-Meter	20-Meter	
0.18mm	$0.20\mu m$	40 to 310/330°C	40501	40502	
	0.40µm	40 to 300/320°C	40510	40511	

Rtx®-65 Structure



similar phases

TAP-CB, 400-65HT, 007-65HT

Rtx®-65 Columns (fused silica)

(mid to high polarity phase; Crossbond® 65% diphenyl/35% dimethyl polysiloxane)

- · General purpose columns for phenols, fatty acids.
- Temperature range: 50 °C to 300 °C.
- Equivalent to USP G17 phase.

The Rtx®-65 phase contains the highest phenyl content of any bonded stationary phase available, to improve separation of aromatic compounds through increased phase-analyte interaction. A unique polarity makes these columns ideal for a variety of analyses, from phenols to FAMEs. As a confirmation column for EPA Method 604 phenols, an Rtx®-65 column produces a different elution order, compared to the primary Rtx®-5 column. Rtx®-65 columns elute FAMEs according to equivalent chain length, similar to bonded Carbowax® columns, but the Rtx®-65 phase does not suffer the thermal stability limitations of other polar stationary phases.

ID	df	temp. limits	30-Meter
0.25mm	0.25µm	50 to 300°C	17023
	0.50µm	50 to 280/300°C	17038
	1.00µm	50 to 260/280°C	17053
0.32mm	0.25µm	50 to 300°C	17024
	0.50µm	50 to 280/300°C	17039
	1.00µm	50 to 260/280°C	17054
0.53mm	0.25µm	50 to 290/300°C	17025
	0.50µm	50 to 270/290°C	17040
	1.00µm	50 to 250/270°C	17055

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 117 for our MXT®-65 columns.

also available

Rtx®-65TG Columns Tested specifically for triglycerides. See page 72.

crossbond[®] technology

reduces bleed, prolongs column lifetime, and allows rejuvenation through solvent rinsing.





Rtx®-440 Columns (fused silica)

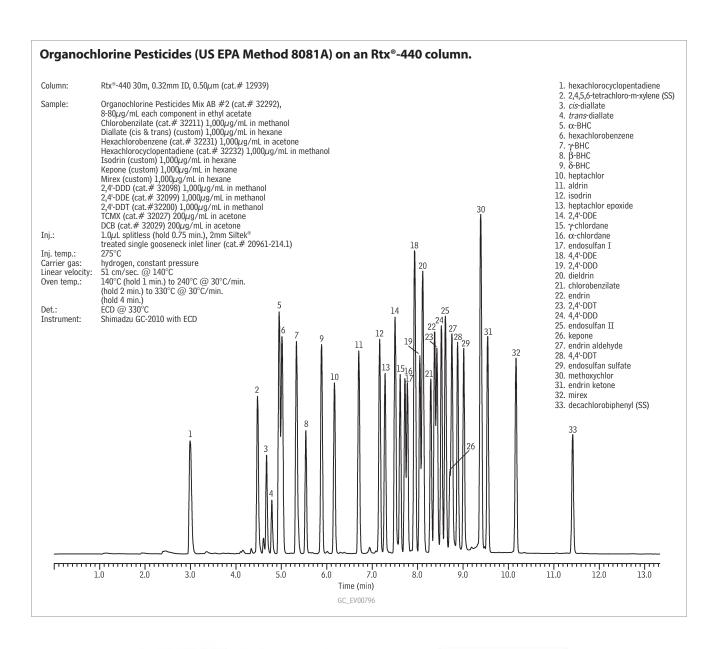
(midpolarity proprietary Crossbond® phase)

- General purpose columns with unique selectivity for pesticides, PAHs, or other semivolatiles. Ideal for low/trace level analyses.
- Low bleed, high-resolution columns with unique selectivity.
- Wide temperature range: 20 °C to 340 °C.

ID	df	temp. limits	30-Meter	
0.25mm	0.25µm	20°C to 320/340°C	12923	
	0.50μm	20°C to 320/340°C	12938	
0.32mm	0.25µm	20°C to 320/340°C	12924	
	0.50μm	20°C to 320/340°C	12939	
0.53mm	0.50μm	20°C to 320/340°C	12940	
	1.00µm	20°C to 320/340°C	12955	
ID	df	temp. limits	20-Meter	40-Meter
0.18mm	0.18µm	20°C to 320/340°C	42902	42903

restek innovation!

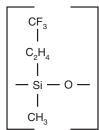








Rtx®-200 Structure



similar phases

DB-200, DB-210, VF-200ms

Rtx®-200/Rtx®-200MS (fused silica)

- General purpose columns for solvents, Freon® fluorocarbons, alcohols, ketones, silanes, glycols. Excellent confirmation column, with an Rtx®-5 column, for phenols, nitrosamines, organochlorine pesticides, chlorinated hydrocarbons, and chlorophenoxy herbicides.
- Temperature range: -20 °C to 340 °C.
- · Equivalent to USP G6 phase.

Rtx®-200 columns have accomplished many difficult separations not possible on any other bonded stationary phase. Many analysts consider these the best, most inert midpolarity columns available. The trifluoropropyl stationary phase has a unique selectivity that changes elution orders and resolves compounds that phenyl, cyano, or Carbowax® phases can not. The Rtx®-200 column offers exceptional thermal stability, low bleed, and superior inertness—even for active compounds such as phenols, and with sensitive detectors such as ECDs, NPDs, and MSDs.

Rtx®-200 Columns (fused silica)

(midpolarity phase; Crossbond® trifluoropropylmethyl polysiloxane)

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	105-Meter
0.25mm	0.25µm	-20 to 320/340°C	15020	15023	15026	15029
	0.50µm	-20 to 310/330°C	15035	15038	15041	15044
	1.00µm	-20 to 290/310°C	15050	15053	15056	15059
0.32mm	0.25µm	-20 to 320/340°C	15021	15024	15027	15030
	0.50µm	-20 to 310/330°C	15036	15039	15042	15045
	1.00µm	-20 to 290/310°C	15051	15054	15057	15060
	1.50µm	-20 to 280/300°C	15066	15069	15072	15075
0.53mm	0.25µm	-20 to 310/330°C	15022	15025	15028	
	0.50µm	-20 to 300/320°C	15037	15040	15043	
	1.00µm	-20 to 290/310°C	15052	15055	15058	
	1.50µm	-20 to 280/300°C	15067	15070	15073	
	3.00µm	-20 to 260/280°C	15082	15085	15088	15091
	1.00μm 1.50μm	-20 to 290/310°C -20 to 280/300°C	15052 15067	15055 15070	15058 15073	15091

I	D	df	temp. limits	10-Meter	20-Meter	40-Meter
0.18	3mm	0.20µm	-20 to 310/330°C	45001	45002	45003
		0.40µm	-20 to 310/330°C	45010	45011	45012

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 118** for our MXT®-200 columns.

Rtx®-200MS—Low-bleed GC/MS Columns (fused silica)

(midpolarity phase; Crossbond® trifluoropropylmethyl polysiloxane)

Column specifically tested for low bleed performance.

ID	df	temp. limits	30-Meter
0.25mm	$0.10 \mu \mathrm{m}$	-20 to 320/340°C	15608
	0.25µm	-20 to 320/340°C	15623
	0.50µm	-20 to 310/330°C	15638
	$1.00 \mu \mathrm{m}$	-20 to 290/310°C	15653
0.32mm	$0.10 \mu \mathrm{m}$	-20 to 320/340°C	15609
	0.25µm	-20 to 320/340°C	15624
	0.50µm	-20 to 310/330°C	15639
	$1.00 \mu \mathrm{m}$	-20 to 290/310°C	15654





Rtx®-1301 (G43) Columns (fused silica)

(low to midpolarity phase; Crossbond® 6% cyanopropylphenyl/94% dimethyl polysiloxane)

- General purpose columns for residual solvents, alcohols, oxygenates, and volatile organic compounds.
- Temperature range: -20 °C to 280 °C.
- Equivalent to USP G43 phase.

Many analysts feel the Rtx®-1301 column has the best cyanosiloxane bonded stationary phase available, with no other column manufacturer providing lower bleed, longer lifetime, or better inertness. Our polymer is fully characterized to ensure long-term reproducibility, column-to-column consistency, and low bleed—even with sensitive detectors such as ECDs and MSDs.

ID	df	temp. limits*	15-Meter	30-M	eter	60-Meter	75-Meter	105-Meter
0.25mm	0.25µm	-20 to 280°C	16020	16023	\$450	16026		
	0.50µm	-20 to 270°C	16035	16038	\$450	16041		
	1.00µm	-20 to 260°C	16050	16053	\$450	16056		
	1.40µm	-20 to 240°C				16016		
0.32mm	0.25µm	-20 to 280°C	16021	16024	\$480	16027		
	0.50µm	-20 to 270°C	16036	16039	\$480	16042		
	$1.00 \mu \mathrm{m}$	-20 to 260°C	16051	16054	\$480	16057		
	1.50µm	-20 to 250°C	16066	16069	\$480	16072		
	1.80µm	-20 to 240°C		16092	\$480	16093		
0.53mm	0.25µm	-20 to 280°C	16022	16025	\$540	16028		
	0.50µm	-20 to 270°C	16037	16040	\$540	16043		
	1.00µm	-20 to 260°C	16052	16055	\$540	16058		
	1.50µm	-20 to 250°C	16067	16070	\$540	16073		
	3.00µm	-20 to 240°C	16082	16085	\$540	16088	16076	16091

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

please **note**

Rtx®-1301 columns and Rtx®-624 columns are exactly the same columns.

Rtx®-624 Columns (fused silica)

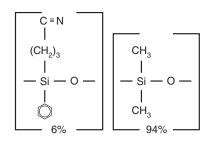
(low to midpolarity phase; Crossbond® 6% cyanopropylphenyl/94% dimethyl polysiloxane)

- Application-specific columns for volatile organic pollutants. Recommended in US EPA methods for volatile organic pollutants.
- Temperature range: -20 °C to 240 °C.
- Equivalent to USP G43 phase.

The unique polarity of the Rtx®-624 column makes it ideal for analyzing volatile organic pollutants. Although the Rtx®-502.2 column is recommended in many methods, the Rtx®-624 column offers better resolution of early eluting compounds. The Rtx®-624 phase produces greater than 90% resolution of the first six gases in EPA Methods 8260 and 524.2. This stationary phase is especially well-suited for EPA Method 524.2 revision IV since it resolves 2-nitropropane from 1,1-dichloropropanone, which share quantification ion m/z 43 and must be separated chromatographically.

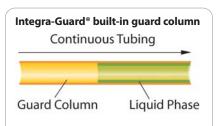
ID	df	temp. limits	30-Meter	60-Meter	75-Meter	105-Meter
0.25mm	1.40µm	-20 to 240°C	10968	10969		
0.32mm	$1.80\mu m$	-20 to 240°C	10970	10972		
0.45mm	2.55µm	-20 to 240°C			10982	
0.53mm	3.00µm	-20 to 240°C	10971	10973	10974	10975
ID	df	temp. limits		20-Meter	40-Meter	
0.18mm	1.00µm	-20 to 240°C		40924	40925	

Rtx®-1301 Structure



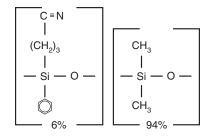
similar phases

DB-1301, DB-624, HP-1301, HP-624, SPB-1301, SPB-624, VF-1301, VF-624ms, CP-1301, CP-Select 624 CB



Get the protection without the connection! For Rtx®-1301 and Rtx®-624 columns with built-in Integra-Guard® guard columns, see page 35.

Rtx®-624 Structure



similar phases

DB-1301, DB-624, HP-1301, HP-624, SPB-1301, SPB-624, VF-1301, VF-624ms, CP-1301, CP-Select 624 CB

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 117 for our MXT®-1301 columns and page 121 for our MXT®-624 columns.



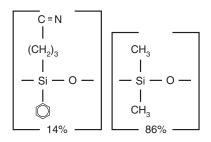






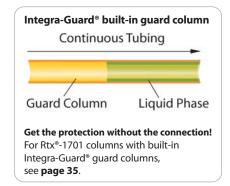


Rtx®-1701 Structure



similar phases

DB-1701, HP-1701, SPB-1701, VF-1701, CP-Sil 19 CB

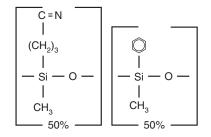


also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See page 118 for our MXT®-1701 columns.

Rtx®-225 Structure



similar phases

56

DB-225, HP-225, SPB-225, CP-Sil 43 CB

Rtx®-1701 Columns (fused silica)

(midpolarity phase; Crossbond® 14% cyanopropylphenyl/86% dimethyl polysiloxane)

- · General purpose columns for alcohols, oxygenates, PCB congeners (e.g. Aroclor mixes), pesticides.
- Temperature range: -20 °C to 280 °C.
- · Equivalent to USP G46 phase.

Rtx®-1701 is one of the more popular stationary phases used in capillary GC. The mix of cyano and phenyl functional groups increases the polarity and offers a different elution order relative to less polar Rtx®-1 or Rtx®-5 columns. An Rtx®-1701 column is ideal for confirmation analysis, in combination with an Rtx®-35 or Rtx®-5 column. The polymer is fully characterized to ensure long-term reproducibility, column-to-column consistency, and low bleed, even with sensitive detectors such as ECDs and MSDs.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.10µm	-20 to 280°C			12011	
	0.25µm	-20 to 280°C	12020	12023	12026	
	0.50µm	-20 to 270/280°C	12035	12038	12041	
	1.00μm	-20 to 260/280°C	12050	12053	12056	
0.32mm	0.10µm	-20 to 280°C		12009		
	0.25µm	-20 to 280°C	12021	12024	12027	
	0.50µm	-20 to 270/280°C	12036	12039	12042	
	1.00µm	-20 to 260/280°C	12051	12054	12057	
	1.50µm	-20 to 240/260°C	12066	12069	12072	
0.53mm	$0.10 \mu \mathrm{m}$	-20 to 270/280°C	12007			
	0.25µm	-20 to 270/280°C	12022	12025	12028	
	0.50µm	-20 to 260/270°C	12037	12040	12043	
	$1.00 \mu \mathrm{m}$	-20 to 250/270°C	12052	12055	12058	
	1.50µm	-20 to 240/260°C	12067	12070	12073	
	3.00µm	-20 to 230/250°C	12082	12085	12088	

ID	df	temp. limits	10-Meter	20-Meter	
0.10mm	0.10µm	-20 to 280°C	42201	42202	
0.18mm	0.20µm	-20 to 280°C	42001	42002	
	0.40µm	-20 to 270/280°C	42010	42011	

Rtx®-225 Columns (fused silica)

(polar phase; Crossbond® 50% cyanopropylmethyl/50% phenylmethyl polysiloxane)

- General purpose columns for FAMEs, carbohydrates, sterols, flavor compounds.
- Temperature range: 40 °C to 240 °C.
- Equivalent to USP G7, G19 phases.

The cyanopropyl-containing Rtx®-225 phase is slightly less polar than bonded polyethylene glycol (PEG) phases, but it can be used for many of the same applications.

Improvements to the Rtx®-225 polymer have increased thermal stability, reduced bleed, and improved inertness. The Rtx®-225 column provides a 20°C thermal stability advantage over other "225" columns because of our unique polymer synthesis technology and proprietary siloxane deactivation. In most similar columns, the Carbowax® deactivation layer is not fully compatible with the cyanopropyl siloxane polymer, which can cause adsorption, tailing of active compounds, and lower efficiency.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.10µm	40 to 220/240°C	14005	14008		
	0.25µm	40 to 220/240°C	14020	14023	14026	
	0.50µm	40 to 220/240°C	14035	14038	14041	
0.32mm	0.10μm	40 to 220/240°C	14006	14009		
	0.25µm	40 to 220/240°C	14021	14024	14027	
	0.50µm	40 to 220/240°C	14036	14039	14042	
	1.00µm	40 to 200/220°C	14051	14054	14057	
0.53mm	0.10µm	40 to 200/220°C	14007	14010		
	0.25µm	40 to 200/220°C	14022	14025		
	0.50µm	40 to 200/220°C	14037	14040	14043	
	1.00µm	40 to 200/220°C	14052	14055	14058	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced





Rt®-2330 Columns (fused silica)

(highly polar phase; 90% biscyanopropyl/10% phenylcyanopropyl polysiloxane—not bonded)

- General purpose columns for cis/trans FAMEs, dioxin isomers.
- Temperature range: 0 °C to 275 °C.
- · Equivalent to USP G8 and G48 phase.

Rt®-2330 is one of the most polar capillary column stationary phases. Cyano groups on both sides of the polymer backbone give the phase a strong dipole moment and high selectivity for cis/trans compounds or compounds with conjugated double bonds. Highly polar columns typically exhibit poor column efficiencies, high bleed, and short column lifetimes when thermally cycled. To overcome some of these problems, we developed a surface treatment that is more compatible with the Rt®-2330 phase. In addition, our improved polymer produces columns with improved column efficiency and lower bleed.

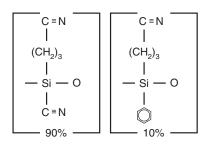
Because the Rt®-2330 stationary phase is not bonded, it should not be solvent rinsed.

ID	df	temp. limits*	30-Meter	60-Meter	105-Meter
0.25mm	$0.10 \mu m$	0 to 260/275°C	10708	10711	10714
	0.20µm	0 to 260/275°C	10723	10726	10729
0.32mm	0.20µm	0 to 260/275°C	10724	10727	10730
0.53mm	$0.10\mu m$	0 to 260/275°C	10710	10713	
	0.20µm	0 to 260/275°C	10725	10728	

ID	df	temp. limits	10-Meter	20-Meter	40-Meter	
0.18mm	0.10µm	0 to 260/275°C	40701	40702	40703	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

Rt®-2330 Structure





DB-23, HP-23, SP-2330, SP-2380

Doing Dioxin Analysis?

Rtx®-Dioxin2 columns provide better resolution and higher maximum temperatures than conventional columns. See page 96.

Rt®-2560 Column (fused silica)

(highly polar phase; biscyanopropyl polysiloxane—not bonded)

NLEA FAMEs resolved on an Rt®-2560 column.

Application-specific column for cis/trans FAMEs.

temp, limits

20 to 250°C

Stable to 250 °C.

0.25mm 0.20µm

min. 0

10

15

Because the Rt®-2560 stationary phase is not bonded, it should not be solvent rinsed.

100-Meter

13199

Resolves <i>cis</i> and <i>trans</i> FAME isomers	12	6	Column: Sample: Inj.: Inj. temp.: Carrier ga: Flow rate: Oven temp Det.:	s: hydrogen, cons 1.2mL/min.	i3199) (cat.# 35078), FAMEs in ide t ratio 100:1), (cat.# 20814) tant flow
3 7 8 2 1 1 9.0	12 14 13 15	17	21 19 22	2627 28 25 1 1 1	

similar phases

SPB-2560, HP-88, Silar 10C, CP-Sil 88 FAME, CP-Sil 88

> 1. C4:0 methyl butyrate 2. C6:0 methyl hexanoate 3. C8:0 methyl octanoate

4. C10:0 methyl decanoate 5. C11:0 methyl undecanoate 6. C12:0 methyl laurate 7. C13:0 methyl tridecanoate 8. C14:0 methyl myristate 9. C14:1 methyl myristoleate (cis-9) 10. C15:0 methyl pentadecanoate 11. C16:0 methyl palmitate 12. C16:1 methyl palmitoleate (cis-9) 13. C17:0 methyl heptadecanoate 14. C18:0 methyl stearate 15. C18:1 methyl elaidate (trans-9) 16. C18:1 methyl oleate (cis-9) 17. C18:2 methyl linoelaidate (trans-9,12) 18. C18:2 methyl linoleate (cis-9,12) 19. C20:0 methyl arachidate 20. C20:1 methyl eicosenoate (cis-11) 21. C18:3 methyl linolenate (cis-9,12,15) 22. C22:0 methyl behenate 23. C22:1 methyl erucate (cis-13) 24. C23:0 methyl tricosanoate 25. C24:0 methyl lignocerate 26. C20:5 methyl eicosapentaenoate (cis-5,8,11,14,17) 27. C24:1 methyl nervonate (cis-15) 28. C22:6 methyl docosahexaenoate (cis-4 7 10 13 16 19)

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GC_FF00651

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tree literature

Selection Guide for Polar Wax GC Column Phases

Download your free copy from **www.restek.com**

lit. cat.# 59890

similar phases

DB-WAX, HP-Wax

Rtx®-Wax Columns (fused silica)

(polar phase; Crossbond® Carbowax® polyethylene glycol)

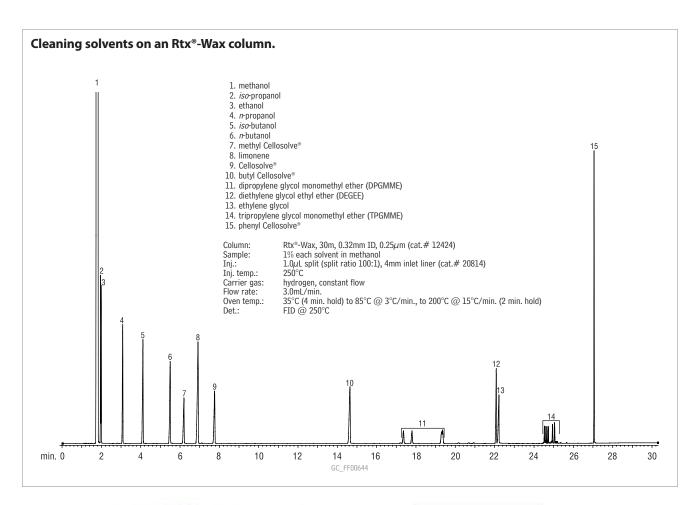
- Best polyethylene glycol (PEG) phase for alkenols, glycols, and aldehydes.
- Temperature range: 20 °C to 250 °C.
- Equivalent to USP G14, G15, G16, G20, G39 phases.

Rtx®-Wax columns are the most inert and efficient PEG columns currently available. The extended operating temperature range allows analysis of compounds having a wide volatility range, and ensures low bleed at temperatures as high as 250 °C. Selectivity is comparable to other Carbowax® columns, for compounds of intermediate to high polarity. Selectivity data available on request.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	20 to 250°C	12420	12423	12426	
	0.50µm	20 to 250°C	12435	12438	12441	
0.32mm	0.25µm	20 to 250°C	12421	12424	12427	
	0.50µm	20 to 250°C	12436	12439	12442	
	1.00µm	20 to 240/250°C	12451	12454	12457	
0.53mm	0.25µm	20 to 250°C	12422	12425		
	0.50µm	20 to 250°C	12437	12440	12443	
	1.00µm	20 to 240/250°C	12452	12455	12458	

ID	df	temp. limits	10-Meter	20-Meter	
0.10mm	0.10µm	20 to 250°C	41601	41602	
	0.20µm	20 to 240/250°C	41603	41604	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.





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Stabilwax®

Stabilwax® Columns (fused silica)

(polar phase; Crossbond® Carbowax® polyethylene glycol)

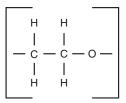
- Most stable polyethylene glycol (PEG) column available.
- Rugged enough to withstand repeated water injections.
- · Lowest bleed PEG column on the market; long column lifetimes are assured
- Temperature range: 40 °C to 260 °C.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.

Restek's polar-deactivated surface tightly binds the Carbowax® polymer and increases thermal stability, relative to competitive columns. Because of the increased stability produced by the bonding process, Stabilwax® columns exhibit long column lifetimes, even when programming repeatedly up to 260 °C. The bonding mechanism of the column also produces polar compound retention times that do not shift as is often observed on other wax-type columns. In addition, this bonding mechanism produces a column that can be rejuvenated by solvent washing. Stabilwax® columns are used for a wide range of compounds and matrices including: FAMEs, flavor compounds, essential oils, solvents, aromatics including xylene isomers, acrolein/acrylonitrile (EPA 603), and oxygenated compounds. Also used for purity testing of chemicals and analyzing impurities in water matrices and alcoholic beverages.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	0.10µm	40 to 250/260°C	10605	10608	10611	
	0.25µm	40 to 250/260°C	10620	10623	10626	
	0.50µm	40 to 250/260°C	10635	10638	10641	
0.32mm	0.25µm	40 to 250/260°C	10621	10624	10627	
	0.50µm	40 to 250/260°C	10636	10639	10642	
	$1.00 \mu m$	40 to 240/260°C	10651	10654	10657	
0.53mm	0.25µm	40 to 250/260°C	10622	10625	10628	
	0.50µm	40 to 250/260°C	10637	10640	10643	
	$1.00 \mu \mathrm{m}$	40 to 240/260°C	10652	10655	10658	
	1.50µm	40 to 230/240°C	10666	10669	10672	
	2.00µm	40 to 220/230°C	10667	10670		

ID	df	temp. limits	10-Meter	20-Meter
0.10mm	$0.10\mu m$	40 to 250/260°C	42601	
0.18mm	0.18µm	40 to 250/260°C		40602

Stabilwax® Structure







similar phases

DB-WAX, DB-WAXetr, HP-Wax, HP-Innowax, Supelcowax 10, CP-Wax 52 CB

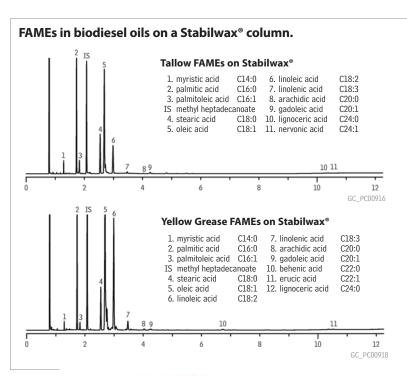
Six columns for the price of five!

Call 800-356-1688, ext. 4, or your Restek representative for details!

also available

Metal MXT® Columns

Rugged, flexible, Silcosteel® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 118** for our MXT®-WAX columns.



Stabilwax®, 30m, 0.32mm ID, 0.25µm (cat.# 10624) Column: Sample: various sources of biodiesel (B100), prepared according to European Method EN 14103 1.0μ L split (split ratio 100:1), Cyclosplitter * inlet liner Ini.: 250°C Inj. temp.: Carrier gas: Linear velocity: hydrogen, constant flow, 3mL/min. 60cm/sec. 210°C (hold 5 min.) to 230°C @ 20°C/min. Oven temp.: (hold 5 min.) FID @ 250°C Det.:

> See page 646 for Soy FAMEs and Rapeseed FAMEs analysis.



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Fast GC Using 0.10 mm and 0.15 mm ID Capillary Columns

- Significantly reduces analysis time without sacrificing resolution.
- Higher column efficiencies speed up separations.
- · Ideal for GC/MS.
- Excellent for comprehensive GC (GCxGC) as second dimension column.

Narrow bore (less than or equal to 0.15 mm ID) columns are attractive alternatives to conventional-diameter capillary columns because they provide faster analysis times and higher resolving power. As column ID decreases, column efficiency (plates/meter) greatly increases. Therefore, resolution can be achieved with a shorter column, which decreases analysis time. In addition, narrow bore columns are more compatible with GC/MS since typical flow rates are 1.0 mL/min. or less, eliminating the need to split the column flow at the MS interface. Conventional methods are easily converted to narrow bore columns, but some research may be necessary due to lower column capacities and higher back pressures.

Rxi®-1ms Columns for Fast GC (fused silica)

(nonpolar phase, Crossbond® 100% dimethyl polysiloxane)

ID	df	temp. limits	10-Meter	20-Meter
0.10mm	$0.10\mu m$	-60 to 330/350°C	13301	
0.15mm	0.15µm	-60 to 330/350°C	43800	43801
	2 0//m	-60 to 330/350°C		43802

Rxi®-5ms Columns for Fast GC (fused silica)

(low polarity phase, Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

ID	df	temp. limits	10-Meter	
0.10mm	0.10µm	-60 to 330/350°C	13401	

Rxi®-5Sil MS Columns for Fast GC (fused silica)

(low polarity Crossbond* silarylene phase; selectivity close to 5% diphenyl/95% dimethyl polysiloxane)

ID	df	temp. limits	10-M	leter	20-Meter
0.10mm	0.10µm	-60 to 330/350°C	43601		
0.15mm	0.15µm	-60 to 330/350°C	43815	\$295	43816
	2.0µm	-60 to 330/350°C			43817

Rxi®-17 Columns for Fast GC (fused silica)

(midpolarity phase; Crossbond® 50% diphenyl/50% dimethyl polysiloxane)

ID	df	temp. limits	10-Meter
0.10mm	0.10c/m	10 to 280/320°C	13501

Rxi®-17Sil MS Columns for Fast GC (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 50% phenyl methyl polysiloxane)

ID	df	temp. limits	10-Meter	20-Meter
0.15mm	0.15µm	40 to 340/360°C	43820	43821

Rtx®-200 Columns for Fast GC (fused silica)

(midpolarity phase; Crossbond® trifluoropropylmethyl polysiloxane)

ID	df	temp. limits	10-Meter	20-Meter	
0.15mm	0.15µm	-20 to 320/340°C	43835	43836	

Stabilwax® Columns for Fast GC (fused silica)

(polar phase; Crossbond® Carbowax® polyethylene glycol)

ID	df	temp. limits	10-Meter	20-Meter
0.10mm	$0.10 \mu m$	40 to 250/260°C	42601	
0.15mm	0.15µm	40 to 250/260°C	43830	43831

Rt®-LC50 Columns for Fast GC (fused silica)

(polar, dimethyl [50% liquid crystal] polysiloxane)

ID	df	temp. limits	10-Meter
0.10mm	0.10µm	100°C to 270°C	19736

Rtx®-CLPesticides for Fast GC (fused silica)

(proprietary Crossbond® phase)

ID	df	temp. limits	10-Meter	
0.10mm	0.10µm	-60 to 310/330°C	43101	

Rtx®-CLPesticides2 for Fast GC (fused silica)

(proprietary Crossbond® phase)

ID	df	temp. limits	10-Meter	20-Meter
0.10mm	0.10µm	-60 to 310/330°C	43301	43302



Operating considerations for 0.10 mm ID columns

The small degree of extra care involved in using 0.10 mm ID columns will be more than repaid by faster analyses and higher column efficiencies. 0.10 mm ID columns require higher operating pressures (>40 psig), which can result in more ferrule leaks, septum leaks, and sample flashback through leaking syringe plungers. Connections must be monitored and leak-checked more often. Operating a 0.10 mm ID column below optimum pressure will cause poor resolution and other poor performance. Sample capacity also is reduced, relative to wider-bore columns. Take care to not overload the column, and make sure you inject quickly when using split injection.







GCxGC Second Dimension Selectivity Kit

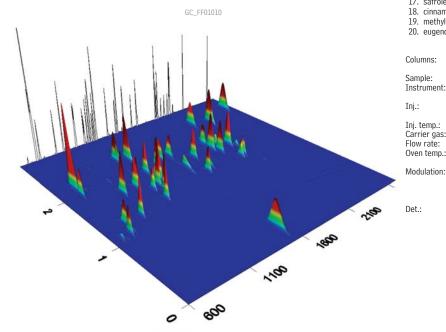
The selectivity kit contains four columns of different selectivity for method development. Includes one each of the following:

- Rxi®-17, 50% diphenyl dimethylpolysiloxane
- Rtx®-CLPesticides, trifluoropropyl containing polymer
- Stabilwax®, polar polyethylene glycol
- Rt®-LC350, liquid crystalline phase selective for aromatic compounds

Fragrance Allergens on Rxi®-1ms & Rxi®-17 (GC x GC)

Description	qty.	cat.#	price
GCxGC Second Dimension Selectivity Kit	kit	15105	
Columns can also be purchased individually.			
Rxi-17, 1.1m (±3cm), 0.10mm ID, 0.10μm	ea.	15104	
Rtx-CLPesticides, 1.1m (±3cm), 0.10mm ID, 0.10 μ m	ea.	15103	
Stabilwax, 1.1m (±3cm), 0.10mm ID, 0.10µm	ea.	15102	
Rt-LC350, 1.1m (±3cm), 0.15mm ID, 0.10μm	ea.	15101	

GCxGC of Fragrance Allergens << Retention time (sec) Rxi-1ms >>



1. limonene 2. 1-fluoronaphthalene benzyl alcohol 4. phenyl acetaldehyde eucalyptol linalool 7. camphor 8. methyl-2-octynoate 9. estragole 10. citronello 11. citral 1 12. trans-cinnamaldehyde 13. geraniol 14. citral 2 15. anise alcohol 16. hydroxycitronellol 17. safrole

18. cinnamyl alcohol 19. methyl-2-nonynoate 20. eugenol

Sample:

Modulation:

isoeugenol 25. α -isomethyl ionone 1 26. lilial 27. α -isomethyl ionone 2 28. amyl cinnamal 29. lyral 1 30. lyral 2 31. amylcinnamyl alcohol 1 32. amylcinnamyl alcohol 2 33. farnesol 1 34. farnesol 2 35. hexyl cinnamal 1 36. benzyl benzoate 37. hexyl cinnamal 2 38. benzyl salicylate 39. benzyl cinnamate

21. methyl eugenol

contaminant

22. coumarin hydroxycitronellol

Rxi®-1ms, 30m, 0.25mm ID, 0.25 μ m (cat.# 13323) Rxi®-17, 1m, 0.10mm ID, 0.10 μ m (10m, cat.# 13501) fragrance allergens in MTBE LECO Corporation GCxGC/FID with quad-jet, dual-stage

modulator and secondary oven 0.2µL split (split ratio 1:200),

4mm laminar cup splitter (cat.# 20801) 250°C

Inj. temp.: Carrier gas: helium, corrected constant flow via pressure ramps Flow rate: 2mL/min. Oven temp.:

Rxi*-1ms: 40° C (hold 1 min.) to 240° C @ 4° C/min. Rxi*-17: 45° C (hold 1 min.) to 245° C @ 4° C/min. modulator temperature offset: 20°C

second dimension separation time: 3 sec. hot pulse time: 0.8 sec. cool time between stages: 0.7 sec.

FID @ 300°C

makeup flow + column flow: 50mL/min.

hydrogen: 40mL/min. air: 450mL/min. data collection rate: 200 Hz







Mar 2011

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Application-specific columns

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- Includes specially deactivated columns.

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- · Clinical, Forensic & Toxicology
- Pharmaceutical
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- Optimized stationary phases for best separations, accurate quantification, and best choice for shorter analysis times.





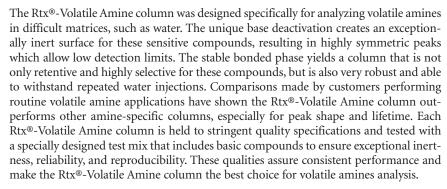
11/12



Basic Compounds Analysis

Rtx®-Volatile Amine Columns (fused silica)

- · Unique selectivity for baseline resolution of all volatile amines.
- Excellent inertness assures accuracy and sensitivity for volatile amines, including free ammonia.
- Highly robust phase withstands repeated water injections, resulting in longer column lifetime.
- High temperature stability (290 °C) ensures elution of amines up to C16 and allows contaminants to be removed by "baking out" the column.



_ ID	temp. limits	15-Meter	30-Meter	60-Meter
0.32mm	-60 to 290°C	18076	18077	18078



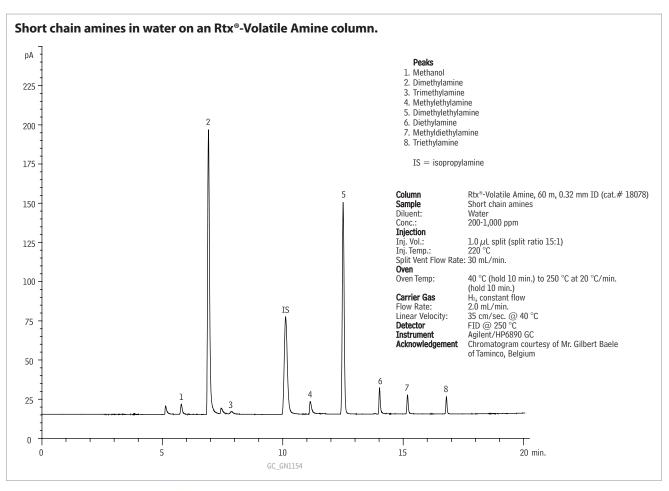


similar phases

Direct replacement for CP-Volamine, thick-film CP-Sil 8 for amines, and other amine-deactivated columns coated with low polarity polysiloxane phases.

please note

We recommend using base-deactivated fused silica guard columns (page 34) and base-deactivated liners (page 213) with Rtx®-Volatile Amine columns.





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similar phase

PTA-5, CP-Sil CB

also available

See page 65 for Rtx®-35 Amine columns.

please note

We recommend using base-deactivated fused silica guard columns (page 34) and base-deactivated liners (page 213) with Rtx®-5 Amine columns.

Chromatogram Search Tool Search by compound name, synonym, CAS # or keyword www.restek.com/chromatograms

Basic Compounds Analysis

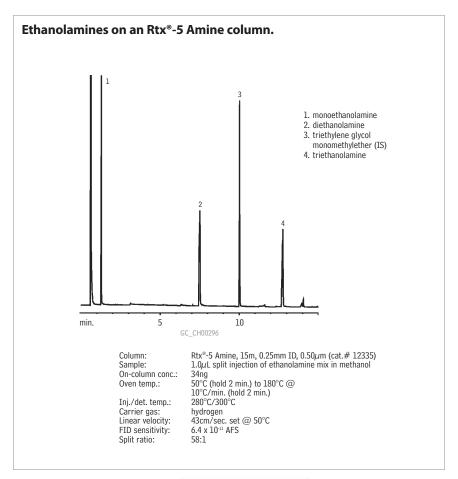
Rtx®-5 Amine Columns (fused silica)

(low polarity phase; Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

- Application-specific columns for amines and other basic compounds, including alkylamines, diamines, triamines, ethanolamines, and nitrogen-containing heterocyclics.
- · Stable to 315 °C.

Active basic compounds that otherwise require derivatization, or an alternative analytical technique, can be analyzed on an Rtx®-5 Amine column. The tubing surface is chemically altered to reduce tailing of basic compounds, eliminating the need for column priming. An Rtx®-5 Amine column is ideal for analyzing a wide variety of basic compounds, but breakthrough technology also allows the analysis of neutral compounds, adsorptive compounds with oxygen groups susceptible to hydrogen bonding, or even weakly acidic compounds such as phenols. Every Rtx®-5 Amine column is tested to ensure that it exceeds the requirements for analyzing ppm levels of amines, without priming, and to ensure low bleed at maximum operating temperature.

ID	df	temp. limits	15-Meter	30-Meter
0.25mm	0.25µm	-60 to 300/315°C	12320	12323
	0.50µm	-60 to 300/315°C	12335	12338
	1.00µm	-60 to 300/315°C	12350	12353
0.32mm	1.00µm	-60 to 300/315°C	12351	12354
	1.50µm	-60 to 290/305°C	12366	12369
0.53mm	1.00µm	-60 to 290/305°C	12352	12355
	3.00µm	-60 to 280/295°C	12382	12385





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Basic Compounds Analysis

Rtx®-35 Amine Columns (fused silica)

(midpolarity phase; Crossbond® 35% diphenyl/65% dimethyl polysiloxane)

- · Application-specific columns for amines and other basic compounds, including alkylamines, diamines, triamines, ethanolamines, and nitrogen-containing heterocyclics.
- · Stable to 220 °C.

Active basic compounds that otherwise require derivatization, or an alternative analytical technique, can be analyzed on an Rtx®-35 Amine column. The tubing surface is chemically altered to reduce tailing of basic compounds, eliminating the need for column priming. An Rtx®-35 Amine column is ideal for analyzing a wide variety of basic compounds, but breakthrough technology also allows the analysis of neutral compounds, adsorptive compounds with oxygen groups susceptible to hydrogen bonding. Every Rtx®-35 Amine column is tested to ensure that it meets the requirements for analyzing ppm levels of amines, without priming, and to ensure low bleed at maximum operating temperature.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.50µm	0 to 220°C	11335	11338	
	1.00µm	0 to 220°C	11350	11353	
0.32mm	1.00µm	0 to 220°C	11351	11354	
	$1.50 \mu m$	0 to 220°C	11366	11369	
0.53mm	1.00µm	0 to 220°C	11352	11355	
	3.00µm	0 to 220°C	11382	11385	

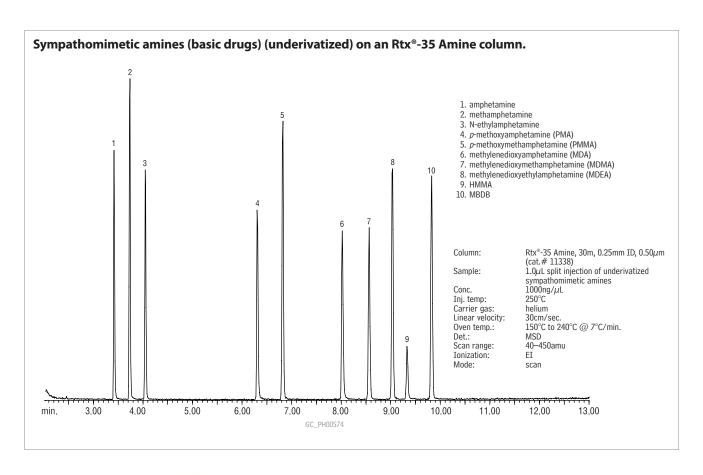
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please **note**

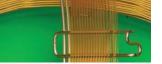
We recommend using base-deactivated fused silica guard columns (page 34) and base-deactivated liners (page 213) with Rtx®-35 Amine columns.







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free literature

GC Analysis of Non-Purgeable Solvents in Pharmaceutical Discharges

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lit. cat.# 580027

similar phases

DB-CAM, Carbowax® Amine, CP Wax 51 for amines

Basic Compounds Analysis

Stabilwax®-DB Columns (fused silica)

(polar phase; Crossbond® base-deactivated Carbowax® polyethylene glycol—for amines and basic compounds)

- Application-specific columns for underivatized amines and other basic compounds, including alkylamines, diamines, triamines, nitrogen-containing heterocyclics. No need for column priming.
- Temperature range: 40 °C to 220 °C.

Stabilwax®-DB columns reduce adsorption and improve responses for many basic compounds, without analyte derivatization or column priming. For different selectivity of basic compounds, or higher oven temperatures, use an Rtx®-5 Amine column.

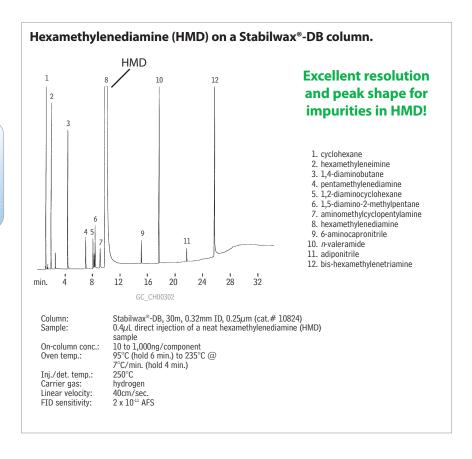
Stabilwax®-DB is a bonded stationary phase, but avoid rinsing these columns with water or alcohols.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter
0.25mm	0.25µm	40 to 210/220°C	10820	10823	
	0.50µm	40 to 210/220°C		10838	
0.32mm	0.25µm	40 to 210/220°C	10821	10824	
	0.50µm	40 to 210/220°C		10839	
	1.00µm	40 to 210/220°C	10851	10854	10857
0.53mm	0.50µm	40 to 210/220°C		10840	
	1.00µm	40 to 210/220°C	10852	10855	10858
	1.50µm	40 to 210/220°C		10869	

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Acidic Compounds Analysis

Stabilwax®-DA Columns (fused silica)

(polar phase; Crossbond® acid-deactivated Carbowax® polyethylene glycol—for acidic compounds)

- Application-specific columns for free (underivatized) acids, some inorganic acids.
- · Resistant to oxidative damage.
- Temperature range: 40 °C to 250 °C.
- · Equivalent to USP G25, G35 phases.

Stabilwax®-DA bonded polyethylene glycol has an acidic functionality incorporated into the polymer structure. This permits analysis of acidic compounds without derivatization, significantly reduces adsorption of acids, and increases sample capacity for volatile free acids. Stabilwax®-DA columns last longer and give better peak shapes for high molecular weight acids. Some inorganic acids also chromatograph well on a Stabilwax®-DA column; the limitation is the volatility of the acidic compound.

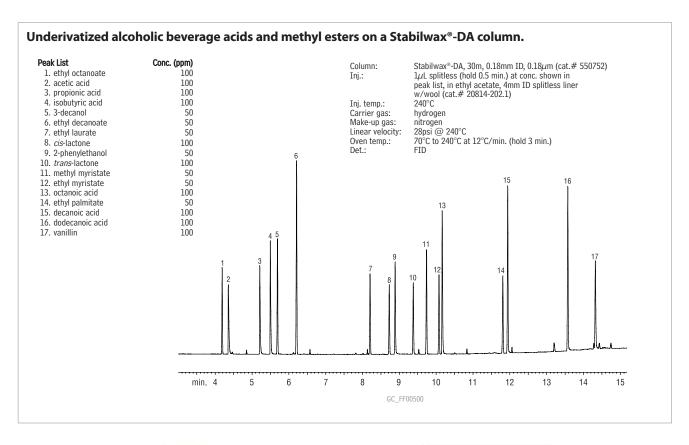
ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	$0.10\mu m$	40 to 250°C	11005	11008	11011	
	0.25µm	40 to 250°C	11020	11023	11026	
	0.50µm	40 to 250°C	11035	11038	11041	
0.32mm	$0.10\mu \mathrm{m}$	40 to 250°C	11006	11009	11012	
	0.25µm	40 to 250°C	11021	11024	11027	
	0.50µm	40 to 250°C	11036	11039	11042	
	1.00µm	40 to 240/250°C	11051	11054	11057	
0.53mm	$0.10\mu m$	40 to 250°C	11007	11010	11013	
	0.25µm	40 to 250°C	11022	11025	11028	
	0.50µm	40 to 250°C	11037	11040	11043	
	1.00µm	40 to 240/250°C	11052	11055	11058	
	1.50µm	40 to 230/240°C	11062	11065	11068	

similar **phases**

DB-FFAP, HP-FFAP, NUKOL, OV-351, CP-Wax 58 CB, FFAP

crossbond® technology

reduces bleed, prolongs column lifetime, and allows rejuvenation through solvent rinsing.





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free literature

A Guide to the Analysis of Chiral Compounds by GC

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please note

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Chiral selectivity improves significantly by realizing lower elution temperatures.
This can be achieved by:

- Faster linear velocities (80 cm/sec.) with hydrogen carrier gas.
- Slower temperature ramp rates (1–2 °C/min.).
- Appropriate minimum operating temperature (40 or 60 °C).
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free literature

Grape Flavor Analysis, Using an Rt®-γDEXsa GC Column

lit. cat.# 59553



GC Analysis of Chiral Flavor Compounds in Apple Juices, Using Rt*-βDEXsm and Rt*-βDEXse Columns

lit. cat.# 59546

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Enantiomers Analysis

Cyclodextrin Columns for Analyzing Many Chiral Compounds

By adding β or γ cyclodextrin to our bonded Rtx®-1701 stationary phase, we greatly enhance overall utility and column lifetime for our chiral columns, compared to columns that have pure cyclodextrin stationary phases. Separations of more than one hundred chiral compounds have been achieved using our unique DEX columns, and our columns continue to demonstrate stability after hundreds of temperature program cycles.

Rt®-βDEXm Columns (fused silica)

(permethylated beta cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane) Uses: General purpose chiral phase with many published applications.

ID	df	temp. limits	30-Meter	
0.25mm	0.25µm	40 to 230°C	13100	
0.32mm	0.25µm	40 to 230°C	13101	

Rt®-BDEXsm Columns (fused silica)

(2,3-di-O-methyl-6-O-tert-butyl dimethylsilyl beta cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane)

Uses: Excellent column for most chiral compounds in essential oils.

ID	df	temp. limits	30-Meter	
0.25mm	0.25 μ m	40 to 230°C	13105	
0.32mm	0.25µm	40 to 230°C	13104	

Rt®-βDEXse Columns (fused silica)

(2,3-di-O-ethyl-6-O-tert-butyl dimethylsilyl beta cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane)

Uses: Similar in performance to Rt-βDEXsm but provides better resolution for limonene, linalool, linalyl acetate, ethyl-2-methylbutyrate, 2,3-butane diol, and styrene oxides.

II	D	df	temp. limits	30-Meter
0.	.25mm	0.25μm	40 to 230°C	13107
0.	.32mm	0.25µm	40 to 230°C	13106

Rt®-βDEXsp Columns (fused silica)

(2,3-di-O-propyl-6-O-tert-butyl dimethylsilyl beta cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane)

Uses: Often useful in dual-column configurations, with the Rt- β DEXsm column, for complex enantiomeric separations.

ID	df	temp. limits	30-Meter	
0.25mm	0.25µm	40 to 230°C	13111	
0.32mm	0.25µm	40 to 230°C	13110	

Rt®-βDEXsa Columns (fused silica)

(2,3-di-acetoxy-6-O-*tert*-butyl dimethylsilyl beta cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane)

Uses: Unique selectivity for esters, lactones, and other fruit flavor components.

ID	df	temp. limits	30-Meter	
0.25mm	0.25μm	40 to 230°C	13109	
0.32mm	0.25μm	40 to 230°C	13108	

Rt®-βDEXcst Columns (fused silica)

(Proprietary cyclodextrin material doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane) Uses: Proprietary stationary phase, developed specifically for the fragrance industry. Also used for pharmaceutical applications.

ID	df	temp. limits	30-Meter	
0.25mm	$0.25\mu\mathrm{m}$	40 to 230°C	13103	
0.32mm	0.25µm	40 to 230°C	13102	

Rt®-γDEXsa Columns (fused silica)

(2,3-di-acetoxy-6-O-*tert*-butyl dimethylsilyl gamma cyclodextrin doped into 14% cyanopropylphenyl/86% dimethyl polysiloxane)

Uses: Larger organic molecules. Also useful for flavor compounds in fruit juices.

ID	df	temp. limits	30-Meter	
0.25mm	0.25µm	40 to 230°C	13113	
0.22mm	U JE''	4U +∼ J3U°C	פווכו	







cis/trans FAMEs

Rt®-2560 Column (fused silica)

(highly polar phase; biscyanopropyl polysiloxane—not bonded)

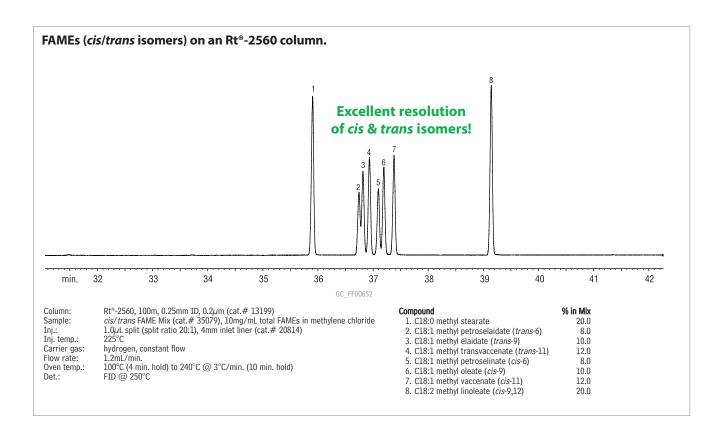
- Application-specific column for cis/trans FAMEs.
- Stable to 250 °C.

Because the Rt®-2560 stationary phase is not bonded, it should not be solvent rinsed.

ID df temp. limits 10	-Meter	100-1	nits	temp. limi	lf		ID
.25mm 0.20μm 20 to 250°C 13199		13199	0°C 13	20 to 250°)μm	0.20	.25mm

similar phases

SPB-2560, HP-88, Silar 10C, CP-Sil 88 FAME, CP-Sil 88





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Polyunsaturated FAME Analysis

FAMEWAX Columns (fused silica)

(polar phase; Crossbond® polyethylene glycol)

- Application-specific columns for FAMEs, specially tested with a FAME mixture.
- Temperature range: 20 °C to 250 °C.

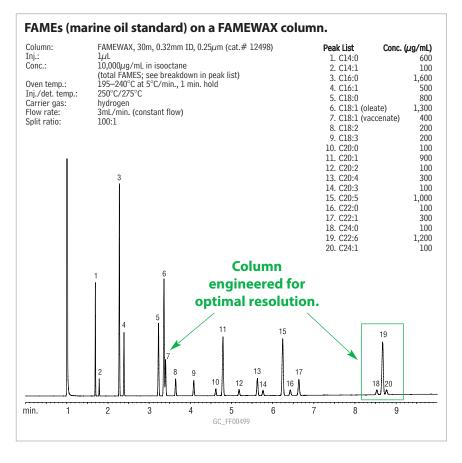
The elution order of polyunsaturated FAMEs on FAMEWAX columns is comparable to that on other Carbowax® columns, but baseline resolution is achieved in significantly less time.

ID	df	temp. limits	30-Meter	
0.25mm	0.25µm	20 to 250°C	12497	
0.32mm	0.25μm	20 to 250°C	12498	
0.53mm	0.50µm	20 to 250°C	12499	

similar phase

Omegawax

Chromatogram Search Tool Search by compound name, synonym, CAS # or keyword www.restek.com/chromatograms











Flavor & Fragrance Compounds Analysis

Rt®-CW20M F&F Columns (fused silica)

(polar phase; Carbowax® polyethylene glycol—not bonded)

- Application-specific columns for flavor and fragrance compounds, specially tested.
- True nonbonded Carbowax® 20M polarity.
- Temperature range: 60 °C to 220 °C.

ID	df	temp. limits	30-Meter	50-Meter	
0.25mm	0.25µm	60 to 220°C	12523		
0.32mm	0.33µm	60 to 220°C		12539	



similar phases

HP-20M, Carbowax® 20M

Rtx®-1 F&F Columns (fused silica)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane)

- Application-specific columns for flavor and fragrance compounds.
- · Stable to 350 °C.

Retention index libraries in the flavor and fragrance industry have been compiled from years of data and thousands of compounds. Any slight variation in column selectivity could render the column useless. Rtx®-1 F&F columns are tailored to match the selectivity required in the industry, while offering excellent thermal stability. Our stringent quality testing ensures column-to-column reproducibility and extended column lifetimes over conventional 100% dimethyl polysiloxane columns.

ID	df	temp. limits	30-Meter	50-Meter	
0.25mm	0.25µm	-60 to 330/350°C	18023		
	0.50µm	-60 to 330/350°C	18038		
	1.00µm	-60 to 320/340°C	18053		
0.32mm	0.25µm	-60 to 330/350°C	18024		
	0.50µm	-60 to 330/350°C	18039	18010	
	$1.00 \mu m$	-60 to 320°C	18054		

similar **phase**

HP-1



Al Carusone, Technical Service

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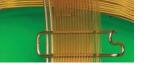
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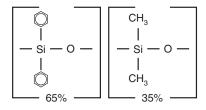
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Rtx®-65TG Structure



save money!

Get six columns for the price of five. **Call 800-356-1688, ext. 4**, or your Restek representative for details!

Triglycerides in Foods Analysis

Rtx®-65TG Columns (fused silica)

(high polarity phase; Crossbond® 65% diphenyl/35% dimethyl polysiloxane)

- Application-specific columns, specially tested for triglycerides.
- Stable to 370 °C.

The Rtx®-65TG phase resolves triglycerides by degree of unsaturation as well as by carbon number. Because of the chemistry required to achieve 370 °C thermal stability, an Rtx®-65TG column should not be used for the analyses of polar compounds.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.10µm	40 to 370°C	17005	17008	
0.32mm	0.10µm	40 to 370°C	17006	17009	
0.53mm	0.10µm	40 to 370°C	17007	17010	

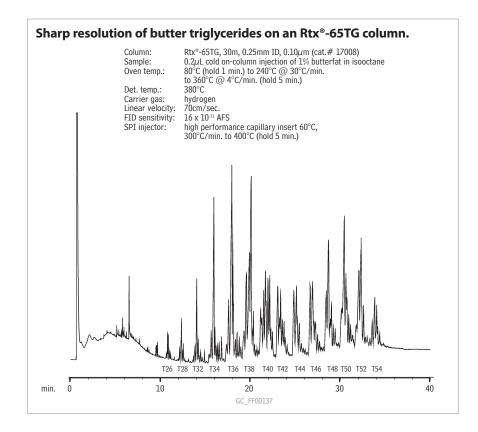
crossbond® technology

reduces bleed, prolongs column lifetime, and allows rejuvenation through solvent rinsing.

please **note**

Triglycerides are often injected via on-column injection. Use 0.53 mm retention gaps and appropriate connectors.

- Vu2 Union® (see page 289)
- MXT®-Union Connector Kits for Fused Silica (see page 292)





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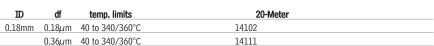
PAHs in Foods Analysis

Rxi®-17Sil MS Columns (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 50% phenyl/ 50% dimethyl arylene polysiloxane)

- 340/360 °C upper temperature limits.
- · Excellent inertness for active compounds.
- Equivalent to USP phase G3.
- Low-bleed for use with sensitive detectors, such as GC/MS.
- · Excellent separation of EU-PAHs, including fluoranthenes.

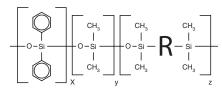
ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25m	m 0.25 μ m	40 to 340/360°C	14120	14123	14126	
0.32m	m 0.25µm	40 to 340/360°C	14121	14124		



*Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

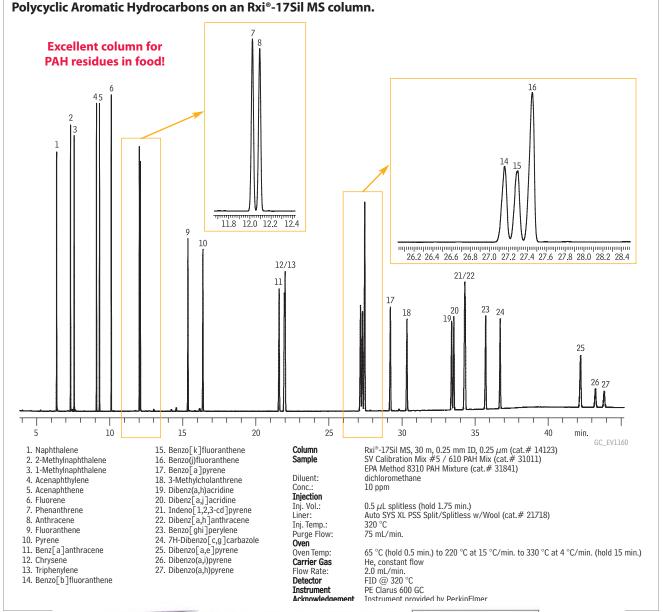






similar phases

DB-17ms, VF-17ms, BPX-50





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Chlorinated Fluorocarbons (CFC) Analysis

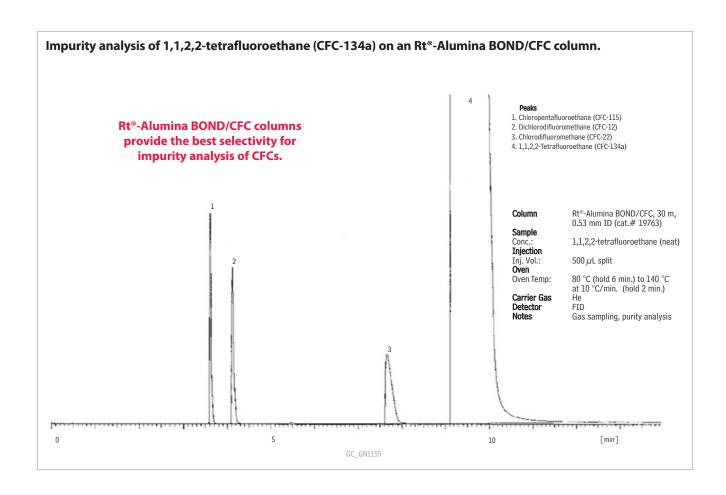
Rt®-Alumina BOND/CFC Columns (fused silica PLOT)

- Improved inertness for halogenated compounds.

 Highly solution aluming based column apparents.
 - Highly selective alumina-based column, separates most CFCs.
 - · High retention and capacity for CFCs.

The alumina adsorbent is ideal for retaining halogenated compounds, especially CFC (chlorinated flourocarbons, freons). It offers high selectivity, allowing a wide range of CFC isomers to be resolved at above ambient temperatures. The Rt®-Alumina BOND/CFC column is thoroughly deactivated to reduce the reactivity of alumina. Even though there is still some residual reactivity for some mono- or di-substituted halogenated hydrocarbons, the majority of these compounds can be accurately quantified from main stream processes or in impurity analyses.

ID	df	temp. limits	30-Meter	
0.53mm	10μm	to 200°C	19763	





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Detailed Hydrocarbon Analysis (DHA)

Rtx®-DHA Columns (fused silica)

(Crossbond® 100% dimethyl polysiloxane—optimized for hydrocarbon analysis)

- · Columns meet or exceed all ASTM D6730-01 and CAN/CGSB 3.0 No. 14.3-99 method guidelines; test report for method D6730 supplied with each column.
- Excellent responses and peak symmetry for polar oxygenates.

Gasolines are complex mixtures of hundreds of compounds. Information about concentrations of the individual components is important for evaluating raw materials and for controlling refinery processes. ASTM D6730-01 outlines a high-resolution GC method for detailed hydrocarbon analysis (DHA) of gasolines. Rtx®-DHA columns are ideal for DHA methods and easily meet or exceed both ASTM D6730-01 and Canadian General Standards Board CAN/CGSB 3.0 No. 14.3-99 requirements. Every Rtx®-DHA column is tested for retention, efficiency, stationary phase selectivity, and bleedguaranteeing reproducible column-to-column performance.

ID	df	temp. limits	50-Meter	100-Meter	150-Meter	
0.20mm	0.50µm	-60 to 300/340°C	10147			
0.25mm	0.50µm	-60 to 300/340°C		10148		
	1.00r/m	-60 to 300/340°C			10149	

Rtx®-5 DHA Tuning Column (fused silica)

(Crossbond® 5% diphenyl/95% dimethyl polysiloxane—optimized for hydrocarbon analysis)

ID	df	temp. limits	5-Meter	
0.25mm	$1.00 \mu m$	-60 to 340°C	10165	

NOTE: Rtx®-1PONA columns have been renamed as Rtx®-DHA columns. There are no changes in the manufacturing process or column performance.



Method Recommended

I	ı	I
Column	cat. #	Dimensions
Rtx-DHA-100	10148	100m x 0.25mm, 0.50µm
Rtx-DHA-100 &	10148	100m x 0.25mm,
Rtx-5 DHA	&	0.50µm w/ precolumn
Tuning Column	10165	
Rtx-DHA-50	10147	50m x 0.20mm, 0.50µm
Rtx-DHA-150	10149	150m x 0.25mm, 1.0µm
	Rtx-DHA-100 Rtx-DHA-100 & Rtx-5 DHA Tuning Column Rtx-DHA-50	Rtx-DHA-100 10148 Rtx-DHA-100 & 10148 Rtx-5 DHA & Tuning Column 10165 Rtx-DHA-50 10147

similar phases

Petrocol DH, DB-Petro, HP-PONA, CP-Sil PONA C8

did you know?

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16. toluene

18. ethylbenzene 19. p-xylene

20. 2,3-dimethylheptane

23. 1,2-methylethylbenzene

26. 1,2,3,5-tetramethylbenzene

22. 5-methylnonane

25. C11 (undecane)

27. naphthalene

28. C12 (dodecane)

30. C13 (tridecane)

29. 1-methylnaphthalene

17. C8

21. C9

24. C10

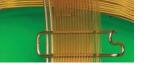
Critical pairs of gasoline components resolved per ASTM specifications on an Rtx[®]-DHA column. 1. ethanol 2. C5 3. tert-butanol 4. 2-methylbutene-2 5. 2,3-dimethylbutane 6. methyl *tert*-butyl ether (MTBE) 7. C6 **Excellent resolution and peak** 8. 1-methylcyclopentene shape improve DHA accuracy! 9. benzene 10. cyclohexane 11. 3-ethylpentane 12. 1-tert-2-dimethylcyclopentane 13. C7 14. 2,2,3-trimethylpentane 15. 2,3,3-trimethylpentane Column: Rtx®-DHA, 100m, 0.25mm ID, 0.5\(\mu\)m (cat.\(\pi\) 10148) plus Rtx®-5DHA tuning column, 2.62m, 0.25mm ID, Resolution 1.0µm, connected via Press-Tight® connector (cat.# 20446) (1-methylcyclopentane/benzene): 1.28 custom detailed hydrocarbon analysis Sample: (DHA) mix, neat 0.01µL, split (split ratio 150:1), 4mm cup Ini.: inlet liner (cat.# 20709) Inj. temp.: 200°C Carrier gas: helium, constant flow 28cm/sec. (2.3mL/min.) Linear velocity: 5°C (hold 15 min.) to 50°C @ 5°C/min. (hold Oven temp.: 50 min.) to 200°C @ 8°C/min. (hold 10 min.) Det : FID @ 250°C 60 70 min. GC PC00743 Circles indicate critical pairs that must be resolved.





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Rt®-Alumina BOND columns show unique retention characteristics for hydrocarbons.

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 108** for our MXT®-Alumina BOND/Na₂SO₄ columns.

similar phases

GC-Alumina KCI, CP-Al₂O₃/KCI

Light Hydrocarbon Analysis

Rt®-Alumina BOND Columns

- 1. Highly selective for C1-C5 hydrocarbons; separates all unsaturated hydrocarbon isomers above ambient temperatures.
- Reactivity of aluminum oxide stationary phase is minimized so that column response for polar unsaturates, such as dienes, is optimized. Column sensitivity or response ensures a linear and quantitative chromatographic analysis for these compounds.
- 3. Strong bonding prevents particle generation. The column can be used in valve switching operations, without release of particles that can harm the injection and detection systems.
- 4. The Rt®-Alumina BOND column is stable up to 200 °C. If water is adsorbed on the column, it can be regenerated by conditioning at 200 °C. Full efficiency and selectivity will be restored.
- High capacity and loadability give exceptionally symmetric peaks; ideal for volatile hydrocarbon separations at percent levels, as well as impurity analyses at ppm concentrations.

Rt®-Alumina BOND/Na2SO4 Columns (fused silica PLOT)

(Na₂SO₄ deactivation)

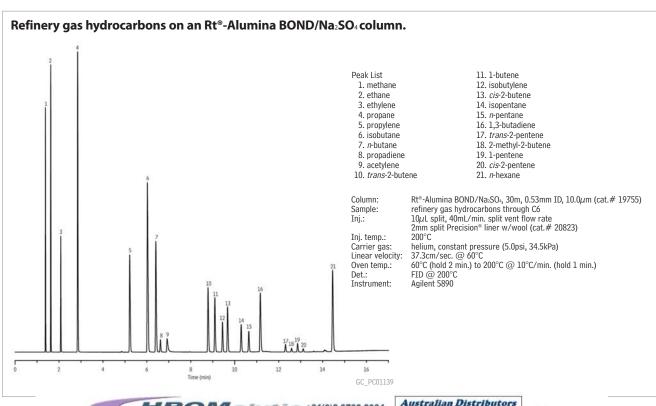
ID	df	temp. limits	30-Meter	50-Meter	
0.25mm	4µm	to 200°C	19775		
0.32mm	5µm	to 200°C	19757	19758	
0.53mm	10μm	to 200°C	19755	19756	

Rt®-Alumina BOND/KCI Columns (fused silica PLOT)

(KCI deactivation)

- Acetylene elutes before C4 hydrocarbons (impurities in butane/isobutane).
- Methyl acetylene (impurity in 1,3-butadiene) elutes before 1,3-butadiene.

ID	df	temp. limits	30-Meter	50-Meter
0.25mm	4µm	to 200°C	19776	
0.32mm	5µm	to 200°C	19761	19762
0.53mm	10µm	to 200°C	19759	19760



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also available

Rtx®-1 SimDist 2887—a packed column for

process instrumentation. See page 126.

Simulated Distillation (C5-C44) Analysis

Rtx®-2887 Column (fused silica)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane—for simulated distillation)

- Application-specific column for simulated distillation.
- Stable to 360 °C.

The Rtx®-2887 column's stationary phase, column dimensions, and film thickness have been optimized to exceed the resolution and skewing factor requirements currently specified in ASTM method D2887. Each column is individually tested to guarantee a stable baseline with low bleed and reproducible retention times. The Crossbond® methyl silicone stationary phase has increased stability compared to packed columns, ensuring stable baselines and shorter conditioning times.

ID	df	temp. limits	10-Meter	
0.53mm	2.65µm	-60 to 360°C	10199	

similar phases

DB-2887, Petrocol EX2887

MXT®-2887 Column (Siltek® treated stainless steel)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane—for simulated distillation)

- Application-specific columns for simulated distillation.
- Stable to 400 °C.

ID	df	temp. limits	10-Meter	
0.53mm	2.65µm	-60 to 400°C	70199	

MXT®-1HT SimDist Column (Siltek® treated stainless steel) (nonpolar phases)

- Stable up to 400 °C—lowest bleed for longest column lifetime.
- Reliably meets all ASTM D2887 specifications.
- 100% dimethyl polysiloxane phase allows easy comparisons to historical data.

ID	df	temp. limits	10-Meter	
0.53mm	2.65µm	-60 to 360/400°C	70132	

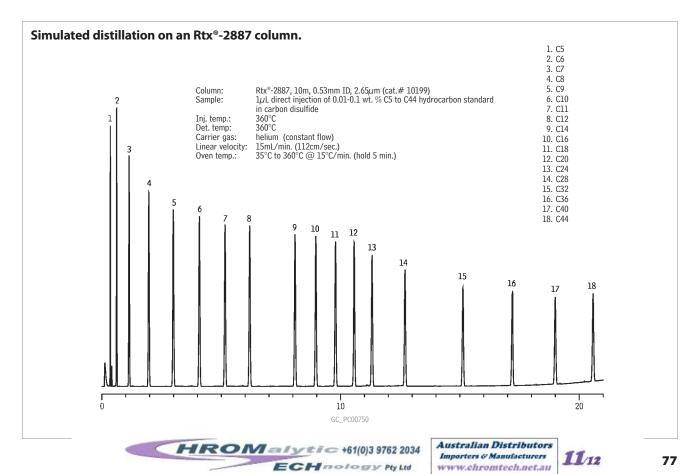
similar phases

DB-2887, Petrocol EX2887, CP-HT-Simdist CB

similar phases

DB-1HT, CP-HT-Simdist CB

See page 78 for more dimensions.









similar phases

DB-1HT, CP-HT-Simdist CB

Method Recommended Columns

ASTM Method	Hydrocarbon Range	cat. #	Configuration
D2887	C5 - C44	70131	5m x 0.53mm, 0.88µm
		70132	10m x 0.53mm, 2.65μm
D7213	C5 - C60	70131	5m x 0.53mm, 0.88µm
(D2887-ext)		70115	5m x 0.53mm, 0.20µm
		70112	5m x 0.53mm, 0.10 μ m
D3710	gasoline up to C14	70132	10m x 0.53mm, 2.65μm
D5307	crude up to C42	70115	5m x 0.53mm, 0.20 μ m
D6352	C10 - C90	70112	5m x 0.53mm, 0.10µm
		70115	5m x 0.53mm, 0.20µm
D7500	C7 - C110	70112	5m x 0.53mm, 0.10 μ m
		70115	5m x 0.53mm, 0.20µm
D7169	C5 - C100	70112	5m x 0.53mm, 0.10 μ m
		70115	5m x 0.53mm, 0.20 μ m

Simulated Distillation (C44-C100) Analysis

MXT®-1HT SimDist Column (Siltek® treated stainless steel) (nonpolar phases)

- Stable up to 450 °C—lowest bleed for longest column lifetime.
- Reliably meet all ASTM D6352, D7169, and D7500 specifications.
- 100% dimethyl polysiloxane phase allows easy comparisons to historical data.

Accurate boiling point determination for medium and heavy fractions using GC simulated distillation requires columns and phase polymers that are robust enough to withstand high temperatures without significant degradation. Metal columns are a better alternative than fused silica, and the MXT®-1HT SimDist columns are the lowest bleed, highest efficiency columns available, outperforming other metal columns for critical method parameters.

ID	df	temp. limits	5-Meter	10-Meter
0.53mm	0.10µm	-60 to 430/450°C	70112	
	0.20µm	-60 to 430/450°C	70115	
	$0.21\mu\mathrm{m}$	-60 to 430/450°C		70118
	0.88µm	-60 to 400/430°C	70131	70134
	1.00µm	-60 to 380/400°C		70130
	1.20µm	-60 to 380/400°C		70119
	2.65µm	-60 to 360/400°C		70132
	5.00µm	-60 to 360/400°C		70133

Low bleed, high efficiency MXT°-1HT SimDist columns outperform competitors (ASTM D6352 conditions).

Lower bleed means:

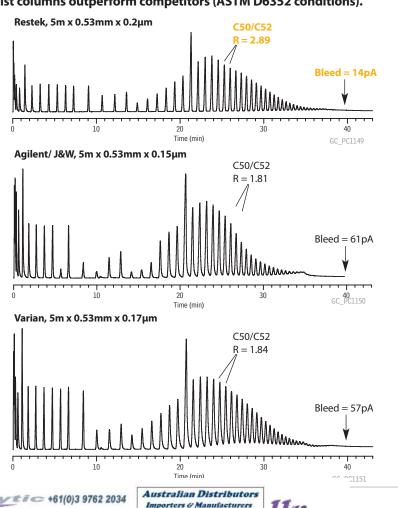
- Longer column lifetime.
- · More stable calibrations.
- Accurate boiling point determinations.

RESTEK ADVANTAGE:

Higher efficiency means:

- Greater resolution; analyze more samples before method criteria are reached.
- Assured method performance.

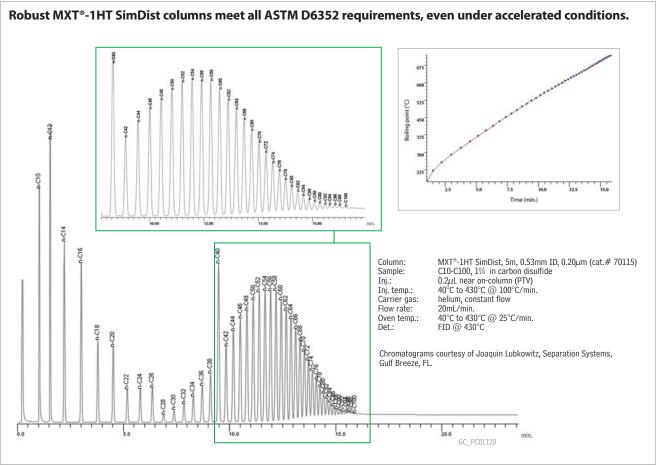
RESTEK ADVANTAGE:





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- Application-specific columns in unbreakable Siltek® treated stainless steel tubing meet all resolution criteria for high temperature simulated distillation (e.g., ASTM Method D2887 Extended).
- MXT $^{\circ}$ -1 SimDist phases offer true methyl silicone polarity; MXT $^{\circ}$ -500 SimDist phase is a carborane siloxane polymer.
- Stable to 430 °C.

MXT®-1 SimDist Column (Siltek® treated stainless steel)

(nonpolar phase)

_ ID	df	temp. limits	6-Meter
0.53mm	$0.15 \mu m$	-60 to 430°C	70101

MXT®-500 SimDist Column (Siltek® treated stainless steel)

(nonpolar phase)

ID	df	temp. limits	6-Meter
0.53mm	$0.15 \mu m$	-60 to 430°C	70104

Polywax® Calibration Materials

Description	qty.	cat.#	price
Polywax 655 calibration material	lg	36225	
Polywax 1000 calibration material	lg	36227	













Aromatics & Oxygenates in Gasoline Analysis

Rt®-TCEP Columns (fused silica)

(highly polar phase; 1,2,3-tris[2-cyanoethoxy]propane—not bonded)

- General purpose columns, ideal for aromatics and oxygenates in gasoline.
- Temperature range: 0 °C to 135 °C.

Most gasolines contain aliphatic hydrocarbons up to n-dodecane (C12). To improve identification of the aromatics and oxygenates, it is desirable to elute benzene after C11 and toluene after C12. The extremely polar Rt®-TCEP stationary phase provides a retention index for benzene greater than 1100 and permits the separation of alcohols and aromatics from the aliphatic constituents in gasoline.

Rt®-TCEP columns have the same high polarity as TCEP packed columns (precolumns in ASTM Method D4815 for the analysis of petroleum oxygenates), with the efficiency of a capillary column. The result is a column that can separate a wide variety of compounds with an elution pattern unattainable using other high polarity siloxanes.

The Rt®-TCEP column incorporates a nonbonded stationary phase coated on a surface specialized for enhanced polymer stability and extended column lifetime. Solvent rinsing should be avoided. Conditioning is necessary only if the column is to be used at temperatures near the maximum operating temperature.

ID	df	temp. limits	30-Meter	60-Meter
0.25mm	0.40µm	0 to 135°C	10998	10999

Petroleum oxygenates on an Rt®-TCEP column. 1. methyl tert-butyl ether 2. n-undecane 3. tert-butanol 4. methanol 5. isopropyl alcohol 6. ethanol 7. n-dodecane 8. n-tridecane 9. n-butanol 10 12 16 GC_PC00195 Rt®-TCEP, 60m, 0.25mm ID, 0.4µm (cat.# 10999) Column: 1.0µL split injection, components @ 500ppm. Ini.: Oven temp.: 60°C (hold 5 min.) to 100°C @ 5°C/min. (hold 10 min.) Inj./det. temp.: 200°C Carrier gas: helium Linear velocity: 30cm/sec. set @ 80°C FID sensitivity: 6.4 x 10⁻¹¹ AFS Split flow: 46ml /min

similar phases

SPB-TCEP, CP-TCEP



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Biodiesel Fuels Analysis

MXT®-Biodiesel TG Columns (Siltek® treated stainless steel)

- Fast analysis times and sharp mono-, di-, and triglyceride peaks.
- Stable at 430 °C for reliable, consistent performance.
- Integra-Gap® built-in retention gap on 0.53 mm ID column eliminates column coupling completely.

Description	temp. limits	cat.#	price
14m, 0.53mm ID, 0.16 μ m with 2m Integra-Gap*	-60 to 380/430°C	70289	
10m, 0.32mm ID, 0.10μm	-60 to 380/430°C	70292	
10m, 0.32mm ID, 0.10µm with 2m x 0.53mm Retention Gap**	-60 to 380/430°C	70290	
15m, 0.32mm ID, 0.10μm	-60 to 380/430°C	70293	
15m, 0.32mm ID, 0.10µm with 2m x 0.53mm Retention Gap**	-60 to 380/430°C	70291	
2m x 0.53mm MXT Biodiesel TG		70294	

^{*}Total column length = 16 meters.

Rtx®-Biodiesel TG Columns (fused silica)

- · Linearity for all reference compounds exceeds method requirements.
- Alumaseal® connector provides leak-free connection; guard column extends column life.
- · Low column bleed at high temperatures.
- For glycerine and glycerides analysis, according to ASTM D6584 and EN 14105 methods.

Description	temp. limits	cat.#	price
10m, 0.32mm ID, 0.10µm	to 330/380°C	10292	
10m, 0.32mm ID, 0.10 μ m with 2m x 0.53mm ID Retention Gap	to 330/380°C	10291	
15m, 0.32mm ID, 0.10μ m	to 330/380°C	10294	
15m, 0.32mm ID, 0.10 μ m with 2m x 0.53mm ID Retention Gap	to 330/380°C	10293	



free literature

Biodiesel Solutions: Innovative Products for Simple, Reliable Biodiesel Analysis

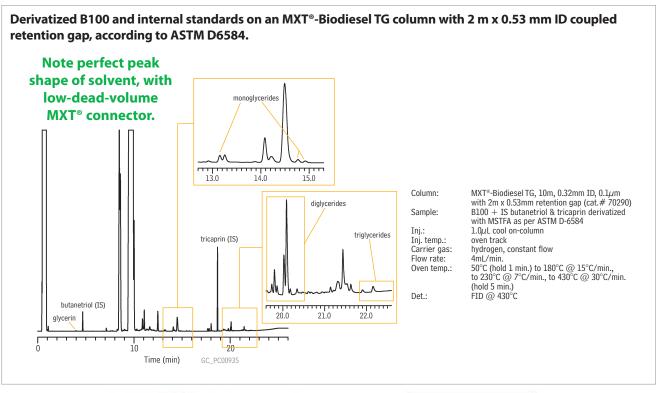
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Integra-Gap® technology

- · Built-in retention gap.
- · Eliminates connector and leaks.
- · Extends analytical column lifetime.

Continuous Tubing Retention Gap Liquid Phase





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^{**}Connected with low-dead-volume MXT connector.



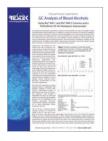


restek innovation!

Baseline resolution in less than 3 minutes.

similar phases

DB-ALC1, DB-ALC2



free literature

GC Analysis of Blood Alcohols

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lit. cat.# 59598A

Blood Alcohol Analysis

Rtx®-BAC1/Rtx®-BAC2

- Application-specific columns for blood alcohol analysis—achieve baseline resolution in less than 3 minutes. Also excellent for abused inhalant anesthetics, γ-hydroxybutyrate (GHB)/γ-butyrolactone (GBL), glycols, and common industrial solvents.
- Rtx®-BAC2 confirmation column provides four elution order changes under the same conditions.
- · Stable to 260 °C.

These columns separate to baseline all blood alcohol compounds in blood, breath, or urine, in less than 3 minutes, under isothermal conditions. Isothermal analysis increases productivity by eliminating the need for oven cycling. Confirmation is easily achieved with this tandem set because there are four elution order changes between the two columns.

Rtx®-BAC1 Columns (fused silica)

(proprietary Crossbond® phase)

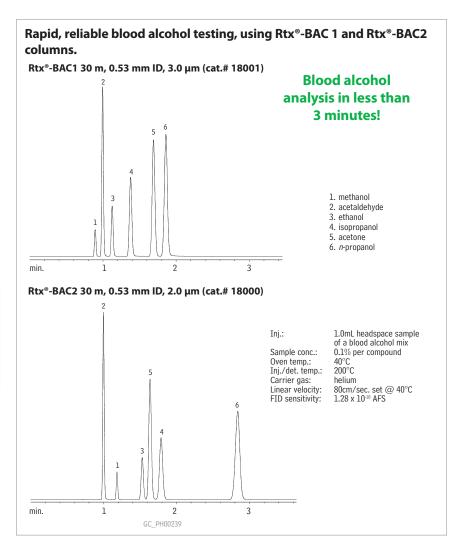
ID df		df	temp. limits	30-Meter		
	0.32mm 1.80µm		-20 to 240/260°C	18003		
	0.53mm	3.00µm	-20 to 240/260°C	18001		

Rtx®-BAC2 Columns (fused silica)

(proprietary Crossbond® phase)

ID	df	temp. limits	30-Meter
0.32mm	$1.20\mu m$	-20 to 240/260°C	18002
0.53mm	2.00µm	-20 to 240/260°C	18000

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Rxi®-624Sil MS Columns



for USP<467> Residual Solvents analysis

Improve system suitablility pass rates with the best resolution of acetonitrile and dichloromethane on any G43.

- Symmetric peak shape for bases provides accurate integration and unmatched sensitivity.
- High thermal stability ensures a consistent baseline, making it the only MS friendly column in its class.
- Reproducible Rxi® technology provides the column-to-column reproducibility needed in validated methods.

Rxi®-624Sil MS Columns (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 6% cyanopropylphenyl/ 94% dimethyl arylene polysiloxane)

- Low bleed, high thermal stability column—maximum temperatures up to 320 °C.
- · Inert—excellent peak shape for a wide range of compounds, including acidic and basic compounds.
- Selective—highly selective for residual solvents, great choice for USP<467>.
- · Manufactured for column-to-column reproducibility—well-suited for validated methods.

ID	df	temp. limits	20-Meter	30-Meter	60-Meter
0.18mm	1.00μm	-20 to 300/320°C	13865		
0.25mm	1.40μm	-20 to 300/320°C		13868	
0.32mm	1.80µm	-20 to 300/320°C		13870	13872
0.53mm	3.00µm	-20 to 280/300°C		13871	

Class 2 Mix A Class 2 Mix B Better resolution of Minimal peak acetonitrile and pyridine dichloromethene tailing dichloromethane improves than on any other accuracy for G43 column. pyridine. acetonitrile 22 24 min. 4.0 5.0 GC PH01117 GC PH01116

Column: Rxi®-624Sil MS, 30m, 0.32mm ID, 1.8µm (cat.# 13870)

1.0mL manual headspace injection, split (3:1), 1mm split liner (cat.# 20972) Inj.: Inj. temp.:

140°C

Instrument:

Carrier gas: helium, constant flow Flow rate:

Agilent 6890

2.2mL/min. 40°C (hold 20 min.) to 240°C @ 10°C/min. (hold 20 min.) Oven temp:

Det: FID @ 250°C Hydrogen: 40mL/min. 450ml /min Makeup: 45mL/min.

Visit www.restek.com/ovi

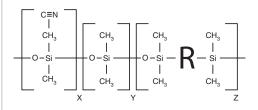
for a complete product listing.

HROM = 1 y # 1 C +61(0)3 9762 2034 ECHnology Pty Ltd

Make the Switch to Rxi® columns!

Replaces: DB-624, HP-624, VF-624, BP-624, ZB-624, AT-624, 007-1301, G43R

Rxi®-624Sil MS Structure





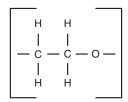
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Pharmaceutical



G16 phase

Stabilwax® Structure



similar phases

DB-WAX, DB-WAXetr, HP-Wax, HP-Innowax,

Supelcowax 10, CP-Wax 52 CB

Organic Volatile Impurities (OVI) Analysis

Stabilwax® Columns (fused silica)

(polar phase; Crossbond® Carbowax® polyethylene glycol)

- Most stable polyethylene glycol (PEG) column available.
- · Rugged enough to withstand repeated water injections.
- · Lowest bleed PEG column on the market; long column lifetimes are assured
- Temperature range: 40 °C to 260 °C.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.

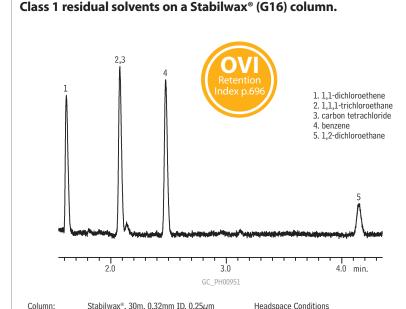
Restek's polar-deactivated surface tightly binds the Carbowax® polymer and increases thermal stability, relative to competitive columns. Because of the increased stability produced by the bonding process, Stabilwax® columns exhibit long column lifetimes, even when programming repeatedly up to 260 °C. The bonding mechanism of the column also produces polar compound retention times that do not shift as is often observed on other wax-type columns. In addition, this bonding mechanism produces a column that can be rejuvenated by solvent washing.

ID	df	temp. limits	30-Meter	
0.32mm	0.25µm	40 to 250/260°C	10624	
0.53mm	0.25µm	40 to 250/260°C	10625	

For our complete listing of Stabilwax® columns, see page 59.

ordering note

Get the protection without the connection! For Stabilwax® columns with built-in Integra-Guard® guard columns, see page 35.





free literature

Residual Solvent Analysis

Download your free copy from www.restek.com

lit. cat.# PHFL1018A

Stabilwax®, 30m, 0.32mm ID, 0.25 μ m (cat.# 10624)

Sample:

USP Stock Mixture USP < 467 > Residual Solvents Class 1 Mix (cat.# 36279) in

20mL headspace vial (cat.# 24685), water diluent

headspace injection (split ratio 1:5), Inj.:

2mm splitless liner IP deactivated (cat.# 20712)

Inj. temp.: 140°C

Carrier gas: helium, constant flow Flow rate: 2.15mL/min., 35.2cm/sec 50°C for 20 min. to 165°C @ 6°C/min. Oven temp.:

(hold for 20 min.)

Det.: FID @ 250°C **Headspace Conditions**

Overbrook Scientific HT200H Instrument:

100°C Syringe temp.: Sample temp.: Sample equil. time.: 45 min. Injection vol : 1 0ml Injection speed: setting 8 Injection dwell: 5 sec.





Organic Volatile Impurities (OVI) Analysis

Rtx®-5 Columns (fused silica)

(low polarity phase; Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

- General purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g. Aroclor mixes), essential oils, semivolatiles.
- Temperature range: -60 °C to 350 °C.
- Equivalent to USP G27 and G36 phases.

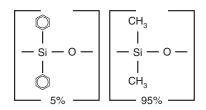
The 5% diphenyl/95% dimethyl polysiloxane stationary phase is the most popular GC stationary phase and is used in a wide variety of applications. All residual catalysts and low molecular weight fragments are removed from the Rtx®-5 polymer, providing a tight mono-modal distribution and extremely low bleed.

ID	df	temp. limits	30-Meter	
0.53mm	$5.00\mu m$	-60 to 270/290°C	10279	

For our complete listing of Rtx®-5 columns, see page 50.

G27 phase

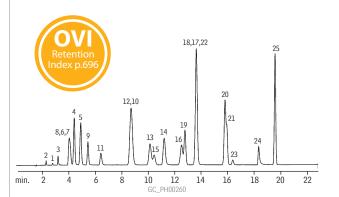
Rtx®-5 Structure



similar phases

DB-5, HP-5, HP-5MS, Ultra-2, SPB-5, Equity-5, MDN-5

Organic volatile impurities on an Rtx®-5 (Rtx®-G27) column.



Rtx®-5 (Rtx®-G27) with 5m phenylmethyl Integra-Guard® guard column, 30m, 0.53mm ID, 5.0µm (cat.# 10279-126)

Inj.: Headspace injection of common solvents for pharmaceutical processing. Prepared to equal about 500ppm in the bulk

pharmaceutical. Samples shaken and heated at 90°C for 15 minutes,

1mL headspace injection.

Oven temp.: 35°C (hold 10 min.) to 100°C @ 5°C/min., to 240°C @ 25°C/min. (hold 5 min.)

Inj./det. temp.: 220°C/240°C

 $1.05 \times 10^{-11} \text{ AFS}$ FID sensitivity:

helium, 35cm/sec. set @ 35°C Carrier gas:

Split ratio:

1. ethylene oxide 2. methanol

3. ethanol 4. diethyl ether

5. 1,1-dichloroethene

6. acetone

7. isopropanol

8. acetonitrile

9. methylene chloride

10 n-hexane

11. n-propanol

12. methyl ethyl ketone 13. ethyl acetate

14. tetrahydrofuran

15. chloroform

16. 1,1,1-trichloroethane

17. carbon tetrachloride

18. benzene

19. 1.2-dichloroethane

20. heptane 21. trichloroethylene

22. n-butanol

23. 1,4-dioxane

24. pyridine

25. toluene

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

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Organic Volatile Impurities (OVI) Analysis

Rtx®-G27 Column (fused silica with 5-meter Integra-Guard® guard column) (Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

- Application-specific columns for residual solvents in pharmaceutical products. Meet all requirements of USP <467>.
- Analytical column with Integra-Guard® guard column eliminates connecting problems and leaks.
- Rtx®-G27 stable to 290 °C.

Some USP <467> methods require the use of a guard column. Our Integra-Guard® integrated guard column system makes it easy to comply.

ID	df	temp. limits	30-Meter with 5-Meter, 0.53mm ID Integra-Guard Guard Column
0.53mm	5.00µm	-60 to 270/290°C	10279-126

free

literature

A Technical Guide for Static Headspace Analysis Using GC

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lit. cat.# 59895A

Rtx®-G43 Column (fused silica with 5-meter Integra-Guard® guard column) (Crossbond® 6% cyanopropylphenyl/94% dimethyl polysiloxane)

- Application-specific columns for residual solvents in pharmaceutical products.
 Meet all requirements of USP <467>.
- Analytical column with Integra-Guard® guard column eliminates connecting problems and leaks.
- Rtx®-G43 stable to 240 °C.

Some USP <467> methods require the use of a guard column. Our Integra-Guard® integrated guard column system makes it easy to comply.

ID	df	temp. limits	30-Meter with 5-Meter, 0.53mm ID Integra-Guard Guard Column
0.53mm	3.00µm	-20 to 240°C	16085-126

Diane Thompson, Customer Service

Restek Customer Service

In the U.S.

Call: 800-356-1688 (ext. 3) or 814-353-1300 (ext. 3)

Monday–Friday 8:00 a.m.–6:00 p.m. ET

Fax: 814-353-1309—24-hours a day

Online: www.restek.com—24-hours a day

Outside the U.S.

Contact your Restek representative: Refer to our list on pages 4-5 or visit our website at www.restek.com







Semivolatiles Analysis

Rxi®-5Sil MS Columns (fused silica)

(low polarity Crossbond® silarylene phase; selectivity close to 5% phenyl/95% dimethyl arylene polysiloxane)

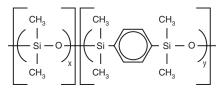
- Engineered to be a low bleed GC/MS column.
- Excellent inertness for active compounds.
- General purpose columns—ideal for GC/MS analysis of polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Temperature range: -60 °C to 350 °C.

The Rxi®-5Sil MS stationary phase incorporates phenyl groups in the polymer backbone. This improves thermal stability, reduces bleed, and makes the phase less prone to oxidation. Rxi®-5Sil MS columns are ideal for GC/MS applications requiring high sensitivity, including use in ion trap systems.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	$0.10 \mu \mathrm{m}$	-60 to 330/350°C	13605	13608		
	0.25µm	-60 to 330/350°C	13620	13623	13626	
	0.50µm	-60 to 330/350°C	13635	13638		
	$1.00 \mu \mathrm{m}$	-60 to 325/350°C	13650	13653	13697	
0.32mm	0.25µm	-60 to 330/350°C	13621	13624		
	0.50µm	-60 to 330/350°C		13639		
	$1.00 \mu \mathrm{m}$	-60 to 325/350°C		13654		
0.53mm	1.50µm	-60 to 310/330°C		13670		

ID	df	temp. limits	10-Meter	20-Meter	40-Meter	
0.10mm	$0.10\mu \mathrm{m}$	-60 to 330/350°C	43601			
0.18mm	0.10µm	-60 to 320/350°C				
	0.18µm	-60 to 330/350°C		43602	43605	
	0.36µm	-60 to 330/350°C		43604		

Rxi®-5Sil MS Structure



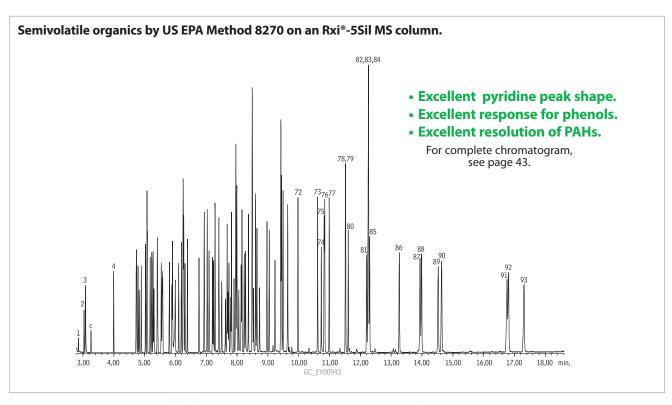
similar phases

DB-5MS, VF-5ms, CP-Sil 8 Low-Bleed/MS

ordering **note**

Get the protection without the connection! For Rxi®-5Sil MS columns with built-in Integra-Guard® guard columns, see **page 35**.

The Rxi®-5Sil MS column is recommended for US EPA Method 8270.





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restek innovation!

- · Very low bleed provides highest sensitivity.
- Faster analysis time with full separation of chlorinated pesticides.



How much time do column changes cost you? Switch to Rtx®-CLPesticides columns and analyze pesticides, herbicides, PCBs and more on a single column set.



Analyze Chlorinated Pesticides, PCBs and Chlorinated Herbicides

Download your free copy from **www.restek.com** lit. cat.# EVFL1013

Purchase one of these recommended combinations of guard and analytical columns and save money.



(kit

ordering note

Add "-530" or "-535" to the catalog number for the column kit, to save on the cost of the reference mix.



Chlorinated Pesticides Analysis

Rtx®-CLPesticides/Rtx®-CLPesticides2

(proprietary Crossbond® phases)

- Application-specific columns for organochlorine pesticides and herbicides.
- Low bleed—ideal for GC/ECD or GC/MS analyses.
- Baseline separations in less than 10 minutes.
- Stable to 340°C.

Improved resolution and faster analyses, compared to 1701 or phenyl phases, make these the pesticide columns of choice. Rtx®-CLPesticides columns are specially designed to overcome the coelutions and analyte breakdown typically encountered in chlorinated pesticide analyses for EPA Methods 8081, 608, and CLP. By achieving baseline resolution of the 20 target analytes, more accurate qualitative data can be obtained, providing reliable identification without GC/MS.

Rtx®-CLPesticides Columns (fused silica)

ID	df	temp. limits	10-Meter	15-Meter	20-Meter	30-Meter	60-Meter
0.10mm	0.10µm	-60 to 310/330°C	43101				
0.18mm	0.18µm	-60 to 310/330°C	42101		42102		
0.25mm	0.25µm	-60 to 320/340°C		11120		11123	11126
0.32mm	0.32µm	-60 to 320/340°C				11141	
	0.50µm	-60 to 320/340°C		11136		11139	
0.53mm	0.50µm	-60 to 300/320°C		11137		11140	

Rtx®-CLPesticides2 Columns (fused silica)

ID	df	temp. limits	10-Meter	15-Meter	20-Meter	30-Meter	60-Meter
0.10mm	0.10µm	-60 to 310/330°C	43301		43302		
0.18mm	0.14µm	-60 to 310/330°C	42301		42302		
0.25mm	0.20µm	-60 to 320/340°C		11320		11323	11326
0.32mm	0.25µm	-60 to 320/340°C		11321		11324	
	0.50µm	-60 to 320/340°C				11325	
0.53mm	0.42µm	-60 to 300/320°C		11337		11340	

Rtx®-CLPesticides Column Kits

(Note: Columns are not preconnected in these kits.)

Rtx-CLPesticides Kit (0.25mm ID)	cat.# 11199 (kit), \$1050	SAVE \$100		
Includes:			cat.#	price
30m, 0.25mm ID, 0.25 μ m Rtx-CLPesticides Column 11123				
30m, 0.25mm ID, 0.20μm Rtx-CLPesticides2 Column			11323	
Universal Angled "Y" Press-Tight Co	nnector, Deactivated		20403-261	
5m. 0.25mm ID Siltek Guard Column			10026	

Rtx-CLPesticides Kit (0.32mm ID)	cat.# 11196 (kit), \$1080	SAVE \$135		
Includes:			cat.#	price
30m, 0.32mm ID, 0.32µm Rtx-CLPesticides Column			11141	
30m, 0.32mm ID, 0.25µm Rtx-CLPesticides2 Column			11324	
Universal Angled "Y" Press-Tight Connector, Deactivated 20403-261				
5m, 0.32mm ID Siltek Guard Column	1	10027		

Rtx-CLPesticides Kit (0.53mm ID)	cat.# 11197 (kit), \$1155	SAVE \$180		
Includes:			cat.#	price
30m, 0.53mm ID, 0.50µm Rtx-CLPesticides Column		11140		
30m, 0.53mm ID, 0.42µm Rtx-CLPesticides2 Column		11340		
Universal Angled "Y" Press-Tight Co	onnector, Deactivated		20403-261	
5m 0.53mm ID ID Deactivated Guard Column			100/15	\$67

also available

For a wide variety of column connectors, see **pag**



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list price price with/kit suffix #

4-353-1300

88

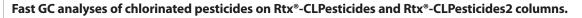
Organochlorine Pesticide Mix AB #1 (cat.# 32291)

Add a reference mix to your kit order and save!



Chlorinated Pesticides Analysis

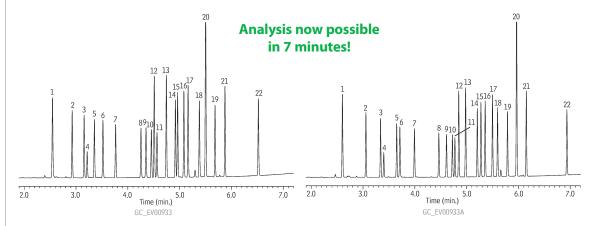




Rtx®-CLPesticides & Rtx®-CLPesticides2 columns (0.32 mm ID)

Rtx®-CLPesticides

Rtx®-CLPesticides2



Rtx*-CLPesticides, 30m, 0.32mm ID, 0.32 μ m (cat.# 11141) and Rtx*-CLPesticides2, 30m, 0.32mm ID, 0.25 μ m (cat.# 11324) with Columns:

5m x 0.32mm ID Rxi® deactivated guard tubing (cat.# 10039), connected using Deactivated Universal "Y" Press-Tight® connector (cat.# 20405-261) Organochlorine Pesticide Mix AB #2, 8-80µg/mL

Sample:

each component in hexane/toluene (cat.# 32292), Pesticide Surrogate Mix,

200µg/mL each component in acetone (cat.# 32000)

Inj.: Inj. temp.: 1.0µL splitless (hold 0.3 min.), 4mm single gooseneck inlet liner (cat.# 20799)

250°C

Carrier gas: helium, constant flow Linear velocity:

Oven temp.:

@ 30°C/min.

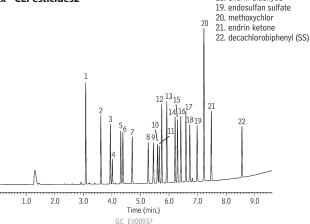
20

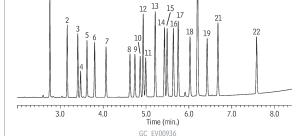
Agilent 6890 w/μ-ECD @ 330°C Det.:

Rtx®-CLPesticides & Rtx®-CLPesticides2 columns (0.53 mm ID)

Rtx®-CLPesticides

Rtx®-CLPesticides2





Columns:

Sample:

Det.:

Rtx®-CLPesticides, 30m, 0.53mm ID, 0.50µm (cat.# 11140) and Rtx*-CLPesticides2, 30m, 0.53mm ID, 0.42µm (cat.# 11340) with 5m x 0.53mm ID Rxi* deactivated guard tubing (cat.# 10054), connected using Siltek* Treated Universal "Y" Press-Tight* connector (cat.# 20486)

Organochlorine Pesticide Mix AB #2, 8-80µg/mL each component

in hexane/toluene (cat.# 32292), Pesticide Surrogate Mix, 200µg/mL each component in acetone (cat.# 32000)

1.0µL splitless (hold 0.3 min.), 4mm single gooseneck inlet liner (cat.# 20799) Inj.:

Inj. temp.:

helium, constant flow Carrier gas: Linear velocity: 45cm/sec. @ 120°C

Oven temp.: 120°C to 200°C @ 45°C/min. to 230°C @ 12.5°C/min. to

320°C (hold 2 min.) @ 20°C/min Agilent 6890 w/u-ECD @ 330°C



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1. 2,4,5,6-tetrachloro-m-xylene (SS)

8. heptachlor epoxide (isomer B)

2. α-BHC

γ-ВНС В-ВНС

δ-BHC 5.

aldrin

6. heptachlor

10. α-chlordane

11. endosulfan I

16. endosulfan II 17. 4,4'-DDT

18. endrin aldehyde

12. 4,4'-DDE

13. dieldrin 14. endrin 15. 4,4'-DDD

γ-chlordane





restek innovation!

it's a **fact**

These columns are treated with Siltek® deactivation, which provides better responses for endrin, DDT, and methoxychlor.

Chlorinated Pesticides Analysis

Stx®-CLPesticides/Stx®-CLPesticides2

(proprietary Crossbond® phases)

- Application-specific columns for organochlorine pesticides and herbicides.
- Baseline separations in less than 10 minutes.
- Siltek® surface deactivation enhances responses for endrin, DDT, methoxychlor.
- Stable to 330 °C.

Many laboratories analyzing organochlorine pesticides struggle with breakdown and adsorption of endrin, DDT, and methoxychlor caused by active sites throughout the analytical system. Siltek® passivation technology enables these columns to offer unsurpassed inertness and the highest responses for active pesticides.

Stx®-CLPesticides Columns (fused silica with Siltek® deactivation)

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.25µm	-60 to 310/330°C	11540	11543	
0.32mm	0.32µm	-60 to 310/330°C		11546	
	0.50µm	-60 to 310/330°C	11541	11544	

Stx®-CLPesticides2 Columns (fused silica with Siltek® deactivation)

ID		df	temp. limits	15-Meter	30-Meter	
0.25	5mm	0.20µm	-60 to 310/330°C	11440	11443	
0.32	2mm	0.25µm	-60 to 310/330°C	11441	11444	

Stx®-CLPesticides Kits

(Note: Columns are not preconnected in these kits.)



Stx-CLPesticides Kit (0.25mm ID)	cat.# 11190 (kit), \$1050	SAVE \$100		
Includes:			cat.#	price
30m, 0.25mm ID, 0.25µm Stx-CLPes	11543			
30m, 0.25mm ID, 0.20µm Stx-CLPes	11443			
Universal Angled "Y" Press-Tight Co	20403-261			
5m, 0.25mm ID Siltek Guard Column			10026	



ordering note

Kits include Siltek® deactivated guard column.

Stx-CLPesticides Kit (0.32mm ID)	cat.# 11193 (kit), \$1080	SAVE \$135		
Includes:			cat.#	price
30m, 0.32mm ID, 0.32 μ m Stx-CLPesti	11546			
30m, 0.32mm ID, 0.25 μ m Stx-CLPesti	11444			
Universal Angled "Y" Press-Tight Cor	20403-261			
5m, 0.32mm ID Siltek Guard Column	10027			

Total cost if purchased separately

\$1215



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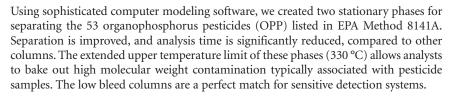
Environmental

Organophosphorus Pesticides Analysis

Rtx®-OPPesticides/Rtx®-OPPesticides2

(proprietary Crossbond® phases)

- · Application-specific columns for organophosphorus pesticides; best column combination for US EPA Method 8141A.
- Low bleed—ideal for GC/FPD, GC/NPD, or GC/MS analyses.
- Stable to 330 °C.



Rtx®-OPPesticides Columns (fused silica)

ID	df	temp. limits	30-Meter	
0.32mm	0.50µm	-20 to 310/330°C	11239	
0.53mm	0.83µm	-20 to 310/330°C	11240	

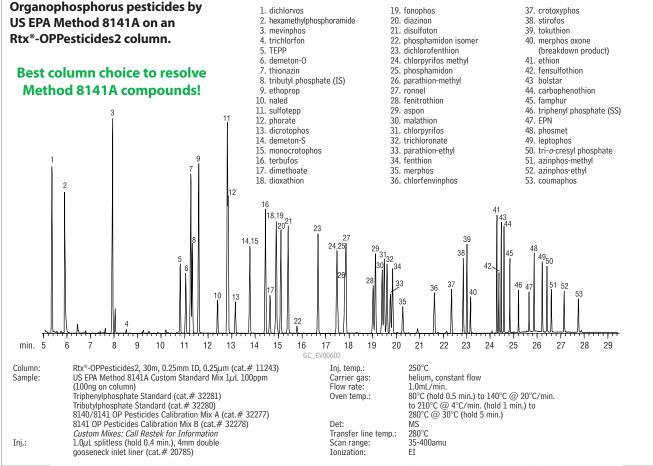
Rtx®-OPPesticides2 Columns (fused silica)

ID	df	temp. limits	20-	Meter	30-Meter
0.18mm	0.20µm	-20 to 310/330°C	11244	\$460	
0.25mm	0.25µm	-20 to 310/330°C			11243
0.32mm	0.32µm	-20 to 310/330°C			11241
0.53mm	0.50µm	-20 to 310/330°C			11242



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- Better separations
- Faster analysis





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Brominated Flame Retardants Analysis

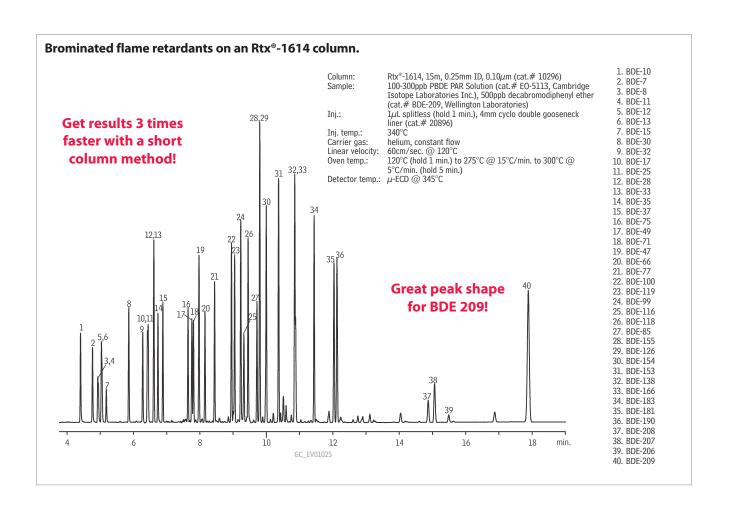
Rtx®-1614 Columns (fused silica)

(5% phenyl methyl)

- Optimized for PBDE analysis by EPA Method 1614.
- Short column option resolves BDE-209 3 times faster, with less thermal breakdown.
- Unique deactivation gives higher BDE-209 response, compared to DB-5HT columns, for greater analytical sensitivity.
- Exceeds EPA Method 1614 resolution criteria for BDE-49 and BDE-71.



ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	$0.10\mu m$	-60 to 330/360°C	10296	10295	







restek innovation!



PCB Congeners Analysis

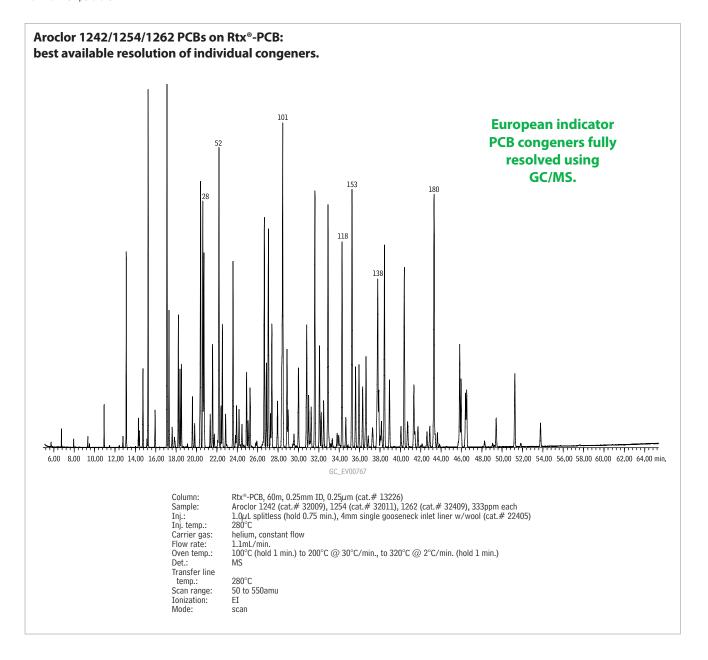
Rtx®-PCB Columns (fused silica)

(proprietary Crossbond® phase)

- Unique polymer for PCBs analysis by GC/ECD or GC/MS.
- · Good results for other semivolatiles.
- · Low polarity; inert to active compounds.
- Stable to 340 °C.

ID	df	temp. limits*	20-Meter	30-Meter	40-Meter	60-Meter
0.18mm	0.18µm	30°C to 320/340°C	41302		41303	41304
0.25mm	0.25µm	30°C to 320/340°C		13223		13226
0.32mm	0.50µm	30°C to 320/340°C		13239		
		and the second second				

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.













PCB Congeners Analysis

Rxi®-XLB Columns (fused silica)

(low polarity proprietary phase)

- General purpose columns exhibiting extremely low bleed. Ideal for many GC/MS applications, including pesticides, PCB congeners (e.g. Aroclor mixes), PAHs.
- Unique selectivity.
- Temperature range: 30 °C to 360 °C.

Improvements in polymer synthesis and tubing deactivation enable us to make inert, stable Rxi®-XLB columns especially well-suited for analyzing active, high molecular weight compounds with sensitive GC/MS systems, including ion trap detectors. Excellent efficiency, coupled with inertness, low bleed, and high thermal stability, make Rxi®-XLB columns ideal for analyzing semivolatile compounds in drinking water (e.g., US EPA Method 525).

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter
0.25mm	0.10µm	30 to 340/360°C	13705	13708	
	0.25µm	30 to 340/360°C	13720	13723	13726
	0.50µm	30 to 340/360°C		13738	
	1.00µm	30 to 340/360°C	13750	13753	
0.32mm	0.10µm	30 to 340/360°C		13709	
	0.25µm	30 to 340/360°C	13721	13724	13727
	0.50µm	30 to 340/360°C		13739	
	1.00µm	30 to 340/360°C		13754	
0.53mm	0.50µm	30 to 340/360°C		13740	
	1.50µm	30 to 320/340°C	13767	13770	

ID	df	temp. limits	10-Meter	20-Meter	
0.10mm	0.10µm	30 to 340/360°C	43701		
0.18mm	0.18µm	30 to 340/360°C		43702	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

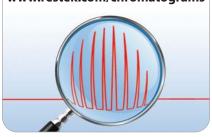
similar phases

DB-XLB, VF-Xms

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms







Dioxin & Furan Congeners Analysis

Rxi®-5Sil MS Columns (fused silica)

(low polarity Crossbond® silarylene phase; selectivity close to 5% phenyl/95% dimethyl arylene polysiloxane)

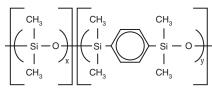
- Engineered to be a low bleed GC/MS column.
- Excellent inertness for active compounds.
- General purpose columns—ideal for GC/MS analysis of polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Temperature range: -60 °C to 350 °C.

The Rxi®-5Sil MS stationary phase incorporates phenyl groups in the polymer backbone. This improves thermal stability, reduces bleed, and makes the phase less prone to oxidation. Rxi®-5Sil MS columns are ideal for GC/MS applications requiring high sensitivity, including use in ion trap systems.

ID	df	temp. limits	30-Meter 60-Meter*
0.18mm	0.10µm	-60 to 320/350°C	43607
0.25mm	0.25µm	-60 to 330/350°C	13623

^{*60}m, 0.18mm ID, 0.10 μ m column (cat.# 43607) intended for dioxin and furan analysis only.

Rxi®-5Sil MS Structure



similar phases

DB-5MS, VF-5ms, CP-Sil 8 Low-Bleed/MS

also available

Other Dimensions!

See page 42 for our complete listing of Rxi®-5Sil MS columns.

Dioxins (TCDDs) and furans (TCDFs) in fly ash on an Rxi®-5Sil MS column. Rxi®-5Sil MS , 60 m, 0.18 mm ID, 0.10 μ m Column **TCDDs** (cat.# 43607) Sample fly ash extract 1236 Diluent: nonane Injection Inj. Vol.: $1 \mu L$ splitless Liner: 2mm Splitless liner (cat.# 20712) Oven Oven Temp: 120 °C (hold 1 min.) to 160 °C at 10 °C/min. to 300 °C at 2.5 °C/min. Carrier Gas He, constant flow Flow Rate: 1 ml /min Detector Waters AutoSpec Ultima Mass Spectrometer Source Temp.: 280 °C Ionization Mode: FT Notes Electron Ionization at 40eV 1278 Chromatogram courtesy of Karen MacPherson, Li Shen, Terry Kolic, and Eric Reiner at the Ontario 2378 1238 Ministry of the Environment 1239 1289 1267 GC_EV1194 2367 100 3467 **TCDFs** 2346 1249 1279 2378 2348 1269 GC FV1195 35.10 Australian Distributors HROMalytic +61(0)3 9762 2034

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95





Excellent for dioxins or furans.

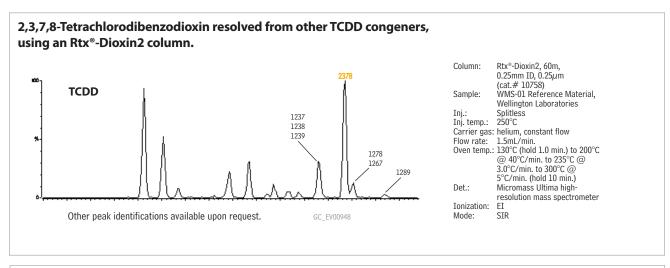
Dioxin & Furan Congeners Analysis

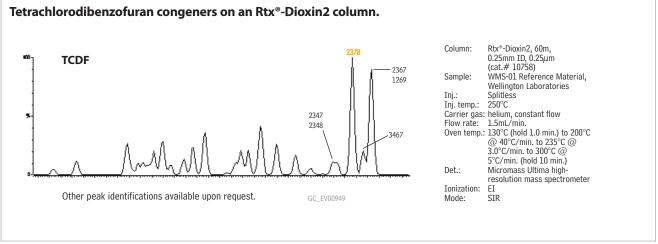
Rtx®-Dioxin2 Columns (fused silica)

(proprietary Crossbond® phase)

- Isomer specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF achieved with one GC column.
- Thermally stable to 340 °C for longer lifetime.
- Unique selectivity for toxic dioxin and furan congeners allow use as a confirmation GC column.

ID	df	temp. limits	40-Meter	60-Meter	
0.18mm	0.18µm	20°C to 340°C	10759		
0.25mm	0.25µm	20°C to 340°C		10758	





Chromatograms courtesy of Terry Kolic, Karen MacPherson, Eric Reiner, Ontario Ministry of the Environment, Toronto, Ontario, Canada





Rxi®-5Sil MS Columns (fused silica)

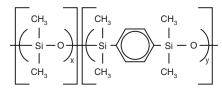
(low polarity Crossbond® silarylene phase; selectivity close to 5% phenyl/95% dimethyl arylene polysiloxane)

- Engineered to be a low bleed GC/MS column.
- Excellent inertness for active compounds.
- General purpose columns—ideal for GC/MS analysis of polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Temperature range: -60 °C to 350 °C.

0.25mm 0.10µm -60 to 330/350°C 13605 13608 0.25µm -60 to 330/350°C 13620 13623 13626	ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25µm -60 to 330/350°C 13620 13623 13626	0.25mm	0.10µm	-60 to 330/350°C	13605	13608		
		0.25µm	-60 to 330/350°C	13620	13623	13626	
0.50µm -60 to 330/350°C 13635 13638		0.50µm	-60 to 330/350°C	13635	13638		

ID	df	temp. limits	10-Meter	20-Meter
0.10mm	0.10µm	-60 to 330/350°C	43601	
0.18mm	0.18µm	-60 to 330/350°C		43602
	0.36µm	-60 to 330/350°C		43604

Rxi®-5Sil MS Structure



similar phases

DB-5MS, VF-5ms, CP-Sil 8 Low-Bleed/MS

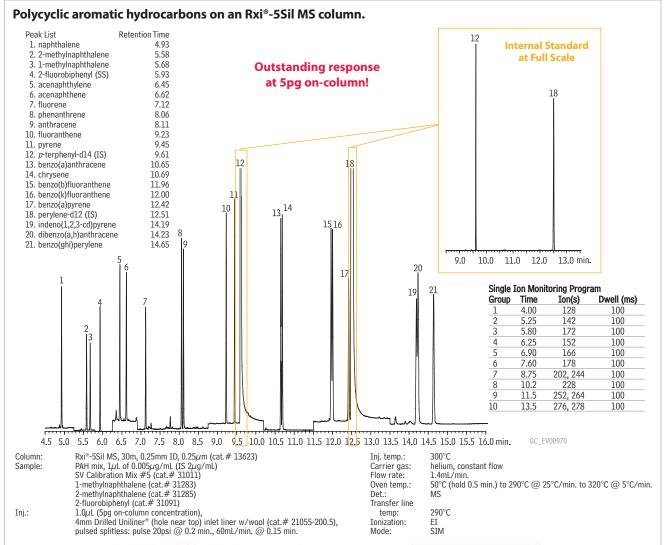
also available

Get the protection without the connection!

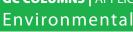
For Rxi®-5Sil MS columns with built-in Integra-Guard® guard columns, see **page 35**.

Other Dimensions!

See **page 42** for our complete listing of Rxi®-5Sil MS columns.



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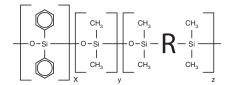








Rxi®-17Sil MS Structure



similar phases

DB-17ms, VF-17ms, BPX-50, DB-EUPAH

Polycyclic Aromatic Hydrocarbon (PAH) Analysis

Rxi®-17Sil MS Columns (fused silica)

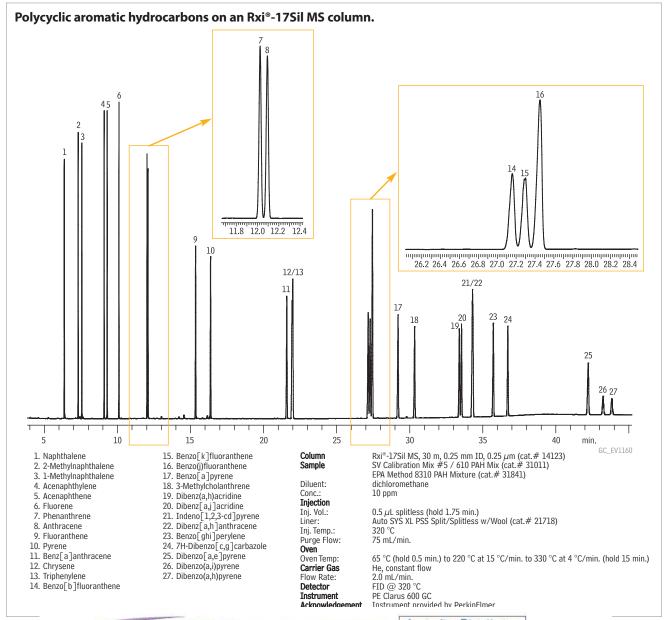
(midpolarity Crossbond® silarylene phase; equivalent to 50% phenyl/50% dimethyl arylene polysiloxane)

- 340/360 °C upper temperature limits.
- Excellent inertness for active compounds.
- Equivalent to USP phase G3.
- Low-bleed for use with sensitive detectors, such as MS.
- · Excellent separation of EU-PAHs, including fluoranthenes.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	40 to 340/360°C	14120	14123	14126	
0.32mm	0.25µm	40 to 340/360°C	14121	14124		

ID	df	temp. limits	20-Meter
0.18mn	n 0.18μm	40 to 340/360°C	14102
	0.36µm	40 to 340/360°C	14111

*Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.





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Mineral Oil Analysis

Rtx®-Mineral Oil Columns (fused silica)

- Application specific columns meet DIN EN ISO 9377-2:2000 requirements.
- · Optimized column dimensions for fast mineral oil screening.
- Surface linked phase guarantees long lifetime, robustness, and stability to 400 °C.





The Rtx®-Mineral Oil stationary phase and column dimensions were optimized for the

fast screening of mineral oils in extracts from solids and water samples according to
DIN EN ISO 9377-2: 2000. The 0.10 µm column is the gold standard for the method,
whereas the $0.15~\mu m$ column provides more complete separation of C10 from the
solvent peak when large injection sizes are used. Compared with common industry
solutions, the unique surface bonding of the Rtx®-Mineral Oil column ensures long col-
umn lifetime, even at higher temperatures. These unique columns can be used at tem-
peratures ranging from 380 °C (isothermal) to 400 °C (programmable), and each
column is tested individually for bleed to ensure exceptional performance at these
extreme conditions.

ID	df	temp. limits	15-Meter	
0.32mm	0.10µm	-60 to 380/400°C	18079	
	0.15μm	-60 to 380/400°C	18074	
	$0.30\mu m$	-60 to 380/400°C	18075	

similar phases

Varian Select Mineral Oil, VF-5HT, DB-1HT, DB-5HT









Volatile Organics Analysis

Rtx®-VMS Columns (fused silica)

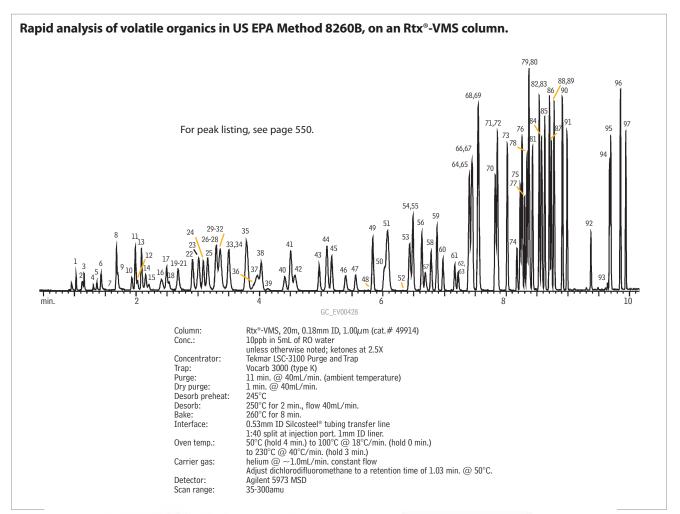
(proprietary Crossbond® phase)

- Application-specific columns for volatile organic pollutants by GC/MS.
- Complete separation of US EPA Method 8260B compounds in less than 10 minutes.
- · Stable to 260 °C.
- No known equivalent phases.

Rtx®-VMS columns offer lower bleed, better selectivity, and overall faster analysis for separating volatile organic compounds, such as those listed in US EPA Method 8260B. The Rtx®-VMS stationary phase is a highly stable polymer that provides outstanding analysis of volatile compounds, in combination with sensitive ion traps and Agilent 5973 mass spectrometers. 0.18 and 0.25 mm ID columns allow sample splitting at the injection port, eliminating the added expense and maintenance of a jet separator. A 0.45 mm or 0.53 mm ID column can be directly connected to the purge & trap transfer line in a system equipped with a jet separator.

ID	df	temp. limits	30-Meter	60-Meter	75-Meter	
0.25mm	1.40µm	-40 to 240/260°C	19915	19916		
0.32mm	1.80µm	-40 to 240/260°C	19919	19920		
0.45mm	2.55µm	-40 to 240/260°C	19908	19909		
0.53mm	3.00µm	-40 to 240/260°C	19985	19988	19974	

ID	df	temp. limits	20-1	Meter	40-N	/leter
0.18mm	1.00µm	-40 to 240/260°C	49914	\$450	49915	\$755









Volatile Organics Analysis

Rtx®-VRX Columns (fused silica)

(proprietary Crossbond® phase)

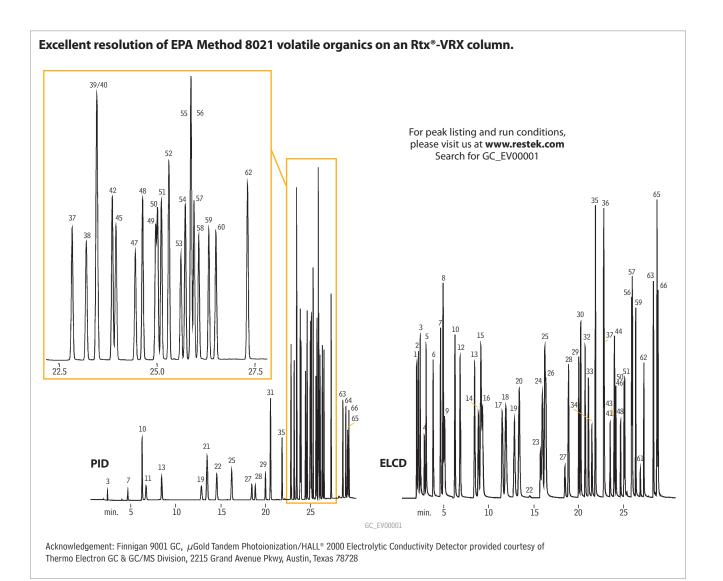
- Application-specific columns for volatile organic pollutants.
- Excellent for US EPA Method 8021 compounds.
- Stable to 260 °C.

The Rtx®-VRX stationary phase and optimized column dimensions provide low bleed, excellent resolution, and fast analysis times for volatile compounds.

ID	df	temp. limits	30-Meter	60-Meter	75-Meter	105-Meter
0.25mm	1.40µm	-40 to 240/260°C	19315	19316		
0.32mm	1.80µm	-40 to 240/260°C	19319	19320		
0.45mm	2.55µm	-40 to 240/260°C	19308		19309	
0.53mm	3.00µm	-40 to 240/260°C	19385	19388	19374	19389

similar phases DB-VRX

ID	df	temp. limits	20-Meter	40-Meter	
0.18mm	$1.00 \mu \mathrm{m}$	-40 to 240/260°C	49314	49315	











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similar phase

DB-502.2

also available

Metal MXT® Columns

Rugged, flexible, Siltek® treated stainless steel tubing; inertness comparable to fused silica tubing. See **page 121** for our MXT®-502.2 and MXT®-Volatiles columns.

similar phase

VOCOL

Volatile Organics Analysis

Rtx®-502.2 Columns (fused silica)

(proprietary Crossbond® diphenyl/dimethyl polysiloxane phase)

- Application-specific columns with unique selectivity for volatile organic pollutants. The Rtx®-502.2 column is cited in US EPA Method 502.2 and in many gasoline range organics (GRO) methods for monitoring underground storage tanks.
- Excellent separation of trihalomethanes; ideal polarity for light hydrocarbons and aromatics.
- Stable to 270 °C.

An Rtx®-502.2 column will enable you to quantify all compounds listed in US EPA methods 502.2 or 524.2, whether you use a mass spectrometer or a PID in tandem with an ELCD. The diphenyl/dimethyl polysiloxane based Rtx®-502.2 stationary phase provides low bleed and thermal stability to 270 °C. A 105-meter column can separate the light gases specified in EPA methods without subambient cooling. Narrow bore columns can interface directly in GC/MS systems.

ID	df	temp. limits	30-Meter	60-Meter	75-Meter	105-Meter
0.25mm	1.40µm	-20 to 250/270°C	10915	10916		
0.32mm	1.80µm	-20 to 250/270°C	10919	10920		10921
0.45mm	2.55µm	-20 to 250/270°C			10986	
0.53mm	3.00µm	-20 to 250/270°C	10908	10909		10910
ID	df	temp. limits	20-Meter	40-Meter		

40915

Rtx®-Volatiles Columns (fused silica)

0.18mm 1.00µm -20 to 250/270°C 40914

(proprietary Crossbond® diphenyl/dimethyl polysiloxane phase)

- Application-specific columns for volatile organic pollutants.
- · Stable to 280 °C.

Rtx®-Volatiles columns were the first columns designed specifically for analyses of the 34 volatile organic pollutants listed in US EPA methods 601, 602, and 624. With these columns, you can quantify all compounds listed in these methods, whether you use a mass spectrometer or a PID in tandem with an ELCD. The diphenyl/dimethyl polysiloxane based Rtx®-Volatiles stationary phase provides low bleed and thermal stability to 280 °C. Narrow bore columns can interface directly in GC/MS systems.

ID	df	temp. limits*	30-Meter	60-Meter	105-Meter	
0.25mm	1.00µm	-20 to 270/280°C	10900	10903		
0.32mm	1.50µm	-20 to 270/280°C	10901	10904		
0.53mm	2.00µm	-20 to 270/280°C	10902	10905	10906	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.



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Volatile Organics Analysis

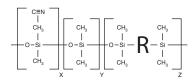
Rxi®-624Sil MS Columns (fused silica)

(midpolarity Crossbond® silarylene phase; equivalent to 6% cyanopropylphenyl/94% dimethyl arylene polysiloxane)

- Low bleed, high thermal stability column—maximum temperatures up to 320 °C.
- Inert—excellent peak shape for a wide range of compounds, including acidic and basic compounds.
- Selective—highly selective for residual solvents, great choice for USP<467>.
- Manufactured for column-to-column reproducibility—well-suited for validated methods.

ID	df	temp. limits	20-Meter	30-Meter	60-Meter	
0.18mm	1.00µm	-20 to 300/320°C	13865			
0.25mm	1.40µm	-20 to 300/320°C		13868		
0.32mm	1.80µm	-20 to 300/320°C		13870	13872	
0.53mm	3.00µm	-20 to 280/300°C		13871		

Rxi®-624Sil MS Structure



similar phases

DB-624, HP-624, VF-624, BP-624, ZB-624, AT-624, 007-1301, G43R

Volatiles by EPA Method 8260 on Rxi®-624Sil MS (30m, 0.25mm ID, 1.40μm) 94.95 Resolution of critical pairs, low bleed, and high inertness make -- = m/z 43this a great column for volatiles! = m/z 72for **more** info www.restek.com/cat006 26 42.43 104 40,43 91,92 102 44 45 23,24 19.20 Column: Rxi $^{\circ}$ -624Sil MS, 30 m, 0.25 mm ID, 1.40 μ m (cat.# 13868) 84.85 50*.51.52 Sample: 8260A Surrogate Mix (cat.# 30240) 8260A Internal Standard Mix (cat.# 30241) 8260B MegaMix® Calibration Mix (cat.# 30633) VOA Calibration Mix #1 (ketones) (cat.# 30006) 8260B Acetate Mix (revised) (cat.# 30489) California Oxygenates Mix (cat.# 30465) 502.2 Calibration Mix #1 (gases) (cat.# 30042) Conc.: Injection 25 ppb in RO water purge and trap split (split ratio 30:1) 225 °C Inj. Temp. Purge and Trap Instrument: OI Analytical 4660 10 Trap Trap Type: Purge: 11 min. @ 20 °C Desorb Preheat Temp.: 180 °C 14,15 0.5 min. @ 190 °C Desorb: 5 min. @ 210 °C Bake: Interface Connection: injection port Oven 35 °C (hold 5 min.) to 60 °C at 11 °C/min. to 220 °C Oven Temp: at 20 °C/min. (hold 2 min.) Carrier Gas: He, constant flow 1.0 mL/min. Flow Rate: Detector: MS 100 Transfer Line Temp.: 12 230 °C Analyzer Type: Quadrupole Source Temp.: Quad Temp.: 150 °C 70 eV Electron Energy: Solvent Delay Time: 1.5 min. Tune Type: BFB Ionization Mode: 36-260 amu Scan Range: Agilent 7890A GC & 5975C MSD 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 15.00 16.00 min GC EV1169 For peak list and complete conditions, see page 547.

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GC COLUMNSPLOT COLUMNS





Next Generation GC PLOT Columns

- New bonding process minimizes particle release, reducing column blockage and protecting instrument parts.
- More consistent flow means stable retention times in Deans and related flow switching techniques.
- Outstanding peak symmetry improves impurity analysis for gases, solvents, and hydrocarbons.

Ouick Reference Chart

PLOT Column	Application Page
Rt-Alumina BOND/ MXT-Alumina BOND (Na ₂ SO ₄ deactivation)	C1–C5 hydrocarbons. Purity analysis of ethylene, propylene, butenes, butadiene
Rt-Alumina BOND (KCl deactivation)	C1-C10 hydrocarbons, C1-C5 isomers. Purity analysis of ethylene, propylene, butene, butadiene.
Rt-Alumina BOND (CFC deactivation)	Multi-halogenated alkanes, C1-C-5 range. CFCs (chlorofluorocarbons)
Rt-Msieve 5A/ MXT-Msieve 5A	Permanent gas analysis (polarity between Q-BOND and S-BOND). He, Ne, Ar, O ₂ , N ₂ , Xe, Rn, SF6, and CH ₄ , C ₂ H ₆ , CO
Rt-Q-BOND/ MXT-Q-BOND	Nonpolar porous polymer. High retention for solvents, alcohols, polar volatiles, CO_2 , sulfur, and ppm water in solvents
Rt-QS-BOND	Intermediate polarity porous polymer. Neutral solvents, ketones, esters, hydrocarbons, and baseline separation of ethane, ethene, acetylene 110
Rt-S-BOND/ MXT-S-BOND	Intermediate polarity porous polymer. Light gases in ethylene and propylene, ketones, esters, hydrocarbons
Rt-U-BOND	Polar porous polymer. More retention for polar compounds



PLOT Column Phase Cross-Reference: Similar Selectivity

Restek	Porous Layer	Agilent/J&W	Supelco	Alltech	Varian/Chrompack	Quadrex
Rt-Alumina BOND/Na ₂ SO ₄	Aluminum oxide	GS-Alumina	Alumina-Sulfate	AT-Alumina	CP-Al ₂ O ₃ /NA ₂ SO ₄	
MXT-Alumina BOND						
Rt-Alumina BOND/KCl	Aluminum oxide	GC-Alumina KCl	Alumina-Chloride		CP-Al ₂ O ₃ /KCl	
		HP PLOT AI203				
Rt-Alumina BOND/CFC			<mark>unique</mark> prod	luct		
Rt-Msieve 5A	Molecular sieve 5A	HP PLOT Molesieve	Molsieve 5A PLOT	AT-Molesieve	CP-Molesieve 5A	PLT-5A
MXT-Msieve 5A						
Rt-Q-BOND	DVB porous polymer	HP PLOT Q	Supel-Q-PLOT	AT-Q	CP-PoraPlot Q,	
MXT-Q-BOND					PoraBond Q	
Rt-QS-BOND	Intermediate polarity porous polymer	GS-Q				
Rt-S-BOND	DVB vinylpyridine				CP-PoraPlot S	
MXT-S-BOND	polymer					
Rt-U-BOND	DVB ethyleneglycol-	HP-PLOT U			CP-PoraPlot U,	
	dimethylacrylate polymer				CP-PoraBond U	

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Next Generation of Porous Layer Open Tubular (PLOT) Columns

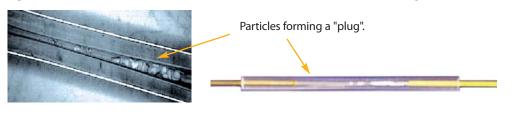
- · Stabilized particle layers improve robustness and reproducibility of retention and flow.
- Fully compatible with valve switching and Deans switching systems.
- Highly efficient, reproducible analyses; ideal for permanent gases, solvents, and hydrocarbons.
- New manufacturing procedure reduces particle generation and improves performance of porous polymers, molecular sieves, and PLOT columns.

Porous layer open tubular (PLOT) columns are very beneficial for solving application problems, especially for the analysis of volatile compounds. PLOT columns have a unique selectivity, allowing for the separation of gaseous compounds at room temperature. Due to the adsorption mechanism of the supports used in PLOT columns, permanent gases and light hydrocarbons can be resolved at room temperature; columns can then be programmed to higher temperatures to elute higher boiling compounds.

Traditional PLOT Columns Offer Poor Stability

The traditional PLOT column is built with a 5-50µm layer of particles adhered to the tubing walls. Because this layer of particles generally lacks stability, PLOT columns must be used very carefully, as particle release is common and can cause unpredictable changes in retention time and flow behavior. PLOT columns generally must be used in conjunction with particle traps to prevent the contamination of valves, injectors, and GC detectors. Figure 1 shows an example of particle accumulation resulting in a blockage inside a Press-Tight® liner. If particle traps are not used, particles will hit the detector resulting in electronic noise, seen as spikes on the baseline. In the case of valves, particles can become lodged in the valve and result in leaks.

Figure 1 Particles released from traditional PLOT columns can cause blockages.



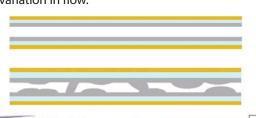
New PLOT Columns Minimize Particle Release

Restek has developed new procedures to manufacture PLOT columns with concentric stabilized adsorption layers. These new generation PLOT columns show a constant flow behavior (permeability) and have significantly improved mechanical stability, resulting in easier operation, better chromatography, and reduced particle release. Greater particle stability means more reproducible retention times, virtually no spiking, and longer column lifetimes. This innovative stabilization chemistry technology is currently applied to Rt®-Alumina BOND, Rt®-Msieve 5A, Rt®-Q-BOND, Rt®-QS-BOND, Rt®-S-BOND, and Rt®-U-BOND fused silica columns. It is also available for select metal columns including MXT®-Alumina BOND and MXT®-Msieve 5A columns.

Consistent Flow Restriction Factor (F) Guarantees Reproducible Flow

Thick layers of particles are difficult to deposit in a homogeneous layer and, in traditionally manufactured PLOT columns, this results in variable coating thicknesses. The positions where the layer is thicker act as restrictions and affect flow (Figure 2). Depending on the number and intensity of these restrictions, traditional PLOT columns often show greater variation in flow restriction than wall coated open tubular (WCOT) columns. In practice, conventional PLOT columns with the same dimensions can differ in flow by a factor of 4-6, when operated at the same nominal pressure. For applications where flow is important, such as with Deans switching, the nonreproducible flow behavior of most commercially available PLOT columns is a problem.

Figure 2 Inconsistent coating thicknesses result in restrictions that cause significant variation in flow.



Ideal open path column

PLOT column with restriction

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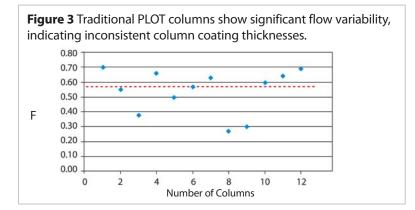
1/12

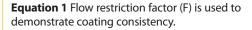
4-353-1300

GC COLUMNS | PLOT COLUMNS PLOT Column Selection

In order to evaluate flow restriction reproducibility, Restek is introducing a new factor: the flow restriction factor (F). This factor is based on the retention time of an unretained marker compound, as measured on both coated and uncoated tubing using the same backpressure setting (Equation 1). For quality control purposes, methane is used as the marker when evaluating porous polymer columns and helium is used for testing Rt®-Msieve 5A columns.

Flow restriction factor determination can be used both to assess the degree of column restriction and to evaluate the reproducibility of the column coating process. Percent flow restriction can also be calculated (Equation 2). Figure 3 shows typical results for PLOT columns manufactured using a conventional process. Because of the difference in flow restriction, individual columns have very different flow characteristics. In contrast, Figure 4 shows results for columns made using the new PLOT column process (Rt®-QS-BOND, bonded porous polymer). Clearly, the new manufacturing process results in greater consistency in both column coating thickness and flow restriction; which, in turn, results in more stable retention times and better performance in Deans switching and related flow switching techniques.



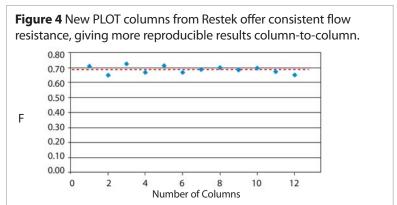


t_{R1} of unretained component (uncoated tubing) t_{R2} of unretained component

 t_R = retention time

Note, F values will always be <1 as the coated column always has more restriction than the uncoated column.

(coated column)



Equation 2 Percent flow restriction of coated column.

% restriction = $(1 - F) \times 100$

In summary, Restek's new PLOT column manufacturing process produces exceptionally robust PLOT columns, featuring concentric stabilized coating layers. These new columns have more consistent flow resistance and are recommended for applications sensitive to variation in retention time or flow. These columns are a significant advance in PLOT column technology and are ideal for more efficient, reproducible analyses of permanent gases, solvents, and hydrocarbons.





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GC COLUMNS | PLOT COLUMNS Alumina BOND Columns







did you know?

Rt®-Alumina BOND columns show unique retention characteristics for hydrocarbons.



Traces of water in the carrier gas and in the sample will affect the retention and the selectivity of alumina. If exposed to water, the retention times will shorten. The column can be regenerated by conditioning for 15-30 min. at 200 °C under normal carrier gas flow. Periodic conditioning ensures excellent run-to-run retention time reproducibility.

The maximum programmable temperature for an Rt®-Alumina BOND column is 200 °C. Higher temperatures cause irreversible changes to the porous layer adsorption properties.

for more info

For more information on Rt®-Alumina BOND/CFC columns, see page 74.



Rt®-Alumina BOND Columns

- 1. Highly selective for C1-C5 hydrocarbons; separates all unsaturated hydrocarbon isomers above ambient temperatures.
- 2. Reactivity of aluminum oxide stationary phase is minimized so that column response for polar unsaturates, such as dienes, is optimized. Column sensitivity or response ensures a linear and quantitative chromatographic analysis for these
- 3. Strong bonding prevents particle generation. The column can be used in valve switching operations, without release of particles that can harm the injection and detection systems.
- 4. The Rt®-Alumina BOND column is stable up to 200 °C. If water is adsorbed on the column, it can be regenerated by conditioning at 200 °C. Full efficiency and selectivity will be restored.
- 5. High capacity and loadability give exceptionally symmetric peaks; ideal for volatile hydrocarbon separations at percent levels, as well as impurity analyses at ppm concentrations.

Guaranteed Reproducibility

Each Rt®-Alumina BOND column is tested with a hydrocarbon test mix to ensure proper phase thickness and selectivity. 1,3-Butadiene is used to calculate k (capacity factor), which is a measure of phase thickness. Selectivity is measured using retention indices for propadiene and methyl acetylene. The resolution of trans-2-butene and 1-butene is also verified. To measure coating efficiency, plates per meter are checked using 1,3-butadiene. Extensive testing assures reproducible retention times and predictable flow behavior column-to-column.

Rt®-Alumina BOND/Na2SO4 Columns (fused silica PLOT)

(Na₂SO₄ deactivation)

- Acetylene/propadiene elute after butanes (impurities in acetylene/propadiene).
- Best separation for butene isomers (impurities in butene streams).
- Methyl acetylene elutes after 1,3-butadiene.
- Cyclopropane (impurity in propylene) elutes well before propylene.

ID	df	temp. limits	30-Meter	50-Meter	
0.25mm	4µm	to 200°C	19775		
0.32mm	5.00µm	to 200°C	19757	19758	
0.53mm	10µm	to 200°C	19755	19756	

Rt®-Alumina BOND/KCI Columns (fused silica PLOT)

(KCI deactivation)

- Acetylene elutes before C4 hydrocarbons (impurities in butane/isobutane).
- Methyl acetylene (impurity in 1,3-butadiene) elutes before 1,3-butadiene.

ID	df	temp. limits	30-Meter	50-Meter	
0.25mm	4µm	to 200°C	19776		NIEWA
0.32mm	5.00µm	to 200°C	19761	19762	(INEW!)
0.53mm	10μm	to 200°C	19759	19760	



Rt®-Alumina BOND/CFC Columns (fused silica PLOT)

- Improved inertness for halogenated compounds such as CFCs.
- Highly selective alumina based column, separates most CFCs.
- High retention and capacity for CFCs.

ID	df	temp. limits	30-Meter
0.53mm	10./m	to 200°C	19763



MXT®-Alumina BOND/Na₂SO₄ Columns (Siltek®-treated stainless steel PLOT)

Advantages of metal MXT® PLOT columns include:

- Can be made in small coil diameters—perfect for tight spaces.
- Will not spontaneously break, making them ideal for rugged environments.
- Designed for robust performance in process GCs and field instruments.

3.5" coil 7" diameter 11-pin cage 30-Meter 30-Meter df (µm) temp. limits









Molecular Sieve 5A PLOT Columns

Restek's molecular sieve 5A PLOT columns are designed for efficient separation of Ar/O₂ and other permanent gases, including CH₄, C₂H₆, and CO. Special coating and deactivation procedures ensure chromatographic efficiency and the integrity of the porous layer coating. Molecular sieves have very high retention, allowing separations of permanent gases at temperatures above ambient. Additionally, our unique immobilization process guarantees that the uniform particles remain adhered to the tubing—even after continuous valve-cycling.





Our revolutionary molecular sieve 5A PLOT columns separate Ar/O₂ and H₂/He at ambient temperature or above (see figure). These columns also are an excellent choice for rapid separation of permanent gases in refinery or natural gas.

Rt®-Msieve 5A Columns (fused silica PLOT)

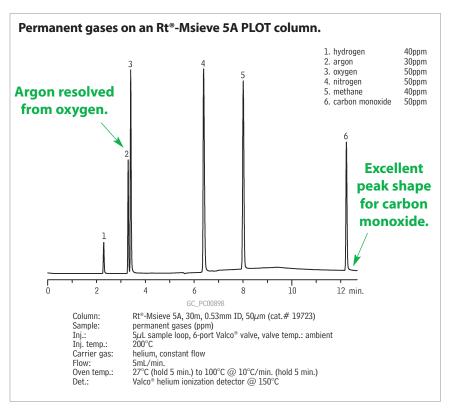
ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	20µm	to 300°C	19773		
0.32mm	30µm	to 300°C	19720	19722	
0.53mm	50µm	to 300°C	19721	19723	

MXT®-Msieve 5A Columns (Siltek®-treated stainless steel PLOT)

Advantages of metal MXT® PLOT columns include:

- Can be made in small coil diameters—perfect for tight spaces.
- · Will not spontaneously break, making them ideal for rugged environments.
- Designed for robust performance in process GCs and field instruments.
- Available in 3.5" coil diameter or 7" diameter 11-pin cage.

				3.5" coil	7" diameter 11-pin cage
ID	df	temp. limits	15-Meter	30-Meter	30-Meter
0.25mm	20µm	to 300°C	79717		
0.53mm	50μm	to 300°C		79723-273	79723



did you know?

Rt®-Msieve 5A PLOT columns are designed for efficient separation of Ar/O₂ and other permanent gases, including CH₄, C₂H₆, and CO.



Because molecular sieve materials are very hydrophilic, they will adsorb water from the sample or carrier gas. Water contamination can have a detrimental effect on peak symmetry and can reduce the resolution of all compounds. If water contamination occurs, reactivate your Rt*-Msieve 5A PLOT column by conditioning at 300 °C with dry carrier gas flow for 3 hours.



Carbon dioxide will not elute from molecular sieve columns. Rt®-Q-BOND is a good choice for this analysis.

did you know?

ShinCarbon ST micropacked columns are another alternative for analyzing permanent gases.

See pag





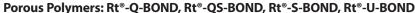












Restek chemists have developed a new process for the manufacturing of porous polymer PLOT columns. The process incorporates the particles to the walls of the tubing, so there is virtually no particle generation. Because of the particle adhering to the walls of the tubing, there is reproducible performance from column to column, including selectivity and flow.

Rt®-Q-BOND Columns (fused silica PLOT)

100% divinylbenzene

- Nonpolar PLOT column incorporating 100% divinyl benzene.
- Excellent for analysis of C1 to C3 isomers and alkanes up to C12.
- High retention for CO₂ simplifies gas analysis; CO₂ and methane separated from $O_2/N_2/CO$ (Note: $O_2/N_2/CO$ not separated at room temperature).
- · Use for analysis of oxygenated compounds and solvents.
- Maximum temperature of 300 °C.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	8µm	to 280/300°C	19764	19765	
0.32mm	10μm	to 280/300°C	19743	19744	
0.53mm	20μm	to 280/300°C	19741	19742	

Rt®-QS-BOND Columns (fused silica PLOT)

porous divinyl benzene homopolymer

- Intermediate polarity PLOT column incorporating low 4-vinyl pyridine.
- · Separates ethane, ethylene and acetylene to baseline.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	8µm	to 250°C	19767	19768	
0.32mm	10μm	to 250°C	19739	19740	
0.53mm	20μm	to 250°C	19737	19738	

Rt®-S-BOND Columns (fused silica PLOT)

divinylbenzene 4-vinylpyridine

- Midpolarity PLOT column, incorporating high 4-vinyl pyridine.
- Use for the analysis of nonpolar and polar compounds.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	8µm	to 250°C	19769	19770	
0.32mm	$10\mu \mathrm{m}$	to 250°C	19747	19748	
0.53mm	20μm	to 250°C	19745	19746	

Rt®-U-BOND Columns (fused silica PLOT)

divinylbenzene ethylene glycol/dimethylacrylate

- Polar PLOT column, incorporating divinylbenzene ethylene glycol/dimethylacrylate.
- · Use for the analysis of polar and nonpolar compounds.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	8µm	to 190°C	19771	19772	
0.32mm	10μm	to 190°C	19751	19752	
0.53mm	20µm	to 190°C	19749	19750	



For more chromatograms, see pages 652, 654 and 701-703, or use our chromatogram search tool at www.restek.com/chromatograms



Advantages of Metal MXT® PLOT columns include:

- Can be made in small coil diameters—perfect for tight spaces.
- Will not spontaneously break, making them ideal for rugged environments.
- Designed for robust performance in process GCs and field instruments.
- Available in 3.5" coil diameter or 7" diameter 11-pin cage.

MXT®-Q-BOND Columns (Siltek®-treated stainless steel PLOT)

				3.5" coil	7" diameter 11-pin cage
ID	df	temp. limits	15-Meter	30-Meter	30-Meter
0.25mm	8µm	to 300/320°C	79718		
0.53mm	20µm	to 300/320°C		79716-273	79716

MXT®-S-BOND Columns (Siltek®-treated stainless steel PLOT)

	3.5" coil		3.5" coil	7" diameter 11-pin cage	
ID	df	temp. limits	30-Meter	30-Meter	
0 52	00	1- 0000	70710 072	70710	

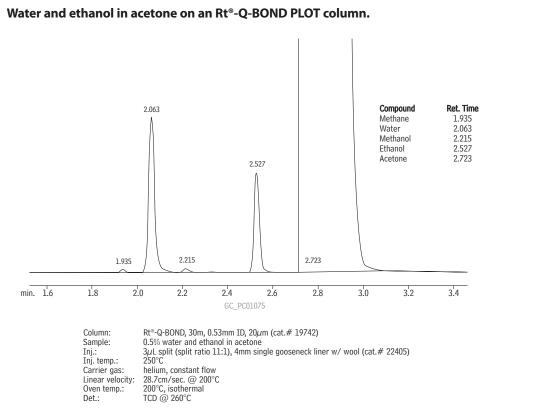














PLOT Column Particle Trap

- Includes two Press-Tight® connectors and a 2.5 m column.
- Protects detector and valves; connects between column and detector or valve.
- Eliminates detector spikes and scratches in valve rotors.

The technology used to adhere particles in PLOT columns is excellent; however, there is still a possibility for particles to dislodge when extreme pressure shocks and gas flow changes are anticipated. This sometimes happens when valve backflush or MS detection is used. In those extreme cases, using particle traps is recommended.

Description	qty.	cat.#	price
PLOT Column Particle Trap, 2.5m, 0.32mm ID with 2 Press-Tight Connectors	ea.	19753	
PLOT Column Particle Trap, 2.5m, 0.53mm ID with 2 Press-Tight Connectors	ea.	19754	



Restek Customer Service

In the U.S.

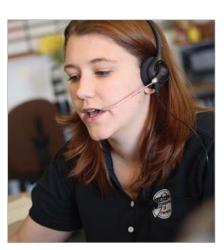
Call: 800-356-1688 (ext. 3) or 814-353-1300 (ext. 3)

Monday-Friday 8:00 a.m.-6:00 p.m. ET Fax: 814-353-1309—24-hours a day

Online: www.restek.com-24-hours a day

Outside the U.S.

Contact your Restek representative: Refer to our list on pages 4-5 or visit our website at www.restek.com









GC COLUMNS METAL (MXT®) CAPILLARY COLUMNS

Overview				
Guard/Retention Gap Columns				
Tubing Scorer for MXT Columns	114			
General Purpose Columns				
MXT-1				
MXT-5				
MXT-20				
MXT-35				
MXT-50				
MXT-65				
MXT-1301				
MXT-1701				
MXT-200				
MXT-WAX	118			
Application-Specific Columns				
MXT-65 TG				
MXT-Biodiesel TG	81, 119			
MXT-2887	77, 119			
MXT-1HT Sim Dist/MXT-1 Sim Dist/				
MXT-500 Sim Dist				
MXT-502.2				
MXT-Volatiles				
MXT-624	121	The state of the s		
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		Importers & Manufacture	¹⁵ 11/12	-

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What is an MXT® column?

MXT® columns are made from stainless steel tubing that has had the internal surface treated with our exclusive Siltek® surface treatment. The Siltek® layer makes the surface as inert as deactivated fused silica. The unique Siltek® process enables us to offer MXT® columns in a wide range of internal diameters, including 0.18 mm, 0.25 mm, 0.32 mm, and 0.53 mm. Because the Siltek® layer permeates the stainless steel surface, rather than simply coating it, the layer is exceptionally flexible, so the tubing can be coiled to very small diameters. The standard coil diameter for MXT® columns is 4.5 inches. The minimum coil diameter for 0.53 mm ID columns is 2.5 inches, and the minimum coil diameter for 0.25 mm ID columns is 1.5 inches.



The unique properties of the Siltek® treated surface enable us to treat the tubing with a wide variety of polymer phases. The many choices of MXT® columns include:

- MXT®-1 • MXT®-5
 - IXT®-5 MXT®-1301
- MXT®-20 • MXT®-35
- MXT®-50
- MXT®-65
- MX1®-1301 • MXT®-1701
- MXT®-200
- MXT®-WAX
- MXT®-65TG
- · MXT®-Biodiesel TG
- MXT®-2887
- MXT®-1HT SimDist • MXT®-1 SimDist
- MXT®-500 SimDist
- MXT®-502.2
- MXT®-Volatiles
- MXT®-624
- Guard tubing



Compare MXT® columns and fused silica columns:

- Metal tubing allows MXT® columns to be used to higher temperatures (430 °C) than fused silica columns (standard rating is 360 °C). This is because the polyimide resin that encases the fused silica becomes brittle over time at high temperatures. MXT® columns do not become brittle.
- Inertness of MXT® columns and fused silica columns is similar, due to the unique properties of the Siltek® surface treatment in MXT® columns.
- Metal columns can be coiled under 4.5 inches without breaking, ideal for small instruments.
- Coating efficiency (plates/meter) of MXT® columns is similar to that of fused silica.
- MXT® columns will not break under stress, and they can be coiled to small diameters.

MXT®-Biodiesel TG columns are undamaged by high thermal cycles compared to high-temperature fused silica columns which break down under the same conditions.



MXT®-Biodiesel TG columns are undamaged by high thermal cycles.



HT fused silica columns, labeled as stable to 430 °C, show pitting and breakdown.

100 temperature cycles to 430 °C totaling 500 minutes at maximum temperature.

also available

Metal PLOT columns! See pages 108-110.

MXT® columns are your best choice for:

- Situations in which the potential for column breakage is high:
 - field instruments
 - process GC
 - GCs with small ovens, such as portable instruments, requiring tightly coiled columns.
- High temperature chromatography. Siltek® deactivated stainless steel tubing can withstand temperatures exceeding 430 °C; the only limitation to oven temperature is the polymer itself.

Custom MXT® columns

We are able to supply 0.18, 0.25, 0.28, 0.32, and 0.53 mm ID columns with the phases listed above in many different configurations. If you do not see the column you need listed in the following pages, call us or your Restek representative, and we will be happy to help



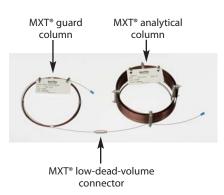
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MXT® guard columns are tested



Connect MXT® columns using an MXT® Low-Dead-Volume Connector!



also available

Column connector kits & ferrules See page 292.



Make a perfect column cut every time!

Intermediate-Polarity Deactivated MXT® Guard/Retention Gap Columns/Transfer Lines (passivated stainless steel)

- Useful for a wide range of applications.
- Compatible with most common solvents.
- Maximum temperature: 350 °C

Nominal ID	Nominal OD	5-Meter	5-Meter/6-pk.	10-Meter
0.28mm	0.56 ± 0.025 mm	70044	70044-600	70046
0.53mm	0.74 ± 0.025mm	70045	70045-600	70047

Hydroguard® Treated MXT® Guard/Retention Gap Columns/Transfer Lines (passivated stainless steel)

- Extend analytical column lifetime by preventing degradation by harsh "steam-cleaning" water injections.
- Maximum temperature: 430 °C.

When transfer lines from purge & trap systems, air monitoring equipment, or other instruments carry condensed water vapor, deactivated column tubing quickly becomes active because of the creation of free silanol groups. These silanol groups adsorb active oxygenated compounds such as alcohols and diols.

Restek chemists have addressed this concern and found a solution—the Hydroguard® deactivation process. A unique deactivation chemistry creates a high-density surface that is not readily attacked by aggressive hydrolysis. The high-density surface coverage of the Hydroguard® deactivation layer effectively prevents water vapor from reaching the fused silica surface beneath. Use Hydroguard® tubing for connecting GCs to:

- Headspace analyzers.
- · Air analysis equipment and concentrator units.

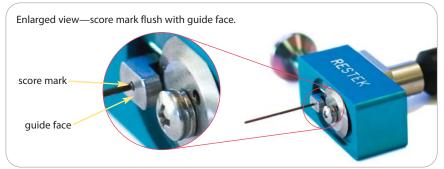
Nominal ID	Nominal OD	5-Meter	10-Meter	30-Meter*	60-Meter*†
0.28mm	0.56 ± 0.025mm	70080	70083	70086	70089
0.53mm	0.74 ± 0.025mm	70081	70084	70087	70090

^{*30-} and 60-meter lengths are banded in 5-meter sections.

Restek Tubing Scorer for MXT® Columns

- Makes a perfect cut every time.
- Easy to use.
- Leaves column entrance perfectly round.

Metal MXT® columns are easy to cut. Scoring wafers can be used, but may leave the column end irregularly shaped. The Restek tubing scorer is designed to make a perfect cut every time, leaving the column entrance perfectly round.



Description	qty.	cat.#	price
Restek Tubing Scorer for MXT Columns (0.25-0.53mm ID & 0.5-0.8mm OD)	ea.	20523	\$195
Replacement Scoring Wheel	ea.	20522	\$40





[†]Recommendation: Cut 60m guard columns into shorter lengths. Using full length may cause peak distortion. Diameters greater than 0.10mm are tested with the Grob test mix to ensure high inertness.

MXT®-1 Columns (Siltek® treated stainless steel)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane)

- General purpose columns for solvent impurities, PCB congeners (e.g. Aroclor mixes), simulated distillation, drugs of abuse, gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semivolatiles, pesticides, and oxygenates.
- Temperature range: -60 °C to 430 °C.
- Equivalent to USP G1, G2, G38 phases.

MXT®-1 columns exhibit long lifetime and very low bleed at high operating temperatures. A proprietary synthesis process eliminates residual catalysts that could cause degradation and increase bleed.

ID	df	temp. limits	6-Meter	15-Mete	r 30-Meter	60-Meter	105-Meter
0.25mm 0.	.10µm	-60 to 330/430°C		70105	70116	70117	70114
0.	.25µm	-60 to 430°C		70120	70123	70126	70129
0.	.50µm	-60 to 400°C		70135	70138	70141	70144
1.	.00µm	-60 to 340/360°C		70150	70153	70156	70159
0.28mm 0.	.10µm	-60 to 430°C	70102 \$3	10 70106	70109		
0.	25µm	-60 to 430°C		70121	70124	70127	
0.	.50µm	-60 to 400°C		70136	70139	70142	
1.	.00µm	-60 to 320/360°C		70151	70154	70157	
3.	.00µm	-60 to 285/360°C		70181	70184	70187	
0.53mm 0.	.15µm	-60 to 430°C	70101* \$3	10 70107			
0.	.25µm	-60 to 430°C		70122	70125	70128	
0.	.50µm	-60 to 400°C		70137	70140	70143	
1.	.00µm	-60 to 320/360°C		70152	70155	70158	
1.	.50µm	-60 to 310/360°C		70167	70170	70173	
3.	.00µm	-60 to 285/360°C		70182	70185	70188	
5.	.00µm	-60 to 270/360°C		70177	70179	70183	
7.	.00µm	-60 to 250/360°C		70191	70192	70193	
TD	df	temn limits	10-Mete	r 20-Mete	r 40-Meter		

^{*}For simulated distillation.

0.18mm 0.20µm -60 to 330/430°C 71811

0.40µm -60 to 320/400°C 71814

Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

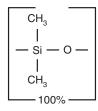
71812

71815

71813

71816

MXT®-1 Structure





similar phases

DB-1, DB-1MS, HP-1, HP-1MS, Ultra-1, SPB-1, Equity-1, MDN-1, CP-Sil 5 CB, VF-1ms



a plus 1 story

"Since now almost 15 years, the Laboratoire Interuniversitaire des Systèmes Atmosphériques (LISA) of the University of Paris XII has been developing GC subsystems for on-board space probe GCMS experiments dedicated to the *in situ* analysis of extraterrestrial environments. Most of the capillary columns used in these subsystems were and still are provided by the Restek company.

One capillary column, MXT-1701¹, was aboard the Huygens probe of the Cassini-Huygens mission which explored successfully in 2005 the atmosphere of Titan, the largest moon of Saturn. Four columns,

MXT'-1, 20, 1701 and MXT'-UPLOT', are "en route" towards the comet Churyumov-Gerasimenko in the frame of the ESA Rosetta mission launched in 2004 to arrive by 2014. They will be used for the first time in situ analysis of a cometary nucleus. And finally, so far, 4 other PLOT (MXT' U) and WCOT^{3,4} (MXT'-1, 20 and CLP) columns have been selected and are currently being built in the GC of the Sample Analysis at Mars (SAM) Pyr/GCMS instrument, part of the payload of the NASA MSL 2009 Mars exploratory mission.

I would like to mention that all the columns selected for space mission are Silcosteel' treated metal capillary columns and they have all been submitted successfully to space qualification tests such as vibration, radiation and thermal cycles⁵, which demonstrated their robustness for space application.

Since the beginning, the Restek company has been more than a manufacturer providing LISA with columns. Indeed, it has been strongly collaborating and helping LISA to develop custom-made columns able to meet the requirements of such an unusual scientific goal for chromatographic columns. That is why LISA is very grateful to Restek for being this ideal partner without the help of which the study and development of chromatographic columns for space use could not have been possible."

Robert STERNBERG

Responsible for the space GC team at LISA (Paris, France)



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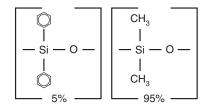


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GC COLUMNS | METAL (MXT®) CAPILLARY COLUMNS General Purpose Columns



MXT®-5 Structure



similar phases

DB-5, HP-5, HP-5MS, Ultra-2, SPB-5, Equity-5, MDN-5, CP-Sil 8 CB

Note: DB-5MS is a silarylene based polymer similar to Rxi®-5Sil MS.

MXT®-5 Columns (Siltek® treated stainless steel)

(low polarity phase; Crossbond® 5% diphenyl/95% dimethyl polysiloxane)

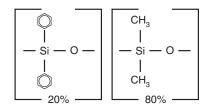
- General purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g. Aroclor mixes), essential oils, and semivolatiles.
- Temperature range: -60 °C to 430 °C.
- Equivalent to USP G27, G36 phases.

The 5% diphenyl/95% dimethyl polysiloxane stationary phase is the most popular GC stationary phase and is used in a wide variety of applications. All residual catalysts and low molecular weight fragments are removed from the MXT®-5 polymer, providing a tight monomodal distribution and extremely low bleed.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.10µm	-60 to 430°C	70205	70208	70211	
	0.25µm	-60 to 430°C	70220	70223	70226	
	0.50µm	-60 to 400°C	70235	70238	70241	
	$1.00 \mu m$	-60 to 340°C	70250	70253	70256	
0.28mm	0.25µm	-60 to 430°C	70221	70224	70227	
	0.50µm	-60 to 400°C	70236	70239	70242	
	1.00µm	-60 to 325/360°C	70251	70254	70257	
	3.00µm	-60 to 290/360°C	70281	70284	70287	
0.53mm	0.25µm	-60 to 430°C	70222	70225	70228	
	0.50µm	-60 to 400°C	70237	70240	70243	
	$1.00 \mu m$	-60 to 325/360°C	70252	70255	70258	
	1.50µm	-60 to 300/360°C	70267	70270	70273	
	3.00µm	-60 to 290/360°C	70282	70285	70288	
	5.00µm	-60 to 270/360°C	70277	70279	70283	

ID	df	temp. limits	10-Meter	20-Meter	40-Meter	
0.18mm	0.20µm	-60 to 325/430°C	71821	71822	71823	
	0.40µm	-60 to 325/400°C	71824	71825	71826	

MXT®-20 Structure



similar phases

SPB-20, VOCOL

MXT®-20 Columns (Siltek® treated stainless steel)

(low to midpolarity phase; Crossbond® 20% diphenyl/80% dimethyl polysiloxane)

- General purpose columns for volatile compounds, flavor compounds, and alcoholic beverages.
- Temperature range: -20 °C to 340 °C.
- · Equivalent to USP G28, G32 phases.

MXT®-20 polymer is synthesized to exacting standards. All residual catalysts and low molecular weight fragments are removed from the polymer, providing a tight monomodal distribution and extremely low bleed.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	-20 to 320/340°C	70320	70323	70326	
	1.00µm	-20 to 300/340°C	70350	70353	70356	
0.28mm	0.25µm	-20 to 310/340°C	70321	70324	70327	
	1.00µm	-20 to 295/340°C	70351	70354	70357	
	3.00µm	-20 to 260/340°C	70381	70384	70387	
0.53mm	0.25µm	-20 to 310/340°C	70322	70325	70328	
	1.00µm	-20 to 295/340°C	70352	70355	70358	
	3.00µm	-20 to 260/340°C	70382	70385	70388	

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.



Search by compound name, synonym, CAS # or keyword

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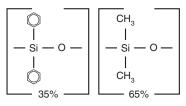
MXT®-35 Columns (Siltek® treated stainless steel)

(midpolarity phase; Crossbond® 35% diphenyl/65% dimethyl polysiloxane)

- General purpose columns for organochlorine pesticides, PCB congeners (e.g. Aroclor mixes), herbicides, pharmaceuticals, sterols, rosin acids, and phthalate esters.
- Temperature range: 0 °C to 340 °C.
- Equivalent to USP G42 phase.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.50µm	0 to 310/340°C	70435	70438		
	$1.00 \mu m$	0 to 300/340°C	70450	70453		
0.53mm	1.00µm	0 to 260/340°C	70452	70455	70458	
	$1.50\mu m$	0 to 250/340°C	70467	70470	70473	
	3.00µm	0 to 240/340°C	70482	70485 \$58	0 70488	

MXT®-35 Structure





similar phases

DB-35, HP-35, SPB-35, SPB-608

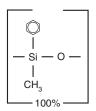
MXT®-50 Columns (Siltek® treated stainless steel)

(midpolarity phase; Crossbond® 100% methylphenyl polysiloxane)

- General purpose columns for pesticides, herbicides, rosin acids, phthalate esters, triglycerides, and sterols.
- Temperature range: 0 °C to 300 °C.
- Equivalent to USP G3 phase.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.53mm	$0.83\mu m$	0 to 270/300°C		70569		
	$1.00 \mu m$	0 to 260/280°C	70552	70555	70558	
	1.50µm	0 to 250/280°C	70567	70570	70573	

MXT®-50 Structure



similar phases

HP-17, SPB-50, SP-2250

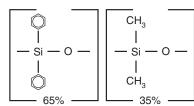
MXT®-65 Columns (Siltek® treated stainless steel)

(mid to high polarity phase; Crossbond® 65% diphenyl/35% dimethyl polysiloxane)

- General purpose columns for phenols and fatty acids.
- Temperature range: 50 °C to 300 °C.
- · Equivalent to USP G17 phase.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	0.25µm	50 to 300°C	77020	77023	
	0.50µm	50 to 300°C	77035	77038	
	$1.00 \mu m$	50 to 280/300°C	77050	77053	

MXT®-65 Structure



similar phases

TAP-CB, 400-65HT, 007-65HT

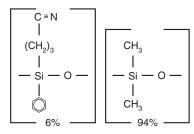
MXT®-1301 Columns (Siltek® treated stainless steel)

(low to midpolarity phase; Crossbond® 6% cyanopropylphenyl/94% dimethyl polysiloxane)

- General purpose columns for residual solvents, alcohols, oxygenates, and volatile organic compounds.
- Temperature range: -20 °C to 280 °C.
- Equivalent to USP G43 phase.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	-20 to 280°C	76020	76023	76026	
	1.00µm	-20 to 260/280°C	76050	76053	76056	
0.28mm	0.25µm	-20 to 280°C	76021	76024	76027	
	$1.00 \mu m$	-20 to 260/280°C	76051	76054	76057	
	1.50µm	-20 to 250/280°C	76066	76069	76072	
0.53mm	0.25µm	-20 to 280°C	76022	76025	76028	
	$1.00 \mu m$	-20 to 260/280°C	76052	76055	76058	
	1.50µm	-20 to 250/280°C	76067	76070	76073	
	3.00µm	-20 to 240/280°C	76082	76085	76088	

MXT®-1301 Structure



similar phases

DB-1301, DB-624, HP-1301, SPB-1301, SPB-624

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum ter





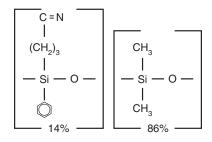


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GC COLUMNS | METAL (MXT®) CAPILLARY COLUMNS General Purpose Columns



MXT®-1701 Structure



similar phases

DB-1701, HP-1701, SPB-1701

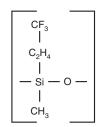
MXT®-1701 Columns (Siltek® treated stainless steel)

(midpolarity phase; Crossbond® 14% cyanopropylphenyl/86% dimethyl polysiloxane)

- General purpose columns for alcohols, oxygenates, PCB congeners (e.g. Aroclor mixes), and pesticides.
- Temperature range: -20 °C to 280 °C.
- · Equivalent to USP G46 phase.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.25µm	-20 to 280°C	72020	72023	72026	
	$1.00 \mu m$	-20 to 260°C	72050	72053	72056	
0.28mm	0.25µm	-20 to 280°C	72021	72024	72027	
	$1.00 \mu m$	-20 to 260°C	72051	72054	72057	
	1.50μ m	-20 to 250°C	72066	72069	72072	
0.53mm	0.25µm	-20 to 280°C	72022	72025	72028	
	0.50µm	-20 to 270/280°C	72037	72040	72043	
	$1.00\mu m$	-20 to 260°C	72052	72055	72058	
	$1.50 \mu m$	-20 to 250°C	72067	72070	72073	
	3.00µm	-20 to 240°C	72082	72085	72088	

MXT®-200 Structure



similar phases

DB-200, DB-210

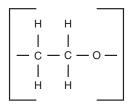
MXT®-200 Columns (Siltek® treated stainless steel)

(midpolarity phase; Crossbond® trifluoropropylmethyl polysiloxane)

- General purpose columns for solvents, Freon® fluorocarbons, alcohols, ketones, silanes, and glycols. Excellent confirmation column with an Rtx®-5 column, for phenols, nitrosamines, organochlorine pesticides, chlorinated hydrocarbons, and chlorophenoxy herbicides.
- Temperature range: -20 °C to 400 °C.
- Equivalent to USP G6 phase.

ID	df	temp. limits*	15-Meter	30-Meter	60-Meter	
0.25mm	0.50µm	-20 to 400°C	75035	75038		
	1.00µm	-20 to 310/360°C	75050	75053		
0.53mm	1.00µm	-20 to 290/360°C	75052	75055	75058	
	1.50µm	-20 to 280/360°C	75067	75070	75073	
	3.00µm	-20 to 260/360°C	75082	75085	75088	

MXT®-WAX Structure



similar phases

DB-WAX, DB-WAXetr, HP-Wax, HP-Innowax, Supelcowax 10, CP-Wax 52 CB

MXT®-WAX Columns (Siltek® treated stainless steel)

(polar phase; Crossbond® Carbowax® polyethylene glycol—provides oxidation resistance)

- General purpose columns for FAMEs, flavor compounds, essential oils, amines, solvents, xylene isomers, and US EPA Method 603 (acrolein/acrylonitrile).
- · Resistant to oxidative damage.
- Temperature range: 40 °C to 260 °C.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.

ID	df	temp. limits	15-Meter	30-Meter	60-Meter	
0.25mm	$0.10 \mu \mathrm{m}$	40 to 260°C	70605	70608	70611	
	0.25µm	40 to 260°C	70620	70623	70626	
	0.50µm	40 to 260°C	70635	70638	70641	
0.28mm	0.25µm	40 to 250/260°C	70621	70624	70627	
	0.50µm	40 to 250/260°C	70636	70639	70642	
	1.00µm	40 to 240/250°C	70651	70654	70657	
0.53mm	0.25µm	40 to 250/260°C	70622	70625	70628	
	0.50μm	40 to 250/260°C	70637	70640	70643	
	1.00µm	40 to 240/250°C	70652	70655	70658	
	1.50µm	40 to 230/250°C	70666	70669	70672	
	2.00µm	40 to 220/250°C	70667	70670		

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.









Triglycerides in Foods Analysis

MXT®-65TG Columns (Siltek® treated stainless steel)

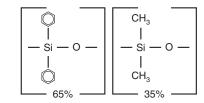
(high polarity phase; Crossbond® 65% diphenyl/35% dimethyl polysiloxane)

- · Application-specific columns, specially tested for triglycerides.
- Stable to 370 °C.

The MXT®-65TG phase resolves triglycerides by degree of unsaturation as well as by carbon number. Because of the chemistry required to achieve 370 °C thermal stability, an MXT®-65TG column should not be used for analyses of compounds that contain active oxygenated groups.

ID	df	temp. limits	15-Meter	30-Meter	
0.25mm	$0.10 \mu m$	20 to 370°C	77005	77008	
0.53mm	0.10µm	20 to 370°C	77007	77010	

MXT®-65TG Structure





Biodiesel Fuels Analysis

MXT®-Biodiesel TG Columns (Siltek® treated stainless steel)

- Fast analysis times and sharp mono-, di-, and triglyceride peaks.
- Stable at 430 °C for reliable, consistent performance.
- Integra-Gap® built-in retention gap on 0.53 mm ID column eliminates column coupling completely.

Description	temp. limits	cat.#	price
14m, 0.53mm ID, 0.16 μ m with 2m Integra-Gap*	-60 to 380/430°C	70289	
10m, 0.32mm ID, 0.10μm	-60 to 380/430°C	70292	
10m, 0.32mm ID, 0.10µm with 2m x 0.53mm Retention Gap**	-60 to 380/430°C	70290	
15m, 0.32mm ID, 0.10μm	-60 to 380/430°C	70293	
15m, 0.32mm ID, 0.10µm with 2m x 0.53mm Retention Gap**	-60 to 380/430°C	70291	
2m x 0.53mm MXT Biodiesel TG Retention Gap		70294	

^{*}Total column length=16 meters.



literature

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lit. cat.# 580207

Simulated Distillation (C5-C44) Analysis

MXT®-2887 Column (Siltek® treated stainless steel)

(nonpolar phase; Crossbond® 100% dimethyl polysiloxane—for simulated distillation)

- Application-specific columns for simulated distillation.
- Stable to 400 °C.

MXT®-2887 columns' stationary phase, column dimensions, and film thickness have been optimized to exceed the resolution and skewing factor requirements currently specified in ASTM method D2887. Each column is individually tested to guarantee a stable baseline with low bleed and reproducible retention times. The Crossbond® methyl silicone stationary phase has increased stability compared to packed columns, ensuring stable baselines and shorter conditioning times. Manufactured from Siltek®treated stainless steel tubing, MXT® columns are the most durable high temperature GC columns available.

ID	dt	temp. limits	10-Meter
0.53mm	2.65µm	-60 to 400°C	70199

similar phases

DB-2887, Petrocol EX2887, CP-HT-Simdist CB





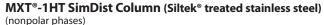


^{**}Connected with low-dead-volume MXT connector.



Simulated Distillation (C44-C100) Analysis





- Stable up to 450 °C—lowest bleed for longest column lifetime.
- Reliably meet all ASTM D6352 and D7500 specifications.
- 100% dimethyl polysiloxane phase allows easy comparisons to historical data.

Accurate boiling point determination for medium and heavy fractions using GC simulated distillation requires columns and phase polymers that are robust enough to withstand high temperatures without significant degradation. Metal columns are a better alternative than fused silica, and the new MXT®-1HT SimDist columns are the lowest bleed, highest efficiency columns available, outperforming other metal columns for critical method parameters.

ID	df	temp. limits	5-Meter	10-Meter	
0.53mm	$0.10\mu\mathrm{m}$	-60 to 430/450°C	70112		
	0.20µm	-60 to 430/450°C	70115		
	0.21 μ m	-60 to 430/450°C		70118	
	0.88µm	-60 to 400/430°C	70131	70134	
	1.00µm	-60 to 380/400°C		70130	
	1.20µm	-60 to 380/400°C		70119	
	2.65µm	-60 to 360/400°C		70132	
	5.00μm	-60 to 360/400°C		70133	



similar phases

DB-1HT, CP-HT-Simdist CB

MXT®-1 SimDist/MXT®-500 SimDist

- Application-specific columns in unbreakable Siltek® treated stainless steel tubing meet all resolution criteria for high temperature simulated distillation (e.g., ASTM Method D2887 Extended).
- MXT®-1HT SimDist and MXT®-1 SimDist phases offer true methyl silicone polarity; MXT®-500 SimDist phase is a carborane siloxane polymer.
- Stable to 430 °C.

MXT®-1 SimDist Column (Siltek® treated stainless steel) (nonpolar phase)

ID	df	temp. limits	6-Meter
0.53mm	0.15µm	-60 to 430°C	70101

MXT®-500 SimDist Column (Siltek® treated stainless steel) (nonpolar phase)

ID	df	temp. limits	6-Meter
0.53mm	0.15µm	-60 to 430°C	70104

Polywax® Calibration Materials

Description	qty.	cat.#	price
Polywax 655 calibration material	lg	36225	
Polywax 1000 calibration material	la	36227	

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Volatile Organics Analysis

MXT®-502.2 Columns (Siltek® treated stainless steel)

(proprietary Crossbond® diphenyl/dimethyl polysiloxane phase)

- · Application-specific columns with unique selectivity for volatile organic pollutants, cited in US EPA Method 502.2 and in many gasoline range organics (GRO) methods for monitoring underground storage tanks. Excellent separation of trihalomethanes; ideal polarity for light hydrocarbons and aromatics.
- Temperature range: -20 °C to 320 °C.

An MXT®-502.2 column will enable you to quantify all compounds listed in US EPA methods 502.2 or 524.2, whether you use a mass spectrometer or a PID in tandem with an ELCD. The diphenyl/dimethyl polysiloxane based MXT®-502.2 stationary phase provides low bleed and thermal stability to 320 °C. A 105-meter column can separate the light gases specified in EPA methods without subambient cooling.

ID	df	temp. limits	30-Meter	60-Meter	105-Meter	
0.25mm	1.40µm	-20 to 270/320°C	70915	70916		
0.28mm	1.60µm	-20 to 250/320°C	70919	70920	70921	
0.53mm	3.00µm	-20 to 270/320°C	70908	70909	70910	
TD	df	tomn limite	10-Motor	20-Meter		

0.18mm 1.00µm -20 to 270/320°C 71891

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similar phase

DB-502.2

MXT®-Volatiles Columns (Siltek® treated stainless steel)

(proprietary Crossbond® diphenyl/dimethyl polysiloxane phase)

- Application-specific columns for volatile organic pollutants.
- Temperature range: -20 °C to 320 °C.

MXT®-Volatiles columns were the first columns designed specifically for analyses of the 34 volatile organic pollutants listed in US EPA methods 601, 602, and 624. With these columns, you can quantify all compounds listed in these methods, whether you use a mass spectrometer or a PID in tandem with an ELCD. The diphenyl/dimethyl polysiloxane based MXT®-Volatiles stationary phase provides low bleed and thermal stability to 320 °C.

ID	df	temp. limits*	30-Meter	60-Meter	105-Meter	
0.25mm	1.00µm	-20 to 280/320°C	70900	70903		
0.28mm	1.25µm	-20 to 280/320°C	70924	70926	70928	
0.53mm	2.00µm	-20 to 280/320°C	70925	70927	70929	
	3.00µm	-20 to 250/320°C	70922	70923		

^{*}Maximum temperatures listed are for 15- and 30-meter lengths. Longer lengths may have a slightly reduced maximum temperature.

similar phase VOCOL

MXT®-624 Columns (Siltek® treated stainless steel)

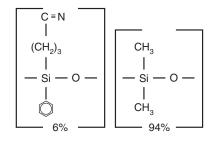
(low to midpolarity phase; Crossbond® 6% cyanopropylphenyl/94% dimethyl polysiloxane)

- Application-specific columns for volatile organic pollutants. Recommended in US EPA methods for volatile organic pollutants.
- · Temperature range: -20 °C to 280 °C.
- Equivalent to USP G43 phase.

The unique polarity of "624" columns makes them ideal for analyses of volatile organic pollutants. Although the MXT®-502.2 column is recommended in many methods, MXT®-624 columns offer the best separation of the early-eluting gases.

ID	df	temp. limits	30-Meter	60-Meter	
0.25mm	1.40µm	-20 to 240/280°C	70968	70969	
0.53mm	3.00µm	-20 to 240/280°C	70971	70973	
ID	df	temp. limits	10-Meter	20-Meter	

MXT®-624 Structure



similar phases

DB-624, HP-624



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GC COLUMNS PACKED/MICROPACKED COLUMNS





Bonded Stationary Phases

We combined our stationary phase synthesis experience with our unique Silcoport® packing deactivation process to create bonded phase packings that provide longer lifetimes, lower bleed, and shorter conditioning times.

Bonded methyl silicone phases (Rtx®-1 and Rtx®-5) and bonded Carbowax® phase (Stabilwax®) are completely cross-linked on Silcoport® packing. We have evaluated Rtx®-1 and Rtx®-5 bonded packed column phases side-by-side with nonbonded phases of comparable polarity; the bonded phases last longer than the equivalent nonbonded packing materials. Table I shows that retention times on an Rtx®-1 bonded packed column are highly repeatable after only 30 minutes of conditioning.

Table I Retention data shows the perfect reproducibility of the bonded phase packed columns with respect to retention times.

	Retention	on Time	
Min.	Max.	Mean	Stand. Dev.
0.241	0.243	0.242	0.001
0.493	0.497	0.495	0.002
5.746	5.765	5.752	0.005
18.482	18.491	18.486	0.004
25.093	25.103	25.098	0.004
32.160	32.171	32.166	0.004
34.316	34.328	34.326	0.007
	0.241 0.493 5.746 18.482 25.093 32.160	Min. Max. 0.241 0.243 0.493 0.497 5.746 5.765 18.482 18.491 25.093 25.103 32.160 32.171	0.241 0.243 0.242 0.493 0.497 0.495 5.746 5.765 5.752 18.482 18.491 18.486 25.093 25.103 25.098 32.160 32.171 32.166



0.53 mm ID micropacked columns now available. See **page 132**.

n = 9 columns





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Bonded Packed Column Stationary Phases

- · Short conditioning times.
- · Low bleed levels.
- · Higher sensitivities.
- · Longer column lifetimes.
- · Unsurpassed inertness for active compounds.

Bonded phases are used in capillary columns because they provide a dramatic increase in column quality. To truly bridge the gap between traditional packed columns and capillary columns, it was necessary to develop bonded liquid phases for packed columns. Packed column chromatographers can expect shorter conditioning times, lower bleed, and longer column lifetimes by using Restek bonded phase packed columns.

Bonded phases also last much longer than nonbonded phases. Bonded phases are more resistant to oxidation than nonbonded phases because of the stronger intermolecular forces produced by cross-linking. Because the material is thoroughly cross-linked, the phase will not migrate or puddle, as often happens with nonbonded phases. Figure 1 shows a comparison of a bonded and a nonbonded methyl silicone column after 170 temperature cycles. The results show the impressive durability of bonded phases.

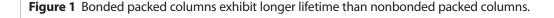
Restek's packed columns deliver the

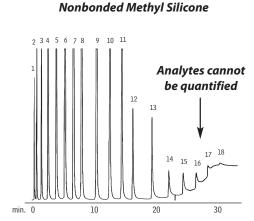
1-2-3 PUNCH!

- 1. Bonded stationary phases mean short conditioning times, low bleed, and unsurpassed column lifetimes.
- 2. SilcoSmooth® tubing provides the inertness of glass and the durability of stainless steel.
- 3. Silcoport[®] diatomaceous earth provides unsurpassed inertness for trace analysis.

Equivalent Liquid Phases

	BP-1, CC-1, CP-Sil 5CB, DB-1, DC-200, GE-SF-96, HP-1, HP-101, OV-1, OV-101,
Rtx-1	RSK-150, RH-1, SE-30, SP-2100, SPB-1, UCC W-98
Rtx-5	BP-5, CB-5, CC-5, CP-Sil 8CB, DB-5, HP-5, OV-73, SE-52, SE-54, SPB-5, Ultra-5
Stabilwax	BP-20, CP-Wax, CW-20, DB-Wax, HP-Innowax, PE-Wax, Supelcowax-10







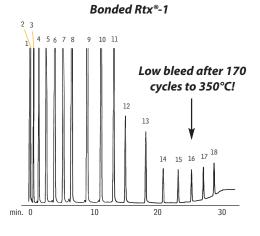
4. octane 5. nonane 6. decane undecane

8. dodecane 9. tetradecane 10. hexadecane 11. octadecane

12. eicosane 13. tetracosane 14. octacosane

15. dotricontane 16. hexatricontane 17. tetracontane

18. tetratetracontane GC PC00369



25" x 1/8" x 2mm ID Rtx®-1 SimDist 2887 SilcoSmooth® stainless steel (cat.# 80000-800)

1.0µI direct injection, 1-12% (w/w) each component

Oven temp.: Inj. & det. temp.: 35°C to 350°C @ 10°C/min. (hold 5 min.) 350°C

helium @ 25mL/min. Carrier gas: FID sensitivity: 256 x 10⁻¹¹ AFS

cat.# 31674 (1% each listed analyte in CS2) and cat.# 31675 (5% each, neat) meet requirements of ASTM D2887-01.







Packed Column Tubing

Restek offers a wide range of tubing choices for our packed columns, including SilcoSmooth® (Siltek®-treated stainless steel), stainless steel, Hastelloy®, nickel, copper, and Teflon® tubing. SilcoSmooth® and stainless steel tubing are our two most popular column materials. SilcoSmooth® tubing is an excellent replacement for fragile glass columns. Stainless steel tubing works well with most applications for nonreactive compounds.

SilcoSmooth® Tubing

If your analysis involves reactive compounds, you can use fragile and inflexible glass columns, or you can step up to SilcoSmooth® tubing which combines the inertness of glass with the strength and flexibility of stainless steel. Made from ultra-smooth, seamless 304 stainless steel and treated with the innovative Siltek® deactivation process, SilcoSmooth® tubing can replace glass columns for virtually any application.

Stainless Steel Tubing

If you are analyzing hydrocarbons or nonreactive compounds, you can use our rugged, flexible, and economical stainless steel columns. Restek stainless steel columns are made from high-quality weldrawn tubing.

Hastelloy® Tubing

Hastelloy® tubing is a nickel-chromium alloy with excellent inertness. It is normally used only for highly corrosive or oxidizing compounds or gases.

Nickel Tubing

Nickel tubing is often used for analyses of caustic or oxidizing compounds or gases.

Copper Tubing

Copper is a general purpose tubing that is only recommended for nonactive compounds.

Teflon® Tubing

Teflon® tubing is often used for reactive compounds or other special applications. Note that this tubing is permeable to gases.

Table I Packed column tubing dimensions

Material	1/4-inch OD x 5.3mm ID	3/16-inch OD x 3.1mm ID ¹	¹ / ₈ -inch OD x 2.0mm ID ²	1/16-inch OD x 1.0mm ID ³	0.95mm OD x 0.75mm ID ⁴	0.74 mm OD x 0.53mm ID
SilcoSmooth	✓	~	~	~	~	~
Stainless Steel	✓	/	~	~	/	
Hastelloy			~			
Nickel			~			
Copper	/		~			
Teflon			~			

- $^{\scriptscriptstyle 1}$ $^{\scriptscriptstyle 3}/_{\scriptscriptstyle 16}\text{-inch OD}$ x 3.1mm ID replaces $^{\scriptscriptstyle 1}/_{\scriptscriptstyle 4}\text{-inch OD}$ x 4mm ID glass columns.
- 2 1 / $_8$ -inch OD x 2mm ID replaces 1 / $_4$ -inch OD x 2mm ID glass columns.
- 3 $^1/_{18}$ -inch OD x 1.2mm and 1.0mm ID micropacked columns are designed for packed column injection systems.
- ⁴ 0.95mm OD x 0.75mm ID micropacked columns are designed for capillary injection systems.

¹/s- or ³/_{1s}-inch OD columns are easily adaptable to ¹/s-inch or 5mm ID injection ports, using inexpensive adaptors. All Restek packed columns can be coiled to fit any instrument configuration.

please note

We do not offer packed glass columns. SilcoSmooth® columns offer the inertness of glass, without breakage problems.

did you know?

Restek's advanced packed column technology provides columns with unmatched inertness and efficiency.

Packed Column Reduction Fittings

We will weld tubing reducers or VCR fittings to your column. Call Customer Service (ext. 3) or your Restek representative for pricing & availability.





Welded Tubing Reducers



Welded VCR Fittings

Frits—A new alternative to glass wool and braided end plugs!

Hastelloy® and Siltek® treated frits are now available for select packed and micropacked columns!







Hastelloy® frit Siltek® frit

Fill out the form on page 142, visit www.restek.com/packed, contact Customer Service or your Restek representative for pricing and availability.









Bonded Packed Column Stationary Phases

- · Low bleed levels.
- · Longer column lifetimes.
- · Short conditioning times.

please note

Stock packed columns are designed with a 2" void on the inlet end for on-column injections. For column configurations containing no void, add suffix -901 to the part number.

		Stair	iless Ste	el Tubing			Silco	Smooth	Tubing**	
Bonded Phase	L	OD	ID			L	OD	ID		
on 100/120 Silcoport W	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price
3% Rtx-1	6	1/8	2.1	80441-		2	1/8	2	80401-	
10% Rtx-1	6	1/8	2.1	80442-		2	1/8	2	80405-	
20% Rtx-1	6	1/8	2.1	80443-		2	1/8	2	80409-	
3% Rtx-5	6	1/8	2.1	80444-		2	1/8	2	80477-	
10% Rtx-5	6	1/8	2.1	80445-		2	1/8	2	80478-	
20% Rtx-5	6	1/8	2.1	80446-		2	1/8	2	80479-	
5% Rtx-Stabilwax	6	1/8	2.1	80447-		2	1/8	2	80415-	
10% Rtx-Stabilwax	6	1/8	2.1	80448-		2	1/8	2	80416-	
20% Rtx-Stabilwax	6	1/8	2.1	80449-		2	1/8	2	80417-	
Rtx-1 SimDist 2887***	25"	1/8	2.1	80450-		25"	1/8	2	80000-	

Frits—A new alternative to glass wool and braided end plugs!

Hastelloy® and Siltek® treated frits are now available for select packed and micropacked columns!



please **note**

listed on page 138.





Hastelloy® frit Siltek® frit

Fill out the form on page 142, visit www.restek.com/packed, contact Customer Service or your Restek representative for pricing and availability.

Temperature limits for stationary phases are

Chromosorb®-Based Packed Columns

	Stainless Steel Tubing					SilcoSmooth Tubing**					
	L	OD	ID			L	OD	ID			
On 100/120 Silcoport W***	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price	
3% Rt-101	6	1/8	2.1	80461-		2	1/8	2	80400-		
3% Rt-2100	6	1/8	2.1	80462-		2	1/8	2	80420-		
5% Rt-1200/1.75% Bentone 34	6	1/8	2.1	80463-		2	1/8	2	80125-		
5% Rt-1200/5% Bentone 34	6	1/8	2.1	80464-		2	1/8	2	80129-		

			Stair	less Ste	el Tubing	SilcoSmooth Tubing**					
On Chromosorb PAW	Mesh	L (ft.)	OD (in.)	ID (mm)	cat.#*	price	(m)	OD (in.)	ID (mm)	cat.#*	price
10% TCEP	100/120	8	1/8	2.1	80465-		2.5	1/8	2	80126-	
23% Rt-1700	80/100	30	1/8	2.1	80466-		9.2	1/8	2	80128-	

Porous Polymer Packed Columns

Restek offers a full range of porous polymers, including HayeSep®, Porapak, Chromosorb® Century Series polymers, and Tenax® TA packing, for analyses of volatile components and light solvents. Our QA procedures give you the confidence that every batch you purchase will deliver consistent column-to-column performance.

		Stainle	ess Stee	l Tubing	SilcoSmooth Tubing**					
Porous Polymers	L	OD	ID			L	OD	ID		
80/100 Mesh	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price
HayeSep Q	6	1/8	2.1	80467-		2	1/8	2	80433-	
Porapak Q	6	1/8	2.1	80468-		2	1/8	2	80427-	
Porapak QS	6	1/8	2.1	80469-		2	1/8	2	80426-	
Porapak R	6	1/8	2.1	80470-		2	1/8	2	80425-	
Chromosorb 101	6	1/8	2.1	80471-		2	1/8	2	80435-	
Chromosorb 102	6	1/8	2.1	80472-		2	1/8	2	80434-	

^{*}Please add column instrument configuration suffix number to cat.# when ordering. See chart on the next page.

also available

Chromosorb®, Porapak, HayeSep®, and Tenax® packing materials. See **pages 136-137.**





^{**}Siltek-treated stainless steel.

^{***}Modified version of Chromosorb W; highest inertness, most consistent performance.



CarboBlack Solid Supports

Graphitized carbon black offers unique selectivity and very little adsorption for alcohol analyses. Two types of CarboBlack supports are available, CarboBlack B and CarboBlack C. CarboBlack B support, with its higher surface area, can hold up to a 10% loading of a nonsilicone liquid phase. CarboBlack C support can hold up to a 1% loading of a nonsilicone liquid phase. Many Carbowax® 20M-loaded CarboBlack packings are available. CarboBlack packings are treated with KOH or picric acid for basic or acidic compounds, and special alcoholic beverage loadings are available. CarboBlack supports provide resolution and retention similar to Carbopack™ and Carbograph supports.

		Stainless Steel Tubing						SilcoSmooth Tubing**					
		L	OD	ID			L	OD	ID				
On CarboBlack B	Mesh	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price		
5% Carbowax 20M	80/120						2	1/8	2	80105-			
5% Carbowax 20M	60/80	6	1/8	2.1	88012-		1.8	1/8	2	80106-			
6.6% Carbowax 20M	80/120	6	1/8	2.1	80451-		2	1/8	2	80107-			
4% Carbowax 20M/													
0.8% KOH	60/80	_					2	1/8	2	80116-			
1% Rt-1000	60/80	8	1/8	2.1	88013-		2.4	1/8	2	80206-			
1% Rt-1000	60/80	6	1/8	2.1	80452-		2	1/8	2	80207-			
3% Rt-1500	80/120	10	1/8	2.1	80453-		3.05	1/8	2	80211-			
1% Rt-1510	60/80	10	1/8	2.1	80454-		3.05	1/8	2	80216-			
1.5% XE-60/1% H ₃ PO ₄	60/80	6	1/8	2.1	80455-		1.8	1/8	2	80305-			

Nickel 200 Tubing

		L	OD	ID		
On CarboBlack B	Mesh	(m)	(in.)	(mm)	cat.#*	price
5% Krytox						
(Ni 200 tubing)	60/80	3.05	1/8	2.1	80127-	\$315

			Stain	less Ste	el Tubing		SilcoSmooth Tubing**				
		L	OD	ID			L	OD	ID		
On CarboBlack C	Mesh	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price
0.2% Carbowax 1500	60/80	6	1/8	2.1	80456-		2	1/8	2	80121-	
0.2% Carbowax 1500	80/100	6	1/8	2.1	80457-		2	1/8	2	80122-	
0.1% Rt-1000	80/100	6	1/8	2.1	80458-		1.8	1/8	2	80205-	
0.19% picric acid	80/100	6	1/8	2.1	80459-		2	1/8	2	80311-	
0.3% Carbowax											
20M/0.1% H ₃ PO ₄	60/80	2.5	3/16	3.1	80460-		0.75	3/16	3.1	80111-	

Molecular Sieve Packed Columns

Molecular sieve packed columns easily separate permanent gases at above-ambient temperatures. Restek's R&D chemists have developed a process for preparing molecular sieve packings, which result in excellent batch-to-batch reproducibility. In addition, our molecular sieves are preactivated and ready to use. Each column comes with metal end-fittings to prevent water or carbon dioxide from adsorbing into the packing during shipment.

		Stainless Steel Tubing						SilcoSmooth Tubing**					
		L	OD	ID			L	OD	ID				
Molecular Sieve	Mesh	(ft.)	(in.)	(mm)	cat.#*	price	(m)	(in.)	(mm)	cat.#*	price		
Molesieve 5A	60/80	6	1/8	2.1	80473-		2	1/8	2	80428-			
Molesieve 5A	80/100	3	1/8	2.1	88015-		1	1/8	2	80440-			
Molesieve 5A	80/100	6	1/8	2.1	80474-		2	1/8	2	80429-			
Molesieve 5A	80/100	10	1/8	2.1	88014-		3.05	1/8	2	80430-			
Molesieve 13X	60/80	6	1/8	2.1	80475-		2	1/8	2	80480-			
Molesieve 13X	80/100	6	1/8	2.1	80476-		2	1/8	2	80439-			

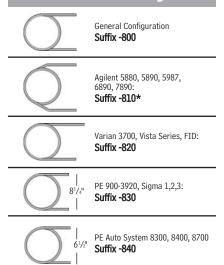
^{*}Please add column instrument configuration suffix number to cat.# when ordering. See chart on this page.

also available

CarboBlack packing materials. See page 134.



Column Instrument Configurations



See page 143 for additional configurations.

Note: Initial 2" of column will be empty, to accommodate a needle. For a completely filled column (not on-column) add suffix -901.









^{**}Siltek-treated stainless steel.

^{*-810} suffix also includes 11/2" void on detector side.



83606-

Aromatics Analysis

D3606 Application Column (2 column set)

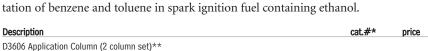
- Complete separation of ethanol and benzene, with a resolution value > 3.00.
- Accurate quantification of benzene and toluene.

Column 1: 6' (1.8m), 1/8" OD, 2.0mm ID, nonpolar Rtx-1

Column 2: 16' (4.9m), 1/8" OD, 2.0mm ID, proprietary packing material

- Fully conditioned two column set—ready to use out of the box.
- A chromatogram is provided with each column set demonstrating conformance to the revised ASTM method.

Conforms to the specifications established in ASTM method D3606-07 for the quantitation of benzene and toluene in spark ignition fuel containing ethanol



*Please add column instrument configuration suffix number to cat.# when ordering. See page 143.

**The column set is designed to accommodate both valve injection and/or syringe injection. Column 1 is configured with a 2" inlet void to facilitate on-column injection. The inlet is identified on both column 1 and column 2. Note: The inlet of column 2 is identified for proper orientation for connection to the valve.

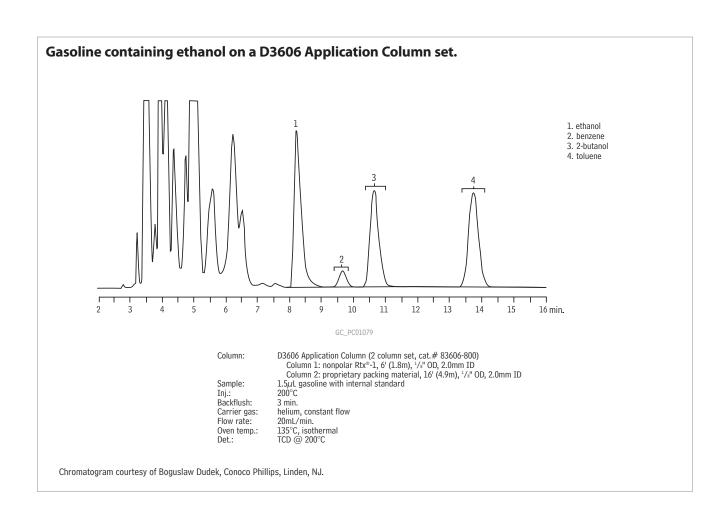
Resolve Benzene and Toluene in Spark Ignition Fuels Containing (thanol may be a seen and toluene in Spark Ignition Fuels Containing thanol may be a seen and to the seen and t

free literature

Resolve Benzene and Toluene in Spark Ignition Fuels Containing Ethanol

Download your free copy from www.restek.com

lit. cat.# 580227







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Light Hydrocarbon Analysis

- **Special Columns for Unsaturated Light Hydrocarbons** Faster separations of C1 to C4 hydrocarbons.
- Res-Sil® packing replaces Porasil materials.

n-Octane on Res-Sil® C Packed Column

This packed column has unique selectivity for resolving unsaturated light hydrocarbons (Figure 1).

OPN on Res-Sil® C Packed Column

This column separates the light hydrocarbons, and baseline resolves *cis*-2-butene from 1,3-butadiene (Figure 2).

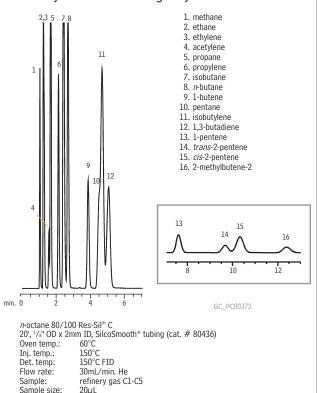
2abc Refinery Gas Column Set

This 3-column set is finely tuned to resolve light hydrocarbons. When used in the proper valving system, it will elute C5+ hydrocarbons ahead of C1 through C4 hydrocarbons. (Figure 3)

Description	cat.#*	price
n-Octane on Res-Sil C, 80/100 (20', 2.0mm ID,		
1/8" Silcosmooth OD)	80436-	
OPN on Res-Sil C, 80/100 (12', 2.0mm ID, 1/8" Silcosmooth OD)	80437-	
2abc Refinery Gas Column Set (3 column set)**	88000-	

^{*}Please add column instrument configuration suffix number to cat.# when ordering. See page 143.

Figure 1 *n*-Octane on Res-Sil® C packing has unique selectivity for unsaturated light hydrocarbons.



for more info

See page 135 for more information on Rec-Sil® nacking materials



Australian Distributors Importers & Manufacturers www.chromtech.net.au

refinery gas

Figure 2 OPN on Res-Sil® C packing has unique selectivity for *cis*-2-butene and 1,3-butadiene.

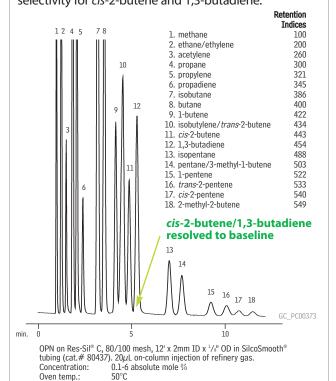


Figure 3 Refinery gas calibration standard on a Restek refinery gas packed column set.

Reference standard courtesy of AC Analytical Controls, Bensalem, PA.

Inj. & det. temp.:

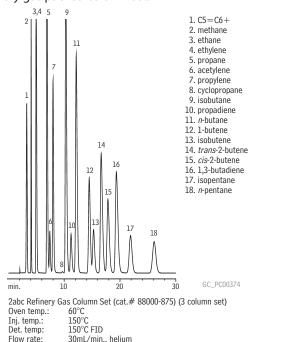
Carrier gas:

Flow rate:

200°C

helium

30mL/min



129

Sample:

^{**}This column set is for a valving system; therefore, packing material is filled to ends of columns



Permanent Gases & Hydrocarbon Analysis

ShinCarbon ST Packed/Micropacked Columns

- Separate permanent gases, including CO/CO₂, without cryogenic cooling.
- · Rapid separations of permanent gas/light hydrocarbon mixtures.
- Excellent compatibility with most GC detectors—minimal bleed, minimal baseline rise.
- Preconditioned, less than 30 minutes to stabilize.

Analyze oxygen, nitrogen, methane, carbon monoxide, and carbon dioxide with one column and at room temperature. ShinCarbon ST material, a high surface area carbon molecular sieve (~1,500 m²/g), is the ideal medium for separating gases and highly volatile compounds by gas solid chromatography (GSC). The rapid, above-ambient analyses these columns provide will be a great convenience. Excellent thermal stability of the high surface area carbon, combined with careful conditioning during column manufacturing, ensures low-bleed operation and rapid stabilization when installing a new column. Custom-made ShinCarbon ST columns are available on request.

ShinCarbon ST is a highly stable material. Its 330 °C upper temperature limit minimizes bleed and baseline rise during temperature programming, making the material compatible with most detection systems used for gas analysis, including TCD or HID. All ShinCarbon ST columns are fully conditioned in an oxygen/moisture free environment to prevent contamination. This minimizes stabilization time (less than 30 minutes) when installing a new column which, in turn, minimizes downtime.

also **available**

it's a fact

gases.

For adapter kits for installing packed/micropacked columns, see **page 133.**

ShinCarbon ST is an ideal packing material

for permanent gases, low molecular weight hydrocarbons, sulfur dioxide, and Freon®

ShinCarbon ST 80/100 Columns (packed)

(SilcoSmooth® Stainless Steel)*

OD	ID	2-Meter
1/8" Silcosmooth	2.0mm	80486-

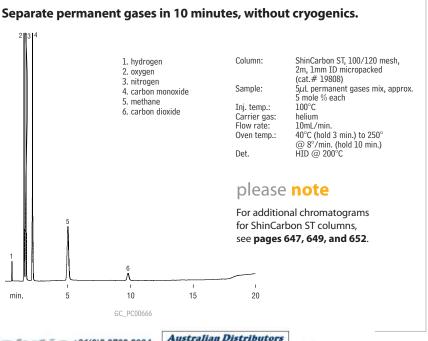
ShinCarbon ST 100/120 Columns (micropacked)

(SilcoSmooth® Stainless Steel)**

OD	ID	1-N	leter	2-Meter		
1/16"			\$245	19808		
0.95mm	0.75mm	19810	\$245			

^{*}Please add column instrument configuration suffix number to cat.# when ordering. See chart on the next page.

Chromatogram Search Tool Search by compound name, synonym, CAS # or keyword www.restek.com/chromatograms



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^{**}Does not include column nuts and ferrules. Optional installation kits can be ordered separately—see page 133.

Sulfur Analysis

Rt®-XLSulfur Packed/Micropacked Columns

- Optimized columns for low pbbv sulfur analyses.
- Eliminate the need for Teflon® tubing.
- · Column and end-fittings are Sulfinert® treated for maximum inertness.

Sulfur analyses are traditionally performed using Teflon® tubing to improve column inertness. Unfortunately, Teflon® tubing is gas permeable, difficult to pack with high efficiency, prone to shrinkage, and has poor thermal stability. The Rt®-XLSulfur packed or micropacked column eliminates these problems. The packing material for Rt®-XLSulfur columns is extensively deactivated for analysis of low ppbv levels of hydrogen sulfide and methyl mercaptan. It is then treated to achieve effective separation of hydrocarbons from sulfur compounds. The interior wall and the end-fittings of the Rt®-XLSulfur column are Siltek® treated, making the column as inert as Teflon®. The extra care taken to manufacture this column ensures more accurate analyses of sulfur compounds.

did you **know**?

Rt®-XLSulfur columns are optimized for low ppb-level sulfur analysis!

Rt®-XLSulfur Columns (packed)*

OD	ID	1-Meter	2-Meter
1/8"	2.0mm	80484-	80485-
3/ ₁₆ ^{II}	3.1mm	80482-	80483-

Rt®-XLSulfur Columns (micropacked)**

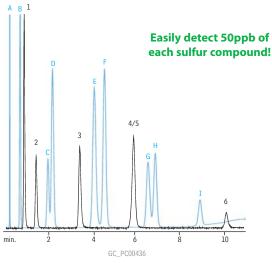
OD	ID	1-Meter	2-Meter
1/ ₁₆ "	1.0mm	19804	19805
0.95mm	0.75mm	19806	19807

^{*}Please add column instrument configuration suffix number to cat.# when ordering. See chart on this page.

also available

For adapter kits for installing packed/micropacked columns, see page 133.

Rt®-XLSulfur micropacked column separates hydrocarbons from sulfur compounds.



Rt®-XLSulfur micropacked column, 1m, 0.75mm ID Column: (cat.# 19806)

50ppb each

60°C to 230°C @ 15°C/min. Oven temp.:

helium Carrier gas: 9mL/min Flow rate: Det.: SCD/FID

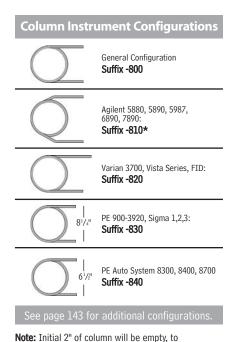
Sulfur standards courtesy of DCG Partnership 1 Ltd., Pearland, TX.

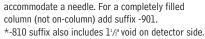
sulfurs

- 1. hydrogen sulfide
- 2. carbonyl sulfide 3. methyl mercaptan
- 4. ethyl mercaptan
- 5. dimethyl sulfide 6. dimethyl disulfide

hydrocarbons

- A. methane
- B. ethane C. propylene
- D. propane
- E. isobutane F. butane
- G. isopentane
- H. pentane
- I. hexane











^{**}Does not include column nuts and ferrules. Optional installation kits can be ordered separately see page 133.

GC COLUMNS | PACKED/MICROPACKED COLUMNS Micropacked Columns



All micropacked columns are made with inert SilcoSmooth® tubing, which is Siltek® treated for maximum inertness. See **page 125**.

Micropacked Columns

- Increased efficiency over traditional packed columns.
- · Higher capacity than PLOT columns.
- · Made from inert, flexible Siltek®-treated stainless steel tubing.
- Siltek®-treated, braided-wire end plug keeps packing intact, even under intense pressure surges during valve switching.
- Wide range of packings available.

Efficient, inert, and flexible

Micropacked columns are highly efficient and provide good sample capacity. With inert Siltek® treatment, micropacked columns are a powerful tool for solving many difficult application problems. The unsurpassed inertness of SilcoSmooth® tubing is based on Siltek® deactivation, which allows the column to be flexed and coiled without any fear of chipping or cracking the inert surface.

Easy to install—multiple internal diameters

Our micropacked columns are designed to fit packed and capillary injection systems. Standard wall (1/16-inch OD) micropacked columns offer improved efficiency in packed column instruments, without the expense of converting to capillary injection systems. Smaller OD (0.74 mm and 0.95 mm OD) micropacked columns install easily into a capillary injector, using slightly larger ferrules. Micropacked columns operate at flows exceeding 10 cc/min., for trouble-free operation.

Braided wire end plugs

Glass wool end plugs can be dislodged easily by carrier gas pressure surges. Restek's chemists insert braided wire into the column and secure it by making a small crimp near the column outlet. End plugs are Siltek® treated—the sample contacts only inert surfaces.

0.53 mm ID Micropacked Columns

- Available in a variety of packing materials.
- High capacity and retention for volatile compounds.
- Can be coiled to fit any GC.

	Mesh	ID	OD	Temp. Range	2-Meter	
HayeSep Q	80/100	0.53mm	0.74mm	up to 275°C	19042	
Molesieve 5A	80/100	0.53mm	0.74mm	up to 300°C	19041	
Rt-XLSulfur	80/100	0.53mm	0.74mm	up to 300°C	19044	
ShinCarbon ST	80/100	0.53mm	0.74mm	up to 330°C	19043	

0.75 mm ID Micropacked Columns

		ID	OD	Temp. Range	0.56-Meter	
20% TCEP on 80/1	100					
Chromosorb PAW		0.75mm	1/16"	0-175°C	19040 \$110	
	Mesh	ID	OD	Temp. Range	1-Meter	2-Meter
HayeSep R	100/120	0.75mm	0.95mm	up to 250°C	19014	19015
HayeSep Q	100/120	0.75mm	0.95mm	up to 275°C	19018	19019
HayeSep N	100/120	0.75mm	0.95mm	up to 165°C	19022	19023
HayeSep S	100/120	0.75mm	0.95mm	up to 250°C	19010	19011
Molesieve 5A	80/100	0.75mm	0.95mm	up to 300°C	19002	19003
Molesieve 13X	80/100	0.75mm	0.95mm	un to 350°C	19006	19007

1.00 mm ID Micropacked Columns

	Mesh	ID	OD	Temp. Range	1-Meter	2-Meter
HayeSep R	100/120	1.00mm	1/16"	up to 250°C	19012	19013
HayeSep Q	100/120	1.00mm	1/16"	up to 275°C	19016	19017
HayeSep N	100/120	1.00mm	1/16"	up to 165°C	19020	19021
HayeSep S	100/120	1.00mm	1/16"	up to 250°C	19008	19009
Molesieve 5A	80/100	1.00mm	1/16"	up to 300°C	19000	19001
Molesieve 13X	80/100	1.00mm	1/16"	up to 350°C	19004	19005 \$140

also available

For adapter kits for installing micropacked columns, see page 133.



Frits—A new alternative to glass wool and braided end plugs!

Hastelloy® and Siltek® treated frits are now available for select packed and micropacked columns!









Fill out the form on page 142, visit www.restek.com/packed, contact Customer Service or your Restek representative for pricing and availability.









Packed Column Inlet Adaptor Kits

- Use $\frac{1}{8}$ " and $\frac{3}{16}$ " OD columns in $\frac{1}{4}$ " on-column injection ports.
- Centers column perfectly in injection port to eliminate bent syringe needles.
- Slotted design prevents carrier gas occlusion.
- Vespel®/graphite reducing ferrules make installation easy.
- Includes all nuts & ferrules used to attach tubing to the injector or detector.

	For 1/8" Columns			For 3/16" Columns		
Description	qty.	cat.#	price	qty.	cat.#	price
Packed Column Inlet Adaptor Kit for 1/4" Injection Ports	kit	21651	\$28	kit	21650	



Adaptor kit centers the packed column in the injection port, so the syringe will not scrape the sides of the column.



Installation Kits for Micropacked Columns

Description	qty.	cat.#	price
Micropacked Column Installation Kit for 1mm ID columns; for valve applications.			
Kit contains: 1/16" Valco nut (1), 1/16" stainless steel nut (1), 1/16" Vespel/graphite ferrule (1),			
1/16" graphite ferrule (1), stainless steel ferrule (1), 1/16" stainless steel front ferrule (1),			
¹/ʁ" stainless steel back ferrule (1).	kit	21065	
Micropacked Column Installation Kit for 1mm ID columns; for direct injections.			
Kit contains: 1/16" stainless steel nuts (2), 1/16" Vespel/graphite ferrules (2), 1/16" graphite			
ferrules (2), 1/16" stainless steel front ferrules (2), 1/16" stainless steel back ferrules (2).	kit	21066	

Installation Kit for Packed Columns

Description	qty.	cat.#	price
Packed Column Installation Kit for 2mm ID columns; for valve applications.			
Kit contains: 1/8" stainless steel nut (1), stainless steel Valco nut (1),			
1/8" Vespel/graphite ferrule (1), stainless steel Valco ferrule (1),			
1/8" stainless steel front ferrule (1), 1/8" stainless steel back ferrule (1).	kit	21067	



Large-Bore Dual Vespel® Ring Inlet Seals

Micropacked Inlet Conversion Kits

Convert a capillary GC split/splitless inlet for use with 1/16" OD micropacked columns.

- For use with Agilent 5890 and 6890 GCs.
- · Sample pathways deactivated for ultimate inertness.

Description	qty.	cat.#	price
Aicropacked Column Adaptor Kit for Split/Splitless Injection			
njection Port Adaptor Kit			
(it includes: Dual Vespel Ring Inlet Seal, large bore; reducing nut, large bore;			
/16" ferrule, Vespel/graphite; 1/16" nut, stainless steel; 4mm splitless liner,			
ntermediate polarity deactivated	kit	22426	
Aicropacked Column Adaptor Kit for On-Column Injection			
njection Port Adaptor Kit			
(it includes: Dual Vespel Ring Inlet Seal, large bore; reducing nut, large bore; 1/16" ferrule,			
espel/graphite; Siltek treated metal liner installation guide; 1/16" nut, stainless steel	kit	22427	
eplacement Inlet Seals for Micropacked Column Adaptor			
Dual Vespel Ring Inlet Seals, large bore (2)	2-pk.	22429	
Replacement Metal Liner Installation Guide for On-Column Injection, Siltek Treated	ea.	22430	
Replacement 4mm Splitless Liner	ea.	20772	





1/4" SS Nut



Vacnal®/Cranhit

1/4" Vespel®/Graphite Ferrule

1/16" SS Nut

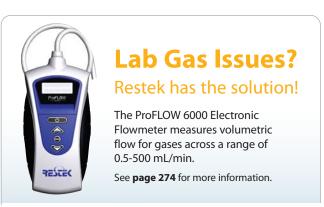




Large-Bore Reducing Nut

1/16" Vespel®/Graphite Ferrules

0 = 1/2 =	
	22430
	20772





Australian Distributors Importers & Manufacturers www.chromtech.net.au











did you know?

Silcoport support replaces

- Supelcoport
- · Chromosorb W HP
- GasChrom Q 2

Silcoport® Packing Materials

Outperform Any Deactivated Diatomaceous Earth Supports Available!

- Superior deactivation technology for improved inertness.
- Available in 80/100 and 100/120 mesh.
- Uniform particle distribution for maximum efficiency.

The increased sensitivity of modern detection systems and the desire to reduce detection limits requires a solid support to meet the challenging demands faced by analysts. Unlike conventional dimethyldichlorosilane (DMDCS) deactivation, Silcoport® incorporates our proprietary fused silica deactivation technology on diatomaceous earth solid supports. Silcoport® supports were developed using a special mixture of deactivants that yields the highest inertness without changing the polarity of the stationary phase. Silcoport® supports from Restek are the perfect match for highly inert SilcoSmooth® tubing.

Description	Temp. Limit	Mesh	Min. Qty.†	cat.#
Silcoport P*	400°C	80/100	100g	25641
	400°C	100/120	100g	25642

Please call for availability.

please **note**

Silcoport® is available uncoated or coated with the liquid stationary phase of your choice on 80/100 or 100/120 mesh sizes. Call Restek at 800-356-1688 or 814-353-1300, ext. 3, or contact your Restek representative for pricing and availability.

CarboBlack Packing Materials

- CarboBlack B supports up to 10% loading of a nonsilicone liquid phase.
- CarboBlack C supports up to 1% loading of a nonsilicone liquid phase.
- Equivalent to Supelco's Carbopack™ packings.

Graphitized carbon black offers unique selectivity and very little adsorption for alcohol analyses. Two types of CarboBlack supports are available, CarboBlack B and CarboBlack C. CarboBlack B support, with its higher surface area, can hold up to a 10% loading of a nonsilicone liquid phase. CarboBlack C support can hold up to a 1% loading of a nonsilicone liquid phase. Many Carbowax® 20M-loaded CarboBlack packings are available. CarboBlack packings are treated with KOH or picric acid for basic or acidic compounds, and special alcoholic beverage loadings are available. CarboBlack supports provide resolution and retention similar to Carbopack™ and Carbograph supports.

			MIN.		
Description	Temp. Limit	Mesh	Qty.	cat.#	price/g
CarboBlack B	500°C	60/80	10g	25500	
	500°C	80/120	10g	25501	
CarboBlack C	500°C	60/80	10g	25502	
	500°C	80/100	10g	25503	
CarboBlack BHT-100	150°C	40/60	10g	25504	
CarboBlack III (F)	175°C	80/100	10g	25506	
5% Carbowax 20m on CarboBlack B	225°C	80/120	10g	25507	
6.6% Carbowax 20m on CarboBlack B	225°C	80/120	10g	25508	
4% Carbowax 20m / 0.8% KOH on CarboBlack B	220°C	60/80	10g	25509	
0.19% picric acid on CarboBlack C	120°C	80/100	10g	25510	
4% Carbowax 20m on CarboBlack B-DA	200°C	80/120	10g	25511	







^{*}Prepared from Chromosorb P; Restek acid washed deactivation.

[†]Bulk quantities are available.

Res-Sil® Packing Materials

- Unique separation of saturated and unsaturated hydrocarbons.
- · Innovative bonding chemistry for batch-to-batch reproducibility, excellent thermal stability, and long life.
- · Wide range of bonded phases available.
- · Equivalent to Waters Durapak packings.

Bonded silica packings with n-octane or cyanopropyl (OPN) functional groups yield faster separations of C1 to C4 hydrocarbons, higher thermal stability, shorter conditioning times, and longer lifetimes than conventional packings. However, bonded silica packings have had inconsistent reproducibility and limited availability. Restek's research team has solved these age-old problems by developing Res-Sil® C packings for consistent performance.

Unique Selectivity for Process GC and High-Speed Analysis of Petrochemicals

Res-Sil® C bonded packings are ideal for fast resolution of difficult-to-separate saturated and unsaturated C4 hydrocarbons (see page 129). This unique selectivity, when combined with other columns in series, provides petroleum and petrochemical method developers with a powerful tool for fast determination of C1 to C5 hydrocarbons.

Innovative Research and Stringent QA Provide Batch-to-Batch Consistency

Restek's synthesis procedure eliminates batch-to-batch variations. The amount of bonded liquid phase is precisely controlled in every batch, for reproducible retention times and separations. Each production batch of Res-Sil® C packing is tested with a complex hydrocarbon mixture to meet demanding retention time and retention index specifications. Column bleed is also evaluated to ensure that there are no retention shifts or high baselines.

OPN on Res-Sil® C Packing—the Latest in a Line of Bonded GC Phases

Restek offers a wide range of bonded packings for packed column GC, including Rtx®-1, Stabilwax®, and Carbowax® phases. We have extended this technology to make n-octane on Res-Sil® C packing, and OPN on Res-Sil® C packing. Each of these packings has low bleed, conditioning times of less than 30 minutes, long lifetime, and consistent batch-to-batch reproducibility.

Temp.		Min.		
Limit (°C)	Mesh	Qty.	cat.#	price/g
300°C	60/80	10g	25400	
300°C	80/100	10g	25028	
300°C	60/80	10g	25401	
300°C	80/100	10g	25080	
175°C	80/100	10g	25081	
150°C	80/100	10g	25042	
150°C	80/100	10g	25030	
150°C	80/100	10g	25044	
	Limit (°C) 300°C 300°C 300°C 300°C 175°C 150°C	Limit (°C) Mesh 300°C 60/80 300°C 80/100 300°C 60/80 300°C 80/100 175°C 80/100 150°C 80/100	Limit (°C) Mesh Qty. 300°C 60/80 10g 300°C 80/100 10g 300°C 60/80 10g 300°C 80/100 10g 175°C 80/100 10g 150°C 80/100 10g 150°C 80/100 10g	Limit (°C) Mesh Qty. cat.# 300°C 60/80 10g 25400 300°C 80/100 10g 25028 300°C 60/80 10g 25401 300°C 80/100 10g 25080 175°C 80/100 10g 25081 150°C 80/100 10g 25042 150°C 80/100 10g 25030

¹N.C. Saha, S.K. Jain, and R.K. Dua. J. Chromat. Sci 1978, 323-328.

also available

Custom packing materials are also available. See page 140.

did you know?

Res-Sil replaces

- · Porasil B
- · Porasil C

ChromaBLOGraphy

Topical and timely insights from top chromatographers. Visit us at blog.restek.com



Australian Distributors www.chromtech.net.au



GC COLUMNS | PACKED/MICROPACKED COLUMNS Packed Column Packing Materials





Tim Herring, Technical Service

Technical Service

Do you have a technical question? Restek's Technical Service group has answers! Drawing from our extensive libraries of technical information and many years of collective chromatography experience, the experts in Technical Service can help you from set-up to method development.

Contact us:

For quick answers to commonly asked questions any time of the day, visit www.restek.com/answers or contact us directly:

In the U.S.

Phone: 1-800-356-1688, ext. 4 Fax: 814-353-1568 e-mail: support@restek.com

Outside the U.S.

Contact your Restek representative.

Chromosorb® Packings

Restek offers the full line of Chromosorb® solid supports. Choosing the appropriate support will depend on your application. Need assistance? Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4, or contact your Restek representative.

Chromosorb® P (used to prepare Silcoport® P)

Chromosorb® P support is manufactured from hard firebrick, making it a rugged material. This support is available acid washed (AW), nonacid washed (NAW), and traditional dimethyldichlorosilane (DMDCS) treated. Chromosorb® P support can hold up to 30 weight% of liquid stationary phase, making it the highest loading support available.

Chromosorb® W (used to prepare Silcoport® W and Silcoport® BW)

Chromosorb® W support is a flux-calcinated diatomite. This solid support is very fragile but offers the highest inertness of all diatomaceous earth supports. It can be prepared with up to 25 weight% of liquid stationary phase. Chromosorb® W support is available in AW, NAW, and DMDCS, or treated with Restek's proprietary (Silcoport®) deactivation. Chromosorb® W-HP is an acid washed, silanized version of Chromosorb® W.

Chromosorb® G

Chromosorb® G support is the hardest support available and has the lowest surface area of all the diatomaceous earth supports. Chromosorb® G support is available as AW, NAW, and DMDCS-treated. It can hold up to 10 weight% of liquid stationary phase.

Chromosorb® T

Chromosorb® T support is made from Teflon® material and is an extremely inert solid support.

Chromosorb® G and Chromosorb® T are available as custom products. Contact us for more information.

Description	Mesh	gm/btl.
Chromosorb P NAW	45/60	100g
	60/80	100g
	80/100	100g
	100/120	100g
Chromosorb P AW	60/80	100g
	80/100	100g
	100/120	100g
Chromosorb P AW/DMDCS	60/80	100g
	80/100	100g
	100/120	100g
Chromosorb W NAW	60/80	100g
Chromosorb W AW	60/80	100g
Chromosorb W AW/DMDCS	60/80	100g
Chromosorb W-HP	60/80	100g

Please call for availability.

NAW—nonacid washed

AW—acid washed

DMDCS—dimethyldichlorosilane

BW—base washed









Chromosorb® Century Packings

	•		Mesh 60/80	Mesh 80/100	Mesh 100/120
Description	Temp. Limits	g/btl.	cat.#	cat.#	cat.#
Chromosorb 101	275/325°C	50g	25608	25609	25610
Chromosorb 102	250/300°C	50g	25611	25612	25613
Chromosorb 103	275/300°C	50g	25614	25615	25616
Chromosorb 104		(equiva	lent to Haye	Sep C)	
Chromosorb 106	250/275°C	50g	25620	25621	25622
Chromosorb 107	250/275°C	50g	25623	25624	25625
Chromosorb 108	250/275°C	50g	25626	25627	25628

Please call for availability.

Porapak Series Packings

			Mesh	50/80	Mesh	80/100	Mesh :	100/120
Description	Temp. Limit	g/btl.	cat.#	price	cat.#	price	cat.#	price
Porapak P	250°C	20g	25576		25577		25578	
Porapak PS	250°C	20g	25579		25580		25581	
Porapak Q	250°C	26g	25582		25583		25584	
Porapak QS	250°C	26g	25585		25586		25587	
Porapak R	250°C	24g	25588		25589		25590	
Porapak S	250°C	26g	25591		25592		25593	
Porapak N	190°C	29g	25594		25595		25596	
Porapak T	190°C	31g	25597		25598		25599	

also available

Custom packing materials are also available. See **page 140**.

HayeSep® Series Packings

			Mest	n 60/80	Mesh	80/100	Mesh :	100/120
Description	Temp. Limit	g/btl.	cat.#	price	cat.#	price	cat.#	price
HayeSep A	165°C	24g	22560		25032		25033	
HayeSep B	190°C	24g	25561		25034		25035	
HayeSep C	250°C	24g	25562		25036		25037	
HayeSep D	290°C	24g	25563		25038		25039	
HayeSep DIP	290°C	24g	25564		25565		25566	
HayeSep DB	290°C	24g	25567		25568		25569	
HayeSep DOX				(Use Hay	eSep DB)			
HayeSep N	165°C	24g	25570		25045		25046	
HayeSep P	250°C	24g	25571		25047		25048	
HayeSep Q	275°C	24g	25572		25049		25050	
HayeSep R	250°C	24g	25573		25051		25052	
HayeSep S	250°C	24g	25574		25053		25054	
HayeSep T	165°C	24g	25575		25055		25056	\$150

Tenax® Packings

		Min.	Mes	h 60/80	Mesi	h 80/100
Description	Temp. Limit	Qty.	cat.#	price/g	cat.#	price/g
Tenax-TA	350°C	10g	25550		25551	
Tenay-GR	350°C	10a	25552		25553	



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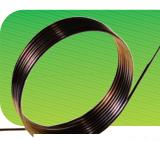
GC COLUMNS | PACKED/MICROPACKED COLUMNS Liquid Phases

We can prepare packed columns from the extensive list of liquid phases shown here. We have many more liquid phases. If you don't see the phase you need, call technical service or contact your Restek representative for availability.

min./max.

Apiezon L 50/300 ρ,ρ'-Azoxydiphenetole 132/140 BC-120 0/125 Bentone-34 0/180 bis (2-ethoxyethyl) adipate 0/150 bis (2-ethoxyethyl) adipate 20/100 ng.r-Bis(ρ-methoxyethyl) adipate 20/100 ng.r-Bis(ρ-methoxyethyl) adipate 189/225 Carbowax 1000 40/150 Carbowax 20M 60/225 Carbowax 20M-terephthalic acid 60/225 Carbowax 400 10/100 Carbowax 600 30/125 Cyclohexanedimethanol succinate 100/250 DC-11 0/300 DC-200 0/200 DC-550 20/250 Di(2-ethylhexyl)sebacate 0/125 Diethylene glycol adipate (DEGS) 20/200 Diethylene glycol adipate (DEGS) 20/200 Diethylene glycol adipate (DEGS) 20/200 Diethylene glycol adipate (DEGA) 0/30 Di-r-decyl phthalate 10/175 Ethylene glycol adipate 10/225 Ethylene glycol succinate 100/200	Phase	temp. (°C)
a,p-Azoxydiphenetole 132/140 BC-120 0/125 Bentone-34 0/180 bis (2-ethxyethyl) adipate 0/150 bis (2-ethxylhexyl) phthalate 150 max. bis (2-methoxyethyl) adipate 20/100 n,rl-Bis(p-methoxylbenzylidene)-α,α'-bi-p-toluidine (BMBT) 189/225 Carbowax 1000 40/150 Carbowax 20M 60/225 Carbowax 400 10/100 Carbowax 600 30/125 Cyclohexanedimethanol succinate 100/250 DC-11 0/300 DC-200 0/200 DC-550 20/250 DEGS-PS 20/200 Diethylene glycol succinate (DEGS) 20/200 Diethylene glycol succinate (DEGS) 20/200 Diisodecyl phthalate 0/125 2.4-Dimethylsulfolane 0/50 Di-r-decyl phthalate 10/175 2.4-Dimethylsulfolane 0/50 Di-r-decyl phthalate 100/225 Ethylene glycol adipate 100/225 Ethylene glycol adipate 100/220 FFAP 50/250 Fluorad FC-431, 50% solution in e		
BC-120 0/125 Bentone-34 0/180 bis (2-ethoxyethyl) adipate 0/150 bis (2-ethoxyethyl) phthalate 150 max. bis (2-methoxyethyl) adipate 20/100 n,n-Bis(ρ-methoxylbenzylidene)-α,α'-bi-ρ-toluidine (BMBT) 189/225 Carbowax 1000 40/150 Carbowax 20M 60/225 Carbowax 20M-terephthalic acid 60/225 Carbowax 400 10/100 Carbowax 600 30/125 Cyclohexanedimethanol succinate 100/250 DC-11 0/300 DC-200 0/2200 DC-550 20/250 DEGS-PS 20/200 Di(2+thylhexyl)sebacate 0/125 Diethylene glycol adipate (DEGA) 0/200 Diethylene glycol succinate (DEGS) 20/200 Dii-mdecyl phthalate 10/175 Dii-mdecyl phthalate 10/175 Dinonyl phthalate 10/175 Ethylene glycol adipate 100/225 Ethylene glycol succinate 100/200 FFAP 50/250 Fluorat		
Bentone-34 0/180 bis (2-ethoxyethyl) adipate 0/150 bis (2-ethylhexyl) phthalate 150 max. bis (2-ethylhexyl) adipate 20/100 n,rl-Bis(p-methoxyethyl) adipate 40/150 Carbowax 1000 40/150 Carbowax 20M 60/225 Carbowax 20M-terephthalic acid 60/225 Carbowax 400 10/100 Carbowax 600 30/125 Cyclohexanedimethanol succinate 100/250 DC-11 0/300 DC-200 0/200 DC-550 20/200 Dicycle-thylhexyl)sebacate 0/125 Diethylene glycol succinate (DEGS) 20/200 Diethylene glycol adipate (DEGA) 0/200 Diradecyl phthalate 0/175 2,4-Dimethylsulfolane 0/50 Diradecyl phthalate 10/175 Diradecyl phthalate 100/200 Ethylene glycol adipate 100/200 Ethylene glycol succinate 100/200 Ethylene glycol phthalate 100/200 Ethylene glycol succinate 20/100		
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OV-3, phenyl methyl 0/350 OV-7, phenyl methyl dimethyl, 20% phenyl 0/350 OV-11, phenyl methyl dimethyl, 35% phenyl 0/350		
OV-7, phenyl methyl dimethyl, 20% phenyl 0/350 OV-11, phenyl methyl dimethyl, 35% phenyl 0/350		
OV-11, phenyl methyl dimethyl, 35% phenyl 0/350		

Phase	min./max. temp. (°C)
OV-25, phenyl methyl diphenyl, 75% phenyl	0/350
OV-61, diphenyl, 33% phenyl	0/350
OV-73, 5.5% diphenyl	0/325
OV-101, dimethyl (fluid)	0/350
OV-105, cyanopropyl methyl	0/275
OV-202, trifluoropropyl (fluid)	0/275
OV-210, trifluoropropyl (fluid)	0/275
OV-215, trifluoropropyl (gum)	0/275
OV-225, cyanopropyl methylphenyl methyl	0/265
OV-275, dicyanoallyl	25/250
OV-330, silicone - Carbowax	0/250
OV-351	50/270
OV-1701, vinyl	0/250
Phenyldiethanolamine succinate	0/230
Polethylene glycol adipate (EGA)	100/225
Polyphenyl ether (5 rings) OS-124	0/200
Polyphenyl ether (6 rings) OS-138	0/225
Polypropylene glycol	0/150
Rtx-1 (Rt-101)	0/350
Rt-1000	50/250
Rt-1200	25/200
Rt-1220	50/200
Rt-1500, Rt-1510	50/230
Rt-2100	0/350
Rt-2300	20/275
Rt-2330, Rt-2340	25/275
Rt-608Pkd	0/275
Rt-Sebaconitrile	25/110
Rt-XLSulfur	250 max.
SE-30, SE-52, SE-54	50/300
Silar 5 CP, Silar 10 CP	0/250
Sorbitol	150 max.
Squalane	20/100
Squalene	0/100
Stabilwax	40/240
Tetracyanoethylated pentaerythritol	30/175
THEED (Tetrahydroxyethlenediamine)	0/125
β,β-Thiodipropionitrile (TDPN)	100
Tricresyl phosphate	20/125
1,2,3-Tris (2-cyanoethoxy) propane (TCEP)	0/175
Triton X-100, Triton X-305	0/200
UC W982	0/300
UCON 50-HB-2000	0/200
UCON 50-HB-280-X	0/200
UCON 50-HB-5100	0/200
UCON HB-1800-X	200 max.
UCON LB-550-X	0/200
Versamid 9000	190/275



OV-22, phenyl methyl diphenyl, 65% phenyl

Advantages of using Restek packed columns

- · Reasonably priced.
- · Low-bleed, long-lifetime bonded phases.

0/350

- · Wide variety of supports and packings.
- Produced by experienced packed column chromatographers.







4-353-1300

GC COLUMNS | PACKED/MICROPACKED COLUMNS USP Liquid Phase & Solid Support Cross-Reference

Restek can meet all of your packed column needs for US Pharmacopeia methods. Commonly used USP liquid phases and supports are listed below. Call Restek or your representative for a quote on your next packed column for pharmaceuticals.

USP	Phase Description	Restek-Supplied Equivalent
Gl	dimethylpolysiloxane oil	Rt-2100, OV-101, Rtx-1
G2	dimethylpolysiloxane gum	OV-1, Rtx-1
G3	50% phenyl-50% methylpolysiloxane	Rt-2250, OV-17
G4	diethylene glycol succinate polyester	Rt-DEGS
G5	3-cyanopropylpolysiloxane	Rt-2340
G6	trifluoropropylmethylpolysiloxane	Rt-2401, OV-210
G7	50% 3-cyanopropyl-50% phenylmethylsilicone	Rt-2300
G8	80% bis (3-cyanopropyl)-20% phenylpolysiloxane	Rt-2330
G9	methylvinylpolysiloxane	UCW 98
G10	polyamide	polyamide
G11	bis(2 ethylhexyl) sebecate polyester	bis(2 ethylhexyl) sebecate polyester
G12	phenyldiethanolamine succinate polyester	phenyldiethanolamine succinate polyester
G13	sorbitol	sorbitol
G14	polyethylene glycol (average mol. wt. 950-1050)	Carbowax 1000
G15	polyethylene glycol (average mol. wt. 3000-3700)	Carbowax 4000
G16	polyethylene glycol compound (average mol. wt. 15,000), a high molecular weight compound of	Carbowax 20M
	polyethylene glycol and a diepoxide linker	
G17	75% phenyl-25% methylpolysiloxane	0V-25
G18	polyalkylene glycol	UCON LB 550X
G19	25% phenyl-25% cyanopropyl-50% methylsilicone	OV 225
G20	polyethylene glycol (average mol. wt. 380-420)	Carbowax 400
G21	neopentyl glycol succinate	neopentyl glycol succinate
G22	bis(2 ethylhexyl) phthalate	bis(2 ethylhexyl) phthalate
G23	polyethylene glycol adipate	EGA
G24	diisodecyl phthalate	diisodecyl phthalate
G25	polyethylene glycol compound TPA, a high molecular weight compound of a polyethylene	Carbowax 20M TPA
GZJ	glycol and a diepoxide that is esterified with terephthalic acid	Carbowax Zoivi IFA
C24	<u> </u>	Dt VE 40
G26	25% 2-cyanoethyl-75% methylpolysiloxane	Rt-XE 60
G27	5% phenyl-95% methylpolysiloxane	SE-52, Rtx-5
G28	25% phenyl-75% methylpolysiloxane	DC 550
G29	3,3'-thiodipropionitrile	TDPN
G30	tetraethylene glycol dimethyl ether	tetraethylene glycol dimethyl ether
G31	nonylphenoxypoly(ethyleneoxy)ethanol (average ethyleneoxy chain length is 30): nonoxynol 30	Igepal CO 880
G32	20% phenylmethyl-80% dimethylpolysiloxane	OV-7
G33	20% Carborane®-80% methylsilicone	Dexsil 300
G34	diethylene glycol succinate polyester stabilized with phosphoric acid	Rt-DEGS PS
G35	a high molecular weight compound of a polyethylene glycol and a diepoxide that is esterified	Rt-1000
	with nitroterephthalic acid	
G36	1% vinyl-5% phenylmethylpolysiloxane	SE 54, Rtx-5
G37	polyimide	polyimide
G38	phase G1 containing a small amount of tailing inhibitor	Rt-2100/0.1% Carbowax 1500
G39	polyethylene glycol (average mol. wt. 1500)	Carbowax 1500
G40	ethylene glycol adipate	Rt-EGA
USP	Support Description	Restek-Supplied Equivalent
SlA	siliceous earth, see method for details on treatment	Silcoport W
SIAB	siliceous earth, treated as S1A and both acid- and base-washed	Silcoport WBW
SIC	crushed firebrick, calcined or burned with a clay binder >900°C, acid-washed, may be silanized	Chromosorb PAW or PAW DMDCS
SINS	untreated siliceous earth	Chromosorb W- Non Acid Washed
S2	styrene-divinylbenzene copolymer with nominal surface area of less than 50m ² /g and an	Chromosorb 101
<i></i>	average pore diameter of 0.3 to $0.4\mu m$	311 011103010 101
S3	ethylvinylbenzene-divinylbenzene copolymer with nominal surface area of 500 to 600m²/g and an	Hayesep Q
55	average pore diameter of $0.0075\mu m$	nayesep a
S4	styrene-divinylbenzene copolymer with aromatic -O and -N groups having a nominal surface	Hayesep R
JT	area of 400 to 600m ² /g and an average pore diameter of 0.0076µm	науезер к
S5	high molecular weight tetrafluorethylene polymer, 40- to 60-mesh	Chromosorb T
	styrene-divinylbenzene copolymer having a nominal surface area of 250 to 350m²/g and an	Chromosorb 102
S6		CHIOHIO201D TOZ
C7	average pore diameter of $0.0091\mu m$	Caula Dia di C
S7	graphitized carbon having a nominal surface area of 12m²/g	CarboBlack C
S8	copolymer of 4-vinyl-pyridine and styrene-divinylbenzene	Hayesep S
S9	porous polymer based on 2,6-diphenyl- <i>p</i> -phenylene oxide	Tenax TA
S10	highly cross-linked copolymer of acrylonitrite and divinylbenzene	HayeSep C
S11	graphitized carbon having a nominal surface area of 100m ² /g, modified with small amounts of	CarboBlack B 80/120 3% Rt 1500
	petrolatum and polyethylene glycol compound	
S12	graphitized carbon having a nominal surface area of 100m²/g	CarboBlack B











Custom Coated Packing Materials

Custom coated packing materials can be made with any of the supports listed below. The liquid stationary phases available are listed on page 138 and the coating ranges are listed in the chart. Coated packings are available in minimum orders of 20 grams.

To order, please call your Restek representative for pricing and specify the following:

- 1) stationary phase and stationary phase concentration
- 2) support and support mesh size
- 3) amount of packing needed

Ordering Example: (3%) (Rtx®-1) (Silcoport® P) (80/100) (20 g).

Support	Max. Coating %	Mesh Sizes	Price /gram
CarboBlack B	1-10%*	60/80, 80/120	
CarboBlack B HT	1-10%	40/60	
CarboBlack C	0.1-1%*	60/80, 80/100	
HayeSep	15%	60/80, 80/100, 100/120	
Porapak	15%	50/80, 80/100, 100/120	

Please call for availability of the following supports.

Chromosorb 101-108	5%*/10%**	60/80, 80/100, 100/120
Chromosorb W HP	20%	45/60, 60/80, 80/100, 100/120
Chromosorb G HP	20%	45/60, 60/80, 80/100, 100/120
Chromosorb G, P or W (AW or NAW)	10% (G) 25% (W) 30% (P)	45/60, 60/80, 80/100, 100/120
Chromosorb G, P or W (AW or DMDCS)	10% (G) 25% (W) 30% (P)	45/60, 60/80, 80/100, 100/120
Chromosorb T	15%	40/60
Silcoport P	30%	80/100, 100/120
Silcoport W BW	20%	80/100, 100/120
Silcoport W (replacement for Chromosorb 750)	20%	80/100, 100/120

^{*}Nonsilicone phase.

NAW—nonacid washed

AW—acid washed DMDCS—dimethyldichlorosilane

Moch

BW—base washed

For coatings over 15% or quantities over 50 grams, please call your Restek representative.

ordering **note**

Mesh Size

When ordering a packed column solid support, please specify mesh size. Refer to this chart to convert microns to mesh size.

Example:

150-180 micron particles = 80/100 mesh

	INICOLL
(µm)	Size
850	20
710	25
600	30
500	35
425	40
355	45
300	50
250	60
212	70
180	80
150	100
125	120
106	140
90	170
75	200
63	230

ordering **note**

Special phases that require a surcharge:

OV®-275, OV®-330, OV®-225, BMBT, 2,4-dimethylsulfolane, Silar, OV®-1701, and XE-60. Call your Restek representative for pricing.

Custom Packed/Micropacked Column Request Form See page 142 or visit www.restek.com/packed







^{**}Silicone phase.

GC COLUMNS | PACKED/MICROPACKED COLUMNS Custom Packed/Micropacked Columns

Custom Packed Columns To order, specify the following:

- 1) column dimensions (length, ID) and tubing material
- 2) packing description (percent coating and phase, support mesh size, and treatment)
- 3) column configuration (instrument manufacturer, model number, on-column injection or not) and with or without nuts and ferrules

Ordering Example: (6' x 1/8") (stainless steel) (3%) (Rtx®-1) (Silcoport® 80/100) (Agilent 6890) (on-column injection) (fittings kit).

Please use the custom order form on page 142 or visit **www.restek.com/packed**





Custom Micropacked Columns

To order, contact your Restek representative and specify the following:

- 1) physical dimensions (length, OD, ID, and tubing material)
- 2) packing description (percent coating and phase, support mesh size)
- 3) installation kit (see page 133), frit type

Ordering Example: $(2 \text{ m x }^{1}/_{16}\text{" OD x } 1.00 \text{ mm ID})$ (Siltek®-treated tubing) (5%) (Carbowax® 20M) (CarboBlack B) (80/120) (installation kit for valve applications, cat. #21065) (Siltek® frits)

Please use the custom order form on page 142 or visit **www.restek.com/packed**

did you know? Packing material in packed

Packing material in packed and micropacked columns is secured using wire braids or frits. This prevents packing material from exiting the column.

Frits—A new alternative to glass wool and braided end plugs!

Hastelloy® and Siltek® treated frits are now available for select packed and micropacked columns!







Siltek® frit

Hastelloy® frit

Fill out the form on page 142, visit www.restek.com/packed, contact Customer Service or your Restek representative for pricing and availability.

ordering note

For international pricing on custom packed or micropacked columns, please contact your Restek representative.







GC COLUMNS | PACKED/MICROPACKED COLUMNS Packed/Micropacked Column Custom Order Form

Order: Q	uote: Reference # f	from previous order (if available):
Date:		
Restek Account #:		Restek Use Only:
Contact:		
' '		
Address:		
		· · · · · · · · · · · · · · · · · · ·
Number of Columns:		
1) Column Dimensions:		
Length	OD x ID:	
2) Tubing (choose one): O S	ilcoSmooth® O Stainless Steel O Hastelloy	[®] ○ Nickel ○ Copper ○ Teflon [®]
3) Packing Description:		
Liquid Phase A (% + descrip	otion):	
Liquid Phase B (% + descrip	tion):	
Liquid Phase C (% + descrip	etion):	
Solid Support:		Mesh:
4) Column Configuration:		
	Inlet: Packed Full? O Yes	O No, leave" void (for on-column injection)
	Outlet: Packed Full? O Yes	O No, leave" void
Do you want this column n	reconditioned? O Yes (additional charge):	• ———
	=	330 3 140
Standard configuration suff	· -	
	O Siltek®	
Special configuration (next		Dimensions:
Welded Tubing Reducers	•	
Special Instructions:		
Place /		
Fittings (check appropriate of	circle)	
O KIT 1S	○ KIT C	○ KIT V
1/4" brass nuts	1/8" stainless steel nuts	¹/s" VCR fitting
1/4" to 1/8" V/G reducing ferrules	1/8" stainless steel front & back ferrules Additional charge	check appropriate circle:
No additional charge	Additional Charge	Stainless Steel (additional charge)Nickel (additional charge)
O KIT 2S	O KIT D 1/8" stainless steel nuts	o mener (dadanto nar enarge)
1/4" brass nuts 1/4" to 3/16" V/G reducing ferrules	,	
No additional charge	Additional charge	for a quote:
O KIT A	O KIT E	Complete this form and fax to Restek
1/8" brass nuts	1/4" stainless steel nuts	at 814-353-1309, or to your Restek
1/8" V/G ferrules	1/4" to 1/8" V/G reducing ferrules	representative.
No additional charge	Additional charge	representative.
○ KIT B	○ KIT F	This form is also available online at:
1/8" brass nuts	1/4" stainless steel nuts	www.restek.com/packed
1/8" brass front & back ferrules	¹ / ₄ " to ³ / ₁₆ " V/G reducing ferrules	II III assairesiii pusitesi
No additional charge	Additional charge	
V/G = Vecnel®/graphite		

142

Standard Configurations (choose one)









Shimadzu 9A Shimadzu 17A, 2010

Shimadzu Mini 2

Varian 3700, Vista





PE Auto System 8300, 8400, 8700



- Agilent 5880, 5890, 5987, 6890, 7890 -810
- -811 Agilent 6850

-800

- -820 Varian 3700, Vista Series, FID
- Varian 3800 -821
- -830 PerkinElmer 900-3920, Sigma 1,2,3
- -840 PerkinElmer Auto System 8300, 8400, 8700, Clarus 500 (C500)
- -841 PerkinElmer Auto Sys XL
- -845 ABB 3100, AAI (4" coil)
- -850 Shimadzu 14A, 2014
- -851 Shimadzu 8A
- -860 Thermo Scientific - TRACE 2000 -865 Carlo Erba -870 Tremetrics/Tracor -874 HNU 310 & 311 (4.5" coil) -875 **Analytical Controls Configuration** -880 Carle 40030

-852

-853

-854

-881

-885

- -890
 - Gow Mac 590 -891 Gow Mac 550
 - -892 Gow Mac 750 -893 Gow Mac 816 (3" coil, 3" spread on the arms,
 - and a total height of 5")
 - -894 Gow Mac 580
 - -895 SRI 8610C
 - SRI 8610C Dual GC Right Side -895R -895L SRI 8610C Dual GC Left Side
 - -896 SRI 9300

Custom Configurations (Please provide dimensions on order form, page 142, or at www.restek.com/packed)

Hitachi 263

Pye Unicam 4500



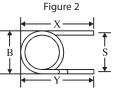
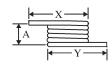




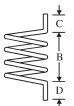


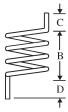
Figure 4

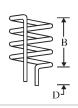


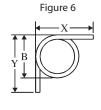


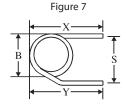














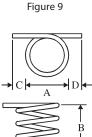
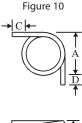


Figure 14





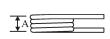


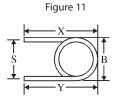


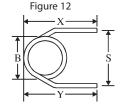
Figure 13



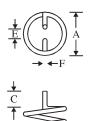


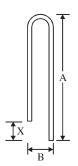
Figure 15























HPLC Columns

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Selecting an LC Column

Column Dimensions

Particle Size and Column Length

When choosing a column, the first two parameters that should be considered are the particle diameter and column length. These two parameters are the major contributors to separation efficiency (N), also known as theoretical plates. The number of theoretical plates is directly proportional to the length of the column over the diameter of the particle.

Particle Diameter

Particle diameter (dp), is commonly expressed in micrometers (µm), and has an inverse relationship to the efficiency of the separation. As the particle diameter decreases, the efficiency of the separation increases proportionately. If all other parameters remain equal, a 3 µm particle diameter offers an approximate 60% increase in efficiency over a 5 µm particle, and a 1.9 µm particle diameter offers an additional 60% over a 3 µm particle. System backpressure also increases proportionally as particle size decreases. Selecting the proper particle diameter is a way of controlling separation efficiency, and even analysis speed, but is limited by the pressure capabilities of the system. Often, particle diameters are determined by instrumentation. Table I is a guideline for selecting the optimal particle size, based upon pressure capability for common mobile phases.

Equation 1 The resolution equation defines variables affecting separations.

 $R = 1/4 \sqrt{N} x (k'/k'+1) x (\alpha-1/\alpha)$

Efficiency Retention capacity Selectivity



Table I Emperically determined maximum pressures exhibited for acetonitrile and methanol gradients for various particle sizes and flow rates

Bold blue numbers represent optimal linear velocity for the given particle size and ID. For longer column lengths, the approximate pressure corresponds to the increase in column length. A 2-fold increase in column length yields a 2-fold increase in back pressure.

Flow rate (mL/min.)		Pressure (ps tonitrile @	-	Flow rate (mL/min.)	Pressure (psi) Methanol @ 25°C		
	1.9µm	2.2µm	3µm_		1.9µm	2.2µm	3µm
0.2	2436	1755	1045	0.2	3198	2304	1371
0.3	3655	2633	1567	0.3	4797	3455	2057
0.4	4873	3510	2090	0.4	6395	4607	2743
0.5	6091	4388	2612	0.5	7994	5759	3429
0.55	6700	4826	2873	0.55	8794	6335	3771
0.6	7309	5265	3135	0.6	9593	6911	4114
0.7	8527	6143	3657	0.7	11192	8062	4800
0.8	9745	7020	4180	0.8	12791	9214	5486
0.9	10964	7898	4702	0.9	14390	10366	6171
1	12182	8775	5224	1	15989	11518	6857

Data are for 2.1 x 50 mm columns using a gradient of 5% B to 95% B (A: water, B: organic solvent). See Table II for optimal flow rates for alternate column internal diameters.

When choosing a particle diameter, it is not recommended to operate significantly below the optimal linear velocity, as losses in efficiency can be observed due to axial dispersion. As a quick estimate of particle diameter usability, check the optimal linear velocity for the organic solvent used and ensure maximum pressures observed are within the pressure specifications of your instrument. Please note that these are maximum pressures observed during gradient analyses. Isocratic mobile phases of lesser viscosity will operate with less back pressure.

Column Length

Column length (L) directly relates to efficiency. Increasing column length increases efficiency. It is important to note that column length is not an ideal way to increase resolution. Doubling the column length yields only a 1.4x gain in resolution (efficiency is a square root term in the resolution equation), while doubling both analysis time and system backpressure. Shorter column lengths are suitable for fast gradients and higher sample throughput, while longer column lengths are more suitable for higher peak capacity and shallow gradients.

Column Internal Diameter

Column internal diameter (ID) is the inner diameter of the column hardware holding the packing material, and is commonly expressed in millimeters (mm). Column ID is ultimately related to efficiency and flow rate through the van Deemter equation. This chromatographic concept relates column efficiency (often called band broadening) to linear velocity. Linear velocity is the distance mobile phase travels per unit time, while flow rate is the volume of mobile phase per unit time. A specific linear velocity has a flow rate that is dependent upon the internal diameter of the column. As column ID is lowered, a lower flow rate is needed to maintain the same linear velocity. Flow rate is the volume of mobile phase needed to create the desired liner velocity. It is important to note that as particle size decreases, optimal linear velocity increases. Columns with smaller particle sizes, namely 1.9 and 2.2 µm, are capable of running much higher flow rates and therefore creating higher sample throughput. Table II (next page) can be used to find the optimal flow rate, as it relates to particle size and internal diameter, and is a good starting point for method development.



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Table II Optimal flow rates for various particle diameters and column internal diameters.

Colu (mm	mn ID)	Optimal flow rate (mL/min.)			
	$1.9 \mu \text{m} \text{dp}$	$2.2\mu\mathrm{m}$ dp	3μ m dp	$5 \mu \text{m dp}$	
4.6			1.50	1.00	
3.2			0.73	0.50	
3.0	1.12	1.00	0.65	0.40	
2.1	0.55	0.47	0.31	0.20	
1.0			0.07	0.05	

System volume, or extra column volume, also affects efficiency. As extra column volume increases, lower efficiency is experienced as band broadening increases. Typically, column IDs less than 3.0 mm, considered narrow bore columns, require systems with minimized extra column volume. Table III defines the classification of columns according to internal diameter or bore. Another contributor to overall system volume and column ID choice is the system delay volume. Delay volume is the volume contained between the pumps and the column, often including the mixing chamber and injection valve. Delay volume is especially significant during gradient analysis. Narrow bore columns often require lower flow rates, and these lower flow rates will not sweep the delay volume in high volume systems quickly. This extends analysis time and creates an increased gradient lag time. For fast gradient analysis and LC/MS, narrow bore columns and systems with low extra column volume are recommended.

Physical Characteristics Silica Type

The physical characteristics of the support material can be selected to control retention and peak shape. The base silica, commonly porous spherical particles, used in the manufacturing of the column can first be selected by type, namely Type A, Type B, or Base Deactivated. Type B silica is typically higher in purity and provides limited silanol activity. When analyzing basic compounds, especially without the use of mobile phase modifiers, Type B silica is recommended for more symmetric peak shape. Type A and Base Deactivated silica are recommended for acidic, neutral, and slightly basic compounds.

Another criterion for choosing a column line is the porosity of the silica. The pore size, or pore diameter, which is commonly expressed in Å, is the average diameter of the silica pores. This relates inversely to available surface area. Smaller pore volumes create a larger surface area in a given particle and, therefore, can be used to control the amount of stationary phase bonded to the particle.

The carbon load, or % carbon in the packing material, is the measure of the amount, or load, of stationary phase. Carbon load directly affects retention. Higher carbon loads typically result in higher retention characteristics. Figure 1 illustrates the relative retention capacities of commercially available columns for hydrophobic compounds. Allure® columns were designed for maximum retention of small molecules by utilizing high carbon load, surface area, and ligand density. In contrast, Viva columns, considered wide pore, have a large pore diameter and are used for the analysis of larger molecules as commonly seen in biological separations. Table IV summarizes the physical characteristics and recommended uses for Restek column lines.

Silica columns commonly have a temperature limit of 80 °C. Increased temperature can be used to decrease mobile phase viscosity and, therefore, lower the back pressure of a

Table III	Common classifications	

for LC columns by internal diameter.

Classification	Internal Diameter
Capillary	<1.0 mm ID
Micro bore	1.0 mm ID
Narrow bore	2.1-3.0 mm ID
Standard bore	3.2-4.6 mm ID
Semi-prep	10 to 21.2 mm ID
Prep	30 to 50 mm ID

Table IV Physical characteristics and recommended uses for Restek columns,
hased on silica lines

Column Line	Pore Size (Å)	Surface Area (m²/g)	Carbon Load Range* (%)	Usage
Allure	60	450	12–27	Very high retention (highest retention available) High purity 5 µm particle size only
Ultra II	100	300	11–19	High retention High purity Full range particle size - 1.9, 2.2, 3 and 5 μ m for UHPLC and HPLC
Ultra	100	300	2–20	High retention High purity 3 and 5 µm particle size only
Pinnacle II	110	180	2–13	Moderate retention Acidic Type A (not for RP analyses of bases) 3 and 5 µm particle size only
Pinnacle DB	140	150	4–11	Moderate retention Base deactivated silica 1.9, 3 and 5 µm particle sizes
Viva	300	100	3.5–9	Low retention Wide-pore silica for biological separations

Ranges are based on phases available for each silica line. See column product listings for more specific*



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4-353-1300



system. It is important to note that while altering the temperature of a separation can lower back pressure, it also lowers retention and can change selectivity. pH can also be used to control the selectivity and retention of ionizable compounds. Acid-base equilibrium can be employed to directly affect the retention characteristics of acidic and basic compounds, mainly in reversed phase chromatography (RPC). The pH limit of most silica columns is between 2 and 8.

Stationary Phases

Stationary phase, or the specific chemical ligand bonded to the silica support, plays a primary role in resolving compounds. Through selectivity, the major contributor to resolution, a stationary phase can control the retention characteristics of the solutes. Identifying the appropriate stationary phase can greatly ease method development and create less need for mobile phase additives. The decision tree in Figure 2 (next page) can help analysts select appropriate stationary phases, based upon analyte solubility and polarity. Liquid chromatography employs specific modes of separation which are denoted by the polarity distinction between the stationary and mobile phases; the most common are reversed phase, normal phase and HILIC.

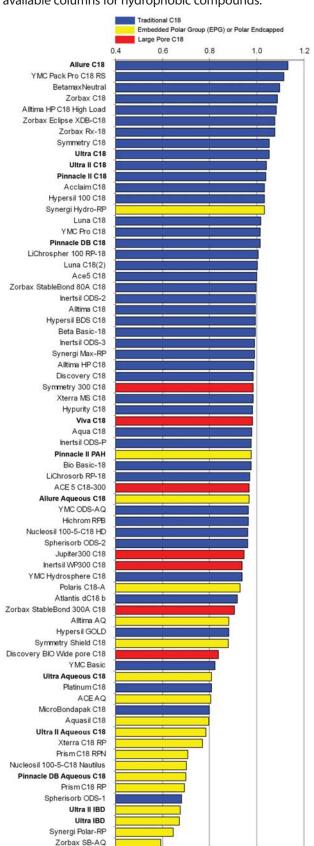
Reversed phase chromatography (RPC) consists of a nonpolar stationary phase and a polar mobile phase. RPC is the most commonly used mode and works well for the analysis of water-soluble hydrophobic compounds. The most common types of columns used in RPC are alkyls (most often a C18, also known as octadecyl or ODS). End-capping is often employed in reversed phase columns. End-capping refers to the dense bonding or modification of the silica surface to further limit silanol activity. This acts to provide better peak symmetry, especially for basic compounds. Alternate ligands and bonding chemistries can be applied to RPC columns to incorporate phenyl, cyano, amino, and other polar groups into the stationary phase, providing alternate selectivity to a C18.

Normal phase chromatography (NPC), named because it was the first type of liquid chromatography, not for being more common, employs a polar stationary phase and a nonpolar mobile phase. NPC is suited for the analysis of fat soluble compounds and can also provide more selectivity for positional isomers than is commonly observed in RPC. Bare silica columns are most commonly used for NPC. Other phases for NPC include cyano and amino.

Hydrophilic Interaction Chromatography (HILIC) employs a polar stationary phase and a less polar mobile phase. HILIC differentiates itself from RPC and NPC as it uses traditional NPC stationary phases and RPC mobile phases. HILIC is recommended for the analysis of very polar compounds, often having negative log P values, and for analysis by LC/MS. Bare silica, cyano and amino columns are also commonly used in HILIC mode. Some stationary phases, like IBD, PFP propyl and cyano, incorporate both nonpolar and polar functionality and can be used in multiple or mixed-mode separation mechanisms.

Restek stationary phases and recommended uses are presented in Figure 3 (page 149). For additional help selecting a column, contact Restek at **support@restek.com** or call your local Restek representative.

Figure 1 Relative retention capabilities of commercially available columns for hydrophobic compounds.





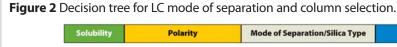


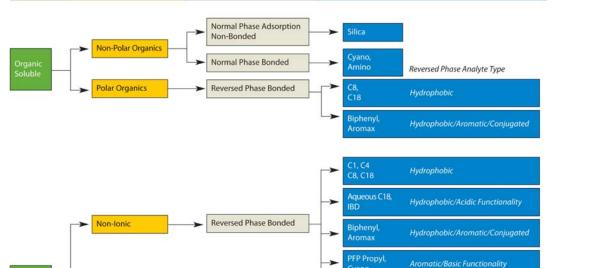
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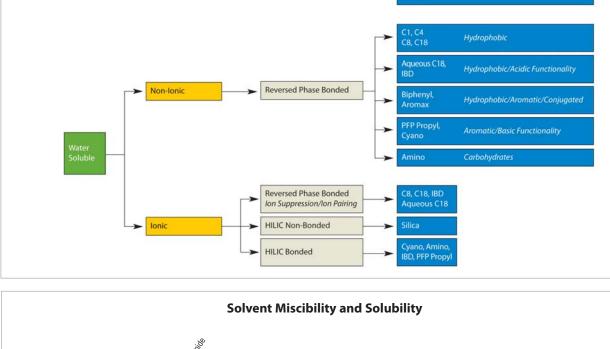


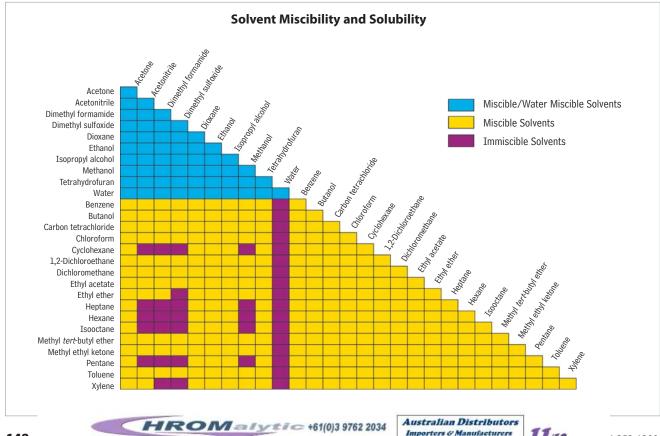


Recommended Stationary Phase









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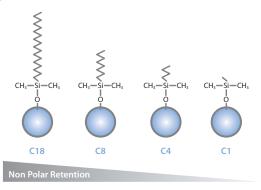
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Figure 3 Restek stationary phases and recommended uses.

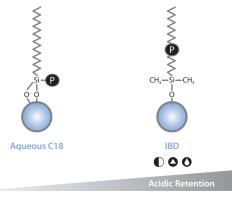
Alkyl Phases

- General purpose reversed phase columns rely on dispersive interaction to separate molecules.
- Elution order is hydrophilic to hydrophobic; increased chain length increases retention.



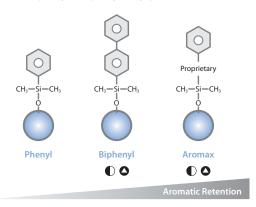
Modified Alkyl Phases

- Alkyl phases with modified bonding chemistry to increase polarity.
- Columns are compatible with 100% aqueous mobile phases.
- · Rely on dispersive interaction with additional hydrogen bonding.
- · Aqueous columns show balanced retention and are a great starting point for method development.
- Polar embedded IBD columns provide good peak symmetry for bases and offer orthogonal selectivity to a C18.
- IBD phases are capable of mixed mode mechanisms and can operate in both reversed phase and HILIC modes.



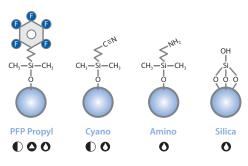
Phenyl Phases

- Phenyl columns rely on dispersive and pi-pi $(\pi$ - π) interactions.
- Enhanced retention and selectivity are seen with aromatic, conjugated molecules, and compounds containing electron withdrawing ring substituents.
- Biphenyl and Aromax columns show more interaction and greater aromatic retention and selectivity, relative to conventional phenyl and phenyl-hexyl phases.



Polar Phases

- · Polar phases rely on aromatic and dipole interactions.
- · Cyano and PFP Propyl phases show increased retention for aromatic compounds and charged bases.
- PFP Propyl phases are commonly used for increased retention of ionic and basic compounds.
- Amino columns are commonly used for the analysis of saccharides.
- Silica columns are used for normal phase and HILIC separations.



Legend orthogonal selectivity to a C18 good choice for LC/MS MILIC compatible

HPLC Pump Pressure Conversion Table

Pressure	psi	atm	kg/cm²	torr	kPa	bar	inches Hg
1 psi =	1	0.068	0.0703	51.713	6.8948	0.06895	2.0359
1 atm =	14.696	1	1.0332	760	101.32	1.0133	29.921
1 kg/cm ² =	14.223	0.967	1	735.5	98.06	0.9806	28.958
1 torr =	0.0193	0.00132	0.00136	1	0.1330	0.00133	0.0394
1 kPa =	0.1450	0.00987	0.0102	7.52	1	0.0100	0.2962
1 bar =	14.5038	0.9869	1.0197	751.88	100	1	29.5300
1 in Hg =	0.49612	0.0334	0.0345	25.400	3.376	0.03376	1

Multiply units in the left-most column by the conversion factors listed in the columns to the right.

10 psi x 0.068 = 0.68 atme.g.,

10 b









Pore

Carbon

End

Restek





Jitra II C18	Υ			
	T	100	19	Ideal for anilines, barbiturates, carbonyls, fat-soluble vitamins, fatty acids, glycerides, phthalates, PTH amino acids, steroids, other acids.
Jitra II Aqueous C18	N	100	15	Ideal for analyses that require >90% water in the mobile phase. Excellent for highly water soluble or poorly organic soluble compounds. Excellent for water-soluble vitamins and organic acids.
Jitra II C8	Υ	100	12	Selectivity and peak shape similar to Ultra C18, but less hydrophobic retention.
Jltra II Biphenyl	Υ	100	15	Excellent choice for the analysis of steroids, tetracyclines, drug metabolites, and other compounds that contain some degree of unsaturation.
Jltra II Aromax	Υ	100	17	Alternative to Biphenyl when more retention is required.
Jltra II IBD	N	100	12	A polar group assists in deactivating surface silanols and contributes to unique separation selectivities for acids, bases, zwitterions, and other polar compounds.
Jitra Ⅱ PFP Propyl	Υ	100	11	Highly retentive for basic analytes. An excellent phase for separating nucleosides, nucleotides, purines, pyrimidines, and halogenated compounds.
Jltra II Silica	N	100	0	Ideal for normal phase applications.
Jltra II Carbamate	N	100	15	Rapid analysis of carbamates.
Jitra II Quat	Υ	100	12	Proprietary phase for the analysis of paraquat and diquat and other quaternary amines.
Pinnacle DB C18	Υ	140	11	Hydrophobic C18 phase suitable for analyses of a wide range of compounds, from acidic through slightly basic.
Pinnacle DB Aqueous C18	_	140	6	Ideal for applications that require highly aqueous mobile phases, such as organic acids and water-soluble vitamins.
Pinnacle DB C8	Υ	140	6	Applications similar to Pinnacle DB C18, but with less hydrophobic retention. Less retention can be useful for shortening analysis time, if resolution is adequate.
Pinnacle DB PFP Propyl	Υ	140	6	Exhibits excellent peak shapes for a wide range of compounds, including nucleosides, nucleotides, and halogenated compounds.
Pinnacle DB Biphenyl	Υ	140	8	Excellent choice for the analysis of steroids, tetracyclines, drug metabolites, and other compounds that contain some degree of unsaturation.
Pinnacle DB Cyano	Υ	140	4	Suitable for a wide range of compounds, from acidic through slightly basic. Also useful for confirmation of analyses on a C18 or C8 column. Can be used in normal phase or reversed phase mode of separation.
Pinnacle DB Phenyl	Υ	140	5.3	Suitable for polar aromatic compounds, fatty acids, purines and pyrimidines.
Pinnacle DB Silica	_	140	_	Normal phase mode of separation.
Pinnacle DB IBD	Υ	140	_	A polar group assists in deactivating surface silanols and contributes to unique separation selectivities for acids, bases, zwitterions, and other polar compounds.
Pinnacle DB PAH	Υ	140	_	Ideal for polycyclic aromatic hydrocarbons.
Pinnacle II C18	Υ	110	13	Superior general purpose C18 for non-basic analytes.
Pinnacle II PAH	Υ	110	_	Maximum resolution of polycyclic aromatic hydrocarbons.
Pinnacle II C8	Υ	110	7	Superior general purpose C8 for non-basic analytes.
Pinnacle II Cyano	Υ	110	4	Superior general purpose cyano for weakly-basic analytes. Used in either normal or reversed phase analyses.
Pinnacle II Phenyl	Υ	110	6	Superior general purpose phenyl for neutral analytes.
Pinnacle II Amino	N	110	2	Excellent general purpose amino phase. Excellent choice for carbohydrate analysis.
Pinnacle II Biphenyl	Υ	110		Multiple aromatic ring structures; excellent for explosives.
Pinnacle II Silica	_	110	_	Ideal for polar analytes.
Allure C18	Υ	60	27	Ideal for MS and light-scattering detection of neutral to slightly polar solutes. Separates basic compounds, showing good deactivation; excellent for explosives or steroids.
Allure Aqueous C18	N	60	_	Ideal for analyses that require >90% water in the mobile phase. Excellent for highly water soluble or poorly organic soluble compounds. Excellent for water-soluble vitamins and organic acids. More retention than Ultra Aqueous columns.
Allure AK	Υ	60	_	Ideal for the analysis of aldehydes and ketones as DNPH derivatives.
Allure Basix	Υ	60	12	Ideal for LC/MS of basic solutes. Excellent for basic pharmaceuticals or other amine-containing compounds.
Allure PFP Propyl	Υ	60	17	Ideal for MS, ELSD, or NPD detection of nucleosides, nucleotides, purines, pyrimidines, or halogenated compounds.
Allure Organic Acids	N	60		Excellent resolution of challenging organic acids.

pH ranges and temperature limits: see product listings on pages listed here. Column I



Australian Distributors Importers & Manufacturers www.chromtech.net.au

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	et 11 pt	USP	Page "
Chromatographic Properties	Similar Phases Discovery C18, Symmetry C18, Hypersil Gold C18,	Code	#
A very retentive, high-purity phase that exhibits excellent peak shape for a wide range of compounds. Recommended as a general purpose reversed phase column.	Luna C18, Zorbax C18, Kromasil C18, LiChrospher RP-18, Inertsil ODS-2, Develosil C18	Ll	157
Highly retentive and selective for reversed phase separations of polar analytes. Highly base deactivated. Compatible with highly aqueous (up to 100%) mobile phases.	AQUA C18, Aquasil C18, Hypersil Gold AQ, YMC ODS-Aq	L1	159
Very retentive, high-purity, base-deactivated reversed phase packing that exhibits excellent peak shape for a wide range of compounds.	Luna C8, Symmetry C8, Hypersil Gold C8	L7	158
A unique reversed phase material that exhibits both increased retention and selectivity for aromatic and/or unsaturated compounds, compared to conventional alkyl and phenyl phases.	Unique	L11	160
A unique reversed phase material that exhibits superior retention and selectivity for aromatic and/or unsaturated compounds, compared to conventional alkyl and phenyl phases.	Unique	L11	161
One of a group of intrinsically base-deactivated (IBD) phases, with a polar group within, or intrinsic to, the alkyl bonded phase. Provides unique selectivity and high level of base deactivation while reducing or eliminating the need for mobile phase additives.	SymmetryShield, Discovery ABZ & ABZ+, Prism	L68	162
A pentafluorophenyl with a propyl spacer.	Fluophase PFP, Discovery HS F5	L43	163
High purity, high surface area.	_	L3	164
Proprietary stationary phase can process up to twice as many samples per hour, compared to a conventional C18 phase.	Unique	_	165
High purity silica.	Unique	_	165
Highly base-deactivated spherical silica manufactured by Restek. Monomeric C18 bonding.	Hypersil BDS C18, Zorbax Eclipse XDB-C18, Spherisorb ODS	L1	166
Highly selective phase for polar analytes. Compatible with highly aqueous (up to 100%) mobile phases. Silica manufactured by Restek.	Aquasil C18, AQUA C18, Hypersil Gold AQ, YMC ODS-Aq	L1	171
Highly base-deactivated spherical silica manufactured by Restek. Monomeric C8 bonding. Similar to Pinnacle DB C18, but the shorter alkyl chain provides less hydrophobic retention.	Hypersil BDS C8, Spherisorb C8	L7	167
Highly base-deactivated spherical silica manufactured by Restek. Unique pentafluorophenyl phase with a propyl spacer.	Discovery HS F5	L43	169
Highly base-deactivated spherical silica manufactured by Restek. Unique reversed phase material that displays both increased retention and selectivity for aromatic and/or unsaturated compounds when compared to conventional alkyl and phenyl phases.	Unique	L11	170
Highly base-deactivated spherical silica manufactured by Restek. Cyano bonding.	Hypersil BDS Cyano, Spherisorb Cyano, Zorbax Eclipse XDB-CN	L10	168
Highly base-deactivated spherical silica manufactured by Restek. Phenyl bonding.	Hypersil BDS Phenyl, Spherisorb Phenyl Zorbax Eclipse XDB-Phenyl	L11	168
Highly base-deactivated spherical silica manufactured by Restek.	_	L3	172
One of a group of intrinsically base-deactivated (IBD) phases, with a polar group within, or intrinsic to, the alkyl bonded phase. Provides unique selectivity and high level of base deactivation while reducing or eliminating the need for mobile phase additives.	Unique	L68	171
Specifically designed to resolve complex mixtures of polycyclic aromatic hydrocarbons.	Unique	_	172
Intermediate carbon load and surface area, suitable for a wide range of neutral to acidic compounds. Silica manufactured by Restek.	Hypersil ODS	L1	173
Proprietary stationary phase; resolves 16 PAHs in US EPA Method 610. Silica manufactured by Restek.	Unique	_	174
Provides shorter retention times for hydrophobic compounds than C18. Silica manufactured by Restek.	Hypersil C8	L7	174
More rugged than bare silica for normal phase analyses. Silica manufactured by Restek.	Hypersil CPS	L10	175
Offers unique selectivity versus traditional alkyl chain phases, especially for aromatic compounds. Silica manufactured by Restek.	Hypersil Phenyl	L11	175
Silica manufactured by Restek.	Hypersil APS 2 Amino, Spherisorb Amino	L8	176
Silica manufactured by Restek. Unique biphenyl phase.	Unique	L11	176
Superior value phase for normal phase separation of polar analytes. Lower retention than Ultra C18. Silica manufactured by Restek.	Hypersil Silica	L3	177
Most retentive phase for hydrophobic and slightly polar analytes. Mobile phase containing higher percentage of organic modifier contributes to higher sensitivity in ESI-based LC/MS.	Ultracarb C18, BetaMax Neutral, Discovery C18	Ll	178
Highly retentive and selective for reversed phase separations of polar analytes. Highly base deactivated. Compatible with highly aqueous (up to 100%) mobile phases.	Unique	L1	179
Highly retentive, highly selective phase, developed specifically for the analysis of aldehydes and ketones as DNPH derivatives.	Unique	-	181
Highly retentive phase for analytes containing amino functionality.	BetaMax Base, Maxsil CN	L10	178
A pentafluorophenyl phase with a propyl spacer. Highly retentive for basic analytes. Excellent for beta-blockers, halogenated compounds, nucleosides, nucleotides, pyridines, pyrimidines, tricyclic antidepressants.	Discovery HS F5	L43	179
Single 30cm column performs equally to two C18 columns in series. (AOAC Method 986.13)	Unique	_	180

Continued on nevt nage...







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Pore

Carbon

End

Restek





HPLC Column	Cap?	Size (Å)	load (%)	Applications
Allure Biphenyl	Υ	60	23	Multiple ring structure; excellent for aromatic and unsaturated compounds. Increased retention over traditional phenyl phases.
Allure Silica		60		Highly retentive phase for normal phase separation.
Ultra C18	Υ	100	20	Ideal for anilines, barbiturates, carbonyls, fat-soluble vitamins, fatty acids, glycerides, phthalates, PTH amino acids, steroids, other acids.
Ultra Aqueous C18	N	100	15	Ideal for analyses that require >90% water in the mobile phase. Excellent for highly water soluble or poorly organic soluble compounds. Excellent for water-soluble vitamins and organic acids.
Ultra IBD	N	100	12	A polar group assists in deactivating surface silanols and contributes to unique separation selectivities for acids, bases, zwitterions, and other polar compounds.
Ultra C8	Υ	100	12	Selectivity and peak shape similar to Ultra C18, but less hydrophobic retention.
Ultra C4	Υ	100	9	Ideal for peptides and small proteins.
Ultra C1	_	100	5	Alternative selectivity to Ultra C18 or C8 columns, especially for polar analytes. Shortest chain alkyl phase available for reversed phase separations.
Ultra Cyano	Υ	100	8	Excellent for basic pharmaceuticals, steroids (normal or reversed phase conditions), or other basic compounds.
Ultra Phenyl	Υ	100	10	Ideal for fatty acids, polycyclic aromatic hydrocarbons, purines and pyrimidines, and polar aromatics.
Ultra Amino	N	100	2	Superior general purpose amino phase. Ideal for carbohydrates.
Ultra PFP	Υ	100	7	Ideal for taxol and precursors, or halogenated compounds, amines, esters, or ketones.
Ultra Silica	_	100	_	Ideal for normal phase applications.
Ultra Carbamate	_	100	_	Rapid analysis of carbamates.
Ultra Quat	_	100		Proprietary phase for the analysis of paraquat and diquat and other quaternary amines.
Viva Wide Pore C18	Υ	300	9	Proteins and other higher molecular weight compounds.
Viva Wide Pore C8	Υ	300	5	Proteins and other higher molecular weight compounds. Less retentive than C18 phase.
Viva Wide Pore C4	Υ	300	3.5	Proteins and other higher molecular weight compounds. Less retentive than C18 and C8 phases.
Viva Wide Pore Biphenyl	Υ	300	6.7	Exhibits excellent peak shape for a wide range of compounds; ideal for large molecule and biomolecule assays.
Viva Wide Pore PFP Propyl	Υ	300	5	Exhibits excellent peak shape for a wide range of compounds, including nucleosides, nucleotides, and halogenated compounds.
Viva Wide Pore Silica	_	300	_	Normal phase applications for highly retained high molecular weight compounds.

pH ranges and temperature limits: see product listings on pages listed here.

Column lifetime will be shorter when operating at pH and/or temperature extremes.



Managing High Backpressure

High backpressure is one of the most common problems encountered in HPLC analyses. Normal column backpressure is observed after a new column has been installed and equilibrated with mobile phase. Unfortunately, this pressure often will increase as the column is used because particles collect on the column inlet frit. These particles can be sample impurities, mobile phase contaminants, or materials from the injector or autosampler rotor seal.

In addition to increasing backpressure, particles on the frit can cause split peaks, peak tailing, and, eventually, over-pressure shut-down. In some circumstances, these problems can be corrected by back-flushing the column. However, in many cases the result is an unusable column.

To minimize backpressure problems, all samples and mobile phase solvents must be filtered before use, and rotor seals should be changed on a routine basis. Along with these preventive measures, it is advisable to use precolumn filters such as the Trident guard column protection system, pages 196-198. Particles build up on the inexpensive, replaceable frit in the filter, instead of on the permanent frit at the column inlet.









Chromatographic Properties Similar Phases		USP Code	Page #
High purity, highly retentive phase for aromatic and unsaturated compounds. Unique		L11	180
High purity, highly retentive phase for normal phase separation of polar analytes. Very high surface area. Maxsil Si		L3	181
A very retentive, high-purity phase that exhibits excellent peak shape for a wide range of compounds. Recommended as a general purpose reversed phase column. Discovery C18, Symmetry C18, Hy Luna C18, Zorbax C18, Kromasil C LiChrospher RP-18, Inertsil ODS-2	18,	Ll	182
Highly retentive and selective for reversed phase separations of polar analytes. Highly base deactivated. Compatible with highly aqueous (up to 100%) mobile phases. AQUA C18, Aquasil C18, Hypersil C YMC ODS-Aq	Gold AQ,	L1	183
One of a group of intrinsically base-deactivated (IBD) phases, with a polar group within, or intrinsic to, the alkyl bonded phase. Provides unique selectivity and high level of base deactivation while reducing or eliminating the need for mobile phase additives. SymmetryShield, Discovery ABZ &	ABZ+, Prism	L68	184
Very retentive, high-purity, base-deactivated reversed phase packing that exhibits excellent peak shape for a wide range of compounds. Luna C8, Symmetry C8, Hypersil G	old C8	L7	183
Exceptionally stable C4 packing, with high bonding coverage and silanol base-deactivation. Exhibits shorter retention than C18 or C8 phases. Supelcosil Butyl (C4), Delta-Pak C4	l	L26	184
Exceptionally stable C1 packing resists hydrolysis, even under acidic mobile phase conditions. Least retentive reversed phase hydrocarbon packing. Spherisorb C1		L13	185
High-purity cyano phase with reduced silanol activity. Often a better choice than C18 for basic pharmaceuticals. Cyano is the most stable bonded phase for normal phase mode. Platinum CN, Develosil Cyano, Lun Hypersil Gold CN	a CN,	L10	185
High-purity, highly retentive, base-deactivated phase with alternate selectivity to hydrocarbon phases, especially for aromatic analytes. Platinum Phenyl, Supelcosil Pheny Betasil Phenyl	,	L11	186
Recommended for normal phase analyses of mono- and disaccharides and other similar compounds. Can also serve as a weak anion exchanger, with aqueous buffers. Platinum Amino, Develosil NH2		L8	186
A pentafluorophenyl phase. Unique selectivity by interaction with functional groups of organohalogens or other basic analytes. Fluophase PFP, Fluosep-RP Phenyl, Curosil PFP	1	L43	187
High purity, high surface area.		L3	188
Proprietary stationary phase can process up to twice as many samples per hour, compared to a conventional C18 phase. Unique		_	188
High purity silica. Unique		_	189
Silica manufactured by Restek. BioBasic 18, Symmetry 300 C18, J Zorbax 300 OSB C18, Synchropak		Ll	190
Silica manufactured by Restek. BioBasic 8, Zorbax 300 OSB C8, Synchropak C8, 208 TP C8		L7	191
Silica manufactured by Restek. BioBasic 4, Symmetry 300 C4, Jup Synchropak C4, 208 TP C4	iter 300 C4,	L26	191
Silica manufactured by Restek. Unique		L11	192
Silica manufactured by Restek. Unique		L43	192
Silica manufactured by Restek. —		L3	193

US Pharmacopeia Cross Reference

- Octadecyl silane chemically bonded to porous silica or ceramic microparticles, 1.7 to 10µm in diameter, or a monolithic rod.
- L1 Ultra II C18 (p. 157), Ultra II Aqueous C18 (p. 159), Pinnacle DB C18 (p. 166), Pinnacle DB Aqueous C18 (p. 171), Pinnacle II C18 (p. 173), Allure C18 (p. 178), Allure Aqueous C18 (p. 179), Ultra C18 (p. 182), Ultra Aqueous C18 (p. 183), Viva C18 (p. 190)
- Porous silica particles, 5 to $10\mu m$ in diameter. L3
 - Ultra II Silica (p. 164), Pinnacle DB Silica (p. 172), Pinnacle II Silica (p. 177), Allure Silica (p. 181), Ultra Silica (p. 188), Viva Silica (p. 193)
- Octylsilane chemically bonded to totally porous silica particles, 1.7 to $10\mu m$ in diameter. **L7**
- Ultra II C8 (p. 158), Pinnacle DB C8 (p. 167), Pinnacle II C8 (p. 174), Ultra C8 (p. 183), Viva C8 (p. 191)
- An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, $3 \text{ to } 10\mu\text{m}$ in diameter. L8 Pinnacle II Amino (p. 176), Ultra Amino (p. 186)
- Nitrile groups chemically bonded to porous silica particles, 3 to 10μ m in diameter. L10
 - Pinnacle DB Cyano (p. 168), Pinnacle II Cyano (p. 175), Allure Basix (p. 178), Ultra Cyano (p. 185)
- Phenyl groups chemically bonded to porous silica particles, 1.7 to 10µm in diameter. Ultra II Aromax (p. 161), Ultra II Biphenyl (p. 160), Pinnacle DB Phenyl (p. 168), L11 Pinnacle DB Biphenyl (p. 170), Pinnacle II Phenyl (p. 175), Pinnacle II Biphenyl (p. 176), Allure Biphenyl (p. 180), Ultra Phenyl (p. 186), Viva Biphenyl (p. 192)
- L13 Trimethylsilane chemically bonded to porous silica particles, 3 to 10µm in diameter. Ultra C1 (p. 185)
- L26 Butyl silane chemically bonded to totally porous silica particles, 3 to 10µm in diameter. Ultra C4 (p.184), Viva C4 (p.191)
- Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 5 to 10μ m in diameter. L43 Ultra II PFP Propyl (p. 163), Pinnacle DB PFP Propyl (p. 169), Allure PFP Propyl (p. 179), Ultra PFP (p. 187), Viva PFP Propyl (p. 192)
- Spherical, porous silica, 100µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not end capped. **L68** Ultra II IBD (p. 162), Pinnacle DB IBD (p. 171), Ultra IBD (p. 184)

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ECHnology Pty Ltd





Ultra Selective Liquid Chromatography™

USLC™ is the directed application of selectivity—the most influential factor affecting resolution—to optimize separations and improve method performance. Restek has extensively studied reversed phase selectivity to provide practicing chromatographers with the most effective and widest range of USLC™ stationary phase chemistries available.



Selectivity Drives Separations

By understanding and controlling selectivity through $USLC^{\mathbb{N}}$, chromatographers have the best opportunity for fast, effective analyte resolution.

One of the most significant challenges in method development is finding the proper stationary and mobile phase chemistry for a particular separation. As sample complexity increases, achieving adequate resolution between matrix components and target analytes becomes more difficult. Despite recent advancements in column format, such as sub-2 micron packings and pellicular particles, resolution can still be difficult to obtain because, while these formats can increase chromatographic efficiency and analysis speed, they do not significantly influence resolution. Selectivity, as shown in Equation 1, is the single most powerful factor affecting resolution, and it is largely dependent upon stationary phase composition.

Real Diversity in Phase Chemistry

Restek columns offer the widest range of selectivities available on a single column line. More choices mean optimized separations and more robust methods.

While numerous bonded phases are available for reversed phase chromatography, many are similar and offer only moderate changes in retention (e.g. C8 and C18), rather than significant differences in selectivity. Method development is less laborious and time-consuming when using a full range of column selectivities, including orthogonal phase chemistries like polar embedded, phenyl, and fluorophenyl columns. Restek has led the development of unique USLC[™] phases across these phase classes in order to provide chromatographers with a more effective range of column selectivities and innovative column chemistries for method development. The phases

Equation 1 Selectivity drives resolution—USLC™ considers column selectivity during method development, resulting in fast, effective separations.

$$R = 1/4\sqrt{N} \times (k'/k'+1) \times (\alpha-1/\alpha)$$
Efficiency Retention capacity Selectivity

shown in Figure 1 provide the widest range of reversed phase selectivity available on any column line, and can be used to guide the least understood and most practically significant part of method development—proper column selection.

Figure 1 Restek offers the widest range of unique column chemistries to aid in fast, easy method development.

Aqueous C18 (alkyl)	IBD (polar embedded)	Biphenyl (phenyl)	PFP Propyl (fluorophenyl)
	CH ₃ —Si—CH ₃	CH ₃ —Si—CH ₃	CH ₃ -Si-CH ₃
Proprietary polar modified and functionally bonded C18	Proprietary polar functional embedded alkyl	Unique Biphenyl	Proprietary end-capped pentafluorophenyl propyl
 C18 phase for balanced retention of multiple solute types. Compatible with up to 100% aqueous mobile phases. 	Enhanced retention of polar acids. Moderate retention of both acidic and basic solutes.	Increased retention of aromatic, unsaturated, conjugated solutes, or solutes containing an electron withdrawing ring substituent. Enhanced retention and selectivity when used with	Increased retention of protonated bases and solutes containing aromatic moieties.
	Proprietary polar modified and functionally bonded C18 C18 phase for balanced retention of multiple solute types. Compatible with up to 100%	Proprietary polar modified and functionally bonded C18 • C18 phase for balanced retention of multiple solute types. • Compatible with up to 100% Proprietary polar functional embedded alkyl • Enhanced retention of polar acids. • Moderate retention of both acidic and basic	Proprietary polar modified and functionally bonded C18 Proprietary polar functional embedded alkyl C18 phase for balanced retention of multiple solute types. Compatible with up to 100% aqueous mobile phases. Proprietary polar functional embedded alkyl Enhanced retention of polar acids. Moderate retention of both acidic and basic solutes. Increased retention of aromatic, unsaturated, conjugated solutes, or solutes containing an electron withdrawing ring substituent. Enhanced retention and

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4-353-1300



Evaluating and Extending Selectivity

Restek leads the industry in USLC™ phase diversity because optimal differences in selectivity are built in during the research and development of our bonded phases.

The diversity in selectivity provided by USLC™ columns can be demonstrated empirically using the hydrophobic-subtraction (HS) model [1]. This model is a novel procedure for characterizing selectivity that uses test probes to define the solute and stationary phase interactions in reversed phase separations. Restek is leading the commercial application of this model by implementing it in the research and development of USLC™ bonded phases. To evaluate phase selectivity using the hydrophobic-subtraction model, the retention characteristics of the solute probes are compared across different phases on the same silica base. In this approach, the range of selectivity is indicated by the degree of scatter along the regression line; high correlations indicate similarity and low correlations represent changes in selectivity across phases (Figure 2). The difference in selectivity across columns can then be quantified based on the correlation by calculating the selectivity (S) statistic for the comparison [2].

hydrophobic-subtraction model and corresponding selectivity (S) value. **HS Model Test Probe Retention Across USLC Phases High degree of scatter indicates** greater differences in selectivity. 10 $r^2 = 0.7138$ < Orthogonal phase on Ultra II Ultra II PFPP Ultra II Biphenyl Ultra ILIBD Ultra II Aqueous C18 Selectivity (S) = $100 \text{ x} \sqrt{1-r^2}$

Figure 2 Restek has extended the selectivity range for reversed phase separations as illustrated by the S = 53.512 10 k' C18 phase on Ultra II

USLC™ Columns: Selectivity Choices Optimize Separations

Restek USLC™ columns offer the widest range of selectivities available and are an integral part of successful method development (Figure 3). Ideal for column switching systems, these columns provide the orthogonal separations needed to create optimal resolution and robust methods. Combining USLCTM phases with a suitable column format gives practicing chromatographers the most powerful tool available for successful method development.

Figure 3: Restek offers the widest range of selective phases available on any column line.

Column Line											
Common Reversed Phase Column Type	Restek Ultra II 1.9, 2.2, 3, 5 and 10μm	Waters Acquity CSH 1.7, 3.5 and 5 μm	Waters Acquity HSS 1.8, 3.5 and 5 μm	Waters Acquity BEH 1.7, 2.5, 3.5, 5 and 10 μm	Phenomenex Kinetex 1.7 and 2.6 µm	Agilent Zorbax RRHD 1.8, 3.5 and 5 μm	Agilent Poroshell 120 2.7 μm				
Alkyl (C18 and C8)	•	•	•	•	•	•	•				
Phenyl	•	•		•							
Polar Embedded Alkyl	•										
Fluorophenyl	•	•			•						

References (Not available from Restek.)

- [1] L.R. Snyder, J.W. Dolan, P.W. Carr, J. Chromatogr. A 1060 (2004) 77.
- [2] U.D. Neue, J.E. O'Gara, A. Mendez, J. Chromatogr. A 1127 (2006) 161.

We're here to help!

To discuss the right selectivity for your separation or to find a comparable column, contact us at support@restek.com or 800-356-1688.



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155



Combine Speed and Selectivity with

Ultra II[®] UHPLC and HPLC Columns

- Ultra Selectivity Widest variety of stationary phases and selectivity of any HPLC and UHPLC column line.
- **Ultra Utility** Full range of particle sizes for use on any HPLC or UHPLC system.
- Ultra Reproducibility 100% Restek manufactured silica for column-to column reproducibility.
- **Ultra Scalability** Both HPLC and UHPLC columns manufactured from identical silica support to allow reliable scaling of methods across systems.





Excellent choice

for method development using column switching systems and systematic Quality by Design approaches

Available Particle Sizes:

- 1.9µm for UHPLC
- 2.2µm for UFLC and RRLC
- 3μm, 5μm, & 10μm for HPLC

Get UHPLC Speed at HPLC Prices!

Restek lets you speed up analyses without paying a premium.

Compare today and save!

Widest Selectivity Available of Any HPLC & UHPLC Column Line!

Available Phases Ultra II C18	Phase Description Inert and rugged reversed phase octadecyl.
Ultra II C8	Inert and rugged general purpose.
Ultra II Aqueous C18	Uniquely modified alkyl for balanced retention and improved mobile phase compatibility, relative to a conventional C18.
Ultra II IBD	Unique polar embedded alkyl for symmetry of bases and increased retention of acids. Orthogonal selectivity to a C18.
Ultra II Biphenyl	Unique Biphenyl phase for enhanced retention and selectivity compared to phenyl and phenyl hexyl phases. Orthogonal selectivity to a C18.
Ultra II Aromax	Proprietary phenyl phase for maximum aromatic selectivity and retention. Orthogonal selectivity to a C18.
Ultra II PFP Propyl	Pentafluorophenyl phase for increased retention of basic compounds. Orthogonal selectivity to a C18.
Ultra II Silica	General purpose silica column for normal phase and HILIC separations.
Ultra II Carbamate	Specifically designed for carbamate analysis.
Ultra II Quat	Ideal for the analysis of paraquat and diquat or other quaternary amines.

Innovative phase developed by Restek!







4-353-1300



Ultra II[®] C18 Columns (USP L1)

Chromatographic Properties:

A retentive, highly pure material that exhibits excellent peak shape for a wide range of compounds. This is a robust and very reproducible general-purpose reversed phase column.

1.0mm ID		2.1mm ID		3.0mm ID		4.6mm ID	
cat.#	price	cat.#	price	cat.#	price	cat.#	price
		9604232		960423E			
		9604252		960425E			
		9604212		960421E			
		9604832		960483E			
		9604852		960485E			
		9604812		960481E			
9604331	\$404	9604332		960433E		9604335	
9604351	\$404	9604352		960435E		9604355	
9604311	\$435	9604312		960431E		9604315	
9604361	\$466	9604362		960436E		9604365	
9604531	\$378	9604532		960453E		9604535	
9604551	\$378	9604552		960455E		9604555	
9604511	\$404	9604512		960451E		9604515	
9604561	\$435	9604562		960456E		9604565	
9604521	\$466	9604522		960452E		9604525	
9604571	\$492	9604572		960457E		9604575	
	9604331 9604351 9604351 9604531 9604551 9604551 9604561 9604521	9604331 \$404 9604351 \$404 9604351 \$404 9604361 \$435 9604531 \$378 9604551 \$378 9604511 \$404 9604561 \$435 9604521 \$466	cat.# price cat.# 9604232 9604232 9604252 9604252 9604212 9604212 960482 9604852 9604852 9604812 9604331 \$404 9604332 9604351 \$404 9604352 9604311 \$435 9604312 9604361 \$466 9604362 9604551 \$378 9604532 9604511 \$404 9604512 9604561 \$435 9604562 9604521 \$466 9604522	cat.# price cat.# price 9604232 9604252 9604252 9604212 9604212 9604832 9604852 9604852 9604812 9604331 \$404 9604332 9604351 \$404 9604352 9604311 \$435 9604312 9604361 \$466 9604362 9604551 \$378 9604552 9604511 \$404 9604512 9604561 \$435 9604562 9604521 \$466 9604522	cat.# price cat.# price cat.# 9604232 960423E 960425E 960425E 960425E 960421E 9604212 960421E 960421E 960483E 960483E 960485E 960485E 960485E 960481E 960481E 960481E 960431E 960433E 960435E 960435E 960435E 960435E 960435E 960435E 960435E 960436E 960436E 960436E 960436E 960456E 960455E 960455E 960455E 960455E 960455E 960451E 960456E 960456E 960456E 960452E 960452E 960452E 960452E 960452E	cat.# price cat.# price cat.# price 9604232 960423E 960425E 960425E 960425E 960425E 960421E 9604212 960421E 960421E 960483E 960483E 960485E 960485E 960485E 960485E 960481E 960481E 960481E 960431E 960433E 960433E 960435E 960435E 960435E 960431E 960431E 960431E 960436E 960436E 960456E 9604551 \$378 9604532 960453E 960455E 960456E 960456E 960456E 960456E 960456E 960456E 960456E 960452E 960452E 960452E 960452E	cat.# price cat.# price cat.# 9604232 960423E 9604252 960425E 9604212 960421E 9604832 960483E 9604852 960485E 9604812 960481E 9604331 \$404 9604332 960433E 9604355 9604351 \$404 9604352 960435E 9604355 9604311 \$435 9604312 960431E 9604315 9604361 \$466 9604362 960436E 9604365 9604531 \$378 9604532 960453E 9604535 9604551 \$378 9604552 960455E 9604555 9604511 \$404 9604512 960451E 9604515 9604561 \$435 9604562 960456E 9604565 9604521 \$466 9604522 960452E 9604525





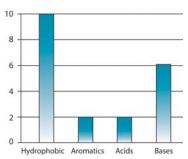
Physical Characteristics:

particle size: 1.9μm, 2.2μm, 3μm or 5μm, spherical pore size: 100Å carbon load: 19% endcap: fully endcapped

pH range: 2.5 to 8 temperature limit: 80°C



Ultra II® C18 Retention Profile



Ultra II® C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II C18 Guard Cartridge	960450212	960450210	960450222	960450220	



Ultra II® C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9604557		9604558		9604559		9604550	
100mm	9604517		9604518		9604519		9604510	
150mm	9604567		9604568		9604569		9604560	
250mm	9604577		9604578		9604579		9604570	

Available in $10\mu\mathrm{m}$ particle size upon request.

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.





also available Bulk Packing Materials See page 194.











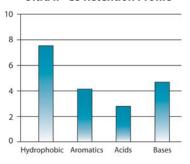


Physical Characteristics:

particle size: 3μm or 5μm, spherical pore size: 100Å carbon load: 12% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



Ultra II® C8 Retention Profile



Ultra II[®] C8 Columns (USP L7)

Chromatographic Properties:

A retentive, high-purity, base-deactivated reversed phase packing that exhibits excellent peak shape for a wide range of compounds. Less retention for neutral, hydrophobic compounds, compared to the Ultra II® C18 column.

	1.0mm ID		2.1mm ID		3.0mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns								
30mm	9603331		9603332		960333E		9603335	
50mm	9603351		9603352		960335E		9603355	
100mm	9603311		9603312		960331E		9603315	
150mm	9603361		9603362		960336E		9603365	
5μ m Columns								
30mm	9603531		9603532		960353E		9603535	
50mm	9603551		9603552		960355E		9603555	
100mm	9603511		9603512		960351E		9603515	
150mm	9603561		9603562		960356E		9603565	
200mm	9603521		9603522		960352E		9603525	
250mm	9603571		9603572		960357E		9603575	

Ultra II® C8 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II C8 Guard Cartridge	960350212	960350210	960350222	960350220	

Ultra II® C8 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9603557		9603558		9603559		9603550	
100mm	9603517		9603518		9603519		9603510	
150mm	9603567		9603568		9603569		9603560	
250mm	9603577		9603578		9603579		9603570	

Available in 10μ m particle size upon request.

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.









Ultra II® Aqueous C18 Columns (USP L1)

Chromatographic Properties:

Highly retentive and selective for reversed phase separations of polar analytes. Highly base-deactivated. Compatible with highly aqueous (up to 100%) mobile phases.

	1.0m	m ID	2.1m	m ID	3.0m	m ID	4.6m	m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns								
30mm	9608331	\$424	9608332	\$398	960833E		9608335	
50mm	9608351	\$424	9608352	\$398	960835E		9608355	
100mm	9608311	\$455	9608312	\$430	960831E		9608315	
150mm	9608361	\$518	9608362	\$502	960836E		9608365	
5µm Columns								
30mm	9608531	\$393	9608532	\$373	960853E		9608535	
50mm	9608551	\$393	9608552	\$373	960855E		9608555	
100mm	9608511	\$414	9608512	\$398	960851E		9608515	
150mm	9608561	\$455	9608562	\$430	960856E		9608565	
200mm	9608521	\$486	9608522	\$461	960852E		9608525	
250mm	9608571	\$512	9608572	\$492	960857E		9608575	

Ultra II® Aqueous C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II Aqueous C18 Guard Cartridge	960850212	960850210	960850222	960850220	\$145

Ultra II® Aqueous C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5μ m Columns								
50mm	9608557		9608558		9608559		9608550	
100mm	9608517		9608518		9608519		9608510	
150mm	9608567		9608568		9608569		9608560	
250mm	9608577		9608578		9608579		9608570	

Available in $10\mu\mathrm{m}$ particle size upon request.





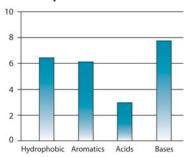
Physical Characteristics:

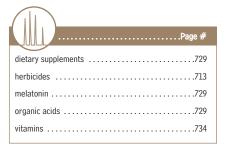
particle size: $3\mu m$ or $5\mu m$, spherical pore size: $100 \mbox{\normalfont\AA}$ carbon load: 15%

endcap: no pH range: 2.5 to 8 temperature limit: 80°C



Ultra II® Aqueous C18 Retention Profile







Supersize without surprise!

ordering note

We strongly recommend ordering a semi-prep or prep column only after evaluating the desired separation on an equivalent analytical-scale column. Because we cannot re-use a column or the silica it contains once it has left our facility, we cannot accept returns of large-scale columns (except in cases of our error).













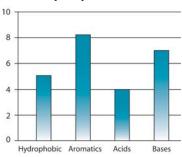
Physical Characteristics:

particle size: 1.9µm, 3µm or 5µm, spherical pore size: 100Å carbon load: 15% endcap: fully endcapped

pH range: 2.5 to 8 temperature limit: 80°C



Ultra II® Biphenyl Retention Profile



UULL
alcohol metabolites
amphetamines
antibiotics
diuretics
drug residues
drugs of abuse
NSAIDs
pain management drugs in urine
sulfa drugs
THC & metabolites

Ultra II® Biphenyl Columns (USP L11)

Chromatographic Properties:

A unique reversed phase material that exhibits both increased retention and selectivity for aromatic and/or unsaturated compounds, compared to conventional alkyl and phenyl phases. This is a great alternative to a C18 column when alternative selectivity is desired. An excellent choice for the analysis of steroids, tetracyclines, drug metabolites, and other compounds that contain some degree of unsaturation.

	1.0mm ID		2.1mm ID		3.0mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9 μ m Columns								
30mm			9609232		960923E			
50mm			9609252		960925E			
100mm			9609212		960921E			
3µm Columns								
30mm	9609331		9609332		960933E		9609335	
50mm	9609351		9609352		960935E		9609355	
100mm	9609311		9609312		960931E		9609315	
150mm	9609361		9609362		960936E		9609365	
5µm Columns								
30mm	9609531		9609532		960953E		9609535	
50mm	9609551		9609552		960955E		9609555	
100mm	9609511		9609512		960951E		9609515	
150mm	9609561		9609562		960956E		9609565	
200mm	9609521		9609522		960952E		9609525	
250mm	9609571		9609572		960957E		9609575	

Ultra II® Biphenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II Biphenyl Guard Cartridge	960950212	960950210	960950222	960950220	\$145

Ultra II® Biphenyl HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9609557		9609558		9609559		9609550	
100mm	9609517		9609518		9609519		9609510	
150mm	9609567		9609568		9609569		9609560	
250mm	9609577		9609578		9609579		9609570	

Available in 10μ m particle size upon request.

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms











Ultra II® Aromax Columns (USP L11)

Chromatographic Properties:

Ultra II® Aromax is a unique reversed phase material that exhibits superior retention and selectivity for aromatic and/or unsaturated compounds, compared to conventional alkyl and phenyl phases. This column is a great alternative to our Biphenyl phase when increased retention is required. A very suitable choice for analysis of steroids, tetracyclines, drug metabolites, and other compounds that contain some degree of unsaturation.

	1.0mm ID		2.1mi	2.1mm ID		3.0mm ID		m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9 μ m Columns								
30mm			9607232		960723E			
50mm			9607252		960725E			
100mm			9607212		960721E			
3µm Columns								
30mm	9607331		9607332		960733E		9607335	
50mm	9607351		9607352		960735E		9607355	
100mm	9607311		9607312		960731E		9607315	
150mm	9607361		9607362		960736E		9607365	
5µm Columns								
30mm	9607531		9607532		960753E		9607535	
50mm	9607551		9607552		960755E		9607555	
100mm	9607511		9607512		960751E		9607515	
150mm	9607561		9607562		960756E		9607565	
200mm	9607521		9607522		960752E		9607525	
250mm	9607571		9607572		960757E		9607575	





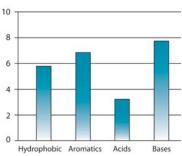
Physical Characteristics:

particle size: 1.9µm, 3µm or 5µm, spherical

pore size: 100Å carbon load: 17% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

ntion Profile

Ultra II® Aromax Retention Profile



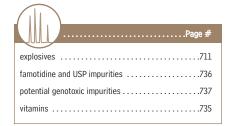
Ultra II® Aromax Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II Aromax Guard Cartridge	960750212	960750210	960750222	960750220	\$145

Ultra II® Aromax HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9607557		9607558		9607559		9607550	
100mm	9607517		9607518		9607519		9607510	
150mm	9607567		9607568		9607569		9607560	
250mm	9607577		9607578		9607579		9607570	

Available in 10μ m particle size upon request.



ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.



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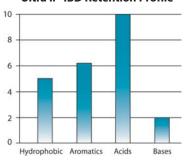


particle size: 3µm or 5µm, spherical

pore size: 100Å carbon load: 12% endcap: no pH range: 2.5 to 8 temperature limit: 80°C



Ultra II® IBD Retention Profile



Ultra II® IBD Columns

Chromatographic Properties:

An intrinsically base-deactivated (IBD) phase, containing a polar group within, or intrinsic to, the hydrocarbon bonded phase. Unique selectivity and high level of base deactivation, while reducing or eliminating the need for mobile phase additives. Great for mixed polar and nonpolar compounds.

	1.0mm ID		2.1m	2.1mm ID		3.0mm ID		m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3μ m Columns								
30mm	9605331		9605332		960533E		9605335	
50mm	9605351		9605352		960535E		9605355	
100mm	9605311		9605312		960531E		9605315	
150mm	9605361		9605362		960536E		9605365	
5μ m Columns								
30mm	9605531		9605532		960553E		9605535	
50mm	9605551		9605552		960555E		9605555	
100mm	9605511		9605512		960551E		9605515	
150mm	9605561		9605562		960556E		9605565	
200mm	9605521		9605522		960552E		9605525	
250mm	9605571		9605572		960557E		9605575	

Ultra II® IBD Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II IBD Guard Cartridge	960550212	960550210	960550222	960550220	\$145

Ultra II® IBD HPLC Prep Columns

	10mm	ID	21.2mr	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9605557		9605558		9605559		9605550	
100mm	9605517		9605518		9605519		9605510	
150mm	9605567		9605568		9605569		9605560	
250mm	9605577		9605578		9605579		9605570	

Available in 10µm particle size upon request.



Supersize without surprise!

ordering **note**

We strongly recommend ordering a semi-prep or prep column only after evaluating the desired separation on an equivalent analytical-scale column. Because we cannot re-use a column or the silica it contains once it has left our facility, we cannot accept returns of large-scale columns (except in cases of our error).







Ultra II® PFP Propyl Columns (USP L43)

Chromatographic Properties:

A pentafluorophenyl phase with a propyl spacer. Highly retentive for basic analytes. An excellent phase for separating nucleosides, nucleotides, purines, pyrimidines, and halogenated compounds.

	1.0mm ID		2.1m	2.1mm ID		3.0mm ID		m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9µm Columns								
30mm			9606232		960623E			
50mm			9606252		960625E			
100mm			9606212		960621E			
3µm Columns								
30mm	9606331		9606332		960633E		9606335	
50mm	9606351		9606352		960635E		9606355	
100mm	9606311		9606312		960631E		9606315	
150mm	9606361		9606362		960636E		9606365	
5µm Columns								
30mm	9606531		9606532		960653E		9606535	
50mm	9606551		9606552		960655E		9606555	
100mm	9606511		9606512		960651E		9606515	
150mm	9606561		9606562		960656E		9606565	
200mm	9606521		9606522		960652E		9606525	
250mm	9606571		9606572		960657E		9606575	

Ultra II® PFP Propyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra TT PEP Propyl Guard Cartridge	960650212	960650210	960650222	960650220	\$145

Ultra II® PFP Propyl HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9606557		9606558		9606559		9606550	
100mm	9606517		9606518		9606519		9606510	
150mm	9606567		9606568		9606569		9606560	
250mm	9606577		9606578		9606579		9606570	

Available in 10μ m particle size upon request.

ordering note

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.





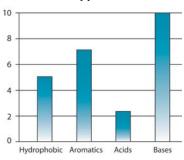


Physical Characteristics:

particle size: 1.9μm, 3μm or 5μm, spherical

pore size: 100Å carbon load: 11% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

Ultra II® PFP Propyl Retention Profile

















particle size: 1.9μm, 2.2μm, 3μm or 5μm, spherical pore size: 100Å carbon load: 0% endcap: no pH range: 2.5 to 8 temperature limit: 80°C

Ultra II® Silica Columns (USP L3)

Chromatographic Properties:

High surface area. Type B silica packing.

	1.0mm ID		2.1m	2.1mm ID		3.0mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
1.9 μ m Columns									
30mm			9600232		960023E				
50mm			9600252		960025E				
100mm			9600212						
2.2µm Columns									
30mm			9600832		960083E				
50mm			9600852		960085E				
100mm			9600812		960081E				
3µm Columns									
30mm	9600331		9600332		960033E		9600335		
50mm	9600351		9600352		960035E		9600355		
100mm	9600311		9600312		960031E		9600315		
150mm	9600361		9600362		960036E		9600365		
5µm Columns									
30mm	9600531		9600532		960053E		9600535		
50mm	9600551		9600552		960055E		9600555		
100mm	9600511		9600512		960051E		9600515		
150mm	9600561		9600562		960056E		9600565		
200mm	9600521		9600522		960052E		9600525		
250mm	9600571		9600572		960057E		9600575		



	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II Silica Guard Cartridge	960050212	960050210	960050222	960050220	\$145



also available Bulk Packing Materials See page 194.

Ultra II® Silica HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9600557		9600558		9600559		9600550	
100mm	9600517		9600518		9600519		9600510	
150mm	9600567		9600568		9600569		9600560	
250mm	9600577		9600578		9600579		9600570	

Available in 10μ m particle size upon request.

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.









Ultra II® Carbamate Columns

Chromatographic Properties:

Specifically designed for carbamates analysis. The unique packing separates 10 target carbamates in just 7 minutes, and is compatible with fluorescence or LC/MS detection. This improved run time will boost productivity and sample throughput, while reducing solvent usage and disposal expenses.

	1.0mi	n ID	2.1m	m ID	3.0m	m ID	4.6m	m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns								
30mm	9611331		9611332		961133E		9611335	
50mm	9611351		9611352		961135E		9611355	
100mm	9611311		9611312		961131E		9611315	
150mm	9611361		9611362		961136E		9611365	
5μ m Columns								
30mm	9611531		9611532		961153E		9611535	
50mm	9611551		9611552		961155E		9611555	
100mm	9611511		9611512		961151E		9611515	
150mm	9611561		9611562		961156E		9611565	
200mm	9611521		9611522		961152E		9611525	
250mm	9611571		9611572		961157E		9611575	





Physical Characteristics:

particle size: 3µm or 5µm, spherical

pore size: 100Å carbon load: 15% endcap: no pH range: 2.5 to 8 temperature limit: 80°C

food contaminants
pesticides (carbamates)

A D

Ultra II® Carbamate Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra II Carbamate Guard Cartridge	961150212	961150210	961150222	961150220	\$145

Ultra II® Carbamate HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9611557		9611558		9611559		9611550	
100mm	9611517		9611518		9611519		9611510	
150mm	9611567		9611568		9611569		9611560	
250mm	9611577		9611578		9611579		9611570	

Available in $10\mu m$ particle size upon request.

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms



Ultra II® Quat Columns

Chromatographic Properties:

Ideal for the analysis of paraquat and diquat or other quaternary amines when used with Ultra Quat reagent solution mobile phase additive (cat.# 32441).

	4.6mm ID
Length	cat.# price
5µm Column	
150mm	9612565





Physical Characteristics:

particle size: 5µm, spherical pore size: 100Å carbon load: 12% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C









Pinnacle® DB Columns: 1.9, 3, or 5µm particle sizes; 140Å pore size

Prepared using a highly base-deactivated silica support; ideal for analyses of basic compounds, or bases mixed with acids/neutrals. Silica manufactured at Restek, for total control of quality and reproducibility.

Pinnacle® DB C18 Columns (USP L1)

Chromatographic Properties:

Highly base-deactivated spherical silica manufactured by Restek. Monomeric C18 bonding. Hydrophobic C18 phase suitable for analyses of a wide range of compounds, from acidic through slightly basic. Replaces Hypersil® BDS C18 and Pinnacle® ODS Amine.

	1.0mm ID		2.1mr	n ID	3.2m	m ID	4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9µm Columns								
30mm			9414232					
50mm			9414252					
100mm			9414212					
3µm Columns								
30mm	9414331		9414332		9414333		9414335	
50mm	9414351		9414352		9414353		9414355	
100mm	9414311		9414312		9414313		9414315	
5µm Columns								
30mm	9414531		9414532		9414533		9414535	
50mm	9414551		9414552		9414553		9414555	
100mm	9414511		9414512		9414513		9414515	
150mm	9414561		9414562		9414563		9414565	
200mm	9414521		9414522		9414523		9414525	
250mm	9414571		9414572		9414573		9414575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Pinnacle® DB C18 Guard Cartridges

Guard Cartridges	3-pk. (10 x 2.1mm)	3-pk.	2-pk. (20 x 2.1mm)	2-pk. (20 x 4.0mm)	price
dual u Cal u luges	(IU X Z.IIIIII)	(TO X 4.0IIIII)	(ZU X Z.IIIIII)	(ZU X 4.UIIIII)	price
Pinnacle DB C18 Guard Cartridge	941450212	941450210	941450222	941450220	\$148

Pinnacle® DB C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9414557		9414558		9414559		9414550	
100mm	9414517		9414518		9414519		9414510	
150mm	9414567		9414568		9414569		9414560	
250mm	9414577		9414578		9414579		9414570	

ordering note

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.





Physical Characteristics:

particle size: 1.9μm, 3μm, or 5μm, spherical pore size: 140Å carbon load: 11% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C







Pinnacle® DB C8 Columns (USP L7)

Chromatographic Properties:

Highly base-deactivated spherical silica manufactured by Restek. Monomeric C8 bonding. Similar to Pinnacle® DB C18, but the shorter alkyl chain provides less hydrophobic retention. Less retention can be useful for reducing analysis time, if resolution is adequate. Replaces Hypersil® BDS C8 and Pinnacle® C8 Amine.

	1.0mm ID		2.1mm	ID	3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9 μ m Columns								
30mm			9413232					
50mm			9413252					
100mm			9413212					
3µm Columns								
30mm	9413331		9413332		9413333		9413335	
50mm	9413351		9413352		9413353		9413355	
100mm	9413311		9413312		9413313		9413315	
5µm Columns								
30mm	9413531		9413532		9413533		9413535	
50mm	9413551		9413552		9413553		9413555	
100mm	9413511		9413512		9413513		9413515	
150mm	9413561		9413562		9413563		9413565	
200mm	9413521		9413522		9413523		9413525	
250mm	9413571		9413572		9413573		9413575	

^{3.0}mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).



Physical Characteristics:

particle size: 1.9μm, 3μm, or 5μm, spherical pore size: 140Å carbon load: 6% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



Pinnacle® DB C8 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB C8 Guard Cartridge	941350212	941350210	941350222	941350220	\$148

Pinnacle® DB C8 HPLC Prep Columns

Length	10mm ID		21.2mm ID		30mm ID		50mm ID	
	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9413557		9413558		9413559		9413550	
100mm	9413517		9413518		9413519		9413510	
150mm	9413567		9413568		9413569		9413560	
250mm	9413577		9413578		9413579		9413570	

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Outside the U.S.

Contact your Restek representative: Refer to our list on pages 4-5 or visit our website at www.restek.com







Mar 2011





particle size: $1.9\mu m$ or $5\mu m$, spherical

pore size: 140Å carbon load: 4% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C





also available Bulk Packing Materials See page 194.

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Pinnacle® DB Cyano Columns (USP L10)

Chromatographic Properties:

Highly base-deactivated spherical silica manufactured by Restek. Cyano bonding. Suitable for analyses of a wide range of compounds, from acidic through slightly basic. Also useful for confirmation of analyses on a C18 or C8 column. Can be used in normal phase or reversed phase mode of separation. Replaces Hypersil® BDS Cyano and Pinnacle® Cyano Amine.

	1.0mm ID		2.1mm ID		3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9µm Columns								
30mm			9416232					
50mm			9416252					
100mm			9416212					
5µm Columns								
30mm	9416531		9416532		9416533		9416535	
50mm	9416551		9416552		9416553		9416555	
100mm	9416511		9416512		9416513		9416515	
150mm	9416561		9416562		9416563		9416565	
200mm	9416521		9416522		9416523		9416525	
250mm	9416571		9416572		9416573		9416575	

Pinnacle® DB Cyano Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB Cyano Guard Cartridge	941650212	941650210	941650222	941650220	

Pinnacle® DB Cyano HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9416557		9416558		9416559		9416550	
100mm	9416517		9416518		9416519		9416510	
150mm	9416567		9416568		9416569		9416560	
250mm	9416577		9416578		9416579		9416570	





Physical Characteristics:

particle range: 5µm, spherical pore size: 140Å carbon load: 5.3% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

Pinnacle® DB Phenyl Columns (USP L11)

Chromatographic Properties:

Highly base-deactivated spherical silica manufactured by Restek. Pinnacle® DB Phenyl columns offer alternate selectivity to straight chain hydrocarbon phases, especially for aromatic analytes. Replaces Hypersil® BDS Phenyl and Pinnacle® Phenyl Amine.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID	
Length	cat.# pri	ce cat.# price	cat.# price	cat.# price	
5µm Columns					
30mm	9415531	9415532	9415533	9415535	
50mm	9415551	9415552	9415553	9415555	
100mm	9415511	9415512	9415513	9415515	
150mm	9415561	9415562	9415563	9415565	
200mm	9415521	9415522	9415523	9415525	
250mm	9415571	9415572	9415573	9415575	

Pinnacle® DB Phenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB Phenyl Guard Cartridge	941550212	941550210	941550222	941550220	







Pinnacle® DB PFP Propyl Columns (USP L43)

Chromatographic Properties:

Pinnacle® DB PFP Propyl, a unique pentafluorophenyl phase with a propyl spacer, uses a highly base-deactivated spherical silica manufactured by Restek. This highly base-deactivated packing exhibits excellent peak shapes for a wide range of compounds, including nucleosides, nucleotides, and halogenated compounds.

	1.0m	m ID	2.1mr	n ID	3.2m	m ID	4.6m	m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1.9 μ m Columns								
30mm			9419232					
50mm			9419252					
100mm			9419212					
3µm Columns								
30mm	9419331		9419332		9419333		9419335	
50mm	9419351		9419352		9419353		9419355	
100mm	9419311		9419312		9419313		9419315	
150mm	9419361		9419362		9419363		9419365	
5µm Columns								
30mm	9419531		9419532		9419533		9419535	
50mm	9419551		9419552		9419553		9419555	
100mm	9419511		9419512		9419513		9419515	
150mm	9419561		9419562		9419563		9419565	
200mm	9419521		9419522		9419523		9419525	
250mm	9419571		9419572		9419573		9419575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).



Physical Characteristics:

particle size: $1.9\mu m$, $3\mu m$, or $5\mu m$, spherical

pore size: 140Å carbon load: 6% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



Pinnacle® DB PFP Propyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB PFP Propyl Guard Cartridge	941950212	941950210	941950222	941950220	

Pinnacle® DB PFP Propyl HPLC Prep Columns

Length	10mm ID		21.2mm ID		30mm ID		50mm ID	
	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9419557		9419558		9419559		9419550	
100mm	9419517		9419518		9419519		9419510	
150mm	9419567		9419568		9419569		9419560	
250mm	9419577		9419578		9419579		9419570	

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms





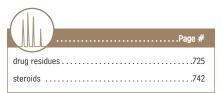






particle size: 1.9µm, 3µm, or 5µm, spherical pore size: 140Å carbon load: 8% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C





Pinnacle® DB Biphenyl Columns (USP L11)

Chromatographic Properties:

Pinnacle® DB Biphenyl is a unique reversed phase material that displays both increased retention and selectivity for aromatic and/or unsaturated compounds when compared to conventional alkyl and phenyl phases. Highly base-deactivated spherical silica manufactured by Restek. An excellent choice for the analysis of steroids, tetracyclines, drug metabolites, and other compounds that contain some degree of unsaturation.

	1.0m	m ID	2.1m	m ID	3.2m	m ID	4.6mm ID		
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
1.9µm Columns									
30mm			9409232						
50mm			9409252						
100mm			9409212						
3µm Columns									
30mm	9409331		9409332		9409333		9409335		
50mm	9409351		9409352		9409353		9409355		
100mm	9409311		9409312		9409313		9409315		
150mm	9409361		9409362		9409363		9409365		
5µm Columns									
30mm	9409531		9409532		9409533		9409535		
50mm	9409551		9409552		9409553		9409555		
100mm	9409511		9409512		9409513		9409515		
150mm	9409561		9409562		9409563		9409565		
200mm	9409521		9409522		9409523		9409525		
250mm	9409571		9409572		9409573		9409575		

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Pinnacle® DB Biphenyl Guard Cartridges

	3-рк.	3-рк.	2-рк.	2-рк.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB Biphenyl Guard Cartridge	940950212	940950210	940950222	940950220	\$148

Pinnacle® DB Biphenyl HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9409557		9409558		9409559		9409550	
100mm	9409517		9409518		9409519		9409510	
150mm	9409567		9409568		9409569		9409560	
250mm	9409577		9409578		9409579		9409570	

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.









Pinnacle® DB Aqueous C18 Columns (USP L1)

Chromatographic Properties:

Highly selective phase for polar analytes. Compatible with highly aqueous (up to 100%) mobile phases. Silica manufactured by Restek.

	1.0mi	1.0mm ID		2.1mm ID		3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
1.9 μ m Columns									
30mm			9418232						
50mm			9418252						
100mm			9418212						
3µm Columns									
30mm	9418331		9418332		9418333		9418335		
50mm	9418351		9418352		9418353		9418355		
100mm	9418311		9418312		9418313		9418315		
150mm	9418361		9418362		9418363		9418365		
5µm Columns									
30mm	9418531		9418532		9418533		9418535		
50mm	9418551		9418552		9418553		9418555		
100mm	9418511		9418512		9418513		9418515		
150mm	9418561		9418562		9418563		9418565		
200mm	9418521		9418522		9418523		9418525		
250mm	9418571		9418572		9418573		9418575		

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).



Physical Characteristics:

particle size: 1.9 μ m, 3 μ m, or 5 μ m, spherical pore size: 140Å carbon load: 6%

pH range: 2.5 to 8 temperature limit: 80°C





Pinnacle® DB Aqueous C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle DB Aqueous C18 Guard Cartridge	941850212	941850210	941850222	941850220	

Pinnacle® DB Aqueous C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	Length cat.# price		cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9418557		9418558		9418559		9418550	
100mm	9418517		9418518		9418519		9418510	
150mm	9418567		9418568		9418569		9418560	
250mm	9418577		9418578		9418579		9418570	

Pinnacle® DB IBD UHPLC Columns

Chromatographic Properties:

An intrinsically base-deactivated (IBD) phase, containing a polar group within, or intrinsic to, the hydrocarbon bonded phase. Unique selectivity and a high level of base deactivation, while reducing or eliminating the need for mobile phase additives.

	2.1mm ID
Length	cat.# price
1.9µm Columns	
30mm	9425232
50mm	9425252
100mm	9425212

Pinnacle® DB IBD HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.# price cat.#		price	cat.# price		cat.#	price	
5µm Columns								
50mm	9425557		9425558		9425559		9425550	
100mm	9425517		9425518		9425519		9425510	
150mm	9425567		9425568		9425569		9425560	
250mm	9425577		9425578		9425579		9425570	



Physical Characteristics:

particle size: 1.9µm pore size: 140Å endcap: yes pH range: 2.5 to 8 temperature limit: 80°C







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particle size: $1.9\mu m$, $3\mu m$, or $5\mu m$, spherical pore size: 140\AA

endcap: no pH range: 2.5 to 8 temperature limit: 80°C



Pinnacle® DB Silica Columns (USP L3)

Chromatographic Properties:

Highly base-deactivated spherical silica manufactured by Restek. Useful for normal phase separations. Replaces Hypersil® BDS and Pinnacle® Amine.

	1.0m	m ID	2.1mr	2.1mm ID		3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
1.9 μ m Columns									
30mm			9410232						
50mm			9410252						
100mm			9410212						
3µm Columns									
30mm	9410331		9410332		9410333		9410335		
50mm	9410351		9410352		9410353		9410355		
100mm	9410311		9410312		9410313		9410315		
150mm	9410361		9410362		9410363		9410365		
5µm Columns									
30mm	9410531		9410532		9410533		9410535		
50mm	9410551		9410552		9410553		9410555		
100mm	9410511		9410512		9410513		9410515		
150mm	9410561		9410562		9410563		9410565		
200mm	9410521		9410522		9410523		9410525		
250mm	9410571		9410572		9410573		9410575		

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

also available

HPLC Syringes

See pages 285-289.



Pinnacle® DB Silica Guard Cartridges

Guard Cartridges	3-рк. (10 x 2.1mm)	3-рк. (10 x 4.0mm)	2-pk. (20 x 2 1mm)	2-рк. (20 x 4.0mm)	price
Pinnacle DB Silica Guard Cartridge	941050212	941050210	941050222	941050220	prioc

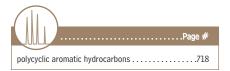
Pinnacle® DB Silica HPLC Prep Columns

10mm	ID	21.2mr	n ID	30mm	ID	50mm	ID
cat.#	price	cat.#	price	cat.#	price	cat.#	price
9410557		9410558		9410559		9410550	
9410517		9410518		9410519		9410510	
9410567		9410568		9410569		9410560	
9410577		9410578		9410579		9410570	
	9410557 9410517 9410567	9410557 9410517 9410567	cat.# price cat.# 9410557 9410558 9410517 9410518 9410567 9410568	cat.# price cat.# price 9410557 9410558 9410518 9410517 9410518 9410568	cat.# price cat.# price cat.# 9410557 9410558 9410559 9410517 9410518 9410519 9410567 9410568 9410569	cat# price cat.# price cat.# price 9410557 9410558 9410559 9410519 9410517 9410518 9410519 9410567 9410568 9410569	cat.# price cat.# price cat.# 9410557 9410558 9410559 9410550 9410517 9410518 9410519 9410510 9410567 9410568 9410569 9410560

Restek manufactured silica

Physical Characteristics:

particle size: 1.9µm pore size: 140Å endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



Pinnacle® DB PAH UHPLC Columns

- Complete resolution of EPA 610 PAHs in less than 4 minutes.
- Greatly reduces run times, increasing sample throughput.

Chromatographic Properties:

Specifically designed to resolve complex mixtures of polycyclic aromatic hydrocarbons.

	Z.IMM ID
Length	cat.# price
1.9µm Columns	
30mm	9470232
50mm	9470252
100mm	9470212







Pinnacle[®] II Columns: 3µm or 5µm particles; 110Å pore size

Silica manufactured at Restek, for total control of quality and reproducibility. Excellent replacement for the original Hypersil® material. Physical and chromatographic properties similar to our original Pinnacle® materials, but with greater lot-to-lot uniformity.

Pinnacle® II C18 Columns (USP L1)

Chromatographic Properties:

Excellent choice as a general purpose C18 column. Intermediate carbon loading and surface area, suitable for a wide range of acidic to neutral hydrophobic compounds. Replaces Hypersil® ODS and Pinnacle® C18.

	1.0mi	1.0mm ID 2.1mm ID		3.2mm ID		4.0mm ID		4.6mm ID		
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns										
30mm	9214331		9214332		9214333				9214335	
50mm	9214351		9214352		9214353				9214355	
100mm	9214311		9214312		9214313				9214315	
5µm Columns										
30mm	9214531		9214532		9214533				9214535	
50mm	9214551		9214552		9214553				9214555	
100mm	9214511		9214512		9214513		9214514		9214515	
150mm	9214561		9214562		9214563		9214564		9214565	
200mm	9214521		9214522		9214523				9214525	
250mm	9214571		9214572		9214573				9214575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Search by compound name, synonym,

www.restek.com/chromatograms

CAS # or keyword

Pinnacle® II C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II C18 Guard Cartridge	921450212	921450210	921450222	921450220	

Pinnacle® II C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9214557		9214558		9214559		9214550	
100mm	9214517		9214518		9214519		9214510	
150mm	9214567		9214568		9214569		9214560	
250mm	9214577		9214578		9214579		9214570	





Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 110Å carbon load: 13% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



allicin
capsaicinoids
morphine sulfate
phenolic antioxidants727, 730



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particle size: 4µm, spherical pore size: 110Å endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



Page #	
polycyclic aromatic hydrocarbons	



Chromatographic Properties:

Developed specifically for challenging analyses of polycyclic aromatic hydrocarbons. The Pinnacle® II PAH stationary phase incorporates a proprietary C18 bonding that enables unique shape selectivity to resolve to baseline all 16 PAHs listed in US EPA Method 610. Every lot of Pinnacle® II PAH bonded phase material is tested to ensure baseline resolution of the Method 610 PAHs, using a simple water/acetonitrile mobile phase gradient. Further, because we make Pinnacle® II PAH columns using our own silica, we have greater control over quality and reproducibility. Replaces Pinnacle® PAH columns. If you are analyzing PAHs, Pinnacle® II PAH columns are a reliable, cost-effective choice.

	2.1mn	n ID	3.2mn	n ID	4.6mm ID cat.# price	
Length	cat.#	price	cat.#	price	cat.#	price
4µm Columns						
50mm	9219452		9219453		9219455	
100mm	9219412		9219413		9219415	
150mm	9219462		9219463		9219465	
200mm	9219422		9219423		9219425	
250mm	9219472		9219473		9219475	

Pinnacle® II PAH Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II PAH Guard Cartridge	921950212	921950210	921950222	921950220	



Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 110Å carbon load: 7% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

Pinnacle® II C8 Columns (USP L7)

Chromatographic Properties:

Reliable performance and symmetric peaks for neutral to acidic compounds. Provides shorter retention times for hydrophobic compounds, compared to C18 phases. Replaces Hypersil® C8 and Pinnacle® C8.

	1.0m	m ID	2.1mi	m ID	3.2m	m ID	4.0m	m ID	4.6m	m ID
Length	cat.#	price								
3 μ m Columns										
30mm	9213331		9213332		9213333				9213335	
50mm	9213351		9213352		9213353				9213355	
100mm	9213311		9213312		9213313				9213315	
5µm Columns										
30mm	9213531		9213532		9213533				9213535	
50mm	9213551		9213552		9213553				9213555	
100mm	9213511		9213512		9213513		9213514		9213515	
150mm	9213561		9213562		9213563		9213564		9213565	
200mm	9213521		9213522		9213523				9213525	
250mm	9213571		9213572		9213573				9213575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Pinnacle® II C8 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II C8 Guard Cartridge	921350212	921350210	921350222	921350220	

Pinnacle® II C8 HPLC Prep Columns

	10mm	ID	21.2mr	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9213557		9213558		9213559		9213550	
100mm	9213517		9213518		9213519		9213510	
150mm	9213567		9213568		9213569		9213560	
250mm	9213577		9213578		9213579		9213570	











Pinnacle® II Cyano Columns (USP L10)

Chromatographic Properties:

Can be used in either reversed phase or normal phase mode. More rugged than bare silica for normal phase applications. Replaces Hypersil® Cyano and Pinnacle® CN.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
cat.# price	cat.# price	cat.# price	cat.# price
9216331	9216332	9216333	9216335
9216351	9216352	9216353	9216355
9216311	9216312	9216313	9216315
9216531	9216532	9216533	9216535
9216551	9216552	9216553	9216555
9216511	9216512	9216513	9216515
9216561	9216562	9216563	9216565
9216521	9216522	9216523	9216525
9216571	9216572	9216573	9216575
	9216331 9216351 9216311 9216531 9216551 921651 9216561 9216521	cat.# price cat.# price 9216331 9216332 9216352 9216351 9216312 9216531 9216532 9216551 9216552 9216511 9216512 9216561 9216562 9216521 9216522	cat.# price cat.# price 9216331 9216332 9216333 9216351 9216352 9216353 9216311 9216312 9216313 9216531 9216532 9216533 9216551 9216552 9216553 9216511 9216512 9216513 9216561 9216562 9216563 9216521 9216522 9216523

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).



Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 110Å carbon load: 4% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C





Pinnacle® II Cyano Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II Cyano Guard Cartridge	921650212	921650210	921650222	921650220	\$148

Pinnacle® II Cyano HPLC Prep Columns

	10mm	ID	21.2mn	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9216557		9216558		9216559		9216550	
100mm	9216517		9216518		9216519		9216510	
150mm	9216567		9216568		9216569		9216560	
250mm	9216577		9216578		9216579		9216570	



also available **Bulk Packing** Materials See page 194.

Pinnacle® II Phenyl Columns (USP L11)

Chromatographic Properties:

The Pinnacle® II Phenyl phase offers unique selectivity versus traditional alkyl chain phases, especially for aromatic compounds. Replaces Hypersil® Phenyl and Pinnacle® Phenyl.

	1.0mm	ID 2.1m	m ID 3.2	mm ID 4.6n	nm ID
Length	cat.#	price cat.#	price cat.#	price cat.#	price
3µm Columns					
30mm	9215331	9215332	9215333	9215335	
50mm	9215351	9215352	9215353	9215355	
100mm	9215311	9215312	9215313	9215315	
5µm Columns					
30mm	9215531	9215532	9215533	9215535	
50mm	9215551	9215552	9215553	9215555	
100mm	9215511	9215512	9215513	9215515	
150mm	9215561	9215562	9215563	9215565	
200mm	9215521	9215522	9215523	9215525	
250mm	9215571	9215572	9215573	9215575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Pinnacle® II Phenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II Phenyl Guard Cartridge	921550212	921550210	921550222	921550220	



Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 110Å carbon load: 6%

endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C





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particle size: $3\mu m$ or $5\mu m$, spherical pore size: $110 \mbox{\normalfont\AA}$ carbon load: 2% endcap: no pH range: 2.5 to 8 temperature limit: $80\mbox{\normalfont\^{C}}$



Pinnacle® II Amino Columns (USP L8)

Chromatographic Properties:

HPLC analysis using an amino-based stationary phase is the most popular technique for routine analyses of simple sugars, using isocratic elution (e.g., acetonitrile:water, 75:25) and a refractive index detector (RID) or an evaporative light scattering detector (ELSD). The Pinnacle® II Amino column is ideal for mono- and disaccharide analyses. Replaces Hypersil® Amino and Pinnacle® Amino.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9217331	9217332	9217333	9217335
50mm	9217351	9217352	9217353	9217355
100mm	9217311	9217312	9217313	9217315
5µm Columns				
30mm	9217531	9217532	9217533	9217535
50mm	9217551	9217552	9217553	9217555
100mm	9217511	9217512	9217513	9217515
150mm	9217561	9217562	9217563	9217565
200mm	9217521	9217522	9217523	9217525
250mm	9217571	9217572	9217573	9217575

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Pinnacle® II Amino Guard Cartridges

	3-рк.	3-рк.	2-рк.	2-рк.	_
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II Amino Guard Cartridge	921750212	921750210	921750222	921750220	



Physical Characteristics: particle size: 5µm, spherical pore size: 110Å endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

Pinnacle® II Biphenyl Columns (USP L11)

Chromatographic Properties:

The Pinnacle® II Biphenyl phase offers alternate selectivity to straight-chain hydrocarbon phases, and enhanced selectivity and retention for unsaturated compounds, compared to traditional phenyl phases. An excellent confirmation column for explosive compounds, as in EPA method 8330.

	4.6mm ID
Length	cat.# price
5μm Column	
150mm	9209565
250mm	9209575

Pinnacle® II Biphenyl Guard Cartridges

	3-pk.	2-pk.	
Guard Cartridges	(10 x 4.0mm)	(20 x 4.0mm)	price
Dinnacle II Rinhenyl Guard Cartridge	020050210	020050220	

ChromaBLOGraphy

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Pinnacle® II Silica Columns (USP L3)

Chromatographic Properties:

Good general purpose packing for normal phase separations. Moderate surface area. Replaces Hypersil® and Pinnacle® Silica.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
cat.# price	cat.# price	cat.# price	cat.# price
9210331	9210332	9210333	9210335
9210351	9210352	9210353	9210355
9210311	9210312	9210313	9210315
9210531	9210532	9210533	9210535
9210551	9210552	9210553	9210555
9210511	9210512	9210513	9210515
9210561	9210562	9210563	9210565
9210521	9210522	9210523	9210525
9210571	9210572	9210573	9210575
	cat.# price 9210331 9210351 9210311 9210531 9210551 9210511 9210561 9210521	cat.# price cat.# price 9210331 9210332 9210352 9210351 9210312 9210312 9210531 9210532 9210552 9210551 9210552 9210512 9210561 9210562 9210521	cat.# price cat.# price 9210331 9210332 9210333 9210351 9210352 9210353 9210311 9210312 9210313 9210531 9210532 9210533 9210551 9210552 9210553 9210511 9210512 9210513 9210561 9210562 9210563 9210521 9210522 9210523

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).



Physical Characteristics:

particle size: $3\mu m$ or $5\mu m$, spherical pore size: 110Å

endcap: no pH range: 2.5 to 8 temperature limit: 80°C





Pinnacle® II Silica Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Pinnacle II Silica Guard Cartridge	921050212	921050210	921050222	921050220	

Pinnacle® II Silica HPLC Prep Columns

	10mm	ID	21.2mn	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9210557		9210558		9210559		9210550	
100mm	9210517		9210518		9210519		9210510	
150mm	9210567		9210568		9210569		9210560	
250mm	9210577		9210578		9210579		9210570	

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

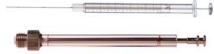
Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.



also available

HPLC Syringes

See pages 346-349.







pore size: 60Å carbon load: 27% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

particle size: 5µm, spherical



Allure® Columns: 5µm particles; 60Å pore size

Small pore size in a high-purity, Type B silica provides a large surface area. High carbon loads, highly retentive. An excellent choice for evaporative light scattering (ELSD) and MS detectors, in which more organic solvent in the mobile phase gives better sensitivity.

Allure® C18 Columns (USP L1)

Chromatographic Properties:

Most retentive of our alkyl stationary phases due to large surface area of the base silica and high-density bondings. Provides excellent peak shapes for a wide range of compounds.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
cat.# price	cat.# price	cat.# price	cat.# price
9164531	9164532	9164533	9164535
9164551	9164552	9164553	9164555
9164511	9164512	9164513	9164515
9164561	9164562	9164563	9164565
9164521	9164522	9164523	9164525
9164571	9164572	9164573	9164575
	9164531 9164551 9164511 9164561 9164521	cat.# price cat.# price 9164531 9164532 9164552 9164551 9164552 9164512 9164561 9164562 9164521	cat.# price cat.# price 9164531 9164532 9164533 9164551 9164552 9164553 9164511 9164512 9164513 9164561 9164562 9164563 9164521 9164522 9164523

Allure® C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure C18 Guard Cartridge	916450212	916450210	916450222	916450220	\$148

Allure® C18 HPLC Prep Columns

	10mm	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9164557		9164558		9164559		9164550		
100mm	9164517		9164518		9164519		9164510		
150mm	9164567		9164568		9164569		9164560		
250mm	9164577		9164578		9164579		9164570		

Physical Characteristics:

particle size: 5µm, spherical pore size: 60Å carbon load: 12% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



Allure® Basix Columns (USP L10)

Chromatographic Properties:

Highly retentive propyl cyano phase. Excellent choice for basic compounds and for analytes containing amine group functionality.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
5µm Columns				
30mm	9161531	9161532	9161533	9161535
50mm	9161551	9161552	9161553	9161555
100mm	9161511	9161512	9161513	9161515
150mm	9161561	9161562	9161563	9161565
200mm	9161521	9161522	9161523	9161525
250mm	9161571	9161572	9161573	9161575

Allure® Basix Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure Basix Guard Cartridge	916150212	916150210	916150222	916150220	

Allure® Basix HPLC Prep Columns

	.2mm I	10mm ID	m ID	30mm	ID	50mm	ID
Length	Ŀ	cat.# price	price	cat.#	price	cat.#	price
5µm Columns							
50mm	58	9161557		9161559		9161550	
100mm	18	9161517		9161519		9161510	
150mm	68	9161567		9161569		9161560	
250mm	78	9161577		9161579		9161570	
							_



also available Bulk Packing Materials See page 194.









Allure® PFP Propyl Columns (USP L43)

Chromatographic Properties:

A pentafluorophenyl phase with a propyl spacer. Highly retentive for basic analytes. An excellent phase for separating nucleosides, nucleotides, purines, pyrimidines, halogenated compounds, β -blockers, and tricyclic antidepressants.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
cat.# price	cat.# price	cat.# price	cat.# price
9169531	9169532	9169533	9169535
9169551	9169552	9169553	9169555
9169511	9169512	9169513	9169515
9169561	9169562	9169563	9169565
9169521	9169522	9169523	9169525
9169571	9169572	9169573	9169575
	9169531 9169551 9169511 9169561 9169521	cat.# price cat.# price 9169531 9169532 9169552 9169551 9169552 9169512 9169561 9169562 9169521	cat.# price cat.# price 9169531 9169532 9169533 9169551 9169552 9169553 9169511 9169512 9169513 9169561 9169562 9169563 9169521 9169522 9169523

Allure® PFP Propyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure PFP Propyl Guard Cartridge	916950212	916950210	916950222	916950220	

Allure® PFP Propyl HPLC Prep Columns

Length	10mm ID		21.2mm ID		30mm ID		50mm ID	
	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9169557		9169558		9169559		9169550	
100mm	9169517		9169518		9169519		9169510	
150mm	9169567		9169568		9169569		9169560	
250mm	9169577		9169578		9169579		9169570	

Physical Characteristics:

particle size: 5µm, spherical pore size: 60Å carbon load: 17% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

JUULI
antibiotics
benzodiazepines751
catecholamines
cocaine, ecgonine methyl ester
nucleic acid bases
opiates



Allure® Aqueous C18 Columns (USP L1)

Chromatographic Properties:

Highly retentive and selective phase for separating polar analytes, including polar acidic compounds. Compatible with highly aqueous (up to 100%) mobile phases. Highly base deactivated. An excellent choice when analyzing a wide range of compounds, as in LC/MS screening methods.

1.0mm ID		2.1m	2.1mm ID		3.2mm ID		m ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
30mm	9168531		9168532		9168533		9168535	
50mm	9168551		9168552		9168553		9168555	
100mm	9168511		9168512		9168513		9168515	
150mm	9168561		9168562		9168563		9168565	
200mm	9168521		9168522		9168523		9168525	
250mm	9168571		9168572		9168573		9168575	

Allure® Aqueous C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure Aqueous C18 Guard Cartridge	916850212	916850210	916850222	916850220	

Physical Characteristics: particle size: 5µm spherical pore size: 60Å endcap: no pH range: 2.5 to 8 temperature limit: 80°C

Chromatogram Search Tool

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms





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Mar 2011



particle size: 5µm, spherical pore size: 60Å carbon load: 23% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



Allure® Biphenyl Columns (USP L11)

Chromatographic Properties:

Highly retentive and selective for aromatic and unsaturated compounds. Increased retention and selectivity, compared to phenyl phases. Excellent selectivity for steroids, tetracyclines, explosives, and other unsaturated compounds.

1.0mm ID		2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
5µm Columns				
30mm	9166531	9166532	9166533	9166535
50mm	9166551	9166552	9166553	9166555
100mm	9166511	9166512	9166513	9166515
150mm	9166561	9166562	9166563	9166565
200mm	9166521	9166522	9166523	9166525
250mm	9166571	9166572	9166573	9166575

Allure® Biphenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure Biphenyl Guard Cartridge	916650212	916650210	916650222	916650220	\$148

Allure® Biphenyl HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5μ m Columns								
50mm	9166557		9166558		9166559		9166550	
100mm	9166517		9166518		9166519		9166510	
150mm	9166567		9166568		9166569		9166560	
250mm	9166577		9166578		9166579		9166570	

Physical Characteristics:

particle size: 5µm, spherical pore size: 60Å endcap: no pH range: 2.5 to 8 temperature limit: 80°C



Allure® Organic Acids Columns

Chromatographic Properties:

Allure® Organic Acids columns provide enhanced retention and selectivity for polar organic acids, allowing the separation to be performed on a single 30cm column. An Allure® Organic Acids column effectively resolves key organic acids such as tartaric and quinic acids, using the chromatographic conditions specified in AOAC method 986.13. Retention is stable and reproducible, even with the 100% aqueous mobile phase specified in the AOAC method.

Length	3.2m	4.6mm ID		
	cat.#	price	cat.#	price
5µm Column				
150mm	9165563	\$586	9165565	
250mm			9165575	
300mm			9165585	

Note: Other dimensions available on request.

Allure® Organic Acids Guard Cartridges

Guard Cartridges	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)	2-pk. (20 x 2.1mm)	2-pk. (20 x 4.0mm)	price	
Allura Organic Acids Guard Cartridge	016550212	016550210	016550222	016550220	-	







Allure® Silica Columns (USP L3)

Chromatographic Properties:

Highly retentive phase for normal phase separations. Very high surface area, Type B silica packing.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
5µm Columns				
30mm	9160531	9160532	9160533	9160535
50mm	9160551	9160552	9160553	9160555
100mm	9160511	9160512	9160513	9160515
150mm	9160561	9160562	9160563	9160565
200mm	9160521	9160522	9160523	9160525
250mm	9160571	9160572	9160573	9160575

Allure® Silica Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Allure Silica Guard Cartridge	916050212	916050210	916050222	916050220	

Allure® Silica HPLC Prep Columns

	10mm	ID	21.2mn	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9160557		9160558		9160559		9160550	
100mm	9160517		9160518		9160519		9160510	
150mm	9160567		9160568		9160569		9160560	
250mm	9160577		9160578		9160579		9160570	

Allure® AK Columns

Chromatographic Properties:

This highly retentive, highly selective phase, unique to Restek, was developed specifically for the analysis of aldehydes and ketones as DNPH derivatives. Allure® AK is a reversed phase HPLC material that has the unique ability to separate all thirteen carbonyl compounds specified in California Air Resources Board (CARB) Method # 1004, using a simple acetonitrile/ water gradient, in less than 15 minutes. Other columns require long analysis times or the use of tetrahydrofuran.

,	3.2mm II)	4.6mm II)
Length	cat.#	price	cat.#	price
5µm Columns with Trident Integral Inlet Fittings				
200mm	9159523-700	\$601	9159525-700	

Allure® AK Guard Cartridge

	3-pk.	
Guard Cartridges	(10 x 4.0mm)	price
Allure AK Guard Cartridge	915950210	

Physical Characteristics:

particle size: 5µm, spherical pore size: 60Å endcap: no pH range: 2.5 to 8 temperature limit: 80°C

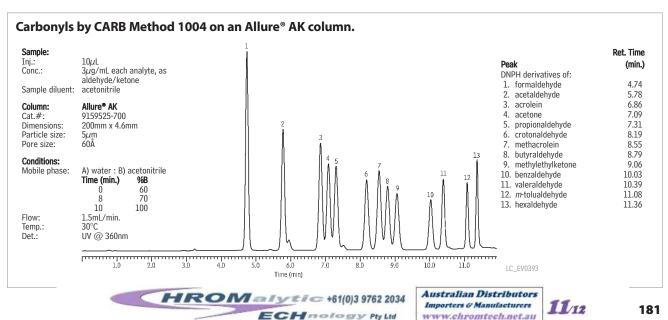


Physical Characteristics:

particle size: 5µm pore size: 60Å endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

www.chromtech.net.au







Ultra Columns: 3µm or 5µm particles; 100Å pore size

Our broadest selection of stationary phases, including unique phases. High density bondings, for maximum retention. High-purity, Type B silica gives excellent peak shapes for a wide range of compounds.

Ultra C18 Columns (USP L1)

Chromatographic Properties:

A retentive, high-purity packing that exhibits excellent peak shape for a wide range of compounds. Excellent general-purpose reversed phase column.

	1.0m	m ID	2.1m	m ID	3.2m	m ID	4.0m	m ID	4.6m	m ID
Length	cat.#	price								
3µm Columns										
30mm	9174331		9174332		9174333				9174335	
50mm	9174351		9174352		9174353				9174355	
100mm	9174311		9174312		9174313				9174315	
5µm Columns										
30mm	9174531		9174532		9174533				9174535	
50mm	9174551		9174552		9174553				9174555	
100mm	9174511		9174512		9174513		9174514		9174515	
150mm	9174561		9174562		9174563		9174564		9174565	
200mm	9174521		9174522		9174523				9174525	
250mm	9174571		9174572		9174573				9174575	

3.0mm ID available on request for 3µm particle applications above 4,000 psi (275 Bar).

Ultra C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra C18 Guard Cartridge	917450212	917450210	917450222	917450220	\$148

Ultra C18 HPLC Prep Columns

	10mm	ID	21.2mr	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9174557		9174558		9174559		9174550	
100mm	9174517		9174518		9174519		9174510	
150mm	9174567		9174568		9174569		9174560	
250mm	9174577		9174578		9174579		9174570	

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

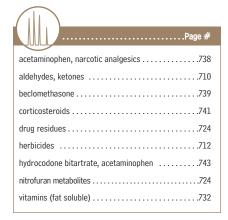
Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.



Physical Characteristics:

particle size: 3μm or 5μm, spherical pore size: 100Å carbon load: 20% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



also available





- Superior packing technology ensures rugged, reproducible columns.
- Wide range of phases and dimensions available please inquire.







Ultra C8 Columns (USP L7)

Chromatographic Properties:

A retentive, high-purity, base-deactivated reversed phase packing that exhibits excellent peak shape for a wide range of compounds. Less retention for neutral, hydrophobic compounds, compared to the Ultra C18 column.

1.0mm ID		2.1mr	2.1mm ID 3.2		nm ID 4.0mm		m ID	n ID 4.6mm ID		
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns										
30mm	9103331		9103332		9103333				9103335	
50mm	9103351		9103352		9103353				9103355	
100mm	9103311		9103312		9103313				9103315	
5µm Columns										
30mm	9103531		9103532		9103533				9103535	
50mm	9103551		9103552		9103553				9103555	
100mm	9103511		9103512		9103513		9103514		9103515	
150mm	9103561		9103562		9103563		9103564		9103565	
200mm	9103521		9103522		9103523				9103525	
250mm	9103571		9103572		9103573				9103575	

^{3.0}mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra C8 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra C8 Guard Cartridge	910350212	910350210	910350222	910350220	

Ultra C8 HPLC Prep Columns

	10mm	ID	21.2mn	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5μ m Columns								
50mm	9103557		9103558		9103559		9103550	
100mm	9103517		9103518		9103519		9103510	
150mm	9103567		9103568		9103569		9103560	
250mm	9103577		9103578		9103579		9103570	

Ultra Aqueous C18 Columns (USP L1)

Chromatographic Properties:

Highly retentive and selective for reversed phase separations of polar analytes. Highly base-deactivated. Compatible with highly aqueous (up to 100%) mobile phases.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9178331	9178332	9178333	9178335
50mm	9178351	9178352	9178353	9178355
100mm	9178311	9178312	9178313	9178315
5µm Columns				
30mm	9178531	9178532	9178533	9178535
50mm	9178551	9178552	9178553	9178555
100mm	9178511	9178512	9178513	9178515
150mm	9178561	9178562	9178563	9178565
200mm	9178521	9178522	9178523	9178525
250mm	9178571	9178572	9178573	9178575

^{3.0}mm ID available on request for $3\mu\mathrm{m}$ particle applications above 4,000 psi (275 Bar).

Ultra Aqueous C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Aqueous C18 Guard Cartridge	917850212	917850210	917850222	917850220	\$148

Ultra Aqueous C18 HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9178557		9178558		9178559		9178550	
100mm	9178517		9178518		9178519		9178510	
150mm	9178567		9178568		9178569		9178560	
250mm								

Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 100Å carbon load: 12% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C



I.

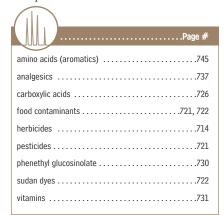
also available

Capillary HPLC Columns www.restek.com

- High quality, Restek manufactured packing materials.
- Superior packing technology ensures rugged, reproducible columns.
- Wide range of phases and dimensions available please inquire.

Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 100Å carbon load: 15% endcap: no pH range: 2.5 to 8 temperature limit: 80°C





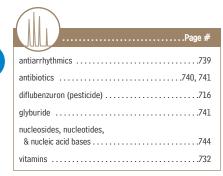
Australian Distributors Importers & Manufacturers www.chromtech.net.au





particle size: 3µm or 5µm, spherical

pore size: 100Å carbon load: 12% endcap: no pH range: 2.5 to 8 temperature limit: 80°C



Ultra IBD Columns

Chromatographic Properties:

An intrinsically base-deactivated (IBD) phase, containing a polar group within, or intrinsic to, the hydrocarbon bonded phase. Unique selectivity and a high level of base deactivation, while reducing or eliminating the need for mobile phase additives.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9175331	9175332	9175333	9175335
50mm	9175351	9175352	9175353	9175355
100mm	9175311	9175312	9175313	9175315
5µm Columns				
30mm	9175531	9175532	9175533	9175535
50mm	9175551	9175552	9175553	9175555
100mm	9175511	9175512	9175513	9175515
150mm	9175561	9175562	9175563	9175565
200mm	9175521	9175522	9175523	9175525
250mm	9175571	9175572	9175573	9175575

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra IBD Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra IBD Guard Cartridge	917550212	917550210	917550222	917550220	\$148

Ultra IBD HPLC Prep Columns

	10mm	ID	21.2mr	n ID	30mm	ID	50mm	ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5μ m Columns								
50mm	9175557		9175558		9175559		9175550	
100mm	9175517		9175518		9175519		9175510	
150mm	9175567		9175568		9175569		9175560	
250mm	9175577		9175578		9175579		9175570	

Physical Characteristics:

particle size: 3µm or 5µm, spherical

pore size: 100Å carbon load: 9% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C

Ultra C4 Columns (USP L26)

Chromatographic Properties:

Exceptionally stable C4 packing, with high bonding coverage and base deactivation. Less retention than C18 or C8 phases.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID	
Length	cat.# price	cat.# price	cat.# price	cat.# price	
3µm Columns					
30mm	9102331	9102332	9102333	9102335	
50mm	9102351	9102352	9102353	9102355	
100mm	9102311	9102312	9102313	9102315	
5µm Columns					
30mm	9102531	9102532	9102533	9102535	
50mm	9102551	9102552	9102553	9102555	
100mm	9102511	9102512	9102513	9102515	
150mm	9102561	9102562	9102563	9102565	
200mm	9102521	9102522	9102523	9102525	
250mm	9102571	9102572	9102573	9102575	

3.0mm ID available on request for 3µm particle applications above 4,000 psi (275 Bar).

Ultra C4 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra C4 Guard Cartridge	910250212	910250210	910250222	910250220	

ChromaBLOGraphy

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Ultra C1 Columns (USP L13)

Chromatographic Properties:

Exceptionally stable C1 phase. Least retentive reversed phase hydrocarbon packing.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9101331	9101332	9101333	9101335
50mm	9101351	9101352	9101353	9101355
100mm	9101311	9101312	9101313	9101315
5µm Columns				
30mm	9101531	9101532	9101533	9101535
50mm	9101551	9101552	9101553	9101555
100mm	9101511	9101512	9101513	9101515
150mm	9101561	9101562	9101563	9101565
200mm	9101521	9101522	9101523	9101525
250mm	9101571	9101572	9101573	9101575

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra C1 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra C1 Guard Cartridge	910150212	910150210	910150222	910150220	

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra C1 Guard Cartridge	910150212	910150210	910150222	910150220	

Ultra Cyano Columns (USP L10)

Chromatographic Properties:

High-purity cyano phase with few silanol sites. Often a better choice than C18 phases for basic pharmaceuticals, especially regarding peak shape and selectivity. Cyano phases are more rugged than bare silica for normal phase analyses because they are less sensitive to small amounts of water in the mobile phase.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9106331	9106332	9106333	9106335
50mm	9106351	9106352	9106353	9106355
100mm	9106311	9106312	9106313	9106315
5µm Columns				
30mm	9106531	9106532	9106533	9106535
50mm	9106551	9106552	9106553	9106555
100mm	9106511	9106512	9106513	9106515
150mm	9106561	9106562	9106563	9106565
200mm	9106521	9106522	9106523	9106525
250mm	9106571	9106572	9106573	9106575

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra Cyano Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Cyano Guard Cartridge	910650212	910650210	910650222	910650220	\$148

Ultra Cyano HPLC Prep Columns

•	10mm	TD	21.2mm ID		30mm ID		50mm ID	
	TOIIIII	ענ	Z1.ZIIII	עז וו	30111111	ענ	Julilli	ענ
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
50mm	9106557		9106558		9106559		9106550	
100mm	9106517		9106518		9106519		9106510	
150mm	9106567		9106568		9106569		9106560	
250mm	9106577		9106578		9106579		9106570	

Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 100Å carbon load: 5% pH range: 2.5 to 8 temperature limit: 80°C

also available

HPLC Syringes

See pages 346-349.



Physical Characteristics:

particle size: 3µm or 5µm, spherical pore size: 100Å carbon load: 8% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C





ordering **note**

We strongly recommend ordering a semi-prep or prep column only after evaluating the desired separation on an equivalent analytical-scale column. Because we cannot re-use a column or the silica it contains once it has left our facility, we cannot accept returns of large-scale columns



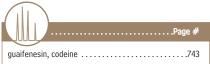






particle size: 3μm or 5μm, spherical pore size: 100Å carbon load: 10% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C





Ultra Phenyl Columns (USP L11)

Chromatographic Properties:

High-purity, highly retentive, base-deactivated phase with alternative selectivity to straight chain hydrocarbon phases, especially for aromatic analytes.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID	
Length	cat.# price	cat.# price	cat.# price	cat.# price	
3µm Columns					
30mm	9105331	9105332	9105333	9105335	
50mm	9105351	9105352	9105353	9105355	
100mm	9105311	9105312	9105313	9105315	
5µm Columns					
30mm	9105531	9105532	9105533	9105535	
50mm	9105551	9105552	9105553	9105555	
100mm	9105511	9105512	9105513	9105515	
150mm	9105561	9105562	9105563	9105565	
200mm	9105521	9105522	9105523	9105525	
250mm	9105571	9105572	9105573	9105575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra Phenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Phenyl Guard Cartridge	910550212	910550210	910550222	910550220	

Ultra Phenyl HPLC Prep Columns

	10mm	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9105557		9105558		9105559		9105550		
100mm	9105517		9105518		9105519		9105510		
150mm	9105567		9105568		9105569		9105560		
250mm	9105577		9105578		9105579		9105570		

Physical Characteristics:

particle size: 3μm or 5μm, spherical

pore size: 100Å carbon load: 2% encap: no pH range: 2.5 to 8 temperature limit: 80°C



also available Bulk Packing Materials See page 194.

Ultra Amino Columns (USP L8)

Chromatographic Properties:

Recommended for normal phase analyses of mono- and disaccharides, or similar compounds.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9107331	9107332	9107333	9107335
50mm	9107351	9107352	9107353	9107355
100mm	9107311	9107312	9107313	9107315
5μ m Columns				
30mm	9107531	9107532	9107533	9107535
50mm	9107551	9107552	9107553	9107555
100mm	9107511	9107512	9107513	9107515
150mm	9107561	9107562	9107563	9107565
200mm	9107521	9107522	9107523	9107525
250mm	9107571	9107572	9107573	9107575

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra Amino Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Amino Guard Cartridge	910750212	910750210	910750222	910750220	







Ultra PFP Columns (USP L43)

Chromatographic Properties:

A pentafluorophenyl phase. Unique selectivity for compounds containing organohalogens or other basic functional groups.

	1.0mm ID 2.1m		3.2mm ID	4.6mm ID	
Length	cat.# price	cat.# price	cat.# price	cat.# price	
3µm Columns					
30mm	9176331	9176332	9176333	9176335	
50mm	9176351	9176352	9176353	9176355	
100mm	9176311	9176312	9176313	9176315	
5µm Columns					
30mm	9176531	9176532	9176533	9176535	
50mm	9176551	9176552	9176553	9176555	
100mm	9176511	9176512	9176513	9176515	
150mm	9176561	9176562	9176563	9176565	
200mm	9176521	9176522	9176523	9176525	
250mm	9176571	9176572	9176573	9176575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Ultra PFP Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra PFP Guard Cartridge	917650212	917650210	917650222	917650220	

Ultra PFP HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	cat.# price		price	cat.#	price
5µm Columns								
50mm	9176557		9176558		9176559		9176550	
100mm	9176517		9176518		9176519		9176510	
150mm	9176567		9176568		9176569		9176560	
250mm	9176577		9176578		9176579		9176570	

Physical Characteristics:

particle size: 3µm or 5µm, spherical

pore size: 100Å carbon load: 7% endcap: fully endcapped pH range: 2.5 to 8 temperature limit: 80°C





ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.



Chromatogram Search Tool Search by compound name, synonym,

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms









particle size: 3μm or 5μm, spherical pore size: 100Å

endcap: no pH range: 2.5 to 8 temperature limit: 80°C





We also have syringe filters! See **page 399**.

restek exclusive!

Physical Characteristics:

particle size: $3\mu m$ or $5\mu m$, spherical

pore size: 100Å pH range: 2.5 to 8 temperature limit: 80°C



restek innovation!

Faster analyses and reduced solvent use!

An Ultra Carbamate column can process as many as 3 to 4 samples per hour, versus less than 2 samples per hour on a general-purpose C18 column.

Ultra Silica Columns (USP L3)

Chromatographic Properties:

High surface area, Type B silica packing.

	1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price	cat.# price
3µm Columns				
30mm	9100331	9100332	9100333	9100335
50mm	9100351	9100352	9100353	9100355
100mm	9100311	9100312	9100313	9100315
5µm Columns				
30mm	9100531	9100532	9100533	9100535
50mm	9100551	9100552	9100553	9100555
100mm	9100511	9100512	9100513	9100515
150mm	9100561	9100562	9100563	9100565
200mm	9100521	9100522	9100523	9100525
250mm	9100571	9100572	9100573	9100575

3.0mm ID available on request for 3µm particle applications above 4,000 psi (275 Bar).

Ultra Silica Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Silica Guard Cartridge	910050212	910050210	910050222	910050220	

Ultra Silica HPLC Prep Columns

	10mm ID		21.2mm ID		30mm ID		50mm ID		
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9100557		9100558		9100559		9100550		
100mm	9100517		9100518		9100519		9100510		
150mm	9100567		9100568		9100569		9100560		
250mm	9100577		9100578		9100579		9100570		

Ultra Carbamate Columns

Chromatographic Properties:

Restek chemists developed the Ultra Carbamate column specifically for carbamates analysis. The unique packing separates 10 target carbamates in just over 10 minutes. The column is compatible with fluorescence or LC/MS detection.* An Ultra Carbamate column can process as many as 3 to 4 samples per hour, versus less than 2 samples per hour on a general-purpose C18 column. In addition to increased sample throughput, this much faster analysis will significantly reduce solvent usage—and the costs of disposing of solvent waste.

	1.0mi	m ID	2.1m	m ID	3.2mm ID		4.0mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns										
50mm	9177351		9177352		9177353		9177354	\$491	9177355	
100mm	9177311		9177312		9177313				9177315	
5µm Columns										
250mm									9177575	\$485

3.0mm ID available on request for $3\mu\mathrm{m}$ particle applications above 4,000 psi (275 Bar).

*For post-column derivatization/fluorescence detection applications using a 4.6mm ID column, the total system dead volume, including the post-column reactor, must be less than 650μ L. For standard post-column reactor systems, we recommend a 250mm x 4.6mm, 5μ m column. Contact Restek technical service or your Restek representative for more information.

Ultra Carbamate Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Carbamate Guard Cartridge	917750212	917750210	917750222	917750220	







Ultra Quat Columns

Chromatographic Properties:

A retentive, high-purity, base deactivated reversed phase packing. Ideal for the analysis of paraquat and diquat or other quaternary amines when used with Ultra Quat Reagent Solution mobile phase additive (cat.# 32441).

	4.0MM 1D
Length	cat.# price
5µm Column	
150mm	9181565

Ultra Quat Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Ultra Quat Guard Cartridge	918150212	918150210	918150222	918150220	

restek **exclusive**!

Physical Characteristics:

particle size: 5µm, spherical pore size: 100Å

pH range: 2.5 to 8 temperature limit: 80°C





Ultra Quat Reagent Solution

Use with Ultra Quat HPLC column. Dilute to 1 liter water, per instructions.

In water, 20mL/bottle

cat. # 32441 (ea.) \$54

Paraquat & Diquat Calibration Mix

paraquat dichloride diquat dibromide $1,000\mu$ g/mL each in water, 1mL/ampul cat. # 32437 (ea.) \$28



free literature

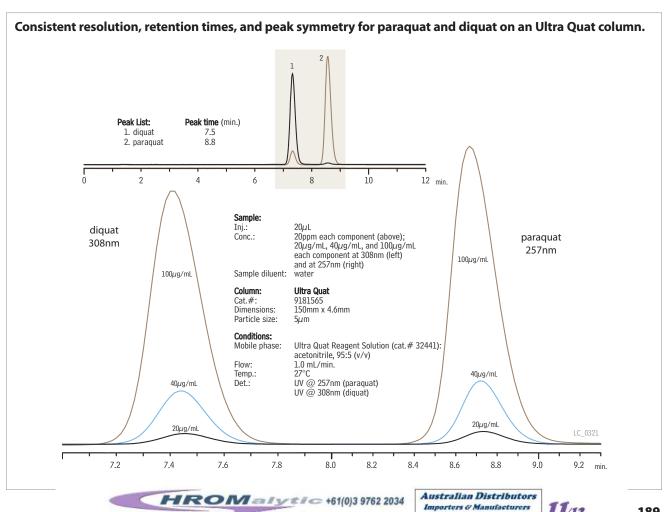
Simple, Sensitive **HPLC/UV Analysis for Paraquat and Diquat**

Download your free copy from www.restek.com

lit. cat.# 580006

restek innovation!

An Ultra Quat column and Ultra Quat Reagent Solution eliminate the need for ion pairing reagents in paraquat/diquat analysis.



www.chromtech.net.au

ECHnology Pty Ltd



restek innovation!

Viva silica has a narrow distribution around the mean pore size, permitting a larger portion of the silica surface to play a role in the separation of large molecules and biomolecules.





Physical Characteristics:

particle size: 3μm or 5μm, spherical pore size: 300Å carbon load: 9% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



Viva Wide Pore Columns: 3µm or 5µm particles; 300Å pore size

- Excellent for separating peptides or proteins.
- Rugged, spherical particles, with 300Å pore size.
- High proportion of pore/surface area available to large molecules.

Viva columns are based on a wide pore material we designed for optimal large molecule separations. In developing Viva silica, we found that although many commercial widepore silicas meet the standard 300Å mean pore size, most have very broad distributions about this mean, with a significant portion of their pore volume falling below 150Å. This means a large portion of the surface area is unavailable to larger molecules. Viva columns have a narrow distribution around the mean pore size, permitting a larger portion of the silica surface to play a role in the separation.

Viva C18 Columns (USP L1)

Chromatographic Properties:

Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds. Excellent general-purpose column for analyzing large molecules and biomolecules.

	1.0mm	n ID	2.1mi	n ID	3.2mi	3.2mm ID		m ID
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
3µm Columns								
30mm	9514331		9514332		9514333		9514335	
50mm	9514351		9514352		9514353		9514355	
100mm	9514311		9514312		9514313		9514315	
150mm	9514361		9514362		9514363		9514365	
5μ m Columns								
30mm	9514531		9514532		9514533		9514535	
50mm	9514551		9514552		9514553		9514555	
100mm	9514511		9514512		9514513		9514515	
150mm	9514561		9514562		9514563		9514565	
200mm	9514521		9514522		9514523		9514525	
250mm	9514571		9514572		9514573		9514575	

3.0mm ID available on request for 3μ m particle applications above 4,000 psi (275 Bar).

Viva C18 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva C18 Guard Cartridge	951450212	951450210	951450222	951450220	

Viva C18 HPLC Prep Columns

	10mm	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9514557		9514558		9514559		9514550		
100mm	9514517		9514518		9514519		9514510		
150mm	9514567		9514568		9514569		9514560		
250mm	9514577		9514578		9514579		9514570		



- High quality, Restek manufactured packing materials.
- Superior packing technology ensures rugged, reproducible columns.
- Wide range of phases and dimensions available please inquire.







Viva C8 Columns (USP L7)

Chromatographic Properties:

Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds. Less retention in reversed phase assays than Viva C18.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID	
cat.# pric	e cat.# price	cat.# price	cat.# price	
9513531	9513532	9513533	9513535	
9513551	9513552	9513553	9513555	
9513511	9513512	9513513	9513515	
9513561	9513562	9513563	9513565	
9513521	9513522	9513523	9513525	
9513571	9513572	9513573	9513575	
	cat.# pric 9513531 9513551 9513511 9513561 9513521	cat.# price cat.# price 9513531 9513532 9513552 9513551 9513552 9513512 9513561 9513562 9513521 9513521 9513522	cat.# price cat.# price 9513531 9513532 9513533 9513551 9513552 9513553 9513511 9513512 9513513 9513561 9513562 9513563 9513521 9513522 9513523	

Viva C8 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva C8 Guard Cartridge	951350212	951350210	951350222	951350220	

Viva C8 HPLC Prep Columns

	10mm ID		21.2mr	21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9513557		9513558		9513559		9513550		
100mm	9513517		9513518		9513519		9513510		
150mm	9513567		9513568		9513569		9513560		
250mm	9513577		9513578		9513579		9513570		



Physical Characteristics:

particle size: 5µm, spherical pore size: 300Å carbon load: 5% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

also available

3µm particles are available for all Viva phases—please inquire.



Viva C4 Columns (USP L26)

Chromatographic Properties:

Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds. Less retention in reversed phase assays than Viva C18 or Viva C8.

1.0mm ID		2.1mm ID	3.2mm ID	4.6mm ID	
Length	cat.# price	cat.# price	cat.# price	cat.# price	
5µm Columns					
30mm	9512531	9512532	9512533	9512535	
50mm	9512551	9512552	9512553	9512555	
100mm	9512511	9512512	9512513	9512515	
150mm	9512561	9512562	9512563	9512565	
200mm	9512521	9512522	9512523	9512525	
250mm	9512571	9512572	9512573	9512575	

Viva C4 Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva C4 Guard Cartridge	951250212	951250210	951250222	951250220	

Viva C4 HPLC Prep Columns

	10mm	10mm ID		21.2mm ID		30mm ID		50mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
50mm	9512557		9512558		9512559		9512550		
100mm	9512517		9512518		9512519		9512510		
150mm	9512567		9512568		9512569		9512560		
250mm	9512577		9512578		9512579		9512570		



Physical Characteristics:

particle size: 5µm, spherical pore size: 300Å carbon load: 3.5% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

ordering **note**

Other column dimensions and phases are available. Please call for a quote.



free literature

Viva Wide Pore HPLC Columns

Download your free copy from **www.restek.com**

lit. cat# 59939









restek exclusive!

Physical Characteristics:

particle size: 5µm pore size: 300Å carbon load: 6.7% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C



also available

3μm particles are available for all Viva phases—please inquire.



Physical Characteristics:

particle size: 5µm, spherical pore size: 300Å carbon load: 5% endcap: yes pH range: 2.5 to 8 temperature limit: 80°C

Viva Biphenyl Columns (USP L11)

Chromatographic Properties:

Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds; ideal for large molecule and biomolecule assays. Highly retentive and selective phase for aromatic and unsaturated compounds, with increased retention, relative to phenyl phases.

1.0		ım ID	ID 2.1mm ID		3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price
5µm Columns								
30mm	9516531		9516532		9516533		9516535	
50mm	9516551		9516552		9516553		9516555	
100mm	9516511		9516512		9516513		9516515	
150mm	9516561		9516562		9516563		9516565	
200mm	9516521		9516522		9516523		9516525	
250mm	9516571		9516572		9516573		9516575	

Viva Biphenyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva Biphenyl Guard Cartridge	951650212	951650210	951650222	951650220	

Viva PFP Propyl Columns (USP L43)

Chromatographic Properties:

A pentafluorophenyl phase with a propyl spacer. Highly retentive for basic analytes. Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds, including nucleosides, nucleotides, and halogenated compounds.

	1.0m	1.0mm ID		2.1mm ID		3.2mm ID		4.6mm ID	
Length	cat.#	price	cat.#	price	cat.#	price	cat.#	price	
5µm Columns									
30mm	9519531		9519532		9519533		9519535		
50mm	9519551		9519552		9519553		9519555		
100mm	9519511		9519512		9519513		9519515		
150mm	9519561		9519562		9519563		9519565		
200mm	9519521		9519522		9519523		9519525		
250mm	9519571		9519572		9519573		9519575		

Viva PFP Propyl Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva PFP Propyl Guard Cartridge	951950212	951950210	951950222	951950220	









Viva Silica Columns (USP L3)

Chromatographic Properties:

Highly base-deactivated wide pore packing that exhibits excellent peak shape for a wide range of compounds in normal phase separations.

1.0mm ID	2.1mm ID	3.2mm ID	4.6mm ID
cat.# price	cat.# price	cat.# price	cat.# price
9510531	9510532	9510533	9510535
9510551	9510552	9510553	9510555
9510511	9510512	9510513	9510515
9510561	9510562	9510563	9510565
9510521	9510522	9510523	9510525
9510571	9510572	9510573	9510575
	9510531 9510551 9510511 9510561 9510521	cat.# price cat.# price 9510531 9510532 9510552 9510551 9510552 9510512 9510561 9510562 9510522	cat.# price cat.# price 9510531 9510532 9510533 9510551 9510552 9510553 9510511 9510512 9510513 9510561 9510562 9510563 9510521 9510522 9510523

Restek manufactured silica

Physical Characteristics: particle size: 5µm, spherical pore size: 300Å pH range: 2.5 to 8 temperature limit: 80°C



Viva Silica Guard Cartridges

	3-pk.	3-pk.	2-pk.	2-pk.	
Guard Cartridges	(10 x 2.1mm)	(10 x 4.0mm)	(20 x 2.1mm)	(20 x 4.0mm)	price
Viva Silica Guard Cartridge	951050212	951050210	951050222	951050220	

ordering **note**

To order a 2.1mm, 3.2mm, or 4.6mm ID column with a Trident Integral Inlet Fitting, add "-700" to the catalog number for the column.

Nominal additional charge \$15.00

Example: 100mm x 4.6mm ID Ultra C18 column with Trident Integral Inlet Fitting: 9174315-700

Also order an XG-XF fitting (10mm: cat.#25026 or 20mm: 25062), see page 196.



Chromatogram **Search Tool**

Search by compound name, synonym, CAS # or keyword

www.restek.com/chromatograms







100-499

500-999



Bulk Packing Materials

Use our bulk packing materials to pack your own columns!

- Prepare your own columns in conventional or custom dimensions.
- · Consistent, high-quality materials.

Restek is among the small group of column manufacturers capable of producing their own high purity silica. We offer our Ultra II®, Pinnacle® II and Pinnacle® DB silica and bonded phases in bulk. Pinnacle® II is an excellent replacement for Hypersil® silica. Pinnacle® DB is a highly base-deactivated material for analyses of basic compounds and an excellent alternative to Hypersil® BDS silica. Bonded phases from our Ultra, Allure®, and Viva lines also are available in bulk.

Our extensive QC program ensures the high quality and reproducibility of these silicas. Each lot of material is tested for mean particle size and distribution, pore diameter, surface area, and total metals analysis. You can be confident that you are getting consistent, high-quality product.

Use these materials for easy scale up to preparative scale chromatography, or for packing your own columns.



					000	
Description	min. qty.	cat.#	5-99 grams	grams	grams	≥1000 grams
3μm Ultra II Bulk Packing Materials						
Ultra II C18 Bulk Packing	5g	96043				
Ultra II C8 Bulk Packing	5g	96033				
Ultra II Silica Bulk Packing	5g	96003				
5µm Ultra II Bulk Packing Materials						
Ultra II C18 Bulk Packing	5g	96045				
Ultra II C8 Bulk Packing	5g	96035				
Ultra II Silica Bulk Packing	5g	96005				
5µm Pinnacle DB Bulk Packing Materia	ls					
Pinnacle DB C18 Bulk Packing	5g	94145				
Pinnacle DB C8 Bulk Packing	5g	94135				
Pinnacle DB Cyano Bulk Packing	5g	94165				
Pinnacle DB Silica Bulk Packing	5g	94105				
3µm Pinnacle II Bulk Packing Materials	3					
Pinnacle II C8 Bulk Packing	5g	92133				
Pinnacle II C18 Bulk Packing	5g	92143				
Pinnacle II Cyano Bulk Packing	5g	92163				
Pinnacle II Phenyl Bulk Packing	5g	92153				
Pinnacle II Silica Bulk Packing	5g	92103				
5µm Pinnacle II Bulk Packing Materials	3					
Pinnacle II Amino Bulk Packing	5g	92175				
Pinnacle II C8 Bulk Packing	5g	92135				
Pinnacle II C18 Bulk Packing	5g	92145				
Pinnacle II Cyano Bulk Packing	5g	92165				
Pinnacle II Phenyl Bulk Packing	5g	92155				
Pinnacle II Silica Bulk Packing	5g	92105				

Description	qty.	cat.#	1-9 bottles	10-49 bottles	50-99 bottles	≥100 bottles
5µm Ultra Bulk Packing Materials						
Ultra C1 Bulk Packing	10g/btl.	91015				
Ultra C4 Bulk Packing	10g/btl.	91025				
Ultra C8 Bulk Packing	10g/btl.	91035				
Ultra C18 Bulk Packing	10g/btl.	91745				
Ultra Amino Bulk Packing	10g/btl.	91075				
Ultra Cyano Bulk Packing	10g/btl.	91065				
Ultra Phenyl Bulk Packing	10g/btl.	91055				
Ultra Silica Bulk Packing	10g/btl.	91005				



Other stationary phases and particle sizes are available; please inquire.













Protect your column with UltraShield and **UltraLine UHPLC Filters**



A cost-effective way to extend the lifetime of any UHPLC column, without sacrificing UHPLC performance.



UltraShield UHPLC PreColumn Filter

- · Cost-effective protection for UHPLC systems.
- · Reliable way to extend column lifetime.
- Universal fit—connects easily to any brand column.
- Leak-tight to 15,000 psi (1034 bar).
- 0.5 µm titanium filter in stainless steel body with PEEK ferrule.

Specifications:

Inlet/Outlet: Female/Male 10-32 Port Geometry: Parker (1/16 CPI) Material: Stainless Steel, PEEK ferrule 0.5 μ m Titanium Filter: Pressure Rating: 15,000 psig (1054 bar)

Wrench Flat:

Description	qty.	cat.#	price
UltraShield UHPLC PreColumn Filter	ea.	24995	\$50
UltraShield UHPLC PreColumn Filter	5-pk.	24996	\$190
UltraShield UHPLC PreColumn Filter	10-pk.	24997	\$360

UltraLine UHPLC In-Line Filter

- In-line design installs easily with standard fittings.
- Cost-effective protection for UHPLC systems.
- · Reliable way to extend column lifetime.
- Leak-tight to 15,000 psi (1034 bar).
- Replaceable $0.5~\mu m$ stainless steel filter in stainless steel body.

Specifications:

Inlet/Outlet: Female/Female 10-32 Port Geometry: Parker (1/16 CPI) Material: Stainless Steel housing

0.5 μ m Stainless Steel, 0.125" W x 0.062" T, 5 μ L volume Filter:

Pressure Rating: 15,000 psig (1054 bar)

Wrench Flat:

Description	qty.	cat.#	price
UltraLine UHPLC In-Line Filter			
(In-Line Assembly with Filter)	ea.	24993	\$125
UltraLine Replacement Filters	5-pk.	24994	\$60



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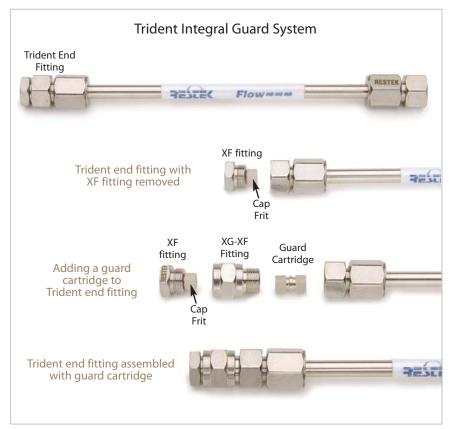


- Convenient and economical leak-free guard cartridge system, extremely easy to install
- Versatile configuration protects against all levels of contamination.
- Integral design eliminates troublesome tubing connections.

The system's foundation consists of the analytical column configured with our exclusive Trident end fitting and XF fitting. This configuration contains the standard internal frit as well as a replaceable cap frit, which easily can be changed without disturbing the packed bed. Changing the external frit can reverse the effects of accumulated particles, such as high backpressure or peak distortion. To obtain this basic configuration, simply order any Restek HPLC column, and add the suffix -700 to the catalog number for the column. (Nominal additional charge.)

For maximum protection against contaminants and particulate matter, the system can be configured with an integral guard cartridge holder (XG-XF), a guard cartridge, and a replaceable external frit. To obtain this configuration, simply order any Restek HPLC column, add the suffix -700 to the catalog number for the column, and order the appropriate XG-XF male fitting (cat.# 25026 or 25062) and Trident guard cartridges. See page 198.

Description	qty.	cat.#	price
XG-XF Fitting for 10mm Guard Cartridge	ea.	25026	
XG-XF Fitting for 20mm Guard Cartridge	ea.	25062	
Replacement XF Filter Fitting	ea.	25024	
Replacement Cap Frits: 4mm 2.0µm	5-pk.	25022	
Replacement Cap Frits: 4mm 0.5 μ m	5-pk.	25023	
Replacement Cap Frits: 2mm 2.0µm	5-pk.	25057	
Replacement Cap Frits: 2mm 0.5µm	5-pk.	25990	





Shannon Rishell, Customer Service

Restek Customer Service

In the U.S.

Call: 800-356-1688 (ext. 3) or 814-353-1300 (ext. 3)

Monday-Friday 8:00 a.m.-6:00 p.m. ET Fax: 814-353-1309—24-hours a day

Online: www.restek.com—24-hours a day

Outside the U.S.

Contact your Restek representative: Refer to our list on pages 4-5 or visit our website at www.restek.com







Trident Direct Guard Cartridge System

Easy to Use, Low Dead Volume—The Ultimate Combination of Convenience and Column Protection

Unlike "one size fits all" guard systems, the Trident Direct system gives you the power to select the right level of protection for your analysis. The system offers three levels of protection and guard cartridges in four dimensions, with a variety of bonded phases to match your analytical column. The economical, leak-free cartridge design provides an unprecedented combination of convenience, economy, and reliability. The foundation of the Trident Direct system is a reusable direct connect holder that easily attaches to any HPLC column using CPI- or Waters-style end fittings.* The system is available in configurations to match different protection level needs: in-line filter, in-line filter with holder for 10mm guard cartridge, and in-line filter with holder for 20mm guard cartridges are available in 2.1 and 4.0mm ID and are interchangeable within the appropriate length holder.



Protection against particulate matter.



Protection against particulate matter and moderate protection against irreversibly adsorbed compounds.



Protection against particulate matter and maximum protection against irreversibly adsorbed compounds.

Description	qty.	cat.#	price
High-pressure filter	ea.	25082	
10mm guard cartridge holder without filter	ea.	25083	
10mm guard cartridge holder with filter	ea.	25084	
20mm guard cartridge holder without filter	ea.	25085	
20mm guard cartridge holder with filter	ea.	25086	
Connection tip for Waters-style end fittings	ea.	25088	
PEEK tip standard fittings	ea.	25087	
Replacement Cap Frits: 4mm 2.0µm	5-pk.	25022	
Replacement Cap Frits: 4mm 0.5µm	5-pk.	25023	
Replacement Cap Frits: 2mm 2.0µm	5-pk.	25057	
Replacement Cap Frits: 2mm 0.5µm	5-pk.	25990	

^{*}The standard PEEK tip in Trident Direct systems is compatible with Parker, Upchurch Scientific, Valco, and other CPI-style fittings. To use Trident Direct systems with Waters-style end fittings, replace the tip with cat.# 25088.

Trident HPLC In-Line Guard Cartridge Holders

A Trident in-line guard cartridge holder can be used with almost any HPLC column by connecting it with a short piece of '/16" tubing, appropriate nuts and ferrules, or fingertight fittings. The system can be used with Restek columns, or with columns from other manufacturers. Holders are available for either 10mm or 20mm guard cartridges. Either size can be purchased with or without a prefilter, which provides added protection against the particles that can shorten the lifetime of the guard cartridge.





25040



25061



25060

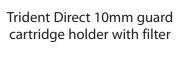
Description	qty.	cat.#	price
Holder for 10mm guard cartridge	ea.	25021	
Holder with filter for 10mm guard cartridge	ea.	25040	
Holder for 20mm guard cartridge	ea.	25061	
Holder with filter for 20mm guard cartridge	ea.	25060	
Replacement Cap Frits: 4mm 2.0µm**	5-pk.	25022	
Replacement Cap Frits: 4mm 0.5µm	5-pk.	25023	
Replacement Cap Frits: 2mm 2.0µm**	5-pk.	25057	
Replacement Cap Frits: 2mm 0.5 μ m	5-pk.	25990	
**Standard porosity			

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Components



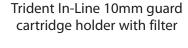


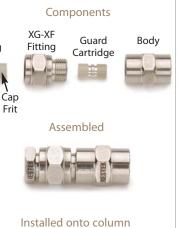


Installed onto column









XF

fitting



Trident HPLC Guard Cartridges



10 & 20 mm Guard Cartridges

Guard Cartridges	3-pk. (10 x 2.1mm)	3-pk. (10 x 4.0mm)	2-pk. (20 x 2.1mm)	2-pk. (20 x 4.0mm)	price
Allure AK Guard Cartridge	_	915950210	_	_	
Allure Basix Guard Cartridge	916150212	916150210	916150222	916150220	
Allure C18 Guard Cartridge	916450212	916450210	916450222	916450220	
Allure PFP Propyl Guard Cartridge	916950212	916950210	916950222	916950220	
Allure Silica Guard Cartridge	916050212	916050210	916050222	916050220	
Allure Organic Acids Guard Cartridge	916550212	916550210	916550222	916550220	
Allure Aqueous C18 Guard Cartridge	916850212	916850210	916850222	916850220	
Allure Biphenyl Guard Cartridge	916650212	916650210	916650222	916650220	
Pinnacle II Amino Guard Cartridge	921750212	921750210	921750222	921750220	
Pinnacle II C8 Guard Cartridge	921350212	921350210	921350222	921350220	
Pinnacle II C18 Guard Cartridge	921450212	921450210	921450222	921450220	
Pinnacle II Cyano Guard Cartridge	921650212	921650210	921650222	921650220	
Pinnacle II PAH Guard Cartridge	921950212	921950210	921950222	921950220	
Pinnacle II Phenyl Guard Cartridge	921550212	921550210	921550222	921550220	
Pinnacle II Biphenyl Guard Cartridge	721330212	920950210	721330222	920950220	
Pinnacle II Silica Guard Cartridge	921050212	921050210	921050222	921050220	
	941350212	941350210		941350220	
Pinnacle DB C8 Guard Cartridge Pinnacle DB C18 Guard Cartridge			941350222		
	941450212	941450210	941450222	941450220	
Pinnacle DB Aqueous C18 Guard Cartridge	941850212	941850210	941850222	941850220	
Pinnacle DB Biphenyl Guard Cartridge	940950212	940950210	940950222	940950220	
Pinnacle DB PFP Propyl Guard Cartridge	941950212	941950210	941950222	941950220	
Pinnacle DB Cyano Guard Cartridge	941650212	941650210	941650222	941650220	
innacle DB Phenyl Guard Cartridge	941550212	941550210	941550222	941550220	
Pinnacle DB Silica Guard Cartridge	941050212	941050210	941050222	941050220	
Jltra II Aromax Guard Cartridge	960750212	960750210	960750222	960750220	
Jltra II Biphenyl Guard Cartridge	960950212	960950210	960950222	960950220	
Jltra II C8 Guard Cartridge	960350212	960350210	960350222	960350220	
Jltra II C18 Guard Cartridge	960450212	960450210	960450222	960450220	
Jltra II Aqueous C18 Guard Cartridge	960850212	960850210	960850222	960850220	
Iltra II Carbamate Guard Cartridge	961150212	961150210	961150222	961150220	
Iltra II IBD Guard Cartridge	960550212	960550210	960550222	960550220	
Iltra II PFP Propyl Guard Cartridge	960650212	960650210	960650222	960650220	
Jltra II Silica Guard Cartridge	960050212	960050210	960050222	960050220	
Iltra Amino Guard Cartridge	910750212	910750210	910750222	910750220	
Iltra Aqueous C18 Guard Cartridge	917850212	917850210	917850222	917850220	
Jltra C1 Guard Cartridge	910150212	910150210	910150222	910150220	
Iltra C4 Guard Cartridge	910250212	910250210	910250222	910250220	
Jltra C8 Guard Cartridge	910350212	910350210	910350222	910350220	
Iltra C18 Guard Cartridge	917450212	917450210	917450222	917450220	
Iltra Carbamate Guard Cartridge	917750212	917750210	917750222	917750220	
Jltra Cyano Guard Cartridge	910650212	910650210	910650222	910650220	
Jltra IBD Guard Cartridge	917550212	917550210	917550222	917550220	
Iltra PFP Guard Cartridge	917650212	917650210	917650222	917650220	
Iltra Phenyl Guard Cartridge	910550212	910550210	910550222	910550220	
Iltra Silica Guard Cartridge	910050212	910050210	910050222	910050220	
Iltra Quat Guard Cartridge	918150212	918150210	918150222	918150220	
Tiva C18 Guard Cartridge	951450212	951450210	951450222	951450220	
Tiva C8 Guard Cartridge	951450212	951350210	951430222		
iva C4 Guard Cartridge	951350212	951350210		951350220	
			951250222	951250220	
Viva PFP Propyl Guard Cartridge	951950212	951950210	951950222	951950220	
/iva Biphenyl Guard Cartridge	951650212	951650210	951650222	951650220	
/iva Silica Guard Cartridge	951050212	951050210	951050222	951050220	











HPLC Normal Phase Test Mix #1 (4 components)

Routine analysis using this mix can assist in determining the need to perform column and/or system maintenance

need to periorin e	oranini ana, or	system mannethance.	
benzene	1.00mg/mL	benzyl alcohol	3.00
benzaldehyde	0.04	4-methoxybenzyl alcohol	2.00

In hexane, 1mL/ampul

cat. # 35004 (ea.) \$33

No data pack available.

HPLC Reversed Phase Test Mix #1 (4 components)

Routine analysis using this mix can assist in determining the need to perform column and/or system maintenance.

benzene	3.00mg/mL	naphthalene	0.50
uracil	0.02	biphenyl	0.06
In methanol:water (75:25) 1ml/amnul		

cat. # 35005 (ea.) \$33

No data pack available.

HPLC Performance Test Mix (5 components)

The National Institute of Standards and Technology (NIST) has formulated a mixture that is highly effective for characterizing HPLC columns for efficiency, void volume, methylene selectivity, retentiveness, and activity toward chelators and organic bases. Results can be used for column classification, for column selection, for monitoring column performance over time, or for quality control. We test our material against the NIST 870 standard.

amitriptyline hydrochloride ethylbenzene	2,800µg/mL 1,700	quinizarin toluene uracil	94 1,400 28
In methanol, 1mL/ampul			

cat. # 31699 (ea.)

Carbohydrate HPLC Performance Check Mix (5 components)

Performance qualification (PQ) determines the precision of the HPLC system. Our performance check mix for HPLC/RI consists of five simple sugars in varied concentrations. We prepare the reference material in water, lyophilize it, and pack it dry for enhanced stability.

glucose	2.0mg	maltose	4.5
fructose	2.1	sucrose	4.0
lactoco	11		

Dry components in 4mL screw-cap vial. Reconstitute in 1mL acetonitrile:water (75:25) to 2.0, 2.1, 4.4, 4.5, 4.0mg/mL, respectively.

cat. # 31809 (ea.) \$33

No data pack available.

HPLC OQ Linearity Test Mix Kit

Linear detector responses to concentration variations are an important part of operation qualification (OQ) for HPLC instruments. Our kit of five aqueous solutions of caffeine can be used to generate simple plots of UV response versus concentration. Certificate of Analysis includes caffeine concentration, calculated variance in preparing each mixture, a linearity plot, and coefficient of determination (r^2) for the linear plot.

Caffeine at 5, 25, 125, 250, 500µg/mL in water in a five ampul kit.

cat. # 31805 (kit)

No data pack available. Quantity discounts not available.

Ultra Quat Reagent Solution

Use with Ultra Quat HPLC column. Dilute to 1 liter, per instructions.

In water, 20mL/bottle

cat. # 32441 (ea.)











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Supplies For Varian GCs				STRANT AND AND AND AND AND
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Purge & Trap Supplies				
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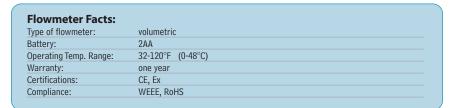


NEW Restek ProFLOW 6000 Electronic Flowmeter State-of-the-art features include:

- Measures volumetric flow for gases across a range of 0.5-500 mL/min.
- NIST traceable calibration.
- Ex rating (electrical apparatus for explosive gas atmospheres) for hydrogen and related gas types.
- Accuracy of \pm 2% of flow or \pm 0.2 mL/min., whichever is greater.
- · Over range warning indicator.
- · Auto shut-off feature.
- Use as a bench-top or hand-held unit.
- · Ergonomic design and side grips for comfort.
- Measures most gas types.*
- · Convenient carrying/storage case included.
- Uses 2-AA batteries (included).
- Data output via USB port.
- · 1-year warranty.
- · Recalibration service available.

Flowmeters that can measure flammable gases are becoming mandatory, due to the increased use of hydrogen in chromatography. With its Ex rating, the Restek ProFLOW 6000 Flowmeter is designed specifically with explosive and flammable gases in mind.

The new Restek ProFLOW 6000 is the only flowmeter you need for any type of chromatography gas measurement because of its wide range of capabilities. The ProFLOW 6000 is an electronic device capable of measuring volumetric flow for most gases. Real-time measurements can be made for various types of flow paths, including continually changing gas types. This portable unit is designed for easy hand-held use, and the stand adds bench-top convenience.



Description	qty.	cat.#	price
Restek ProFLOW 6000 Electronic Flowmeter with Hard-Sided Carrying Case	ea.	22656	
ProFLOW 6000 Recalibration Service	ea.	22656-R	
Soft-Side Storage Case	ea.	22657	

^{*}The flowmeter is designed to measure clean, dry, non-corrosive gases.

restek recommends

Recalibrate your ProFLOW 6000 Flowmeter once every year. Prolonged failure to recalibrate your unit may result in increased error. To always get the most accurate flowmeasurements, send in your flowmeter for recalibration (cat.# 22656-R).





22657

Optional soft-side storage case is ideal for storing your flowmeter in smaller spaces, such as your tool box.





Mar 2011



CE (Ex)

Restek Electronic Leak Detector

Don't let a small leak turn into a costly repair—protect your instrument and analytical column by using a Restek Leak Detector.

Features & Benefits include:

- · Optimized sample flow path.
- · New ergonomic, hand-held design.
- · Rugged side grips for added durability.
- · Handy probe storage for cleanliness and convenience.
- Longer lasting battery, up to 6 hours of continuous use.
- · Automatic shut-off.
- · A convenient carrying and storage case.
- · Easy to clean probe assembly.
- A universal charger set (US, European, UK, and Australian plugs included).

Backed by a 1-year warranty, the new Restek Leak Detector sets an industry standard for performance and affordability in hand-held leak detectors.



22839

Hard-sided carrying case included with purchase of unit.

Leak Detector Facts	
Detectable gases:	helium, nitrogen, argon, carbon dioxide, hydrogen
Battery:	Rechargeable Ni-MH internal battery pack (6 hours normal operation)
Operating Temperature Range:	32°-120°F (0°-48°C)
Humidity Range:	0-97%
Warranty:	one year
Certifications:	CE, Ex, Japan
Compliance:	WEEE, RoHS

Limits of Detection

These gases can be detected with the Restek Electronic Leak Detector at the following leak rates.

Gas	Minimum Detectable Leak Rate (atm cc/sec.)	Indicating LED Light Color	
Helium	1.0 X 10 ⁻⁵	Red	
Hydrogen*	1.0 X 10 ⁻⁵	Red	
Nitrogen	1.4 X 10 ⁻³	Yellow	
Argon	1.0 X 10 ⁻⁴	Yellow	
Carbon Dioxide	1.0 X 10 ⁻⁴	Yellow	



Optional soft-side storage case is ideal for storing your leak detector in smaller spaces, such as your tool box.

Description	qty.	cat.#	price
Leak Detector with Hard-Sided Carrying Case and Universal Charger Set			
(US, UK, European, Australian)	ea.	22839	
Leak Detector Routine Maintenance Review**	ea.	22839-R	
Soft-Side Storage Case	ea.	22657	
Small Probe Adaptor	ea.	22658	

*Caution: The Restek Electronic Leak Detector is designed to detect trace amounts of hydrogen in a noncombustible environment. It is NOT designed for determining leaks in a combustible environment. A combustible gas detector should be used for determining combustible gas leaks under any condition. The Restek Electronic Leak Detector may be used for determining trace amounts of hydrogen in a GC environment only.

**Routine maintenance includes inspection of the probe tip, internal/external tubing and a battery replacement.





Avoid using liquid leak detectors on a GC! Liquids can be drawn into the system.



Checking for leaks maintains the integrity



To keep your Leak Detector performing at optimal levels, send it in every two years for a Routine Maintenance Review. Our engineers will inspect the probe tip, internal/external tubing and replace the battery. This preventive maintenance plan will help ensure your leak detector operates properly for years to come.

for **more** info

How much sensitivity is needed in a leak detector?

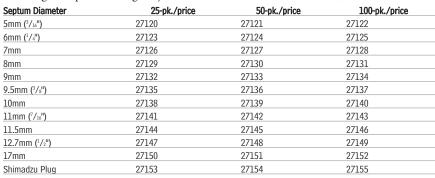
www.restek.com/cat001





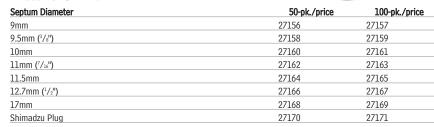
Restek Thermolite® Septa

- Usable to 340 °C inlet temperature.
- · Precision molding assures consistent, accurate fit.
- · Excellent puncturability.
- · Preconditioned and ready to use.
- Do not adhere to hot metal surfaces.
- · Packaged in precleaned glass jars.





- Usable to 250 °C inlet temperature.
- Precision molding assures consistent, accurate fit.
- General-purpose septa.
- · Excellent puncturability.
- · Preconditioned and ready to use.
- · Do not adhere to hot metal surfaces.
- · Packaged in precleaned glass jars.
- · Ideal for SPME.



BTO® Septa

- Usable to 400 °C inlet temperature.
- · Precision molding assures consistent, accurate fit.
- Partial predrilled CenterGuide design.
- · Preconditioned and ready to use.
- · Do not adhere to hot metal surfaces.
- Packaged in precleaned glass jars.
- · Each batch GC/FID tested.
- Bleed and temperature optimized; ideal for demanding GC and GC/MS applications.

Septum Diameter	50-pk./price	100-pk./price
5mm CenterGuide	27100	27101
6mm (1/4")	27102	27103
9mm CenterGuide	27104	27105
9.5mm (³ / ₈ ")	27106	27107
10mm	27108	27109
11mm (7/16") CenterGuide	27110	27111
11.5mm CenterGuide	27112	27113
12.7mm (1/2") CenterGuide	27114	27115
17mm CenterGuide	27116	27117
Shimadzu Plug	27118	27119



Precision

molded!

Precision

molded!

Precision

molded!

septum size chart

Instrument	Septum Diameter (mm)
Agilent (HP)	
5880A, 5890, 6850,	
6890, 7890, PTV	11
5700, 5880	9.5/10
On-Column Injection	5
Thermo Scientific	
TRACE GC	17
GCQ w/TRACE, PTV	17
8000 series	17
Finnigan (TMQ)	
GC 9001	9.5
GCQ	9.5
QCQ	9.5
TRACE 2000	9.5
PerkinElmer	
Sigma series	11
900,990	11
8000 series	11
Auto SYS	11
Auto SYS XL	11
Shimadzu	
All models	Plug
SRI	
All models	Plug
Tracor	
540	11.5
550,560	9.5
220,222	12.5
Varian Injector type:	
Injector type: Packed column	0.5/10
1078/1079	9.5/10
	10/11
1177	9
1075/1077	11

for **more** info

How Hot is Your Septum?

www.restek.com/cat002



Tips for Handling Septa

All septa, regardless of composition, puncturability, or resistance to thermal degradation will fail if they are mishandled. Overtightening a septum nut invariably will reduce septum lifetime by increasing coring/splitting. All septa contain volatile materials (e.g., phthalates) that are released when the septum is heated (septum bleed). Because most GCs are equipped with a septum purge, septum bleed generally will disappear within 30 minutes after installing a new septum and exposing it to normal injector temperatures. All Restek septa are preconditioned and are ready to use without delay.

Note: Due to the injection port temperatures, Restek recommends using only BTO septa in Thermo Scientific instruments.



Australian Distributors Importers & Manufacturers www.chromtech.net.au





True Blue Performance

- Increase accuracy and reproducibility with state-of-the-art deactivation.
- Achieve lower detection limits for a wide range of active compounds.
- Use wool without risking the loss of sensitive analytes.

When faced with complex choices, simple solutions stand out. Sky[™] inlet liners from Restek use a comprehensive, state-of-the-art deactivation and are

New Sky[™] liners give you the inertness you need for more accurate trace level results. the only blue liners on the market—making them an easy-to-recognize solution to common inlet problems.



The innovative deactivation used for Sky^{TM} liners results in exceptional inertness for a wide range of analyte chemistries. By reducing active sites and enhancing analyte transfer to the column, these liners increase accuracy and precision, allowing lower detection limits for many active com-

pounds. In addition to improved data quality, you'll benefit from fewer liner changes and less downtime for maintenance.

Selecting the right liner for your application can be a daunting task. Sky^{TM} inlet liners make the choice simple; the comprehensive deactivation, distinctive color, and availability in popular configurations mean Sky^{TM} liners are the best choice for optimizing chromatographic performance. Regardless of your application, Sky^{TM} liners provide reliable inertness and assured performance, day-afterday and analysis-after-analysis.

The Story Behind Sky™

For over 25 years, Restek's vision has been to be the company chromatographers trust. This philosophy is the cornerstone of our business, and it's the reason our chemists and engineers are dedicated to developing innovative, best-in-class products like Sky™ liners. As chromatographers, we understand your needs and strive to develop and deliver products that make your life easier.

With Sky™ liners our goal was to create a state-of-the-art deactivation that provides superior performance, but why did we make them blue? Restek has always been associated with the color blue; to us, it signifies strength, innovation, and excellence. We made SKY™ liners blue because it represents the technological advancements and unmatched quality that define Restek products. Choose blue—the best choice for dependable results.





Simple Solutions:

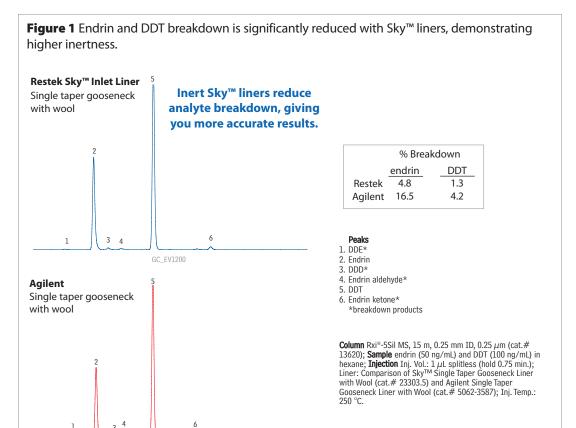
Inert Sky™ Inlet Liners Improve Accuracy and Precision for a Wide Range of Analytes

Many chromatographic problems, such as poor response and missing or tailing peaks are caused by activity in the inlet liner. These effects complicate quantification and can be particularly problematic for sensitive analytes. New Sky™ inlet liners from Restek offer exceptional inertness, assuring enhanced transfer of analytes to the column, good response, and highly symmetric peaks. The inertness of these liners is due to a state-of-theart deactivation process that completely passivates the liner and wool so that they are inert to a wide variety of reactive analytes.

Some deactivations, such as base deactivation, are effective only for particular target compound chemistries. In contrast, the balanced deactivation of Sky™ liners prevents interactions with many chemical classes. As shown on the following pages, complex pesticide probes, as well as both acidic and basic compounds have strong responses and excellent peak shapes, demonstrating the inertness of Sky™ liners. With new Sky™ inlet liners you will see improved sensitivity, accuracy, and reproducibility liner-to-liner, which allows you to quantify challenging compounds at trace levels with confidence.

Reduced Breakdown Improves Trace Analyses

Endrin & DDT are important analytes for the environmental and food safety industries, and also serve as excellent general probes for liner inertness. Both compounds are sensitive to different modes of activity due to their chemical structures and because they are analyzed at very low concentrations (typically parts-per-billion concentrations for µECD analyses). As shown in Figure 1, Sky™ liners are significantly more inert than comparable liners from Agilent, showing 3-4 times less endrin and DDT breakdown.



did you **know**?

Sky[™] inlet liners from Restek are extensively tested to assure consistent product quality. The color and label have been shown not to interfere with analyses or contribute to background. Choose blue—the best liner for sensitive applications.



GC_EV1202

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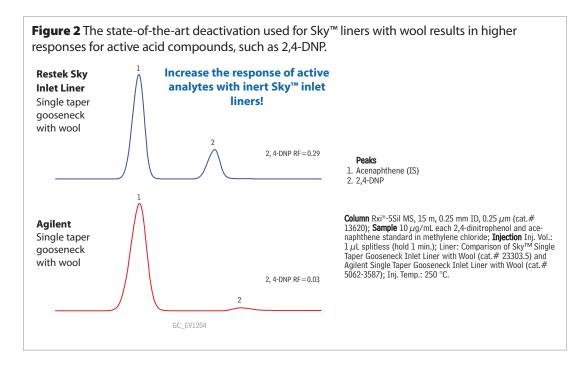
Mar 2011

Simple Solutions:

Inert Sky™ Inlet Liners Improve Accuracy and Precision for a Wide Range of Analytes

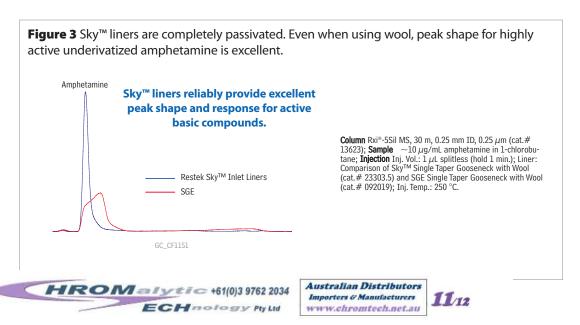
Greater Inertness Results in Higher Analyte Response

Another common probe used to illustrate inertness is 2,4-dinitrophenol (2,4-DNP), which functions as an indicator of acid compound interactions. It is used to monitor system suitability in semivolatiles methods, which benefit from the use of wool to assist in sample vaporization. As shown in Figure 2, the response of 2,4-DNP with the Sky[™] inlet liner, even at low concentrations, is superior to a competitor's liner. The Agilent liner with wool has active sites that adsorb 2,4-DNP and reduce its response. In contrast an excellent response is achieved using the Sky[™] liner, even in the presence of wool.



Comprehensive Deactivation Assures Excellent Peak Shape

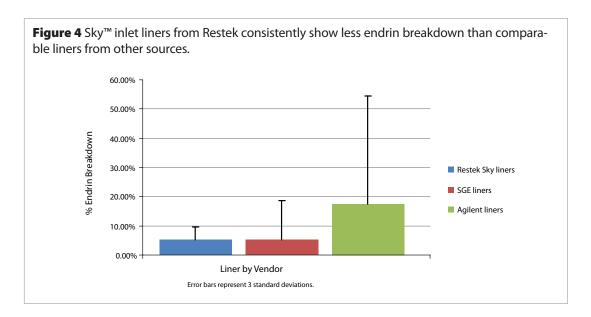
In addition to providing excellent results for reactive pesticides and acidic compounds, Sky^{TM} inlet liners are also highly inert to active basic compounds, such as underivatized amphetamines. The exceptional inertness of Sky^{TM} liners produces much better peak shape than is typically seen on other liners, resulting in simpler quantification and more accurate results (Figure 3).



Liner-to-Liner Reproducibility: A Measure of Consistent Quality

It's not good enough to have one quality liner. You have to be confident that every liner will give the same level of performance. We test Sky^{TM} liners extensively to ensure that each one is exceptionally inert and will provide optimal results. Using endrin breakdown as a measure of reproducibility, the data in Figure 4, based on multiple lots, illustrate that Sky^{TM} liners are more consistently inert than competitor products.

New SkyTM liners provide exceptional inertness across a wide range of active analytes. The consistent, comprehensive deactivation process results in the accuracy and precision you need for reliable trace level analyses. Simplify liner selection with SkyTM liners from Restek—**choose blue, the best choice for dependable results.**





New Sky[™] inlet liners are easily recognizable for your reordering convenience. All Sky[™] liners come in specially marked boxes and are packaged in ultra-clean blister packs.





Sky™ Inlet Liners for Agilent GCs

Splitless Liners for Agilent GCs	ID OD x Length	Similar to Agilent part #	ea.	cat.#/price 5-pk.	25-pl	
RESTEK	2.0mm 6.5mm x 78.5mm	5181-8818 (ea.) 5183-4703 (5-pk.) 5183-4704 (25-pk.)	23313.1	23313.5	23313	
2mm Splitless	• 00	Э105- 4 7 04 (25-рк.)	022141	022745	0227.4	
RESTÈK	2.0mm 6.5mm x 78.5mm		23314.1	23314.5	23314.	
2mm Splitless w/Wool						
RESTEK	2.0mm		23315.1	23315.5	23315.	
2mm Single Taper Gooseneck	6.5mm x 78.5mm					
RESTEK	2.0mm		23316.1	23316.5	23316.	
2mm Single Taper Gooseneck w/Wool	6.5mm x 78.5mm					
	4.0mm	210-3003 (ea.)	23301.1	23301.5	23301.	
RESTEK	6.3mm x 78.5mm	210-3003-05 (5-pk.)	2000111	20001.0	20002	
4mm Straight	- 40	19251-60540 (ea.)	00000 7	00000 5	00000	
RESTEK	4.0mm 6.3mm x 78.5mm	5183-4691 (5-pk.)	23300.1	23300.5	23300.	
4mm Straight w/Wool	0.511111 x 7 0.5111111	5183-4692 (25-pk.)				
RESTEK	4.0mm	5181-3316 (ea.) 5183-4695 (5-pk.)	23302.1	23302.5	23302.	
4mm Single Taper Gooseneck	6.5mm x 78.5mm	5183-4696 (25-pk.)				
	4.0mm	5062-3587 (ea.)	23303.1	23303.5	23303.	
RESTEK	6.5mm x 78.5mm	5183-4693 (5-pk.)		_5555.5	_5505.	
4mm Single Taper Gooseneck w/Wool	10	5183-4694 (25-pk.) 5181-3315 (ea.)	00000	00000 =	0000-	
RESTÈK	4.0mm 6.5mm x 78.5mm	5183-4705 (5-pk.)	23308.1	23308.5	23308.	
4mm Double Taper Gooseneck	0.3IIIII X 76.3IIIII	5183-4706 (25-pk.)				
RESTEK =	4.0mm		23310.1	23310.5	23310.	
4mm Cyclo Double Taper Gooseneck	6.5mm x 78.5mm					
Split Liners	ID			cat.#/price		
for Agilent GCs	OD x Length	Similar to Agilent part #	ea.	5-pk.	25-pl	
DECTEV	4.0mm	19251-60540 (ea.)	23304.1	23304.5	23304.	
RESTEK 4mm Straight w/Wool	6.3mm x 78.5mm	5183-4691 (5-pk.) 5183-4692 (25-pk.)				
	4.0mm	3103 4072 (23 pk.)	22205.1	22205 5	22205	
RESTEK	6.3mm x 78.5mm	210-4004-5 (5-pk.)	23305.1	23305.5	23305.	
4mm Precision Liner w/Wool						
WANNAMAN RESTEK	4.0mm		23312.1	23312.5	23312.	
4mm Cyclosplitter	6.3mm x 78.5mm					
Split/Splitless Liners	ID			cat.#/price		
for Agilent GCs	OD x Length	Similar to Agilent part #	ea.	5-pk.		
RESTEK	4.0mm		23309.1	23309.5		
Low Pressure Drop Liner w/Wool	6.3mm x 78.5mm					
DI Liners for Agilent GCs (for 0.25/0.32/0.53mm ID Columns)	ID OD x Length	Similar to Agilent part #	ea.	cat.#/price 5-pk.	25-pl	
	4.0mm		23306.1	23306.5	الإ-دے	
RESTEK	6.3mm x 78.5mm	G1544-80730 (ea.)	ZJJUU.I	23300.3		
Drilled Uniliner (hole near bottom)						
RESTEK	4.0mm 6.3mm x 78.5mm		23307.1	23307.5		
	MMC.8/ X IIIII16.0					
Drilled Uniliner (hole near bottom) w/Wool	1.1		23311.1	02211 E	23311.	
Drilled Uniliner (hole near bottom) w/Wool	4.0mm		20011.1	23311.5		
Drilled Uniliner (hole near bottom) w/Wool	4.0mm 6.3mm x 78.5mm		23311.1	23311.3		
Drilled Uniliner (hole near bottom) w/Wool RESTEK Drilled Uniliner (hole near top)	6.3mm x 78.5mm		25511.1	23311.3		
Drilled Uniliner (hole near bottom) w/Wool RESTEK Drilled Uniliner (hole near top) Sky™ Inlet Liners for PerkinE	6.3mm x 78.5mm		25511.1			
Drilled Uniliner (hole near bottom) w/Wool RESTEK Drilled Uniliner (hole near top) Sky™ Inlet Liners for PerkinE PSS Liners	6.3mm x 78.5mm Elmer GCs ID	Similar to DF part #		cat.#/price		
Drilled Uniliner (hole near bottom) w/Wool RESTEK Drilled Uniliner (hole near top) Sky™ Inlet Liners for PerkinE	6.3mm x 78.5mm	Similar to PE part #	ea. 23317.1			

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Sky™ Inlet Liners for Shimadzu GCs

Split Liners for Shimadzu 17A, 2010, and 2014 GCs	ID OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
RESTEK	3.5mm 5.0mm x 95mm	221-41444-01	23318.1	23318.5	23318.25
RESTEK 5mm Split w/Wool	3.5mm 5.0mm x 95mm		23319.1	23319.5	23319.25
.5mm Precision Liner w/Wool	3.5mm 5.0mm x 95mm		23320.1	23320.5	
Splitless Liners for Shimadzu 17A, 2010, and 2014 GCs	ID OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	
.5mm Single Taper Gooseneck	3.5mm 5.0mm x 95mm	221-48335-01	23321.1	23321.5	
Smm Single Taper Gooseneck w/Wool	3.5mm 5.0mm x 95mm		23322.1	23322.5	
Sky™ Inlet Liners for Therm	o Scientific GCs				
Split Liners for Thermo TRACE, 8000, 8000 TOP, & Focus SSL	ID OD x Length	Similar to TS part #	ea.	cat.#/price 5-pk.	25-pk.
RESTEK	5.0mm 8.0mm x 105mm	453 20030	23323.1	23323.5	23323.25

Splitless Liners for Thermo TRACE, 8000, 8000 TOP, & Focus SSL	ID OD x Length	Similar to TS part #	ea.	cat.#/price 5-pk.	25-pk.
RESTEK 5mm Precision Liner w/Wool	5.0mm 8.0mm x 105mm		23327.1	23327.5	
RESTEK 5mm Straight w/Wool	5.0mm 8.0mm x 105mm		23324.1	23324.5	23324.25
RESTEK 5mm Straight	5.0mm 8.0mm x 105mm	453 20030	23323.1	23323.5	23323.25

,, -		OD A Longer	onima to to part n	oui	o più	ao pro	
5mm Splitless	RESTEK	5.0mm 8.0mm x 105mm	453 20033	23325.1	23325.5	23325.25	
5mm Splitless w/Wool	RESTEK	5.0mm 8.0mm x 105mm		23326.1	23326.5	23326.25	

Sky™ Inlet Liners for Varian GCs

Liners for Varian 1177 S/SL Injection Ports	ID OD x Length	Similar to Varian part #	ea.	cat.#/price 5-pk.	
RESTEK 4mm Split Liner w/Glass Frit	4.0mm 6.3mm x 78.5mm		23330.1	23330.5	
RESTEK 4mm Precision Liner w/Wool	4.0mm 6.3mm x 78.5mm		23328.1	23328.5	
RESTEK 4mm Single Taper Gooseneck	4.0mm 6.5mm x 78.5mm	392611927	23331.1	23331.5	
Amm Single Taper Gooseneck w/Wool	4.0mm 6.5mm x 78.5mm	392611936	23332.1	23332.5	
Liners for Varian 1078/1079 Injection Ports	ID OD x Length	Similar to Varian part #	ea.	cat.#/price 5-pk.	25-pk.
RESTEK 3.4mm Split–No Frit	3.4mm 5.0mm x 54mm	392611945	23329.1	23329.5	23329.25





Mar 2011



Technical Tips for Avoiding Inlet Problems

Inlet issues can lead to poor chromatography and be a significant source of frustration in the lab. Many problems can be avoided by considering some basic principles. Here are some simple tips to help you improve chromatography and select the best liner for your application.

Consider Volume and Inner Diameter

Problems such as broad or tailing peaks, poor reproducibility, ghost peaks, and nonlinear response can result if sample expansion volume and linear velocity are not considered when choosing liner dimensions.

Sample Expansion Volume

When a liquid sample is vaporized inside an inlet liner, its volume expands considerably. Care should be taken to match the effective liner volume and the expanded volume of the injected sample. If the liner volume is exceeded, the sample will be forced back into the gas lines, causing irreproducible peak areas and sample carryover.

Linear Velocity

Choosing a liner with a narrow inner diameter will give a faster linear velocity (for a given flow rate), which will move the sample onto the column quickly, improving efficiency and helping keep peak widths narrow. This is particularly important for gaseous samples introduced via purge-and-trap or static headspace techniques, or when 0.18 mm, 0.15 mm, and 0.10 mm ID columns are used.

Solvent expansion volumes based on an injection port temperature of 250°C and a 10 psig head-pressure.

For a straight 4mm ID x 78.5mm long liner, the effective liner volume is approximately 500μ L.

Expansion Volume (µL)				
H₂O	C₂S		Hexane	Isooctane
710	212	200	98	78
1420	423	401	195	155
2840	846	802	390	310
7100	2120	2000	975	775
	710 1420 2840	H₂O C₂S 710 212 1420 423 2840 846	H ₂ O C ₆ S CH ₂ Cl ₂ 710 212 200 1420 423 401 2840 846 802	H₂O C₂S CH₂Cl₂ Hexane 710 212 200 98 1420 423 401 195 2840 846 802 390

[—] indicates expansion volume exceeds effective liner volume.

Protect Analytes from Active Sites

Active sites in the inlet or liner can interact with reactive analytes, resulting in poor chromatography and reduced response. Exposure of analytes to active sites can be minimized by carefully considering liner packing, geometry, and deactivation.

Packing

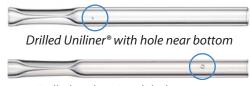
Sample characteristics and injection technique will dictate whether packing is used. Analyses of high molecular weight analytes, especially in split mode, benefit from the use of packing. However, while wool improves sample vaporization, protects the column from nonvolatile compounds, and permits larger volume injections, it can also be a source of active sites that cause poor peak shape. When using a wool packed liner, highly inert SkyTM liners are recommended for optimal performance. (See pages 206-209 for technical comparison.)

Specialized Uniliner® Geometry

Unliner® and Drilled Uniliner® inlet liners reduce analyte exposure by allowing a fused silica column to be connected directly to the liner through a seal made between the inner glass wall of the liner and the polyimide coating on the outside of the column. This configuration maximizes the amount of sample transferred to the GC column, minimizes sample exposure to hot injection port parts, and is a good choice for trace analyses.

Use the Drilled Uniliner® inlet liner with the hole near the bottom for semivolatile analyses or when com-

pounds of interest could be affected by a tailing solvent peak. Use the Drilled Uniliner® inlet liner with the hole near the top for chlorinated pesticides analyses, aqueous injections, and analyses in which the compounds of interest elute away from the solvent peak. Note that instruments equipped with electronic pressure control must use Drilled Uniliner® liners, rather than standard Uniliner® liners.



Drilled Uniliner® with hole near top







Deactivations

Liners need to provide highly inert pathways to guard against sample adsorption (reversible or irreversible) and sample degradation. Deactivations can help accomplish this and Restek offers several deactivation choices.

Intermediate Polarity (IP) Deactivation

- Phenylmethyl-deactivated surface for better recovery of polar and nonpolar compounds.
- · Compatible with most common solvents.
- · Our standard deactivation—every clear Restek liner is IP deactivated unless otherwise requested.

Siltek®-Deactivation

- · Minimizes breakdown.
- Low bleed.
- · Thermally stable.
- "Clean and green"—manufactured without the use of harmful organic solvents.

The patented Siltek® deactivation process for liners produces a highly inert glass surface that features high temperature stability, extreme durability, and low bleed. Try Siltek® liners, guard columns, and connectors for better recovery of sample analytes.

For Siltek®-deactivated inlet liners, add the corresponding suffix number to the liner catalog number.

qty.	Si	ltek Lir	ner	Siltek Line	r w/Wool	Siltek Liner	w/CarboFrit	
each	-214.1	\$5	addl. cost	-213.1	addl. cost	-216.1	addl. cost	
5-pk.	-214.5	\$20	addl. cost	-213.5	addl. cost	-216.5	addl. cost	
25-pk.	-214.25	\$90	addl. cost	-213.25	addl. cost	-216.25	addl. cost	

Base Deactivation

- Excellent inertness for basic compounds.
- Recommended for use with Rtx®-5 Amine, Rtx®-35 Amine, and Stabilwax®-DB columns.

For base-deactivated inlet liners, add the corresponding suffix number to the liner catalog number.

qty.	Base-De	activat	ed Liner	w/ Base-Deacti		w/Car		
each	-210.1	\$14	addl. cost	-211.1	addl. cost	-229.1	addl. cost	
5-pk.	-210.5	\$45	addl. cost	-211.5	addl. cost	-229.5	addl. cost	
25-pk.	-210.25	\$145	addl. cost	-211.25	addl. cost	-229.25	addl. cost	

Don't Forget Routine Maintenance

Inlet liners are the key to good injection port maintenance; changing them regularly helps prevent problems such as:

- Sample degradation resulting in poor response.
- Sample adsorption resulting in poor peak shape (tailing).
- Sample discrimination.
- Irreproducibility.
- Extraneous peaks from contamination or cored septum particles.

Finally, be sure to condition your liners at 20 °C higher than the operating inlet temperature for a minimum of 10 minutes to prepare them for use. By following these basic tips, you can avoid inlet problems and improve chromatographic performance.







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ECHnology Pty Ltd

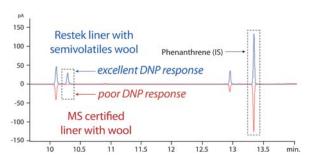
GC ACCESSORIES | INSTRUMENT SUPPLIES Liner Packing Materials

Semivolatiles Wool

The new deactivation used on this wool gives it superior inertness for semivolatiles analysis. Acidic semivolatile compounds, such as 2,4-dinitrophenol (DNP), are reactive and can be difficult to quantify with wool packed in the inlet liner. With this innovative deactivation, the response of DNP is excellent and an improvement over deactivations offered by competitors (Figure 1). For example, the test shown here resulted in a DNP response factor of 0.21 (calculated relative to the internal standard), easily meeting the EPA Method 8270D criterion of 0.01. In contrast, the competitive "MS Certified Liner with Wool" showed virtually no response.



Figure 1 Response of 10 ng of 2,4-dinitrophenol compared to phenanthrene using a flame ionization detector.

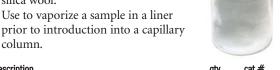


To order Semivolatiles Wool in prepacked liners, add the corresponding suffix number to the liner catalog number.

qty.	IP Deactivated Liner with Semivolatiles Wool				
each	-231.1	\$16	addl. cost		
5-pk.	-231.5	\$31	addl. cost		
25-pk.	-231.25	\$81	addl. cost		

Deactivated Wool

- · More inert than our traditional fused silica wool.
- · Use to vaporize a sample in a liner



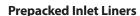
Description	qty.	cat.#	price
Deactivated Wool	10 grams	24324	

Base-Deactivated Wool

Ideal for amines and other basic compounds.



Description	qty.	cat.#	price
Base-Deactivated Wool	10 grams	20999	



Let Restek do the work! Just add the appropriate suffix to the liner catalog number.

qty.	Wool	CarboFrit†	price
ea.	-200.1	-209.1	addl. cost
5-pk.	-200.5	-209.5	addl. cost
25-pk.	-200.25	-209.25	addl. cost

†CarboFrit inserts require a neck greater than 2mm.

CarboFrit® Inlet Liner Packing Material

- · Highly inert.
- · Extends analytical column lifetime.
- · Enhances reproducibility of split and splitless injection.
- Uniform pore size and consistent packing density guarantee consistent flow through the liner.
- Easy to install in any liner with an ID >3.5 mm when using puller-inserter tool listed below.*



Add the corresponding suffix number to the liner catalog number.

Description	suffix	price	
each	-209.1	addl. cost	
5-pk.	-209.5	addl. cost	
25-pk.	-209.25	addl. cost	

*Liners with IDs less than 3.5mm are difficult to pack. We will pack them on a custom basis (minimum neck ID of 2mm required).

Replacement CarboFrit® Inserts

Description	qty.	cat. #	price
Frits for liner ID ≤4mm	10-pk.	20295	
Frits for liner ID >4mm	10-pk.	20294	



CarboFrit® Puller/Inserter Tool

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

Description	qty.	cat.#	price
CarboFrit Puller/Inserter Tool	ea.	21642	



Use of Packings with Autosampler

We recommend using an injection port liner with wool or CarboFrit® packing when making injections with an autosampler. If there is no packing material in the liner, the solvent droplets act like water on a hot iron: they bounce around until vaporized (Leidenfrost phenomenon). Because autosamplers make rapid injections, samples can be incompletely vaporized, leading to nonreproducible peak response and tailing. You can prevent this by using wool or CarboFrit® packing material in the splitless liner, to provide a surface for the solvent droplets to "sit" on until











Mini Wool Puller/Inserter

Insert and remove wool plugs easily. Order a spare pack so you'll always have one available.





Description	qty.	cat.#	price
Mini Wool Puller/Inserter	2-pk.	20114	



Eliminates user variation!

Inlet Liner Packing Tool

- · Position wool reproducibly every time.
- · Accurate to a specific, measured depth.
- · Can be used with all manufacturer's liners.







Place a plug of loosely bound wool at the top of the inlet liner.



Insert the liner packing tool into the liner until the tool bottoms out. Remove the tool. The wool is positioned correctly in the liner and the liner is ready for use

Description	qty.	cat.#	price	
Inlet Liner Packing Tool	ea.	20339		



Inlet Liner Removal Tool

- · Easily remove liner from injector—no more burned fingers.
- · Made from high-temperature silicone.
- · Won't chip or crack the liner.

Description	qty.	cat.#	price
Inlet Liner Removal Tool	3-nk	20181	







The Claw and The Claw Holder Kit

- · Easily removes hot liners from injection ports.
- 4mL vials (not included) can be replaced when dirty.

Never again will you have to burn your fingers removing a hot injection port liner. The Claw safely and cleanly removes liners, O-rings, or other small objects from the injection port. You can then place the hot objects in a clean 4 mL vial situated in the Claw holder until ready for



Description	qty.	cat. #	price
The Claw	ea.	26261	
The Claw Holder Kit (includes The Claw and holder)	kit	26262	
WISP 48 Snap Seal Vial	100-pk.	24658	



Injector Maintenance

Approximately ninety percent of "bad" chromatography is traceable to problems in the injection port. These problems include contaminated carrier gas, incorrect injector flows, active or dirty sites on inlet seals and liners, improper use of wool, leaks, backflash, discrimination, incorrect injector temperature, poor column installation, and use of the wrong injection technique. To minimize injection port problems, set up a routine maintenance schedule and be sure to investigate the injector first when troubleshooting.





GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Liners



Splitless Liners		ID*			cat.#/price	
for Agilent GCs	Benefits/Uses	OD x Length	Similar to Agilent part #	ea.	5-pk.	25-pk.
2mm Splitless	trace samples $<2\mu$ L	2.0mm 6.5mm x 78.5mm	5181-8818 (ea.) 5183-4703 (5-pk.) 5183-4704 (25-pk.)	20712	20713	20714
4mm Splitless	trace samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	210-3003 (ea.) 210-3003-5 (5-pk.)	20772	20773	20774
4mm Splitless w/Wool	trace samples >2µL	4.0mm 6.5mm x 78.5mm	19251-60540 (ea.) 5183-4691 (5-pk.) 5183-4692 (25-pk.)	22400	22401	22402
5mm Splitless	accommodates more polar solvents and lower MW solvents	5.0mm 6.5mm x 78.5mm	NEW!	22975	22976	_
2mm Splitless (Quartz)	trace samples $< 2\mu$ L	2.0mm 6.5mm x 78.5mm	18740-80220 (ea.) 5183-4707 (5-pk.)	20914	20915	_
4mm Splitless (Quartz)	trace samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	_	20912	20913	_
4mm Splitless w/Wool (Quartz)	trace samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	_	22403	22404	_
Gooseneck Splitless (2mm)	trace samples $< 2\mu$ L	2.0mm 6.5mm x 78.5mm	_	20795	20796	20797
Gooseneck Splitless (4mm)†	trace samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	5181-3316 (ea.) 5183-4695 (5-pk.) 5183-4696 (25-pk.)	20798	20799	20800
Gooseneck Splitless (4mm) w/Wool†	trace samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	5062-3587 (ea.) 5183-4693 (5-pk.) 5183-4694 (25-pk.)	22405	22406	22407
Gooseneck Splittless (5mm)	accommodates more polar solvents and lower MW solvents	5.0mm 6.5mm x 78.5mm	NEW!	22973	22974	_
Double Gooseneck Splitless (4mm)	trace, active samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	5181-3315 (ea.) 5183-4705 (5-pk.) 5183-4706 (25-pk.)	20784	20785	20786
Cyclo Double Gooseneck (2mm)	trace, active, dirty samples <2µL	2.0mm 6.5mm x 78.5mm	_	20907	20908	_
Cyclo Double Gooseneck (4mm)	trace, active, dirty samples $> 2\mu$ L	4.0mm 6.5mm x 78.5mm	_	20895	20896	20997
Recessed Gooseneck (2mm)**	base easily packs with wool for dirty samples $< 2\mu L$	2.0mm 6.5mm x 78.5mm	_	20980	20981	20982
Recessed Gooseneck (4mm)**	base easily packs with wool for dirty samples $> 2\mu L$	4.0mm 6.5mm x 78.5mm	_	20983	20984	20985
Recessed Gooseneck (4mm) w/Wool**	base easily packs with wool for dirty samples $> 2\mu L$	4.0mm 6.5mm x 78.5mm	_	22408	22409	22410
Recessed Double Gooseneck (4mm)**	trace, active samples $>2\mu$ L	4.0mm 6.5mm x 78.5mm	_	20986	20987	20988

^{*}Nominal ID at syringe needle expulsion point.

†Use this liner for increased sensitivity.

All liners are 100% deactivated

All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.







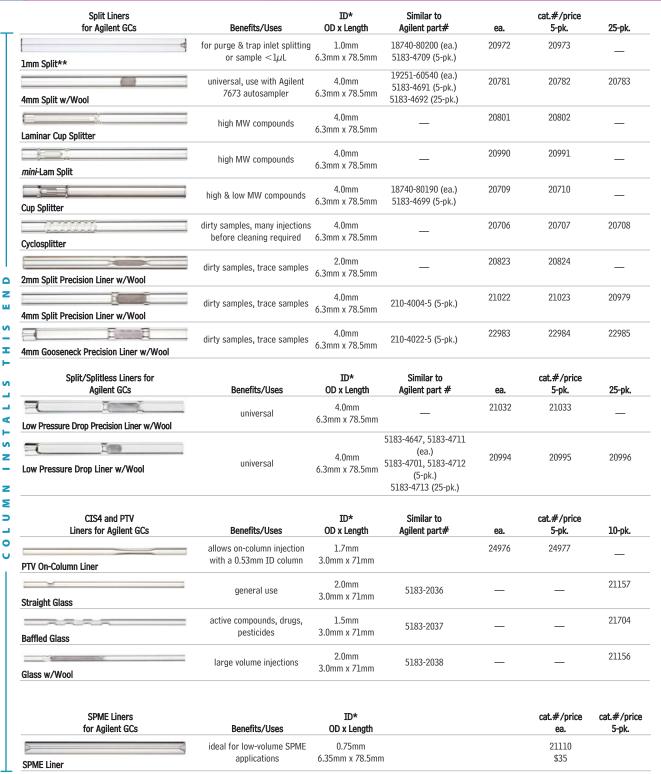


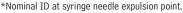
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^{**}Use with two-hole ferrule for dual-column analysis.



GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Liners





^{**}Use this liner for increased sensitivity.





Mar 2011



DI Liners for Agilent GCs**		ID*	Similar to		cat.#/price	
(For 0.25/0.32/0.53mm ID Columns)	Benefits/Uses	OD x Length	Agilent part #	ea.	5-pk.	25-pk.
	trace, active samples, high	4.0mm	_	21054	21055	20998
Drilled Uniliner (hole near top)	recovery & linearity	6.3mm x 78.5mm				
Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	G1544-80730	20756	20771	_
Double Gooseneck Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	_	20508	20509	_
Double Gooseneck Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	G1544-80700	20954	20989	_
Drilled Cyclo-Uniliner (hole near top)	trace, dirty, high MW, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	_	22979	22980	_
1mm Uniliner	trace, active samples, samples $<1\mu\mathrm{L}$	1.0mm 6.3mm x 78.5mm	_	21052	21053	_
Uniliner	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	NEW!	22268	22269	_
Cyclo-Uniliner	trace, dirty, high MW active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	NEW!	22270	22271	
Open-top Uniliner w/Wool	trace, dirty, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	NEW!	22272	22273	_



^{**}Hole in Drilled Uniliner liner makes direct injection possible with EPC-equipped Agilent 6890 & 7890 GCs!



Drilled Uniliner® Liners

Use the Drilled Uniliner® liner with the hole near the bottom for semivolatile analysis or when compounds of interest could be affected by a tailing solvent peak. Use the Drilled Uniliner® liner with the hole near the top for chlorinated pesticides analysis, aqueous injections, as well as for analysis in which the compounds of interest elute away from the solvent peak.

All liners are
100%
deactivated

All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.





Siltek® Metal Inlet Liners for Agilent GCs

- · Won't crack, chip, or break like glass liners.
- Excellent response for pesticides, phenols, and other active compounds.

Liner Type (5.2mm ID x 6.3mm OD x 78.5mm)	5-pk.	25-pk.
Cyclo/Single Gooseneck	20974	20975
Single Gooseneck	21702	21703
Cyclosplitter	20726	20729
Split/Splitless w/Wool	21700	21701









Viton® O-Rings for Agilent GCs

Fit split (6.3 mm OD) or splitless (6.5 mm OD) liners.

	Max.	Similar to		7	
Description	temp.	Agilent part #	qty.	cat.#	price
Viton O-Rings for Agilent GCs	250°C	5188-5365	25-pk.	20377	

High Temperature O-Rings for Agilent GCs

- Usable to 350 °C inlet temperature.

• Fits split (6.3 mm OD) (6.5 mm OD) liners.	and splitl	ess			
		10	-pk.	25	-pk.
Description	Max. temp.	cat.#	price	cat.#	price
High Temperature O-Rings					

350°C

NEW!

23403

23404

Graphite O-Rings

for Agilent GCs

for Agilent and Varian 1177 Injectors

Excellent thermal stability at injection port temperatures up to 450 °C!

					THE REAL PROPERTY.	
	Max.	Similar to	10	-pk.	50	-pk.
Description	temp.	Agilent part #	cat.#	price	cat.#	price
6.35mm ID Graphite						
O-Rings for split liners	450°C	5180-4168	20296		20297	
6.5mm ID Graphite						
O-Rings for solitless liners	450°C	5180-4173	20298		20299	

Liner Seals for CIS4 and PTV

	Max.	Similar to	Similar to			
Description	temp.	Agilent part #	Gerstel part #	qty.	cat.#	price
Liner Seals for						
CIS4 and PTV	450°C	5182-9749	007541-005-00	5-pk.	22684	

Replacement Viton® O-Rings for use with the Agilent Flip Top Inlet Sealing System

	Similar to	1		
Description	Agilent part #	qty.	cat.#	price
Viton Replacement O-Rings for use with				
the Agilent Flip Top Inlet Sealing System	5188-5366	10-pk.	22336	

Injector/Detector Plug Nuts

- · Use to cap off an injector to isolate leaks.
- Use to cap off a detector for thermal cleaning.
- · Use to check a detector or make-up gas flow rate.
- Use to cap off a detector and prevent hydrogen from accidentally diffusing into the oven from an unused detector base.

Similar to				
Description	Agilent part#	qty.	cat.#	price
Injector/Detector Plug Nuts	5020-8294	2-pk.	21883	



Thermolite® Septa

Septa for Agilent GCs

Preconditioned and ready to use!

Septum Diameter	25-pk./price	50-pk./price	100-pk./price
Thermolite Septa (usab	le to 340°C inlet temp.)		
5mm (3/16")	27120	27121	27122
9.5mm (³ / ₈ ")	27135	27136	27137
10mm	27138	27139	27140
11mm (⁷ /16")	27141	27142	27143
9.5mm (³ / ₈ ") 10mm 11mm (⁷ / ₁₆ ")	.,	27158 27160 27162	27159 27161 27163
		2/102	2/103
BTO Septa (usable to 40	00°C inlet temp.)	27102	2/103
BTO Septa (usable to 40 5mm CenterGuide	00°C inlet temp.)	27100	27103
5mm CenterGuide	00°C inlet temp.)	-	
• `	00°C inlet temp.)	27100	27101

HANDY septum size chart

Agilent Instrument	Septum Diameter (mm)
5880A, 5890, 6890, 6850, 7890, PTV	11
5700, 5880	9.5/10
On-Column Injection	5

Merlin Microseal Septa

for Agilent GCs

- Allow operation from 2 to 100 psi (400 Series) or 2 to 30 psi (300 Series).
- · Maximum temperature—Agilent 7890, 6890, 5890 Series II: 325 °C; Agilent 5890A: 300 °C.





Microseal High-Pressure Septa, 400 Series (100psi)	Merlin #	Similar to Agilent#	cat.#	price
Standard kit (nut, 2 septa)	404	Not offered	22810	
Starter kit (nut, 1 septum)	405	5182-3442	22811	
Nut kit (1 nut, fits 300 & 400 series septa)	403	5182-3445	22809	
High-pressure replacement septum (1 septum)	410	5182-3444	22812	

Microseal Septa, 300 Series (30psi)	Merlin #	Similar to Agilent#	cat.#	price
Standard kit (nut, 2 septa)	304	5181-8833	22813	
Starter kit (nut, 1 septum)	305	5181-8816	22814	
Microseal replacement septum (1 septum)	310	5181-8815	22815	



Australian Distributors Importers & Manufacturers www.chromtech.net.au



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GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Inlet



20117

Septum Puller

- · Use hooked end for removing septa and O-rings; pointed end works well for removing stuck ferrules or debris.
- Keep several on hand in your laboratory—can be used in many different ways.

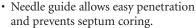




Description	qty.	cat.#	price
Septum Puller	ea.	20117	

Septum Nuts

for use with Agilent 5890/6890/6850/7890 Split/Splitless Injectors



- Manual injection septum nut allows use of 26-gauge needles for on-column injections.
- · Made of high-quality stainless steel.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Septum Nut, Autosampler & PTV				
(for 23-gauge needles)	18740-60835	ea.	20631	
Septum Nut, Manual Injection				
(for 26-gauge needles)	18740-60835	ea.	21309	

Septum Nut Removal Tool

for Agilent 5890/6890/6850/7890 GCs

- Easily remove the septum nut without touching the heated nut-no more burned fingers!
- · Unique, ergonomic handleeasy to grip.
- Nut remains in tool for quick reattachment.

Description	qty.	cat.#	price
Septum Nut Removal Tool			
for Agilent 5890/6890/6850/7890 GCs	ea.	24918	

Injector Wrench

for Agilent 5890/6890/6850 GCs

- Use to remove the septum nut and weldments during GC maintenance.
- Use the smaller end to remove the septum nut.
- · Use the larger end to tighten the split/splitless weldment nut.
- High-quality stainless steel construction.
- Meets original equipment performance.

	Similar to		4	
Description	Agilent part #	qty.	cat.#	price
Injector Wrench				







aluminum oxide sanding disk (cleans critical seal on base of injector)

Injection Port Repair Tool

for Agilent Split/Splitless Injection Ports

- · Remove contaminants, achieve a better seal.
- Cleans critical inlet seal areas.

Description	qty.	cat.#	price	
Injection Port Repair Tool				
for Agilent Split/Splitless Injection Ports	ea.	21393		
Replacement Sanding Disks (5 fine & 5 medium)	10-pk.	22689		
Replacement Bore Brushes (one 6.5mm & one 7mm)	2-pk.	21353		

Rethreading Tool

for Agilent Split/Splitless Injection Ports

- · Repair worn or damaged threads in injection ports, fittings, etc.
- · Built-in guide to prevent crossthreading.



Worn & damaged threads can allow oxygen into the system compromising analytical results and destroying columns.

Make your injection port threads like new!

Screw the tool completely onto the injection port in a clockwise direction. Unscrew the tool and inspect the threads, repeat as necessary. When done, wipe threads with methanol to remove any debris.

Description	qty.	cat.#	price
Rethreading Tool for 1/4" compression fittings			
(Agilent split/splitless injection ports)	ea.	23018	

tech tip

Minimizing Injector Discrimination

When an injected sample is not completely vaporized, lower percentages of compounds that are less volatile (i.e., compounds with high boiling points or high molecular weights) are transferred into the analytical column. As a result, these later-eluting compounds will have progressively decreased peak areas. You can minimize injector discrimination by reducing injector flows, increasing the injector temperature, using pressure pulse injection or a fast autosampler, or using an injector liner that aids in vaporization (e.g., a laminar cup splitter or a liner packed with wool).





for Agilei

220

2065

GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Inlet





Capillary Column Nuts for Agilent 5890/6890/7890 GCs Available in brass or stainless steel.





Agilent-style ferrules

for use with standard ferrules

Description	Similar to Agilent part #	qty.	cat.#	price
For use with "compact" Agilent-style fe	errules.			
Stainless Steel Capillary Column Nut	5181-8830	2-pk.	21884	
Brass Capillary Column Nut	5181-8830	2-pk.	21878	
For use with standard 1/16"-type ferrules	s.*			
Stainless Steel Capillary Column Nut	05921-21170	2-pk.	20883	
Brass Capillary Column Nut	05921-21170	2-pk.	21879	

^{*}Designed to fit a wider variety of 1/16" ferrules

Hot Swap Capillary Column Nuts

- No more burned fingers!
- No more downtime waiting for injector parts to cool down.



Never worry again about burned fingers or having to wait for the injector to cool down. The Hot Swap Capillary Column Nut allows you to change your capillary column while the injector temp is still hot.

Description	qty.	cat.#	price
For use with "compact" Agilent-style ferrules.			
Hot Swap Capillary Column Nut	ea.	22348	
For use with standard 1/16"-type ferrules.			
Hot Swap Capillary Column Nut	ea.	22347	



Finger-Tight Capillary Column Nuts

- · Allow wrench-free column installations.
- · Work with standard or compact (Agilent-style) ferrules.
- · Made from high-quality stainless steel.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
For use with "compact" Agilent-style	ferrules.			
	5020-8293,			
Finger-Tight Capillary Column Nuts	5020-8292	2-pk.	21040	
For use with standard 1/two forms	lac			

5020-8293,

Finger-Tight (









Finger-Tight Capillary Column Nuts

- Rapidly tighten without wrenches; avoid stripped threads.
- Either version can be used with 0.25, 0.32, or 0.53 mm ID columns.

Description	qty.	cat.#	price
For use with "compact" Agilent-style ferrules.			
Finger-Tight Capillary Column Nut	ea.	21311	
For use with standard 1/16"-type ferrules.			
Finger-Tight Capillary Column Nut	ea.	21312	







Capillary Installation Gauge

- Seats graphite* ferrules onto column for consistent installations.
- · Prevents crushed column ends.
- · Made from high-quality stainless steel.

Description	qty.	cat.#	price
Capillary Installation Gauge			
for Agilent-style fittings (compact ferrules)	ea.	21034	
Capillary Installation Gauge			
for 1/16" fittings (1/16" ferrules)	ea.	21399	

^{*}Recommended for use with graphite ferrules.

Inlet Maintenance Kit

for Agilent GCs

- · Includes the most common consumable GC supplies and tools.
- All parts meet or exceed performance of instrument manufacturer's parts.
- · Parts list makes reordering easy.

Inlet kit includes:

- · 0.4, 0.5, and 0.8 mm ID graphite ferrules.
- · Viton® O-rings.
- · Capillary nuts. · Inlet seals.
- · Reducing nut.
- · Scoring wafer. • 11 mm Thermolite® septa.
- · 4.0 mm single gooseneck liner.
- · 4.0 mm split liner with wool.
- · Capillary column caps.
- $^{1}/_{4}$ " x $^{5}/_{16}$ " wrench.
- · Septum puller.
- · Installation gauge.
- · Wire cleaning brush.
- · Jet reamers/ferrule removers.
- · Inlet liner removal tool.
- · Septa nut removal tool.

Description cat.# price Inlet Maintenance Kit kit 22181







" Adaptor Fitting

Flip Seals

A **reversible** Dual Vespel® Ring Inlet Seal that lasts twice as long, for the same great price!

Our new Flip Seal greatly improves injection port performance while saving you time and money. This reversible inlet seal allows twice as many uses as other inlet seals, at the same cost. By using our patented Dual Vespel® Ring technology, the Flip Seal features two soft Vespel® rings, one on the top and one on the bottom, which eliminate the need for a washer. Our new reversible design allows you to flip the inlet seal and use it twice as many times.

Feature	Benefit
Reversible design.	Allows twice as many uses as other seals, at the same cost.
Vespel® ring embedded in bottom surface.	Eliminates need for a washer.
Vespel® ring embedded in top surface.	Very little torque required to make seal—reduces operator variability.
Lower leak rate compared to OEM metal inlet seals.	Less detector noise.
Prevents oxygen from permeating the carrier gas.	Increases column lifetime.
Gold or Siltek Treated seals.	Reduces breakdown and adsorption of compounds, maximizing component transfer to GC column.

restek innovation!

Patented

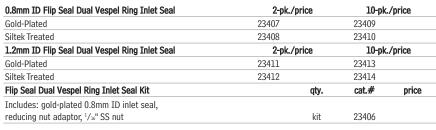












Note that the Flip Seal requires a special reducing nut, which is included in the kit.

Dual Vespel® Ring Inlet Seals

Washerless, leak-tight seals for Agilent GCs

- Does not require a separate washer.
- · Requires less torque to seal.
- Does not require retightening of reducing nut after several oven cycles.
- Extends column lifetime by preventing oxygen from reaching the column.
- Same price as the regular inlet seals with washers.







Extend your column lifetimes!



Now available in economical 50-pks.

0.8mm ID Dual Vespel Ring Inlet Seal	2-pk./price	10-pk./price	50-pk./price
Gold-Plated	21240	21241	23418
Siltek Treated	21242	21243	23419
Stainless Steel	21238	21239	23420
1.2mm ID Dual Vespel Ring Inlet Seal	2-pk./price	10-pk./price	
Gold-Plated	21246	21247	
Siltek Treated	21248	21249	
Stainless Steel	21244	21245	









Dual Vespel® Ring Cross-Disk Inlet Seals for Agilent GCs

- Ideal for high-flow split applications.
- · Washerless, leak-tight seals.

0.8mm ID Dual Vespel Ring Cross-Disk Inlet Seal	2-pk./price	10-pk./price
Gold-Plated	22083	22084
Siltek Treated	22085	22086



Replacement Inlet Seals with Washers

- Siltek® treatment provides inertness similar to fused silica.
- · All seals include washers.

Replacement Inlet Seals

for Agilent GCs

The inlet seal at the base of the Agilent 5890/6890/7890 GC injection port contacts the sample and must be changed frequently to prevent adsorption of active compounds. In addition, septum fragments and sample residue accumulate on the disk surface, requiring disk replacement.

To reduce breakdown and adsorption of active compounds, use Siltek® or gold-plated seals.

				Now available in
Single-Column Installation	Similar to			economical 50-pks.
0.8mm ID (Opening)	Agilent part #	2-pk./price	10-pk./price	50-pk./price
Gold-Plated	18740-20885	21317	21318	23415
Siltek Treated		21319	21320	23416
Stainless Steel	18740-20880	21315	21316	23417
0.25/0.32mm ID Dual-Column Installation				
1.2mm ID (Opening)		2-pk./price	10-pk./price	
Gold-Plated		21305	21306	
Siltek Treated		21307	21308	
Stainless Steel		20390	20391	
0.53mm ID Dual-Column Installation				
1/16-inch ID (Opening)		2-pk./price	10-pk./price	
Stainless Steel		20392	20393	

Replacement Inlet Seal Washers

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Inlet Seal Washers	5061-5869	15-pk.	21710	



NEW!

Note: The 1.2 mm inlet seal is recommended when installing two columns using a two-hole Vespel®/graphite ferrule.

All seals include washers.



Cross-Disk Inlet Seals

for Agilent GCs

- Ideal for high-flow split applications on Agilent 5890 GCs.
- · All seals include washers.

0.8mm ID Cross-Disk Inlet Seal	Similar to Agilent part #	2-pk./	'nrico	10-pk./price
			price	• • •
Gold-Plated	5182-9652	20477		20476
Siltek Treated	_	20475		20474
	Similar to			
1.2mm ID Cross-Disk Inlet Seal	Agilent part #	2-pk./	price	10-pk./price
Gold-Plated	_	21009	\$71	21010
Siltek Treated	_	21011	\$71	21012

Silver PTV Seals

for Agilent 6890 GCs

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Silver PTV Seals for Anilant 6890 GCs	5189-0763	5-nk	21400	











Not available in Germany or Japan.

restek innovation!

Helping our customers improve efficiency!



Simply slip the Weldment Removal Tool over the weldment, then twist and remove. For speed and efficiency, the weldment stays secured in the Weldment Removal Tool until you reattach it.



EZ Twist Top® Split/Splitless Injection Ports for Agilent GCs

The importance of injection port maintenance has been well documented by instrument and column companies industry wide. Restek has made it easy to carry out this maintenance with the innovation of our EZ Twist Top® injection port.

- · Change inlet liners faster and more easily.
- Gas lines are attached to shell weldment bottom to help eliminate broken gas lines.
- · Gas lines don't interfere with routine maintenance.
- Weldment Removal Tool allows for quick removal of the hot weldment without fingers ever touching hot surfaces.
- Weldment stays secure in the tool for reattachment.

	Restek	Agilent
Get the EZ Twist Top® ADVANTAGE	EZ Twist Top®	Flip Top
Eliminate damaged gas lines	✓	
Siltek deactivation for enhanced inertness & durability	✓	
Avoid touching hot metal surfaces—Weldment removal tool included	✓	



EZ Twist Top® Split/Splitless Injection Port for Agilent 7890 GCs

Description	qty.	cat.#	price
Injection Port Assembly Kit			
Includes: shell weldment, 2 weldment O-rings, Siltek Dual Vespel Ring inlet seal,			
septum nut, reducing nut, stainless steel capillary nut for use with 1/16" ferrules,			
and weldment removal tool	kit	22177	
Injection Port Assembly Kit, Siltek Treated			
Includes: Siltek shell weldment, 2 weldment O-rings, Siltek Dual Vespel Ring inlet seal,			
septum nut, reducing nut, stainless steel capillary nut for use with 1/16" ferrules, and			
weldment removal tool	kit	22178	
Weldment			
(2 weldment O-rings are installed on the weldment)	ea.	22724	
Weldment, Siltek Treated			
(2 weldment O-rings are installed on the weldment)	ea.	22732	
Shell Weldment	ea.	22175	
Shell Weldment, Siltek Treated	ea.	22176	
Weldment O-rings	10-pk.	22729	
High Temperature Weldment O-Rings	– 10-pk.	23405	
Septum Nut, Autosampler & PTV (for 23-gauge needles)	ea.	20631	
Stainless Steel Capillary Column Nut (for use with standard 1/16" ferrules)	2-pk.	20883	
Reducing Nut	ea.	22078	
0.8mm Dual Vespel Ring Inlet Seal, Siltek Treated	2-pk.	21242	
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Weldment Removal Tool	ea.	22728	

Visit www.restek.com/slideshows for an educational video on our EZ Twist Top injection port system.



Which EZ Twist Top® should you buy?

The type of split vent trap you have connected to the EPC module/block on your 6890/6850 Agilent GC determines which EZ Twist Top® Injection Port you need to buy.

Simply remove the top and rear panel on the GC and see if you have the small (pencil type) split vent filter (cat.# 22820) or the large canister type filter (cat.# 23031) attached to the split vent gas line. If you have the small (pencil type) split vent filter, you need the EZ Twist Top® Injection Port for Agilent 6890/6850 GCs (cat.# 22721 or 22722). If you have the large canister filter, you'll need the EZ Twist Top® with Optional Split Vent for Agilent 6890/6850 GCs, for use with large canister type filters (cat.# 22735 or 22736).







EZ Twist Top® Split/Splitless Injection Port

for Agilent 6890/6850 GCs (for use with large canister type filter)

Description	qty.	cat.#	price
Complete Injection Port Assembly Kit			
Includes: split/splitless weldment, shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22735	
Complete Injection Port Assembly Kit, Siltek Treated			
Includes: Siltek split/splitless weldment, Siltek shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22736	
Optional Split/Splitless Shell Weldment	ea.	22733	
Optional Split/Splitless Shell Weldment, Siltek Treated	ea.	22734	

EZ Twist Top® Split/Splitless Injection Port

for Agilent 6890/6850 GCs with Pencil Traps

Description	qty.	cat.#	price
Injection Port Assembly Kit			
Includes: split/splitless weldment, shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22721	
Injection Port Assembly Kit, Siltek Treated			
Includes: Siltek split/splitless weldment, Siltek shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22722	
Weldment			
(2 weldment O-rings are installed on the weldment)	ea.	22724	
Weldment, Siltek Treated			
(2 weldment O-rings are installed on the weldment)	ea.	22732	
Shell Weldment	ea.	22723	
Shell Weldment, Siltek Treated	ea.	22730	
Weldment O-rings	10-pk.	22729	
High Temperature Weldment O-Rings (NEW!)—	10-pk.	23405	
Septum Nut, Autosampler & PTV (for 23-gauge needles)	ea.	20631	
Stainless Steel Capillary Column Nut (for use with standard 1/16" ferrules)	2-pk.	20883	
Reducing Nut	ea.	22078	
0.8mm Dual Vespel Ring Inlet Seal, Siltek Treated	2-pk.	21242	
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Weldment Removal Tool	ea.	22728	

EZ Twist Top® Split/Splitless Injection Port

for Agilent 5890 GCs

Description	qty.	cat.#	price
Injection Port Assembly Kit			
Includes: split/splitless weldment, shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22725	
Injection Port Assembly Kit, Siltek Treated			
Includes: Siltek split/splitless weldment, Siltek shell weldment, 2 weldment O-rings,			
Siltek Dual Vespel Ring inlet seal, septum nut, reducing nut, stainless steel capillary nut			
for use with 1/16" ferrules, and weldment removal tool	kit	22726	
Weldment			
(2 weldment O-rings are installed on the weldment)	ea.	22724	
Weldment, Siltek Treated			
(2 weldment O-rings are installed on the weldment)	ea.	22732	
Shell Weldment	ea.	22727	
Shell Weldment, Siltek Treated	ea.	22731	
Weldment O-rings	10-pk.	22729	
High Temperature Weldment O-Rings (NEW!)	10-pk.	23405	
Septum Nut, Autosampler & PTV (for 23-gauge needles)	ea.	20631	
Stainless Steel Capillary Column Nut (for use with standard 1/16" ferrules)	2-pk.	20883	
Reducing Nut	ea.	22078	
0.8mm Dual Vespel Ring Inlet Seal, Siltek Treated	2-pk.	21242	
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Weldment Removal Tool	ea.	22728	

Not available in Germany or Ianan









did you know?

22728

You can now heat your EZ Twist Top® Injection Port to even higher temperatures. Our new High Temperature Weldment O-rings (cat.# 23405) won't melt in the injection port and can reach up to 350 °C.

High Temperature O-rings are also now available for split (6.3 mm OD) and splitless (6.5 mm OD) liners for Agilent GCs (cat.# 23403 and 23404, page 219).

Use our new High Temperature O-rings for

tures.

Mar 2011

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Split/Splitless Injection Ports for Agilent GCs

Would you like better performance from your injector? Our Siltek® treated split/splitless injector is a direct replacement for Agilent 5890 and 6890/6850 GCs, but Siltek® treatment passivates the metal surface to ensure an inert pathway for the sample, delivering increased performance. The injector is manufactured from high-quality stainless steel and meets or exceeds Agilent original equipment performance.





Split/Splitless Injection Port (Direct Replacement or Siltek® Treated) for Agilent 5890 GCs

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Weldment*	19251-60575	ea.	20265	
Replacement Weldment*,				
Siltek Treated	19251-60575	ea.	20267	
Replacement Shell Weldment	19251-80570	ea.	20266	
Replacement Shell Weldment,				
Siltek Treated	19251-80570	ea.	20268	



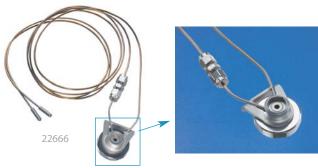
Split/Splitless Injection Port (Direct Replacement or Siltek® Treated) for Agilent 6890/6850 GCs

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Weldment with EPC	G1544-60575	ea.	22674	
Replacement Weldment with EPC,				
Siltek Treated	G1544-60575	ea.	22672	
Replacement Weldment*	19251-60575	ea.	20265	
Replacement Weldment*,				
Siltek Treated	19251-60575	ea.	20267	
Replacement Shell Weldment	G1544-80570	ea.	22673	
Replacement Shell Weldment,				
Siltek Treated	G1544-80570	ea.	22671	
Split/Splitless Weldment (for use				
with large canister type filter)	G1544-60585	ea.	22686	
Split/Splitless Weldment (for use				
with large canister type filter),				
Siltek Treated	G1544-60585	ea.	22670	

^{*}For use with manual flow or EPC on Agilent 5890 GCs. For use with manual flow only on Agilent 6890/6850 GCs.

Injection Port Weldments for Agilent GCs for use with Purge and Trap Systems

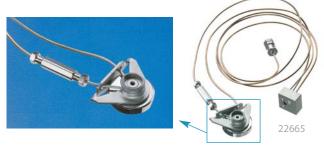
Easily attach your purge and trap with pre-installed low dead volume fittings.



Injection Port Weldments

for Agilent GCs with Tekmar Purge and Trap Systems

Description	qty.	cat.#	price
Weldment for Agilent 6890 GCs	ea.	22664	
Weldment			
for Agilent 6890 GCs with large canister type filter	ea.	22668	
Weldment for Agilent 5890 GCs	ea.	22666	



Injection Port Weldments for Agilent GCs with OI Purge and Trap Systems

Description	qty.	cat.#	price
Weldment for Agilent 6890 GCs	ea.	22665	
Weldment			
for Agilent 6890 GCs with large canister type filter	ea.	22669	
Weldment for Agilent 5890 GCs	ea.	22667	



Installing a New Weldment

To eliminate possible leaks and damage to the weldment, always replace the split vent line, nut, and ferrule when installing a new shell weldment.









PTV Inlet Adaptor Kit

for Gerstel CIS 3 and CIS 4 PTV Inlets

- Meets original manufacturer's performance.
- Includes inlet adaptor, silver PTV seal, and slotted capillary nut.



	Similar to			
Description	Gerstel part #	qty.	cat.#	price
PTV Inlet Adaptor Kit				
for 0.25 and 0.32mm ID Columns	007259-045-00	kit	22350	
PTV Inlet Adaptor Kit				
for 0.53mm ID Columns	007259-007-00	kit	22351	
Silver PTV Seals	002841-005-00	5-pk.	21409	
PTV Slotted Capillary Column Nut	001268-005-00	2-pk.	22349	
Liner Seal Pre-Seat Tool	007542-000-00	ea.	22352	



Vacuum Vu-Union® Connector

for GC/MS Applications

- · Connects analytical column to MS transfer line.
- · Use under vacuum conditions.
- Use only with Vu-Union® Vespel®/graphite ferrules (order ferrules separately).
- Includes metal housing body, one deactivated tapered glass insert, and Vu-Union® Helping Hand.
- Fits column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).

A specifically designed Vu-Union® glass insert permits more torque to be applied to the ferrules without fear of cracking the insert. The hex end nuts enable you to use wrenches to tighten the end fittings.

Vu-Union® Helping Hand

The Helping Hand is designed to hold in place the metal housing of the Vacuum Vu-Union® connector. This allows you to easily assemble the columns in the glass insert and tighten the nuts. The Helping Hand is included with the Vacuum Vu-Union® connector.



Description	qty.	cat.#	price
Vacuum Vu-Union Connector (with the Helping Hand)	ea.	20427	
Replacement Inserts	3-pk.	20428	



Gerstel GRAPHPACK® 3D/2 Connectors & Ferrules

GRAPHPACK® technology provides a complete system that quickly and reliably makes a leak-tight, low-dead-volume connection. The central component is a metal-jacketed graphite ferrule—the ideal seal for GC applications.

Gerstel GRAPHPACK® 3D/2 Connectors

Description	Fits Column ID	qty.	cat.#	price
GRAPHPACK 3D/2				
Connector*	0.25mm to 0.32mm ID	ea.	20272	
GRAPHPACK 3D/2				
Connector*	0.45mm to 0.7mm ID	ea.	20273	

GRAPHPACK® 3D/2 Ferrules

Ferrule ID	Fits Column ID	qty.	cat.#	price
0.4mm	0.25mm	10-pk.	20271	
0.5mm	0.32mm	10-pk.	20270	
0.8mm	0.45/0.53mm	10-pk.	20274	

GRAPHPACK® 2m Ferrules



Fits Column ID	Similar to Gerstel part #	qty.	cat.#	price
0.25mm	001805-040-00	10-pk.	22223	
0.32mm	001805-045-00	10-pk.	22224	
0.53mm	001805-007-00	10-pk.	22225	

Liner Seals for CIS4 and PTV

	Max.	Similar to	Similar to			
Description	temp.	Agilent part #	Gerstel part #	qty.	cat.#	price
Liner Seals for						
CIS4 and PTV	450°C	5182-9749	007541-005-00	5-pk.	22684	

ChromaBLOGraphy

Topical and timely insights from top chromatographers.

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1/16-Inch Capillary Inlet Adaptor Fitting Kit (Split/splitless fitting for capillary columns)

- 1/16-inch split/splitless fitting that accepts standard capillary ferrules.
- · Easier to install capillary columns because the nut protrudes farther from the insulated injection port chamber.
- Same column insertion depth as the original manufacturer's equipment.
- Kit includes adaptor fitting, capillary nut, gold plated 0.8 mm ID Dual Vespel® Ring Inlet Seal, and one 0.4 mm ID ferrule.

Description	qty.	cat.#	price
1/16-Inch Capillary Inlet Adaptor Fitting Kit	kit	27184	
	2-pk.	21240	
0.8mm ID Dual Vespel Ring Inlet Seal, Gold-Plated	10-pk.	21241	



Direct Replacement Reducing Nut

- · Made from high-quality stainless steel.
- Meets original manufacturer's equipment performance.

	Similar to			_
Description	Agilent part #	qty.	cat.#	price
Reducing Nut	18740-20800	ea.	22078	



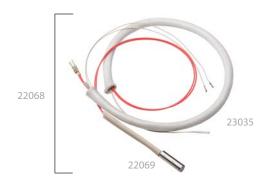
EPC Test Kit

for Agilent 6890 GCs

Kit includes 3 O-rings, 2 plugs, 1 mounting screw and 1 test block.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
EPC Test Kit	G1530-60960*	kit	24323	

*Similar to Agilent part # G1530-60960, but not exact equivalent. Kits differ in



Heater Cartridge & Platinum Resistance Thermometer (PRT) Sensor

for Agilent 5890 GCs

- Use with 5890 FID and split/splitless weldments.
- Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Injector/FID Heater and				
Injector/FID PRT Sensor	05890-61140	kit	22068	
Injector/FID Heater	19231-60620	ea.	22069	
Injector/FID PRT Sensor	19231-60660	ea.	23035	



Sign up for Restek's e-newsletter, The Buzz www.restek.com/buzz

Heat Sink

for Agilent 5890 GC Split/Splitless

Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Heat Sink	18740-20940	ea.	20409	







Supplies for Agilent GCs: Replacement Parts, Tools



Heater Block Retaining Nuts

for Agilent GC Split/Splitless Injectors

- Aluminum construction.
- Meet or exceed manufacturer's performance.

Similar to					
Description	Agilent part #	qty.	cat.#	price	
Heater Block Retaining Nut					
for Agilent 5890 GCs	19251-20620	ea.	22080		
Heater Block Retaining Nut					
for Agilent 6890/6850 GCs	G1544-20590	ea.	23042		



Oven Temperature Sensor Assembly

for Agilent GCs

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Oven Temperature Sensor				
for Agilent 5890 GC	05890-61030	ea.	23040	
Oven Temperature Sensor				
for Agilent 6890 GC	G1530-61030	ea.	23039	



60 psig Backpressure Regulator Kit

Increase the versatility of your Agilent 5890 GC by replacing the existing 30 psig (207 kPa) backpressure regulator and gauge with our 60 psig (414 kPa) regulator. Enables you to use longer 60 m and 105 m columns as well as shorter 10 m columns. Includes complete instructions.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Backpressure Regulator Kit	19246-60630	kit	20634	







Replacement Chemical Traps

for Agilent GCs

- Easy to install.
- Attach to same fittings as original manufacturer's equipment.
- Built-in frits retain fine particles; adsorbents remove both moisture and hydrocarbons.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Split Vent Trap				
for Agilent 6890/6850 GCs	G1544-80550	ea.	22820	
Replacement Chemical Trap				
for Agilent 5890 GCs	05890-61260	ea.	21610	
Split Vent Line (32-inch)				
for Agilent GCs				
(Includes all installation hardware.)	19251-80525	2-pk.	22800	
O-Rings for Agilent Trap Fittings	5180-4181	25-pk.	22064	
Optional Split Vent Trap Assembly				
for Agilent 6890/6850 GCs	G1544-60610	kit	23031	
Replacement Traps (2)				
and O-Rings (4)	G1544-80530	kit	23032	



See **page 219** or visit **www.restek.com** and search on septa.

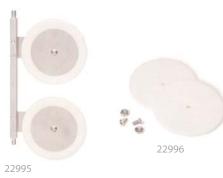






GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Tools







Oven Flapper Assemblies

for Agilent 5890/6890 GCs

- Ensure even and consistent column heating when the insulation becomes damaged or worn.
- Replacement Insulation Gasket and Hardware Kit includes the insulation gasket, 2 screws and 2 nuts.
- Meets or exceeds original manufacturer's performance.
- · Insulation is replaceable, using Restek's Oven Flapper Assemblies.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Oven Flapper Assembly				
for Agilent 5890 GCs	05890-80560	ea.	22994	
Oven Flapper Assembly				
for Agilent 6890 GCs	G1530-80560	ea.	22995	
Replacement Insulation Gasket and				
Hardware Kit*		kit	22996	

*Fits Restek's Oven Flapper Assembly only.



Air Diverter

for Agilent GCs

- Divert GC exhaust heat up and away from the lab bench.
- · Meets or exceeds original manufacturer's performance.
- Easy to install—no tools required.

Description	Similar to Agilent part #	qty.	cat.#	price
Air Diverter for Agilent	19247-60510,			
5890/6890/7890 GCs	G1530-80650	ea.	22076	



for Agilent 5890/6890/6850 GCs

- · Use to remove the septum nut and weldments during GC maintenance.
- · Use the smaller end to remove the septum nut.
- Use the larger end to tighten the split/splitless weldment nut.
- High-quality stainless steel construction.
- · Meets original equipment performance.



	Similar to			
Description	Agilent part #	qty.	cat.#	price
Injector Wrench for Agilent				
5890/6890/6850 GCs	19251-00100	ea.	22065	

Rethreading Tool

for Agilent Split/Splitless Injection Ports

- Repair worn or damaged threads in injection ports, fittings, etc.
- Built-in guide to prevent cross-threading.



Worn & damaged threads can allow oxygen into the system compromising analytical results and destroying columns.



Make your injection port threads like new!

Screw the tool completely onto the injection port in a clockwise direction. Unscrew the tool and inspect the threads, repeat as necessary. When done, wipe threads with methanol to remove any debris.

Description	qty.	cat.#	price
Rethreading Tool for 1/4" compression fittings			
(Agilent split/splitless injection ports)	ea.	23018	









Inlet Liner Removal Tool

- Easily remove liner from injector—no more burned fingers.
- · Made from high-temperature silicone.
- Won't chip or crack the liner.









No more burned fingers!

Description	qty.	cat.#	price
Inlet Liner Removal Tool	3-pk.	20181	



The Claw and The Claw Holder Kit

- Easily removes hot liners from injection ports.
- 4mL vials (not included) can be replaced when dirty.

Never again will you have to burn your fingers removing a hot injection port liner. The Claw safely and cleanly removes liners, O-rings, or other small objects from the injection port. You can then place the hot objects in a clean 4 mL vial situated in the Claw holder until ready for reuse.



			price		
Description	qty.	cat. #	price		
The Claw	ea.	26261			
The Claw Holder Kit (includes The Claw and holder)	kit	26262			
WICD AR Coan Coal Vial	100-nk	24658			



also available

Looking for autosampler vials? Restek carries a full line of autosampler vials for Agilent autosamplers. See **pages 353 to 363** or visit **www.restek.com** and search on autosampler vial.





Everything you need in one complete kit!

Make Life Easier (MLE) Capillary Tool Kit for Agilent GCs

Includes:

- capillary installation gauge for Agilent GCs
- · injector wrench for Agilent GCs
- · septum nut removal tool
- + $^{1}/_{8}\text{",}~^{3}/_{16}\text{",}$ and $^{1}/_{4}\text{"}$ nylon brushes
- 1/4", 3/8", and 3/16" stainless steel wire tube brushes
- · stainless steel surface brush
- 6 stainless steel jet reamers (0.25–0.65 mm OD)
- 1/4" x 5/16" open end wrench
- 3/8" x 7/16" open end wrench
- $^{7}/_{16}$ " x $^{1}/_{2}$ " open end wrench
- 1/2" x 9/16" open end wrench

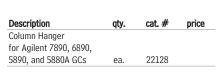
- · rubber-tipped slide-lock tweezers
- scoring wafers with handles
- inlet liner removal tool
- septum puller
- mini wool puller/inserter tool4-inch tapered needle file
- swivel head flashlight
- Swiver nead mashingm
- mini hand drill set
- $\, \cdot \,$ 15 cm compact steel ruler
- pocket magnifier
- high temperature string (1 meter)
- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)

Description	qty.	cat.#	price
MLE Capillary Tool Kit for Agilent GCs	kit	22186	

Column Hanger for Agilent 7890, 6890, 5890, and 5880A GCs















Direct Injection (DI) Inserts and Liner Adaptor for ¹/₄-Inch Packed Column Injection Ports (for 0.25, 0.32, & 0.53 mm ID columns)

DI Glass Inserts

for Agilent 5890 Packed Column GC

- · Tolerances closely controlled.
- Can be removed from the septum nut weldment.

Description	Similar to Agilent part #	qty.	cat.#	price
DI Glass Inserts				
for Agilent 5890 Packed Column GC	5181-3382,			
(1.7mm ID x 3.0mm OD x 93mm)	5080-8732	5-pk.	20967	

DI Uniliner® Liners

for Agilent 5890 Packed Column GC

- Press-Tight® taper forms dead-volume-free connection to column.
- · Minimizes solvent and peak tailing.
- Use with 0.25, 0.32, and 0.53 mm ID capillary columns.
- Can be removed from the septum nut weldment.

Description	adaptor as Agilent part #	qty.	cat.#	price
DI Uniliner Liner	5181-3382,	ea.	20964	
for Agilent 5890 Packed Column GC	5080-8732	5-pk.	20965	
(1.7mm ID x 3.0mm OD x 93mm)		25-pk.	20966	

DI Liner Adaptor

for Agilent 5890 Packed Column GC

- Uses standard 1/16-inch capillary nut and ferrules.
- Convenient wrench pad at base.
- Includes ¹/₄-inch graphite ferrule and stainless steel nut.
- Use with Agilent or Restek DI glass inserts or Restek DI Uniliner[®] liners for an Agilent 5890 packed column GC.



Description	Similar to Agilent part #	qty.	cat.#	price
DI Liner Adaptor				
for Agilent 5890 Packed Column GC	19244-80540	ea.	21303	

Siltek® Septum Packed Purge Port Weldment

for Agilent 5890 GCs

Siltek® treatment makes welment inert and eliminates adsorption of sensitive compounds (e.g., DDT and Endrin). Order Viton® O-rings (below) and appropriate septa separately. See page 219.



Description	Similar to Agilent part #	qty.	cat.#	price
Siltek Septum Packed Purge Port				
Weldment for Agilent 5890 GCs	19243-80570	ea.	21691	
Viton Replacement O-rings	5080-8898	10-pk.	21685	

Micropacked Inlet Conversion Kits

- Convert a capillary GC split/splitless inlet for use with ¹/16" OD micropacked columns.
- For use with Agilent 5890 and 6890 GCs.
- Sample pathways deactivated for ultimate inertness.

je-Bor	e Dual



Large-Bore Dual Vespel® Ring Inlet Seals

Description	qty.	cat.#	price
Micropacked Column Adaptor Kit for Split/Splitless Injection			
Injection Port Adaptor Kit			
Kit includes: Dual Vespel Ring Inlet Seal, large bore; reducing nut, large bore;			
1/16" ferrule, Vespel/graphite; 1/16" nut, stainless steel; 4mm splitless liner,			
intermediate polarity deactivated	kit	22426	
Micropacked Column Adaptor Kit for On-Column Injection			
Injection Port Adaptor Kit			
Kit includes: Dual Vespel Ring Inlet Seal, large bore; reducing nut, large bore; 1/16" ferrule,			
Vespel/graphite; Siltek treated metal liner installation guide; 1/16" nut, stainless steel	kit	22427	
Replacement Inlet Seals for Micropacked Column Adaptor			
Dual Vespel Ring Inlet Seals, large bore (2)	2-pk.	22429	
Replacement Metal Liner Installation Guide for On-Column Injection, Siltek Treated	ea.	22430	
Replacement 4mm Splitless Liner	ea.	20772	



Looking for packed and micropacked columns?
See pages 122-143





1/4" SS Nut



Large-Bore

FID Adaptor

1/16" SS Nut





Large-Bore Reducing Nut

¹/₁₆" Vespel®/Graphite Ferrules

22430

also available

Looking for more information or products on converting packed columns to capilla







232

Dual-Column mini-Lam Direct Injection Tee

- · Inverted cup design offers complete sample vaporization.
- · Permits larger sample volumes.
- Incorporates a Press-Tight® taper in each outlet leg, to make a perfect, dead-volume-free connection to each analytical column (ODs ranging from 0.4 to 0.8 mm).
- · Allows visual confirmation of the column connection.
- · Open-top design makes it easy to pack with glass wool, keeping sample residue from contaminating the cup.

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



Dual-Column Direct Injection Tee

- · Designed with a glass spiral to promote sample vaporization and provide even sample distribution to the two columns.
- Traps sample residue and minimizes the need for guard columns.
- · Press-Tight® taper in each outlet leg facilitates a perfect dead-volume-free connection to each analytical column (OD 0.4 to 0.8 mm) and allows visual confirmation of the column connection.



Description	qty.	cat.#	price
DI Tee Kit	kit	20412	
Replacement Tee	ea.	20411	





1/8-Inch Capillary Inlet Adaptor Fitting Kit

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

- 1/8-inch split/splitless fitting accepts standard two-hole capillary ferrules and a standard 1/8-inch nut.
- · Makes column installation easy due to the nut protruding 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 0.8 mm ID two-hole ferrule.
- · Use recessed gooseneck liners with this adaptor.

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



Inlet Adaptor Kit for Dual Column Installation for **Agilent Capillary Injectors**

(Split/splitless fitting for capillary columns)

- 1/16-inch split/splitless fitting that accepts standard, two-hole capillary ferrules.
- Easier to install capillary columns due to the nut protruding farther from the insulated injection port chamber.
- · Same column insertion depth as the original manufacturer's equipment.
- Kit includes adaptor fitting, 1/16" capillary nut, gold-plated 1.2 mm ID Dual Vespel® Ring Inlet Seal, one 0.4 mm ID two-hole ferrule, and one 0.5 mm ID two-hole ferrule.

Description	qty.	cat.#	price
Inlet Adaptor Kit for Dual Column Installation			
for Agilent Capillary Injectors	kit	27185	
	2-pk.	21246	
1.2mm ID Dual Vespel Ring Inlet Seal, Gold-Plated	10-pk.	21247	

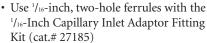
also available

Looking for more information or products on dual column analyses?

See pages 268-270.

Two-Hole Ferrules

for 1/8-Inch and 1/16-Inch Compression-Type





• Use 1/8-inch, two-hole ferrules with the 1/8-Inch Capillary Inlet Adaptor Fitting Kit (cat.# 20645).

Fitting Size	Ferrule ID	Fits Column ID	qty.	Vespel/Graphite
1/16"	0.4mm	0.25/0.28mm	5-pk.	24848
1/16"	0.5mm	0.32mm	5-pk.	24849
1/8"	0.8mm	0.45/0.53mm	5-pk.	20246





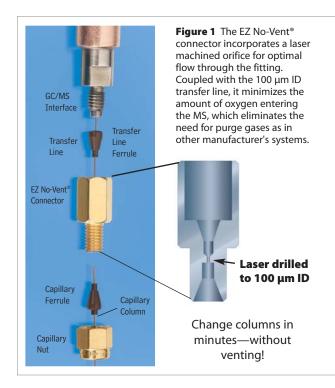


EZ No-Vent® GC Column-Mass Spectrometer Connector for Agilent GCs with 5971/5972, 5973, or 5975 GC/MS

- Change GC/MS columns in minutes without venting— $100~\mu m$ transfer line throttles vacuum and eliminates the need to vent.
- Easy to install and maintain—no special tools or plumbing required.
- Gold-plated body for inertness.
- · Deactivated transfer line keeps analytes focused.
- High-temperature polyimide ferrules eliminate leaks at the problematic transfer line fitting.
- · Lower cost than other "no-vent" fittings.



We designed the EZ No-Vent® GC column-mass spectrometer connector to be simple and easy to use. A critical orifice in the EZ No-Vent® connector minimizes the amount of oxygen allowed into the MS source, eliminating the need for purge gas as is required for other manufacturer's vent systems. This enables you to skip the lengthy vent and pump-down cycle otherwise required when you make a column change. This can save nearly a day of down-time with each column change. The EZ No-Vent® connector easily attaches to the MS source without special tools or extra plumbing. Figure 1 shows the internal structure of the connector. Figure 2 illustrates the high performance achieved with the EZ No-Vent® Connector.



restek innovation!

Kit installs easily, without special tools or plumbing.

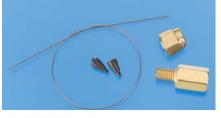
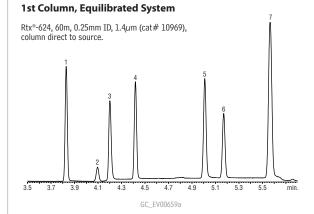
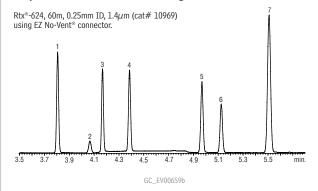




Figure 2 Sharp, symmetric peaks for gases show the EZ No-Vent® connector does not add dead volume and allows rapid column changes.



Acquired 76 minutes after installing 2nd column



1. dichlorodifluoromethane

2. 1,2-dichlorotetrafluoroethene (Freon® 114)

3. chloromethane

4. vinyl chloride

5. bromomethane

6. chloroethane7. trichlorofluoromethane

7. tricilloronuorometham

Sample:

Inj.:

GC

Volatile Gas Mix 502.2 Calibration Mix#1 (gases)

cat# 30042 Purge & Trap Agilent 6890 300°C

Inj. temp.: 300°C Carrier gas: helium, constant flow Flow rate: 1.0mL/min. Oven temp.: 60°C isothermal
Det: Agilent 5973 GC/MS

Transfer line temp.: 280°C Scan range: 35-550amu Tune BFB Ionization: EI

Description	qty.	cat.#	price
EZ No-Vent Connector Kit			
includes: EZ No-Vent Connector, two 0.4mm ID			
adaptor ferrules for capillary column, two 0.4mm ID			
ferrules for transfer line, 100µm deactivated transfer			
line (3 ft.), column plug, column nut	kit	21323	
Replacement ferrules for connecting capillary column			
to EZ No-Vent Connector:			
0.4mm ID (Polyimide)	2-pk.	21015	
0.5mm ID (Polyimide)	2-pk.	21016	
Replacement ferrules for connecting transfer line to			
EZ No-Vent Connector: 0.4mm ID	2-pk.	21043	
Replacement 100µm deactivated transfer line	3 ft.	21018	
Replacement EZ No-Vent Column Nut	20-pk.	23100	
Replacement EZ No-Vent Plug	5-pk.	23112	
Open-End Wrenches, 1/4" x 5/16"	2-pk.	20110	



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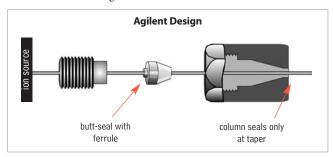
Restek MSD Conversion Fitting

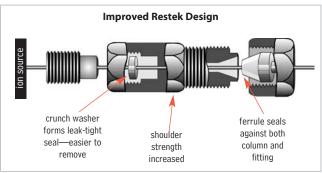
- · A flat, soft aluminum sealing ring deforms and butt-seals against the MSD interface.

21314

- A standard Vespel® ferrule seals the column and 1/16-inch stainless steel nut.
- · Fitting is constructed of nickel-plated brass for longevity and
- Use any standard Vespel® or Vespel®/graphite 1/16-inch ferrule.
- Includes a 1/16-inch stainless steel nut and two replacement sealing rings. Order ferrules separately.
- · Improved design reduces chance of leaks.

Agilent's MSD interface uses a butt-seal to seal the MSD source to the capillary column. This system is prone to leakage. Restek's MSD conversion fitting is designed with two separate seals to reduce the chance of leaks: a crunch washer seals the MSD conversion fitting to the source; a ferrule seals the capillary tubing to the conversion fitting.





Description	qty.	cat.#	price
MSD Conversion Fitting	ea.	21314	
Replacement Ring Seal for MSD Conversion Fitting	2-pk.	21313	
For Vespel ferrules, see page 210.			

Restek MSD Source Nut

- 1.2 mm nut bore permits easy removal of ferrules with a standard tapered-needle file (cat.# 20106).
- Made of brass to prevent threadstripping on the transfer line.
- · Design enhances ease of threading onto the transfer line and improves overall lifetime.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
(Detector) MSD Source Nut	05988-20066	2-pk.	20643	





Capillary Installation Gauge

for Agilent 5973/5975 MS

- · Seats ferrules onto column for consistent installations.
- · Made from high-quality stainless steel.







the column, then insert the column through the installation tool, exposing several centime-

ters at the exit end.

(not depicted)

Score and remove the
exposed end of the
column, then loosen
the nut.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Capillary Installation Gauge				
for Agilent 5973/5975 MS	G1099-20030	ea.	21894	



Gold Tip Transfer Line

- For use with Agilent 5971/5972 MS Systems.
- · Gold-plated for inertness.
- Meets or exceeds original manufacturer's performance.

	Similar to				
Description	Agilent part #	qty.	cat.#	price	
Gold Tip Transfer Line	05971-20305	ea.	24699		
adia rip rianoro: Eme	0077 1 20000		21077		



Replacement Interface with Bellows

for Agilent 5971/5972 MS

- · Meets or exceeds manufacturer's performance.
- · Made of high-quality stainless steel.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Interface with Bellows				
for Agilent 5971/5972 MS	05971-60302	ea.	22659	







Mar 2011

GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: GC/MS

ETP Electron Multipliers

for Mass Spectrometry

- · Air stable.
- 2-year shelf life guarantee.
- Discrete dynode design results in extended operating life.

The multi-dynode approach of all ETP multipliers results in longer lifetimes and better sensitivities compared with channel multipliers because of greater surface area.



The electron multipliers manufactured by ETP use a proprietary dynode material. This material has a number of properties that make it very suitable for use in an electron multiplier. It has very high secondary electron emission, which allows exceptional gain to be achieved from each dynode. This material is also very stable in air. In fact, an ETP multiplier can be stored for years before being used. As a direct result of the high stability of the active materials used in ETP multipliers, they come with a 2-year shelf life warranty (stored in original sealed package). Many testing laboratories take advantage of this long shelf life by keeping a replacement ETP multiplier on hand, ready for immediate installation. This keeps the instrument downtime to a minimum.

did you know?

A typical ETP electron multiplier has a total active dynode surface area of ~1,000 mm² compared to a standard continuous dynode multiplier that only has a total channel surface area of around 106 mm². The increased surface area of the ETP slows the aging process and improves operating life.

Description	qty.	cat.#	price
Electron Multipliers for Agilent GC/MS and LC/MS			
For Agilent 5970 GC/MS	ea.	23072	
For Agilent 5971, 5972, GC GC/MS	ea.	23073	
For Agilent 5973 & 5975 GC/MS			
(includes mount for initial installation)*†	ea.	23074	
For Agilent 5973 & 5975 GC/MS and LC/MSD			
(Replacement Multiplier)*†	ea.	23075	
For Agilent LC/MSD			
(includes mount for initial installation)*†	ea.	23076	

*Note: The electron multipliers have been specifically developed to retrofit the original manufacturer's equipment. The detector incorporates a modular design to facilitate ease of replacement and additional innovations intended to enhance performance. First time installation requires a mount which includes the mechanical housing. After initial installation, only the replacement electron multiplier is required.

†This unit is designed for use in the 5975, 5973 GC and the LC/MSD.

also available

Other ETP Electron Multipliers are available upon request. Call us if you do not see your instrument listed.



Replacement Interface Guide Tube

for Agilent 5971/5972 MS

- · Meets or exceeds manufacturer's performance.
- · Made of high-quality stainless steel.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Interface Guide Tube				
for Agilent 5971/5972 MS	05971-20307	ea.	22660	



Replacement Cold Sensor

for Agilent 5971/5972 MS Diffusion Pump

- Meets or exceeds manufacturer's performance.
- · Made of high-quality stainless steel.

Description	Similar to Agilent part #	qty.	cat.#	price
Replacement Cold Sensor for Agilent				
5971/5972 MS Diffusion Pump	3103-0145	ea.	22661	



Tom Bloom, Technical Service

Technical Service

Do you have a technical question? Restek's Technical Service group has answers! Drawing from our extensive libraries of technical information and many years of collective chromatography experience, the experts in Technical Service can help you from set-up to method development.

Contact us:

For quick answers to commonly asked questions any time of the day, visit www.restek.com/answers or contact us directly:

In the U.S. Outside the U.S.

Phone: 1-800-356-1688, ext. 4

Contact your Restek representative.

Fax: 814-353-1568 e-mail: support@restek.com









Replacement Diffusion Pump Fan Assemblies for Agilent 5971/5972 MS

110/120 VAC

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Diffusion Pump Fan				
Assembly for Agilent 5971 MS	05971-60540	ea.	22662	
Replacement Diffusion Pump Fan				
Assembly for Agilent 5972 MS	05972-60540	ea.	22663	

Inland 45 is the highest quality rough pump oil you can use for your mass spectrometer.

Inland 45 Pump Oil

Recommended for most mass spectrometers.

- · Ease at cold start.
- Low vapor pressure 10⁻⁷ torr.
- · Nontoxic and noncorrosive.
- · Compatible with buna-N, neoprene, and Viton® seals.
- Optimum vacuum pump performance.
- · Lowest mass spectrometer background.
- Recommended for optimum mass spec performance.



	Similar to			
Description	Agilent part #	qty.	cat.#	price
Inland 45 Pump Oil	6040-0834	1 liter	24819	

Rough Pump Oil #19

for MSD Pumps, Oil Vacuum Pump

- · Formulated from crude oil stocks known for their durability and line lubricating qualities.
- Use in Agilent 5973/5972/5971 and GCD mass spec systems, or in other manufacturers' MSD systems that require rough pump oil.
- · Under average use, the oil in the foreline rough pump should be replaced every six months.



Description	qty.	cat.#	price
Rough Pump Oil for MSD Pumps	1 liter	22687	



Ion Source Cleaning Powder

Use this aluminium oxide powder to clean surfaces that contact the sample or ion beam when you encounter poor sensitivity and inadequate abundances at high masses.



	Similar to			
Description	Agilent part #	qty.	cat.#	price
Ion Source Cleaning Powder	8660-0791	1 kg	22685	





GC/MS Cleaning Kit

Poor sensitivity, loss of sensitivity at high masses, or high multiplier gain during an auto tune are all indicators that your mass spectrometer source may need to be cleaned. Restek has assembled all of the necessary components for cleaning and polishing your ion source.

The Restek GC/MS Cleaning Kit (cat.#s 27194, 27195) includes:

- lint free nylon gloves (small-2 pair)
- · lint free nylon gloves (large-2 pair)
- · lint free cotton cloth, 9 x 9 (10-pk.)
- micro mesh 4 x 6 sheet (4-pk.)
- · aluminum oxide (75 gram jar)
- · cotton tip applicators
- · tweezers, large
- · tweezers, small
- · septum puller
- Dremel® tool, battery-operated (optional, 27194)
- tool kit bag

Reorder Kit (cat.# 27196) includes:

- · lint free nylon gloves (small-2 pair)
- lint free nylon gloves (large-2 pair)
- lint free cotton cloth, 9 x 9 (10-pk.)
- micro mesh 4 x 6 sheet (4-pk.)

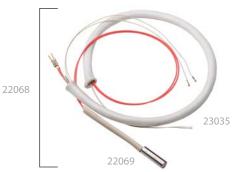
Description	qty.	cat.#	price
Mass Spec Cleaning Kit with Dremel Tool	kit	27194	
Mass Spec Cleaning Kit without Dremel Tool	kit	27195	
Mass Spec Cleaning Kit Replacement Parts Kit			
Includes: cloths, micro mesh sheets,			
small and large gloves	kit	27196	













for Agilent 5890 GCs

- · Use with 5890 FID and split/splitless weldments.
- Meets or exceeds original manufacturer's performance.

Description	Similar to Agilent part #	qty.	cat.#	price
Injector/FID Heater and				
Injector/FID PRT Sensor	05890-61140	kit	22068	
Injector/FID Heater	19231-60620	ea.	22069	
Injector/FID PRT Sensor	19231-60660	ea.	23035	



FID Collector Housing Kits

for Agilent GCs

- Meets or exceeds original manufacturer's performance.
- Available for Agilent 5890, 6890, or 7890 GCs.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FID Collector Housing Kit for Agilent				
5890 GCs (includes collector body,				
spanner nut, and silicone washer—				
order mount separately)	19231-20920	kit	23037	
FID Collector Housing Kit for Agilent				
6890/7890 GCs (includes collector				
body, silicone washer, nut, and mount)	G1531-20550	kit	23045	
FID Collector Housing				
for Agilent 6890/7890 GCs	G1531-20740	ea.	23044	
Replacement Silicone Washers				
for FID Collector Housing				
for Agilent 5890/6890/7890 GCs	5180-4165	12-pk.	23064	



FID Collector Mount for Agilent GCs

- Meets or exceeds original manufacturer's performance.
- · Available for Agilent 5890, 6890, or 7890 GCs.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FID Collector Mount				
for Agilent 5890 GCs	19231-20930	ea.	23036	
FID Collector Mount				



FID Base Weldment

for Agilent GCs

- · Meets or exceeds original manufacturer's performance.
- · Includes brass nut.
- Available for Agilent 5890, 6850, or 6890 GCs.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FID Base Weldment				
for Agilent 5890 GCs	19231-80580	ea.	23041	
FID Base Weldment, Pack Column FID				
for Agilent 6850/6890 GCs	G1531-80580	ea.	23052	
FID Base Weldment, Capillary Column				
FID for Agilent 6850/6890 GCs	G1531-80630	ea.	23053	

Note: 6890 GC connections to EPC modules are not compatible with the 7890 EPC modules.

Spanner Wrench

for Agilent 5890/6890/6850/7890 FID Collector Assemblies

- · Easily remove the nut from the FID collector without damaging the nut.
- · Unique, ergonomic handle—easy to grip.
- · Fits all instrument models.



Remove FID ignitor castle.



Easily loosen the nut by aligning the two pins on the bottom of the wrench with the two open slots on the nut...



...then turn counterclockwise...



...and remove.

Description	Similar to Agilent part #	qty.	cat.#	price
Spanner Wrench				
for Agilent 5890/6890/6850/7890				
FTD Callantar Annumble	חכיחת יכרתי	~~	വാവവ	



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GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Detector



FID Collector Assembly Kit

for Agilent 5890 GCs

- · Constructed of high-quality stainless steel.
- · Meets or exceeds original manufacturer's performance.
- · Individual replacement parts available.

Similar to			
Agilent part #	qty.	cat.#	price
19231-60690	kit	23010	
	kit	21131	
19231-20970,			
19231-20960,			
19231-20950	ea.	21138	
19231-20940,			
5181-3311	set	21136	
19231-60680	ea.	21001	
19231-20910	ea.	21137	
	ea.	21135	
	19231-60690 19231-20970, 19231-20960, 19231-20950 19231-20940, 5181-3311 19231-60680	19231-60690 kit kit 19231-20970, 19231-20960, 19231-20950 ea. 19231-20940, 5181-3311 set 19231-60680 ea. 19231-20910 ea.	19231-60690 kit 23010 kit 21131 19231-20970, 19231-20960, 19231-20950 ea. 21138 19231-20940, 5181-3311 set 21136 19231-60680 ea. 21001 19231-20910 ea. 21137

^{*}Also fits OI Analytical 4410 detector (similar to OI part # 191833).



FID Flow Measuring Adaptor

for Agilent 5890/6890/6850/7890 GCs

- Makes setting flows easy.
- Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FID Flow Measuring Adaptor	19301-60660	ea.	21000	

FID Gauge Pack

for Agilent 5890 GCs

- Pressure regulators and gauges for air & hydrogen.
- ¹/s-inch bulkhead allows easy hookup to instrument.
- Rated for inlet pressures to 250 psi (1,724 kPa).
- Rated for outlet pressures of 0 to 60 psi (0-414 kPa).



Description	qty.	cat.#	price
FID Gauge Pack for Agilent 5890 GCs	ea.	22071	



FID Collector Assembly Kit

for Agilent 6890/6850/7890 GCs

- · Constructed of high-quality stainless steel.
- Meets or exceeds original manufacturer's performance.
- · Individual replacement parts available.

Description	Similar to Agilent part #	ahı	cat.#	price
FID Collector Assembly Kit	Aylielit part #	qty.	tat.#	price
(includes insulator)	G1531-60690	kit	21699	
FID Collector Assembly Kit				
w/Siltek Ignitor Castle		kit	21132	
	G1531-20690,			
FID Collector (includes insulators)	G1531-20700	ea.	21139	
	19231-20940,			
FID Collector Nut and Washer	5181-3311	set	21136	
FID Ignitor*	19231-60680	ea.	21001	
FID Ignitor Castle	19231-20910	ea.	21137	

^{*}Also fits OI Analytical 4410 detector (similar to OI part # 191833).

FID Maintenance Kits

for Agilent GCs

- Include the most common consumable GC supplies and tools.
- All parts meet or exceed performance of instrument manufacturer's parts.
- · Parts list makes reordering easy.

FID kits include:

- $^{1}/_{4}$ ", 0.4, 0.5, and 0.8 mm ID graphite ferrules.
- FID/NPD capillary adaptor.
- · Capillary nuts.
- Jet reamers/ferrule removers.
- 1/4" nut.
- · Scoring wafer.
- · Capillary column caps.
- Ignitor for either Agilent 5890 or 6890/6850/7890 GCs.
- · FID flow measuring adaptor.
- 1/4" x 5/16" wrench.
- · Installation gauge.
- · Wire cleaning brush.
- High-performance Siltek® treated FID jet for either Agilent 5890 (adaptable jet) or 6890/6850/7890 (dedicated jet) GCs.
- · Spanner wrench.
- · FID jet removal tool.

Description	qty.	cat.#	price
FID Maintenance Kit for Agilent 5890 GCs	kit	22180	
FTD Maintenance Kit for Agilent 6850/6890/7890 GCs	kit	22179	







Mar 2011





Which FID Jet Should I Use?

There are two FID jet configurations for Agilent GCs. The longer "adaptable" jet fits both 5890 and 6890 GCs, and can be used with capillary or packed columns. The shorter "dedicated" jet is for the FID in the 6890/7890 GC that is designed only for use with capillary columns.



- Engineered with a fluted tip to guide the capillary column into the jet.
- Threads specially coated for easy installation and removal.
- Special processing ensures the highest degree of cleanliness.
- Meets or exceeds original manufacturer's performance.

High-Performance Version—Siltek® Treated

- Similar to the standard version, but Siltek® treated.
- Extremely inert, for use with active compounds.

Capillary Adaptable FID Replacement Jet

for Agilent 5890/6890/6850 GCs

	Similar to						
Description	Agilent part #	qty.	cat.#	price	qty.	cat.#	price
Standard, 0.011-Inch ID Tip	19244-80560	ea.	20670	\$56	3-pk.	20671	
High-Performance Siltek Treated,							
0.011-Inch ID Tip	19244-80560	ea.	20672	\$63	3-pk.	20673	



for Agilent 6890/6850/7890 GCs

Similar to Agilent part #	aty.	cat.#	price	gty.	cat.#	price
G1531-80560	ea.	21621	\$46	3-pk.	21682	
G1531-80560	ea.	21620	\$51	3-pk.	21683	
G1531-80620	ea.	23078	\$53	3-pk.	23079	
	Agilent part # G1531-80560 G1531-80560	Agilent part # qty. G1531-80560 ea. G1531-80560 ea.	Agilent part # qty. cat.# G1531-80560 ea. 21621 G1531-80560 ea. 21620	Agilent part # qty. cat.# price G1531-80560 ea. 21621 \$46 G1531-80560 ea. 21620 \$51	Agilent part # qty. cat.# price qty. G1531-80560 ea. 21621 \$46 3-pk. G1531-80560 ea. 21620 \$51 3-pk.	Agilent part # qty. cat.# price qty. cat.# G1531-80560 ea. 21621 \$46 3-pk. 21682 G1531-80560 ea. 21620 \$51 3-pk. 21683

Packed Column FID Replacement Jets

for Agilent 5890/6890/6850 GCs

- 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.

	Similar to						
Description	Agilent part #	qty.	cat.#	price	qty.	cat.#	price
Standard, 0.018-Inch ID Tip	18710-20119	ea.	21694	\$45	3-pk.	21695	
High-Performance Siltek Treated,							
0.018-Inch ID Tip	18710-20119	ea.	21696	\$56	3-pk.	21697	
	Similar to						
Description	Agilent part #	qty.	cat.#	price	qty.	cat.#	price
Standard, 0.030-Inch ID Tip	18789-80070	ea.	21688	\$43	3-pk.	21689	
ULL D. C. CULLT I. I.							
High-Performance Siltek Treated,							
0.030-Inch ID Tip	18789-80070	ea.	21686	\$56	3-pk.	21687	



FID Jet Removal Tool

for Agilent 5890/6890/6850/7890 FIDs

- Securely grips jet in socket for easy removal or installation.
- Unique, ergonomic handle—easy to hold.



Slip tool over FID jet...

...loosen jet...

...and remove.

Description	qty.	cat.#	price
FID Jet Removal Tool			
for Agilent 5890/6890/6850/7890 FIDs	ea.	22328	









Torx® Screwdriver Set

- Set includes TR-10, TR-15, and TR-20.
- Ideal for performing routine maintenance on Agilent 6890 and 7890 GCs.



Description	qty.	cat.#	price
Torx Screwdriver Set	set	23034	





FID/Injector Cleaning Kit

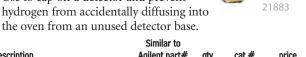
The FID/Injector Cleaning Kit includes:

- Nylon tube brushes (1/8", 3/16", 1/4").
- Pipe cleaner.
- Stainless steel tube brushes (3/8", 3/16", 1/4").
- · Stainless steel surface brush.
- · Stainless steel jet reamers.
- · Emery cloth.

Description	qty.	cat.#	price
FID/Injector Cleaning Kit	kit	20120	

Injector/Detector Plug Nuts

- Use to cap off an injector to isolate leaks.
- Use to cap off a detector for thermal cleaning.
- Use to check a detector or make-up gas flow rate.
- · Use to cap off a detector and prevent hydrogen from accidentally diffusing into





cat.# Description Agilent part# qty. price Injector/Detector Plug Nuts 5020-8294 2-pk. 21883

also available

Looking for more detector replacement parts? See page 271.



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.
- Includes 1/4- and 1/16-inch stainless steel nuts, and 1/4-inch Vespel® and 0.4mm ID graphite ferrules.

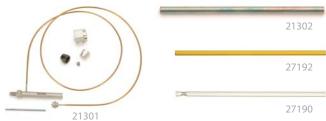
Description	qty.	cat.#	price
FID/NPD Adaptor Fitting	kit	20884	



FID/NPD Capillary Adaptor Fitting for Agilent 5890/6890/6850 GCs

- · High-quality stainless steel construction.
- · Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FTD/NPD Capillary Adaptor Fitting	19244-80610	ea	22077	



ECD/FID Dual-Purpose Make-Up Gas Kit

for Agilent 5890 GCs

Kit includes: replacement fitting, 1/4" nut, Vespel/graphite ferrule, 1/16" nut, 0.4 mm ID graphite ferrule, Siltek treated guide

	Similar to			
Description	Agilent part #	qty.	cat.#	price
ECD/FID Replacement Fitting Kit				
with Flow Manifold Connection		kit	21301	
Replacement ECD Siltek Metal Guide		2-pk.	21302	
Replacement ECD Fused Silica Liner	19233-20625	ea.	27192	
		5-pk.	27193	
Replacement Micro ECD Liner	G2397-20540	ea.	27190	
		5-pk.	27191	







GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Agilent GCs: Cables

Replacement Cables

for Agilent GCs, Integrators, & Autosamplers

- Considerable savings over original manufacturer's equipment.
- · Instructions and wiring diagrams included.
- · Manufactured with only the highest-quality components.



Connect an Agilent 5890 GC to an Agilent integrator (for second Inet integrator).

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	35900-60610	6 ft.	ea.	20650	



Connect an Agilent 5890 GC to an Agilent 3396 integrator to enable remote starts (non-Inet connection from GC to integrator).

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	03394-60560	6 ft.	ea.	20654	



Connect an Agilent 3396 integrator to remote-start another piece of equipment or to start the Agilent 3396 integrator from that other piece of equipment.

	Sillillar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	03394-60540	6 ft.	ea.	20655	



Connect an Agilent 5890 GC to a non-Agilent integrator or standard strip chart recorder.

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	05890-60800	6 ft.	ea.	20652	





Connect an Agilent 5890 GC to remote-start another piece of equipment or to start the Agilent 5890 GC from that piece of equipment.

Description	Similar to Agilent part #	length	qty.	cat.#	price
Replacement Cable	05890-61080	6 ft.	ea.	20657	
	20658		4		

Connect an Agilent 3396 integrator to a non-Agilent GC.

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	35900-60630	6 ft.	ea.	20658	



Connect an Agilent 5890 GC to an Agilent 35900C Interface or to an Agilent 7673A Autosampler to enable remote starts.

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	35900-60700	6 ft.	ea.	20660	



Automatic liquid sampler stop/start cable for Agilent GCs.

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	G1530-60930	7 ft.	ea.	20929	



Connect an Agilent 6890 GC to a PC 9F/9F (RS232).

	Similar to				
Description	Agilent part #	length	qty.	cat.#	price
Replacement Cable	G1530-60600	6 ft.	ea.	22694	





Replacement Parts for Agilent Autosamplers

All parts meet or exceed original manufacturer's performance.



Injector Mounting Posts and Parking Post

for Agilent 7673 & 7683 Autosamplers

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Injector Mounting Post				
for Agilent 7673 Series Autosamplers				
for use with 6890 GCs	07673-21140	ea.	21237	
Injector Mounting Post				
for Agilent 7683 Series Autosamplers				
for use with 6850/6890 GCs	G2613-20500	ea.	21172	
Parking Post for Agilent 7673/7683				
Series Autosamplers for use with				
5890/6890/7890 GCs	05890-61525	ea.	22343	



Turret Tray Assembly for Agilent 5890/6890 GC

Holds sample, waste, and solvent vials.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Turret Tray Assembly				
for Agilent 5890/6890 GC	07673-60605	ea.	22855	



Autosampler Plunger Carrier Belt

for Agilent 7673A & 7673B Autosamplers

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Autosampler Plunger Carrier Belt				
for Agilent 7673A and 7673B	07673-61275	ea.	22695	



Carriage Motor Belt

for Agilent 7673A & 7683B Autosamplers

Similar to					
Description	Agilent part #	qty.	cat.#	price	
Carriage Motor Belt					
for Agilent 7673A and 7673B	1500-0676	ea.	22692		



Z-Belt

for Agilent 7673B Autosampler

	Similar to			
Description	Agilent part #	qty.	cat.#	price
7-Rolt for Agilant 7673B Autosampler	1500-0803	02	22232	



Injector Turret Motor

for Agilent 7673A & 7673B Injectors

Description	Similar to Agilent part #	qty.	cat.#	price
Injector Turret Motor				
for Agilent 7673A & 7673B Injectors	07673-60810	ea.	22337	









Mar 2011



Liners for APEX ProSep 800 & ProSep 800 Plus GCs

APEX Liners for ProSep 800		ID*	Similar to	cat.#/price
& ProSep 800 Plus GCs	Benefits/Uses:	OD x Length	APEX part #	ea.
	injections <125ul	4.0mm	1 00410	21075
Mega IV (4.0mm ID)	injections S123µL	6.0mm x 243mm	L-00410	
	injections /Eul	1.0mm	1 00110	21073
Micro I (1.0mm ID)	injections Sout	6.0mm x 243mm	L-00110	
	injections (2Eul	2.0mm	1 00010	21074
MIDI II (2.0mm ID)	IIIJections ≤23μL	6.0mm x 243mm	L-00210	
	Mega IV (4.0mm ID)	& ProSep 800 Plus GCs Benefits/Uses: injections ≤125μL Micro I (L.0mm ID) injections ≤5μL injections ≤25μL	& ProSep 800 Plus GCs Benefits/Uses: OD x Length injections ≤125μL 4.0mm Mega IV (4.0mm ID) injections ≤5μL 1.0mm Micro I (1.0mm ID) injections ≤5μL 2.0mm	& ProSep 800 Plus GCs Benefits/Uses: OD x Length APEX part # Mega IV (4.0mm ID) injections ≤125μL 4.0mm 6.0mm x 243mm L-00410 Micro I (1.0mm ID) injections ≤5μL 1.0mm 6.0mm x 243mm L-00110 injections ≤25μL 2.0mm L-00210

^{*}Nominal ID at syringe needle expulsion point.

Accessories

for APEX GCs



Viton® O-Rings for Apex Liners

	Max.			
Description	temp.	qty.	cat.#	price
O-Rings for APEX liners	250°C	25-pk.	22067	

Deactivated Wool

This deactivated wool is more inert than our traditional fused silica wool. This wool can be used to vaporize a sample in a liner prior to introduction into a capillary column.



20117

cat.#/price

Description	qty.	cat.#	price
Deactivated Wool	10 grams	24324	

restek innovation!

Inlet Liner Removal Tool

- Easily remove liner from injector—no more burned fingers.
- Made from high-temperature silicone.
- Won't chip or crack the liner.



Septum Puller

ID*

- Use hooked end for removing septa and O-rings; pointed end works well for removing stuck ferrules or debris.
- Keep several on hand in your laboratory—can be used in many different ways.

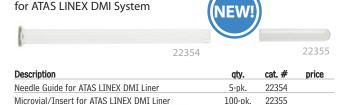
Description	qty.	cat.#	price
Septum Puller	ea.	20117	

Liners for ATAS Injectors

Liners for ATAS Injectors	Benefits/Uses:	OD x Length	ATAS part #	ea.	5-pk.
ATAS Open Liner, 3mm	universal	3.0mm 5.0mm x 80mm		22415 \$25	
ATAS Open Liner, 1mm	trace, active samples $<1\mu$ L	1.0mm 5.0mm x 80mm	A100049	2241 <i>7</i> \$42	
ATAS Fritted Gooseneck	dirty samples	3.0mm 5.0mm x 80mm	A100126	22419 \$40	
Liners for ATAS LINEX DMI System OPTIC 2 and 3 inlets		ID* OD x Length			cat.#/price 5-pk.
ATAS LINEX DMI Liner		3.3mm 5.0mm x 81mm	NEW!		22353
*Naminal TD at auringa paadla avaulaian nai	nt				

20181

*Nominal ID at syringe needle expulsion point.



ordering **note**

Similar to

For additional liner ordering information, see **pages 206-213**.





Accessories

GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for PerkinElmer GCs: Liners

Split Liners for PerkinElmer GCs	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
	universal, for most common analyses	3.5mm 5.0mm x 100mm	N6502008	20736	20737	_
Straight						
Cup Splitter	high & low MW compounds	3.5mm 5.0mm x 100mm	_	20739	20740	_
Cyclosplitter	dirty samples, many injections before cleaning required	3.5mm 5.0mm x 100mm	_	20745	20746	_
Auto SYS Splitter w/Wool	universal for most common analyses	4.0mm 6.2mm x 92.1mm	N6502009	20832	20833	20834
	high & low MW compounds	4.0mm 6.2mm x 92.1mm	N6502011	20835	20836	_
Auto SYS Cup Splitter	dirty samples, many injections before	4.0mm 6.2mm x 92.1mm	N6502012	20910	20911	
Auto SYS Cyclosplitter	cleaning required	4.0mm 6.2mm x 92.1mm	_	20827	20828	_
Auto SYS Laminar Cup Splitter	dirty samples, trace samples	4.0mm 6.2mm x 92.1mm	N6121020	21026	21027	_
Auto SYS Split Precision Liner w/Wool						
Splitless Liners for PerkinElmer GCs	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
Splitless (2mm ID)	trace samples	2.0mm 5.0mm x 100mm	N6502007	20730	20731	20732
Auto SYS Splitless	headspace & purge & trap	1.0mm 6.2mm x 92.1mm	N6502006	21272	21273	21274
Auto SYS Splitless (2mm ID) w/Wool	trace samples	2.0mm 6.2mm x 92.1mm	N6121021	20829	20830	_
Auto SYS Double Gooseneck	trace, active samples up to 4µL	4.0mm 6.2mm x 92.1mm	N6502003	20853	20854	_
Auto SYS Cyclo Double Gooseneck	trace, dirty, active samples, up to 4μ L	4.0mm 6.2mm x 92.1mm	N6502005	20899	20900	_
PSS Liners for PerkinElmer GCs	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
PSS Split/Splitless (1mm ID)	trace samples	1.0mm 4.0mm x 86.2mm	N6121006	20738	20741	_
Auto SYS XL PSS Split/Splitless w/Wool	most common analyses	2.0mm 4.0mm x 86.2mm	N6121004	21717	21718	_
PSS Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	2.0mm 4.0mm x 86.2mm		22986	22987	_
PSS Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	2.0mm 4.0mm x 86.2mm		22988	22989	_
1 55 Printed Chinines (Hote Heat Doctoril)						

^{*}Nominal ID at syringe needle expulsion point.

All liners are shipped intermediate 100% polarity (IP) deactivated unless deactivated otherwise requested.



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Australian Distributors Importers & Manufacturers www.chromtech.net.au

11/12

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GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for PerkinElmer GCs: Liners



Zero Dilution Liners for PerkinElmer Auto SYS and Clarus GCs	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
Zero Dilution Inner Liner	headspace analysis	1.0mm 2.0mm x 73mm	N1011446	22990	22991	_
Zero Dilution Outer Liner	headspace analysis	2.5mm 6.2mm x 90mm	N1011445	22992	22993	_
Zero Dilution Liners for PerkinElmer GCs with PSS Inlets	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
Zero Dilution Inner Liner	headspace analysis	1.0mm 2.0mm x 73mm	N1011446	22990	22991	_
Zero Dilution Outer Liner	headspace analysis	2.5mm 4.2mm x 83mm	N1011447	24978	24979	_
PTV Liners for PerkinElmer GCs	Benefits/Uses:	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
PTV Press-Tight	high linearity for 0.25, 0.32, & 0.53mm ID columns	1.0mm 2.0mm x 88mm	_	20733	20734	20735
1.0mm PTV Liner	high linearity	1.0mm 2.0mm x 88mm	_	20742	20743	20744
DI Liners for PerkinElmer GCs (0.32/0.53mm ID)	Benefits/Uses:	ID* OD x Length	Similar to PE part#	ea.	cat.#/price 5-pk.	25-pk.
Uniliner	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 100mm	N6502018	20855	20856	_
Cyclo-Unilliner	trace, dirty, active samples, high linearity	3.5mm 5.0mm x 100mm	N6502019	20857	20858	_
Auto SYS Open-top Uniliner w/Wool	trace, dirty, active samples, high recovery & linearity	4.0mm 6.2mm x 92.1mm	N6502016	20837	20838	_
Auto SYS Cyclo-Uniliner	trace, dirty, high MW active samples, high linearity	4.0mm 6.2mm x 92.1mm	N6502017	20839	20840	_
DI Liners for PerkinElmer GCs (For 0.32/0.53mm ID Columns)	Benefits/Uses	ID* OD x Length	Similar to PE part #	ea.	cat.#/price 5-pk.	25-pk.
Auto SYS Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	4.0mm 6.2mm x 92.1mm	N6121022	20819	20822	_
Auto SYS Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	4.0mm 6.2mm x 92.1mm	N6502013	21293	21294	_
Auto SYS Gooseneck Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	4.0mm 6.2mm x 92.1mm	N6502014	21295	21296	_
Auto SYS Gooseneck Drilled Uniliner	trace, active samples, high recovery & linearity	4.0mm 6.2mm x 92.1mm	N6502015	21297	21298	_

^{*}Nominal ID at syringe needle expulsion point.

(hole near bottom)





Graphite O-Rings

for PerkinElmer Auto SYS XL or Clarus GCs with PSS Injector



Description	Max.	Similar to			
Description	temp.	PE part #	qty.	cat.#	price
Graphite O-Rings					
for PerkinElmer Auto SYS XL or	450°C	N610-1751	10-pk.	21475	
Clarus GCs w/PSS Injector	450°C	N610-1751	25-pk.	21476	

Viton® O-Rings

for PerkinElmer PSS Injector



Description	Max. temp.	Similar to PE part #	qty.	cat.#	price
Viton O-Rings					
for PerkinElmer PSS Injector	250°C	N6101747	10-pk.	20366	

Silicone O-Rings

for PerkinElmer Auto SYS XL or Clarus with CAP Injector



	Max.	Similar to PE			
Description	temp.	part #	qty.	cat.#	price
Silicone O-Rings					
for PerkinElmer Auto SYS XL or					
Clarus with CAP Injector	250°C	N6101374	10-pk.	20262	



Septa (11mm)

for PerkinElmer GCs

- Preconditioned and ready to use.
- · Packaged in precleaned glass jars.

	Thermolite Septa usable to 340°C inlet temp.			IceBlue Septa usable to 250°C inlet temp.		40	BTO Sepons usable to D°C inlet to	0
qty.	cat.#	price	qty.	cat.#	price	qty.	cat.#	price
25-pk.	27141		50-pk.	27162		50-pk.	27110	
50-pk.	27142		100-pk.	27163		100-pk.	27111	
100-pk.	27143							

HANDY

septum size chart

PerkinElmer	Septum
Instrument	Diameter (mm)
Sigma series	11
900,990	11
8000 series	11
Auto SYS	11
Auto SYS XL	11



also available

Looking for packed column parts for PerkinElmer instruments?

Merlin Microseal Septa

for PerkinElmer GCs 350 °C max injection port temperature.









force. The Microseal septum incorporates two separate sealing mechanisms. These sliding seals eliminate septum coring and the resulting accumulation of septum crumbs in the injection port liner.

The advantages of the Merlin Microseal Septum include elimination of septum coring, longer life, and consistent low needle insertion

The Microseal septum uses a 23 gauge (0.63 mm, .025") needle or probe with a blunt, truncated conical tip. Since the syringe plunger end details are determined by manual or autosampler compatibility, often a removable needle syringe is an effective way to match both of these requirements. Installation is simple, requiring no modification of the injection port.

Microseal Septa for PerkinElmer GCs	Merlin#	Similar to	cat.#	price	
PerkinElmer Kit		PE#			
(septum cap adapter, O-ring, nut, 2 septa)	51-12w	N9303344	22781		
Replacement Septum for PerkinElmer Kits		PE#			
(1 septum)	21-01w	N9303345	22782		





Injector Adaptor

for PerkinElmer Auto SYS XL

- · Made of high-quality stainless steel.
- Meet or exceed original manufacturer's performance.
- Siltek $^{\circledR}$ treated version available for increased inertness.

	Similar to			
Description	PE part #	qty.	cat.#	price
For use with PE style capillary nuts Injector Adaptor				
for PerkinElmer Auto SYS XL	N6100157	ea.	22318	
Siltek Treated Injector Adaptor				
for PerkinElmer Auto SYS XL		ea.	22320	
For use with 1/16" compression style nuts				
Injector Adaptor				
for PerkinElmer Auto SYS XL		ea.	22319	

FID Capillary Column Adaptor for PerkinElmer Auto SYS XL

- Made of high-quality stainless steel.
- Meet or exceed original manufacturer's performance.



Description	Similar to PE part #	qty.	cat.#	price
For use with PE style capillary nuts				
FID Capillary Column Adaptor for				
PerkinElmer Auto SYS XL	N6120020	ea.	22608	
	_			

For use with $^1\!/_{16}{}^{\!\scriptscriptstyle II}$ compression style nuts

FID Capillary Column Adaptor for







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FID Replacement Parts

for PerkinElmer Auto SYS XL and Clarus 500

- · Made of high-quality stainless steel.
- Meet or exceed original manufacturer's performance.

	Similar to			
Description	PE part #	qty.	cat.#	price
FID Jet for PerkinElmer Auto SYS XL				
and Clarus 500	N6100361	ea.	23038	
	N6103167,			
Auto-Ignite FID Replacement Part Kit	N6103175,			
for PerkinElmer Auto SYS XL and	N6101085,	kit	23061	
Clarus 500	N6001204,			
	09912223			
Nozzle Insulator for PerkinElmer				
Auto SYS XL and Clarus 500	N6101085	ea.	23062	
FID Body for PerkinElmer Auto SYS XL				
and Clarus 500	N6100364	ea.	23063	



The Claw and The Claw Holder Kit

- Easily removes hot liners from injection ports.
- 4mL vials (not included) can be replaced when dirty.

Never again will you have to burn your fingers removing a hot injection port liner. The Claw safely and cleanly removes liners, O-rings, or other small objects from the injection port. You can then place the hot objects in a clean 4 mL vial situated in the Claw holder until ready for reuse.



Description	qty.	cat. #	price
The Claw	ea.	26261	
The Claw Holder Kit (includes The Claw and holder)	kit	26262	
WISP 48 Snap Seal Vial	100-pk.	24658	





Make Life Easier (MLE) Capillary Tool Kit for PerkinElmer GCs

Includes

- 1/8", 3/16", and 1/4" nylon brushes
- 1/4", 3/8", and 3/16" stainless steel wire tube brushes
- · stainless steel surface brush
- 6 stainless steel jet reamers (0.25–0.65 mm OD)
- 1/4" x 5/16" open end wrench
- ³/₈" x ⁷/₁₆" open end wrench
- ⁷/₁₆" x ¹/₂" open end wrench
- 1/2" x 9/16" open end wrench
- · rubber-tipped slide-lock tweezers
- · scoring wafers with handles

- · inlet liner removal tool
- · septum puller
- · mini wool puller/inserter tool
- · 4-inch tapered needle file
- · swivel head flashlight
- · mini hand drill set
- 15 cm compact steel ruler
- pocket magnifier
- high temperature string (1 meter)
- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)

Description	qty.	cat.#	price
MLE Capillary Tool Kit	kit	22185	



Open-End Wrench Set

High-quality $^{1}/_{4}$ " x $^{5}/_{16}$ ", $^{3}/_{8}$ " x $^{7}/_{16}$ ", $^{7}/_{16}$ " x $^{1}/_{2}$ ", and $^{1}/_{2}$ " x $^{9}/_{16}$ " wrenches for tightening a wide variety of chromatography fittings.

Description	qty.	cat.#	price
Open-End Wrench Set	set	20387	



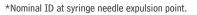






GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Shimadzu GCs: Liners

Split Liners for Shimadzu 14A GCs	Benefits/Uses:	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
Solit	universal, for most common analyses	3.5mm 5.0mm x 99mm	221-32544-01	20860	20861	20862
Cyclosplitter	dirty samples, many injections before cleaning required	3.5mm 5.0mm x 99mm	_	20870	20871	_
	high MW compounds	3.5mm 5.0mm x 99mm	_	20868	20869	_
Laminar Cup Splitter Splitless Liners for Shimadzu 14A GCs	Benefits/Uses:	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
3.5mm Splitless	_	3.5mm 5.0mm x 99mm	221-32544-00	20863	20864	20865
DI Liners for Shimadzu 14A GCs (0.25/0.32/0.53mm ID)	Benefits/Uses	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
Uniliner E		3.5mm 5.0mm x 99mm	_	20876	20877	_
Cyclo-Uniliner	trace, dirty, high MW active samples, high recovery & linearity	3.5mm 5.0mm x 99mm	-	20893	20894	_
Split Liners for Shimadzu 17A, 2010, and 2014 GCs	Benefits/Uses:	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
1mm Solit	purge & trap, fast GC	1.0mm 5.0mm x 95mm		20976	20977	20978
	universal, for most common analyses	3.5mm 5.0mm x 95mm	221-41444-01	22283	22284	22285
3.5mm Split 2mm Split Precision Liner w/Wool	dirty samples, trace samples	2.0mm 5.0mm x 95mm	NEW!	22171	22172	_
3.5mm Split Precision Liner w/Wool	dirty samples, trace samples	3.5mm 5.0mm x 95mm	_	21020	21021	_
Single Gooseneck w/Wool	dirty samples, trace samples	3.5mm 5.0mm x 95mm	NEW!	22173	22174	_
Cyclosplitter	dirty samples, many injections before cleaning required	3.5mm 5.0mm x 95mm	_	22072	22073	_
Splitless Liners for Shimadzu 17A, 2010, and 2014 GCs	Benefits/Uses:	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	
2mm Gooseneck Splitless	universal, trace samples	2.0mm 5.0mm x 95mm	_	22276	22277	_
3.5mm Gooseneck Splitless	universal, trace samples	3.5mm 5.0mm x 95mm	221-48335-01	22286	22287	_
5.5iiiii dooseneck Spiidess	reduces backflash and	3.5mm	_	22274	22275	_



Double Gooseneck Splitless

All liners are

All liners are shipped intermediate 100% polarity (IP) deactivated unless deactivated otherwise requested.



catalytic decomposition 5.0mm x 95mm





Mar 2011



Split/Splitless Liners for Shimadzu 17A, 2010, and 2014 GCs	Benefits/Uses:	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
Split/Splitless w/Wool	universal, for most common analyses	3.5mm 5.0mm x 95mm	221-41444-00	20955	20956	20957
SPME Liner for Shimadzu 17A, 2010, and 2014 GCs	Benefits/Uses	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
SPME Liner	ideal for low volume SPME applications	0.75mm 5.0mm x 95mm	ommouse pare n	22278	22279	_
Liners for Shimadzu 17A PTV GCs	Benefits/Uses	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
17A PTV Liner w/Wool	trace, dirty, high & low MW active samples	1.6mm 4.0mm x 95mm	225-09212-01	21705	21706	21707
DI Liners for Shimadzu 17A, 2010, and 2014 GCs (0.25/0.32/0.53mm ID)	Benefits/Uses	ID* OD x Length	Similar to Shimadzu part #	ea.	cat.#/price 5-pk.	25-pk.
Uniliner w/Wool	trace, dirty, high MW active samples, high recovery & linearity	3.5mm 5.0mm x 95mm	_	21713	21719	_
Open-top Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 95mm	_	21285	21286	_
Open-top Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 95mm	_	21287	21288	_
Gooseneck Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 95mm	_	21289	21290	_
Gooseneck Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 95mm	_	21291	21292	_

^{*}Nominal ID at syringe needle expulsion point.



Siltek® Treated Metal Inlet Liners for Shimadzu GCs

- Won't crack, chip, or break like glass liners.
- Excellent response for pesticides, phenols, and other active compounds.

Liner Type (3.5mm ID x 5.0mm OD x 95mm)	qty.	cat.#	price
95mm Split/Splitless w/Wool, Siltek, Metal	5-pk.	21003	







OLUMN INSTALLS THI



GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Shimadzu GCs: Inlet

Viton® O-Rings

for Shimadzu 17A, 2010, and 2014 GCs



	Max.	Similar to			
Description	temp.	Shimadzu part #	qty.	cat.#	price
Viton O-Rings for Shimadzu 17A,					
2010, and 2014 GCs	250°C	036-11203-84	10-pk.	24899	

Graphite O-Rings

for Shimadzu 2010, and 2014 GCs



Description	Max. temp.	Similar to Shimadzu part #	qty.	cat.#	price
Graphite O-Rings					
for Split Liners	450°C	221-48393-91	5-pk.	20243	
Graphite O-Rings					
for Splitless Liners	450°C	221-47222-91	5-pk.	20244	



Septa (Plug)

for Shimadzu GCs

	Thermolite Septa usable to 340°C inlet temp.			IceBlue Septa usable to 250°C inlet temp.		40	ta o temp.	
qty.	cat.#	price	qty.	cat.#	price	qty.	cat.#	price
25-pk.	27153		50-pk.	27170		50-pk.	27118	
50-pk.	27154		100-pk.	27171		100-pk.	27119	
100-pk.	27155							



Septum Nut

for Shimadzu 17A, 2010, and 2014 GCs

- · One piece design for ease of installation and removal.
- · Made of clear anodized aluminum and high-quality stainless steel.

	Similar to			
Description	Shimadzu part #	qty.	cat.#	price
Septum Nut for Shimadzu 17A,	221-41286-00,			
2010, and 2014 GCs	221-44584-00	ea.	22079	



Injector Nut Kit

for Shimadzu

for Shimadzu 17A, 2010, and 2014 GCs

Includes 17A injector nut, 0.4 mm graphite ferrule, and ¹/₁₆-inch stainless steel capillary nut.

Description	qty.	cat.#	price
Injector Nut Kit			
for Shimadzu 17A, 2010, and 2014 GCs	kit	21895	
Siltek Treated Injector Nut Kit			



Capillary Nut

for Shimadzu 17A, 2010, and 2014 GCs

Meets original manufacturer's performance.

Description	Similar to Shimadzu part #	atv.	cat.#	price
Capillary Nut for Shimadzu 17A,	ommana paren	49.		рисс
2010, and 2014 GCs	221-41533-00	2-pk.	22688	





Restek Enhanced Capillary Nut

for Shimadzu 17A, 2010, and 2014 GCs

- · Restek's design eliminates the slot, increasing lifetime and durability.
- · Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Shimadzu part #	qty.	cat.#	price
Restek Enhanced Capillary Nut for				
Shimadzu 17A, 2010, and 2014 GCs	221-41533-00	2-pk.	20375	



5 mm Ferrules

for Shimadzu 17A GCs

- · For use with packed columns.
- Graphite construction.

Description	qty.	cat.#	price
5mm Ferrules for Shimadzu 174 GCs	10-nk	21121	



Graphite Ferrules

for Shimadzu 17A, 2010, & 2014 GCs

- Graphite 2-piece construction.
- Available in 0.4, 0.5, and 0.8 mm sizes.
- · Packaged on mandrel for easy handling.

		Similar to			
Ferrule ID	Fits Column ID	Shimadzu part #	qty.	cat.#	price
0.4mm	0.25mm and less	220-90765-00	10-pk.	24827	
0.5mm	0.32mm	221-32126-05	10-pk.	24828	
0.8mm	0.53mm	221-32126-08	10-pk.	24829	











Injector Wrench

for Shimadzu 17A, 2010, and 2014 GCs

- Designed specifically for removing Shimadzu injection ports.
- · High-quality stainless steel construction.

	Similar to			
Description	Shimadzu part #	qty.	cat.#	price
Injector Wrench for Shimadzu 17A,				
2010, and 2014 GCs	221-46977-00	ea.	21159	



Open-End Wrench Set

for use with Shimadzu 17A, 2010, and 2014 Capillary Installation Gauge

Description	qty.	cat.#	price
1/4" x 5/16" and 10mm x 11mm Open-End Wrench Set			
for use with Shimadzu 17A, 2010, and 2014			
Capillary Installation Gauge	ea.	22334	





Capillary Installation Gauge for Shimadzu 17A, 2010, & 2014 GCs

- Seats ferrule onto column for consistent installations.
- · Prevents crushed column ends.
- · Made from high-quality stainless steel.
- · For use with graphite ferrules.

Description	qty.	cat.#	price
Capillary Installation Gauge			
for Shimadzu 17A, 2010, and 2014 GCs	ea.	22333	



Make Life Easier (MLE) Capillary Tool Kit for Shimadzu GCs

Includes:

- · capillary installation gauge for Shimadzu GCs
- · injector wrench for Shimadzu GCs
- $^{1}/_{8}$ ", $^{3}/_{16}$ ", and $^{1}/_{4}$ " nylon brushes
- 1/4", 3/8", and 3/16" stainless steel wire tube brushes
- · stainless steel surface brush
- · 6 stainless steel iet reamers (0.25-0.65 mm OD)
- 1/4" x 5/16" open end wrench
- 3/8" x 7/16" open end wrench
- 6 mm x 7 mm open end wrench
- 8 mm x 10 mm open end wrench
- 16 mm x 17 mm open end wrench

- rubber-tipped slide-lock tweezers
- · scoring wafers with handles
- · inlet liner removal tool
- septum puller
- · mini wool puller/inserter tool
- · 4-inch tapered needle file
- · swivel head flashlight
- · mini hand drill set
- · 15 cm compact steel ruler
- · pocket magnifier
- high temperature string (1 meter)
- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)

Description	qty.	cat.#	price
MLE Capillary Tool Kit for Shimadzu GCs	kit	22182	



did you know? Restek offers a full line of Parker®

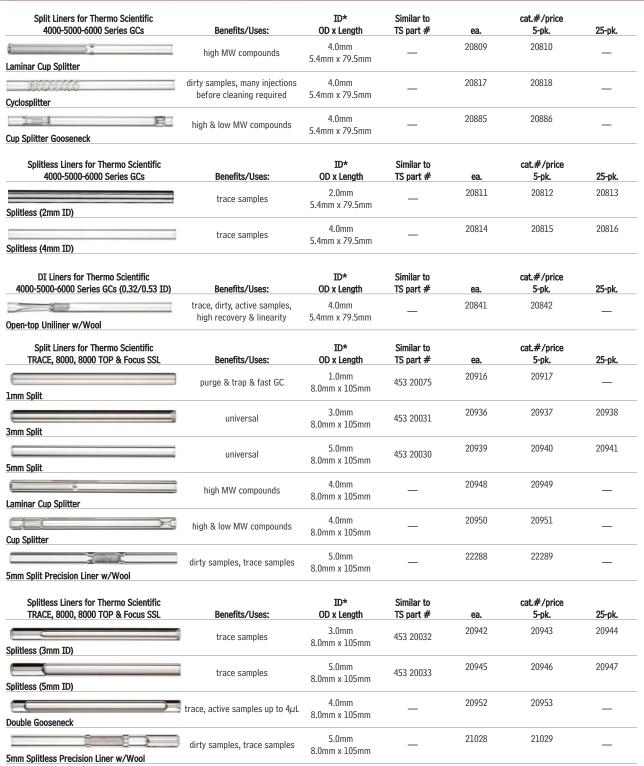
gas generators.

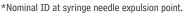
Gas generators are a safe and costeffective alternative to gas cylinders. See pages 304-308 for more information.





GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Thermo Scientific GCs: Liners





THE HEIDING



All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.







GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Thermo Scientific GCs: Liners



22411

22413

22412

22414

Split Liners for Thermo Scientific TRACE PTV	Benefits/Uses:	ID* OD x Length	Similar to TS part #	ea.	cat.#/price 5-pk.	25-pk.
1mm ID Glass Liner	trace samples, high recovery & linearity	1.0mm 2.75mm x 120mm	453 22054	21114	21115	_
2mm ID Glass Liner	universal	2.0mm 2.75mm x 120mm	453 22045	21116	21117	_
Baffle Liner	trace samples	2.0mm 2.75mm x 120mm	_	22074	22075	_
DI Liners for Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL (0.32 & 0.53mm ID columns)	Benefits/Uses:	ID* OD x Length	Similar to TS part #	ea.	cat.#/price 5-pk.	25-pk.
Uniliner w/Wool	trace, active samples, high recovery, & linearity	5.0mm 8.0mm x 105mm	_	21005	21006	_

5.0mm

8.0mm x 105mm

5.0mm

8.0mm x 105mm

trace, active samples, high recovery, & linearity

trace, active samples, high

recovery, & linearity



Drilled Uniliner (hole near top)

Drilled Uniliner (hole near bottom)

COLUMN INSTALLS THIS END



Siltek® Treated Metal Inlet Liners for Thermo Scientific GCs

- Won't crack, chip, or break like glass liners.
- Excellent response for pesticides, phenols, and other active compounds.

Liner Type (5.0mm ID x 8.0mm OD x 105mm)	ea./price	5-pk./price
5mm ID Split/Splitless w/Wool		21004
Liner Type (2.75mm OD x 120mm)	ea./price	5-pk./price
1mm ID Split/Splitless**	21080	21081
2mm ID Split/Splitless**	21082	21083
Liner Type (0.8mm ID x 2.75mm OD x 120mm)	ea./price	5-pk./pri e
SPME for TRACE 2000 GCs & PTV Inlets	22598	22599

^{**}Works with PTV injectors.







Supplies for Thermo Scientific GCs: Septa, Injector

Inlet Liner Seals

for Thermo Scientific TRACE PTV



	Max.	Similar to TS			
Description	temp.	part #	qty.	cat.#	price
Inlet Liner Seals					
for Thermo Scientific TRACE PTV	450°C	29013417	2-pk.	21392	

Graphite Sealing Ring for Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL Instruments

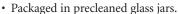


	Max.	Similar to TS			
Description	temp.	part #	qty.	cat.#	price
Graphite Sealing Ring					
for Thermo Scientific TRACE.	_450°C	290-334-06	ea.	21898	
8000, 8000 TOP & Focus SSL	450°C	290-334-06	2-pk.	21899	

Precision molded!

Septa (9.5 mm, 17 mm) for Thermo Scientific GCs

· Preconditioned and ready to use.



_ '	recisio	n mol	ded!
6.6	-		
	_		4
	-		
	J	*	
	вто∘		

Septum Diameter	25-	k./price	50-pk./price	100-pk./price
BTO Septa (usable to	400°C iı	nlet temp.)		
9mm CenterGuide	_	_	27104	27105
9.5mm (3/8")	_		27106	27107
17mm CenterGuide			27116	27117

Due to the injection port temperatures, Restek recommends using only BTO septa in Thermo Scientific instruments.

HANDY
septum
size chart

Instrument	Septum Diameter (mm)
Thermo Scientific	
TRACE GC, 8000, 8000 TOP, GCQ	w/TRACE,
PTV, 8000 series	17
Finnigan (TMQ)	
GC 9001, GCQ, QCQ, TRACE 2000	9.5



Restek has the solution!

The ProFLOW 6000 Electronic Flowmeter measures volumetric flow for gases across a range of 0.5-500 mL/min.

See page 274 for more information.

Septum Cap

for Split/Splitless Injector on Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL



	Sillillai to			
Description	TS part #	qty.	cat.#	price
Septum Cap for Split/Splitless Injector				
on Thermo Scientific TRACE,				
8000, 8000 TOP & Focus SSL	350 01 050	ea.	24971	









Septa Holder Kits

for Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL

- · Includes septum support and holder.
- · Made from high-quality stainless steel.
- Silcosteel®-AC treated version helps with septum removal.

	Similar to			
Description	TS part #	qty.	cat.#	price
Septa Holder for Thermo Scientific	233 030 15, 350			
TRACE, 8000, 8000 TOP & Focus SSL	054 335	kit	21299	
Silcosteel-AC Treated Septa Holder				
for Thermo Scientific TRACE,	233 030 15, 350			
8000, 8000 TOP & Focus SSL	054 33	kit	24972	

Gold-Plated Liner Cap

for Split/Splitless Injector on Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL



	Similar to				
Description	TS part #	qty.	cat.#	price	
Gold-Plated Liner Cap					
for Split/Splitless Injector					
on Thermo Scientific TRACE,					
8000, 8000 TOP & Focus SSL	290 042 90	ea.	22089		







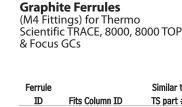
Description	Similar to TS part #	aty.	cat.#	price
Silver Seal	29033629	10-pk.	23057	,
for Split/Splitless Injector	29033629	20-pk.	23058	





Supplies for Thermo Scientific GCs: Injector, FID









Ferrule		Similar to	Grap	hite	Grapl	hite
ID	Fits Column ID	TS part #	2-pk.	price	10-pk.	price
0.3mm	0.10/0.15mm	_	22221		22222	
0.4mm	0.18/0.28mm	29013488 (2-pk.) 29053488 (10-pk.)	20280		20281	
0.5mm	0.32mm	29013487 (2-pk.) 29053487 (10-pk.)	20282		20283	
0.8mm	0.45/0.53mm	29013486 (2-pk.) 29053486 (10-pk.)	20284		20285	

Adapters for Capillary Columns

on Thermo Scientific TRACE and Focus SSL

- Use same installation distance as manufacturer's adaptors.
- · Made of high-quality stainless steel.
- Siltek® treated version available for additional inertness.

Description	Similar to TS part #	atv.	cat.#	price
For use with standard 1/16" ferrules.		12-		P
Adaptor for Capillary Column				
on Detector Base		ea.	24916	
Adaptor for Capillary Column				
on Split/Splitless Injector		ea.	24917	
Siltek Treated Adaptor for Capillary				
Column on Split/Splitless Injector		ea.	20543	
For use with M4 ferrules.				
Adaptor for Capillary Column				
on Detector Base	347 25 436	2-pk.	24969	
Adaptor for Capillary Column				
on Split/Splitless Injector	347 05 451	ea.	24970	
Siltek Treated Adaptor for Capillary				
Column on Split/Splitless Injector		ea.	20544	



for Thermo Scientific TRACE and Focus GCs

Meets or exceeds original manufacturer's performance.



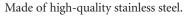
	Similar to			
Description	TS part #	qty.	cat.#	price
FID Jet for Thermo Scientific TRACE				
and Focus GCs	404 043 01	ea.	23080	

Nut for Terminal Fitting for Thermo Scientific TRACE GCs



Description	Similar to TS part #	ah.	cat.#	price
Nut for Terminal Fitting	15 part #	qty.	cau#	price
for Thermo Scientific TRACE GCs	350 221 25	2-nk	24896	

Fixing Nut for Capillary Column for Split/Splitless Injector on Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL





Description	Similar to TS part #	qty.	cat.#	price
Fixing Nut for Capillary Column				
for Split/Splitless Injector on				
Thermo Scientific TRACE, 8000,				
8000 TOP & Focus SSL	350 32 423	5-pk.	24973	







Supplies for Thermo Scientific GCs: Tools

Liner Cap Removing Tool for Thermo Scientific GCs: Focus GC / TRACE GC / Ultra/TRACE GC x GC

- Easily loosens the liner cap from the injector.
- Unique, ergonomic handle—easy to grip.



Remove septum cap. septum holder, septum, and septum support.



Place tool on liner cap. Align two pins on bottom of tool with two open slots on liner cap.

24937



Turn counterclockwise to loosen liner cap.



Use tweezers (cat. #20101) to remove liner cap.

	Similar to TS			
Description	part #	qty.	cat.#	price
iner Cap Removing Tool				
or Thermo Scientific GCs	205 070 10	ea.	24937	



Metric Wrench Set

High-quality 6 x 7 mm, 8 x 10 mm, and 16 x 17 mm wrenches for tightening a wide variety of fittings.

Description	qty.	cat.#	price
Metric Wrench Set	set	22997	



Metric 9 Piece Ball-Point Hex Key Set

Includes 9 metric hex keys (Allen wrenches): 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10 mm.

Description	qty.	cat.#	price
Metric 9 Piece Ball-Point Hex Key Set	set	22999	



Capillary Installation Gauge

for Thermo Scientific TRACE and Focus SSL (M4 Ferrules)

- · Seats ferrule onto column for consistent installations.
- · Prevents crushed column ends.
- · Made from high-quality stainless steel.



Install nut and ferrule onto column. Cut column end squarely. Slide column into installation gauge to recommended insertion distance. Finger-tighten column nut.

Tighten assembly to ensure a properly seated ferrule. Loosen assembly and remove column and column nut

The ferrule will be properly seated, and should remain in place when light force is applied. If it slides loosely on the column, repeat procedure.

Description	qty.	cat.#	price
Capillary Installation Gauge for Thermo Scientific			
TRACE & Focus SSL (M4 ferrules)	ea.	22330	



Make Life Easier (MLE) Capillary Tool Kit for Thermo Scientific GCs

Includes:

- · capillary installation gauge for Thermo Scientific GCs
- · liner cap removing tool for Thermo Scientific GCs
- 1/8", 3/16", and 1/4" nylon brushes
- 1/4", 3/8", and 3/16" stainless steel wire tube brushes
- · stainless steel surface brush
- · 6 stainless steel jet reamers (0.25-0.65 mm OD)
- 1/4" x 5/16" open end wrench
- 3/8" x 7/16" open end wrench
- 6 mm x 7 mm open end wrench
- 8 mm x 10 mm open end wrench

- 16 mm x 17 mm open end wrench
- · rubber-tipped slide-lock tweezers
- · scoring wafers with handles
- · inlet liner removal tool
- · septum puller
- mini wool puller/inserter tool
- · 4-inch tapered needle file
- · swivel head flashlight
- · mini hand drill set
- 15 cm compact steel ruler
- · pocket magnifier
- high temperature string (1 meter)

cat.#

- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)



11/12

gty.

257

Mar 2011

price





Description

ETP Electron Multipliers for Mass Spectrometry

- · Air stable.
- 2-year shelf life guarantee.
- · Discrete dynode design results in extended operating life.

The multi-dynode approach of all ETP multipliers results in longer lifetimes and better sensitivities compared with channel multipliers because of greater surface area.



The electron multipliers manufactured by ETP use a proprietary dynode material. This material has a number of properties that make it very suitable for use in an electron multiplier. It has very high secondary electron emission, which allows exceptional gain to be achieved from each dynode. This material is also very stable in air. In fact, an ETP multiplier can be stored for years before being used. As a direct result of the high stability of the active materials used in ETP multipliers, they come with a 2-year shelf life warranty (stored in original sealed package). Many testing laboratories take advantage of this long shelf life by keeping a replacement ETP multiplier on hand, ready for immediate installation. This keeps the instrument downtime to a minimum.

Electron Multiplier for Thermo Scientific GC/MS	qty.	cat.#	price
For Thermo TRACE DSQ, DSQII, and Polaris-Q GC/MS	ea.	23081	

Other ETP Electron Multipliers are available upon request. Call us if you do not see your instrument listed.

did you **know**?

A typical ETP electron multiplier has a total active dynode surface area of ~1,000 mm² compared to a standard continuous dynode multiplier that only has a total channel surface area of around 106 mm². The increased surface area of the ETP slows the aging process and improves operating life.



Transfer Line Reducing Kit

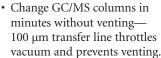
for Thermo Scientific TRACE and Focus DSQ Mass Spectrometers

Meets or exceeds original manufacturer's performance.

	Similar to			
Description	TS part #	qty.	cat.#	price
Transfer Line Reducing Kit	76458-2014s,			
for Thermo Scientific TRACE	76458-2009s,			
and Focus DSQ Mass Spectrometers	A0101-03151	kit	22082	

EZ No-Vent® GC Column-Mass **Spectrometer Connector**

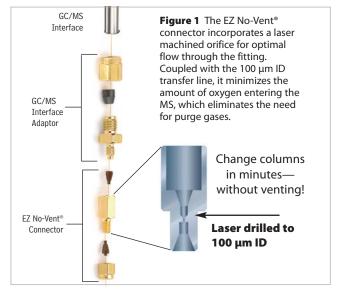
for Thermo Scientific Focus DSO **GC Mass Spectrometers**





- Easy to install and maintain—no special tools or plumbing required.
- · Gold-plated body for inertness.
- Deactivated transfer line keeps analytes focused; high-temperature polyimide ferrules eliminate leaks at the problematic transfer line fitting.
- · Lower cost than other "no-vent" fittings.

We designed the EZ No-Vent® GC column-mass spectrometer connector to be simple and easy to use. A critical orifice in the EZ No-Vent® connector minimizes the amount of oxygen allowed into the MS source, eliminating the need for purge gas as is required for other manufacturer's vent systems. This enables you to skip the lengthy vent and pump-down cycle otherwise required when you make a column change. This can save nearly a day of down-time with each column change. The EZ No-Vent® connector easily attaches to the MS source without special tools or extra plumbing.



Description	qty.	cat.#	price
EZ No-Vent Connector Kit			
for Thermo Scientific Focus DSQ GC Mass Spectrometers			
Includes: EZ No-Vent Connector, interface adaptor, two			
0.4mm ID adaptor ferrules for capillary column, two			
0.4mm ID ferrules for transfer line, 100 μ m deactivated			
transfer line (3 ft.), column plug, column nut	kit	22454	
Replacement ferrules for connecting capillary column to			
EZ No-Vent Connector:			
0.4mm ID (Polyimide)	2-pk.	21015	
0.5mm ID (Polyimide)	2-pk.	21016	
Replacement ferrules for connecting transfer line to EZ			
No-Vent Connector: 0.4mm ID	2-pk.	21043	
Replacement 100µm deactivated transfer line	3 ft.	21018	
Replacement EZ No-Vent Column Nut	20-pk.	23100	
Replacement EZ No-Vent Plug	5-pk.	23112	
Open-End Wrenches, 1/4" x 5/16"	2-pk.	20110	
		5	

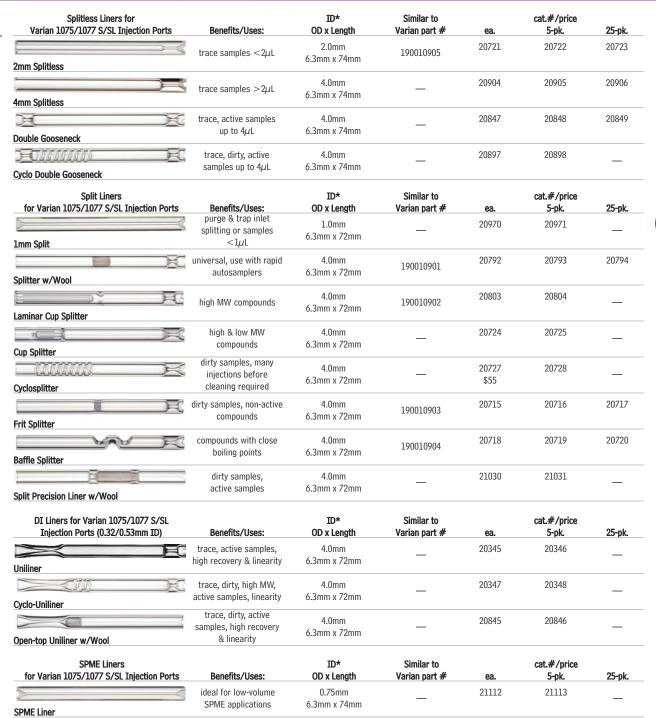








GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Varian GCs: Liners





All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.



*Nominal ID at syringe needle expulsion point.



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SPI Liners		ID*	Similar to		cat.#/price	
for Varian S/SL Injection Ports	Benefits/Uses:	OD x Length	Varian part #	ea.	5-pk.	25-pk.
0.5mm SPI	high linearity for 0.25 & 0.32mm ID columns	0.53mm 4.6mm x 54mm	190010906	20775	20776	20777
0.8mm SPI	high linearity for 0.53mm ID columns	0.80mm 4.6mm x 54mm	190010907	20778	20779	20780
SPI with Buffer	dirty samples $>1\mu$ L, fits 0.25, 0.32 & 0.53mm ID columns	2.4mm 4.6mm x 54mm	190010908	20850	20851	20852

Liners for Varian 1177 S/SL Injection Ports	Benefits/Uses:	ID* OD x Length	Similar to Varian part #	ea.	cat.#/price 5-pk.	25-pk.
4mm Split w/Glass Frit	universal	4.0mm 6.3mm x 78.5mm	_	21045	21046	_
4mm Split w/Wool	universal, use with Agilent 7673 autosampler	4.0mm 6.3mm x 78.5mm	392611934	_	21079	_
4mm Split Precision Liner w/Wool	dirty samples, trace samples	4.0mm 6.3mm x 78.5mm	_	20759	20762	_
Low Pressure Drop Precision Liner w/Wool	trace samples <2µL, dirty samples	2.0mm 6.3mm x 78.5mm	_	22421	22422	_
Laminar Cup Splitter	high MW compounds	4.0mm 6.3mm x 78.5mm	_	20765	20768	_
2mm Splitless w/Wool	trace samples <2µL	2.0mm 6.5mm x 78.5mm	392599903	_	21077	_
Gooseneck Splitless (4mm)	trace samples <2μL	4.0mm 6.5mm x 78.5mm	392611927	21896	21897	_
Gooseneck Splittess (4mm) w/Wool	trace samples <2µL	4.0mm 6.5mm x 78.5mm	392611928	21896-200.1	21897-200.5	_
Double Gooseneck Splittess (4mm)	trace, active samples <2µL	4.0mm 6.5mm x 78.5mm	392611929	21891	21892	_

DI Liners for Varian 1177 S/SL Injection Ports (For 0.25/0.32/0.53mm ID Columns)	Benefits/Uses	ID* OD x Length	Similar to Varian part #	cat.#/price ea.	cat.#/price 5-pk.	
Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	_	21470	21471	
Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	4.0mm 6.3mm x 78.5mm	_	21468	21469	

^{*}Nominal ID at syringe needle expulsion point.



All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.







COLUMN INSTALLS THIS END



GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Varian GCs: Liners

Liners for Varian 1078/1079 Injection Ports	Benefits/Uses:	ID* OD x Length	Similar to Varian part #	ea.	cat.#/price 5-pk.	25-pk.
1078/1079 Split w/CarboFrit	dirty samples, non-active compounds	3.4mm 5.0mm x 54mm	392611946	21708	21709	_
1078/1079 Splitless	trace samples <2\mu L	2.0mm 5.0mm x 54mm	392611947	21711	21712	_
Open 0.5mm ID	trace samples <1µL	0.5mm 5.0mm x 54mm	392611949	20992	20993	_
1078/1079 Split–No Frit	active samples	3.4mm 5.0mm x 54mm	392611945	20859	20901	20909
Open 0.75mm ID	trace, low volume samples	0.75mm 5.0mm x 54mm	392611948	21714	21715	21716
1078/1079 Split Precision Liner w/Wool	dirty samples, trace samples	3.4mm 5.0mm x 54mm	_	21024	21025	_



DI Liners for Varian 1078/1079 Injection Ports (For 0.25/0.32/0.53mm ID Columns)	s Benefits/Uses	ID* OD x Length	Similar to Varian part #	cat.#/price ea.	cat.#/price 5-pk.	
Drilled Uniliner (hole near top)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 54mm	_	24974	24975	
Drilled Uniliner (hole near bottom)	trace, active samples, high recovery & linearity	3.5mm 5.0mm x 54mm	_	22280	22281	

^{*}Nominal ID at syringe needle expulsion point.



Drilled Uniliner® Liners

Use the Drilled Uniliner® liner with the hole near the bottom for semivolatile analysis or when compounds of interest could be affected by a tailing solvent peak. Use the Drilled Uniliner® liner with the hole near the top for chlorinated pesticides analysis, aqueous injections, as well as for analysis in which the compounds of interest elute away from the solvent peak.

Siltek® Treated Metal Inlet Liners for Varian GCs

- · Won't crack, chip, or break like glass liners.
- Excellent response for pesticides, phenols, and other active compounds.

Liner Type (3.8mm ID x 5.0mm OD x 54mm)	qty.	cat.#	price
Split/Splitless	5-pk.	20711	
Splitless Gooseneck	5-pk.	21002	









GC ACCESSORIES | INSTRUMENT SUPPLIES Supplies for Varian GCs: Inlet



Inlet Liner Seals

for Varian 1177 Injectors

Meets or exceeds original manufacturer's performance.

	Max.	Similar to	10-pk.		50-	pk.
Description	temp.	Varian part #	cat.#	price	cat.#	price
6.35mm ID Graphite						
O-Rings for split liners	450°C		20296		20297	
6.5mm ID Graphite						
O-Rings for splitless liners	450°C	39-26119-40	20298		20299	





Liner Seals

for Varian 1078/1079 GCs

	Max.	Similar to			
Description	temp.	Varian part #	qty.	cat.#	price
5mm Graphite Liner Seals		392611919,			
for Varian 1078/1079 GCs	450°C	392534201	10-pk.	22683	



Septa

for Varian GCs

- · Precision molding assures consistent, accurate fit.
- · Preconditioned and ready to use.
- · Does not adhere to hot metal surfaces.
- · Packaged in precleaned glass jars.

Septum Diameter	25-pk./price	50-pk./price	100-pk./price
Thermolite Septa (u	sable to 340°C inlet to	emp.)	
9mm	27132	27133	27134
9.5mm (3/8")	27135	27136	27137
10mm	27138	27139	27140
11mm (⁷ / ₁₆ ")	27141	27142	27143

TraRius Senta (usable to 250°C inlet temp.)

recoluc ocpia (as	techiae depta (adable to 250 e miet temp.)						
9mm			27156	27157			
9.5mm (3/8")			27158	27159			
10mm	_	_	27160	27161			
11mm (7/vil)	_	_	27162	27163			

BTO Septa (usable to 400°C inlet temp.)

9mm CenterGuide	_	_	27104	27105
9.5mm (3/8")	_	_	27106	27107
10mm	_	_	27108	27109
11mm (⁷ / ₁₆ ")				
CenterGuide	_		27110	27111

HANDY septum size chart

Injector Type Packed Column 1078/1079 1177	Septum
	Diameter (mm)
Packed Column	9.5/10
1078/1079	10/11
1177	9
1075 /1077	11



Merlin Microseal Septa for Varian GCs

350 °C max injection port temperature.



22780

The advantages of the Merlin Microseal Septum include elimination of septum coring, longer life, and consistent low needle insertion force. The Microseal septum incorporates two separate sealing mechanisms. These sliding seals eliminate septum coring and the resulting accumulation of septum crumbs in the injection port liner.

The Microseal septum uses a 23 gauge (0.63 mm, 0.025") needle or probe with a blunt, truncated conical tip. Since the syringe plunger end details are determined by manual or autosampler compatibility, often a removable needle syringe is an effective way to match both of these requirements. Installation is simple, requiring no modification of the injection port.

Description	Merlin#	cat.#	price
Varian 1078/1079 Kit			
(septum cap adapter, O-ring, nut, septum)	21-11w	22779	
Varian 1177 Kit (septum cap adapter, O-ring, nut,			
spacer ring, septum)	22-11w	22780	
Replacement Septum for Varian Kits (1 septum)	21-01w	22782	





Australian Distributors Importers & Manufacturers www.chromtech.net.au



GC ACCESSORIES | INSTRUMENT SUPPLIES

Supplies for Varian GCs: Inlet, Tools



Capillary Nuts for Varian GCs

Choose brass or stainless steel construction.

	Sillilar to			
Description	Varian part #	qty.	cat.#	price
Brass Capillary Nuts	03-949551-00	2-pk.	20881	
Stainless Steel Capillary Nuts	03-949551-00	2-pk.	20882	



Siltek® Treated Inlet Support Springs for Varian 1075/1077 Split Injectors

Siltek® treated to eliminate sample adsorption.

	Similar to			
Description	Varian part #	qty.	cat.#	price
Siltek Treated Inlet Support Springs				
for Varian 1075/1077 Split Injectors	03-949786-00	3-pk.	21690	



Capillary Installation Gauge

for Varian GCs for use with 1/16 ferrules

- Seats ferrule* onto column for consistent installations.
- · Prevents crushed column ends.
- · Made from high-quality stainless steel.

Description	qty.	cat.#	price
Capillary Installation Gauge			
for Varian GCs for use with 1/16" ferrules	ea.	22335	

^{*}Recommended for use with graphite ferrules.







Make Life Easier (MLE) Capillary Tool Kit for Varian GCs

Includes:

- · capillary installation gauge for Varian GCs
- $^{1}/_{8}$ ", $^{3}/_{16}$ ", and $^{1}/_{4}$ " nylon brushes
- 1/4", 3/8", and 3/16" stainless steel wire tube brushes
- · stainless steel surface brush
- 6 stainless steel jet reamers (0.25-0.65 mm OD)
- 1/4" x 5/16" open end wrench
- 3/8" x 7/16" open end wrench
- ⁷/₁₆" x ¹/₂" open end wrench
- 1/2" x 9/16" open end wrench
- · rubber-tipped slide-lock tweezers

- · scoring wafers with handles
- · inlet liner removal tool
- · septum puller
- · mini wool puller/inserter tool
- · 4-inch tapered needle file
- · swivel head flashlight
- · mini hand drill set
- 15 cm compact steel ruler
- · pocket magnifier
- high temperature string (1 meter)
- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)

Description	qty.	cat.#	price
MLE Capillary Tool Kit	kit	22184	

Rethreading Tool

- · Repair worn or damaged threads.
- Multiple uses (injection ports, fittings, etc.).
- · Built-in guide to prevent cross-threading.





Make your injection port threads like new!

Simply screw the rethreading tool onto the part, unscrew, and inspect the threads. Repeat as necessary. When done, wipe threads clean with methanol to remove any debris.

Description	qty.	cat.#	price
Rethreading Tool			
for 7/16" compression fitting (Varian injection ports)	ea.	23019	
Rethreading Tool			
for 1/4" Varian-style capillary column fittings	ea.	21893	







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restek innovation!

Kit installs easily, without special tools or plumbing.

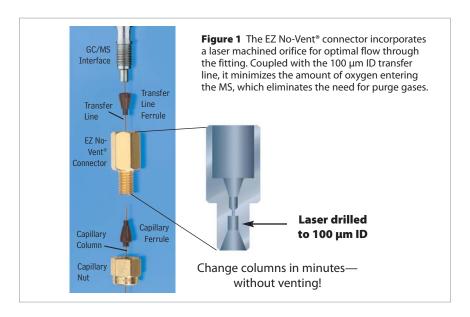


EZ No-Vent® GC Column-Mass Spectrometer Connector

for Varian Saturn 2000 Series Mass Spectrometers

- Change GC/MS columns in minutes without venting—100 μm transfer line throttles vacuum and prevents venting.
- Easy to install and maintain—no special tools or plumbing required.
- · Gold-plated body for inertness.
- Deactivated transfer line keeps analytes focused; high-temperature polyimide ferrules eliminate leaks at the problematic transfer line fitting.
- · Lower cost than other "no-vent" fittings.

We designed the EZ No-Vent® GC column-mass spectrometer connector to be simple and easy to use. A critical orifice in the EZ No-Vent® connector minimizes the amount of oxygen allowed into the MS source, eliminating the need for purge gas as is required for other manufacturer's vent systems. This enables you to skip the lengthy vent and pump-down cycle otherwise required when you make a column change. This can save nearly a day of down-time with each column change. The EZ No-Vent® connector easily attaches to the MS source without special tools or extra plumbing.



Description	qty.	cat.#	price
EZ No-Vent Connector Kit for Varian Saturn 2000 Series MSs			
Includes: EZ No-Vent Connector, two 0.4mm ID adaptor ferrules for capillary column,			
two 0.4mm ID ferrules for transfer line, 100µm deactivated transfer line (3 ft.),			
column plug, column nut	kit	22423	
Replacement ferrules for connecting capillary column			
to EZ No-Vent Connector:			
0.4mm ID (Polyimide)	2-pk.	21015	
0.5mm ID (Polyimide)	2-pk.	21016	
Replacement ferrules for connecting transfer line to EZ No-Vent Connector:			
0.4mm ID	2-pk.	21043	
Replacement 100µm deactivated transfer line	3 ft.	21018	
Replacement EZ No-Vent Column Nut	20-pk.	23100	
Replacement EZ No-Vent Plug	5-pk.	23112	
Open-End Wrenches, 1/4" x 5/16"	2-pk.	20110	







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 0.53 mm ID capillary columns: the Vu-Tight liner and the Uniliner® liner with adaptor (next page). The Vu-Tight liner fits directly into the 1/4-inch injection port and allows visual confirmation of the connection between the column and the liner. The Uniliner® liner and adaptor work together to allow either direct or on-column injection when using 0.53 mm ID columns. Both systems incorporate a Press-Tight® connection between the liner and column inlet, minimize dead volume, and reduce solvent peak tailing.

Features of Both Conversion Kits:

- Fit Agilent, Varian, and other common GCs with 1/4-inch packed column injection ports (with maximum insertion depth of 4 inches).
- · Install easily within fifteen minutes.
- Accommodate either 0.32 or 0.53 mm ID fused silica columns (tubing OD \geq 0.5 mm).
- · Liners are deactivated and extremely inert.
- Liners designed to accept dirty samples are available for either system.
- Press-Tight® connections between the liner and column inlet minimize dead volume, reduce solvent peak tailing, and sharpen early-eluting components.

Vu-Tight Inlet Liners

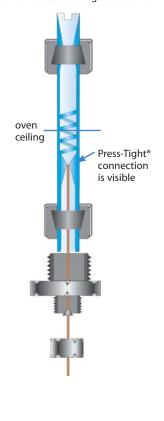
for 1/4-Inch Packed Injection Port Conversion

- · Visually observe the Press-Tight® connection between the column end and liner.
- Fit 0.32 and 0.53 mm ID capillary columns (column ODs from 0.5 mm to 0.8 mm).
- Slotted top prevents obstruction of carrier gas flow.
- · Two designs available.
- Operate in the direct injection mode.

it's a fact

Vu-Tight Inlet Liners

The 1/4-inch Vu-Tight liner fits directly into a ¹/₄-inch injection port. The connection between the liner 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 detected easily, making proper installation worry-free. The Cyclo Vu-Tight liner prevents nonvolatile residue from contaminating the column.





Vu-Tight Inlet Liners

for 1/4-Inch Packed Injection Port Conversion Can easily be packed with wool for dirty samples.

Description	qty.	cat.#	price
Vu-Tight DI Liner	ea.	20342	
Vu-Tight DI Liner	5-pk.	20343	
Vu-Tight DI Liner	25-pk.	20344	

Cyclo Vu-Tight DI Liner (1/4-inch OD)

Ideal for dirty samples. Spiral bore prevents nonvolatile residue from contaminating the column.

Description	qty.	cat.#	price
Cyclo Vu-Tight DI Liner	ea.	20787	
Cvclo Vu-Tight DI Liner	5-pk.	20788	



Includes a 1/4-inch stainless steel nut and graphite ferrule for attaching the liner to the GC inlet and a 1/4 to 1/16-inch stainless steel reducer, plus a 1/4-inch and 0.5 mm ID graphite ferrule for attaching the column to the liner.



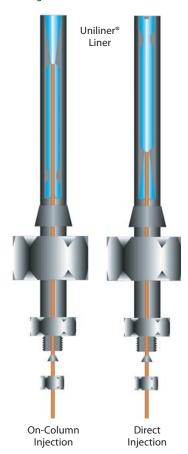






it's a fact

5 mm Uniliner® liners fit into the ¹/₄-inch Uniliner® Liner Adaptor, which fits into a ¹/₄-inch injection port. The Uniliner® liner can be inserted in one direction for direct injections or inverted for on-column injections. Because the ¹/₄-inch injection port ferrule seals against the metal liner adaptor surface, it is virtually impossible to crack the glass Uniliner® liner during installation.





also **available**

Looking for other packed column accessories for Agilent GCs?

See page 232.

Uniliner® Liner

for 1/4-Inch Packed Injection Port Conversion

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

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

inter taper.			
Description	Column ID Injection Mode*	ea. cat.#/price	5-pk. cat.#/price
Uniliner Liner (small buffer volume chamber 60mm long, for injections $\leq 2\mu$ L)	0.53mm DI or OC	20902	20903
Uniliner Liner (large buffer volume chamber 85mm long, for injections $\leq 4\mu$ L)	0.32 & 0.53mm DI only	20308	20309
	0.53mm DI or OC	20301	20305
Cyclo-Uniliner Liner (for active, dirty samples)	0.32 & 0.53mm DI only	20319	20320
Open-Top Uniliner Liner (packed with wool)	0.32 & 0.53mm DI only	20315	20316
Low Volume/Purge & Trap Uniliner Liner (1mm ID x 5mm OD: use in ¹/x" injection ports to troubleshoot purge & trap units)	0.32 & 0.53mm DI only	20307	20314
Uniliner Liner Adaptor	Includes ¹ / _r -inch nut & graphite ferrule, ¹ / _{1s} -inch nut, and 0.8mm ID graphite ferrule.		
(required for installing Uniliner liners in 1/4" injection ports		Stainless Steel	Siltek-Treated
	For injection ports <8cm	20310	22282

*DI = direct injection, OC = on-column injection

1/4" Ferrules for Uniliner Liner Adaptor

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





For injection ports 8-15cm 20311

cat.# 20234 (5-pk.)

V. Timbe Citting



Injection Port Conversion Chart

	Uniliner Liner Set-Up		Vu-Tight Fitting		
Instrument Avious CC (/ instringuish posts)	Uniliner Liner: cat.# 20301, 20305, 20308, 20309, 20315, 20316, 20319, 20320, 20902, & 20903	Liner Adaptor: cat.# 20310	Vu-Tight Fitting Kit: cat.# 20504 Liner: cat.# 20342, 20343, 20344, 20787, & 20788	Vu-Tight Fitting Kit: cat.# 20504	
Agilent GCs (¹/-inch injection ports) Models: 5700, 5710, 5711, 5712, 5830, 5840, 5880, 5890, 6850, 6890	✓	✓	✓	✓	
Varian GCs (\(\frac{\}\)-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	✓ /	✓	✓	✓	
PerkinElmer GCs (1/4-inch injection ports) Models: Sigma, 1B-4B, 300, 2001, 2100	✓ /	✓	✓ /	✓	
PerkinElmer Auto SYS*	/				

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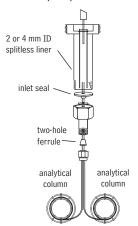
^{*}Does not require Uniliner liner adaptor.



Dual Column Analysis: Which technique is right for you?

Split/Splitless Injection

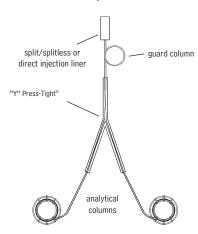
Two-hole ferrules allow dual-column confirmational analysis in the same split/splitless inlet.



0.25 and 0.32 mm ID columns can be used with standard \(^1/16\)-inch inlet fittings (cat. # 27185).
0.53 mm ID columns require \(^1/6\)-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.

Split/Splitless or Direct Injection

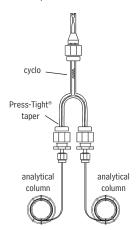
The "Y" Press-Tight® configuration allows dual columns to be used in either a split/splitless or direct injection inlet.



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

Direct Injection

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



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.

Analyzing the same sample on two columns of different polarity can increase both 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 0.32 mm or less (or 0.5 mm OD) can be inserted directly into the ¹/₁₆-inch standard capillary fitting (cat.# 27185, page 269) by using a two-hole capillary ferrule. Columns with internal diameters of 0.53 mm cannot be inserted into a standard ¹/₁₆-inch capillary fitting because the outside column diameter (0.8 mm) 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 0.53 mm ID column (cat.# 20645, page 269).*

On-Column or Direct Injections

On-column or direct injections require a Press-Tight® connection to the inlet liner. Usually a section of 0.53 mm ID guard tubing is attached to one leg of a Press-Tight® "Y" connector (cat.# 20405, page 270). 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 269) or *mini*-Lam Direct Injection Tee (cat.# 20436, page 269), 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 0.53 mm ID Capillary Co

Dual Column Direct Injection Tee (for 1/4-inch packed column inlets)

- Designed with a glass spiral to promote sample vaporization and provide even sample distribution to the two columns.
- Traps sample residue and minimizes the need for guard columns.
- Press-Tight® taper in each outlet leg facilitates a perfect dead-volume-free connection to each analytical column (OD 0.4 to 0.8 mm) and allows visual confirmation of the column connection.



20412

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

Dual Column mini-Lam Direct Injection Tee

(for 1/4-inch packed column inlets)

- · Inverted cup design offers complete sample vaporization.
- Permits larger sample volumes.
- Incorporates a Press-Tight® taper in each outlet leg, to make a perfect, dead-volume-free connection to each analytical column (ODs ranging from 0.4 to 0.8 mm).
- · Allows visual confirmation of the column connection.
- Open-top design makes it easy to pack with glass wool, keeping sample residue from contaminating the cup.

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





Graphite Replacement Ferrules

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

also available

Please see our detailed GC column ferrule product listing on **pages 284–286**



2	•

9

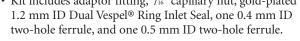
olumns)	Column Installation for
	Agilent Capillary Injectors (Split/splitless fitting for capillar columns)
	• ¹/¹6-inch split/splitless fitting
	that accepts standard, two-ho

 Easier to install capillary columns due to the nut

Inlet Adaptor Kit for Dual

protruding farther from the insulated injection port chamber. Same column insertion depth as the original manufacturer's equipment.

• Kit includes adaptor fitting, 1/16" capillary nut, gold-plated 1.2 mm ID Dual Vespel® Ring Inlet Seal, one 0.4 mm ID



Description	qty.	cat.#	price
Inlet Adaptor Kit for Dual Column Installation			
for Agilent Capillary Injectors	kit	27185	
	2-pk.	21246	
1.2mm ID Dual Vespel Ring Inlet Seal, Gold-Plated	10-pk.	21247	



1/8-Inch Capillary Inlet Adaptor Fitting Kit

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

- 1/8-inch split/splitless fitting accepts standard two-hole capillary ferrules and a standard 1/8-inch nut.
- Makes column installation easy due to the nut protruding 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 0.8 mm ID two-hole ferrule.
- · Use recessed gooseneck liners with this adaptor.

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

Two-Hole Ferrules

for 1/8-Inch and 1/16-Inch Compression-Type Fittings

- Use 1/16-inch, two-hole ferrules with the ¹/₁₆-Inch Capillary Inlet Adaptor Fitting Kit (cat.# 27185)
- Use ¹/₈-inch, two-hole ferrules with the 1/8-Inch Capillary Inlet Adaptor Fitting Kit (cat.# 20645).



Fitting Size	Ferrule ID	Fits Column ID	qty.	Vespel/Graphite
1/16"	0.4mm	0.25/0.28mm	5-pk.	24848
1/16"	0.5mm	0.32mm	5-pk.	24849
1/8"	0.8mm	0.45/0.53mm	5-pk.	20246



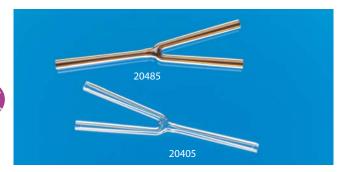




GC ACCESSORIES | INSTRUMENT SUPPLIES Dual Column Analysis

Press-Tight® Connectors

- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).

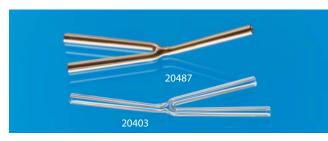




An alternative method of performing dual-column confirmational analyses!

- · Split sample flow onto two columns.
- Split a single column flow to two detectors—perform confirmation analysis with a single injection.

Description	ea./p	rice	3-pk./price	
Universal "Y" Press-Tight Connector	20405	\$78	20406	
Universal "Y" Press-Tight Connector,				
Deactivated	20405-261	\$79	20406-261	
Universal "Y" Press-Tight Connector,				
Siltek Treated	20485	\$80.50	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.

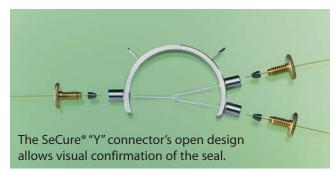
Description	ea./price		3-pk./price	
Universal Angled "Y" Press-Tight				
Connector	20403	\$77	20404	
Universal Angled "Y" Press-Tight				
Connector, Deactivated	20403-261	\$78	20404-261	
Universal Angled "Y" Press-Tight				
Connector Siltek Treated	20487	\$87.50	20469	

Polyimide Resin

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

	Max.			
Description	Temp.	qty.	cat.#	price
Polyimide Resin	350°C	5 grams	20445	





SeCure® "Y" Connector Kits

- Connect two analytical columns to a transfer line or guard column.
- Use standard "Y" Press-Tight® connectors and ¹/16" graphite ferrules.
- Reliable seal integrity, will not unexpectedly disconnect during temperature-programmed analyses.
- Open design allows visual confirmation of the seal for added confidence in the connection.

Combine the simplicity of a "Y" Press-Tight® connector with the strength of a metal union. The ferrules and knurled nuts hold the fused silica tubing in place, which prevents the tubing from unexpectedly disconnecting, even at temperatures as high as 400 °C.

Kits include: SeCure® "Y" connector body, 3 knurled nuts, "Y" Universal Press-Tight® union, 3 ferrules.

Description	Ferrules Fit Column ID	qty.	cat.#	price
SeCure "Y" Connector Kit	0.18/0.25/0.28mm	kit	20276	
SeCure "Y" Connector Kit	0.32mm	kit	20277	
SeCure "Y" Connector Kit	0.45/0.53mm	kit	20278	
Knurled nut		3-nk	20279	

MXT® "Y"-Union Connector Kits

for Fused Silica Columns

- Low-dead-volume, leak-tight connection.
- · Reusable.
- Siltek® treatment ensures maximum inertness.
- Ideal for connecting a guard column or transfer line to an analytical column.
- Use to oven temperatures of 360 °C.
- Available in union and "Y" configurations.
- · Can also be used for fused silica to metal connections.

Each kit contains the MXT® union, three ¹/₃₂-inch nuts and three one-piece fused silica adaptors.

Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21389	
For 0.32mm ID Fused Silica Columns	kit	21388	
For 0.53mm ID Fused Silica Columns	kit	21387	

also available

See the complete connector product listing on pages 287–293.







Replacement Accessories for Hall 1000



ELCD Nickel Reaction Tubes

for Hall 1000

- · Pretreated for maximum sensitivity.
- · Quality-controlled for reliability.
- · Available for many popular models.

To replace these instrument part numbers:		Res	tek part nu	mbers:
ELCD Model #	Instrument #	qty.	cat.#	price
	PerkinElmer # N660-1072			
	Shimadzu # 220-90435-00			
	Tremetrics # 117459-0003			
Hall 1000	Varian # 00-997625-12	2-pk.	21581	
O.I. 4420	O.I. Analytical # 260323	2-pk.	21582	

ELCD Nickel Reaction Tube Nut

High-quality stainless steel ELCD nut mounts nickel reaction tube into ELCD.



Order these

Description	qty.	cat.#	price
ELCD Nickel Reaction Tube Nut	2-pk.	21584	

1/16-Inch Vespel®/Graphite Sealing Ring

Installs onto the nickel reaction tube after the screw. Easily compresses on the reaction tube to provide a leak-tight seal and prevent detector oxidation.



Description	qty.	cat.#	price
¹/16-Inch Sealing Ring, Vespel/Graphite	2-pk.	21583	

Cleaned Teflon® Transfer Lines for ELCDs

We stringently clean our ELCD Teflon® transfer lines with an HCl solution to remove any contaminants, then rinse with methanol. Convenient 6.5-inch precut pieces directly interface the nickel reaction tube and conductivity cell in Tracor, Tremetrics, O.I., and many other ELCDs.



Description	qty.	cat.#	price
Teflon Transfer Lines for ELCDs, 1/16" OD x 0.020" ID			
(five 6.5-inch lines)	5-pk.	20121	

Antifoam Agent for Purge & Trap Samples

- · Efficiently controls foam; effective over a wide pH range.
- No hazardous materials, no components that are target analytes.
- Effective at less than 0.1% of sample volume.

See page 452.



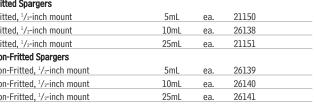
Purge-and-Trap Spargers

for Tekmar 2000, 3000, or 3100

- · Available with uniform frits, to ensure maximum purging efficiency.
- Use nonfritted spargers for wastewater samples.
- Manufactured to tight tolerances to ensure a leak-tight seal.



Description	Volume	qty.	cat.#	price
Fritted Spargers				
Fritted, 1/2-inch mount	5mL	ea.	21150	
Fritted, 1/2-inch mount	10mL	ea.	26138	
Fritted, 1/2-inch mount	25mL	ea.	21151	
Non-Fritted Spargers				
Non-Fritted, 1/2-inch mount	5mL	ea.	26139	
Non-Fritted, 1/2-inch mount	10mL	ea.	26140	
Non-Fritted, 1/2-inch mount	25mL	ea.	26141	



21035



Moisture Control By-Pass Lines

for Tekmar Instruments

- Increase response for ketones, alcohols, and acetates.
- Silcosteel®-deactivated tubing for increased inertness.
- Suitable for US EPA Methods 8260, 524.2, and OLM4.1.
- Easily attaches in minutes.

Description	qty.	cat.#	price
Moisture Control By-Pass Line for Tekmar 3000	ea.	21035	
Moisture Control By-Pass Line for Tekmar 3100	ea.	21109	







Photoionization Lamps

Model 108-10.0/10.6 offers both 10.0 and 10.6 eV potential, has a 0.781" base diameter, and is used in Tracor, OI, and Baseline instruments. Model 103 has a 1.375" base and is used in HNU and SRI detectors. Model 108-BTEX lamp's higher output makes it ideal for detection of BTEX compounds.

Features	Benefits
Longer life.	More for your money with each lamp.
Model 108-BTEX has 33% more output than older models.	Operate continuously at 1 ma and 250°C for 6 months and still have better than 50% of the initial output.
Lamps individually tested.	Your lamp will work to specifications.
Variety of models.	Among the best lamps available for most instrumentation.

Description	eV Rating	Base	qty.	cat. #	price
PID Lamp, Model 103 C	10.2	1.375"	ea.	20676	
PID Lamp, Model 108	10.0/10.6	0.781"	ea.	20675	
PID Lamp, Model 108-BTEX	10.0/10.6	0.781"	ea.	23020	
PID Lamp Polishing Kit (contai	ns iron oxide o	cleaning			







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GC ACCESSORIESCOLUMN INSTALLATION

 Leak Detector & Flowmeters
 .273-275

 Column Installation Tools & Tool Kits
 .275-283

 Ferrules
 .284-286

 Connectors
 .287-293





HROMalytic +61(0)3 9762 2034

Australian Distributors Importers & Manufacturers www.chromtech.net.au

11/12



Restek Electronic Leak Detector

Don't let a small leak turn into a costly repair—protect your instrument and analytical column by using a Restek Leak Detector.

Features & Benefits include:

- · Optimized sample flow path.
- New ergonomic, hand-held design.
- Rugged side grips for added durability.
- Handy probe storage for cleanliness and convenience.
- Longer lasting battery, up to 6 hours of continuous use.
- · Automatic shut-off.
- A convenient carrying and storage case.
- · Easy to clean probe assembly.
- A universal charger set (US, European, UK, and Australian plugs included).

Backed by a 1-year warranty, the new Restek Leak Detector sets an industry standard for performance and affordability in hand-held leak detectors.

Detectable gases:	helium, nitrogen, argon, carbon dioxide, hydrogen
Battery:	Rechargeable Ni-MH internal battery pack (6 hours normal operation
Operating Temperature Range:	32°-120°F (0°-48°C)
Humidity Range:	0-97%
Warranty:	one year
Certifications:	CE, Ex, Japan
Compliance:	WEEE, RoHS

Limits of Detection

These gases can be detected with the Restek Electronic Leak Detector at the following leak rates.

Gas	Minimum Detectable Leak Rate (atm cc/sec.)	Indicating LED Light Color	
Helium	1.0 X 10 ⁻⁵	Red	
Hydrogen*	1.0 X 10 ⁻⁵	Red	
Nitrogen	1.4 X 10 ⁻³	Yellow	
Argon	1.0 X 10 ⁻⁴	Yellow	
Carbon Dioxide	1.0 X 10 ⁻⁴	Yellow	

Description	qty.	cat.#	price
Leak Detector with Hard-Sided Carrying Case and Universal Charger Set			
(US, UK, European, Australian)	ea.	22839	
Leak Detector Routine Maintenance Review**	ea.	22839-R	
Soft-Side Storage Case	ea.	22657	
Small Probe Adaptor	ea.	22658	

*Caution: The Restek Electronic Leak Detector is designed to detect trace amounts of hydrogen in a noncombustible environment. It is NOT designed for determining leaks in a combustible environment. A combustible gas detector should be used for determining combustible gas leaks under any condition. The Restek Electronic Leak Detector may be used for determining trace amounts of hydrogen in a GC environment only.

**Routine maintenance includes inspection of the probe tip, internal/external tubing and a battery replacement.



Checking for leaks maintains the integrity of a



To keep your Leak Detector performing at optimal levels, send it in every two years for a Routine Maintenance Review. Our engineers will inspect the probe tip, internal/external tubing and replace the battery. This preventive maintenance plan will help ensure your leak detector operates properly for years to come.

for **more** info

How much sensitivity is needed in a leak detector? www.restek.com/cat001





Hard-sided carrying case included with purchase of unit.



22657

Optional soft-side storage case is ideal for storing your leak detector in smaller spaces, such as your tool box.





Avoid using liquid leak detectors on a GC! Liquids can be drawn into the system.



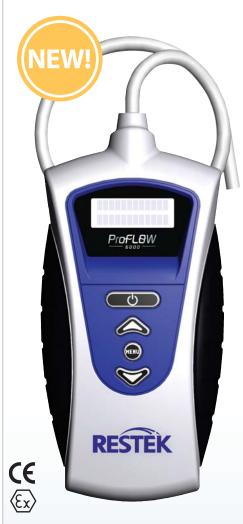




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Lab Gas Issues? **RESTEK HAS THE SOLUTION!**



Introducing the **NEW** Restek

ProFLOW 6000

Electronic Flowmeter

The ProFLOW 6000 is an electronic device capable of measuring volumetric flow for most gases.* Real-time measurements can be made for various types of flow paths, including continually changing gas types.

NEW Restek ProFLOW 6000 Electronic Flowmeter State-of-the-art features include:

- Measures volumetric flow for gases across a range of 0.5-500 mL/min.
- NIST traceable calibration.
- Ex rating (electrical apparatus for explosive gas atmospheres) for hydrogen and related gas types.
- Accuracy of \pm 2% of flow or \pm 0.2 mL/min., whichever is greater.
- Over range warning indicator.
- · Auto shut-off feature.
- Use as a bench-top or hand-held unit.
- Ergonomic design and side grips for comfort.
- Measures most gas types.*
- · Convenient carrying/storage case included.
- Uses 2-AA batteries (included).
- Data output via USB port.
- 1-year warranty.
- Recalibration service available.



Hard-sided carrying case included with purchase of unit.

restek innovation!

Flowmeter Facts:

Type of flowmeter:	volumetric
Battery:	2AA
Operating Temp. Range:	32-120°F (0-48°C)
Warranty:	one year
Certifications:	CE, Ex
Compliance:	WEEE, RoHS

Description	qty.	cat.#	price
Restek ProFLOW 6000			
Electronic Flowmeter with			
Hard-Sided Carrying Case	ea.	22656	
ProFLOW 6000			
Recalibration Service	ea.	22656-R	
Soft-Side Storage Case	ea.	22657	

*The flowmeter is designed to measure clean, dry, non-corrosive gases.

Optional soft-side case is ideal for storage in smaller spaces such as your tool box.

Go to www.restek.com/flowmeter for details.

restek **recommends**

Recalibrate your ProFLOW 6000 Flowmeter once every year. Prolonged failure to recalibrate your unit may result in increased error.



Australian Distributors www.chromtech.net.au







Soap Film Bubble Flowmeter

- 1 mL flowmeter for flows between 0.1 and 10 cc/min.
- 50 mL flowmeter for flows between 10 and 300 cc/min.
- Includes a reservoir bulb, twenty-four inches (60 cm) of ¹/₄-inch ID tubing, adaptor tubes for ¹/₈-inch tubing and 0.53 mm ID capillary columns, and Velcro® fasteners.

Description	Volume	qty.	cat.#	price
Bubble Flowmeter	1mL	ea.	20135	
Bubble Flowmeter	50mL	ea.	20136	

Methane Cylinder Kit

Setting the column flow rate by injecting methane and optimizing linear velocity is a preferred method for establishing reproducible retention times (ASTM Method E1510-93). The kit includes a Scotty® 14 cylinder containing 1% methane in helium, a MINICYL regulator, a syringe adaptor, and a package of twenty-five septa for the adaptor.



Description	qty.	cat.#	price
Methane Cylinder Kit	kit	20197	
Replacement Septa for Syringe Adaptor	25-pk.	20198	
Replacement Methane Cylinder	ea.	20199	



Column not included.

Capillary Column Rinsing Reservoir Kit

Restore the performance of bonded-phase capillary columns by dissolving and removing soluble, nonvolatile residue, using this reservoir kit. The 50 ml rinsing reservoir is equipped with ¹/₄-inch inlet and outlet connections and includes a built-in fritted disk to prevent particulate matter from contaminating the column. The kit includes: reservoir, pressure regulator, fittings, ferrules, and tubing. Reservoir also available separately.

Description	qty.	cat.#	price
Rinsing Reservoir Complete Kit	kit	20612	
Rinsing Reservoir only	00	20412	



FID Flow Measuring Adaptor

- · Makes setting flows easy.
- Meets or exceeds original manufacturer's performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
FID Flow Measuring Adaptor	19301-60660	ea.	21000	

Inlet and FID Maintenance Kits

for Agilent GCs

- Include the most common consumable GC supplies and tools.
- All parts meet or exceed performance of instrument manufacturer's parts.
- · Parts list makes reordering easy.

Inlet kit includes:

- 0.4, 0.5, and 0.8 mm ID graphite ferrules.
- Viton® O-rings.
- · Capillary nuts.
- Inlet seals.
- · Reducing nut.
- Scoring wafer.
- 11 mm Thermolite® septa.
- 4.0 mm single gooseneck liner.
- 4.0 mm split liner with wool.
- · Capillary column caps.
- 1/4" x 5/16" wrench.
- · Septum puller.
- Installation gauge.
- · Wire cleaning brush.
- Jet reamers/ferrule removers.
- Talet lines removed tool
- Inlet liner removal tool.
- Septa nut removal tool.

FID kits include:

- 1/4", 0.4, 0.5, and 0.8 mm ID graphite ferrules.
- FID/NPD capillary adaptor.
- Capillary nuts.
- · Jet reamers/ferrule removers.
- 1/4" nut.
- · Scoring wafer.
- · Capillary column caps.
- Ignitor for either Agilent 5890 or 6890/6850/7890 GCs.
- · FID flow measuring adaptor.
- 1/4" x 5/16" wrench.
- · Installation gauge.
- · Wire cleaning brush.
- High-performance Siltek® treated FID jet for either Agilent 5890 (adaptable jet) or 6890/6850/7890 (dedicated jet) GCs.
- Spanner wrench.
- FID jet removal tool.







Description	qty.	cat.#	price
Inlet Maintenance Kit for Agilent			
5890/6850/6890/7890 GCs	kit	22181	
FID Maintenance Kit for Agilent 5890 GCs	kit	22180	
FID Maintenance Kit for Agilent 6850/6890/7890 GCs	kit	22179	





















MLE Tool Kits conveniently provide the tools that make it easier to install and maintain capillary columns at a discounted price compared to buying the tools individually!



Make Life Easier (MLE) Capillary Tool Kits

Everything you need in one complete kit!

All kits include these components:

- 1/8", 3/16", 1/4" nylon brushes
- $^{1}/_{4}$ ", $^{3}/_{8}$ ", $^{3}/_{16}$ " stainless steel wire tube brushes
- · stainless steel surface brush
- 6 stainless steel jet reamers (0.25-0.65 mm OD)
- 1/4" x 5/16" open end wrench
- + $^{3}/_{8}^{\prime\prime}$ x $^{7}/_{16}^{\prime\prime}$ open end wrench
- · rubber-tipped slide-lock tweezers
- · scoring wafers with handles
- inlet liner removal tool
- · septum puller
- · mini wool puller/inserter tool
- · 4-inch tapered needle file
- · swivel head flashlight
- · mini hand drill set
- 15 cm compact steel ruler
- · pocket magnifier
- high temperature string (1 meter)
- pipe cleaner (12-inch)
- · cotton tip swabs (pk. of 25)

MLE Capillary Tool Kit for Agilent GCs (cat.# 22186) also includes:

- capillary installation gauge for Agilent GCs
- injector wrench for Agilent GCs
- · septum nut removal tool
- 7/16" X 1/2" open end wrench
- 1/2" x 9/16" open end wrench

MLE Capillary Tool Kit for PerkinElmer GCs (cat.# 22185) also includes:

- 7/16" x 1/2" open end wrench
- 1/2" x 9/16" open end wrench

MLE Capillary Tool Kit for Shimadzu GCs (cat.# 22182) also includes:

- · capillary installation gauge for Shimadzu GCs
- · injector wrench for Shimadzu GCs
- 6 mm x 7 mm open end wrench
- 8 mm x 10 mm open end wrench
- 16 mm x 17 mm open end wrench

MLE Capillary Tool Kit for Thermo Scientific GCs (cat.# 22183) also includes:

- capillary installation gauge for Thermo Scientific GCs
- · liner cap removing tool for Thermo Scientific GCs
- 6 mm x 7 mm open end wrench
- 8 mm x 10 mm open end wrench
- 16 mm x 17 mm open end wrench

MLE Capillary Tool Kit for Varian GCs (cat.# 22184) also includes:

- · capillary installation gauge for Varian GCs
- ⁷/₁₆" x ¹/₂" open end wrench
- 1/2" x 9/16" open end wrench

Description	qty.	cat.#	price
MLE Capillary Tool Kit for Agilent GCs	kit	22186	
MLE Capillary Tool Kit for PerkinElmer GCs	kit	22185	
MLE Capillary Tool Kit for Shimadzu GCs	kit	22182	
MLE Capillary Tool Kit for Thermo Scientific GCs	kit	22183	
MLF Capillary Tool Kit for Varian GCs	kit	22184	







Column Hanger

for Agilent 7890, 6890, 5890, and 5880A GCs

Description	qty.	cat. #	price
Column Hanger			
for Agilent 7890, 6890,			
5890, and 5880A GCs	ea.	22128	



Sapphire Scribe

- Produces a clean, square cut.







One quick stroke...

...and just a tap leaves a clean, square end.

Description	qty.	cat.#	price
Sapphire Scribe	ea.	20182	

Scoring Wafer with Handle

- · Ceramic wafer is serrated on one side and straight-edged on the other to cut both fused silica and metal tubing cleanly.
- Unique, ergonomic handle is made of soft, comfortable rubber.



Description	qty.	cat.#	price
Scoring Wafer with Handle	2-pk.	23015	

Shortix® Capillary GC Column Cutter

- · Consistently make precise, clean, square cuts with a diamond blade.
- Built-in magnifier to verify square cut.
- Use with 0.25 mm ID to 0.53 mm ID tubing (0.78 mm OD maximum).

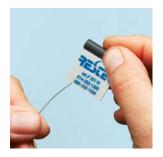


Description	qty.	cat.#	price
Shortix Capillary GC Column Cutter	ea.	23026	
Maintenance Kit for Shortix Capillary GC Column			
Cutter (Includes: diamond cutting wheel, O-rings, and			
a tool to open the column cutter)	kit	23027	

Ceramic Scoring Wafer

- · Four straight scoring edges for cutting fused silica tubing and four serrated edges for cutting MXT® metal capillary columns.
- Sure-grip handle included.



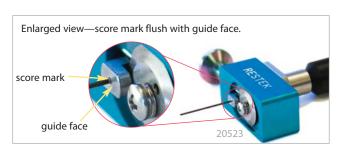


Exert just enough pressure to put a slight arc in the tubing. The tubing should fall off or break with a slight tap of the wafer.



Check the cut against the white of the scoring wafer. Look for a clean, square cut.

Description	qty.	cat.#	price
Ceramic Scoring Wafers	5-pk.	20116	



Restek Tubing Scorer

- · Makes perfect cuts every time.
- · Easy to use.
- · Leaves column entrance perfectly round.

Metal MXT® columns are easy to cut. Scoring wafers can be used, but may leave the column end irregularly shaped. The Restek tubing scorer is designed to make a perfect cut every time, leaving the column entrance perfectly round.

Description	qty.	cat.#	price
Restek Tubing Scorer for MXT Columns			
(0.25-0.53mm ID & 0.5-0.8mm OD)	ea.	20523	







Easily seat ferrules for consistent installations!









22335



22333



- Seats ferrules onto column for consistent installations.*
- · Prevents crushed column ends.
- · Made from high-quality stainless steel.

Using the capillary installation gauge for Agilent-style fittings.



Install the column nut and ferrule onto the column. Slide the column into the installation gauge to the recommended insertion distance. Finger-tighten the nut.



Tighten the assembly to ensure a properly seated ferrule. Loosen the assembly and remove the column and column nut.



The ferrule will be properly seated, and should remain in place when light force is applied. If it slides loosely on the column, repeat procedure.

Description	qty.	cat.#	price
Capillary Installation Gauge			
for Agilent-style fittings (compact ferrules)	ea.	21034	
Capillary Installation Gauge			
for 1/16" fittings (1/16" ferrules)	ea.	21399	
Capillary Installation Gauge			
for Thermo Scientific TRACE & Focus SSL (M4 ferrules)	ea.	22330	
Capillary Installation Gauge			
for Varian GCs for use with 1/16" ferrules	ea.	22335	
Capillary Installation Gauge			
for Shimadzu 17A, 2010, and 2014 GCs	ea.	22333	

^{*}Recommended for use with graphite ferrules.



did you know?

Restek carries a complete line of replacement parts for Agilent GCs. See **pages 216-243** for more information.

Capillary Installation Gauge

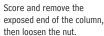
for Agilent 5973/5975 MS

- Seats ferrules onto column for consistent installations.
- · Made from high-quality stainless steel.



Install the nut and ferrule onto the column, then insert the column through the installation tool, exposing several centimeters at the exit end, then tighten the nut on to the gauge.







The ferrule will be properly seated and should remain in place when light force is applied. Install the column into the GC/MS interface.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Capillary Installation Gauge				
for Agilent 5973/5975 MS	G1099-20030	ea.	21894	





Capillary Column Caps

- Attach to the column in seconds to form an airtight seal.
- Increase column lifetime—prevent moisture and air from entering the column during storage.
- Two styles to choose from: glass or silicone material.
- Glass caps are color-coded for identifying detector and injector ends.
- · Not recommended for reuse.

Description	Material	qty.	cat.#	price
Capillary Column Caps	glass	10-pk.	21044	
Capillary Column Caps	silicone	10-pk.	22858	

Injector/Detector Plug Nuts

- Use to cap off an injector to isolate leaks.
- Use to cap off a detector for thermal cleaning.
- Use to check a detector or make-up gas
- Use to cap off a detector and prevent hydrogen from accidentally diffusing into the oven from an unused detector base.

	Similar to			
Description	Agilent part#	qty.	cat.#	price
Injector/Detector Plug Nuts	5020-8294	2-pk.	21883	







20339

restek

innovation!

No more burned fingers!

Inlet Liner Removal Tool

- Easily remove liner from injector no more burned fingers.
- · Made from high-temperature silicone.
- · Won't chip or crack the liner.



Gently push the liner removal tool onto the liner in the injection port, with a slight circular motion.

No more burned

The Claw and The Claw Holder Kit

Claw holder until ready for reuse.

fingers!

when dirty.



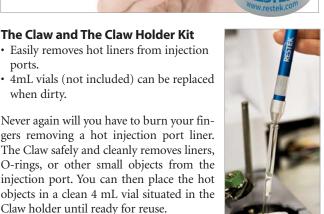
Slowly pull the liner out of the injection port.



20181

Use the liner removal tool to place a new liner into the injection port, avoiding hot metal surfaces.

Description	qty.	cat.#	price
Inlet Liner Removal Tool	3-pk.	20181	



Description	qty.	cat. #	price
The Claw	ea.	26261	
The Claw Holder Kit (includes The Claw and holder)	kit	26262	
WISP 48 Snap Seal Vial	100-pk.	24658	



- · Position wool reproducibly every time.
- · Accurate to a specific, measured depth.
- Can be used with all manufacturer's liners.



Loosen the nut on the side of the tool and adjust the gauge to the manufacturer's recommended depth



Place a plug of loosely bound wool at the top of the inlet liner



Insert the liner packing tool into the liner until the tool bottoms out Remove the tool. The wool is now positioned correctly in the liner and the liner is ready for use.

Eliminates user variation!

Description	qty.	cat.#	price
Inlet Liner Packing Tool	ea.	20339	



Mini Wool Puller/Inserter

Insert and remove wool plugs easily. Order a spare pack so you'll always have one available.

Description	qty.	cat.#	price
Mini Wool Puller/Inserter	2-nk	20114	









Rethreading Tool

- · Repair worn or damaged threads.
- Multiple uses (fittings, injectors, detectors, etc.)
- Built-in guide to prevent crossthreading.



Repeated installation, removal, and temperature changes cause wear and damage to threads on GC parts. This can cause a poor seal, and oxygen can enter the system, compromising analytical results and possibly destroying expensive analytical columns.



Achieve a better seal!

Simply screw the rethreading tool onto the part, unscrew, and inspect the threads. Repeat as necessary. When done, wipe threads clean with methanol to remove any debris.

Description	qty.	cat.#	price
Rethreading Tool for 1/16" compression fitting	ea.	23016	
Rethreading Tool for 1/8" compression fitting	ea.	23017	
Rethreading Tool for 1/4" compression fittings			
(Agilent split/splitless injection ports)	ea.	23018	
Rethreading Tool			
for 7/16" compression fitting (Varian injection ports)	ea.	23019	
Rethreading Tool			
for 1/4" Varian-style capillary column fittings	ea.	21893	



for Agilent 5890/6890/6850 GCs

- Use to remove the septum nut and weldments during GC maintenance.
- Use the smaller end to remove the septum nut.
- Use the larger end to tighten the split/splitless weldment nut.
- High-quality stainless steel construction.
- Meets original equipment performance.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Injector Wrench				
for Agilent 5890/6890/6850 GCs	19251-00100	ea.	22065	



Injector Wrench

for Shimadzu 17A, 2010, and 2014 GCs

- · Designed specifically for removing Shimadzu injection ports.
- · High-quality stainless steel construction.

Description	Similar to Shimadzu part #	qty.	cat.#	price
Injector Wrench for Shimadzu 17A,				
2010, and				



Open-End Wrench Set

for use with Shimadzu 17A, 2010, and 2014 Capillary Installation Gauge

. ,			
Description	qty.	cat.#	price
1/4" x 5/16" and 10mm x 11mm Open-End Wrench Set			
for use with Shimadzu 17A, 2010, and 2014 Capillary			
Installation Gauge	ea.	22334	



Open-End Wrench Set

High-quality $^1/_4$ " x $^5/_{16}$ ", $^3/_8$ " x $^7/_{16}$ ", $^7/_{16}$ " x $^1/_2$ ", and $^1/_2$ " x $^9/_{16}$ " wrenches for tightening a wide variety of chromatography fittings.

Description	qty.	cat.#	price
Open-End Wrench Set	set	20387	



Open-End Wrenches

High-quality wrenches for tightening capillary fittings.

Description	Size	qty.	cat.#	price
Open-End Wrenches	1/4" X 5/16"	2-pk.	20110	
Open-End Wrenches	3/8" X 7/16"	2-pk.	22455	



Metric Wrench Set

High-quality 6 x 7 mm, 8 x 10 mm, and 16 x 17 mm wrenches for tightening a wide variety of fittings.

Description	qty.	cat.#	price
Metric Wrench Set	set	22997	







Metric 9 Piece Ball-Point Hex Key Set

Includes 9 metric hex keys (Allen wrenches): 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10 mm.

Description	qty.	cat.#	price
Metric 9 Piece Ball-Point Hex Key Set	set	22999	



12 Piece Ball-Point Hex Key Set

Includes 12 hex keys (Allen wrenches): .050", 1/16", 5/64", 3/32", 7/64", 1/8", 9/64", 5/32", 3/16", 7/32", 1/4", and 5/16".

cat.#	price
22998	



Torx® Screwdriver Set

- Set includes TR-10, TR-15, and TR-20.
- Ideal for performing routine maintenance on Agilent 6890 and 7890 GCs.

Description	qty.	cat.#	price
Torx Screwdriver Set	set	23034	



High-Temperature String

- Withstands temperatures to 400 °C.
- Use to restring capillary columns, attach column connectors to column cages, or hold a column in the GC oven.

Description	qty.	cat.#	price
High-Temperature String	10m	20109	
High-Temperature String	450m	20618	



Slide-Lock Tweezers and 15 cm Compact Steel Ruler

- "Lock" capillary columns to the correct insertion distance recommended by the instrument manufacturer during installation.
- · Useful for many laboratory tasks.

Description	qty.	cat.#	price
Slide-Lock Tweezers and 15cm Compact Steel Ruler	set	20101	





Stainless Steel Tube Brushes/Surface Brush

Unlike brass brushes that can leave a metal residue, these stainless steel tube brushes ($^3/_8$ -, $^3/_{16}$ -, and $^1/_4$ -inch) work well for cleaning dirty collectors, injector ports, and detector ports. The surface brush can be used to remove residue that builds up on metal detector jets and electronic contacts.

Description	qty.	cat.#	price
Stainless Steel Tube Brushes/Surface Brush	4-piece set	20112	



Nylon Tube Brushes and Pipe Cleaner

Use to remove small septum fragments and residue from dirty glass inlet liners. Brushes are ¹/₈-, ³/₁₆-, and ¹/₄-inch in diameter; pipe cleaner is one foot (30cm) long.

Description	qty.	cat.#	price
Nylon Tube Brushes and Pipe Cleaner	4-piece set	20108	









4" Tapered Needle Files

These files can be used for many purposes. They are especially useful for removing ferrules that are lodged in injector or detector ports.

Description	qty.	cat.#	price
4" Tapered Needle Files	2-pk.	20106	



- Small and easy to handle.
- 10x magnification makes it easy to see the column end to verify a square cut.



Description	qty.	cat.#	price
Pocket Magnifier	ea.	20124	

GC Oven Thermometer

- Verify GC oven temperature.
- Quick measurements via sensor in the measuring tip.
- Swivel head can turn 180°.
- Wide measuring range: -50°C to +350°C.

Description	qty.	cat.#	price
GC Oven Thermometer	ea.	22066	





MXT® Needle Files

Multi-purpose files especially useful for cutting Siltek® treated stainless steel columns.

Description	qty.	cat.#	price
MXT Needle Files	2-pk.	21601	



21601

Mini Hand Drill Set

Drill ferrules to the proper ID in seconds! Includes three drills, for use with 0.25, 0.32, and 0.53 mm ID (0.4, 0.5, and 0.8 mm OD) capillary columns.

Description	qty.	cat.#	price
Mini Hand Drill Set	3-nioco cot	20122	



Stainless Steel Jet Reamers

A great tool for cleaning detector jets or removing stuck ferrules from other small orifices. Serrated design is optimal for removing silica deposits and other contaminants.

Description	qty.	cat.#	price
Stainless Steel Jet Reamers	6-piece set	20113	

Flashlight with Swivel Head

- Ideal for tight spaces—like inside a GC oven.
- Uses two AA batteries (included).



Description	qty.	cat.#	price	
Flachlight with Swivel Head	0.2	22187		

Septum Puller

- Use hooked end for removing septa and O-rings; pointed end works well for removing stuck ferrules or debris.
- Keep several on hand in your laboratory can be used in many different ways.





Remove septum without damaging an expensive weldment.

Dislodge a stuck ferrule quickly and easily—without scoring the fitting.

Description	qty.	cat.#	price
Septum Puller	ea.	20117	



save **money**!

You can save money on column installation tools by purchasing the MLE Capillary Tool Kits described on page 276.





20117

restek

innovation!

Septum Nut Removal Tool

for Agilent 5890/6890/6850/7890 GCs

• Easily remove the septum nut without touching the heated nutno more burned fingers!

- · Unique, ergonomic handle easy to grip.
- · Nut remains in tool for quick reattachment.



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innovation!



Slip tool over septum nut...



and remove, avoiding hot metal surfaces.



loosen nut...



Septum nut remains in tool until reinstalled.

qty.	cat.#	price
ea.	24918	
		12

Liner Cap Removing Tool for Thermo Scientific GCs:

Focus GC / TRACE GC / Ultra/TRACE GC x GC

- Easily loosens the liner cap from the injector.
- · Unique, ergonomic handle easy to grip.



Remove septum cap, septum holder, septum, and septum support.

Turn counter-

clockwise to

loosen liner

cap.



24937

Place tool on liner cap. Align two pins on bottom of tool with two open slots on liner cap.





Use tweezers (cat. #20101) to remove liner cap.

Description	Similar to TS part #	qty.	cat.#	price
Liner Cap Removing Tool	-			
for Thermo Scientific GCs	205 070 10	ea.	24937	



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Vespel® ferrules



Choosing the Right Ferrule

Although graphite and Vespel®/graphite ferrules each have advantages and disadvantages, the choice of ferrule composition is largely a personal preference. Graphite ferrules are soft, easy to seal, stable to 450 °C, and contain no binders that might off-gas. Vespel®/graphite ferrules work better for vacuum and highpressure applications (e.g., GC/MS) because they will not fragment or allow oxygen to permeate into the system, whereas graphite ferrules will. Because Vespel®/graphite ferrules are made from a harder material, they might require retightening after several temperature cycles. Alumaseal® ferrules are ideal for GC/MS. They will not crack or fragment and require no retightening after temperature cycles.



graphite ferrules



graphite ferrules



graphite ferrules

Vespel® Ferrules

- 100% high-temperature polyimide.
- · Stable to 350 °C.
- · Durable, leak-tight.

Graphite Ferrules

- Preconditioned to eliminate out-gassing.
- High-purity, high-density graphite.
- Smoother surface and cleaner edges than conventional graphite ferrules.
- · Contain no binders that can off-gas or adsorb analytes.
- Stable to 450 °C.

Vespel®/Graphite Ferrules

- 60%/40% Vespel®/graphite blend, offering the best combination of sealing and ease of workability.
- Seal with minimal torque, reusable, and preferred for vacuum and high-pressure uses.
- Stable to 400 °C.
- Recommended for mass spec transfer lines.

Capillary Ferrules

for ¹/₁₆-Inch Compression-Type Fittings Available in Vespel®, graphite, or Vespel®/graphite.

Ferrule II) Fits Column ID	qty.	Vespel	Graphite	Vespel/Graphite
0.3mm		10-pk.	22213	20233	20275
0.4mm	0.10/0.15/0.18/0.25/0.28mm	10-pk.	22214	20200	20211
0.4mm	0.10/0.15/0.18/0.25/0.28mm	50-pk.		20227	20229
0.5mm	0.32mm	10-pk.	22215	20201	20212
0.5mm	0.32mm	50-pk.	_	20228	20231
0.6mm	0.28mm**	10-pk.	_	_	20232
0.8mm	0.45/0.53mm	10-pk.	22216	20202	20213
0.8mm	0.45/0.53mm	50-pk.	_	20224	20230
1.0mm	0.75mm*	10-pk.	22217	21058	24912
1.2mm	0.75mm*	10-pk.	22218	_	
1.6mm	1.00mm*	10-pk.		21060	

Encapsulated Ferrules

for ¹/₁₆-Inch Compression Fittings

- Reusable—will not deform and stick in fittings.
- · Less torque needed to seal ferrule.
- · Restek's unique blend of graphite minimizes fragmentation and outgassing.

Ferrule ID	Fits Column ID	qty.	cat.#	price
0.4mm	0.25mm	10-pk.	21036	
0.5mm	0.32mm	10-pk.	21037	
0.8mm	0.53mm	10-nk	21038	

Compact Ferrules

for Agilent 5890/6890/6850/7890 GCs Available in graphite or Vespel®/graphite.

Ferrule ID	Fits Column ID	qty.	Graphite	Vespel/Graphite
0.4mm	0.25/0.28mm	10-pk.	20250	20238
0.4mm	0.25/0.28mm	50-pk.	20251	20239
0.5mm	0.32mm	10-pk.	21007	20248
0.5mm	0.32mm	50-pk.	21008	20249
0.8mm	0.45/0.53mm	10-pk.	20252	20263
0.8mm	0.45/0.53mm	50-pk.	20253	20264
1.0mm	0.75mm*	10-pk.	21059	
1.6mm	1.00mm*	10-pk.	21061	

^{*}For micropacked columns.

^{**}For 0.28 mm MXT columns.











Standard Ferrules

for ¹/₁₆-, ¹/₈-, and ¹/₄-Inch Fittings

Available in Vespel®, graphite, or Vespel®/graphite.

Fitting Size	Ferrule ID	qty.	Ves	pel	Graphite	Vespel/Graphite
1/4"	3/ ₁₆ ^{II}	5-pk.			_	 20258
1/16"	1/16"	10-pk.	22210		20207	20218
1/8"	1/8"	10-pk.	22211		20208	20219
1/8"	reduce to 1/16"	10-pk.			20209	20220
1/4"	1/4"	10-pk.	22212		20210	20221
1/411	reduce to 1/8"	10-pk.	22219		20225	20222
1/4"	reduce to 1/16"	10-pk.			20226	20223





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.	24848
1/16"	0.5mm	0.32mm	5-pk.	24849
1/8"	0.8mm	0.45/0.53mm	5-pk.	20246





Reducing Ferrules

Available in graphite or Vespel®/graphite.

Fitting Size	Ferrule ID	Fits Column ID	qty.	Graphite	Vespel/Graphite
1/8 ^{II}	0.4mm	0.25mm	5-pk.	20205	20254
1/8 ^{II}	0.5mm	0.32mm	5-pk.	20205	20255
1/8 ^{II}	0.8mm	0.53mm	5-pk.	20206	20215
1/4"	0.4mm	0.25mm	5-pk.	20203	_
1/4"	0.5mm	0.32mm	5-pk.	20203	20257
1/4"	0.8mm	0.45/0.53mm	5-pk.	20204	20217



Blank Ferrules

for 1/16-Inch Fittings

Fitting Size	Ferrule ID	qty.	Vespel/Graphite	
1/16"	no hole	10-nk	20240	



Alumaseal® Ferrules*

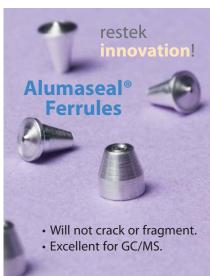
- Aluminum construction—will not crack or fragment.
- No retightening required after temperature cycles—excellent for GC/MS.
- Eliminate out-gassing, make leak-tight seals, for less detector noise.
- Unique two-piece design permanently locks on fused silica tubing without causing breakage.
- Will not stick in fittings, unlike Vespel® or graphite.
- Stable to 550 °C.
- Use with any 1/16" compression-type fitting.

Ferrule ID	Fits Column ID	qty.	cat.#	price
0.4mm	0.25mm	10-pk.	21472	
0.5mm	0.32mm	10-pk.	21473	
0.8mm	0.53mm	10-pk.	21474	

^{*}Patent pending.









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Teflon® Ferrules

- Upper temperature limit 250 °C.
- 100% Teflon®; completely inert.
- One-piece design requires no back ferrule.

Fitting Size	Ferrule ID	qty.	cat.#	price
1/ ₁₆ ^{II}	1/16"	10-pk.	21122	
1/ ₁₆ "	0.4mm	10-pk.	21123	
1/ ₁₆ "	0.5mm	10-pk.	21124	
1/ ₁₆ "	0.8mm	10-pk.	21125	
1/8"	1/8"	10-pk.	21126	
3/ ₁₆ ^{II}	3/ ₁₆ ^{II}	10-pk.	21127	
1/4"	1/ ₄ "	10-pk.	21128	

Graphite Ferrules

(M4 Fittings) for Thermo Scientific TRACE, 8000, 8000 TOP & Focus GCs

- Preconditioned to eliminate out-gassing.
- High-purity, high-density graphite.
- Smoother surface and cleaner edges than conventional graphite ferrules.
- Contain no binders that can off-gas or adsorb analytes.
- Stable to 450 °C.

Ferrule		Similar to	Gra	phite	Gra	phite
ID	Fits Column ID	TS part #	2-pk.	price	10-pk.	price
0.3mm	0.10/0.15mm	_	22221		22222	
		29013488 (2-pk.)				
0.4mm	0.18/0.28mm	29053488 (10-pk.)	20280		20281	
		29013487 (2-pk.)				
0.5mm	0.32mm	29053487 (10-pk.)	20282		20283	
		29013486 (2-pk.)				
0.8mm	0.45/0.53mm	29053486 (10-pk.)	20284		20285	





5 mm Ferrules

for Shimadzu 17A GCs

- For use with packed columns.
- Graphite construction.

Description	qty.	cat.#	price
5mm Ferrules for Shimadzu 17A GCs	10-pk.	21121	



Graphite Ferrules

for Shimadzu 17A, 2010, & 2014 GCs

- Graphite 2-piece construction.
- Available in 0.4, 0.5, and 0.8 mm sizes.
- · Packaged on mandrel for easy handling.

	Similar to					
Ferrule ID	Fits Column ID	Shimadzu part #	qty.	cat.#	price	
0.4mm	0.25mm and less	220-90765-00	10-pk.	24827		
0.5mm	0.32mm	221-32126-05	10-pk.	24828		
0.8mm	0.53mm	221-32126-08	10-pk.	24829		

also available Restek carries Swagelok® fittings in brass & stainless steel. See pages 313-315 or visit www.restek.com and search on Swagelok.







Restek Press-Tight® Connectors

Press-Tight® connectors are lightweight, quickly installed, and easy to use. They connect fused silica tubing having outside diameters ranging from 0.33 to 0.74 mm (Restek 0.1 to 0.53 mm ID). Press-Tight® connectors do not cause solvent tailing, or adsorb active compounds.

Press-Tight® connectors most often are used to connect a guard column to an analytical column. They also are used to connect columns differing in polarity, for unique separations, or to repair a broken column.





Make a clean, square cut for optimum connector performance. The cut on the right will produce a poor seal.

A brown ring indicates a proper seal.

Obtaining a leak-tight seal:

To achieve optimum performance from these connectors, begin with a properly cut fused silica column or retention gap end. Even if you use polyimide resin (cat.# 20445, page 288) for extra insurance, a poorly cut capillary column will make an inadequate seal.

Press the cut ends into the connector, then establish a flow, and leak-check the seal with a Restek Electronic Leak Detector (cat.# 22839, page 273) before heating the system. The seal is made permanent as the polyimide resin coating on the column bonds to the inner surface of the connector after several thermal cycles to 200 °C.

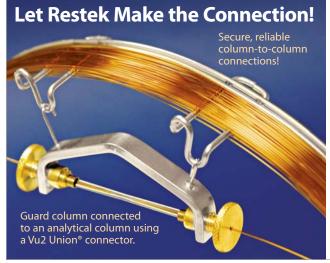


Press-Tight® connectors are effective at oven temperatures to 325 °C, the temperature at which the polyimide coating on the column decomposes and the connection will begin to leak. We strongly recommend using a Vu2 Union® (page 289) or SeCure® "Y" Connector (page 290) connector if oven temperatures will exceed 325 °C for prolonged periods of time.

Can Press-Tight® connectors be used with MXT® columns?

No. To achieve a leak-tight fused silica to stainless steel connection, we recommend an MXT® connector (see page 292).





Restek will connect a guard column/transfer line to any analytical column, using a Vu2 Union® connector. We will leak-check the connection and confirm analytical integrity by analyzing a test mixture. To order a preconnected guard column/transfer line, add the three-digit suffix from the chart below to any analytical column catalog number. Example: A 5 m, 0.32 mm ID guard column connected to a 30 m, 0.32 mm ID, 1.0 µm Rtx®-5 column is cat.# 10254-163.

5m Guard Column	cat.# suffix	Additional Cost*
0.15mm ID	-160	
0.18mm ID	-161	
0.25mm ID	-162	
0.32mm ID	-163	
0.53mm ID	-164	

10m Guard Column	cat.# suffix	Additional Cost*
0.25mm ID	-165	
0.32mm ID	-166	
0.53mm ID	-167	

Guard columns listed are intermediate polarity (IP) deactivated.

For more information about guard columns and other deactivations, see pages 31–35.

*Additional cost will be added to the price of the column









Press-Tight® Connectors

- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).



Universal Press-Tight® Connectors

- · Connect a guard column to an analytical column.
- · Repair a broken column.
- Connect a column outlet to a transfer line.

Description	5-pk./price	25-pk./price	100-pk./price
Universal Press-Tight Connectors	20400	20401	20402
Universal Press-Tight Connectors,			
Deactivated	20429	20430	
Universal Press-Tight Connectors,			
Siltek Treated	20480	20449	



Universal Angled Press-Tight® Connectors

- Ideal for connecting a guard column to an analytical column.
- Angle approximates the curvature of a capillary column, reduces strain on column-end connections.

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

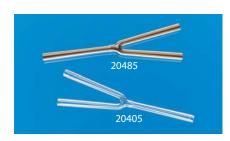


Universal "Y" Press-Tight® Connectors

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.

Description	ea./price	3-pk./price
Universal "Y" Press-Tight Connector	20405	20406
Universal "Y" Press-Tight Connector, Deactivated	20405-261	20406-261
Universal "Y" Press-Tight Connector, Siltek Treated	20485	20486



Single injection confirmational analyses!

20487

Universal Angled "Y" Press-Tight® Connectors

- Perform confirmation analysis with a single injection.
- Inlet and outlet ends conform to the column curvature—alleviates column-end connection strain.

Description	ea./price	3-pk./price
Universal Angled "Y" Press-Tight Connector	20403	20404
Universal Angled "Y" Press-Tight Connector, Deactivated	20403-261	20404-261
Universal Angled "Y" Press-Tight Connector, Siltek Treated	20487	20469



Polyimide Resin

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

Description	Max. Temp.	qty.	cat.#	price
Polyimide Resin	350°C	5 grams	20445	





Connectors

Vu2 Union® Connectors

- · Connect a guard column to an analytical column.
- · Connect a column to a transfer line.
- · Connect two columns in series.
- · Repair a broken column.
- · Fit both Restek cage designs.

Restek's Vu2 Union® connector combines the simplicity of a Press-Tight® union with the strength of a metal union.

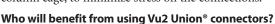
injector detector Vu2 Union® connector analytical column column

A guard column connected to an analytical

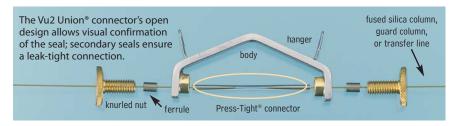
column by a Vu2 Union® connector.

How does a Vu2 Union® connector work?

A Press-Tight® union in the Vu2 Union® connector joins the fused silica ends together; the ferrule and knurled nut at each end of the connector hold the tubing in place via a secondary seal between the ferrule and the Press-Tight® union. Each knurled nut applies independent pressure to each ferrule, to make a leak-tight seal with the column end. These ultra-strong connections will not unexpectedly disconnect under temperature changes, vibrations, or other stresses normally encountered in GC analyses. The open design allows visual confirmation of the seal between the column and the Press-Tight® union, to ensure confidence in the connection. Hang the connector from the column cage, to minimize stress on the connections.



Any analyst using guard columns, transfer lines, or restrictor tubing, performing a dualcolumn analysis with columns connected in series, or seeking to repair a broken column will find Vu2 Union® connectors the simple, reliable, easy-to-use solution to their connection needs.



Kits include: Vu2 Union® body, 2 knurled nuts, 2 Press-Tight® unions, and 4 ferrules

Description	Ferrules Fit Column ID	qty.	cat.#	price
Vu2 Union Connector Kit	0.10/0.15mm	kit	22220	
Vu2 Union Connector Kit	0.18/0.28mm	kit	21105	
Vu2 Union Connector Kit	0.32mm	kit	21106	
Vu2 Union Connector Kit	0.45/0.53mm	kit	21107	
Knurled nut		2-pk.	21108	

Universal Press-Tight® Connectors

Description	5-pk.	/price	25-pk.	/price	100-pk./price
Universal Press-Tight Connectors	20400	\$49.50	20401	\$198	20402
Universal Press-Tight Connectors, Deactivated	20429	\$57.50	20430	\$228	
Universal Press-Tight Connectors, Siltek Treated	20480	\$62	20449	\$259	

Graphite Ferrules

for Vu2 Union® Connectors

- High-purity, high-density graphite.
- Stable to 450 °C.
- · No binders that can off-gas or adsorb analytes.
- · Smooth surface and clean edges.

Ferrule ID	Fits Column ID	Graphite 2	-pk./price	Graphite 10	-pk./price
0.3mm	0.10/0.15mm	22221	\$23	22222	
0.4mm	0.18/0.28mm	20280	\$23	20281	
0.5mm	0.32mm	20282	\$23	20283	
0.8mm					1/2







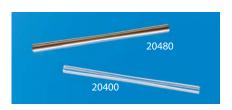
Fit both Restek cage designs.





Secure, reliable column-to-column connections!

NOTE: This product is not recommended for GC column-to-MS connections—use the Vacuum Vu-Union®. See page 291.







restek innovation!



Fit both Restek cage designs.



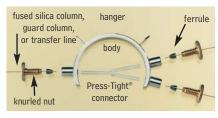
Patent pending.

SeCure® "Y" Connector Kits

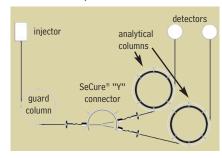
- Connect two analytical columns to a transfer line or guard column.
- Use standard "Y" Press-Tight® connectors and 1/16" graphite ferrules.
- Reliable seal integrity, will not unexpectedly disconnect during temperature-programmed analyses.
- Open design allows visual confirmation of the seal for added confidence in the connection.
- Fit both Restek cage designs.

Combine the simplicity of a "Y" Press-Tight® connector with the strength of a metal union. The ferrules and knurled nuts hold the fused silica tubing in place, which prevents the tubing from unexpectedly disconnecting, even at temperatures as high as 400 °C.

The SeCure® "Y" Connector's open design allows visual confirmation of the seal.



Dual-column confirmational analysis with a single injection—one of the SeCure® "Y" connector's many uses.



Kits include: SeCure® "Y" connector body, 3 knurled nuts, "Y" Universal Press-Tight® union, 3 ferrules.

Description	Ferrules Fit Column ID	qty.	cat.#	price
SeCure "Y" Connector Kit	0.18/0.25/0.28mm	kit	20276	
SeCure "Y" Connector Kit	0.32mm	kit	20277	
SeCure "Y" Connector Kit	0.45/0.53mm	kit	20278	
Knurled nut		3-pk.	20279	

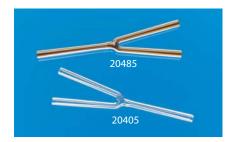
Secure, reliable column-to-column connections!

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 nonpolar compounds.
- Siltek® treated connectors are ideal for organochlorine pesticides analysis.
- Fit column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).

Description	ea./price		3-pk./price	
Universal "Y" Press-Tight Connector	20405	\$78	20406	
Universal "Y" Press-Tight Connector, Deactivated	20405-261	\$79	20406-261	
Universal "Y" Press-Tight Connector Siltek Treated	20485	\$80.50	20486	



Graphite Ferrules

for SeCure® "Y" Connectors

- · Preconditioned to minimize out-gassing.
- · High-purity, high-density graphite.
- Stable to 450 °C.
- No binders that can off-gas or adsorb analytes.
- · Smooth surface and clean edges.

Ferrule ID	Fits Column ID	Graphite 1	0-pk./price	Graphite 50	-pk./price
0.4mm	0.10/0.15/0.18/0.25/0.28mm	20200	\$32	20227	
0.5mm	0.32mm	20201	\$32	20228	
N 8mm	0 45/0 53mm	20202	\$32	20224	













Vacuum Vu-Union® Connector for GC/MS Applications

- · Connects analytical column to MS transfer line.
- Use under vacuum conditions.
- Use only with Vu-Union® Vespel®/graphite ferrules (order ferrules separately).
- Includes metal housing body, one deactivated tapered glass insert, and Vu-Union® Helping Hand.
- Fits column ODs from 0.33–0.74 mm (Restek 0.1 mm–0.53 mm ID).

A specifically designed Vu-Union® glass insert permits more torque to be applied to the ferrules without fear of cracking the insert. The hex end nuts enable you to use wrenches to tighten the end fittings.

Vu-Union® Helping Hand

The Helping Hand is designed to hold in place the metal housing of the Vacuum Vu-Union® connector. This allows you to easily assemble the columns in the glass insert and tighten the nuts. The Helping Hand is included with the Vacuum Vu-Union® connector.



Description	qty.	cat.#	price
Vacuum Vu-Union Connector (with the Helping Hand)	ea.	20427	
Replacement Inserts	3-pk.	20428	



Vu-Union® Vespel®/Graphite Ferrules

- Use with Vacuum Vu-Union® connectors.
- 60% Vespel®/40% graphite.
- 400 °C maximum operating temperature.

Ferrule ID	Fits Column	qty.	cat.#	price
0.3mm	< 0.22mm ID/< 0.4mm OD	10-pk.	20423	
0.4mm	0.25mm ID/0.4mm OD	10-pk.	20420	
0.5mm	0.32mm ID/0.5mm OD	10-pk.	20421	
0.8mm	0.45/0.53mm ID/0.8mm OD	10-pk.	20422	



Coupling GC Columns

An MXT® connector is a good alternative to a glass connector when coupling GC columns. This connector is constructed from stainless steel and will not break; it uses ferrules for sealing. The design ensures low dead volume, and Siltek® treatment ensures the MXT® connector is inert—both features help minimize peak tailing. MXT® connectors can be used to connect metal-to-metal, metal-to-fused silica, or fused silica-to-fused silica tubing. When connecting metal tubing, use ½32-inch stainless steel ferrules (listed above); for fused silica tubing, use Valcon polyimide adaptor ferrules (see page 292).



Gerstel GRAPHPACK® 3D/2 Connectors & Ferrules

GRAPHPACK® technology provides a complete system that quickly and reliably makes a leak-tight, low-dead-volume connection. The central component is a metal-jacketed graphite ferrule—the ideal seal for GC applications.

Gerstel GRAPHPACK® 3D/2 Connectors

Description	Fits Column ID	qty.	cat.#	price
GRAPHPACK 3D/2 Connector*	0.25mm to 0.32mm ID	ea.	20272	
GRAPHPACK 3D/2 Connector*	0.45mm to 0.7mm ID	ea.	20273	



GRAPHPACK® 3D/2 Ferrules

Ferrule ID	Fits Column ID	qty.	cat.#	price
0.4mm	0.25mm	10-pk.	20271	
0.5mm	0.32mm	10-pk.	20270	
0.8mm	0.45/0.53mm	10-pk.	20274	

^{*}Use only with GRAPHPACK 3D/2 ferrules.

GRAPHPACK® 2m Ferrules

Fits Column ID	Similar to Gerstel part #	qty.	cat.#	price
0.25mm	001805-040-00	10-pk.	22223	
0.32mm	001805-045-00	10-pk.	22224	
0.53mm	001805-007-00	10-pk.	22225	



Ferrule Removal Kit

The tapered tools in this kit have teeth designed to grip and remove fused silica adaptor ferrules that have become stuck in the fitting detail. Each kit has two tools: one for removing ¹/₃₂-inch adaptor ferrules and one for removing ¹/₁₆-inch adaptor ferrules.

Description	Valco #	qty.	cat.#	price
Ferrule Removal Kit	FRK1	kit	20146	



1/4-Inch-3/16-Inch Open-End Wrenches

High-quality miniature wrenches to use with MXT® low-dead-volume connectors.

Description	qty.	cat.#	price
1/4"-3/16" Open-End Wrenches	2-piece set	20388	







MXT®-Union Connector Kits for Fused Silica Columns

- · Low-dead-volume, leak-tight connection.
- · Reusable.
- · Siltek® treatment ensures maximum inertness.
- Ideal for connecting a guard column or transfer line to an analytical column.
- Use to oven temperatures of 360 °C.
- · Available in union and "Y" configurations.
- Can also be used for fused silica to metal connections.

These MXT® connectors can be used with fused silica tubing, because of a Valcon polyimide 1/32-inch one-piece fused silica adaptor. This unique graphite-reinforced composite allows a capillary column to slide into the adaptor and be locked in place simply by loosening and tightening the fitting.



MXT®-Union Connector Kits

for Fused Silica Columns Each kit contains the MXT®

union, two 1/32-inch nuts and two one-piece fused silica adaptors.



Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21386	
For 0.32mm ID Fused Silica Columns	kit	21385	
For 0.53mm TD Fused Silica Columns	kit	21384	

MXT® "Y"-Union Connector Kits for Fused Silica Columns

Each kit contains the MXT® union, three 1/32-inch nuts and three onepiece fused silica adaptors.



Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21389	
For 0.32mm ID Fused Silica Columns	kit	21388	
For 0.53mm ID Fused Silica Columns	kit	21387	





¹/₃₂-Inch Valco[®] Adaptor Ferrules (Valcon Polyimide)

Fused silica adaptor ferrules are Valcon polyimide, a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at temperatures to 350 °C. The determining factor for selecting adaptor ferrule size is the fused silica tubing OD.

Tubing OD	Tubing ID	Valco #	qty.	cat.#	price
$0.25 \le 0.40$ mm	0.25mm	FS.4-5	5-pk.	20137	
$0.40 \le 0.50$ mm	0.32mm	FS.5-5	5-pk.	20140	
$0.50 \le 0.80$ mm	0.53mm	ZF.5V-5	5-pk.	20141	
1/2" Replacement N	lut .		5-nk	20389	

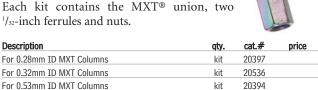


These low-dead-volume connectors are Siltek® treated to make them inert to active compounds, just like our MXT® columns. They can be used at temperatures up to 430 °C without degrading the deactivated layer. Purchase the appropriate ferrules for connecting 0.28, 0.32 or 0.53 mm ID tubing.

MXT® Low-Dead-Volume Connector Kits for Metal Columns

- · Connect a guard column/transfer line to an MXT® stainless steel column.
- · Low thermal mass tracks rapid oven temperature programming.
- · Stainless steel ferrules and nuts.
- · Available in "Y" and union configurations.
- · Siltek® treatment ensures ultimate inertness.

1/32-inch ferrules and nuts.



MXT® Low-Dead-Volume "Y" **Connector Kits**

for Metal Columns

Connect two MXT® columns to one inlet or one MXT® column to two detectors.

Each kit contains the MXT® union, three 1/32-inch ferrules and nuts.



Description	qty.	cat.#	price
For 0.28mm ID MXT Columns	kit	20396	
For 0.32mm ID MXT Columns	kit	20537	
For 0.53mm ID MXT Columns	kit	20395	

Replacement Ferrules (1/32-Inch Stainless Steel) for MXT® Connectors



Ferrule ID	Fits Column ID	qty.	cat.#	price
0.59mm	0.28mm	10-pk.	20398	
0.53mm	0.32mm	10-pk.	20535	
0.79mm	0.53mm	10-pk.	20399	









Zero-Dead-Volume Valco® Internal Union

Ends of tubing seat squarely at bottoms of fitting details. 300 series stainless steel. For 1/16" OD tubing. Stainless steel ferrules included.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Union	0.15mm	ZU1XC	ea.	20147	
Internal Union	0.25mm	ZU1C	ea.	20148	
Internal Union	0.75mm	ZU1	ea.	20149	
Internal Union	1/ ₁₆ "	ZU1T	ea.	20150	



Zero-Dead-Volume Valco® Internal Reducing Union

Connect two sizes of tubing, using zero-dead-volume fittings on each end. For 1/8" to 1/16" OD tubing. Stainless steel ferrules included.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Reducing Union	0.25mm	ZRU21C	ea.	20151	
Internal Reducing Union	0.75mm	ZRU21	ea.	20152	
Internal Reducing Union	1/16"	ZRU21T	ea.	20153	



Zero-Dead-Volume Valco® Internal Tee

Connect three lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Tee	0.25mm	ZT1C	ea.	20154	
Internal Tee	0.75mm	ZT1	ea.	20155	



Zero-Dead-Volume Valco® Internal Cross

Connect four lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Cross	0.25mm	ZX1C	ea.	20156	
Internal Cross	0.75mm	ZX1	ea.	20157	



Male Pipe to Valco® Internal Adapter

Makes a minimum volume connection from a female pipe fitting on a pressure gauge or regulator to a Valco® zero-dead-volume fitting. 300 series stainless steel; stainless steel ferrules included.

Description	Fitting Size	Bore	Valco #	qty.	cat.#	price
Male Pipe to Valco	1/8" NPT Male					
Internal Adapter	to 1/16" ZDV	1.0mm	PZA21	ea.	20158	
Male Pipe to Valco	1/4" NPT Male					
Internal Adapter	to 1/16" ZDV	1.0mm	PZA41	ea.	20159	





Nuts & Ferrules (1/16-Inch Stainless Steel)

for Valco® Connectors

Description	Valco #	qty.	cat.#	price
Ferrules, 1/16" Stainless Steel	ZF1-10	10-pk.	20286	
Nuts, 1/16" Stainless Steel	ZN1-10	10-pk.	20287	



1/16-Inch Valco® Adaptor Ferrules

			Va	Icon Polyi	imide		Polyimid	le
Tubing OD	Tubing ID	Valco #	qty.	cat.#	price	qty.	cat.#	price
0.25-0.4mm	0.1-0.25mm	FS1.4-5	5-pk.	20142		2-pk.	21015	
0.4-0.5mm	0.32mm	FS1.5-5	5-pk.	20143		2-pk.	21016	
0.5-0.8mm	0.53mm	FS1.8-5	5-pk.	20144				
0.8mm (1/32")		FS1.9-5	5-pk.	20145		_	_	









GC ACCESSORIESGAS PURIFICATION ESSENTIALS





Restek provides the following total gas system solution:

- Restek gas purifiers provide cost-effective gas purity assurance.
- Restek stainless steel and copper tubing, precleaned and ready to use.
- Swagelok® and Parker A-Lok® tube fittings consistently deliver high-quality performance.
- · Extensive line of hand tools to make your work easier and faster, including Restek's Electronic Leak Detector.
- Gas generators for an uninterupted supply of gas.
- Gas regulators for optimum line pressure control of all your chromatography gases.

Restek's Technical Service Team (800-356-1688, ext. 4 or support@restek.com) or your Restek representative can answer your questions and provide system-design advice. From the gas source to your point of use, we offer the products and services that ensure the purity of your gas.





Why do I need to use traps and where should I install them?

Carrier gas must contain less than 1 ppm of oxygen, water vapor, or any other trace contaminant, to prevent column degradation, shortened column lifetime, and increased stationary phase bleed. Contaminants cause ghost peaks to appear during temperature programming and degrade the validity of analytical data. The expense of using high-purity gases in combination with carrier gas purifiers will be offset by longer column lifetime and less instrument maintenance.

Moisture Removal

Moisture in carrier gas lines will prematurely degrade oxygen and hydrocarbon traps and increase detector noise (particularly with ECDs). As a precaution, we highly recommend installing a moisture trap before the hydrocarbon and oxygen traps on all carrier gas lines. Our favorite trap is the Super-Clean Ultra-High Capacity Moisture Filter (cat.# 22028, pg. 299).

Hydrocarbon Removal

Use a hydrocarbon trap if your gas has a potential source of hydrocarbon contaminants (e.g., an oil pump in an air compressor) or if you suspect you are observing carrier gas ghost peaks. Install the hydrocarbon trap after the moisture trap, to prevent moisture from degrading the hydrocarbon-trapping ability of the activated carbon in the hydrocarbon trap. We recommend the Super-Clean Ultra-High Capacity Hydrocarbon Filter (cat.# 22030, pg. 299).

Oxygen Removal

Oxygen is a column killer and can enter the system at any connection which is leaking. It is present even in ultra high purity gases, as minute leaks at fittings allow oxygen to influx against the concentration gradient. There are many choices for oxygen removal—the Super-Clean Ultra-High Capacity Oxygen Filter (cat.# 22029, pg. 299) is popular with Restek chemists. Because oxygen can enter a gas line at any fitting, the oxygen trap should be the last connection before the gas line enters the chromatograph.

Leak Checking

To prevent column degradation, increase column lifetime, and decrease stationary phase bleed, carrier gas should always contain <1 ppm oxygen. This can be monitored by continually leak checking all gas system connections using Restek's Electronic Leak Detector (cat.# 22839, page 296).

for **more** info

Questions about which carrier gas purifier to use?

Call 800-354 1600 or 014 252 1200 out 4 or contact your Doctol representative to discuss your application with our technical corvice chamiets





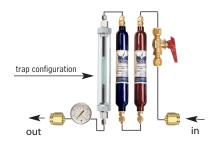




Restek Gas Management System

- Removes moisture, hydrocarbons, and oxygen from carrier gas, extending column lifetime.
- Produces high-purity carrier gas for most applications.
- Includes one each: moisture, hydrocarbon, and indicating oxygen trap.
- · Replacing traps is safe and easy.
- · Maximum flow: 1 liter/minute.

Restek has put together a convenient unit providing gas purification all in one step. Complete with an indicating trap, your gas purification issues are handled in one central location.



did you know?

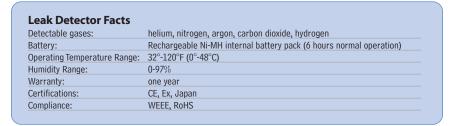
The Restek Gas Management System removes water vapor (to 10 ppb), hydrocarbons (to 0.1 ppm), and oxygen (to less than 0.1 ppm) with three traps housed in one unit.

Description	Fittings	qty.	cat.#	price
Restek Gas Management System	includes fittings for 1/8" and 1/4" gas line	kit	21999	
Replacement Traps		qty.	cat.#	price
High-Capacity Moisture Trap	1/8" Nickel-Plated Brass	ea.	21997	
Capillary-Grade Hydrocarbon Trap	1/8" Nickel-Plated Brass	ea.	21991	
Indicating Oxygen Trap	1/8" Nickel-Plated Brass	ea.	22010	

Restek Electronic Leak Detector

Don't let a small leak turn into a costly repair—protect your instrument and analytical column by using a Restek Leak Detector.

Backed by a 1-year warranty, the new Restek Leak Detector sets an industry standard for performance and affordability in hand-held leak detectors.



Description	qty.	cat.#	price
Leak Detector with Hard-Sided Carrying Case and Universal Charger Set			
(US, UK, European, Australian)	ea.	22839	
Leak Detector Routine Maintenance Review**	ea.	22839-R	
Soft-Side Storage Case	ea.	22657	
Small Probe Adaptor	ea.	22658	

*Caution: The Restek Electronic Leak Detector is designed to detect trace amounts of hydrogen in a noncombustible environment. It is NOT designed for determining leaks in a combustible environment. A combustible gas detector should be used for determining combustible gas leaks under any condition. The Restek Electronic Leak Detector may be used for determining trace amounts of hydrogen in a GC environment only.

**Routine maintenance includes inspection of the probe tip, internal/external tubing and a battery replacement.



Dimensions: 12" x 14" x 3" (30.5 x 35.6 x 7.6 cm)







Avoid using liquid leak detectors on a GC! Liquids can be drawn into the system.

for more info

See page 273 for more information on the Restek Electronic Leak Detector.











Dimensions: 91/4" x 2" (23.5 x 5.1 cm)

High-Capacity Indicating Oxygen Trap

- · Indicator changes from dark blue to black as oxygen & water are trapped.
- · Lasts longer than three smaller traps.
- · Use with all carrier gases.
- Ambient operating temperature, 100 psi (689 kPa) operating
- · Built-in frit traps microparticles.
- Outlet gas purity:

 O_2 < 0.1 ppm when inlet does not exceed 15 ppm. $H_2O < 0.5$ ppm when inlet does not exceed 10 ppm.

- Maximum operating pressure: 150 psi (1,034 kPa).
- · Maximum flow: 16.5 L/min.

Description	Fittings	qty.	cat.#	price
	1/8" Compression			
High-Capacity Indicating Oxygen Trap	Tube Brass	ea.	20624	
	1/4" Compression			
High-Capacity Indicating Oxygen Trap	Tube Brass	ea.	20623	
Replacement Cartridge (fits 1/4" or 1/8"	housing)	ea.	20625	
Replacement O-Rings				
(5 small O-rings and 5 large O-rings)		kit	22081	



Dimensions: 10" x 11/4" (25.4 x 3.2 cm)

Indicating Oxygen Trap

- · Indicator changes from light green to grey as oxygen is trapped.
- · Heavy-walled glass body, protected by polycarbonate sleeve, prevents oxygen & water infusion.
- · Prepurged for fast stabilization.
- 100 psi (689 kPa) maximum operating pressure.
- Reduces oxygen to 0.1 ppm.
- 10 µm frits at inlet and outlet.

Description	Fittings	qty.	cat.#	price
Indicating Oxygen Trap	1/8" Brass	ea.	22010	
Indicating Oxygen Trap	1/4" Brass	ea.	22011	



Dimensions: 11" x 11/2" (27.9 x 3.8 cm)

High-Capacity Oxygen Trap

- Removes up to 600 mg of oxygen or 2 g of water.
- Long life—typically purifies more than five 200 ft³ cylinders.
- Reduces oxygen to 15 ppb.
- Maximum operating pressure: 250 psi (1,724 kPa).
- Flow: 3 L/min. @ 32 psi (221 kPa).

Description	Fittings	qty.	cat.#	price
High-Capacity Oxygen Trap	1/8" Nickel-Plated Brass	ea.	20601	
High-Canacity Oxygen Tran	1/4" Nickel-Plated Brass	63	20600	

Rechargeable Molecular Sieve S-Trap

- Traps water vapor; increases column and oxygen trap lifetime.
- Reduces baseline noise from sensitive detectors such as ECDs and mass spectrometers.
- Activated and ready to use.
- Reduces water to less than 1 ppm.
- Fits in GC oven for easy thermal recharging.
- · Maximum flow: 1 L/min.



Dimensions: 63/4" x 55/8" (17.1 x 14.3 cm)

Description	Fittings	qty.	cat.#	price
Rechargeable Molecular Sieve S-Trap	1/8" Brass	ea.	20686	
Rechargeable Molecular Sieve S-Trap	1/4" Brass	ea.	20685	



Dimensions: 11" x 11/2" (27.9 x 3.8 cm)

High-Capacity Moisture Trap

- Purged with ultra-high-purity helium; ready to use.
- Reduces water to less than 15 ppb.
- Maximum operating pressure: 250 psi (1,724 kPa).
- Maximum flow: 1.25 L/min.

Description	Fittings	qty.	cat.#	price
High-Capacity Moisture Trap	1/8" Nickel-Plated Brass	ea.	21997	
High-Capacity Moisture Trap	1/4" Nickel-Plated Brass	ea.	20638	



Dimensions: 13" x 2" (33 x 5.1 cm)

Indicating Moisture Trap

- Reduces water to less than 10 ppb; indicator changes from orange to green at 5% relative humidity.
- · Prepurged for fast stabilization.
- · Reduces noise from high-sensitivity detectors.
- Heavy-walled glass body prevents oxygen & water infusion.
- 10 µm frit prevents microparticulate damage to needle valves and flow controllers.
- Maximum operating pressure: 100 psi (689 kPa).

Description	Fittings	qty.	cat.#	price
Indicating Moisture Trap	1/8" Brass	ea.	22014	
Indicating Moisture Trap	1/4" Brass	ea.	22015	

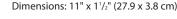






GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Gas Traps





Capillary-Grade Hydrocarbon Trap

- Packed with an extremely high surface area, baked coconut shell-based activated carbon.
- · Purged with ultra-high purity helium.
- Reduces organics to 0.1 ppm (assuming 100 ppm input).
- Maximum operating pressure: 250 psi (1,724 kPa).

Description	Fittings	qty.	cat.#	price
Capillary-Grade Hydrocarbon				
Trap	1/8" Nickel-Plated Brass	ea.	21991	
Capillary-Grade Hydrocarbon				
Trap	1/4" Nickel-Plated Brass	ea.	21992	



Dimensions: 91/4" x 21/4" (23.5 x 5.7 cm)

Refillable Hydrocarbon Trap

- Removes trace impurities from carrier gas.
- Reduces organics to 0.1 ppm (assuming 100 ppm input).
- 60 µm frit prevents gas contamination by purifier particles.
- Good for purge & trap systems.
- · Refillable and rechargeable.
- Maximum operating pressure: 125 psig (862 kPa).
- · Maximum flow: 5 L/min.

Description	Fittings	qty.	cat.#	price
Refillable Hydrocarbon Trap	1/8" Nickel-Plated Brass	ea.	22012	
Refillable Hydrocarbon Trap	1/4" Nickel-Plated Brass	ea.	22013	
Carbon Refill (two recharges)		pint	20626	

Hydrocarbon S-Trap

- Removes hydrocarbons and other contaminants.
- Reduces organics to 0.1 ppm (assuming 100 ppm input).
- Each individually activated to ensure maximum efficiency.
- Fits in GC oven for easy thermal recharging.
- Maximum operating pressure: 60 psi (414 kPa).



Dimensions: 6³/₄" x 5⁵/₈" (17.1 x 14.3 cm)

Description	Fittings	qty.	cat.#	price
Hydrocarbon S-Trap	1/8" Brass	ea.	22016	



Dimensions: 6" x 13/4" (15.2 x 4.4 cm)

Indicating Hydrocarbon Trap for Air Compressors

- Pass compressed air from an oil-filled air compressor through this trap, to remove oil vapors and mist.
- Indicator changes from pale pink to deep pink.

Description	Fittings	qty.	cat.#	price
Indicating Hydrocarbon Trap for				
Air Compressors	1/8" Brass	ea.	20637	
Indicating Hydrocarbon Trap for				
Air Compressors	1/4" Brass	ea.	20636	



Dimensions: 6" x 1" (15.2 x 2.5 cm)

High-Capacity Split Vent Trap

- Reduces the release of hazardous materials from the capillary split vent into the lab.
- · Includes connecting lines and mounting kit.

Description	Fittings	qty.	cat.#	price
High-Capacity Split Vent Trap	1/8"	ea.	20698	
High-Capacity Split Vent Trap	1/8"	5-pk.	20699	



Dimensions: 6" x 1" (15.2 x 2.5 cm)

ECD Vent Trap

- Reduces the release of hazardous materials from the ECD vent into the lab.
- · Includes connecting lines and mounting kit.

Description	Fittings	qty.	cat.#	price	
ECD Vent Trap	1/ ₈ "	ea.	22017		



Carrier Gas Purity

Carrier gas should contain less than 1 ppm of oxygen, moisture, or other trace contaminants, to prevent column degradation, increase column lifetime, and decrease stationary phase bleed.

The expense of using high-purity gases in combination with carrier gas line purifiers will be offset by longer column lifetime and less GC maintenance.







Restek Super-Clean Gas Filters

- High-purity output ensures 99.9999% pure gas (at max. flow of 2 L/min.).
- "Quick connect" fittings for easy, leak-tight cartridge changes.
- Glass inside to prevent diffusion; polycarbonate housing outside for safety.
- All traps measure $10^{5}/8$ " x $1^{3}/4$ " (27 x 4.4 cm).
- Each base plate unit measures 4" x 4" x $1^{7}/_{8}$ " (10.2 x 10.2 x 4.8 cm).

Table I Each Super-Clean gas filter provides high-purity outlet gas.

Maximum Pressure/ Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Maximum Pressure/ Maximum Maximum Pressure/ Pressure/ Maximum Pressure/ Pres		Pressure/ Maximum Indicator			H ₂ 0 (g)		pacity ——— Hydrocarbons (g)	Estimated Lifetime (years)
Moisture cat.# 22028	>99.9999	11 bar 159 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	7.2	_	_	>2
Oxygen cat.# 22029	>99.9999	11 bar 159 psi/ 7 L/min.	Inert carrier gas	Green to grey	NA	1,000	_	>2
Hydrocarbons cat.# 22030	>99.9999	11 bar 159 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	No indicator	NA	_	123	>2
Fuel Gas¹ cat.# 22022	>99.9999	11 bar 159 psi/ 7 L/min.	Inert carrier gas Air Hydrogen	Yellow/orange to clear	3.5	_	24 ³	>1.5
Triple ² cat.# 22020	>99.9999	11 bar 159 psi/ 7 L/min.	Inert carrier gas	Yellow/orange to clear Green to grey	1.8	500	43	>1
Helium Specific ² cat.# 21982	>99.9999	11 bar 159 psi/ 7 L/min.	Helium	Yellow/orange to clear Green to grey	1.8	500	_	>1

¹Removes hydrocarbons, moisture.





Restek Super-Clean Gas Filter Kits and Replacements

Description	qty.	cat.#	price
Carrier Gas Cleaning Kit			
Includes: mounting base plate, 1/8" inlet/outlet fittings, and oxygen/moisture/hydrocarbon Triple Gas Filter	kit	22019	
Fuel Gas Purification Kit			
Includes: mounting base plate, 1/8" inlet/outlet fittings, and hydrocarbon/moisture Fuel Gas Filter	kit	22021	
Ultra-High Capacity Hydrocarbon Filter	ea.	22030	
Ultra-High Capacity Moisture Filter	ea.	22028	
Ultra-High Capacity Oxygen Filter	ea.	22029	
Replacement Triple Gas Filter (removes oxygen, moisture and hydrocarbons)	ea.	22020	
Replacement Fuel Gas Filter (removes moisture and hydrocarbons)	ea.	22022	
Helium-Specific Carrier Gas Cleaning Kit			
Includes: mounting base plate, 1/8" inlet/outlet fittings, and oxygen/moisture/hydrocarbon Helium-Specific Filter	kit	21983	
Replacement Helium-Specific Gas Filter (removes oxygen, moisture and hydrocarbons)	ea.	21982	
Gas Filter Bundle Kit			
Includes: one Triple Gas Filter (cat.# 22020) and two Fuel Gas Filters (cat.# 22022)	kit	22031	



Oxygen and Moisture Traps

Restek highly recommends oxygen and moisture traps for make-up gas when operating sensitive detectors such as electron capture detectors (ECD). The hydrogen reaction gas for sensitive electrolytic conductivity detectors (ELCD) also requires a hydrocarbon trap, to remove trace impurities.





22025





did you know?

All Restek Super-Clean gas filter cartridges (except hydrocarbon filter cat.# 22030) feature easy-to-read indicators. The indicator code is shown on every trap so there is no confusion about when to replace it.



²Removes hydrocarbons, moisture, oxygen.

Super-Clean Gas Filters









- Standard base plate fittings are 1/8". To adapt to 1/4", order 1/8" to 1/4" tube-end unions.
- End fittings available in brass or stainless steel.
- · Base plates fit all Super-Clean gas filters listed.

		Brass		S	Stainless S	Steel
Description	qty.	cat.#	price	qty.	cat.#	price
Filter Base Plate, Single-Position	ea.	22025	\$231	ea.	22344	
Filter Base Plate, 2-Position	ea.	22026	\$425	ea.	22345	
Filter Base Plate, 3-Position	ea.	22027	\$609	ea.	22346	

Wall Mounting Bracket

Base plates can be mounted by using screws and the mounting holes on the base plate, or by using this optional wall mounting bracket.



Description	qty.	cat.#	price
Wall Mounting Bracket for Super-Clean Base Plates	ea.	21984	

Replacement O-Rings for Cartridge Base Plates

Pack includes 10 large O-rings and 10 small O-rings.



Description	qty.	cat.#	price
Replacement O-Rings for Cartridge Base Plates	20-pk.	22023	

1/8-Inch to 1/4-Inch Tube-End Unions

To adapt 1/8" Super-Clean base plate fittings to 1/4", use 1/8" to 1/4" tube-end unions.

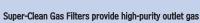


	Brass				Stainless Steel			
Description	qty.	cat.#	price	qty.	cat.#	price		
Tube-End Reducer, 1/8" tube to 1/4"	5-pk.	21833	\$31	2-pk.	21933			

Restek Super-Clean Gas Trapping System for LC/MS

A Super-Clean quick-change cartridge system efficiently removes hydrocarbons from nitrogen!

- · Changing filters is quick and easy.
- Up to 20 L of hydrocarbon-free nitrogen per minute.
- · Filters connected in parallel to handle high flows of LC/MS.



Type of filter:	Hydrocarbon (charcoal)
Max. Flow:	20 L/min.
Outlet Gas Quality %:	99.9999%
Maximum Pressure:	11 bar/159 psi
Estimated Lifetime:	3 to 6 months

20 L of purified nitrogen per minute!

Description	qty.	cat.#	price
Super-Clean Gas-Trapping System			
(2-position base plate, 2 charcoal filters)	ea.	22062	
Replacement Hydrocarbon (Charcoal) Filters	2-pk.	22061	

also available

Looking for a nitrogen generator for your LC/MS?

Restek offers a full line of Parker LC/MS generators.

See page 307.





Sign up for Restek's e-newsletter, The Buzz www.restek.com/buzz







Restek Click-On Inline Super-Clean Purification Gas Traps

- High-purity output ensures 99.9999% pure gas.
- Click-On fittings for easy, leak-tight cartridge changes; brass or stainless steel, '/4" or '/8".
- Helium-Specific Triple Gas Trap is ideal for GC/MS—it contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.
- Triple Gas Trap is ideal for purifying carrier gas—it contains oxygen, moisture, and hydrocarbon scrubbers in one cartridge.
- Fuel Gas Trap is ideal for purifying flame ionization detector (FID) fuel gases, removing both moisture and hydrocarbons.

Click-On adaptor connectors allow cartridges to be exchanged without introducing oxygen, moisture, and hydrocarbons. Spring-loaded check valves seal when a filter is removed and open only when a new filter has been locked in place.

Filter Type	Gas Quality at Outlet	Maximum Pressure	Maximum Flow (L/min.)	Use For	H₂O (g)	Capacity 0 ₂ (mL)	Hydrocarbons (g) (<i>n</i> -butane)	Estimated Lifetime (years)
Moisture cat.#22467	>99.9999	11 bar 160 psi	25	Inert carrier gas, helium, air, H ₂	15	NA	NA	>3
Oxygen cat.#22468	>99.9999	11 bar 160 psi	25	Inert carrier gas	NA	2,000	NA	>3
Hydrocarbon cat.#22466	>99.9999	11 bar 160 psi	25	Inert carrier gas, helium, air, H ₂	NA	NA	24	>3
Fuel Gas¹ cat.#22465	>99.9999	11 bar 160 psi	25	Inert carrier gas, helium, air, H ₂	7	NA	12	>2
Triple² cat.#22464	>99.9999	11 bar 160 psi	25	Inert carrier gas	4	1,000	8	>2

¹Removes hydrocarbons, moisture.

NOTE: Super-Clean Gas Filters are recommended for purifying noncorrosive gases with low concentrations of contaminants. The maximum concentration of oxygen in the incoming gas stream for oxygen purifiers is 0.5%.



Description	qty.	cat.#	price
Carrier Gas Purification Kit			
Includes: (2) 1/8" SS connectors			
and (1) oxygen/moisture/hydrocarbon triple trap	kit	22456	
Includes: (2) 1/8" brass connectors			
and (1) oxygen/moisture/hydrocarbon triple trap	kit	22457	
Includes: (2) 1/4" SS connectors			
and (1) oxygen/moisture/hydrocarbon triple trap	kit	22458	
Includes: (2) 1/4" brass connectors			
and (1) oxygen/moisture/hydrocarbon triple trap	kit	22459	
Fuel Gas Purification Kit			
Includes: (4) 1/8" SS connectors			
and (2) hydrocarbon/moisture traps	kit	22460	
Includes: (4) 1/8" brass connectors			
and (2) hydrocarbon/moisture traps	kit	22461	
Includes: (4) 1/4" SS connectors			
and (2) hydrocarbon/moisture traps	kit	22462	
Includes: (4) 1/4" brass connectors			
and (2) hydrocarbon/moisture traps	kit	22463	

See next page for more Click-On Inline Super-Clean products.







Trap replacement depends on the quality of the incoming gas. Use the double connector and install an indicating cartridge after a trap to indicate when the trap should be replaced.





To prevent settling of dessicant, mount vertically, not horizontally.







²Removes hydrocarbons, moisture, oxygen.

GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Super-Clean Gas Filters



Click-On Inline Super-Clean Indicator

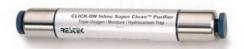
- · Oxygen: green to grey
- · Moisture: beige to clear

Description	qty.	cat.#	price
Click-On Inline Super-Clean Indicator (oxygen, moisture)	ea.	22474	



Install an indicator after the Click-On inline gas filter so there is no confusion about when to replace the traps.





Click-On Inline Super-Clean Replacement Gas Traps

Description	qty.	cat.#	price
Triple Trap (removes oxygen, moisture and hydrocarbons)	ea.	22464	
Fuel Gas Trap (removes moisture and hydrocarbons)	ea.	22465	

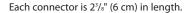


Click-On Inline Super-Clean Ultra-High Capacity Gas Traps

Description	qty.	cat.#	price
Ultra-High Capacity Hydrocarbon Trap	ea.	22466	
Ultra-High Capacity Moisture Trap	ea.	22467	
Ultra-High Capacity Oxygen Trap	ea.	22468	



Click-On connectors allow you to change traps quickly, without introducing oxygen into your system.





Description	Fittings	qty.	cat.#	price
Click-On Inline Super-Clean Connectors	1/8" Brass	2-pk.	22475	
	1/8" Stainless			
Click-On Inline Super-Clean Connectors	Steel	2-pk.	22476	
Click-On Inline Super-Clean Connectors	1/4" Brass	2-pk.	22477	
	1/4" Stainless			
Click-On Inline Super-Clean Connectors	Steel	2-pk.	22478	

Click-On Inline Super-Clean Double Connector

Connects any Click-On trap to a Click-On indicator.

Each double connector is 3" (8 cm) in length.







Accessories

for Inline Super-Clean Gas Traps and Connectors

Description	qty.	cat.#	price
Wall-Mounting Clamps			
for Click-On Inline Super-Clean Gas Traps	4-pk.	22480	
Replacement O-Rings for Click-On Inline Super-Clean			
Connectors (includes 10 large and 10 small)	20-pk.	22481	

Helium-Specific Click-On Inline Super-Clean Gas Trap and Connector Kits

Description	qty.	cat.#	price
Helium-Specific Carrier Gas Cleaning Kits			
Includes: (2) 1/8" SS connectors			
and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22469	
Includes: (2) 1/8" brass connectors			
and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22470	
Includes: (2) 1/4" SS connectors			
and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22471	
Includes: (2) 1/4" brass connectors			
and (1) oxygen/moisture/hydrocarbon helium-specific triple trap	kit	22472	
Replacement Trap			
Helium-Specific Replacement Triple Trap (removes oxygen, moisture and hydrocarbons)	ea.	22473	



did you **know**?

Helium-Specific Click-On Inline Super-Clean Gas Trap and Kits are designed specifically for purification of helium in GC/MS systems.







VICI® Mat/Sen® Gas-Specific Purifier Modules

- Replace separate oxygen, moisture, and hydrocarbon traps with one multiple-bed purifier, specific for purifying helium, hydrogen, nitrogen, or air.
- Reduce gas impurities from ppm to low ppb levels.
- Decrease baseline noise and increase GC/MS sensitivity.
- Prepurged with the specified gas, to shorten downtime.

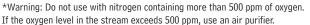
Performance for these purifiers is optimized by incorporating a multiple-bed format that progressively lowers concentrations of contaminants at each successive bed. VICI® Mat/Sen® purifiers are guaranteed to produce gases that are purer than 99.9999%, when supplied with gas of 99.995% purity, and are prepurged with the specified gas to speed conditioning. Purifier capacity is approximately four tanks of gas at 99.995% (50 ppm) purity, and correspondingly longer for purer gases.



Please Note: We recommend using an indicating oxygen trap (e.g., cat.# 22029, pg. 225) downstream from a VICI® Mat/Sen® purifier to continually ensure gas purity and indicate absolute change-out time.

Specifications: Length	21" (53.3 cm)
	, ,
Diameter	1.5" (3.8 cm)
Maximum Inlet Pressure	1,000 psi (6895 kPa)
Maximum Recommended Flow	500 mL/min.
Pressure Drop from 120 psi (82)	7 kPa)
inlet at at 0-500mL/min.:	<0.20 psi (1.4 kPa)
End Fittings	compression, 1/8" or 1/4", stainless steel
Shipping Weight	3.04 lb. (1,300 g)

Gas-Specific		(Compression	n Tube Fitt	tings	
Purifier Module		¹/₄-inch			¹/s-inch	
	qty.	cat.#	price	qty.	cat.#	price
Helium Purifier Module	ea.	22600		ea.	22601	
Hydrogen Purifier Module	ea.	22602		ea.	22603	
Nitrogen Purifier Module*	ea.	22604		ea.	22605	
Air Purifier Module	ea.	22606		ea.	22607	
AIT PUTITIET WOODIE	ea.	22000		ea.	22007	





Dimensions: 13" x 1/2" (33 x 1.3 cm)

Thermal Gas High Capacity Purifier Replacement Getter Tube

Each replacement getter tube has 12 L oxygen and 35 L water vapor capacity at a minimum flow rate of 1 liter/minute and removes oxygen, water, carbon monoxide, carbon dioxide, hydrocarbons (except methane) to ppb levels; pure enough for MS. Typically requires replacement once per year.

Change tube when gas pressure drops.

Replacement Getter Tubes	qty.	cat.#	price
1/8" Fittings (Similar to Supelco part# 2-2396)	ea.	21661	
1/4" Fittings (Similar to Supelco part# 2-2398)	ea.	21660	

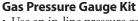
Replacement getter tubes must be used with a Thermal Gas Purifier housing unit.

22820 22064 21610 22800 23032

Replacement Chemical Traps

- Easy to install.
- Attach to same fittings as original manufacturer's equipment.
- Built-in frits retain fine particles; adsorbents remove both moisture and hydrocarbons.

	Similar to			
Description	Agilent part #	qty.	cat.#	price
Replacement Split Vent Trap				
for Agilent 6890/6850 GCs	G1544-80550	ea.	22820	
Replacement Chemical Trap				
for Agilent 5890 GCs	05890-61260	ea.	21610	
Split Vent Line (32-inch)				
for Agilent GCs				
Includes: all installation hardware	19251-80525	2-pk.	22800	
O-Rings for Agilent Trap Fittings	5180-4181	25-pk.	22064	
Optional Split Vent Trap Assembly				
for Agilent 6890/6850 GCs	G1544-60610	kit	23031	
Replacement Traps (2) and O-Rings (4)	G1544-80530	kit	23032	



- Use an in-line pressure gauge to indicate when a thermal gas purifier getter tube should be replaced.
- Includes 1/8" tee and 0–100 psi (0-689 kPa) gauge.

Description	qty.	cat.#	price
In-line Gas Pressure Gauge Kit			
for Thermal Gas Purifiers	kit	21657	









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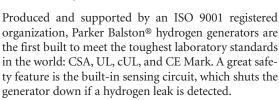


Parker Balston® PEM Hydrogen Generators

- Proton Exchange Membrane (PEM) cell eliminates the need for liquid electrolytes.
- Reliably generate 99.9995% pure hydrogen—for better chromatography.
- Eliminates high-pressure cylinders—greater convenience and improved lab safety.
- Compact unit, requiring only one square foot of bench space.
- Quick and easy to service and maintain; unique display lighting changes color for easy status checks and water level indication.
- Comes with a set of universal power adapters for US, European, and Asian plug types.



pressure gas cylinders. The new Proton Exchange Membrane (PEM) cell eliminates the use of liquid electrolytes with hydrogen generators. Deionized water is all that is required to generate hydrogen for weeks of continuous operation. With an output capacity of up to 510 cc/minute, one generator can supply 99.9995% pure hydrogen for up to several FIDs. Based on cylinder gas savings alone, a hydrogen generator pays for itself in one or two years.



99.9995% pure hydrogen
$10-100 \text{ psig} \pm 1 \text{ psig} (69-689 \text{ kPa} \pm 7 \text{ kPa})$
¹/s" compression
100-230 VAC/50-60 Hz
17.12"h x 13.46"w x 17.95"d
(43.48 x 34.19 x 45.6 cm)
40 lbs. (18 kg) dry

Œ

Description	Model #	Capacity	qty.	cat.#	price
Hydrogen Generator	H2PEM-100	100cc/min.	ea.	23065	
Hydrogen Generator	H2PEM-165	165cc/min.	ea.	23066	
Hydrogen Generator	H2PEM-260	260cc/min.	ea.	23067	
Hydrogen Generator	H2PEM-510	510cc/min.	ea.	23068	
Replacement and Maintenance Components for Hy	ydrogen Generators (for all mode	s listed above)			
Replacement Desiccant Cartridge for H2PEM Gene	erators		ea.	23069	
6-Month Maintenance Kit for H2PEM Generators					
Includes: 1 deionizer cartridge, 1 water filter, 3 environmental filters			kit	23070	
24-Month Maintenance Kit for H2PEM Generators					
Includes: 1 deionizer cartridge, 1 water filter, 3 er	nvironmental filters, 1 water level	sensor, 1 water pump,			
and 1 desiccant cartridge			kit	23071	





free literature

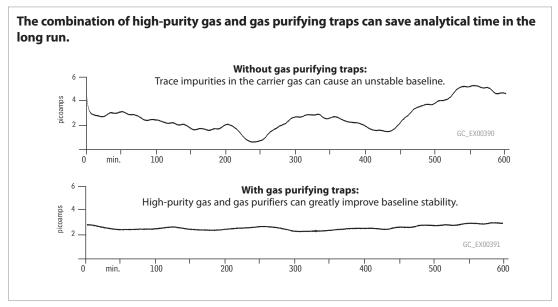
Parker Balston® Hydrogen Generators

Download your free copy from www.restek.com

lit. cat.# 580053A



Using purifying gas traps in combination with a gas generator can improve chromatography tremendously and improve column lifetime.









Parker Balston® Model FID-1000 and FID-2500 Gas Stations

- · Single unit produces UHP zero air from house compressed air and 99.995% pure hydrogen from deionized water.
- Ideal for supplying up to 5-6 FIDs.
- · Eliminates inconvenient and dangerous gas cylinders.
- Silent operation, minimal operator attention required.

Parker Balston® Gas Stations provide both UHP grade hydrogen gas and zero grade air for flame ionization detectors. The system is specifically designed to supply gas to FIDs and to support flame thermionic and flame photometric detectors. The units produce zero air by purifying compressed air to a total hydrocarbon concentration of 0.1 ppm or less (measured as methane).

The hydrogen generators produce hydrogen gas from deionized water, using the principle of electrolytic dissociation of water and hydrogen proton conduction through a proton exchange membrane cell.



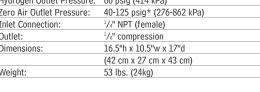


Produce zero air and pure hydrogen from one unit!

Specifications

Hydrogen Purity:	99.9995%
Zero Air Purity:	FID-1000:
	< 0.1 ppm total hydrocarbons as methane
	FID-2500:
	< 0.05 ppm total hydrocarbons as methane
Max. Hydrogen Flow Rate:	FID-1000: 90 cc/min.
	FID-2500: 250 cc/min.
Max. Zero Air Flow Rate:	FID-1000: 1000 cc/min.
	FID-2500: 2500 cc/min.

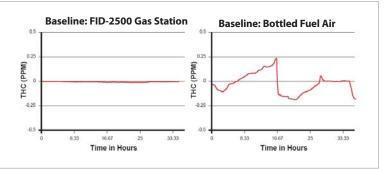
Power:	120 VAC/amp, 60 Hz, 400 watts
Hydrogen Outlet Pressure:	60 psig (414 kPa)
Zero Air Outlet Pressure:	40-125 psig* (276-862 kPa)
Inlet Connection:	1/4" NPT (female)
Outlet:	¹/8" compression
Dimensions:	16.5"h x 10.5"w x 17"d
	(42 cm x 27 cm x 43 cm)
Weight:	53 lbs. (24kg)







Compare baselines produced by a Parker Balston® FID Gas Station and bottled fuel air. The baseline produced by the Parker Balston® Generator is flat, with no fluctuations or peaks; the chromatogram from the bottled air fuel supply has many peaks ranging from 0.25 ppm to -0.25 ppm total hydrocarbons.



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FID Gas Stations

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lit. cat.# 580051

Description	Model #	qty.	cat. #	price
Gas Station	Model FID-1000 (ideal for 1-2 FIDs)	ea.	20177	
Gas Station	Model FID-2500 (ideal for 5-6 FIDs)	ea.	24913	
Replacement Components for FID Gas Statio	ons			
Resin Bed Cartridge for Hydrogen Generato	rs in FID-1000 and FID-2500 Gas Stations	ea.	24914	
Replacement Desiccant Cartridge		ea.	21671	
FID Gas Station Maintenance Kit				
Includes: 1 desiccant cartridge, 1 resin bed	cartridge, 1 filter cartridge	ea.	24915	

ordering note

For international orders, please add the appropriate power cord suffix from the table below.

International Power Cord Sets

Just add the proper suffix to the catalog number for the gas generator you are ordering.

Location	qty.	cat.# suffix	price
United Kingdom (230VAC, 50/50Hz)	ea.	-550	
European (230VAC, 50/60Hz)	ea.	-551	
IEC Connector Only (230VAC, 50/60Hz)	ea.	-552	
Japanese (200VAC, 50/60Hz)	ea.	-556	
Japanese for Zero Air (100VAC, 50/60Hz)	ea.	-553	
Japanese for Hydrogen (100VAC, 50/60Hz)	ea.	-554	
Japanese for Nitrogen (100VAC, 50/60Hz)	ea.	-555	

Select the power cord you need.







^{*}Zero air inlet requires minimum of 40 psig (276 kPa) compressed air pressure.



Parker Balston® Nitrogen Gas Generators

- Produces ultra-pure nitrogen (up to 99.9995%).
- Flows from 1 to 75+ lpm.
- Require only a compressed air source and 110 volt AC power.
- Typical applications include GC carrier gas, make-up gas, and low flow sample concentrators.
- Maintenance kits include replacement filters.

Specifications

	Model HPN2-1100 or UHPN2-1100	Model HPN2-2000
Maximum Nitrogen Flow Rate:	See Flow Table	2 lpm
Nitrogen Purity:	99.9999%	99.99%
Minimum/Maximum Inlet Pressure:	60 psig/125 psig	75 psig/120 psig
	(414/862kPa)	(517/827kPa)
Electrical Requirements ¹ :	120 VAC/60 Hz	120 VAC/60 Hz
Dimensions:	35"h x 12"w x 16"d	35"h x 12"w x 16"d
	(89cm x 30cm x 41cm)	(89cm x 30cm x 41cm)
Shipping Weight:	115 lbs. (52 kg)	115 lbs. (52 kg)



Models HPN2-1100 and HPN2-2000 do not remove hydrocarbons. ¹Power consumption is: Model HPN2-1100

21654

= 25 Watts Model UHPN2-1100

= 700 Watts Model HPN2-2000 = 25 Watts

Flow Table for Models HPN2-2000, HPN2-1100, and UHPN2-1100

Inlet Air Pressure Maximum Outlet Flow (cc/min.)		Maximum
	Models HPN2-1100 and UHPN2-1100	Outlet Pressure
125 psig (862kPa)	1100	85 psig (586kPa)
110 psig (758kPa)	1000	75 psig (517kPa)
100 psig (689kPa)	900	65 psig (448kPa)
90 psig (621kPa)	800	60 psig (414kPa)
80 psig (552kPa)	700	50 psig (345kPa)
70 psig (483kPa)	600	45 psig (310kPa)
60 psig (414kPa)	500	35 psig (241kPa)
	Model HPN2-2000	
75-120 psig (517-827kP	a) 2000	90 psig (621kPa)



free literature

Nitrogen Generators

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lit. cat.# 580052

ordering

note

For international orders, please add the appropriate power cord suffix from the table below.

Nitrogen Generators	Model #	qty.	cat.#	price
Nitrogen Generator	HPN2-2000 (high purity)	ea.	21654	
Nitrogen Generator	HPN2-1100 (ultra-high purity)	ea.	21653	
Nitrogen Generator	HPN2-1100 with European Cord Set	ea.	21653-551	
Nitrogen Generator	HPN2-1100 with IEC Connector Only	ea.	21653-552	
Nitrogen Generator	UHPN2-1100 (ultra-high purity zero grade)	ea.	20697	
Maintenance Kits	Model #	qty.	cat.#	price
Maintenance Kit	for HPN2-1100, HPN2-2000, 76-96, 76-92	kit	21649	
Maintenance Kit	for UHPN2-1100, 76-94	kit	21655	

International Power Cord Sets

Just add the proper suffix to the catalog number for the gas generator you are ordering.

Select the power cord you need.

Location	qty.	cat.# suffix	price
United Kingdom (230VAC, 50/50Hz)	ea.	-550	
European (230VAC, 50/60Hz)	ea.	-551	
IEC Connector Only (230VAC, 50/60Hz)	ea.	-552	
Japanese (200VAC, 50/60Hz)	ea.	-556	
Japanese for Zero Air (100VAC, 50/60Hz)	ea.	-553	
Japanese for Hydrogen (100VAC, 50/60Hz)	ea.	-554	
Japanese for Nitrogen (100VAC, 50/60Hz)	ea.	-555	







Parker Balston® Nitrogen Gas Generators for LC/MS

- Turn compressed air into ultra-pure nitrogen (up to 99.5%).
- Flows from 1 to 44 lpm.
- Models N2-04, N2-14, N2-22, and N2-35 require no electricity.
- Safe, reliable, low maintenance.
- Maintenance kits include replacement filters.







Specifications	NitroFlow Lab	N2-04	N2-14 or N2-14A	N2-22 or N2-22A	N2-35 or N2-35A
Maximum Nitrogen					
Flow Rate:	32 lpm	8 lpm	78scfh at 95% purity	N2-22: 44 lpm N2-22A: 29 lpm	44 lpm
Nitrogen Purity:	99.50%	99%	95.0%-99.5%	99%	99%
Min/Max Inlet					
Pressure:	N/A	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig	60 psig/145 psig
Electrical					
Requirements:	120VAC/60Hz	None	N2-14: None	N2-22: None	N2-35: None
			N2-14A: 120VAC/60Hz	N2-22A: 120VAC/60Hz	N2-35A: 120VAC/60Hz
Dimensions:	27.6"h x 35.4"w x 12.2"d	11"h x 13"w x 16"d	50"h x 16"w x 16"d	50"h x 16"w x 16"d	50"h x 16"w x 16"d
	(70cm x 90cm x 31cm)	(27cm x 34cm x 41cm)	(127cm x 41cm x 41cm)	(127cm x 41cm x 41cm)	(127cm x 41cm x 41cm)
Shipping Weight:	205 lbs. (93 kg)	43 lbs. (20 kg)	N2-14: 75 lbs. (34 kg)	N2-22: 101 lbs. (46 kg)	N2-35: 115 lbs. (52 kg)
			N2-14A: 80 lbs. (36 kg)	N2-22A: 106 lbs. (48 kg)	N2-35A: 119 lbs. (54 kg)



Nitrogen Generators for LC/MS	Model #	qty.	cat.#	price
Nitrogen Generator for LC/MS	NitroFlow Lab Model, 32 lpm max. flow	ea.	22129	
Nitrogen Generator for LC/MS	N2-04 Model for ELSD, 8 lpm max. flow	ea.	22130	
Nitrogen Generator for LC/MS	N2-14 (general purpose) 78 scfh max. flow at 95% purity	ea.	20677	
Nitrogen Generator for LC/MS	N2-14 with European Power Cord	ea.	20677-551	
Nitrogen Generator for LC/MS	N2-14A (general purpose w/oxygen analyzer) 78 scfh max. flow at 95% purity	ea.	21652	
Nitrogen Generator for LC/MS	N2-22 Model, 44 lpm max. flow	ea.	22131	
Nitrogen Generator for LC/MS	N2-22A Model, 29 lpm max. flow	ea.	22132	
Nitrogen Generator for LC/MS	N2-35 Model, 44 lpm max. flow	ea.	22133	
Nitrogen Generator for LC/MS	N2-35A Model, 44 lpm max. flow	ea.	22134	
Maintenance Kits	Model #	qty.	cat.#	price
Maintenance Kit	for N2-14, N2-14A, 75-72, 75-720NA	kit	21648	
Maintenance Kit with Carbon Filter	for N2-14, N2-14A, 75-72, 75-720NA	ea.	22135	

ordering

note

For **international orders**, please add the appropriate power cord suffix from the table on the previous page.



...and Introducing the **NEW** Restek **ProFLOW 6000**

Electronic Flowmeter



Go to www.restek.com/flowmeter for details.





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ECHnology Pty Ltd

Specifications





Parker Balston® Zero Air Generators

- Turn in-house compressed air into ultra-pure air (<0.1 ppm total hydrocarbons).
- Remove hydrocarbons to less than 0.1 ppm by catalytic oxidation.
- Operate at 40 to 125 psi (276-862 kPa).
- Typical payback is less than one year, based on cylinder costs.
- Install easily and take up little bench space.
- · Maintenance kits include a one year supply of prefilters and final filter.



	Model	of FIDs*
	75-83NA	Up to 3
	HPZA-3500	Up to 11
	HPZA-7000	Up to 23
	HPZA-18000	Up to 60
N. D.	HPZA-30000	Up to 100

*based on a 300 cc/min. fuel air rate

Number

•		
Maximum Zero Air Flow Rate:	75-83NA	1 lpm
	HPZA-3500	3.5 lpm
	HPZA-7000	7 lpm
	HPZA-18000	18 lpm
	HPZA-30000	30 lpm
Outlet Hydrocarbon Concentration (as methane):	75-83NA	< 0.1 ppm
	HPZA-30000	< 0.1 ppm
	Other Models	< .05 ppm
Minimum/Maximum Inlet Air Pressure:	40 psig/125 psig (2	276/862 kPa)
Maximum Inlet Hydrocarbon Concentration (as methane):	100 ppm	
Pressure Drop at Maximum Flow Rate:	4 psi (28 kPa) diffe	rential
Maximum Inlet Air Temperature:	78°F (25°C)	
Inlet/Outlet Ports:	1/4" NPT (female)	
Start-up Time to Specified Hydrocarbon Concentration:	45 minutes	
Electrical Requirements:	75-83NA	120 VAC/60 Hz, 0.5 amps
	Other Models	120 VAC/60 Hz, 3.5 amps
Dimensions:	75-83NA	12"h x 10"w x 3"d (30 cm x 25 cm x 8 cm)
	Other Models	16"h x 11"w x 13"d (42 cm x 27 cm x 3 cm)
Shipping Weight:	75-83NA	7 lbs. (3 kg)
5	Other Models	41 lbs. (19 kg)

Zero Air Generator Model # Capacity cat.# qty. price Zero Air Generator 75-83NA 1000cc/min. 20684 ea. Zero Air Generator 75-83NA with United Kingdom Power Cord 1000cc/min. ea. 20684-550 Zero Air Generator HPZA-3500 3500cc/min. ea. 20680 HPZA-3500 with European Power Cord 20680-551 Zero Air Generator 3500cc/min ea. HPZA-7000 7000cc/min. 20681 Zero Air Generator ea. Zero Air Generator HPZA-18000 18,000cc/min. 20682 ea. Zero Air Generator HPZA-30000 30,000cc/min 20683 ea. Maintenance Kits (includes a one-year supply of prefilters and final filter) qty. cat.# price Maintenance Kit for 75-83NA kit 21646 for HPZA-3500, HPZA-7000, HPZA-18000, HPZA-30000 Maintenance Kit kit 21647 Replacement Catalyst Towers Model # Capacity qty. cat. # price for 75-83NA 22005 Replacement Catalyst Tower 1000cc/min. ea. 22004 for HPZA-3500 3500cc/min. Replacement Catalyst Tower ea. Replacement Catalyst Tower for HPZA-7000 7000cc/min ea. 22006 Replacement Catalyst Tower for HPZA-18000 18,000cc/min 22007 ea. 30,000cc/min 22008 Replacement Catalyst Tower for HPZA-30000

ordering

note

For international orders, please add the appropriate power cord suffix from the table below.



free literature

Zero Air Generators

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lit. cat.# 580050

International Power Cord Sets

Just add the proper suffix to the catalog number for the gas generator you are ordering.

Location	qty.	cat.# suffix	price
United Kingdom (230VAC, 50/50Hz)	ea.	-550	
European (230VAC, 50/60Hz)	ea.	-551	
IEC Connector Only (230VAC, 50/60Hz)	ea.	-552	
Japanese (200VAC, 50/60Hz)	ea.	-556	
Japanese for Zero Air (100VAC, 50/60Hz)	ea.	-553	
Japanese for Hydrogen (100VAC, 50/60Hz)	ea.	-554	
Japanese for Nitrogen (100VAC, 50/60Hz)	ea.	-555	









Silcosteel® Regulators

Single and dual stage regulators are now available with Silcosteel® surface treatment. This proprietary passivation process, developed by SilcoTek™, provides excellent inertness for sulfur and mercury calibration standards and improved corrosion resistance over bare 316L stainless steel or other more expensive alloys.



Silcosteel® treated sampling and transfer systems allow oil and gas exploration, chemical and petrochemical plants, and refineries to obtain accurate sulfur and mercury data the first time, every time, with no delay, sample errors, or false readings, down to partper-billion (ppb) levels. Analysts charged with monitoring sulfur and mercury levels in process streams can save thousands of dollars in improved yields, better test cycle times, and improved system reliability.



Applications:

- · CEM Continuous Emission Monitoring
- Environmental Stack and Gas Emission Standards
- Low level sulfur and mercury analysis
- · Reactive or corrosive gases
- Off-shore platform systems
- · Corrosive and salt water exposure

Outlet pressure: 0 to 100 psig
Outlet gauge: 30" — 0 to 200 psig
Inlet gauge: 0 to 4000 psig

Outlet assembly: diaphragm valve, 1/4" tube fitting

qty.	cat.#	price
ea.	21361-5	
ea.	21361-6	
ea.	21361-11	
ea.	21360-2	
ea.	21360-7	
ea.	21360-12	
	ea. ea. ea. ea.	ea. 21361-5 ea. 21361-6 ea. 21361-11 ea. 21360-2 ea. 21360-7

For other CGA fittings, please contact your local Restek representative.





also available
Regulators for use
with gas standards.
See pages 433-434.









Overview of Restek's Ultra-High Purity (UHP) Gas Regulators

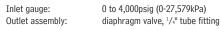
- Regulators feature metal-to-metal seals throughout for long-term leak-tightness.
- Metal diaphragm outlet valve ensures gas purity.
- Each regulator is helium leak-test-certifiable to 1x10⁻⁸ scc/sec.
- Temperature range: -40 °C to 60 °C

Ultra-High Purity (UHP) Brass Body Gas Regulators

UHP brass regulators are the best choice when using ultra-high purity carrier gas for sensitive GC applications using MS, PID, or ECD detection methods. They feature reduced internal dead-volume, relative to stainless steel bodies. The metal valve diaphragm ensures leak-free shut-off. Oxidation-resistant chrome plating maintains a like-new appearance.

Dual-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators

- · Oxidation-resistant, chrome-plated.
- Most stable outlet pressure control.
- Secondary pressure regulation not needed.
- Most widely used regulator.
- Less internal volume than stainless steel gas regulators.



Fitting	Outlet Pressure	Outlet Gauge	qty.	cat.#	price
CGA 580 (N ₂ He, Ar)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	21667	
CGA 350 (H ₂ , P ₅)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	21668	
CGA 590 (Air)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	21669	



Single-Stage Ultra-High Purity Chrome-Plated Brass Gas Regulators

- · Oxidation-resistant, chrome-plated.
- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.

Inlet gauge: 0 to 4,000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	Outlet Pressure	Outlet Gauge	qty.	cat.#	price
CGA 580 (N ₂ , He, Ar)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20646	
CGA 350 (H ₂ , P ₅)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20647	
CGA 590 (Air)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20648	



Ultra-High Purity Chrome-Plated Brass Line Gas Regulator

- Oxidation-resistant, chrome-plated.
- Use where you need to reduce the line pressure by 20 psig (138 kPa) or more.
- Same purity protection as high-pressure cylinder regulators.

Inlet connections: $^{1}/_{4}$ " FPT Outlet assembly: $^{1}/_{4}$ " FPT port

Fitting	Outlet Pressure	Outlet Gauge	qty.	cat.#	price
1/4" female NPT ports*	0-50psig (0-345kPa)	30" - 0 to 100psig (0-689kPa)	ea.	21666	
1/4" female NPT ports*	0-100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	22452	

^{*}Order appropriate male connector, pipe-to-tube fittings.



Swagelok® Male Connector, Pipe-to-Tube Fittings



Fitting Type	Size	Similar to		Brass			Stainless St	eel
	(inches)	Swagelok	qty.	cat.#	price	qty.	cat.#	price
Male Connector	1/4" to 1/4" NPT	400-1-4	10-pk.	23134	\$44	2-pk.	23184	
Male Connector	1/8" to 1/4" NPT	200-1-4	10-pk.	23136	\$50	2-pk.	23186	
Tube End Reducer	1/4" to 1/8"	200-R-4	5-pk.	23129	\$29	2-pk.	23179	







Ultra-High Purity (UHP) Stainless Steel Body Gas Regulators

UHP stainless steel regulators are the standard for ultra-high-purity and corrosion-resistant pressure regulation. They are more easily purged of atmospheric components, compared to brass gas regulators, making them ideal for the most demanding applications. Stainless steel is especially useful in atmospheres of dry corrosive gases such as hydrogen.

Dual-Stage Ultra-High Purity Stainless Steel Gas Regulators

- Most stable outlet pressure control.
- Secondary pressure regulation not needed.

Inlet gauge: 0 to 4,000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	Outlet Pressure	Outlet Gauge	qty.	cat.#	price
CGA 580 (N2, He, Ar)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20662	
CGA 350 (H ₂ , P ₅)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20663	
CGA 590 (Air)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20664	



Single-Stage Ultra-High Purity Stainless Steel Gas Regulators

- Use when there is secondary pressure regulation downstream.
- Identical gas purity protection as with dual-stage gas regulators.

Inlet gauge: 0 to 4,000psig (0-27,579kPa)
Outlet assembly: diaphragm valve, 1/4" tube fitting

Fitting	Outlet Pressure	Outlet Gauge	qty.	cat.#	price
CGA 580 (N2, He, Ar)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20665	
CGA 350 (H ₂ , P ₅)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20666	
CGA 590 (Air)	0 to 100psig (0-689kPa)	30" - 0 to 200psig (0-1379kPa)	ea.	20667	





Flexible Stainless Steel Hoses

Description	Length	Fittings	qty.	cat. #	price
Flexible Stainless Steel Hose	36"	1/4" Female NPT	ea.	21339	
Flexible Stainless Steel Hose	18"	1/4" Female NPT	ea.	21340	
Flexible Stainless Steel Hose	36"	Stainless Steel CGA 580	ea.	21344	



Flammable Gas Flash Arrestor—Factory Mutual Approved*

- · Gas flow shuts off in the event of a flashback.
- Flame extinguished—flame front prevented from reaching the gas supply.
- No gas flow restriction under normal operating conditions.

Description	qty.	cat.#	price
Flammable Gas Flash Arrestor, Brass Body	ea.	21334	

^{*}Approved for brass body servicing hydrogen, acetylene, propane, or natural gas only.



CGA Fittings

CGA-specified nuts and nipples with internal frit, 1/4-inch NPT nickel-plated brass.

Description	qty.	cat.#	price
CGA 580 Fitting, (N ₂ , He, Ar)	ea.	21336	
CGA 350 Fitting, (H₂, P₅)	ea.	21337	
CGA 590 Fitting, (Air)	ea.	21338	



ordering **note**

International Fittings

All gas regulators are available with the following BS (British Standard) and DIN (German Industrial Standards Organization) connections. Please contact your local Restek representative for more information.

BS 341 #01	BS 341 #08	BS 341 #15	DIN 477 #06	DIN 477 #10	DIN 477 #14
BS 341 #02	BS 341 #10	DIN 477 #01	DIN 477 #07	DIN 477 #11	DIN 477 #15
BS 341 #03	BS 341 #13	DIN 477 #03	DIN 477 #08	DIN 477 #12	
BS 341 #04					





GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Gas Pressure System Accessories

Critical Purity Automatic Switchover System for Noncorrosive Gases

High-purity automatic switchover systems provide a continuous supply of high purity gas to the laboratory, process, or instrument, to allow you to replace a depleted gas source without interrup-



tion in the gas supply. Continuous gas supply is achieved by setting the two regulators at slightly different pressures and discharging one side of the system at a time. These models include flexible, all-stainless-steel pigtails with armor casing. The CGA connection on each pigtail has a check valve in the gland to prevent contamination and minimize purging requirements.

Switching pressure: 200psig/170psig (1379/1172kPa)
Inlet connections: flexible SS pigtails (36")
Line regulator: 0 to 100psig (0-689kPa)

Brass Automatic Switchover System

Di doc i dicinalio di licono lo di dicini			
with Line Regulator	qty.	cat.#	price
CGA 580 (N ₂ , He, Ar)	ea.	20668580	
CGA 350 (H ₂ , P ₅)	ea.	20668350	
CGA 590 (Air)	ea.	20668590	
Stainless Steel Automatic Switchover System			
with Line Regulator	qty.	cat.#	price
CGA 580 (N ₂ , He, Ar)	ea.	21593580	

Protocol Station

The protocol station is designed for convenient wall mounting of high-purity gas regulators. Wall mounting provides ease of use, prevents gas regulator damage, and improves safety. Either chrome-plated brass or 316



stainless steel option is complete with a 3-foot, flexible, all-stainless-steel pigtail with armor casing. The CGA connection on the pigtail has an integral check valve in the gland to prevent contamination during cylinder changeout.

Chrome-Plated Brass Protocol Station*	qty.	cat.#	price
CGA 580 (N ₂ , He, Ar)	ea.	21347	
CGA 350 (H ₂ , P ₅)	ea.	21348	
CGA 590 (Air)	ea.	21349	
Stainless Steel Protocol Station*	qty.	cat.#	price
CGA 580 (N ₂ , He, Ar)	ea.	21327	

^{*}Pressure regulator not included. Order separately.



Cylinder Valve Wrench

This specially-designed wrench enables easy opening of cylinder valves that are fitted with a hand wheel. It is also suitable for removing difficult cylinder caps.





Universal Cylinder Wrench

Use this versatile wrench for tightening gauges and gas regulator CGA fittings to cylinder outlets and pipe thread connections.

Description	qty.	cat.#	price
Universal Cylinder Wrench	ea.	21322	



Backpressure Gas Regulator

Capillary GC inlet systems have backpressure regulators to maintain a constant upstream pressure and rapidly respond to catastrophic leaks. The 0–60 psig (0-414 kPa) operating range is sufficient to operate a 105 m, 0.25 mm ID column at its optimum flow rate.

Description	qty.	cat.#	price
Backpressure Gas Regulator	ea.	20635	

MINICYL Regulator

This compact general purpose regulator has many laboratory applications including air-drying glassware, sparging or evaporating solutions, and controlling pneumatic valves. It is constructed of lightweight aluminum with an elastomer diaphragm. Includes a 0–60 psig (0-414 kPa) gauge and either 1/s- or 1/4-inch tube fittings.



Description	Fittings	qty.	cat.#	price
MINICYL Regulator	1/8" Fittings	ea.	20610	
MINICYL Regulator	1/4" Fittings	ea.	20611	



Cylinder Holders, Wall Mounted

Prevent serious injuries! These holders are designed to prevent free-standing gas cylinders from tipping over and injuring personnel. The cast aluminum holder can be secured to a wall or the side of a work bench. Each mount will secure a cylinder 4-15 inches in diameter.

Size	qty.	cat.#	price
Single	ea.	21333	
Double	ea.	23400	
Triple	ea.	23401	
	Single Double	Single ea. Double ea.	Single ea. 21333 Double ea. 23400



Australian Distributors Importers & Manufacturers www.chromtech.net.au



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Swagelok® Fitting Kits (Brass & Stainless Steel)

Save more than 40% by purchasing a new Restek Swagelok® Fittings Kit, compared to prices for the individual parts!

- Includes the most common assortment of 1/8" and 1/4" brass or stainless steel fittings.
- · Parts list makes reordering easy.
- Parts come in sturdy tool box for easy and convenient storage.









Swagelok #, Description, qty included in kit

B-202-1	1/8" brass nut (20)
B-402-1	1/4" brass nut (20)
B-203-1	1/8" brass front ferrule (20)
B-403-1	1/4" brass front ferrule (20)
B-204-1	1/8" brass back ferrule (20)
B-404-1	1/4" brass back ferrule (20)
B-200-C	1/8" brass cap (6)
B-400-C	1/4" brass cap (6)
B-200-P	1/8" brass plug (6)
B-400-P	1/4" brass plug (6)
B-200-6	1/8" brass union (2)
B-400-6	1/4" brass union (2)
B-400-6-2	$^{1}/_{4}$ " to $^{1}/_{8}$ " brass reducing union (2)
B-200-3	1/8" brass tee (2)
B-400-3	1/4" brass tee (2)
B-400-R-2	$^{1}/_{8}$ " to $^{1}/_{4}$ " brass tube end reducer (2)
B-200-R-4	$^{1}/_{4}$ " to $^{1}/_{8}$ " brass tube end reducer (2)
MS-IG-200	1/8" inspection gauge (1)
MS-IG-400	1/4" inspection gauge (1)

Description	qty.	cat.#	price
Swagelok Fitting Kit, Brass	kit	23141	

Swagelok #, Description, qty included in kit

SS-202-1	¹/ ₈ " SS nut (20)
SS-402-1	1/4" SS nut (20)
SS-203-1	1/8" SS front ferrule (20)
SS-403-1	1/4" SS front ferrule (20)
SS-204-1	1/8" SS back ferrule (20)
SS-404-1	1/4" SS back ferrule (20)
SS-200-C	1/8" SS cap (6)
SS-400-C	1/4" SS cap (6)
SS-200-P	1/8" SS plug (6)
SS-400-P	1/4" SS plug (6)
SS-200-6	1/8" SS union (2)
SS-400-6	1/4" SS union (2)
SS-400-6-2	$^{1}/_{4}$ " to $^{1}/_{8}$ " SS reducing union (2)
SS-200-3	1/8" SS tee (2)
SS-400-3	1/4" SS tee (2)
SS-400-R-2	$^{1}/_{8}$ " to $^{1}/_{4}$ " SS tube end reducer (2
SS-200-R-4	$^{1}/_{4}$ " to $^{1}/_{8}$ " SS tube end reducer (2
MS-IG-200	1/8" inspection gauge (1)
MS-TG-400	1/4" inspection gauge (1)

Description	qty.	cat.#	price
Swagelok Fitting Kit, Stainless Steel	kit	23197	









Swagelok® Fittings (Brass & Stainless Steel)

Restek is pleased to offer one of the premier lines of fittings available for chromatographers in the market today. We can supply the entire line of Swagelok® fittings. If you don't see the exact product you're looking for, please call us for a quote.





















back ferrule



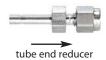
















port connector



male connector





male quick coupling

female connector



female quick coupling

				Brass		316 Gr	ade Stainle	ss Steel
Fitting Type	Size	Swagelok #	qty.	cat.#	price	qty.	cat.#	price
Nut	1/1611	102-1	20-pk.	23100		5-pk.	23150	
	1/8"	202-1	40-pk.	23101		10-pk.	23151	
	1/4"	402-1	40-pk.	23102		10-pk.	23152	
Front Ferrule	1/16"	103-1	20-pk.	23103		10-pk.	23153	
	1/8"	203-1	40-pk.	23104		20-pk.	23154	
	1/4"	403-1	40-pk.	23105		20-pk.	23155	
Back Ferrule	1/16"	104-1	20-pk.	23106		10-pk.	23156	
	1/8"	204-1	40-pk.	23107		20-pk.	23157	
	1/4"	404-1	40-pk.	23108		20-pk.	23158	
Nut & Ferrule Set	1/16"		10-pk.	23109		2-pk.	23159	
	1/8"		20-pk.	23110		5-pk.	23160	
	1/4"		20-pk.	23111		5-pk.	23161	
Plug	1/16"	100-P	5-pk.	23112		2-pk.	23162	
i lug	1/8"	200-P	10-pk.	23113		4-pk.	23163	
	1/4"	400-P	10-pk.	23114		4-pk.	23164	
Union	1/16"	100-6	3-pk.	23115		ea.	23165	
Ollion	1/8"	200-6	5-pk.	23116		2-pk.	23166	
	1/4"	400-6	5-pk.	23117		2-pk.	23167	
Reducing Union	1/8" to 1/16"	200-6-1	5-pk.	23118		ea.	23168	
Reducing Onion	1/4" to 1/16"	400-6-1	5-pk.	23119		2-pk.	23169	
	1/4" to 1/8"	400-6-2	5-pk.	23120		2-pk.	23170	
Tee	1/16"	100-3	2-pk.	23121		ea.	23171	
iee	1/8"	200-3	2-pk.	23122		ea.	23172	
	1/4"	400-3	2-pk.	23123		ea.	23173	
Cross	1/8"	200-4	2-pk.	23124		ea.	23174	
Cross	1/4"	400-4	2-pk.	23125		ea.	23175	
T. b - F- d D- d	1/8" to 1/16"	100-R-2	5-pk.	23126		2-pk.	23176	
Tube End Reducer	1/4" to 1/16"	100 R 2	5-pk.	23127		2-pk.	23177	
	1/8" to 1/4"	400-R-2	5-pk.	23128		2-pk.	23178	
	1/4" to 1/8"	200-R-4	5-pk.	23129		2-pk.	23179	
	1/8"	201-PC	5-pk.	23129		2-pk.	23180	
Port Connector	/8 1/4 ^{II}	401-PC	3-рк. 10-рк.	23131		2-pk. 2-pk.	23181	
	1/8" to 1/4"	401-PC 401-PC-2	10-рк. 5-рк.	23131		2-pk. 2-pk.	23182	
Male Connector	1/8" to 1/8" NPT	200-1-2	10-pk.	23133		2-pk.	23183	
	1/4" to 1/4" NPT	400-1-4	10-pk.	23134		2-pk.	23184	
	1/16" to 1/8" NPT	100-1-2	5-pk.	23135		2-pk.	23185	
	1/8" to 1/4" NPT	200-1-4	10-pk.	23136		2-pk.	23186	
	1/4" to 1/8" NPT	400-1-2	10-pk.	23137		2-pk.	23187	
Female Connector	1/8" to 1/8" NPT	200-7-2	5-pk.	23138		2-pk.	23188	
	1/4" to 1/4" NPT	400-7-4	5-pk.	23139		2-pk.	23189	
	1/4" to 1/8" NPT	400-7-2	5-pk.	23140		2-pk.	23190	
Male & Female	¹/₅" male*	QC4D-200	_	_		ea.	23191	
Quick Couplings	1/8" male	QC4S-200	_	_		ea.	23192	
	1/8" female*	QC4B-200	_	_		ea.	23193	
	1/4" male*	QC4D-400	_	_		ea.	23194	
	1/4" male	QC4S-400	_	_		ea.	23195	
	1/4" female*	QC4B-400	_	_		ea.	23196	

^{*}Includes self-sealing shut-off valve.

also available

Restek also carries specialized tools for Swagelok® fittings. See page 325.









Swagelok® Fittings (Siltek®/Sulfinert® & Silcosteel®-CR Treated)

- Full line of treated 1/16", 1/8", and 1/4" fittings.
- Silcosteel®-CR treatment enhances corrosion resistance by 10x, or more.
- Custom treatment available for any Swagelok® fitting, or other system parts not listed here (call for details).
- · Description of custom Restek coatings listed below.

			Siltek/Sulfinert Treated			Silcosteel-CR Treated		
Fitting Type	Size	Swagelok #	qty.	cat.#	price	qty.	cat.#	price
Jnion	1/16	SS-100-6	ea.	22540		ea.	22575	
	1/8"	SS-200-6	ea.	22541		ea.	22576	
	1/4"	SS-400-6	ea.	22542		ea.	22577	
	3/8"	SS-600-6	ea.	22909		ea.	22904	
Tee	1/16"	SS-100-3	ea.	22543		ea.	22578	
	1/8"	SS-200-3	ea.	22544		ea.	22579	
	1/4"	SS-400-3	ea.	22545		ea.	22580	
	3/811	SS-600-3	ea.	22910		ea.	22905	
Reducing Union	1/8" to 1/16"	SS-200-6-1	ea.	22546		ea.	22581	
	1/4" to 1/16"	SS-400-6-1	ea.	22547		ea.	22582	
	1/4" to 1/8"	SS-400-6-2	ea.	22548		ea.	22583	
	3/8" to 1/4"	SS-600-6-4	ea.	22911		ea.	22906	
Elbow	1/8"	SS-200-9	ea.	22549		ea.	22584	
	1/4"	SS-400-9	ea.	22550		ea.	22585	
Plug	1/8"	SS-200-P	ea.	22573		ea.	22620	
-	1/4"	SS-400-P	ea.	22574		ea.	22597	
Cross	1/8"	SS-200-4	ea.	22551		ea.	22586	
	1/4"	SS-400-4	ea.	22552		ea.	22587	
Tube End Reducer	1/8" tube to 1/16"	SS-100-R-2	ea.	22553		ea.	22588	
	1/4" tube to 1/16"	SS-100-R-4	ea.	22554		ea.	22589	
	1/8" tube to 1/4"	SS-400-R-2	ea.	22555		ea.	22590	
	1/4" tube to 1/8"	SS-200-R-4	ea.	22556		ea.	22591	
Port Connector	1/8"	SS-201-PC	ea.	22557		ea.	22592	
	1/4"	SS-401-PC	ea.	22558		ea.	22593	
	1/8" tube to 1/4"	SS-401-PC-2	ea.	22559		ea.	22594	
Male Connector	1/8" to 1/8" NPT	SS-200-1-2	ea.	22561		ea.	22595	
	1/4" to 1/4" NPT	SS-400-1-4	ea.	22562		ea.	22596	
	1/16" to 1/8" NPT	SS-100-1-2	ea.	22563		ea.	22610	
	1/8" to 1/4" NPT	SS-200-1-4	ea.	22564		ea.	22611	
	1/4" to 1/8" NPT	SS-400-1-2	ea.	22565		ea.	22612	
	3/8" to 3/8" NPT	SS-600-1-6	ea.	22912		ea.	22907	
emale Connector	1/8" to 1/8" NPT	SS-200-7-2	ea.	22566		ea.	22613	
	1/4" to 1/4" NPT	SS-400-7-4	ea.	22567		ea.	22614	
	1/4" to 1/8" NPT	SS-400-7-2	ea.	22568		ea.	22615	
	1/8" to 1/4" NPT	SS-200-7-4	ea.	22569		ea.	22616	
Bulkhead Union	1/8"	SS-200-61	ea.	22570		ea.	22617	
	1/4"	SS-400-61	ea.	22571	\$68	ea.	22618	











reducing union







cross

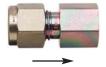




tube end reducer

port connector





male connector

female connector



bulkhead union

Custom Restek Coatings



- **Siltek**®—The ultimate passivation of treated surfaces, from glass to high nickel alloys of steel; ideal for sulfurs, automotive exhaust testing, or stack gas sampling.
- Sulfinert®—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.
- Silcosteel®-CR—A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, or seawater.

For more information on our custom coatings, see page 318.









Parker® Fittings (Brass & Stainless Steel)

Parker's (A-Lok®) two-piece ferrules and NPT fittings are ideal for installing new equipment, modifying existing instrumentation, or replacing worn connections. Restek offers both brass and stainless steel fittings. If there is a particular Parker® fitting that you are looking for and it is not listed here, please contact us to inquire about avail-



back ferrule	





back ferrule	nut & ferrule set





union













port connector







male & female quick couplings

	ı	1		Brass		316 Gr	ade Stainle	ess Steel
Fitting Type	Size	Parker #	qty.	cat.#	price	qty.	cat.#	price
Nut	1/16"	1 Nu 1	20-pk.	21800		5-pk.	21900	
	1/8"	2 Nu 2	40-pk.	21801		10-pk.	21901	
	1/4"	4 Nu 4	40-pk.	21802		10-pk.	21902	
Front Ferrule	1/16"	1 FF 1	20-pk.	21803		10-pk.	21903	
	1/8"	2 FF 2	40-pk.	21804		20-pk.	21904	
	1/4"	4 FF 4	40-pk.	21805		20-pk.	21905	
Back Ferrule	1/ ₁₆ "	1 BF 1	20-pk.	21806		10-pk.	21906	
	1/8"	2 BF 2	40-pk.	21807		20-pk.	21907	
	1/4"	4 BF 4	40-pk.	21808		20-pk.	21908	
Nut & Ferrule Set	1/ ₁₆ "	_	10-pk.	21809		2-pk.	21909	
	1/8"	_	20-pk.	21810		5-pk.	21910	
	1/4"	_	20-pk.	21811		5-pk.	21911	
Plug	1/16"	1 BLP 1	5-pk.	21815		2-pk.	21915	
	1/8"	2 BLP 2	10-pk.	21816		4-pk.	21916	
	1/411	4 BLP 4	10-pk.	21817		4-pk.	21917	
Union	1/ ₁₆ "	1 SC 1	3-pk.	21818		ea.	21918	
	1/8"	2 SC 2	5-pk.	21819		2-pk.	21919	
	1/4"	4 SC 4	5-pk.	21820		2-pk.	21920	
Reducing Union	1/8" to 1/16"	2 RU 1	5-pk.	21823		ea.	21923	
Academy official	1/4" to 1/16"	4 RU 1	5-pk.	21824		2-pk.	21924	
	1/4" to 1/8"	4 RU 2	5-pk.	21825		2-pk.	21925	
Гее	1/16"	1 ET 1	2-pk.	21826		ea.	21926	
166	1/8"	2 ET 2	2-pk.	21827		ea.	21927	
	1/4"	4 ET 4	2-pk.	21828		ea.	21928	
Cross	1/8"	2 ECR 2	2-pk.	21829		ea.	21929	
LIUSS	1/4"	4 ECR 4	2-pk.	21830		ea.	21930	
Tube End Reducer	1/8" tube to 1/16"	2 TUR 1	5-pk.	21831		2-pk.	21931	
Tube chu Reducer	1/4" tube to 1/16"	4 TUR 1	5-pk.	21832		2-pk.	21932	
	1/8" tube to 1/4"	2 TUR 4	5-pk.	21833		2-pk.	21933	
	1/4" tube to 1/8"	4 TUR 2	5-pk.	21834		2-pk.	21934	
D	1/8"	2 PC 2	5-pk.	21835		2-pk.	21935	
Port Connector	1/ ₄ "	4 PC 4	10-pk.	21836		2-pk.	21936	
	1/8" tube to 1/4"	2 PC 4	5-pk.	21837			21937	
	1/8" to 1/8" NPT	2 MSC 2N	3-рк. 10-рк.	21841		2-pk. 2-pk.	21937	
Male Connector	1/4" to 1/4" NPT							
		4 MSC 4N	10-pk.	21842		2-pk.	21942	
	1/16" to 1/8" NPT	1 MSC 2N	5-pk.	21843		2-pk.	21943	
	1/8" to 1/4" NPT	2 MSC 4N	10-pk.	21844		2-pk.	21944	
	1/4" to 1/8" NPT	4 MSC 2N	10-pk.	21845		2-pk.	21945	
Female Connector	1/8" to 1/8" NPT	2 FSC 2N	5-pk.	21846		2-pk.	21946	
	1/4" to 1/4" NPT	4 FSC 4N	5-pk.	21847		2-pk.	21947	
	1/4" to 1/8" NPT	4 FSC 2N	5-pk.	21848		2-pk.	21948	
Male & Female	¹/₅" male*	2A-Q4VN	_	_		ea.	21957	
Quick Couplings	¹/₅" male	2A-Q4P	-	_		ea.	21958	
	1/8" female*	2A-Q4CN	-	_		ea.	21959	
	¹/₄" male*	4A-Q4VN	-	_		ea.	21960	
	1/4" male	4A-Q4P	-	_		ea.	21961	
	1/4" female*	4A-Q4CN	_	_	_	ea.	21962	

^{*}Includes self-sealing shut-off valve.







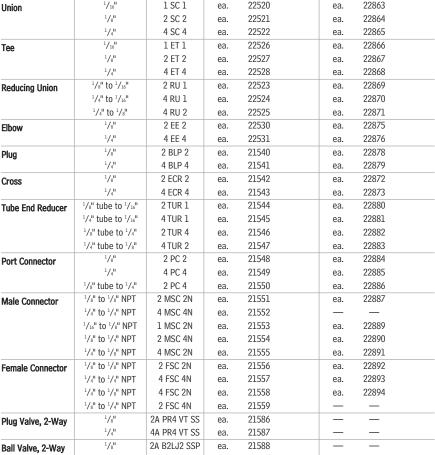
Parker® Fittings (Siltek®/Sulfinert® Treated & Silcosteel®-CR Treated)

A broad line of 1/16", 1/8" and 1/4" fittings are available with Siltek®/Sulfinert® or Silcosteel®-CR treatment. Because of expanding applications for these coatings, we have received many requests for a broader product offering. If you do not see everything you need, contact us for information on custom coating services.

Cilhale/Culfinant Tunatad

Cilonatoni CD Tunatoni

		Siltek/Sulfinert Treated			Sile	Silcosteel-CR Treated		
Fitting Type	Size	Parker #	qty.	cat.# pric	e qty.	cat.#	price	
Jnion	1/16"	1 SC 1	ea.	22520	ea.	22863		
	1/8"	2 SC 2	ea.	22521	ea.	22864		
	1/4"	4 SC 4	ea.	22522	ea.	22865		
Гее	1/16"	1 ET 1	ea.	22526	ea.	22866		
	1/8"	2 ET 2	ea.	22527	ea.	22867		
	1/4"	4 ET 4	ea.	22528	ea.	22868		
Reducing Union	1/8" to 1/16"	2 RU 1	ea.	22523	ea.	22869		
•	1/4" to 1/16"	4 RU 1	ea.	22524	ea.	22870		
	1/4" to 1/8"	4 RU 2	ea.	22525	ea.	22871		
Elbow	1/8"	2 EE 2	ea.	22530	ea.	22875		
	1/4"	4 EE 4	ea.	22531	ea.	22876		
Plug	1/8"	2 BLP 2	ea.	21540	ea.	22878		
	1/4"	4 BLP 4	ea.	21541	ea.	22879		
Cross	1/8"	2 ECR 2	ea.	21542	ea.	22872		
	1/4"	4 ECR 4	ea.	21543	ea.	22873		
Tube End Reducer	1/8" tube to 1/16"	2 TUR 1	ea.	21544	ea.	22880		
	1/4" tube to 1/16"	4 TUR 1	ea.	21545	ea.	22881		
	1/8" tube to 1/4"	2 TUR 4	ea.	21546	ea.	22882		
	1/4" tube to 1/8"	4 TUR 2	ea.	21547	ea.	22883		
Port Connector	1/8"	2 PC 2	ea.	21548	ea.	22884		
0.1 000010.	1/4"	4 PC 4	ea.	21549	ea.	22885		
	1/8" tube to 1/4"	2 PC 4	ea.	21550	ea.	22886		
Male Connector	1/8" to 1/8" NPT	2 MSC 2N	ea.	21551	ea.	22887		
	1/4" to 1/4" NPT	4 MSC 4N	ea.	21552	_	_		
	1/16" to 1/8" NPT	1 MSC 2N	ea.	21553	ea.	22889		
	1/8" to 1/4" NPT	2 MSC 4N	ea.	21554	ea.	22890		
	1/4" to 1/8" NPT	4 MSC 2N	ea.	21555	ea.	22891		
Female Connector	1/8" to 1/8" NPT	2 FSC 2N	ea.	21556	ea.	22892		
dinaid doinidatai	1/4" to 1/4" NPT	4 FSC 4N	ea.	21557	ea.	22893		
	1/4" to 1/8" NPT	4 FSC 2N	ea.	21558	ea.	22894		
	1/8" to 1/4" NPT	2 FSC 4N	ea.	21559	_	_		
Plug Valve, 2-Way	1/8"	2A PR4 VT SS	ea.	21586	_			
ing valle, 2 way	1/4"	4A PR4 VT SS	ea.	21587	_	_		
Ball Valve, 2-Way	1/8"	2A B2LJ2 SSP	ea.	21588	_			
San vaire, 2 tray	1/4"	4A B2LJ2 SSP	ea.	21589	_	_		















reducing union









cross





tube end reducer







male connector

female connector





plug valve, 2-way

ball valve, 2-way

Valco® Fittings (Siltek®/Sulfinert® Treated)

are not in contact with sample pathway, and thus do not require coating.

		Siltek/Sulfinert Treated
Fitting Type	Size	qty. cat.# price
Z D IV.L T	1/16"	ea. 22534
Zero Dead Volume Tee	1/8"	ea. 22535
Zero Dead Volume Union	1/16"	ea. 22532
	1/8"	ea. 22533

Please note: Nuts and ferrules are not treated unless requested (custom parts). Nuts and ferrules normally

Ball and plug valves are also available in brass and stainless steel. See page 322.



zero dead volume

tee



zero dead volume union







GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Tubing



Tubing and Available Coatings

Restek sets the standard in tubing for analytical and process applications. Complete your system with precleaned or treated tubing and treated fittings and valves for an inert, corrosion-resistant pathway.

Available tubing coatings include:

- Siltek®—The ultimate passivation of treated surfaces, from glass to high nickel alloys of steel; ideal for sulfurs, automotive exhaust testing or stack gas sampling.
- Silcosteel®-CR—A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, or seawater.
- Sulfinert®—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.

Frequently Asked Questions

1. Can treated tubing be bent?

Treated tubing can be bent into curves with a bend radius greater than 1 inch for 1/16-inch OD tubing, 2 inches for 1/8-inch OD tubing, or 4 inches for 1/4-inch OD tubing. The treatment layer will remain intact as long as the tubing isn't stretched dramatically. If tight bends are necessary, use a treated elbow union or bend untreated tubing and send it to Restek for custom treatment.

2. Can compression fittings be used without crushing the treatment layer?

Yes. The layer is thin and permeates the surface. It compresses with minimal damage.

3. Is welding possible after treatment?

Yes. The coating does not interfere with the welding of two coated components. The coating is lost at the weld and in the heat affected zones approximately 2 to 5 mm on either side of the weld.

4. Is any additional chemical deactivation necessary?

A Sulfinert® or Silcosteel® layer leaves few exposed active sites, so there usually is no need for additional treatment. Chemical deactivation is useful in chromatographic applications in which water will be vaporized on the Silcosteel® treated surface, but is not necessary for Sulfinert® treated surfaces. Parts used in high-temperature applications (>400 °C) cannot be chemically deactivated.

5. What are the temperature constraints of these surface treatments?

On stainless steel, a Silcosteel® layer is stable to 600 °C. Parts treated with a secondary polymeric layer are limited to temperatures of 400 °C in inert atmospheres and 250 °C when oxygen is present, the temperature maximums for the polymer. Temperatures above 600 °C can be used under certain conditions-please contact us for information.

6. Why use Sulfinert® or Silcosteel® treatment instead of Teflon® coating?

Three reasons: 1) Sulfinert® and Silcosteel® layers are nonpolymeric, so they do not exhibit the problems associated with gas permeability. 2) Teflon® coating often flakes off the surface, while the Sulfinert® or Silcosteel® layer is tightly integrated into the substrate lattice. 3) Teflon® coating is limited to 280 °C, while Silcosteel® treated stainless steel tubing and fittings can be used to 600 °C.

7. Why use Siltek®/Sulfinert® treated tubing for transfer lines?

Siltek®/Sulfinert® treated stainless steel tubing offers all of the advantages of glass or fused silica tubing for the transfer of active compounds (e.g., sulfurs), but is far more durable and flexible.

8. Is treated tubing similar to glass-lined tubing (GLT)?

No. Sulfinert® or Silcosteel® treated tubing is flexible and can be bent without heating. Also, the Sulfinert® or Silcosteel® layer is highly inert, unlike impure glass.

9. How can I clean the surface of a treated part after use?

Most often, a mild organic solvent (methylene chloride, methanol, hexane) or water is sufficient. Mild sonication may assist and accelerate the process. Do not use caustic, abrasive, or high pH (pH>8) cleaners, as they will damage or dissolve the layer. Steam cleaning in the presence of oxygen or air could create surface activity, and also should be avoided.

10. What materials should I avoid using with Silcosteel® treated parts?

The Silcosteel® coating is silicon-based and is prone to attack by hydrofluoric acid or by basic compounds. The surface should not be exposed to media with pH>8.

11. Siltek® and Sulfinert®: What's the Difference?

Siltek® is the name for the patented deposition process. When the Siltek® process was developed, the application that showed the greatest benefit was the storage and transfer of low ppb level active sulfur compounds, such as hydrogen sulfide and mercaptans. Because there was (and continues to be) demand for a reliable surface treatment for this application, the name Sulfinert® is used to describe Siltek® treated products created specifically for this purpose.









Instrument-Grade Welded and Drawn 304 Grade Stainless Steel Tubing

Clean tubing is critical to ensure the delivery of pure gas to your instrument. Restek's stainless steel tubing is cleaned specifically for inertness using the procedure for processing Silcosteel® and Siltek®-treated products, because scrupulously clean parts are a prerequisite for a quality coating. This ensures you are getting quality tubing for your chromatography system.

Tubing				Lengt	th (per-foot pric	ing on 26 feet o	r more)
Dim	ensions	25	Feet	26-1	00 Feet	>10) Feet*
ID (in.)	OD (in.)	cat.#	price	cat.#	price	cat.#	price
0.01"	1/16"	21500	\$67	21501		21502	
0.02"	1/16"	21503	\$67	21504		21505	
0.03"	1/16"	21506	\$67	21507		21508	
0.04"	1/ ₁₆ "	21509	\$67	21510		21511	
0.085"	1/8"	21512	\$60	21513		21514	
0.21"	1/4"	21515	\$72.50	21516		21517	

^{*}The availability of long lengths (continuous lengths up to 500 feet) is subject to inventory constraints. Please inquire before ordering.



ordering **note**

Required length in meters x 3.2808 = length in feet.

An extra charge is applied for cutting and/or straightening stainless steel and/or copper tubing, calculated from the total number of pieces produced for each line item:



Precleaned Copper Tubing

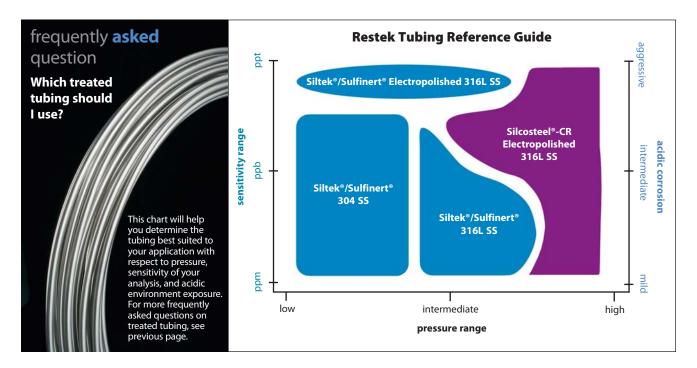
- · Adheres to ASTM B-280.
- · Precleaned and ready to use.
- Use for plumbing GC systems.

ID	OD	Wall	qty.	cat.#	price
0.065"	1/8"	0.030"	50 ft.	21590	
0.190"	1/4"	0.030"	50 ft.	21592	



Plumbing a GC

It is essential to use clean chromatographic-grade tubing to plumb a GC. Standard-grade tubing contains residual hydrocarbon contaminants from the drawing process. These contaminants migrate into the carrier gas stream, elevating background noise and causing down time.





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did you know?

A smoother internal surface is less adsorptive.



Top: electropolished finish, surface roughness average number: 10-15.

Bottom: conventional finish, surface roughness average number: approx. 23-27.

Treated Seamless Electropolished 316L Grade Stainless Steel Tubing

Our highest performing tubing. Recommended for:

- · demanding/corrosive environments.
- · high temperatures.
- · ultimate inertness.

Siltek®/Sulfinert Treated (Coiled)				Price-per-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.	
1/8" (3.18mm)	0.085" (2.16mm)	0.020"	22538					
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22539					

Silcosteel®-CR Treated (Coiled)					Price-	per-foot	
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.
1/8" (3.18mm)	0.085" (2.16mm)	0.020"	22536				
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22537				

1/8" OD: 5 ft. to 95 ft. in one continuous coil; 1/4" OD: 5 ft. to 300 ft. in one continuous coil. Longer lengths will be more than one coil.



An extra charge is applied for cutting Siltek*/Sulfinert* or Silcosteel*-CR tubing. The charge is calculated from the total number of pieces produced for each line item:

# of Pieces	Added Charge
5 to 15	\$50
16 to 30	\$100
31 to 75	\$150
76 to 99	\$200
100 to 200	\$250

Treated Welded/Drawn 304 Grade Stainless Steel Tubing

Our most popular grade of tubing. Recommended for:

- · chromatography applications.
- gas delivery systems.
- · lower pressures.
- · inert applications.

Siltek®/Sulfinert® Treated (Coiled)				Price-per-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.	
0.022" (0.56mm)	0.011" (0.28mm)		22500					
0.029" (0.74mm)	0.021" (0.53mm)		22501					
¹ / ₁₆ " (1.59mm)	0.010" (0.25mm)		22502					
¹/16" (1.59mm)	0.020" (0.51mm)		22503					
1/16" (1.59mm)	0.030" (0.76mm)		22504					
¹/16" (1.59mm)	0.040" (1.02mm)		22505					
1/8" (3.18mm)	0.085" (2.16mm)	0.020"	22506					
1/4" (6.35mm)	0.210" (5.33mm)	0.020"	22507					

Minimum Bend Radius for Coated Tubing

OD	Min. Bend Radius
≤¹/ ₁₆ "	1" (2.5 cm)
1/8"	2" (5.1 cm)
1/4"	4" (10.2 cm)
3/8"	6" (15.2 cm)

Treated Seamless 316L Grade Stainless Steel Tubing

High durability tubing. Recommended for:

- · inert applications.
- · high temperatures.
- · high pressures.
- · corrosive environments.
- · zero bleed.

did you **know**?

Other lengths and diameters of treated tubing are available on a custom basis.

Call for availability of lengths greater than 1,000 ft.

Siltek®/Sulfi		Price-	per-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
1/8" (3.18mm)	0.055" (1.40mm)	0.035"	22508				
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22509				
3/8" (9.52mm)	0.277" (7.04mm)	0.049"	22914				

Silcosteel®-C		Price-p	er-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
1/8" (3.18mm)	0.055" (1.40mm)	0.035"	22896				
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22897				
3/8" (9.52mm)	0.277" (7.04mm)	0.049"	22915				

ordering **note**

Required length in meters x 3.2808 = length in feet.







Treated Straight, 6-Foot Length Stainless Steel Tubing

Individual 6-foot ($\pm \frac{1}{2}$ ") straight pieces.

In response to customer requests, we offer 6-foot straight lengths of 1/8-, 1/4, and 3/8-inch treated tubing. This tubing can be cut to your exact requirements using a standard tubing cutter.

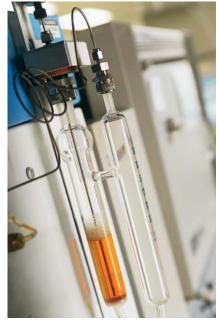
Siltek®/Sulfinert® Treated, 316L Grade

OD	ID	Wall Thickness	qty.	cat.#	price
1/8" (3.18mm)	0.055" (1.40mm)	0.035"	ea.	22901	
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	ea.	22902	
3/8" (9.52mm)	0.277" (7.04mm)	0.049"	ea.	22903	

Silcosteel®-CR Treated, 316L Grade

OD	ID	Wall Thickness	qty.	cat.#	price
1/8" (3.18mm)	0.055" (1.40mm)	0.035"	ea.	22898	
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	ea.	22899	
3/8" (9.52mm)	0.277" (7.04mm)	0.049"	ea.	22900	

Siltek®/Sulfinert® treated tubing is recommended for purge & trap and headspace systems





Treated Hydroguard® Deactivated Stainless Steel Tubing

Hydroguard® deactivation creates a high-density surface that is not readily attacked by aggressive hydrolysis.

Silcosteel® 1		Price-	per-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
1/16" (1.59mm)	0.010" (0.25mm)		22497				
1/16" (1.59mm)	0.020" (0.51mm)		22496				
1/16" (1.59mm)	0.030" (0.76mm)		22495				
1/16" (1.59mm)	0.040" (1.02mm)		22494				
1/8" (3.18mm)	0.085" (2.16mm)	0.020"	22493				
1/4" (6.35mm)	0.210" (5.33mm)	0.020"	22492				

Silcosteel® Tr		Price-	er-foot				
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-199 ft.	200-399 ft.	>400 ft.
1/8" (3.18mm)	0.055" (1.40mm)	0.035"	22491				
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22490				

Silcosteel® Treated, Electropolished 316L Grade Price-per-foot								
OD	ID	Wall Thickness	cat.#	5-24 ft.	25-99 ft.	100-299 ft.	>300 ft.	
1/8" (3.18mm)	0.085" (2.16mm)	0.020"	22489					
1/4" (6.35mm)	0.180" (4.57mm)	0.035"	22488					

An extra charge is applied for cutting Siltek®/Sulfinert®, Silcosteel®, or Silcosteel®-CR tubing. The charge is calculated from the total number of pieces produced for each line item:

# of Pieces	Added Charge
5 to 15	
16 to 30	
31 to 75	
76 to 99	
100 to 200	





GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Gas Valves, VCO Fittings

Shut-Off Gas Valves

Swagelok®







Ball valve

Plug valve Toggle valve 1/8" 1/4" 1/8" 1/4" **Brass Brass** Stainless Steel Stainless Steel Valve Type cat.# cat.# cat.# cat.# 23143 23142 23198 23199

23145

23147

Metering Gas Valves Swagelok[®]

23144

23146

Ball

Plug





23200

23202

Description	qty.	cat.#	price
1/8" Brass			
Metering Valve, straight	ea.	23148	
¹/₄" Brass			
Metering Valve, straight	ea.	23149	
1/8" Stainless Steel			
Metering Valve, straight	ea.	23204	\$240
1/4" Stainless Steel			
Metering Valve, straight	ea.	23205	
Vernier Knob			
for Metering Valve	ea.	23206	\$40



23201

23203

23148

Shut-Off Gas Valves Parker Balston®









Toggle valve

Ball valve Plug valve

		/ ₈ "	•	4 "	•	/8" Charl	,	4"
	Br	ass	Bra	ass	Stainle	ss Steel	Stainle	ss Steel
Valve Type	cat.#	ea.	cat.#	ea.	cat.#	ea.	cat.#	ea.
Toggle	22188		22189		22190		22191	
Ball	22192		22193		22194		22195	
Plug	22196	\$61	22197		22198		22199	

Parker Balston ball and plug valves are also available treated. See page 317.

Metering Gas Valves Parker Balston®



Description	qty.	cat.#	price
1/8" Nickel-Plated Brass			
Metering, straight	ea.	22200	
1/4" Nickel-Plated Brass			
Metering, straight	ea.	22201	
1/8" Stainless Steel			
Metering, straight	ea.	22204	
1/4" Stainless Steel			
Metering, straight	ea.	22205	
Vernier Knoh			



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23212

23209



23214

23207

VCO® O-Ring Face Seal Fittings Swagelok®

- · Unique design allows easy installation where space is limited.
- · Assemblies can be used from high pressure to critical vacuum, across a wide range of temperatures.
- Smooth finish on gland face ensures positive seal.
- · Sealing is accomplished with a captive O-ring in the body component.

Swagelok® VCO® O-ring face seal fittings are designed for rapid assembly in pipe, tube, and welded systems.

23213



Specifications:		
Pressure Ratings	Up to 15,400 psig (1061 bar)	
Temperature Ratings	Up to 400 °F (204 °C)	

Description	Material	qty.	cat.#	price
1/4" VCO to 1/4" Tube Adaptor	Stainless Steel	2-pk.	23207	
1/4" VCO to 1/4" Tube Adaptor	Siltek Treated	2-pk.	23209	
1/4" VCO to 1/4" Tube Fitting	Stainless Steel	2-pk.	23210	
1/4" VCO to 1/4" Tube Fitting	Siltek Treated	ea.	23211	
1/4" VCO to 1/8" Tube Fitting	Stainless Steel	2-pk.	23215	
1/4" VCO to 1/8" Tube Fitting	Siltek Treated	ea.	23216	
1/4" VCO Nut	Stainless Steel	2-pk.	23212	
1/4" VCO Nut Blind	Stainless Steel	2-pk.	23213	
1/4" VCO Body Blind	Stainless Steel	2-pk.	23214	
Replacement O-Ring, 70 Duromo	eter			
Fluorocarbon FKM, VCO 1/4", Siz	e 010	10-pk.	23208	

Gap inspection gauge available on page 325.

GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Installation Tools



GC Installation Kit

This kit contains the tubing and fittings needed to add an additional GC to your lab bench. Kit includes: tubing cutter, one ¹/₈-inch x ¹/₄-inch reamer, one ¹/₄-inch x ¹/₈-inch brass tube end reducer, one ⁷/₁₆-inch wrench, one ¹/₂-inch wrench, four ¹/₈-inch brass tees, ten 1/8-inch brass nuts, ten brass front and back ferrules, and 50 feet (15.2 meters) of our instrument-grade cleaned 1/8-inch copper tubing.

Description	qty.	cat.#	price
GC Installation Kit	kit	21325	



54-Piece Tool Kit

Set comes with screwdrivers, pliers, wrenches, sockets, scissors, clamps, and more. Durable, zippered, notebook-style carrying case for easy transport.

Description	qty.	cat.#	price
Tool Kit	kit	23004	

Plier Set

Includes 6-inch nose/side cutter, 6-inch wire cutter, and 6-inch adjusting pliers.



Description	qty.	cat.#	price
Plier Set	set	23033	



Metric 9 Piece Ball-Point Hex Key Set

Includes 9 metric hex keys (Allen wrenches): 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10 mm.

Description	qty.	cat.#	price
Metric 9 Piece Ball-Point Hex Key Set	set	22999	



12 Piece Ball-Point Hex Key Set

Includes 12 hex keys (Allen wrenches): 0.050", 1/16", 5/64", 3/32", 7/64", 1/8", 9/64", 5/32", 3/16", 7/32", 1/4", and 5/16".

Description	qty.	cat.#	price
12 Piece Ball-Point Hex Key Set	set	22998	

Torx® Screwdriver Set

- Set includes TR-10, TR-15, and TR-20.
- · Ideal for performing routine maintenance on Agilent 6890 and 7890 GCs.





Description	qty.	cat.#	price
Torx Screwdriver Set	set	23034	



5-in-1 Magnetic Screwdriver

Magnetic power tip holds bits and screws securely.

Description	qty.	cat.#	price
5-in-1 Magnetic Screwdriver	set	23002	



Wrench Set

Includes 4-inch, 6-inch, and 8-inch adjustable wrenches.

Description	qty.	cat.#	price
Wrench Set	set	23001	







GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Tubing Tools



1/16-Inch Tubing Cutter

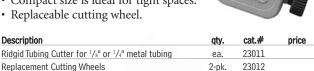
20192

- Produces square, smooth cuts in 1/16-inch tubing.
- Eliminates tubing distortion.
- · Replaceable cutting wheel.

Description	qty.	cat.#	price
¹/¹6" Tubing Cutter	ea.	20192	
Replacement Cutting Wheels	3-pk.	20185	

Ridgid® Tubing Cutter

- Excellent for cutting 1/8- or 1/4-inch metal tubing.*
- Compact size is ideal for tight spaces.







Ridgid® Heavy-Duty Tubing Cutter

- Specifically designed to cut ³/₁₆-1¹/₈" stainless steel tubing.
- Large knob and 6 individual bearings for more control with less turning.
- Convenient fold-away reamer.

Description	qty.	cat.#	price
Ridgid Heavy-Duty Tubing Cutter	ea.	22621	



¹/₁₆-Inch Tubing Cutting Pliers

- Ideal for cutting 1/16-inch tubing.
- · Cuts quickly, reducing distortion.
- · Cuts clean, eliminating need for deburring.

Description	qty.	cat.#	price
1/16" Tubing Cutting Pliers	ea.	20193	



Dimensions: $8" \times 6^{1/4}" \times 4^{1/4}"$ (20.3 x 15.9 x 10.8 cm) Weight: 11 lbs. (5.0 kg)

SSI TC-20 Tube Cutting Machine

- Cuts ¹/¹6", ¹/8", or ¹/⁴" tubing with inside diameter as small as 0.008".
- Electrically operated bench-top model.
- Handy dressing tool on the swing arm removes burrs and reams tubing.
- Voltage selectable 110–120/220–240 volts, 50–60 Hz.*

Description	qty.	cat.#	price
SSI Tubing Cutter Machine	ea.	23029	
SSI Replacement Cutting Wheels	3-pk.	23030	

*Unit shipped set for 110–120 operating voltage. Switch to 220–240 volts by using alternate fuse and power cord (included).

Restek Tubing Scorer

for MXT® Columns

- · Makes perfect cuts every time.
- · Easy to use.
- Leaves column entrance perfectly round.

Metal MXT® columns are easy to cut. Scoring wafers can be used, but may leave the column end irregularly shaped. The Restek tubing scorer is designed to make a perfect cut every time, leaving the column entrance perfectly round.



Description	qty.	cat.#	price
Restek Tubing Scorer for MXT Columns			
(0.25-0.53mm ID & 0.5-0.8mm OD)	ea.	20523	
Replacement Scoring Wheel	ea.	20522	





GC ACCESSORIES | GAS PURIFICATION ESSENTIALS Tubing & Fitting Tools



Tubing Burring & Reaming Tool

Removes burrs and reams tubing.

Description	Size	qty.	cat.#	price
Tubing Dressing Tool	1/16	ea.	20188	
Replacement Insert	for 1/16" Tubing Dressing Tool	ea.	20189	
Tubing Dressing Tool	1/8"	ea.	20190	
Replacement Insert	for 1/8" Tubing Dressing Tool	ea.	20191	



Tubing Reamer

- · Removes burrs from stainless steel tubing.
- For 1/4- or 1/8-inch tubing.
- · Nonslip safety design.

20134	
	20134



Tubing Bender

- Bends 1/8-inch, 3/16-inch, or 1/4-inch tubing.
- Assists in making accurate left-hand, right-hand, or offset bends.

Description	qty.	cat.#	price
Tubing Bender	ea.	23009	



ResTape Teflon® Tape

- For threaded connections in a wide range of plumbing materials.
- Each roll is 1/2" x 260".
- Maximum temperature: 260 °C.

					w.
Description	Color	Uses	qty.	cat.#	price
ResTape	Green PTFE	oxygen service*	ea.	22485	
ResTape	Yellow PTFE	general gas service**	ea.	22486	
ResTape	Grey PTFE	stainless steel fittings***	ea.	22487	

- *Compatible with gaseous or liquid oxygen, and with many other gases and liquids.
- **Compatible with a broad range of gases and liquids.
- ***Anti-galling. Also compatible with many other metals and polymers.



Flexible Inspection Light

- Inspect inside surfaces of sample cylinders or other chambers.
- 14" reach.
- 100,000-hour LED life.

Description	qty.	cat.#	price
Flexible Inspection Light	ea.	22627	



Swaging Tool

- · Preswage compression fittings for easy installation.
- · Ideal for installations in tight areas.
- For Swagelok® fittings only.

Description	qty.	cat.#	price
Swaging Tool	ea.	22622	



Tee Wrench

- Hold ¹/₄" or 6 mm tee or cross fittings secure in multiple orientations during installation.
- Fits easily in tool box, pouch, or belt.
- · Cushioned vinyl grip with generous gripping area.
- For Swagelok® fittings only.

Description	qty.	cat.#	price
Tee Wrench	ea.	22623	



Gap Inspection Gauge

- Confirm that fittings are sufficiently tightened.
- For use with 1/4", 3/8", 1/2" Swagelok® fittings.
- For Swagelok® fittings in new installations only.

Description	qty.	cat.#	price
Gap Inspection Gauge	ea.	22624	







HPLCACCESSORIES

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Restek Replacement Parts for Agilent HPLC Systems

Meet or exceed OEM performance.

		Similar to			
Description	Model #	Agilent part #	qty.	cat.#	price
Preventive Maintenance Kit Includes: rotor					
seal, needle seat, needle assembly, seat cap	1050	01078-68721	kit	25259	
Autosampler Preventive Maintenance Kit					
Includes: rotor seal, needle assembly,					
needle seat	1100	G1313-68709	kit	25271	
Pump Maintenance Kit Includes: PTFE frit,					
outlet cap, active inlet cartridge, gold disk seal,					
2 piston seals, glass solvent filter	1050, 1100	G1311-68710	kit	25270	
Active Inlet Cartridge	1050, 1100, 1200	5062-8562	ea.	26393	
Outlet Ball Valve, Binary Pump	1100, 1200	G1312-60012	ea.	25267	
Outlet Ball Valve	1050, 1100, 1200	G1311-60012	ea.	25276	
Sieves for Outlet Valve	1050, 1100, 1200	5063-6505	10-pk.	25266	
Check Valve Cartridge Assembly	1090	79835-67101	ea.	25344	
Piston Seals, Teflon w/Graphite, Black*	1050, 1100, 1200	5063-6589	2-pk.	22482	
Piston Seals, Teflon w/Graphite, Black*	1050, 1100, 1200	5063-6589	10-pk.	22483	
Piston Seals (Black)	1090	5062-2494	4-pk.	25347	
Seal Wash Kit, Binary Pump (4 seals, 4 gaskets)	1100		kit	25268	
Seal Wash Kit (2 seals, 2 gaskets)	1050, 1100		kit	25269	
Wash Seal	1050, 1100, 1200	0905-1175	ea.	25277	
Sapphire Piston	1050, 1100, 1200	5063-6586	ea.	25273	
Sapphire Piston	1090	6980-0672	ea.	25345	
Needle Seat	1050	79846-67101	ea.	25258	
Needle Seat	1090	79846-67101	ea.	25348	
Needle Seat Assembly	1100	G1313-87101	ea.	25265	
Needle Assembly	1100	G1313-87201	ea.	25278	
Rotor Seal (not for use with 7125 injection					
valve)	1050	0101-0626	ea.	25272	
Rotor Seal	1100	0100-1853	ea.	25275	
Rotor Seal (Rheodyne-style)	1090	1535-4048	ea.	25349	
Frits, PTFE	1050, 1100, 1200	01018-22707	5-pk.	25466	
Seal, Gold Disk (outlet)	1050, 1100, 1200	5001-3707	ea.	25467	
Outlet Cap	1050, 1100	5062-2485	4-pk.	25139	
Outlet Cap & Gold Seal Assembly	1050, 1100		2-pk.	25140	
Connecting Tube	1050, 1100	G1311-67304	ea.	25058	
Bottle Head Assembly		G1311-60003	ea.	25059	
Detector Lamp, 1090 DA, 1050 VW/DA/MWD	1090, 1050	79883-60002	ea.	25260	
Lamp, DAD G1315A, G1365A	1100, 1200	2140-0590	ea.	25261	
Lamp, VWD G1314A	1100, 1200	G1314-60100	ea.	25262	
8453 Deuterium Lamp		2140-0605	ea.	25263	
G1321 Fluorescence Detector Flash Lamp		2140-0600	ea.	25264	
Lamp, DAD Long Life Deuterium (2000 hours)	1100	2140-0813	ea.	25399	
Helium Tubing, PTFE, 5m x 0.057" ID	1050, 1100	5062-2461	ea.	24990	
Injector Lubricant, PTFE, 10g	1050, 1100	79841-65501	ea.	26520	
	1040, 1050, 1090,	-			
Solvent Inlet Filter, SS	1100, 1200	01018-60025	ea.	26423	
Stator Face Assembly	1100, 1200	0100-1851	ea.	26424	
#Consists filled Teffers beet for some six selection	h a				



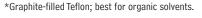




Outlet Cap & Gold Seal Assembly Tool See page 337.

25265





Capillary Stainless Steel Tubing Assemblies for Agilent HPLC Systems

- Precut, micropolished tubing and presented fittings for quick, easy maintenance of your Agilent HPLC systems.
- · Meet or exceed manufacturer's performance.

		Similar to			
Description	Model #	Agilent part #	qty.	cat.#	price
Capillary SS Tubing with fittings, 130mm x 0.17mm ID	1090	01090-87305	ea.	26525	
Capillary SS Tubing with fittings, 800mm x 0.17mm ID	1050	01078-87305	ea.	26526	
Capillary SS Tubing with fittings, 180mm x 0.17mm ID	1100	G1313-87305	ea.	26527	
Capillary SS Tubing with fittings, 700mm x 0.25mm ID	1050	01018-67305	ea.	26528	
Capillary SS Tubing with fittings, 700mm x 0.25mm ID	1050	01078-87306	ea.	26529	
Seat Capillary, SS Tubing, 0.17mm ID	1050	01078-87303	ea.	26530	
Capillary SS Tubing, 105mm x 0.17mm ID	_	5021-1816	ea.	26531	
Mixing Capillary Assembly	1100	G1312-67302	ea.	26532	
Capillary SS Tubing, Valve to Metering Head	1100	G1313-87301	ea.	26533	
Capillary SS Tubing, 150mm x 0.17mm ID	_	5021-1817	ea.	26534	
Capillary SS Tubing, 280mm x 0.17mm ID	_	5021-1818	ea.	26535	
Capillary SS Tubing, 400mm x 0.17mm ID	_	5021-1819	ea.	26536	
¹/16" Fitting, F					





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26528



26525

Instrument Accessories & Parts





Restek Replacement Parts for Beckman HPLC Systems

		Similar to			
Description	Model #	Beckman part #	qty.	cat.#	price
	110A&B, 112, 114M, 116, 118,				
Inlet Check Valve Assembly	125, 126, 127, 128 Pumps	240720	ea.	25439	
	110A&B, 112, 114M, 116, 118,				
Outlet Check Valve Assembly	125, 126, 127, 128 Pumps	240721	ea.	25440	
Inlet Check Valve Cartridge	110A&B, 112, 114M, 116, 118,				
for Check Valve Assembly	125, 126, 127, 128 Pumps	240620	ea.	25441	
Outlet Check Valve Cartridge	110A&B, 112, 114M, 116, 118,				
for Check Valve Assembly	125, 126, 127, 128 Pumps	240621	ea.	25442	
Guide Sleeve					
for Graphite Plunger Guide	110 Series Pumps	243713	ea.	25444	
Outlet Check Filter Frit Assembly	110 Series Pumps	240619	ea.	25445	
Piston Guide Assembly	110 Series and 112 Pumps	243045	ea.	25446	
Plunger	110 Series and 112 Pumps	243053	ea.	25447	
Plunger Seal	110 Series Pumps	887138	ea.	25448	
	114M, 116, 118, 125,				
Sapphire Plunger	126, 127, 128 Pumps	240714	ea.	25450	
	114M, 116, 118, 126,				
Plunger Seal	127, 128 Pumps	241037, 237162	ea.	25451	
	114, 116, 125, 126,				
Pump Seal, Gold**	127, 128 Pumps	241037	ea.	25452	
Plunger Wash Seal	125, 126, 127, 128 Pumps	728772, 728772	ea.	25453	
Deuterium Lamp	DU60, 62, 64, 65	596791	ea.	25454	

^{**}Ultra-high molecular weight polyethylene (UHMWPE); increased resistance to abrasion, best for buffers.



Restek Replacement Parts for Hitachi HPLC Systems

		Similar to			
Description	Model #	Hitachi part #	qty.	cat.#	price
SS Check Valve Cartridges					
(1/16" Ruby Ball)	655/6000/6200	AN0-085	2-pk.	25455	
		AN0-0833, 885-			
Inlet Check Valve Assembly	655/6000/6200	1330	ea.	25456	
		AN0-0834, 885-			
Outlet Check Valve Assembly	655/6000/6200	1331	ea.	25457	
Plunger Assembly	655, 6000, 6200, 7100	810-1033	ea.	25458	
Plunger Seal, Black*	L655A, 6000, 6200, 7100	655-1080	ea.	25459	
Plunger Seal, Gold**	655, 6000, 6200, 7100	655-1080	ea.	25460	
Inlet Check Valve Assembly	L-7100	AN0-0836	ea.	25461	
Outlet Check Valve Assembly	L-7100	AN0-0837	ea.	25462	
Rotor Assembly for Dilutor Valve	AS-7200 Autosampler	810-3095	ea.	25463	
	AS-7200,				
Rotor Seal Kit	AS-7250 Injection Valve	AN0-0818	ea.	25464	
Deuterium Lamp, Prealigned	L4000, L4200, L4250, L7400	AN0-0424	ea.	25465	
10 12 (0) 17 (1 1 1 1					

^{*}Graphite-filled Teflon; best for organic solvents.

 $[\]hbox{$\star$"Ultra-high molecular weight polyethylene (UHMWPE); increased resistance to abrasion, best for buffers.}$



Restek Replacement Parts for PerkinElmer HPLC Systems

		Similar to			
Description	Model #	PE part #	qty.	cat.#	price
Inlet Check Valve	PE 200, 4, 250, 400, 410, 620	2540177	ea.	25438	
Outlet Check Valve	PE 200, 4, 250, 400, 410, 620	2540197	ea.	25437	
Standard Pump Seal Kit	PE 200	N2910383	kit	26425	
	PE Series 200 Pumps-1, 2, 3, 3B, 4, 10,				
High Pressure Seal Kit	250, 400, 410, 620, Int. 4000 Pump	2540275	ea.	25433	
Standard High Pressure	PE Series 200 Pumps-1, 2, 3, 3B, 4, 10,				
Seal, Gold**	250, 400, 410, 620, Int. 4000 Pump	9907324	ea.	25434	
Low Pressure Seal, Gold**	PE Series 200 Pumps	9907339	ea.	25435	
Needle	PE Series 200 Pumps	N2930023	ea.	25432	
	PE Lambda-2, 5, 7, 8, 10, 11, 12, 14,				
Deuterium Lamp	15, 16, 17, 18, 19, 20, 40, 800, 900	B0160917	ea.	25436	
Deuterium Lamp	PE 200/785A	N2920149	ea.	25431	

^{**}Ultra-high molecular weight polyethylene (UHMWPE); increased resistance to abrasion, best for buffers.







Restek Replacement Parts for Shimadzu HPLC Systems

		Similar to			
Description	Model #	Shimadzu part #	qty.	cat.#	price
Inlet Check Valve	LC-6A, LC-10AS	228-12353-91	ea.	25287	
Inlet Check Valve	LC-600, LC-9A, LC-10AD	228-18522-91	ea.	25295	
Inlet Check Valve	LC-10ADvp	228-39093-92	ea.	24984	
Inlet Check Valve	LC-10AT, LC-10ATvp	228-32166-91	ea.	26521	
Inlet Check Valve	LC-20AD/B	228-48249-91	ea.	26426	
Outlet Check Valve	LC-6A, LC-10AS	228-09054-93	ea.	25288	
Outlet Check Valve Rebuild Kit	LC-6A, LC-10AS	228-11200-91	2-pk.	25289	
Outlet Check Valve	LC-600, LC-9A, LC-10AD, LC-10AT	228-18522-92	ea.	25282	
Outlet Check Valve	LC-10ADvp, LC-10ATvp	228-34976-91	ea.	24983	
Outlet Check Valve	LC-20AD/B	228-45705-91	ea.	26427	
Plunger Seal, Gold**	LC-6A	228-11999-00	ea.	25285	
Plunger Seal, Polyethylene, Gold**	LC-10AS, LC-10AT, LC-10ATvp	228-21975-00	ea.	25290	
Plunger Seal	LC-600, LC-9A, LC-10AD	228-18745-00	ea.	25293	
Plunger Seal, Black*	LC-10ADvp, LC 20AD	228-35146-00	ea.	24980	
Plunger Seal, Gold**	LC-10ADvp	228-32628-00	ea.	24981	
Plunger Seal, Black*	SIL-10ADvp, LC-10ATvp	228-35145-00	ea.	24985	
Plunger Rinse Seal	LC-10AS	228-28499-00	ea.	25292	
Sapphire Plunger	LC-10AS	228-17019-93	ea.	25291	
Sapphire Plunger	LC-600, LC-9A, LC-10AD	228-18523-91	ea.	25294	
Needle Seal	SIL-10A, 10XL, 10ADvp	228-33355-04	ea.	25468	
Rotor Seal	SIL-10ADvp	228-21217-97	ea.	24986	
Rotor Seal Assembly	SIL-10A, 10AXL	228-21217-91	ea.	25469	
Stator Assembly	SIL-10A, 10AXL	228-21220-91	ea.	25470	
Syringe, 500µL	SIL-10A, 10AXL	228-25237-04	ea.	25471	
Plunger Assembly, Ceramic	LC-10ADvp	228-35601-91	ea.	25472	
Plunger Assembly, Ceramic	LC-10ATvp	228-35009-92	ea.	25473	
Plunger Assembly, Sapphire	LC-10ADvp	228-35601-92	ea.	24982	
Deuterium Lamp	SPD-10A, 10AV, SPD-20A	228-34016-02	ea.	25284	















^{*}Graphite-filled Teflon; best for organic solvents.

^{**}Ultra-high molecular weight polyethylene (UHMWPE); increased resistance to abrasion, best for buffers.

Instrument Accessories & Parts





	\$	Similar to SP/TSP	P			
Description	Model #	part #	qty.	cat.#	price	
Inlet Check Valve Assembly	SP8800 & P-Series Pumps	A3495-010	ea.	25474		
Outlet Check Valve						
Assembly	SP8800 Series Pumps	A3490-010	ea.	25475		
Piston	SP8800 & P-Series Pumps	A3102-010	ea.	25476		
Back-up Seal	SP8800 & P-Series Pumps	A2963-010	ea.	25477		
Plunger Seal, Gold**						
Superseal	SP8800 & P-Series Pumps	A2962-010	ea.	25478		
Check Valve and Transducer						
Assembly	P-Series Pumps	A3990-010	ea.	25479		
Kel-F Washer	P-Series Pumps	A2973-010	ea.	25480		
Rotor Seal Assembly,	TSP AS100, 300, 1000, 3000, 3500,					
Rheodyne 7010	8875, and 8880 Autosamplers	7010-039	ea.	25481		
	TSP AS100, 300, 1000, 3000, 3500,					
Syringe Assembly, 250µL	8875, and 8880 Autosamplers	A3588-020	ea.	25482		
Syringe, 500µL	8800 Series	3301-0100	ea.	25483		
	Linear UV-200, 203, 204, 205, 206, and					
Lamp, UV	UV 100, 150, 1000, and 2000 Detectors	9551-0023	ea.	25484		
	_	Similar to TSP				
Description	Model #	part #	qty.	cat.#	price	
Check Valve Cartridge	LDC Constametric Pumps	900946	ea.	25485		
Sapphire Plunger	LDC Constametric Pumps	801306	ea.	25486		
Plunger Seal Kit, Gold**	LDC Constametric Pumps	31-36-00754	kit	25487		
Plunger Seal, Black*	LDC Constametric Pumps	206129001	ea.	25488		
Plunger Seal, Gold**	LDC Constametric Pumps	206156001	ea.	25489		
	LDC SM-I, II, III, 3000, 3100,					
Lamp, Deuterium	3100X, and 4000 Detectors	108035	ea.	25490		

^{*}Graphite-filled Teflon; best for organic solvents.

^{**}Ultra-high molecular weight polyethylene (UHMWPE); increased resistance to abrasion, best for buffers.



Restek Rheodyne® Style Replacement Parts for Waters HPLC Systems Similar to

Description Model #		Rheodyne part #	qty.	cat.#	price
Vespel Rotor Seal	1090, 7000, 7010, 7040, 7067	7010-039	ea.	25279	
Vespel Rotor Seal	7125, 7126, 7725, 7725i, 9725	7125-047	ea.	25280	
Isolation Seal	7010	7010-015	ea.	25281	

For easy access to Rheodyne fittings, use a ValvTool Wrench. See page 337.





		Similar to			
Description	Model #	Waters part #	qty.	cat.#	price
Window Gasket	484, 486, 490	80335	ea.	25423	
Lamp Side Gasket	484, 486, 490	80336	ea.	25424	
Quartz Lens	486	80687	ea.	25427	
Xenon Lamp (without holder or mirror)	470	_	ea.	25404	
Xenon Lamp	474	_	ea.	25405	
Deuterium Lamp (UV/Vis)	480, 481	99499	ea.	25403	
Deuterium Lamp (UV/Vis)	484	80357	ea.	25406	
Deuterium Lamp (UV/Vis)	486	80678	ea.	25407	
Deuterium Lamp	996, 2996	WAT052586	ea.	25408	
Deuterium Lamp	2487	WAS081142	ea.	25409	
Deuterium Lamp, long life (2,000 hours)*	486	80678	ea.	25410	

^{*}Standard lamps have nominal 1,000-hour life.







Instrument Accessories & Parts

Restek Replacement Parts for Waters HPLC Systems

Doscrintion	Model #	Similar to	ah.	cat #	price
Description Preventive Maintenance Kit	Model #	Waters part #	qty.	cat.#	price
Includes: sparge diffuser, filter insert, compression					
screws, SS ferrule, battery for 2690/717, 250µL WISP					
syringe, seal wash plunger seal kits (2), wash tube seal					
tits (4), 2690 seal pack rebuild kit (steel bodies not includ-					
ed), 2690 head plunger seal kits (2), solvent reservoir					
20µm filters (4), Alliance check valve cartridges (2), Alliance plunger assemblies (2), 2690 face seals (4)	Alliance 2690, 2695	WAT270944	kit	25143	
Preventive Maintenance Kit Includes: PerformancePLUS	Alliance 2070, 2073	WAIZ/U/74	KIL	23173	
cartridges (2), sparge diffusers (4), Super Seals (2),					
solvent reservoir 20µm filters (2), sapphire plungers (2),					
reference valve rebuild kit, inlet manifold kit	600 Pump	WAT052675	kit	25144	
Preventive Maintenance Kit Includes: 717 seal pack with	77.7 A	MATOFO	1.9	053.45	
needle, filter insert, 250µL WISP syringe Preventive Maintenance Kit	717 Autosampler	WAT052669	kit	25145	
Includes: 616/326/625 plunger assemblies (2), pump seal					
kit, sparge diffusers (4), solvent reservoir 20 μ m filters (4),					
616 cartridge assemblies (4)	616 Pump	WAT052672	kit	25146	
Preventive Maintenance Kit Includes: PerformancePLUS					
check valves (2), sparge diffuser, solvent 10 μ m filter,	E1E Dumr	WATOFOFOZ	1.14	26510	
sapphire plungers (2), plunger seals (2) Preventive Maintenance Kit	515 Pump	WAT052587	kit	26519	
Includes: plungers, check valves, seals, filters	1525 Pump	201000114	kit	26430	
Inlet Check Valve Assembly	M6KA, 501, 510, 515, 590, 600E	33679, 25214	ea.	25360	
inlet Check Valve Housing	M6KA, 501, 510, 515, 590, 600E	25203	ea.	25361	
Inlet Check Valve Rebuild Kit	M6KA, 501, 510, 515, 590, 600E	60495	2-pk.	25362	
Outlet Check Valve Assembly (Actuator Style)	M6KA, 501, 510, 515, 590, 600E	WAT025028	ea.	25363	
Outlet Check Valve Housing (Actuator Style)	M6KA, 501, 510, 515, 590, 600E	25212	ea.	25364	
Outlet Check Valve Rebuild Kit (Actuator Style)	M6KA, 501, 510, 515, 590, 600E	26016	2-pk.	25365	
Outlet Check Valve Assembly (Ball & Seat Style)	M6KA, 501, 510, 515, 590, 600E	25216	ea.	25366	
Outlet Check Valve Housing (Ball & Seat Style)	M6KA, 501, 510, 515, 590, 600E	25207	ea.	25367	
Outlet Check Valve Rebuild Kit (Ball & Seat Style)	M6KA, 501, 510, 515, 590, 600E	26014	2-pk.	25368	
inlet Check Valve Assembly, 225µL (Extended Flow)	M6KA, 501, 510, 515, 590, 600E	60307	ea.	25369	
PerformancePLUS Check Valve Cartridge	M6KA, 501, 510, 515, 590, 600E	700000254	2-pk.	25370	
Check Valve Rebuild Kit (Extended Flow)	M6KA, 501, 510, 515, 590, 600E	88223	2-pk.	25371	
PerformancePLUS Check Valve Housing	M6KA, 501, 510, 515, 590, 600E	MATO70043	ea.	25372	
Check Valve Cartridges	Alliance	WAT270941	2-pk.	25373	
Super Seal for Analytical Heads	M6KA, 501, 510, 515, 590, 600E	22946, 22934	ea.	25374	
Plunger Seal, Gold for Analytical Heads** Plunger Seal, Black for graphite-filled Teflon*	M6KA, 501, 510, 515, 590, 600E M6KA, 501, 510, 515, 590, 600E	22934 26613	ea.	25375 25378	
Plunger Seal, Black for graphite-filled lefton* Plunger Seal, Black for EF Heads*	510, 590, 600E	26644	ea.	25378	
Plunger Seal, Gold for EF Heads**	510, 590, 600E	26644	ea.	25380	
Seal Wash Plunger Seal	Alliance	WAT271018	2-pk.	25386	
Head Plunger Seal Kit	Alliance	WAT271018 WAT270938	2-pk. 2-pk.	25387	
Head Plunger Seal Kit (Black)	Alliance	WAT271066	2-pk.	25388	
Head Plunger Seal	Acquity, nanoAcquity	700002599	2-pk.	26428	
nsert Seal Parts Kit	M6KA, 501, 510, 515, 590, 600E	60012	kit	25389	
Sapphire Plunger	M6KA, 510, 590, 600	25656	ea.	25381	
Sapphire Plunger (Extended Flow)	510, 590, 600E	60304	ea.	25382	
Sapphire Plunger Assembly Kit	M515	WAS207069	ea.	25384	
Sapphire Plunger	616, 625, 626	31788	ea.	25420	
Sapphire Plunger	Alliance	WAT270959	ea.	25385	
Oraw-Off Tube Assembly	510, 515, 600, 610	WAT060476	ea.	25392	
nlet Manifold Kit	M45, 501, 510, 590, 600E	60448	kit	25412	
errule, Stainless Steel	515	22330	ea.	25417	
ace Seals Replacement Kit	Alliance 2690	WAT270939	4-pk.	26547	
Vash Face Seal	Alliance 2690	WAT271017	ea.	25428	
Vash Tube Seal Kit	Alliance 2690	WAT270940	4-pk.	25429	
Vash Seal	Acquity, nanoAcquity	700002598	2-pk.	26429	
tebuild Kit, Reference Valve	600 Pump	25746	ea.	25492	
Compression Screws, Stainless Steel	Alliance 2690		2-pk.	25493	
Battery	Alliance 2690, 717, 486, 484	14/47071010	ea.	25494	
Seal Pack Rebuild Kit, without Seal Wash Tube Assembly	Alliance 2690	WAT271019	ea.	25495	
717 Seal Pack (Rebuilt) with Needle	717 Autosampler	4559	ea.	25496	
Seal Kit, Pump	616 Pump, 626, 625	31790	ea.	25497	
Cartridge Assembly, Stainless Steel	616 Pump	24960	ea.	25498	





Kits are convenient and economical, compared to ordering individual items!





25145



25496









*Graphite-filled Teflon: hest for organic solvents:

^{**}Ultra-high



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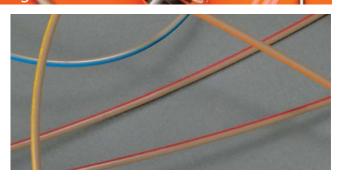
Instrument Accessories & Parts, Tubing & Connection



ASI Piston Seals for Agilent HPLC Systems

Over time the piston seal in every HPLC system becomes worn and must be replaced. Our piston seals are constructed of Teflon® material with an additive that reduces their tendency to "cold flow" and improves their wear characteristics. Teflon® seals are more resistant to any HPLC solvent than UHMWPE seals, but they are less wear-resistant and rugged. For Agilent 1050 and 1100 HPLC systems.

Description	Similar to Agilent part #	qty.	cat.#	price
ASI Piston Seal	5062-8516	ea.	25175	
ASI Piston Seal		10-pk.	25176	



Inert PEEK™ Tubing

- Replaces stainless steel, titanium, Teflon® or Tefzel® tubing.
- Less oxygen permeable and more temperature resistant (to 250 °C) than Teflon® or Tefzel® tubing.
- Use with PEEK™ fingertight or flangeless fittings.
- Use to 7,000 psi (48,263 kPa).

Description	OD	ID	Length	Color Code	qty.	cat.#	price
PEEK Tubing	1/16"	0.0025"	1m	pink dash stripe	3-pk.	25320	
PEEK Tubing	1/16"	0.005"	3m	red stripe	ea.	25065	
PEEK Tubing	1/16"	0.007"	3m	yellow stripe	ea.	25066	
PEEK Tubing	1/16"	0.010"	3m	blue stripe	ea.	25067	
PEEK Tubing	1/16"	0.020"	3m	orange stripe	ea.	25068	





ASI Check Valves

ASI subjects each valve to a rigorous series of tests, including self-priming capability, which means you typically won't need a syringe or draw-off valves to prime your pump. A high-pressure test ensures that the valve will not leak, even at pressures up to 12,000 psi (82,737 kPa). A low-pressure test verifies that the valve closes properly, even without a high backpressure force. The cartridge design allows easy, convenient replacement of worn or damaged valves.

for Agilent 1050 & 1100

Description	Material	qty.	cat.#	price			
Outlet Check Valve							
(cartridge and housing)	Sapphire & Ruby Ball & Seat	ea.	25170				
Outlet Check Valve							
(cartridge and housing)	Ceramic Ball & Seat	ea.	25173				
Outlet Cartridge	Sapphire & Ruby Ball & Seat	ea.	25171				
Outlet Cartridge	Ceramic Ball & Seat	ea.	25174				
Outlet Housing	_	ea.	25172				
for Waters Alliance® Model 2690 & 2695							
Description	Material	qty.	cat.#	price			
Inlet and Outlet Cartridges	Sapphire & Ruby Ball & Seat	ea.	25160				
Inlet and Outlet Cartridges	Ceramic Ball & Seat	ea.	25162				



HPLC Stainless Steel Capillary Tubing

- 316 grade stainless steel.
- Precise pre-cut lengths.
- · Smooth surface finish.
- · Ultra clean.

Whether you need to replace system tubing as part of your troubleshooting or want to reduce the dwell volume of your system as you move to narrower columns, Restek has the quality tubing in the lengths and IDs you need. Each ID is color-coded so it is easy to identify and replace correctly.

			5" ID ed)		7" ID ay)		0" ID ue)		0" ID low)
Length	qty.	cat.#	price	cat.#	price	cat.#	price	cat.#	price
1/ه" OD آ	Tubing								
5cm	3-pk.	25240		25244		25248	\$17	25252	
10cm	3-pk.	25241		25245		25249	\$20	25253	
20cm	3-pk.	25242		25246		25250	\$23	25254	
30cm	3-pk.	25243		25247		25251	\$26	25255	







Teflon® Tubing

- · Ideal for mobile phase inlet lines.
- Chemically inert.
- Use to 500 psi (3,447 kPa) and 80 °C.

Description	OD	ID	Length	qty.	cat.#	price
Teflon Tubing	1/8"	0.063" (1.6mm)	3m	3m	25306	
Teflon Tubing	1/8"	0.094" (2.4mm)	3m	3m	25307	



Tubing Clip

Securely holds ¹/¹s-inch or ¹/s-inch tubing in beaker, flask, or bottle up to 4 mm thick.

Description	qty.	cat.#	price
Tubing Clip	5-pk.	25310	



PEEK™ Tubing Elbows

Tubing Elbows (90° and 180°) are ideal for routing $^1/_{16}$ -inch PEEK $^{\text{TM}}$ tubing through your system. Simply snap the tubing into the elbow. Prevent pinching of PEEK $^{\text{TM}}$ tubing which can cause high pressure.

Description	qty.	cat.#	price
PEEK Tubing Elbow, 90°	5-pk.	25308	
PEEK Tubing Elbow, 180°	5-pk.	25309	



20188

Tubing Dressing Tool

Opens stainless steel tubing bore and removes burrs. For $^1/_{16}$ -inch OD tubing or $^1/_{8}$ -inch OD tubing.

Description	Size	qty.	cat.#	price
Tubing Dressing Tool	1/ ₁₆ "	ea.	20188	
Replacement Insert	for 1/16" Tubing Dressing Tool	ea.	20189	
Tubing Dressing Tool	1/8"	ea.	20190	
Replacement Insert	for 1/8" Tubing Dressing Tool	ea.	20191	





Clean-Cut Tubing Cutter

- Burr-free, perpendicular cuts that will not distort the tubing OD or close the ID.
- Use on PEEK[™], Teflon®, Tefzel®, other polymeric tubing.

Description	qty.	cat.#	price
Clean-Cut Tubing Cutter	ea.	25069	
Replacement Blade for Clean-Cut Cutter	ea.	25070	

For stainless steel tubing cutters, see page 324 or visit www.restek.com.



Tubing & Connections

Improving Column Connections

A good connection is necessary for trouble-free chromatography. Connecting incompatible fittings from different manufacturers can result in leaks, poor peak shape, and increased void volume (Figure 1). Each type of end-fitting has a unique seat depth or style. Generally, Restek, Valco®, Parker, and Upchurch Scientific® fittings are interchangeable; whereas Waters, SSI, Rheodyne®, and Gasukura fittings are not (Figure 2).

Our wrenchless universal 10-32 PEEK™ Column Connector (cat.# 25015) can be used with any style of end fitting, and all ¹/16-inch tubing. It is reusable and will adjust to any seat, depth, or style, allowing tubing to adjust to depth of hole.

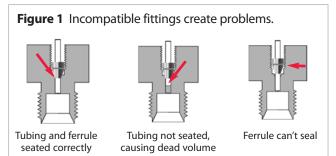




Figure 2 Fitting styles differ among various manufacturers.

Parker

Valco®

Waters

Universal 10-32 PEEK™
Column Connector works with any style of end fitting!



Universal 10-32 PEEK™ Column Connectors and Plugs

Universal PEEK™ Connectors allow easy installation of all ¹/16-inch tubing, including stainless steel.

Description	qty.	cat.#	price
PEEK Column Connector (beige, round body)	10-pk.	25015	
PEEK Column Plug (black)	10-pk.	25016	
PEEK Fingertight Fittings (blue, flat-sided)	10-pk.	25324	



Rheodyne® Style Nut and Ferrule

Replacement long nut for connecting stainless steel tubing to a Rheodyne® 6-port valve or other Rheodyne® part.

Description	qty.	cat.#	price
1/16" Rheodyne Style Nut	10-pk.	25095	
1/16" Rheodyne Style Ferrule	10-pk.	25096	

ChromaBLOGraphy

Topical and timely insights from top chromatographers.

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PEEK™ Union Connector

Quickly and reliably connect two pieces of 1/16-inch tubing. 0.3 mm union bore. End fittings included.

Description	qty.	cat.#	price
PEEK Union Connector 1/16"	2-pk.	25323	



Zero-Dead-Volume Valco® Internal Union

Ends of tubing seat squarely at bottoms of fitting details. 300 series stainless steel. For 1/16" OD tubing. Stainless steel ferrules included.

Description	Union Bore	Valco #	qty.	cat.#	price
Internal Union	0.15mm	ZU1XC	ea.	20147	
Internal Union	0.25mm	ZU1C	ea.	20148	
Internal Union	0.75mm	ZU1	ea.	20149	
Internal Union	1/16"	ZU1T	ea.	20150	



Secure-Fit Fittings

A good connection between HPLC components is necessary for trouble-free chromatography. Secure-Fit connectors from Restek and Selerity Technologies ensure a consistent, leak-free seal—and they eliminate excess dead volume! An internal spring mechanism holds the capillary tubing at the proper depth in the female fitting. This seal is maintained while you finger-tighten the nut. These fittings are available in stainless steel or PEEK™, and in a variety of tubing lengths and internal diameters.

Secure-Fit Fittings (Single Connectors)

	Stainless Steel				PEEK		
Length	0.005" ID	0.007" ID	0.010" ID	0.005" ID	0.007" ID	0.010" ID	price
6cm	25181	25185	25190	25230	25234	25217	
10cm	25182	25186	25191	25231	25235	25218	
20cm	25183	25187	25192	25232	25236	25219	
30cm	25184	25188	25193	25233	25237	25220	
50cm	26510	26511	26512	_	_	_	

Secure-Fit Fittings (Two Connectors)

	S	tainless Ste	el		PEEK		
Length	0.005" ID	0.007" ID	0.010" ID	0.005" ID	0.007" ID	0.010" ID	price
10cm	25208	25211	25214	25221	25224	25227	
20cm	25209	25212	25215	25222	25225	25228	
30cm	25210	25213	25216	25223	25226	25229	
50cm	26513	26514	26515	_		_	



Ferrules for Secure-Fit (1/16")

Description	Material	qty.	cat.#	price
1/16" Ferrule for Secure-Fit	PEEK	10-pk.	20568	
1/16" Ferrule for Secure-Fit	Stainless Steel	10-pk.	25043	









Kits are convenient and economical, compared to ordering individual items!



Survival Kit for HPLC, PEEK™

The PEEK™ Survival Kit is an invaluable parts kit that contains tubing, fittings, and tools essential for setting up and maintaining your HPLC system: PEEK™ tubing, connectors, and elbows, Teflon® tubing, a tubing cutter and extra blades, a ValvTool wrench, open-end wrenches, and more.

For start-up and maintenance in all HPLC systems.

Description	qty.	cat.#	price
Survival Kit for HPLC, PEEK	kit	25322	
Contents:			
Description	qty.	cat.#	price
PEEK Column Connector (beige, round body)	10-pk.	25015	
PEEK Tubing, 1/16" OD x 0.005" ID x 3m (red stripe)	ea.	25065	
PEEK Tubing, 1/16" OD x 0.007" ID x 3m (yellow stripe)	ea.	25066	
PEEK Tubing, 1/16" OD x 0.010" ID x 3m (blue stripe)	ea.	25067	
PEEK Tubing Elbow, 90°	5-pk.	25308	
PEEK Tubing Elbow, 180°	5-pk.	25309	
Teflon Tubing, 1/8" OD x 0.063" (1.6mm) ID x 3m	3m	25306	
Teflon Tubing, 1/8" OD x 0.094" (2.4mm) ID x 3m	3m	25307	
Tubing Clip	5-pk.	25310	
ValvTool Wrench	ea.	25321	
Open-End Wrenches, 1/4" x 5/16"	2-pk.*	20110	
Clean-Cut Tubing Cutter	ea.	25069	
Replacement Blade for Clean-Cut Cutter	ea.	25070	
PEEK Union Connector 1/16"	2-pk.	25323	
Mobile Phase Sparge Filter: 2µm	ea.	25311	
Inlet Filter: 10µm	ea.	25312	

^{*}Kit contains 1 wrench, replacement (cat.# 20110) is a 2-pk.

Survival Kit for HPLC, Stainless Steel

The stainless steel survival kit contains a wide range of tubing, fittings, and tools necessary to set up and maintain your HPLC system: a selection of lengths and IDs of 1/16-inch tubing, plus nuts, ferrules, a ValvTool wrench, and a zero-dead-volume union.

Description		qty.	cat.#	price
Survival Kit for HPLC, Stainless Steel		kit	25097	
Contents:				
Description	color	qty.	cat.#	price
HPLC Capillary Tubing, SS 1/16" x 0.005" x 5cm	red	3-pk.	25240	
HPLC Capillary Tubing, SS, 1/16" x 0.005" x 10cm	red	3-pk.	25241	
HPLC Capillary Tubing, SS, 1/16" x 0.005" x 20cm	red	3-pk.	25242	
HPLC Capillary Tubing, SS, 1/16" x 0.005" x 30cm	red	3-pk.	25243	
HPLC Capillary Tubing, SS, 1/16" x 0.007" x 5cm	gray	3-pk.	25244	
HPLC Capillary Tubing, SS, 1/16" x 0.007" x 10cm	gray	3-pk.	25245	
HPLC Capillary Tubing, SS, 1/16" x 0.007" x 20cm	gray	3-pk.	25246	
HPLC Capillary Tubing, SS, 1/16" x 0.007" x 30cm	gray	3-pk.	25247	
HPLC Capillary Tubing, SS, 1/16" x 0.010" x 5cm	blue	3-pk.	25248	
HPLC Capillary Tubing, SS, 1/16" x 0.010" x 10cm	blue	3-pk.	25249	
HPLC Capillary Tubing, SS, 1/16" x 0.010" x 20cm	blue	3-pk.	25250	
HPLC Capillary Tubing, SS, 1/16" x 0.010" x 30cm	blue	3-pk.	25251	
HPLC Capillary Tubing, SS, 1/16" x 0.020" x 5cm	yellow	3-pk.	25252	
HPLC Capillary Tubing, SS, 1/16" x 0.020" x 10cm	yellow	3-pk.	25253	
HPLC Capillary Tubing, SS, 1/16" x 0.020" x 20cm	yellow	3-pk.	25254	
HPLC Capillary Tubing, SS, 1/16" x 0.020" x 30cm	yellow	3-pk.	25255	
¹/½" Rheodyne Style Nut		10-pk.	25095	
¹/½" Rheodyne Style Ferrule		10-pk.	25096	
ValvTool Wrench		ea.	25321	
Ferrules, 1/16" Stainless Steel		10-pk.	26548	
Nuts, 1/16" Stainless Steel		10-pk.	20287	
Zero-Dead-Volume Internal Union		ea.	20148	

HPLC PEEK™ Performance Kit

This HPLC PEEK™ Performance Kit is a useful complement to your HPLC system. Includes:

- Hub-Cap Adapter w/Cap (1)
- Tubing Clips (3)
- Clean Cut Tubing Cutter (1)
- PEEK Finger Tight Fittings (5)
- PEEK Column Plugs (5)
- PEEK 90° Tubing Elbows (2)

PEEK 180° Tubing Elbows (2) PEEK Column Connectors (2)			
Description	qty.	cat.#	price
HPLC PEEK Performance Kit	kit	26394	













PEEK™ Fitting Extractor

Drill into the broken fitting, then screw the extractor into the fitting and remove it easily. Eliminates the need for heat or other techniques that could damage your column.









Description	qty.	cat.#	price
PEEK Fitting Extractor	ea.	25325	



ValvTool Wrench

The ValvTool is a time-saving device that provides easy access to many hard-to-reach Rheodyne® or Valco® valves. For ¹/₄-inch nuts.

Description	qty.	cat.#	price
ValvTool Wrench	ea.	25321	





HPLC Piston Seal Insertion Tool

Simplify pump maintenance: use one end to remove your old seal, then simply slip your new seal on the other end and push it flush into position. The tool cannot mar the surrounding metal surface of the pump housing.



Remove a seal







Seat a seal







Description	qty.	cat.#	price
HPLC Piston Seal Insertion Tool	ea.	21356	

Outlet Cap and Gold Seal Assembly Tool for Agilent 1050 & 1100 HPLC Systems

Easily install the gold seal into the outlet cap.



Put Outlet Cap on male part of Assembly Tool.



Push the Assembly Tool together, then hold on to Outlet Cap and pull Assembly



Put Gold Seal over pin on male part of Assembly Tool.



Push the Assembly Tool together and press the Gold Seal in the Outlet Cap.



Pull the Assembly Tool apart and remove assembled Outlet Cap and Gold Seal.

1001 apart.			
Description	qty.	cat.#	price
Outlet Cap and Gold Seal Assembly Tool for Agilent 1050 & 1100 HPLC Systems	ea.	24989	
Seal, Gold Disk (outlet)	ea.	25467	
Outlet Cap	4-pk.	25139	
Outlet Cap & Gold Seal Assembly	2-pk.	25140	











Mobile Phase Accessories



Waste Overflow Indicator

- · Avoid messy pooling around mobile phase waste containers.
- Audible alarm instantly alerts user, preventing overflow.
- Compact, battery operated unit.
- · Available for 4-liter and GL-45 solvent bottles.



The Restek Waste Overflow Indicator will help keep your mobile phase waste where it belongs—in the waste container! Compact, battery operated unit fits securely on solvent bottles and accommodates two waste streams. An audible alarm is given as the solvent waste container approaches capacity, giving you time to empty or change the container. Another innovative design from Restek!

Description	qty.	cat.#	price
Waste Overflow Indicator for HPLC Systems, 4 Liter	ea.	26543	
Waste Overflow Indicator for HPLC Systems, GL-45	ea.	26550	
Replacement AA Battery for the Waste Overflow Indicator	ea.	26544	
Replacement AA Batteries			
for the Waste Overflow Indicator	3-pk.	26545	

Opti-Cap® Bottle Top

The most economical way to helium-sparge and deliver HPLC mobile phases.

The Opti-Cap® top fits all standard GL-45 bottles and has two 1/8-inch holes and one 1/16-inch hole for tubing. All three openings are designed for threaded PEEK™ plugs



Bottle not included.

Description	qty.	cat.#	price
Opti-Cap (Cap and PEEK Plug)	ea.	25300	
Opti-Cap Kit			
(Opti-Cap, 3 meters of tubing, sparging filters)	kit	25301	
Opti-Cap Kit with 1L Bottle	kit	25302	
Opti-Cap Kit with 2L Bottle	kit	25303	
Related items and replacement parts	qty.	cat.#	price
Mobile Phase Sparge Filter: 2µm, stainless steel	ea.	25311	
Mobile Phase Inlet Filter: 10µm	ea.	25312	
Teflon Tubing, 1/8" OD x 0.094" (2.4mm) ID x 3m	3m	25307	
Teflon Tubing, 1/8" OD x 0.063" (1.6mm) ID x 3m	3m	25306	
PEEK Plug, 1/4"-28 threads	3-pk.	25319	
1L Graduated Safety-Coated Bottle — GL-45 threads	ea.	25304	
2L Graduated Safety-Coated Bottle — GL-45 threads	ea.	25305	

Eco-Cap Bottle Top, PTFE

Fits all standard GL-45 bottles; has two 1/s-inch holes and one ¹/₁₆-inch hole for tubing. Holes are not threaded.



Description	qty.	cat.#	price
Eco-Cap Bottle Top, includes 1 Male Luer Plug	ea.	25395	







Opti-Cap® Adapters

Allow the use of the Hub-Cap with GL-45 solvent bottles.

Description	qty.	cat.#	price
Opti-Cap Adapter	ea.	27197	
Opti-Cap Adapter Multi-pack	3-pk.	27198	
Onti-Can Adapter w/Hub-Can	kit	26551	









Hub-Cap 4 Liter Bottle Tops

Hub-Cap bottle tops are a great way to neatly keep your mobile phase lines where they belong. Use instead of parafilm, aluminum foil, or tape on your mobile phase reservoirs.



Description	qty.	cat.#	price
Hub-Cap (assembly of the bottle cap and plug)	kit	26541	
Huh-Can Multi-nack	3-nk	26542	



Hub-Cap Adapters

Allow the use of the Opti-Cap™ with 4-liter solvent bottles.

Description	qty.	cat.#	price
Hub-Cap Adapter	ea.	26538	
Hub-Cap Adapter Multi-pack	3-pk.	26539	
Hub-Cap Adapter and Opti-Cap	kit	26540	



Mobile Phase Additives

Mobile phase additives such as triethylamine, trifluoroacetic acid, and ion-pairing reagents can compete with sample ions, decreasing sensitivity and, in some cases, reducing sample ion intake into the MS. To obtain symmetric peaks and/or sufficient retention, use base deactivated, stateof-the-art Type B silica packings that minimize the need for additives.

Transfer and filter mobile phase in a single step!



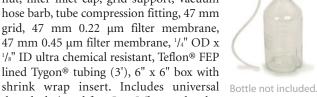


26395

Hub-Cap Filter Kit

Kit includes: bottle adapter, bottle adapter nut, filter inlet cap, grid support, vacuum hose barb, tube compression fitting, 47 mm grid, 47 mm 0.22 µm filter membrane, 47 mm 0.45 μm filter membrane, 1/4" OD x 1/8" ID ultra chemical resistant, Teflon® FEP lined Tygon® tubing (3'), 6" x 6" box with threads designed for 4L or Wheaton bottles.





Assembles quickly and easily!







Place membrane filter on top of grid.



Reattach top.



Connect vacuum line to side port.

Description	aty.	cat.#	price
Hub-Cap Filter Kit for 4L or Wheaton bottles	kit	26395	pilos
Replacement Membrane Filters	qty.	cat.#	price
Polypropylene Membrane Filters, 47mm, 0.45µm	100-pk.	26396	
Polypropylene Membrane Filters, 47mm, 0.22µm	100-pk.	26397	
Nylon Membrane Filters, 47mm, 0.45µm	100-pk.	26398	
Nylon Membrane Filters, 47mm, 0.22 μ m	100-pk.	26399	







FlatLine Pulse Damper

- Rupture-proof, no diaphragm minimal risk of failure or leaks.
- Clean flush-out design—no sample carryover.
- Low internal volume—negligible effect on analyte bandwidth.



The ASI FlatLine Pulse Damper combines performance and reliability in a simple, easy-to-use housing. Standard 10-32 inlet and outlet ports allow quick connection into virtually any HPLC system. Solid core technology provides reliable long-term operation without the downtime associated with ruptured or leaking membrane dampers. $600-700~\mu L$ internal volume at ambient pressure. Maximum pressure: 6,000~psi~(41,369~kpa)

Description	qty.	cat.#	price
FlatLine Pulse Damper, 1.5" W x 3.75" L	ea.	25340	

MiniPulse Pulse Damper

- Compact unit (2.5" x 1.5") can be placed almost anywhere.
- Small, 160 μL dead volume at atmospheric pressure.
- PEEK[™] unit can withstand pressures to 5,000 psi (34,474 kPa).
- 316 Stainless steel unit can withstand pressures to 6,000 psi (41,369 kPa).



Improves system baseline stability while increasing the total system volume by only 160 μ L. The MiniPulse pulse damper is ideal for applications where minimizing the total system volume is critical. Stainless steel and PEEKTM options for a wide range of

Description	qty.	cat.#	price
MiniPulse Pulse Damper, Stainless Steel	ea.	25238	
MiniDulca Dulca Damnar DEEK	02	25230	



LO-Pulse Pulse Damper

applications.

The LO-Pulse Pulse Damper is a patented, wide-dynamic-range 316 stainless steel device that smooths pulsations and maintains constant flow at system pressures from 500 to 6,000 psi (3,447 to 41,369 kPa). The flow path volume is only 0.9 mL and the path is efficiently swept, eliminating solvent memory effects when changing mobile phases.

The LO-Pulse pulse damper also is available in a space-saving, economical kit that includes hardware for mounting the pulse damper on a bracket, or for installing feet on it for bench-top use.

Description	qty.	cat.#	price
Model LP-21 LO-Pulse Pulse Damper	ea.	25012	
Pulse Dai			





The UHP Pulse Dampener provides minimal flow pulsation at system pressures up to 18,000 psi. Its low dead volume (220 μL at atmospheric pressure) reduces overall system volume for UHP applications. The UHP Pulse Dampener has a stainless steel fluid path.



Specifications:	
Operating Pressure:	0-18,000psi
Pulsation Damping:	3:1 reduction in pulsation (dependent on pump
	characteristics and system volume and pressure)
Fluid Path Volume:	220µL (atmospheric pressure)
	+44µL (per 1,000psi system pressure)
Wetted Materials:	316 SS; PTFE; Teflon
Dimensions:	2.5" diameter x 2.0" high

Description	qty.	cat.#	price
UHP Pulse Dampener	ea.	26549	

Solvent Debubbler

Bubbles in an HPLC system can cause check valve malfunctions and pump cavitation, seriously affecting pump performance. The debubbler removes bubbles from the fluid stream before it enters the pump.



Special geometry at the base of the housing allows bubbles entrained in the inlet fluid stream to rise and be trapped in the reservoir. The gas/liquid interface is easily visible through the translucent wall of the device. Loosening the airtight cap releases the trapped gas. The debubbler is fitted with a bracket and universal connecting tips.

Description	qty.	cat.#	price
Solvent Debubbler with Bracket	ea.	25014	





Degasys Ultimate Degasser provides highly stable baselines Ultimate Degasser Off Mobile Phase: water:methanol 50:50 Flow: 1.0ml/min. UV @ 210nm Ultimate Degasser On

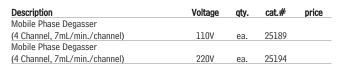
To prevent system damage, do not use the Degasys system with solutions containing TFA at concentrations greater than 5%.

Mobile Phase Degasser

Dissolved oxygen can cause flow rate instability and increased baseline noise. Also, it has a quenching effect on fluorescence detection and increases the background of UV detectors. Dissolved gases can out-gas in the HPLC system, forming bubbles in check valves, at connections, or in detector flow cells.

In-line vacuum degassing is more effective at removing dissolved gas from mobile phases than sonication or helium sparging. In-line degassers work by withdrawing gas across a gas-permeable membrane encased in a sealed chamber. Traditionally, the membrane has been made of PTFE tubing, but the Degasys Ultimate Degasser uses tubing composed of an amorphous fluoropolymer that is 200 to 300 times more gas permeable than PTFE. This translates into the ability to use shorter tubing for removing dissolved gas. This new material also has better tubular burst strength than PTFE. To prevent cross contamination, each channel on this Degasys unit is individually encased within its own vacuum chamber.

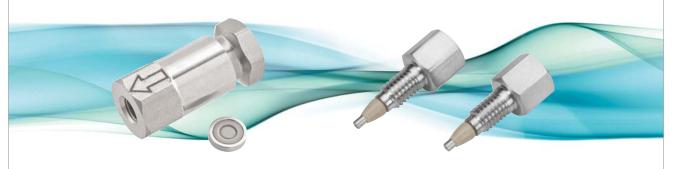
Specification	s:		
Residual Oxygen ¹	0.9ppm	Wetted Parts	Teflon AF, PTFE,
Pressure Loss ¹	0.24psi (1.65kPa)		ETFE, PPS
Internal Volume	500μL	Max Flow Rate	7mL/min./channel
¹ At a flow rate of	lmL/min.		





and UltraLine UHPLC Filters

A cost-effective way to extend the lifetime of any UHPLC column without sacrificing UHPLC performance



See page 195 for details.



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1/12

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Low-Pressure Slip-On Inlet Filter for Mobile Phase Reservoir

A type 316 stainless steel tip with a Tefzel® collar seals to a corrosion-resistant type 316 stainless steel filter element. The slip-on filter easily attaches to the pump inlet line, without the use of wrenches. The universal tip accommodates standard Teflon® tubing inner diameters. The cylindrical filter is standard 10 μm porosity. '/s" OD. Fits Altex, ISCO, LDC, Varian, Waters, PerkinElmer, and other pumps.

Description	qty.	cat.#	price
Slip-on Inlet Filter	ea.	25008	



sive way to prepare and maintain mobile phases free of dissolved gas. Both filters are made from 316 stainless steel and PEEK™ and are compatible with most solvents.

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Description	qty.	cat.#	price
Mobile Phase Sparge Filter: 2µm	ea.	25311	
Inlet Filter: 10µm	ea.	25312	
Inlet Filter: 20µm	ea.	25313	



Low-Pressure CPI Inlet Filter for Mobile Phase Reservoir

A 316 stainless steel knurled cap and Tefzel® CPI ferrule seal to $^{1}\!/_{s}$ " OD Teflon® tubing when finger-tightened onto the precision-machined filter holder. The filter element is replaceable. Standard 10 μm porosity protects delicate pump components from particles but introduces very little pressure drop. $^{1}\!/_{s}$ " OD. May be used as a helium sparging diffuser.

Description	qty.	cat.#	price
CPI Inlet Filter	ea.	25009	
Replacement Elements: 10µm filter	2-pk.	25010	

Last Drop Filter

The flat filter element sits parallel to the bottom of the mobile phase reservoir, allowing the filter to draw 98% of the mobile phase without drawing air into the system. Conventional cylindrical mobile phase filters begin to draw air into the system when approximately 10% of the solvent remains in the reservoir. The Last Drop Filter allows more analyses per batch of mobile phase and helps reduce hazardous waste. 22.1 mm OD.



Description	qty.	cat.#	price
Last Drop Filter, 2 μ m	ea.	25314	
Last Drop Filter, 10µm	ea.	25315	









Membrane Microfiltration Glassware

47 mm filtration apparatus with fritted glass support is recommended for routine filtration of corrosive liquids and removal of particles from HPLC solvents. The ground joint connection eliminates phthalate contamination that can occur when using silicone or neoprene stoppers. The support base has a coarse porosity glass frit and an integral vacuum connection, located above the drip tip to prevent contamination of the vacuum line with filtrate droplets. Each apparatus includes a funnel, an anodized aluminum clamp, a 47 mm fritted glass support base, and a filtration flask.

All-Glass Microfiltration Apparatus	qty.	cat.#	price
300mL Funnel, 1000mL Flask	ea.	KT953825-0000	
500mL Funnel, 2000mL Flask	ea.	KT953835-0000	
1000mL Funnel, 4000mL Flask	ea.	KT953845-0000	
Replacement Parts for Microfiltration Apparatus	qty.	cat.#	price
40/35 PTFE Joint Sleeve	6-pk.	KT676001-4035	
Flask Cap, 40/35 Outer Joint	ea.	KT953830-0000	
Fritted Glass Support, 47mm, 40/35 Joint	ea.	KT953826-0000	
Glass Funnel, 47mm, 100mL	ea.	KT953761-0000	
Glass Funnel, 47mm, 300mL	ea.	KT953751-0000	
Glass Funnel, 47mm, 500mL	ea.	KT953771-0000	
Glass Funnel, 47mm, 1000mL	ea.	KT953781-0000	
Flask, 1000mL, 40/35 Joint	ea.	KT953827-0000	
Flask, 2000mL, 40/35 Joint	ea.	KT953828-0000	
Flask, 4000mL, 40/35 Joint	ea.	KT953829-0000	
Aluminum Clamp, 47mm	ea.	KT953753-0000	
Membrane Filters	qty.	cat.#	price
Polypropylene Membrane Filters, 47mm, 0.45 μ m	100-pk.	26396	
Polypropylene Membrane Filters, 47mm, 0.22 μ m	100-pk.	26397	
Nylon Membrane Filters, 47mm, 0.45µm	100-pk.	26398	
Nylon Membrane Filters, 47mm, 0.22µm	100-pk.	26399	



- · Easy to set up!
- Operation range: 5 °C above ambient to 85 °C, ±1 °C.
- · Lightweight, compact design fits in small spaces.
- Column holder can be placed in any orientation.

This unique design completely encloses any HPLC analytical column up to 25 cm in length. Two lengths of heater jackets are available: the short column holder accommodates columns up to 10 cm in length, while the long column holder holds columns up to 25 cm in length. The control module provides optimum heating performance, accuracy to within 1 °C, and stability to within 0.1 °C. The new Sidewinder controller has fast 10 Hz sampling for improved responsiveness. Power requirements: 24 V control unit for maximum stability; RS232 control allows external programming.

Description	Length	qty.	cat.#	price
Temperature Control Module				
and Column Holder	Long (25cm)	ea.	26516	
Temperature Control Module				
and Column Holder	Short (10cm)	ea.	26517	



gty. cat.#

qty.

cat.#

price

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Mar 2011

price

Sidewinder Heater/Cooler Temperature Control Module

- Operation range: 5-55 °C, ±0.2 °C.
- Ability to program multiple temperature points.
- Accommodates columns up to 30 cm in length and 7.8 mm ID.
- · Compact design.

Description

The Sidewinder heater/cooler unit has a doubly insulated cover to maintain the programmed temperature to within 0.2 °C. The 24 V control unit provides maximum stability and rapid equilibration times; RS232 control allows external programming.

Sidewinder Heater/Cooler Tempera	ture Control Module	ea.	26518
	Elline		



Mobile Phase Pre-Heater

- Heats mobile phase before it enters a heated column.
- Minimizes temperature changes, to help keep analyte peaks sharp.

HROWalytic +61(0)3 9762 2034

ECH nology Pty Ltd

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Description







Fluid resistor technology eliminates adjustments to capillary tubing for optimizing split ratio. Wide range of interchangeable resistors available.

Fixed Flow Splitters for HPLC & LC/MS

- Split ratio not affected by changes in viscosity or pressure.
- High operating pressure limit: 10,000 psi (68,948 kPa).
- Low dead volume—negligible effect on analyte bandwidth.
- Total flow: 0.1–5.0 mL/min.



- Adjustable metering valve gives convenient control of split ratio.
- Split ratio not affected by changes in viscosity or pressure.
- High operating pressure limit: 5,000 psi (34,474 kPa).
- Low dead volume—negligible effect on analyte bandwidth.
- Total flow: 0.1-5.0 mL/min.

Description	Split Ratio	qty.	cat.#	price
Binary Fixed, Post Column	100:1	ea.	25326	
	50:1	ea.	25327	
	20:1	ea.	25328	
	10:1	ea.	25329	
	5:1	ea.	25330	
Replacement Fixed Resistor Set,	100:1	ea.	25331	
Post Column	50:1	ea.	25332	
	20:1	ea.	25333	
	10:1	ea.	25334	
	5:1	ea.	25335	
Adjustable, Post Column	5:1 to 100:1	ea.	25336	
	1:1 to 20:1	ea.	25337	
	50:1 to 1000:1	ea.	26416	
Replacement Adjustable Resistor Set,	5:1 to 100:1	ea.	25338	
Post Column	1:1 to 20:1	ea.	25339	



HPLC Mixers

- · Reduced baseline noise.
- · Increased sensitivity.
- Improved gradient accuracy, for more reproducible results.
- Increased reaction efficiency in post-column derivatization.

An efficient cross-flow shearing mechanism and interchangeable cartridges produce vortex shear mixing over a wide range of flows. Stainless steel or PEEK TM .

HyperShear™ Static In-Line Mixers

	S	tainless St	eel		PEEK	
Volume	qty.	cat.#	price	qty.	cat.#	price
1μL	ea.	26409	\$510	ea.	26410	
25µL	ea.	26411	\$605	ea.	26412	
50μL	ea.	25341	\$605	ea.	26413	
150µL	ea.	25342	\$605	ea.	26414	
250µL	ea.	25343	\$605	ea.	26415	



Ternary Tee Mixer

Description	Volume	qty.	cat.#	price
Ternary Tee Mixer	25µL	ea.	25138	





Valves, Backpressure Regulators





Our valves have low internal volumes and are rated to 15,000 psi (103,421 kPa). They feature a 2-piece stem assembly in which the rotating upper shank is coupled through a ball joint to a static lower stem. Only fingertight torque is required to make the seal.

Description	qty.	cat.#	price
Two-Way Through Valve for HPLC, 1/16" Fittings,			
1/4-28, Stainless Steel, Includes Nuts and Ferrules	ea.	26400	
Two-Way Angle Valve for HPLC, 1/16" Fittings,			
1/4-28, Stainless Steel, Includes Nuts and Ferrules	ea.	26401	
Three-Way Bottom Vent Valve for HPLC, 1/16" Fittings,			
1/4-28, Stainless Steel, Includes Nuts and Ferrules	ea.	26402	
Side Vent Valve for HPLC, 1/16" Fittings,			
1/4-28, Stainless Steel, Includes Nuts and Ferrules	ea.	26403	
Dual Stem Three Way Valve for HPLC, 1/16" Fittings,			
1/4-28, Stainless Steel, Includes Nuts and Ferrules	ea.	26404	
Prime/Purge Valve for HPLC, 1/4-28 Flanged Seat,			
Stainless Steel, with Tubing and Fittings	ea.	26406	
Prime/Purge Valve Repair Kit for Prime/Purge Valve	kit	26407	



In-Line Check Valves for HPLC

60µL internal

	Max			
Description	Pressure	qty.	cat.#	price
Check Valve, Soft Seat, for HPLC, 1/16" Fittings,				
1/4-28, Stainless Steel, Includes Nuts and Ferrules	15,000psi	ea.	26405	
Check Valve with 1/8" Ball Cartridge,				
48µL internal volume	15,000psi	ea.	26417	
Check Valve Replacement 1/8" Ball Cartridge,				
48µL internal volume	15,000psi	ea.	26418	
UHP Check Valve with 1/8" Ball Cartridge,				
48µL internal volume	30,000psi	ea.	26419	
UHP Check Valve Replacement 1/8" Ball Cartridge,				
48µL internal volume	30,000psi	ea.	26420	
Check Valve with 3/16" Ball Cartridge,				
60µL internal volume	15,000psi	ea.	26421	
Check Valve Replacement 3/16" Ball Cartridge,				



Backpressure Regulators

Backpressure regulators can improve detector performance by preventing bubble formation in the detector flow cell. They also are useful in post-column reaction lines and between detectors and fraction collectors in preparatory work. Regulators are superior to more specific alternative solutions, like small-bore tubing, in which pressure varies with flow rate.

Our end-of-line and flow-through backpressure regulators are adjustable to assure constant backpressure over a wide range of mobile-phase viscosities and flow rates. The end-of-line model is available with 1/4-28 plastic flange-type fittings or high-pressure ¹/₁₆-inch compression fittings; this design adjusts from 15 to 60 psi (103 to 414 kPa). The flow-through design has ¹/₁₆-inch compression fittings and is adjustable from 7 to 75 psi (48 to 517 kPa).

Description	qty.	cat.#	price
Backpressure Regulator:			
end-of-line, 1/16-inch OD tubing, flanged	ea.	25017	
Backpressure Regulator: end-of-line, high-pressure seat	ea.	25018	
Backpressure Regulator:			
flow-through, 5µL internal volume	ea.	25020	





HROMalytic +61(0)3 9762 2034

Syringes for Waters U6K Valves

- · Reinforced plungers.
- · Removable needles.
- Replaceable plunger/barrel assemblies.
- Barrel stop prevents plunger blowout.



Hamilton

Volume	Needle	Needle	Needle	Point	Hamilton			Restek	
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
10µL	RN	25s	1.97"	3	801	84815	ea.	21255	
25μL	RN	25s	1.97"	3	802	84816	ea.	21256	
50μL	RN	25s	1.97"	3	805	84817	ea.	21257	
100μL	RN	25s	1.97"	3	810	84818	ea.	21258	
250µL	RN	25s	1.97"	3	825	84819	ea.	21259	



SGE

Volume	Needle	Needle	Needle	Point	SGE	SGE		Restek	
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
25µL	R	25	50mm	3	25R-WLC-RA8	003375	ea.	24873	
50μL	R	25	50mm	3	50R-WLC-RA8	004375	ea.	24874	
100μL	R	25	50mm	3	100R-WLC-RA8	005375	ea.	24875	
250µL	R	25	50mm	3	250R-WLC-RA8	006375	ea.	24876	
500μL	R	25	50mm	3	500R-WLC-RA8	007375	ea.	24877	

Replacement Needles for Syringes for Waters U6K Valves



Hamilton

Syringe	Needle	Needle	Point	Hamilton		Restek	
Volume	Gauge	Length	Style	cat.#	qty.	cat.#	price
10-100μL	25s	1.97"	3	8647-01	6-pk.	21270	
250µL-10mL	25s	1.97"	3	8648-01	6-pk.	21271	





Gas-Tight Syringes for Rheodyne® & Valco® Valves

- Teflon®-tipped plungers.
- · Removable needles.
- Replaceable syringe barrels, plungers, and plunger tips.

Hamilton

	Needle	Needle	Needle	Point	Hamilton			Restek	
Volume	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
10µL	RN	26s	2"/51mm	3	1701	80065	ea.	21260	
25µL	RN	22s	2"/51mm	3	1702	80265	ea.	21261	
50μL	RN	22s	2"/51mm	3	1705	80965	ea.	21262	
100μL	RN	22s	2"/51mm	3	1710	81065	ea.	21263	
250µL	RN	22s	2"/51mm	3	1725	81165	ea.	21264	



SGE

	Needle Needle Needle		Needle	Point	SG	SGE		Restek	100
Volume	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
10µL	R	22	2"	3	10R-GT-LC	002313	ea.	24866	
25µL	R	22	2"	3	25R-GT-LC	003312	ea.	24867	
50μL	R	22	2"	3	50R-GT-LC	004312	ea.	24868	
100μL	R	22	2"	3	100R-GT-LC	005312	ea.	24869	
250µL	R	22	2"	3	250R-GT-LC	006312	ea.	24870	
500μL	R	22	2"	3	500R-GT-LC	007312	ea.	24871	



24868

Replacement Needles for Gas-Tight Syringes for Rheodyne® & Valco® Valves

Hamilton

Syringe	Needle	Needle	Point	Hamilton		Restek	
Volume	Gauge	Length	Style	cat.#	qty.	cat.#	price
5–100μL	22s	2"	3	7770-01	6-pk.	24941	
250µL-10mL	22	2"	3	7780-04	6-pk.	24945	



SGE

Syringe	Needle	Needle	Point	SGE		Restek	
Volume	Gauge	Length	Style	cat.#	qty.	cat.#	price
10μL	22	2"	3	037250	5-pk.	24808	
25-500µL	22	2"	3	038250	5-pk.	24809	



Economical Microliter Liquid-Type Syringes for Rheodyne® & Valco® Valves

- · Cemented/fixed needles.
- Plungers and barrels are not interchangeable or replaceable.

Hamilton



Volume	Needle	Needle	Needle	leedle Point Hamilton Res		le Point	Hamilton		Restek	
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price	
10μL	N	22s	2"	3	701	80365	ea.	21250		
25μL	N	22s	2"	3	702	80465	ea.	21251		
50μL	N	22s	2"	3	705	80565	ea.	21252		
100μL	N	22s	2"	3	710	80665	ea.	21253		
250μL	N	22s	2"	3	725	80765	ea.	21254		

SGE



Volume	Needle	Needle	Needle	Point	SGE			Restek		
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price	
10μL	F	22	2"	3	10F-LC	002301	ea.	24860		
25µL	F	22	2"	3	25F-LC	003300	ea.	24861		
50μL	F	22	2"	3	50F-LC	004300	ea.	24862		
100μL	F	22	2"	3	100F-LC	005300	ea.	24863		
250µL	F	22	2"	3	250F-LC	006300	ea.	24864		
500µL	F	22	2"	3	500F-LC	007300	ea.	24865		

Priming Syringes for Waters 6000, 6000A, 501, 510, 590, 610 and 610E HPLC Pumps

- Designed for maximum safety with metal flange and luer-lock (LL) hub.
- Teflon®-tipped plunger.

Hamilton







21265

Volume	Needle	SGI	E			Restek	
	Term.	Model	cat.#	Pressure Tested to	qty.	cat.#	price
10mL	LL	10MDR-LL-GT	008960	100 psig	ea.	24759	

^{*}Needles sold separately.





Syringes for LC Autosamplers

SGE

for Agilent 1090 & 1100 LC Autosamplers

	3GE			Rester		
Volume	Model	cat.#	qty.	cat.#	price	
25μL, 1/4-32 UNEF Thread	25D-HP1090-GT	003670	ea.	22290		



SGE

for Hitachi LC Autosamplers

	JUL			VESIEK		
Volume	Model	cat.#	qty.	cat.#	price	
500μL, M10 X1 Thread	500C-HITACH1	007660	ea.	22292		

CCE



SGE

for PerkinElmer LC Autosamplers

	20	20E			
Volume	Model	cat.#	qty.	cat.#	price
100μL, 1/4-28 UNF Thread	100D-CX-GT	005990	ea.	22296	
250µL, 1/4-28 UNF Thread	250D-CX-GT	006995	ea.	22297	
500μL, 1/4-28 UNF Thread	500D-CX-GT	007995	ea.	22298	
1mL, 1/4-28 UNF Thread	1MD-C-GT	008185	ea.	22299	





Syringes for Waters WISP LC Autosamplers

Teflon® PTFE-tipped plungers

Hamilton

	Ham				
Volume	Model	cat.#	qty.	cat.#	price
25μL, 1/4-28 UNF Thread	1702	80020	ea.	24528	
250µL, 1/4-28 UNF Thread	1725	80024	ea.	24529	



SGE

	SG	SGE			
Volume	Model	cat.#	qty.	cat.#	price
25μL, 1/4-28 UNF Thread	25D-WISP	003990	ea.	22293	
250µL, 1/4-28 UNF Thread	250D-WISP	006690	ea.	22294	



Syringes for CTC LC Autosamplers

Hamilton

Volume	Needle	Needle	Needle	Point	Hamiltor	1		Restek	
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
10μL	N	22s	2"/51mm	3	701N	203073	ea.	22743	
25µL	N	22s	2"/51mm	3	1702N	203075	ea.	22744	
100µL	N	22s	2"/51mm	3	1710N Slim Line*	203077	ea.	22745	
100µL	N	22	2"/51mm	3	1710N	203235	ea.	22746	
250µL	N	22	2"/51mm	3	1725N	203079	ea.	22747	
500μL	N	22	2"/51mm	3	1750N	203349	ea.	22748	



SGE

Volume	Needle	Needle	Needle	Point	SGE			Restek	
	Term.	Gauge	Length	Style	Model	cat.#	qty.	cat.#	price
10μL	F	22s	2"/51mm	LC	10F-CTC-LC	002710	ea.	22737	
100µL*	R	22s	2"/51mm	LC	100R-C/T-GT-LC	005330	ea.	22741	
500μL*	F	22s	2"/51mm	LC	500F-CTC-GT-LC(0.41)	007720	ea.	22742	

²²⁷³⁷

^{*}Gas-tight syringe.







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^{*}Barrel OD = 6.7mm; all other $25\mu L$ and $100\mu L$ syringes have a 7.9mm barrel OD.

LC/MS Nitrogen Purification/Generation, Lab Organize

Restek Super-Clean Gas Trapping System for LC/MS

- Changing filters is quick and easy.
- Up to 20 L of hydrocarbonfree nitrogen per minute.
- Filters connected in parallel to handle high flows of LC/MS.

The Super-Clean Gas Trapping System is the latest technology in cartridge-style gas filtration for purifying nitrogen, and is ideal for use in LC/MS systems. The two-position base plate (installed in the gas line) allows cartridges



to be exchanged without introducing impurities into the system. Spring-loaded check valves seal when a cartridge is removed and open only when a new cartridge has been locked in place. There is no need for loosening and tightening fittings every time you change cartridges, and your system cannot become contaminated during the changing process.

To meet the high flow needs of the LC/MS system, the activated charcoal-filled cartridges are positioned and connected in parallel. The incoming gas stream is split equally between the cartridges, and the two streams are rejoined after purification but before the gas exits the base plate. This approach allows longer contact between the nitrogen and the adsorbent, ensuring higher gas purity and eliminating a potential source of contaminants to your analyses.

A handy date wheel, included with the system, indicates the cartridge installation date and the recommended replacement date.

Description	qty.	cat.#	price
Super-Clean Gas-Trapping System			
(2-position base plate, 2 charcoal filters)	ea.	22062	
Replacement Hydrocarbon (Charcoal) Filters	2-pk.	22061	

it's a fact



Lab Organizers*







Deluxe BenchBooster Organizer



Mini pHPerch Storage Unit



HPLC 30-Column Storage Cabinet



Book Holders



Open Supply Bins, 13-bin unit



TopLoader BalanceBank Storage



Glove Box Dispensers

Description	dimensions	qty.	cat.#	price
LCLocker	24 x 12 x 6"	ea.	25149	
BenchBooster	24 x 7 x 12"	ea.	25150	
Mini pHPerch	13 x 12 x 6"	ea.	25147	
TopLoader	12 x 12 x 7"	ea.	25148	
30 Column Cabinet	17 ³ / ₈ x 15 x 2 ⁷ / ₈ "	ea.	25159	
Book Holder,				
0.75" ID (Small)	4 ¹ / ₂ x 6 x 1 ¹ / ₄ "	ea.	25151	
Book Holder,				
1.5" ID (Large)	4 ¹ / ₂ x 6 x 1 ³ / ₄ "	ea.	25152	
Open Supply Bin	24 x 12 x 10" (4-bin Unit)	ea.	25153	
Open Supply Bin	12 x 16 x 10.5" (5-bin Unit)	ea.	25154	
Open Supply Bin	12 x 7.5 x 12" (13-bin Unit)	ea.	25155	
Glove Box Dispenser	51/8 x 11 x 41/4" (Single)	ea.	25156	
Glove Box Dispenser	10 ¹ / ₈ x 11 x 4 ¹ / ₄ " (Double)	ea.	25157	
Glove Box Dispenser	151/8 x 11 x 41/4" (Triple)	ea.	25158	

^{*}Please note: Accessories and supplies in photographs are not included.



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#nology Pty Ltd

Restek Pack in a Box Kit

Restek's Pack in a Box Kit is a complete column-packing system. Everything you need to pack your own analytical HPLC columns is included: pump, 20 mL reservoir, column hardware (two, 150 x 4.6 mm), and system control software (computer not included). Detailed packing instructions and a DVD video also are included. The packing pump is electric, so no pressurized air is required. AC input requirement: 85-265 VAC. 10,000 psi maximum pressure.



Description	qty.	cat.#	price
Pack in a Box Kit	kit	26408	

Bio-Safe Column System (PEEK™)

- · Completely biocompatible.
- 100% metal free.
- Stable to 8,000 psi.

Bio-Safe columns are biocompatible and precision-machined from virgin PEEK™ (polyetheretherketone), a strong, inert polymer material.

Product Specs

· 4.6mm ID x 30mm length column with end fittings.

Description	qty.	cat.#	price
Bio-Safe Column System,			
PEEK, 4.6mm x 30mm, 2.0µm	ea.	26546	\$129





Restek tubing is manufactured from fine, chromatographicgrade 316 stainless steel. It is corrosion resistant, ultrasonically cleaned and passivated. We polish the tubing and promise a burr-free cut. You can use this tubing immediately—there is no need for additional treatment.

	2.1mm ID	3.2mm ID	4.6mm ID
Length	cat.# price	cat.# price	cat.# price
1/4" OD Tubing			
30mm	25100	25106	25112
50mm	25101	25107	25113
100mm	25102	25108	25114
150mm	25103	25109	25115
200mm	25104	25110	25116
250mm			



- · 316 stainless steel tubing complete with end-fittings, frits, nuts, and ferrules.
- Preassembled prior to shipment, unless otherwise requested.
- Internal ¹/₁₆-inch seats are compatible with Valco® and Parker

	2.1r	nm ID	3.2n	nm ID	4.6mm ID	
Length	cat.#	price	cat.#	price	cat.# price	e
1/4" OD Tubing						
30mm	25118	\$73	25124	\$73	25130	
50mm	25119	\$73	25125	\$73	25131	
100mm	25120	\$73	25126	\$73	25132	
150mm	25121	\$80	25127	\$81	25133	
200mm	25122	\$80	25128	\$80	25134	
250mm	25123	\$80	25129	\$80	25135	



Column End-Fittings

¹/₄-inch end-fittings are compatible with Valco® and Parker fittings.

Description	qty.	cat.#	price
Column End-Fitting for 4.6mm Column	ea.	25077	
Column End-Fitting Flat Bottom	ea.	25078	



Packing particle size	Use this pore size:	
3–4µm	0.5µm	
5–20μm	2.0µm	

1/4-Inch HPLC Frits

We manufacture our frits from fine, chromatographic-grade 316 stainless steel, and we offer sizes to fit most column and pore sizes. To choose the correct frit, check its pore size compatibility with the particle size of the packing in the column (see chart above). If the packing has a smaller particle size than the pore size of the frit, the packing can clog the frit.

ID	Pore Size	qty.	cat.#	price
4.6mm	2.0µm	10-pk.	25071	
4.6mm	0.5µm	10-pk.	25072	
3.2mm	2.0µm	10-pk.	25073	
3.2mm	0.5µm	10-pk.	25074	
2.1mm	2.0µm	10-pk.	25075	



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