



GC consumables



In the laboratory today, the time spent and the precision required for sample preparation are key investments in an efficient workflow. Having spent that time and effort in sample preparation, it then becomes critical to maintain the integrity of the sample as it is delivered to the separation and detection steps of the analysis. This is why Trajan Scientific and Medical (Trajan) is focused on delivering a portfolio of high performance GC Inlet liners, GC columns, connections and fittings all with the specific and aggregate intent of ensuring the sample is not compromised on its journey to the detection system.



Our portfolio is built on the strength and world class heritage of the SGE GC supplies portfolio. In each of our manufacturing operations around the world, our products are built to exacting standards so that you can rely on their performance, accuracy and precision.

With a strong team of design chemists and production engineers, and an extensive network of application based industry opinion leaders, our portfolio of GC consumables continues to develop within Trajan. This means you, as a user in the laboratory, are assured of your sample integrity through collection, injection, separation and detection, optimizing your analysis.



We are confident that in this selection guide you will be able to identify and select the correct consumables for your application. If not, please contact us and we can investigate a custom solution for you.



As a major provider of tools and components for the analytical industry, Trajan is manufacturing product in the USA, Malaysia and Australia and we continue to service our valued customers around the world via a connected group of commercial and distribution facilities in Europe, the Americas, Asia and Australia. This supply chain is ably supported by a strong field technical team around the world.

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Trajan consumables | GC selection

SGE Syringes



Please refer to the Syringes for the laboratory brochure.

SGE Inlet liners



Color	Injection technique	Sample types	Liner geometry
Dark green	Splitless	<ul style="list-style-type: none"> Trace level analyses Active compounds 	Taper/gooseneck
Blue	Split	<ul style="list-style-type: none"> General purpose Concentrated samples Dirty samples 	FocusLiner®
Aqua	Splitless	<ul style="list-style-type: none"> Trace level analyses Dirty samples Wide boiling point range 	Tapered FocusLiner
Orange	Direct	<ul style="list-style-type: none"> Trace level analyses Active compounds 	ConnecTite™
Purple	Split/ splitless	<ul style="list-style-type: none"> General purpose Concentrated samples Dirty samples (only if quartz wool is present) Gaseous samples (also purge and trap, headspace) 	Straight
Yellow	Splitless LVI	<ul style="list-style-type: none"> Trace level analyses Low boiling point compounds Active compounds 	Double taper
Gray	PTV LVI	<ul style="list-style-type: none"> Trace level analyses Large volume injections 	PTV/LVI



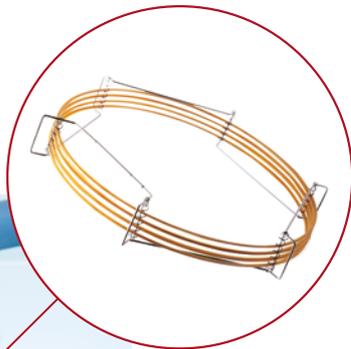
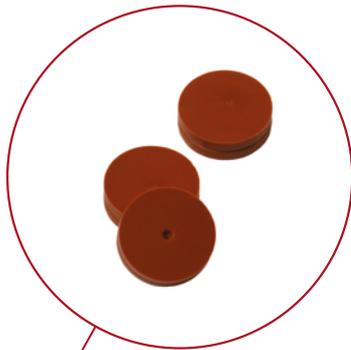
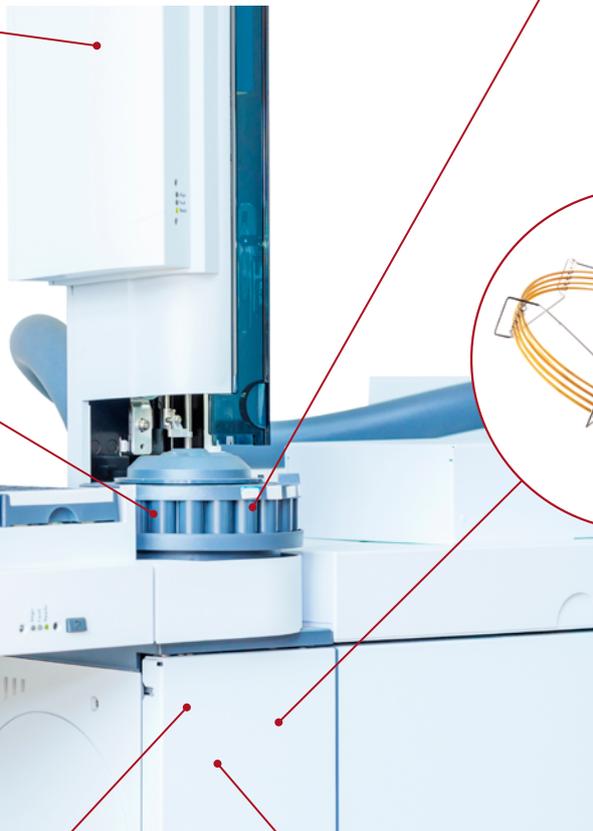
Connectors and ferrules



SiTite®

Material	Uses	Advantages	Limitations
100% Graphite	FID, NPD, high temperature	<ul style="list-style-type: none"> Easy-to-use stable seal Higher temperature limit Easily removed Reusable 	<ul style="list-style-type: none"> Not for MS or oxygen-sensitive detectors Soft, easily deformed or destroyed Possible system contamination
15% Graphite/ 85% Vespel®	MS and oxygen-sensitive detectors	<ul style="list-style-type: none"> Long lifetime High temperature limit MS compatible 	<ul style="list-style-type: none"> Cannot be re-used Must be re-tightened after initial temperature cycles
SiTite® metal	MS and oxygen-sensitive detectors	<ul style="list-style-type: none"> Long lifetime High temperature limit MS compatible 	<ul style="list-style-type: none"> Cannot be re-used





Septa

Material	Max operating temperature	Key features
GP grade	275°C*	Low temperature applications
EC grade	350°C*	Low bleed
MN grade	350°C*	Premium septa for autosamplers
HT grade	400°C*	Outstanding mechanical properties for the highest temperature applications

*Temperature for 11 mm septa only.

SGE GC columns



Column parameter	Parameters affecting resolution			Performance changes
	Efficiency	Retention	Selectivity	
Column length (m)	✓			Doubling column length increases resolution by ~40%
Internal diameter (mm)	✓	✓		The smaller the column ID, the greater the efficiency and better the resolution
Film thickness (µm)		✓		The thicker the film, the greater the retention, e.g. ideal for highly volatile compounds. The thinner the film, the sharper the peaks and lower the bleed
Stationary phase chemistry			✓	Altering the stationary phase can affect elution order and help separate closely, or co-eluting peaks

SilFlow®



3 port, 4 port or Deans' switch configuration microchannel devices for multidimensional analysis.

Septa

Low bleed | Long lifetime



The purpose of a septa in a GC system is to isolate the sample flow path from the outside world. The septa provides a barrier that is readily penetrated by the injector needle whilst maintaining internal pressure without causing system contamination. An ideal septa has low bleed and a long lifetime.

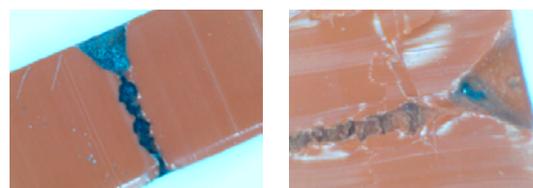
Septa selection

	GP grade	EC grade	MN grade	HT grade	Enduro blue
					
	<ul style="list-style-type: none"> • Low temperature applications. 	<ul style="list-style-type: none"> • Combines significantly longer injection life, low bleed and low injection port adhesion. 	<ul style="list-style-type: none"> • Premium septa for autosamplers. • Up to 400 injections per septa. • Pre-pierced to reduce coring. 	<ul style="list-style-type: none"> • Bleed and temperature optimized, combined with outstanding mechanical properties for the highest temperature applications. • Retains softness and pierceability at high temperatures, and low injection port adhesion. 	<ul style="list-style-type: none"> • For Shimadzu GCs.
Material	Silicone	High temperature silicone	High temperature silicone	BTO silicone	High temperature silicone
Durability	Good	Excellent	Excellent	Excellent	Excellent
Resealing	Good	Excellent	Excellent	Excellent	Excellent
Solvent resistance	Excellent	Excellent	Excellent	Excellent	Excellent
Tear resistance	Good	Excellent	Excellent	Excellent	Excellent
Maximum temperature	275°C	350°C	350°C	400°C	350°C

Temperature for 11 mm septa only.

Why septa should be replaced regularly:

- Avoid decomposition in GC inlet
- Prolong column lifetime
- Avoid system leaks and sample loss

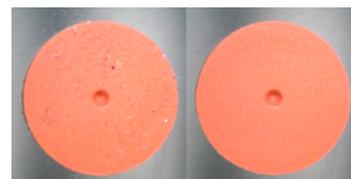


Examples of worn septa.

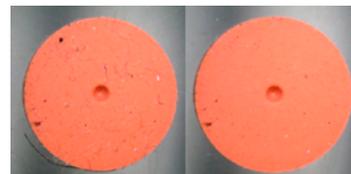
Heat stability and sticking

All EC, MN and HT grade septa are treated with a non-stick coating:

- Reduces sticking in the injection port
- Improves ease of replacement
- Prevents dust accumulation on the surface
- Reduces potential causes of leaks and contamination



Coated MN septa after exposing to dust and wiping.



Uncoated MN septa after exposing to dust and wiping.

Septa for Agilent instruments

Diameter (mm)	Type	Pack size	Fisher Scientific Cat. No.
For Agilent 7890, 6890, 6850, 5890 and 4890			
11	GP	50	10055430
11	EC	25	12985721
11	MN	50	10492711
11	HT	25	12975721

Septa for PerkinElmer instruments

Diameter (mm)	Type	Pack size	Fisher Scientific Cat. No.
For PerkinElmer Autosystem, Clarus 500, 600, 590 and 690			
11	GP	50	10055430
11	EC	25	12985721
11	MN	50	10492711
11	HT	25	12975721

Septa for Shimadzu instruments

Style	Type	Pack size	Fisher Scientific Cat. No.
For Shimadzu GC-2030, GC-2014, GC-2010 and GC-17A			
Plug	Enduro blue	50	12905721
Plug	EC	50	15238623
Plug	HT	50	12995721

Septa for Thermo Scientific instruments

Diameter (mm)	Type	Pack size	Fisher Scientific Cat. No.
For Thermo Scientific TRACE 1300 series GC†			
11	GP	50	10055430
11	EC	25	12985721
11	MN	50	10492711
11	HT	25	12975721

†Contact us for 17 mm septa Fisher Scientific Cat. No.s for previous Thermo Scientific instruments.

Confidence in your analysis



The purpose of an inlet liner in a GC system is to allow a sample injected in the liquid phase to pass into the gaseous phase and onto the GC column.

The elevated temperature used in the GC inlet vaporizes the liquid sample into a gaseous sample for transfer to the GC column.

During the transition from a liquid to a gas, there is change in the volume and the liner must be able to contain this volume.

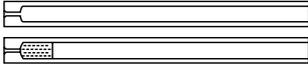
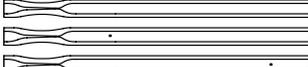
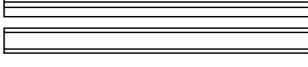
If the volume is too large, sample is lost, impacting reproducibility and sensitivity.



Important considerations when selecting inlet liners:

- Must ensure complete vaporization of the sample before it reaches the column entrance.
- Must not react with the sample.
- The liner volume must be larger than the volume of vaporized sample.
- The liner should minimize discrimination not promote it.
- Adding quartz wool increases the surface area and promotes mixing.
- Inlet liners should be deactivated, especially for analysis of polar solutes and for splitless injections.
- Wool should be placed in the optimum position.

Liner selection guide

Color	Injection technique	Sample types	Liner geometry	How the Geometry Works
Dark green	Splitless	<ul style="list-style-type: none"> Trace level analyses Active compounds 	Taper/gooseneck 	<ul style="list-style-type: none"> A bottom taper focuses sample onto the head of the column and minimizes sample contact with metal parts of the inlet. Remember – the addition of quartz wool to your inlet liner promotes mixing of analytes, aids the vaporization of liquid samples, and works as a trap to collect non-volatile residue in the sample (i.e. protects capillary column from 'dirty' samples).
Blue	Split	<ul style="list-style-type: none"> General purpose Concentrated samples Dirty samples 	FocusLiner 	<ul style="list-style-type: none"> Ensures quartz wool remains in the correct position in the liner. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation. Minimizes high molecular weight discrimination.
Aqua	Splitless	<ul style="list-style-type: none"> Trace level analyses Dirty samples Wide boiling point range 	Tapered FocusLiner 	<ul style="list-style-type: none"> Bottom taper focuses sample onto the head of the column and minimizes contact with metal parts of the inlet. Ensures quartz wool remains in the correct position in the liner. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation.
Orange	Direct	<ul style="list-style-type: none"> Trace level analyses Active compounds 	ConnecTite 	<ul style="list-style-type: none"> ConnecTite liners facilitate maximum transfer of sample to the GC column and inhibit sample degradation due to hot metal components inside the inlet. Systems equipped with electronic pressure control require a hole in the liner body to maintain system gas flows. ConnecTite liners that have a hole near the bottom are best suited to analyses where a tailing solvent peak could affect early eluting compounds. ConnecTite liners with a hole at the top of the liner will improve your analysis with aqueous injections or where compounds of interest elute away from the solvent peak.
Purple	Split/splitless	<ul style="list-style-type: none"> General purpose Concentrated samples Dirty samples (only if quartz wool is present) Gaseous samples (also purge and trap, headspace) 	Straight 	<ul style="list-style-type: none"> Straight liners facilitate higher split flows. Narrow bore straight liners facilitate fast GC work. Small injection volumes of less than 0.5 µL are best used with a narrow bore. Narrow bore straight liners improve focussing of gaseous samples (purge, trap and headspace).
Yellow	Splitless LVI	<ul style="list-style-type: none"> Trace level analyses Low boiling point compounds Active compounds 	Double taper 	<ul style="list-style-type: none"> Bottom taper minimizes contact with metal parts of the inlet and focuses sample onto the head of the column. Top taper aids in minimizing sample flashback.
Gray	PTV LVI	<ul style="list-style-type: none"> Trace level analyses Large volume injections 	PTV/LVI 	<ul style="list-style-type: none"> PTV and LVI liners generally have sintered glass beads or powder to increase the surface area and trap nonvolatile residue. PTV liners use baffles or a wisp of quartz wool to aid in vaporization of samples and retain droplets during low temperature injections. Side hole needles are recommended for these techniques to ensure effective distribution of sample within the liner.

Inlet liner volume

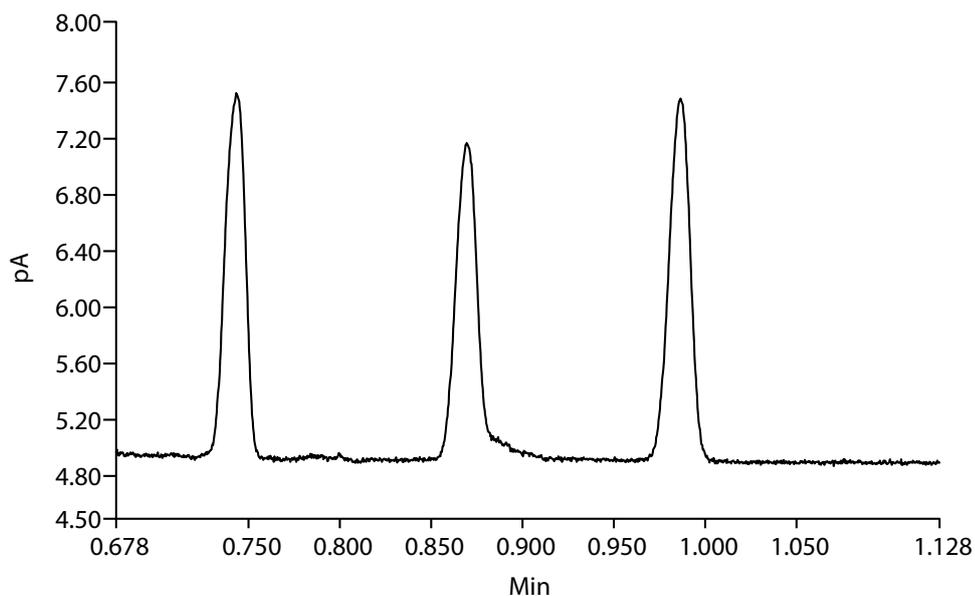
The volume of the vaporized sample should not exceed half of the total volume of the liner. Expansion volumes of solvents need to be understood to calculate injection volume. Solvents with low densities enable more volume of solvent to be injected into the GC system.

To demonstrate this, acetonitrile was injected onto a split straight liner with volume of 986 μL .



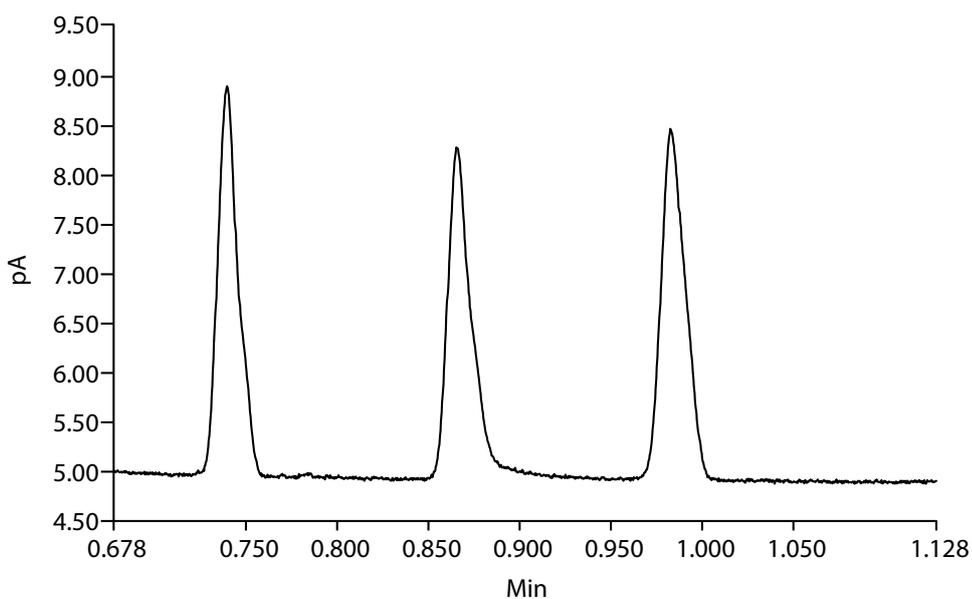
Comparison of injection volume

1 μL injection



1 μL expands to 432 μL : Good peak shape, but approaching limits of half total liner volume.

2 μL injection



2 μL expands to 864 μL : Peak shape distorted as vapor exceeded half of liner volume.

Liner deactivation

Deactivation is carried out at a temperature $>400^{\circ}\text{C}$ which is hotter than injection port temperatures. This ensures no thermal breakdown of the deactivation under normal injection operating conditions.

Deactivation of liners with wool in situ means there is no handling of the wool after deactivation. Manual handling of wool can cause fracturing which can lead to active sites.

Proprietary deactivation reagent ensures stability of deactivation and excellent lifetime.

Liner comparison of Endrin and DDT% breakdown

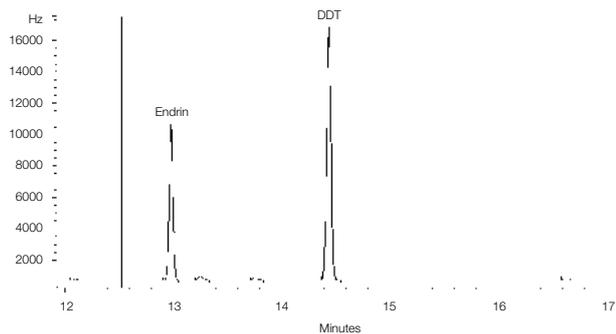
If the Endrin or DDT breakdown is 3% or higher it fails.

Competitor	
Endrin Deg%	3.23
DDT Deg%	1.95

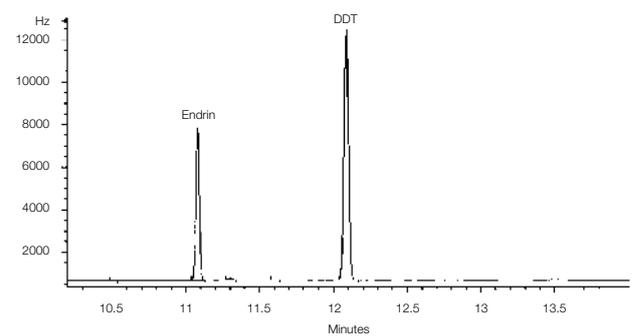
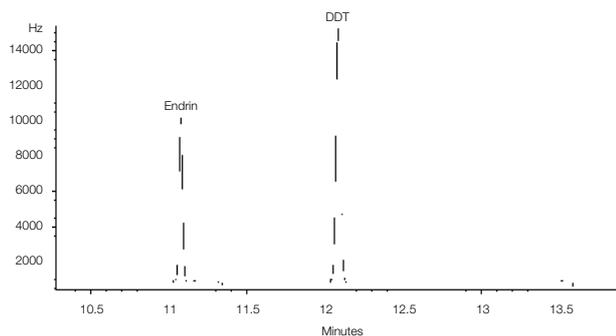
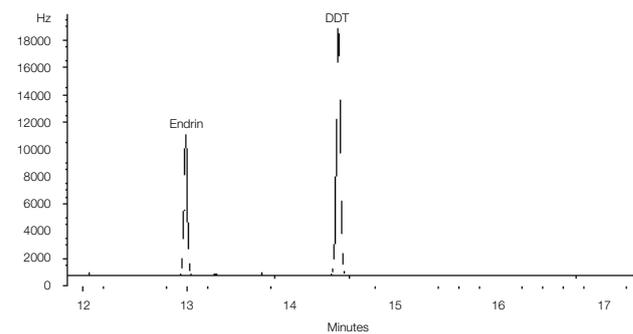
SGE FocusLiner	
Endrin Deg%	1.33
DDT Deg%	0.83



Competitor liner

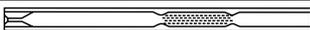
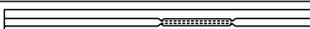
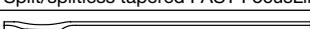
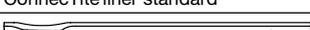
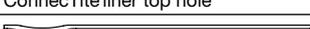
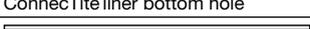
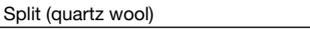
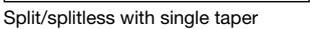
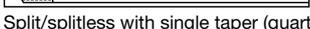
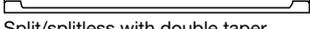
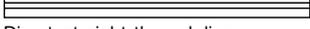


SGE FocusLiner





SGE Inlet liners

Description and geometry sketch	OD (mm)	ID (mm)	Length (mm)	Pack size	Fisher Scientific Cat. No.
For Agilent 7890, 6890, 6850, 5890 and 4890					
 Split/splitless FocusLiner	6.3	4	78.5	5	10592393
				25	10710404
 Split/splitless tapered FocusLiner	6.3	4	78.5	5	10043662
				25	10003712
 Split/splitless FAST FocusLiner	6.3	2.3	78.5	5	12694925
				25	12967141
 Split/splitless tapered FAST FocusLiner	6.3	2.3	78.5	5	11931996
				25	11926985
 ConnectTite liner standard	6.3	4	78.5	5	15249013
 ConnectTite liner top hole				5	15259013
 ConnectTite liner bottom hole	6.3	4	78.5	5	15269013
				5	15269013
 Split, straight-through liner	6.3	4	78.5	5	10538492
				25	12924071
 Split (quartz wool)	6.3	4	78.5	5	10702572
				25	10422285
 Split/splitless with single taper	6.3	4	78.5	5	10422371
				25	12964071
 Split/splitless with single taper (quartz wool)	6.3	4	78.5	5	12684925
				25	12904071
 Split/splitless with double taper	6.3	4	78.5	5	10065320
				25	12974071
 Direct, straight-through liner	6.3	1.2	78.5	5	10350321
				25	12944071
 Split/splitless quartz, straight-through liner	6.1	2	78.5	5	10137540
				5	10137540
 Splitless with recessed gooseneck	6.3	2	78.5	5	10259050
 Split/splitless recessed gooseneck (quartz wool)				5	10656211



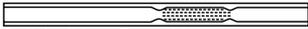
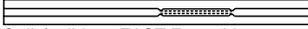
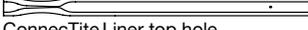
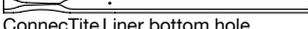
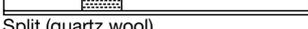
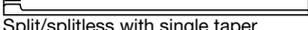
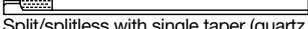
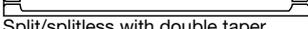
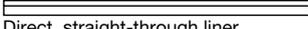
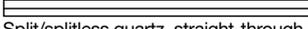
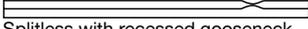
- Taper/gooseneck
- FocusLiner
- Tapered FocusLiner
- ConnectTite
- Straight
- Double taper
- PTV/LVI

O-rings and sealing rings

Description	Usage	Pack size	Fisher Scientific Cat. No.
For Agilent 7890, 6890, 6850, 5890 and 4890			
O-ring	Temperatures up to 300°C. Suitable for inlet liners with OD of 6.3 mm	10	11942637
Graphite sealing ring	Temperatures up to 450°C. Suitable for inlet liners with OD of 6.3 mm	10	10085360
Graphite sealing ring	Temperatures up to 450°C. Suitable for use with inlet liners 092004	10	10370841



SGE Inlet liners

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 ConnectTite Liner standard	6.3	4	78.5	5	15249013
 ConnectTite Liner top hole				5	15259013
 ConnectTite Liner bottom hole	6.3	4	78.5	5	15269013
 Split, straight-through liner	6.3	4	78.5	5	10538492
				25	12924071
 Split (quartz wool)	6.3	4	78.5	5	10702572
				25	10422285
 Split/splitless with single taper	6.3	4	78.5	5	10422371
				25	12964071
 Split/splitless with single taper (quartz wool)	6.3	4	78.5	5	12684925
				25	12904071
 Split/splitless with double taper	6.3	4	78.5	5	10065320
				25	12974071
 Direct, straight-through liner	6.3	1.2	78.5	5	10350321
				25	12944071
 Split/splitless quartz, straight-through liner	6.1	2	78.5	5	10137540
 Splitless with recessed gooseneck	6.3	2	78.5	5	10259050
 Split/splitless recessed gooseneck (quartz wool)	6.3	4	78.5	5	10656211
				25	12934071



- Taper/gooseneck
- FocusLiner
- Tapered FocusLiner
- ConnectTite
- Straight
- Double taper
- PTV/LVI

O-rings and sealing rings

Description	Usage	Pack size	Fisher Scientific Cat. No.
For PerkinElmer Clarus 590 and 690			
O-ring	Temperatures up to 300°C. Suitable for inlet liners with OD of 6.3 mm	10	11942637
Graphite sealing ring	Temperatures up to 450°C. Suitable for inlet liners with OD of 6.3 mm	10	10085360
Graphite sealing ring	Temperatures up to 450°C. Suitable for use with inlet liners 092004	10	10370841



SGE Inlet liners

Description and geometry sketch	OD (mm)	ID (mm)	Length (mm)	Pack size	Fisher Scientific Cat. No.
For Shimadzu GC-2030 (SPL injector), GC-2010 (SPL-2010 Injector), GC-2014 (SPL-2014 injector) and GC-17A (SPL-17 injector)					
Split/splitless FocusLiner (top of wool 25 mm)	5	3.4	95	5	10309142*
Split/splitless tapered FocusLiner (top of wool 25 mm)	5	3.4	95	5	12913991
Split/splitless FocusLiner (top of wool 15 mm)	5	3.4	95	5	12614935
Split/splitless tapered FocusLiner (top of wool 15 mm)	5	3.4	95	5	10013712
ConnecTite liner standard	5	3.4	95	5	15279013
ConnecTite liner top hole	5	3.4	95	5	15299013
ConnecTite liner bottom hole	5	3.4	95	5	15219023
Split, straight-through liner	5	3.4	95	5	12904001
Splitless, straight-through liner	5	2.6	95	5	12914021
Split/splitless with single taper	5	3.4	95	5	12974001
Split/splitless with middle gooseneck	5	3.4	95	5	12994001
Split/splitless with recessed gooseneck and quartz wool	5	3.4	95	5	12963991
Split/splitless with middle gooseneck	5	3.4	95	5	12984011
ConnecTite (0.53 mm ID columns)	5	2.6	95	5	12934021
SPME liner	5	0.75	95	5	12974021



- Taper/gooseneck
- FocusLiner
- Tapered FocusLiner
- ConnecTite
- Straight
- Double taper
- PTV/LVI

* When using a standard 42 mm needle for autosamplers, the sample will be injected on top of the wool for this liner.

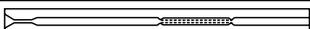
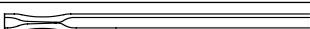
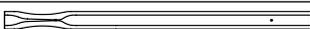
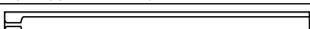
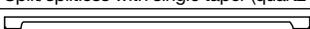
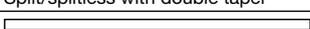
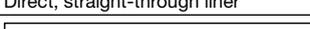
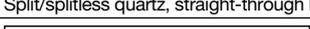
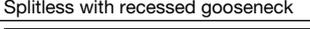
O-rings and sealing rings

Description	Usage	Pack size	Fisher Scientific Cat. No.
O-ring	For GC-2030 (SPL-2030 injector), GC-2014 (SPL-2014 injector) and GC-2010 (SPL-2010 injector)	10	15218883
Graphite sealing ring	Temperatures up to 450°C. For GC-17A (SPL-17 injector)	10	15238863

Inlet liners | Thermo Scientific



SGE Inlet liners

Description and geometry	OD (mm)	ID (mm)	Length (mm)	Pack size	Fisher Scientific Cat. No.
For Thermo Scientific TRACE 1300 series GC					
 Split/splitless FocusLiner	6.3	4	78.5	5	10592393
				25	10710404
 Split/splitless tapered FocusLiner	6.3	4	78.5	5	10043662
				25	10003712
 Split/splitless FAST FocusLiner	6.3	2.3	78.5	5	12694925
				25	12967141
 Split/splitless tapered FAST FocusLiner	6.3	2.3	78.5	5	11931996
				25	11926985
 ConnectTite Liner standard	6.3	4	78.5	5	15249013
 ConnectTite Liner top hole				5	15259013
 ConnectTite Liner bottom hole	6.3	4	78.5	5	15269013
 Split, straight-through liner	6.3	4	78.5	5	10538492
				25	12924071
 Split (quartz wool)	6.3	4	78.5	5	10702572
				25	10422285
 Split/splitless with single taper	6.3	4	78.5	5	10422371
				25	12964071
 Split/splitless with single taper (quartz wool)	6.3	4	78.5	5	12684925
				25	12904071
 Split/splitless with double taper	6.3	4	78.5	5	10065320
				25	12974071
 Direct, straight-through liner	6.3	1.2	78.5	5	10350321
				25	12944071
 Split/splitless quartz, straight-through liner	6.1	2	78.5	5	10137540
 Splitless with recessed gooseneck	6.3	2	78.5	5	10259050
 Split/splitless recessed gooseneck (quartz wool)				5	10656211
				25	12934071



- Taper/gooseneck
- FocusLiner
- Tapered FocusLiner
- ConnectTite
- Straight
- Double taper
- PTV/LVI

O-rings and sealing rings

Description	Usage	Pack size	Fisher Scientific Cat. No.
For Thermo Scientific TRACE 1300 series GC			
O-ring	Temperatures up to 300°C. Suitable for inlet liners with OD of 6.3 mm	10	11942637
Graphite sealing ring	Temperatures up to 450°C. Suitable for inlet liners with OD of 6.3 mm	10	10085360
Graphite sealing ring	Temperatures up to 450°C. Suitable for use with inlet liners 092004	10	10370841

Connectors and ferrules

Easy to install | Leak free | Stable



Ferrules are used to seal the connection of the column or liner to the GC system.

Considerations in ferrule selection include:

- Leak free seal
- Accommodate various column ODs
- Seal with minimum torque
- Non-stick to column or fittings
- Withstand temperature cycling

Minimizing problems associated with ferrules:

- Do not over tighten
- Ensure clean prior to use
- Bake out prior to use
- Change ferrule when installing new column
- Use correct ferrule for column size

Ferrule selection guide

Material	Uses	Advantages	Disadvantages
100% Graphite	FID, NPD	<ul style="list-style-type: none"> • Easy-to-use stable seal • High temperature limit • Easily removed • Reusable 	<ul style="list-style-type: none"> • Not for MS or oxygen-sensitive detectors • Soft, easily deformed or destroyed • Possible system contamination
15% Graphite/85% Vespel	MS and oxygen-sensitive detectors	<ul style="list-style-type: none"> • Long lifetime • High temperature limit • MS compatible 	<ul style="list-style-type: none"> • Cannot be re-used • Must be re-tightened after initial temperature cycle
SilTite metal	MS and oxygen-sensitive detectors	<ul style="list-style-type: none"> • Long lifetime • High temperature limit • MS compatible 	<ul style="list-style-type: none"> • Cannot be re-used

SilTite metal ferrules



Designed for connecting fused silica GC columns and tubing to mass spectrometer interfaces and injectors.

SilTite metal ferrules provide a continuous leak free connection without the need to re-tighten the nut after a few temperature cycles. SilTite ferrules are a high performing alternative to Graphite/Vespel ferrules in a GCMS system. Their performance and cost effectiveness also makes them ideal for connecting GC columns to injectors and atmospheric detectors.



SilTite GC connectors



Column connections in GC have traditionally suffered from unreliability, leaks, excessive dead volumes and lack of inertness, leading to poor chromatography results and instrument downtime.

SilTite GC connectors are designed to minimize installation time and provide ongoing, robust connections throughout the life of the GC column.

SilTite FingerTite ferrules



Designed for each injector and detector, simplify your GC column installation.

- Typical kit contains 5 x female nuts, 10 x ferrules and 1 x measuring tool.
- A ferrule system for GC systems delivering an easy, leak free installation for capillary columns without the use of any tools.
- SilTite FingerTite will simplify your column installation process, giving you less hassle and more time for chromatography.



SilTite μ -Union



Designed to connect columns without the complications of conventional connectors.

- Tubing connections without leakage concern from temperature cycling or fear of getting pieces of ferrule stuck inside the tubing.
- Low thermal mass: 9 mm in length and mass <0.5 g.
- Available in kits to connect a range of columns from 0.1 mm ID through to 0.53 mm ID.
- Each kit contains: 5 x ferrules, 2 x male μ -connector end fittings, 2 x female μ -connector end fittings and installation tooling.



Fisher Scientific Cat. No.	Part description and detail
16692632	SilTite μ -Union for joining 0.10-0.25 mm and 0.10-0.25 mm ID columns/fused silica
15248933	SilTite μ -Union for joining 0.10-0.25 mm and 0.32 mm ID columns/fused silica
11353662	SilTite μ -Union for joining 0.10-0.25 mm and 0.53 mm ID columns/fused silica
15258933	SilTite μ -Union for joining 0.32 mm and 0.32 mm ID columns/fused silica
15268933	SilTite μ -Union for joining 0.32 mm and 0.53 mm ID columns/fused silica
15278933	SilTite μ -Union for joining 0.53 mm and 0.53 mm ID columns/fused silica
Replacement parts	
15288933	Replacement SilTite μ -Union ferrules for joining 0.10-0.25 mm and 0.10-0.25 mm ID columns/fused silica, PK10
15298933	Replacement SilTite μ -Union ferrules for joining 0.10-0.25 mm and 0.32 mm ID columns/fused silica, PK10
15208943	Replacement SilTite μ -Union ferrules for joining 0.10-0.25 mm and 0.53 mm ID columns/fused silica, PK10
15218943	Replacement SilTite μ -Union ferrules for joining 0.32 mm and 0.32 mm ID columns/fused silica, PK10
15228943	Replacement SilTite μ -Union ferrules for joining 0.32 mm and 0.53 mm ID columns/fused silica, PK10
15238943	Replacement SilTite μ -Union ferrules for joining 0.53 mm and 0.53 mm ID columns/fused silica, PK10
15258943	Replacement SilTite μ -Union only (no ferrules) for joining 0.10-0.32 mm and 0.10-0.32 mm ID columns/fused silica, PK5
15248943	Replacement SilTite μ -Union only (no ferrules) for joining 0.10-0.32 mm and 0.53 mm ID columns/fused silica, PK5
15278943	Replacement SilTite μ -Union only (no ferrules) for joining 0.53 mm and 0.53 mm ID columns/fused silica, PK5

Connectors and ferrules | Agilent

SilTite FingerTite ferrules



Description	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
For Agilent 7890, 6890, 6850, 5890 and 4890				
SilTite FingerTite INJ/FID starter kit	0.10-0.25 mm	0.4 mm	*	15268943
SilTite FingerTite capillary/FID starter kit	0.10-0.25 mm	0.4 mm	*	16632642
SilTite FingerTite INJ/MS starter kit	0.10-0.25 mm	0.4 mm	*	10386458
SilTite FingerTite INJ/FID starter kit	0.53 mm	0.7 mm	*	15248953
SilTite FingerTite injector starter kit	0.53 mm	0.7 mm	*	16622642
Replacement parts				
SilTite FingerTite ferrule 0.4 mm	0.10-0.25 mm	0.4 mm	10	15218983
SilTite FingerTite ferrule 0.5 mm	0.32 mm	0.5 mm	10	15228983
SilTite FingerTite ferrule 0.7 mm	0.53 mm	0.7 mm	10	15238983
SilTite FingerTite blanking ferrule	–	–	2	15248983
SilTite FingerTite female nut	–	–	5	15258983
SilTite FingerTite INJ base seal	0.10-0.25 mm	–	2	15268983
SilTite FingerTite capillary adaptor	–	–	1	16602642
SilTite FingerTite MS adaptor	–	–	1	15208953
SilTite FingerTite FID detector	–	–	1	16612642
SilTite FingerTite injector adaptor (includes 2 base seals)	0.10-0.25 mm	–	1	15228953

*Each starter kit includes all the parts necessary to convert one GC system (one injector and one detector) to the SilTite FingerTite system. In addition there are five SilTite FingerTite nuts, ten SilTite FingerTite ferrules, and a ferrule install tool which allows you to seat the ferrule in the correct position on the capillary column.

Ferrules

Instrument	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
15% Graphite/85% Vespel ferrules				
Injectors and detectors at atmospheric pressure e.g. FID	0.10-0.25 mm	0.4 mm	10	10773714
	0.32 mm	0.5 mm	10	11902637
	0.53 mm	0.8 mm	10	11992627
	for 1/8" OD packed columns	1/8"	10	16652632
	for 1/4" OD packed columns	1/4"	10	16642632
GCMS interface connection	0.10-0.25 mm	0.4 mm	10	10340611
	0.32 mm	0.5 mm	10	10300661
	0.53 mm	0.8 mm	10	10507922
100% Graphite ferrules				
Injectors and detectors at atmospheric pressure e.g. FID (not for GCMS)	0.10-0.32 mm	0.5 mm	10	16632632
	0.45-0.53 mm	0.8 mm	10	11912637
	for 1/8" OD packed columns	1/8"	10	16682622
	for 1/4" OD packed columns	1/4"	10	16672622
SilTite metal ferrules				
GCMS interface connection (starter kit)	0.10-0.25 mm	0.4 mm	10*	12604945
	0.32 mm	0.5 mm	10*	12957091
	0.53 mm	0.8 mm	10*	12967091
Split/splitless injectors (starter kit)	0.10-0.25 mm	0.4 mm	10#	12684935
	0.32 mm	0.5 mm	10#	12977091
	0.45-0.53 mm	0.8 mm	10#	12987091
	1/32"	0.81 mm	10#	15258923

*Includes ten ferrules, two SilTite nuts. #Includes ten ferrules, two SilTite nuts and two SilTite inlet base seals.

Ferrules continued

Instrument	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
Replacement SilTite metal ferrules				
All connections	0.10-0.25 mm	0.4 mm	10	13477238
	0.32 mm	0.5 mm	10	13497238
	0.53 mm	0.8 mm	10	10123554
	1/32"	0.81 mm	10	15278913
Replacement SilTite nuts				
GCMS interface connection	–	–	5	12790740
Split/splitless injector	–	–	5	12694935
Replacement SilTite base seals				
Split/splitless injector	–	–	2	12614945
	–	–	10	12700750



Connectors and ferrules | PerkinElmer

SilTite FingerTite ferrules



Description	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
SilTite FingerTite PerkinElmer injector/GCMS starter kit	0.10-0.25 mm	0.4 mm	*	15258973
SilTite FingerTite PerkinElmer injector/FID starter kit	0.10-0.25 mm	0.4 mm	*	15228973
Replacement parts				
SilTite FingerTite ferrule 0.4 mm	0.10-0.25 mm	0.4 mm	10	15218983
SilTite FingerTite ferrule 0.5 mm	0.32 mm	0.5 mm	10	15228983
SilTite FingerTite ferrule 0.7 mm	0.53 mm	0.7 mm	10	15238983
SilTite FingerTite blanking ferrule	–	–	2	15248983
SilTite FingerTite female nut	–	–	5	15258983
SilTite FingerTite ferrule 0.7 mm	0.53 mm	0.7 mm	10	15238983
SilTite FingerTite blanking ferrule	–	–	2	15248983
SilTite FingerTite female nut	–	–	5	15258983
SilTite FingerTite Inj base seal	0.10-0.25 mm	–	2	15268983
SilTite FingerTite capillary adaptor	–	–	1	16602642
SilTite FingerTite MS adaptor	–	–	1	15208953
SilTite FingerTite FID detector	–	–	1	16612642
SilTite FingerTite injector adaptor (includes 2 base seals)	0.10-0.25 mm	–	1	15228953

*Each starter kit includes all the parts necessary to convert one GC system (one injector and one detector) to the SilTite FingerTite system. In addition there are five SilTite FingerTite nuts, ten SilTite FingerTite ferrules, and a ferrule install tool which allows you to seat the ferrule in the correct position on the capillary column.

Ferrules continued

Instrument	Column ID	Size of nut	Ferrule ID	Pack size	Fisher Scientific Cat. No.
15% Graphite/85% Vespel ferrules					
For injectors and detectors at atmospheric pressure e.g. FID	0.10-0.25 mm	1/16"	0.4 mm	10	10340611
	0.10-0.25 mm	1/8"	0.4 mm	10	16662632
	0.32 mm	1/16"	0.5 mm	10	10300661
	0.32 mm	1/8"	0.5 mm	10	10075350
	0.45-0.53 mm	1/16"	0.8 mm	10	10507922
	0.45-0.53 mm	1/8"	0.8 mm	10	16672632
	for 1/8" OD packed columns	1/8"	1/8"	10	16652632
	for 1/4" OD packed columns	1/4"	1/4"	10	16642632
100% Graphite ferrules					
Injectors and detectors at atmospheric pressure e.g. FID (not for GCMS)	0.10-0.32 mm	1/16"	0.5 mm	10	10700272
	0.10-0.32 mm	1/8"	0.5 mm	10	16612632
	0.45-0.53 mm	1/16"	0.8 mm	10	10055440
	0.45-0.53 mm	1/8"	0.8 mm	10	16622632
	1/8" OD packed columns	1/8"	1/8"	10	15228973
	1/4" OD packed columns	1/4"	1/4"	10	10526962
SilTite metal ferrules					
GCMS interface connection (starter kit)	0.10-0.25 mm	–	0.4 mm	10*	12604945
	0.32 mm	–	0.5 mm	10*	12957091
	0.53 mm	–	0.8 mm	10*	12967091
Replacement SilTite metal ferrules					
GCMS interface connection	0.10-0.25 mm	–	0.4 mm	10	13477238
	0.32 mm	–	0.5 mm	10	13497238
	0.53 mm	–	0.8 mm	10	10123554
	1/32"	–	0.81 mm	10	15278913
Replacement SilTite nuts					
SilTite metal nuts	–	–	–	5	12790740

*Includes ten ferrules, two SilTite nuts.

Connectors and ferrules | Shimadzu

SilTite FingerTite ferrules



Description	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
For Shimadzu GC-2030 and GC-2010				
SilTite FingerTite INJ/FID starter kit	0.10-0.25 mm	0.4 mm	*	15278963
SilTite FingerTite INJ/MS starter kit	0.10-0.25 mm	0.4 mm	*	15248963
SilTite FingerTite INJ/FID starter kit	0.53 mm	0.7 mm	*	16642642
Replacement parts				
SilTite FingerTite ferrule 0.4 mm	0.10-0.25 mm	0.4 mm	10	15218983
SilTite FingerTite ferrule 0.5 mm	0.32 mm	0.5 mm	10	15228983
SilTite FingerTite ferrule 0.7 mm	0.53 mm	0.7 mm	10	15238983
SilTite FingerTite ferrule blanking	–	–	2	15248983
SilTite FingerTite female nut	–	–	5	15258983

*Each starter kit includes all the parts necessary to convert one GC system (one injector and one detector) to the SilTite FingerTite system. In addition there are five SilTite FingerTite nuts, ten SilTite FingerTite ferrules, and a ferrule install tool which allows you to seat the ferrule in the correct position on the capillary column.

Ferrules

Column ID	Description	Pack size	Fisher Scientific Cat. No.
For Shimadzu GC-2030, GC-2014, GC-2010, and GC-17A injectors (not for MS interfaces or QP2010 injector)			
0.10-0.32 mm ID columns	100% Graphite	10	16692622
0.45-0.53 mm ID columns	100% Graphite	10	16602632
5 mm OD packed columns	100% Graphite	10	15218863
0.10-0.25 mm ID columns	SilTite metal - initial installation	10*	12997091
0.10-0.25 mm ID columns	SilTite ferrules	10	15208923
0.32 mm ID columns	SilTite metal - initial installation	10*	12907101
0.32 mm ID columns	SilTite ferrules	10	15218923
0.45-0.53 mm ID columns	SilTite metal - initial installation	10*	12917101
0.53 mm ID columns	SilTite ferrules	10	15228923
n/a	SilTite metal nuts - slotted	5	12997101
For Shimadzu QP5000/5050 standard MS interface			
QP5000-I 0.10-0.25 mm ID columns	15% Graphite/85% Vespel ferrules	10	14893612
QP5000-I 0.32 mm ID columns	15% Graphite/85% Vespel ferrules	10	15278883
QP5000-II and QP5050 0.10-0.25 mm ID columns	15% Graphite/85% Vespel ferrules	10	10454302
QP5000-II and QP5050 0.32 mm ID columns	15% Graphite/85% Vespel ferrules	10	10592203
0.10-0.25 mm ID columns	SilTite metal - initial installation	10*	15258913
0.10-0.25 mm ID columns	SilTite ferrules	10	15208923
0.32 mm ID columns	SilTite metal - initial installation	10*	15268913
0.32 mm ID columns	SilTite ferrules	10	15218923
0.53 mm ID columns	SilTite ferrules	10	15228923
n/a	SilTite metal nuts - QP5000/5050 standard MS interface	5	15248923
For Shimadzu QP5000/5050 wide bore MS interface, QP2010 injector and QP2010 standard MS interface			
0.10-0.25 mm ID columns	15% Graphite/85% Vespel ferrules	10	10340611
0.32 mm ID columns	15% Graphite/85% Vespel ferrules	10	10300661
0.45-0.53 mm ID columns	15% Graphite/85% Vespel ferrules	10	10507922
0.10-0.25 mm ID columns	SilTite metal - initial installation	10*	12604945
0.10-0.25 mm ID columns	SilTite ferrules	10	13477238
0.32 mm ID columns	SilTite metal - initial installation	10*	12957091
0.32 mm ID columns	SilTite ferrules	10	13497238
0.45-0.53 mm ID columns	SilTite metal - initial installation	10*	12967091
0.45-0.53 mm ID columns	SilTite ferrules	10	10123554
n/a	SilTite metal nuts	5	12790740
Replacement SilTite nuts			
GC-2030/GC-2010 GCMS system		5	12790740
GC-2030/GC-2010 GCMS system with QP5000 series MS		5	12790740
GC-2030/GC-2014/GC-2010 GC injectors and atmospheric detectors		5	12790740
QP5000 jet separator MS interface		5	12790740
QP5000 direct MS interface		5	15248923
All injectors jet separator (starter kit), except GC-2030/GC-2014/GC-2010		5	12997101

*Includes ten ferrules, two SilTite nuts.



Connectors and ferrules | Thermo Scientific

SilTite FingerTite ferrules



Description	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
For Thermo Scientific TRACE 1300 series GC				
SilTite FingerTite INJ/MS starter kit (ISQ/ITQ MS only)	0.10-0.25 mm	0.4 mm	*	10386458
SilTite FingerTite injector starter kit**	0.10-0.25 mm	0.4 mm	*	15288943 + 15228953
Replacement parts				
SilTite FingerTite ferrule 0.4 mm	0.10-0.25 mm	0.4 mm	10	15218983
SilTite FingerTite ferrule 0.5 mm	0.32 mm	0.5 mm	10	15228983
SilTite FingerTite ferrule 0.7 mm	0.53 mm	0.7 mm	10	15238983
SilTite FingerTite blanking ferrule	–	–	2	15248983
SilTite FingerTite female nut	–	–	5	15258983
SilTite FingerTite INJ base seal	0.10-0.25 mm	–	2	15268983
SilTite FingerTite MS adaptor	–	–	1	15208953
SilTite FingerTite injector adaptor (includes 2 base seals)	0.10-0.25 mm	–	1	15228953

*Each starter kit includes all the parts necessary to convert one GC system (one injector and one detector) to the SilTite FingerTite system. In addition there are five SilTite FingerTite nuts, ten SilTite FingerTite ferrules, and a ferrule install tool which allows you to seat the ferrule in the correct position on the capillary column. ** Starter kit 15288943 requires injector adaptor 15228953.

Ferrules

Instrument	Column ID	Ferrule ID	Pack size	Fisher Scientific Cat. No.
15% Graphite/85% Vespel ferrules				
For Thermo Scientific TRACE 1300 series GC split/splitless injectors	0.10-0.25 mm	0.4 mm	10	10773714
	0.32 mm	0.5 mm	10	11902637
	0.53 mm	0.8 mm	10	11992627
For Thermo Scientific TRACE 1300 series GC GCMS interface connection	0.10-0.25 mm	0.4 mm	10	10340611
	0.32 mm	0.5 mm	10	10300661
	0.53 mm	0.8 mm	10	10507922
100% Graphite ferrules				
For Thermo Scientific TRACE 1300 series GC split/splitless injectors	0.10-0.32 mm	0.5 mm	10	16632632
	0.45-0.53 mm	0.8 mm	10	11912637
SilTite metal ferrules				
GCMS interface connection (starter kit)	0.10-0.25 mm	0.4 mm	10*	12604945
	0.32 mm	0.5 mm	10*	12957091
	0.53 mm	0.8 mm	10*	12967091
For Thermo Scientific TRACE 1300 series GC split/splitless injectors (starter kit)	0.10-0.25 mm	0.4 mm	10#	12684935
	0.32 mm	0.5 mm	10#	12977091
	0.45-0.53 mm	0.8 mm	10#	12987091
	1/32"	0.81 mm	10#	15258923
Replacement SilTite metal ferrules				
All GCMS interface connections	0.10-0.25 mm	0.4 mm	10	13477238
	0.32 mm	0.5 mm	10	13497238
	0.53 mm	0.8 mm	10	10123554
	1/32"	0.81 mm	10	15278913
For Thermo Scientific TRACE 1300 series GC split/splitless injector connections	0.10-0.25 mm	0.4 mm	10	13477238
	0.32 mm	0.5 mm	10	13497238
	0.53 mm	0.8 mm	10	10123554
	1/32"	0.81 mm	10	15278913
Replacement SilTite nuts				
SilTite metal nuts for all GCMS interface connections	–	–	5	12790740
For Thermo Scientific TRACE 1300 series GC split/splitless injector	–	–	5	12694935
Replacement SilTite base seals				
For Thermo Scientific TRACE 1300 series GC split/splitless injector	–	–	2	12614945
	–	–	10	12700750

*Includes ten ferrules, two SilTite nuts. #Includes ten ferrules, two SilTite nuts and two SilTite inlet base seals.

Connectors and ferrules | SilFlow®

Easy to install | Leak free | Stable



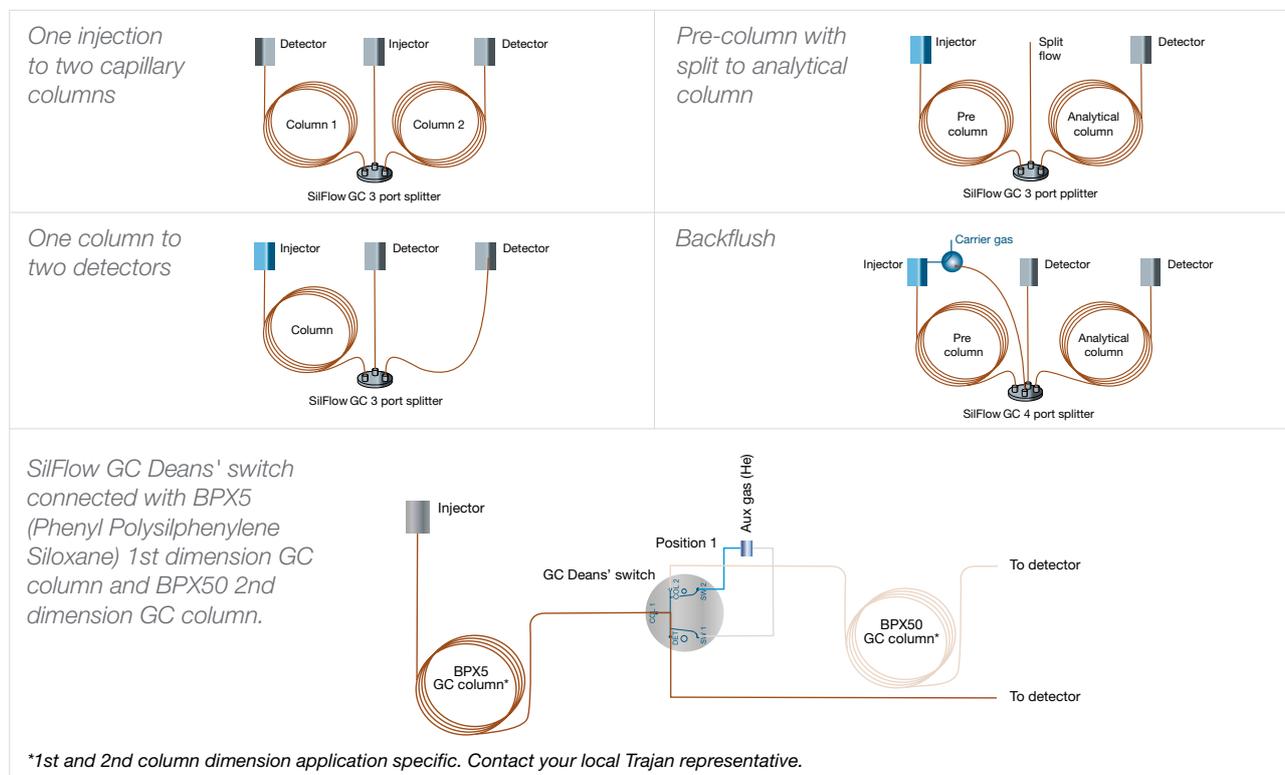
Trajan understands today's chromatographers need to move from tubing based flow systems to planar microchannel systems to deliver flexible chromatography solutions. SilFlow is an innovation in design and fabrication resulting in a highly efficient and reliable microfluidic platform that improves your GC connectivity to enable maximum chromatography performance.

Configuration options for your chromatography solutions

The SilFlow microchannel device (MCD) is available in a number of configurations:

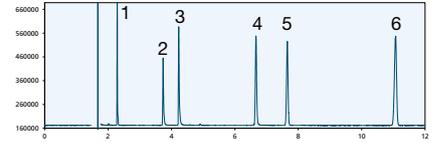
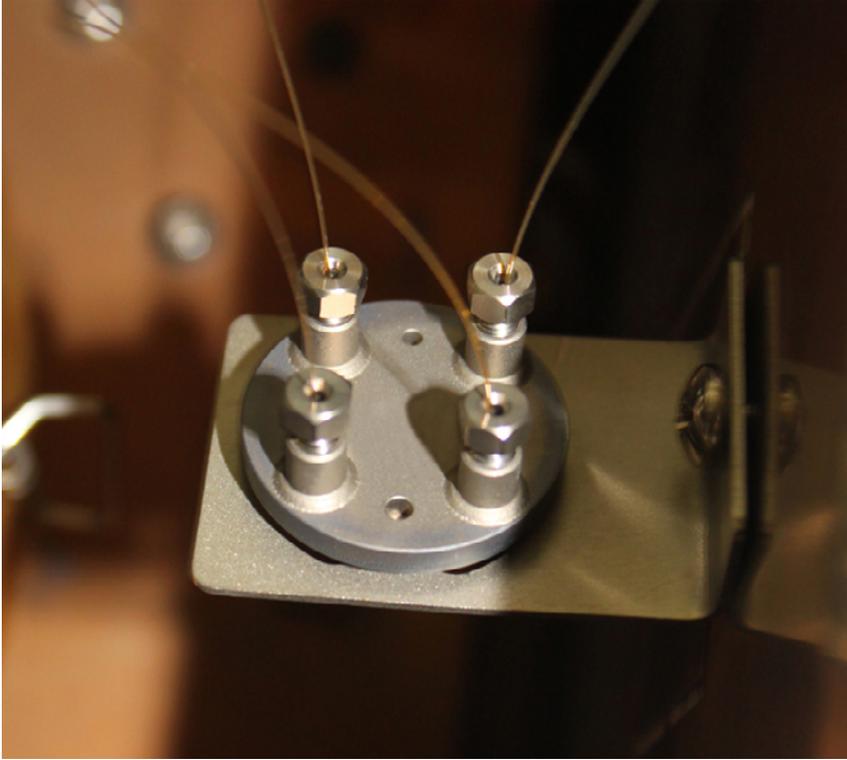
- 3 port GC splitters allowing flow splitting options with three different configurations.
- 4 port GC splitters offering similar configuration flexibility as the 3 port solution.
- Deans' switch MCD, perfect for multidimensional analyses.

Some suggested application configurations for use with SilFlow splitters:

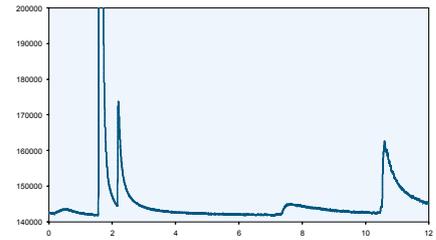


Chemically inert

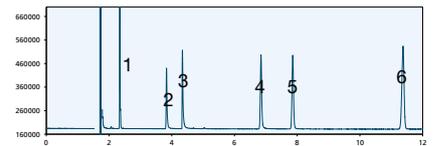
- Enabled by Trajan's expertise in surface chemistry, SilFlow features chemically deactivated stainless steel channels avoiding active sites experienced with conventional connections.
- SilFlow can be incorporated into your system without impacting your chromatography.



a) Column only



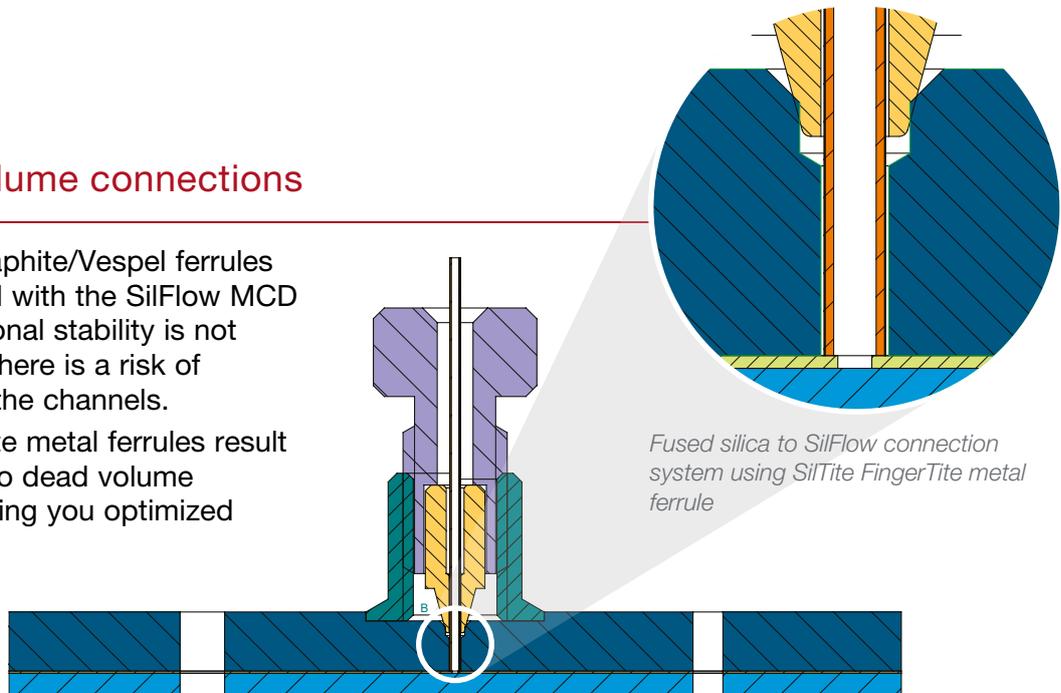
b) Column with metal connector without special deactivation



c) Column with deactivated SilFlow (GC Deans' switch)

Low dead volume connections

- Graphite or Graphite/Vespel ferrules cannot be used with the SilFlow MCD as the dimensional stability is not adequate and there is a risk of contaminating the channels.
- SilTite FingerTite metal ferrules result in a reliable zero dead volume connection, giving you optimized peak shapes.



Fused silica to SilFlow connection system using SilTite FingerTite metal ferrule

Superb operational stability

SilFlow technical specifications:

- Pressure capability - The SilFlow system can be operated at pressures greater than 25,000 psi (170,000 kPa).
- Thermal lag - SilFlow tracks oven temperature up to 20°C/min. The design of SilFlow alleviates cold spots and sample condensation.
- Maximum temperature - No practical temperature limit. Limited only by the temperature rating of the GC column being used, $\leq 420^{\circ}\text{C}$.

Easy to install and leak free

SilFlow kits incorporate SilTite FingerTite fittings that are easy to set up and can be tightened using finger force to achieve a perfect, reliable seal, even for the most sensitive MS systems – no wrenches required!



Each SilFlow kit contains:

- SilFlow microfluidic device (MCD)
- SilTite FingerTite tool
- Mounting bracket
- Ferrules, nuts and blanking ferrules

SilFlow GC 3 port splitter



Fisher Scientific Cat. No.	Part description and detail
13589000	Port A 0.25/0.32 mm ID, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter kit
12700948	Port A 0.53 mm ID, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter kit
15289173	Port A 1.1 mm OD, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter kit
15219183	Microchannel device only, port A 0.25/0.32 mm ID, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter
15209183	Microchannel device only, port A 0.53 mm ID, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter
15299173	Microchannel device only, port A 1.1 mm OD, ports B and C 0.25/0.32 mm ID SilFlow GC 3 port splitter

SilFlow GC 4 port splitter



Fisher Scientific Cat. No.	Part description and detail
15259183	Port A 0.25/0.32 mm ID, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter kit
15249183	Port A 0.53 mm ID, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter kit
15239183	Port A 1.1 mm OD, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter kit
15289183	Microchannel device only, port A 0.25/0.32 mm ID, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter
15279183	Microchannel device only, port A 0.53 mm ID, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter
15269183	Microchannel device only, port A 1.1 mm OD, ports B, C, and D 0.25/0.32 mm ID SilFlow GC 4 port splitter

SilFlow GC Deans' switch



Fisher Scientific Cat. No.	Part description and detail
15279163	Deans' switch kit (includes 1.1 mm OD tubing)
15229183	Microchannel device only Deans' switch

SilFlow replacement parts



Fisher Scientific Cat. No.	Part description and detail
Replacement parts	
15289163	SilFlow nuts, PK10
15259173	SilFlow ferrules 0.35 mm ID, PK10
15209173	SilFlow ferrules 0.4 mm ID, PK10
15219173	SilFlow ferrules 0.5 mm ID, PK10
15239173	SilFlow ferrules 0.7 mm ID, PK10
15299163	SilFlow ferrules 1.1 mm ID, PK5
15269173	SilFlow blanking ferrules and pins, PK5
15279173	SilTite FingerTite tool
16692542	SilFlow ferrules 0.55 mm ID, PK10
16602552	SilFlow ferrules 0.75 mm ID, PK10
15299183	SilFlow ferrules 0.8 mm ID, PK10
15229193	SilFlow stainless steel capillary tubing, 75 cm long, 1.1 mm OD sleeved to 1/16" at one end (not included in kits, must be purchased separately if required)

Minimal bleed | Highly inert Temperature stable

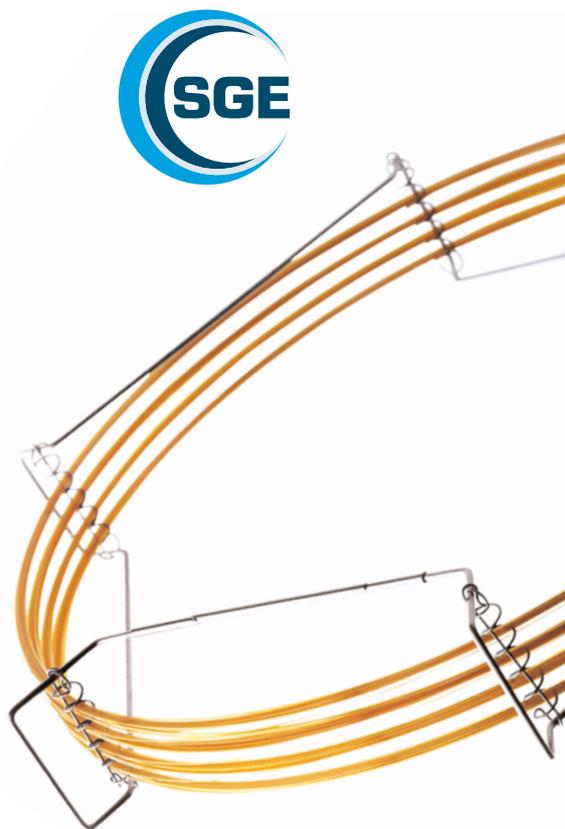
The GC column carries out the separation. When selecting a column for an application, four basic parameters need to be considered:

- Stationary phase
- Column internal diameter
- Film thickness
- Column length

A GC column is generally specified with two maximum operating temperatures:

- The isothermal limit at which the column may be run continuously.
- A programmed maximum where the column reaches a maximum for a limited period only.

There is also a minimum temperature below which a column will perform poorly. If a column is run continuously at the upper limit of temperature, column bleed will be observed. This is background noise caused by stationary phase degradation and this increases with increased film thickness.



Adjusting GC column performance

Column parameter	Parameters affecting resolution			Performance changes
	Efficiency	Retention	Selectivity	
Column length (m)	✓			Doubling column length increases resolution by ~40%
Internal diameter (mm)	✓			The smaller the column ID, the greater the efficiency and better the resolution
Film thickness (µm)		✓		The thicker the film, the greater the retention e.g. ideal for highly volatile compounds. The thinner the film, the sharper the peaks and lower the bleed
Stationary phase chemistry			✓	Altering the stationary phase can affect elution order and help separate closely, or co-eluting peaks

Stationary phase

General rules on selecting a phase

- Select the least polar phase that will perform the separation you require.
- Non-polar stationary phases separate analytes predominantly by order of boiling point. Increase the amount of phenyl and/or cyanopropyl content in the phase, and the separation is then influenced more by differences in dipole moments or charge distributions (BP10 (1701), BPX35, BPX50, BPX70).
- To separate compounds that differ more in their hydrogen bonding capacities (for example aldehydes and alcohols), polyethylene glycol type phases are best suited (BP20 (WAX), BP21 (FFAP), SolGel-WAX).
- Wherever possible use published retention indices to assist in your selection. Retention indices are calculated for a range of probe compounds which can highlight specific selectivity characteristics of a stationary phase.

Retention indices for eight cross-linked phases

The use of retention indices is a valuable tool in assisting selection of the stationary phase which provides maximum resolution for the compounds to be analyzed.

The retention indices of the five test compounds indicate the differences and similarities of each stationary phase. The values are calculated in reference to a homologous series of n-alkane hydrocarbons plotted on a logarithmic scale. Each n-alkane has a retention index of 100 times the carbon number (ie. C6, RI=600). Therefore, the retention index for each of the test compounds illustrates the elution position in reference to this n-alkane series.

Each probe compound is selected to represent the interaction characteristics of various organic functionalities.

Retention indices are calculated using the following formula:

Probe compound	Interactions represented
Benzene	Aromatics, unsaturated hydrocarbons
Butanol	Alcohols, diols
2-Pentanone	Ethers, esters, ketones and aldehydes
Nitropropane	Nitro and nitrile derivatives
Pyridine	Aromatic bases

$$IA = 100N + 100n (\log t'R(A) - \log t'R(N)) / (\log t'R(N+n) - \log t'R(N))$$

IA is the retention index of compound A (from corrected retention times) which elutes between two n-paraffins separated by either one or two carbon numbers.

Phase	Benzene (X)	Butanol (Y)	2-Pentanone (Z)	Nitropropane (U)	Pyridine (S)	Average
BP1	647	646	666	707	722	678
BP5	667	665	692	743	746	703
BPX5	664	667	697	752	750	706
HT8	680	673	728	796	780	731
BPX35	728	726	763	862	848	785
BP10 (1701)	709	774	772	862	832	790
BP20 (WAX)	947	1153	998	1217	1185	1100
BPX70	1067	1219	1170	1365	1300	1224

The table lists the responses to each test compound and the average value for eight cross-linked phases ranging from the non-polar BP1 to the very polar BPX70. The range has been developed to cover the widest possible range of compound functionality and application areas.

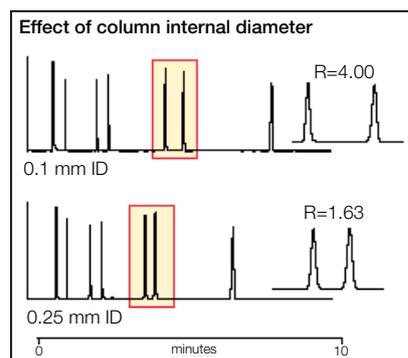
Average retention index values are listed, and provide an indication of the phase polarity. This can assist in selecting a suitable stationary phase for a particular application area. The individual responses to each test compound can further assist in determining the best phase for any specific type or group of compounds.

Column internal diameter

Effect of column internal diameter

The smaller the internal diameter the greater the efficiency and therefore the better the resolution. Reduce the diameter by half and the column efficiency doubles.

As the diameter increases, the film thickness can increase to maintain the same phase ratio. The thicker the film, the greater the loading capacity. Overloading a column will always result in loss of resolution. If the column diameter is halved while maintaining the same film thickness, then the loading capacity will also be halved.



Column ID	Recommendations
0.1 mm and 0.15 mm	Fast GC columns ideal for FID, ECD.
0.22 mm and 0.25 mm	Ideal for MS and high resolution applications.
0.32 mm	Provide good resolution for most applications, ample sample loading and compatibility with nearly all detector systems.
0.53 mm	Provide large sample capacities.

Film thickness

Sample loading

For samples with a variation in solute concentration, a thick film column is recommended. This will reduce the possibility of broad overloaded peaks co-eluting with other compounds of interest. If the separation of two solutes is sufficient and co-elution is still unlikely, even with large differences in concentration, then a thinner film can be used.

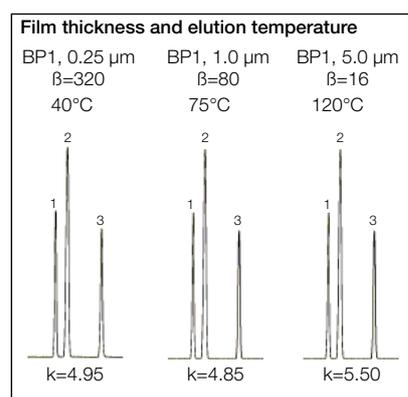
Volatility of solute

The greater the film thickness, the greater the retention of a solute, therefore the higher the elution temperature. As a rule, doubling the film thickness results in an increase in elution temperature of approximately 15-20°C, under isothermal conditions. Using a temperature program, the increase in elution temperature is slightly less.

As well as film thickness, changing the column internal diameter also effects the elution temperature. To avoid using two parameters that can alter individually, phase ratio is often used as it takes both into account.

The chromatograms demonstrate the effect on elution temperature for a mixture of compounds using 0.32 mm ID columns with film thickness of 0.25 µm, 1 µm and 5 µm.

An increase in film thickness from 0.25 µm to 5 µm needs a change in analysis temperature of 80°C to maintain the same elution time.



Film thickness continued

Phase ratio

Phase ratio encompasses both the film thickness and column internal diameter to give a value that can characterize all column internal diameters and film thickness combinations.

Calculate phase ratio using the following formula:

$$\beta = d/4d_f$$

where:

β = phase ratio

d = column internal diameter (μm)

d_f = film thickness (μm)

From the phase ratio value, a column can be categorized for the type of application it would best suit. The smaller the β value, the greater the concentration of phase to the volume of the column, making it better suited for analyzing volatile compounds. Columns which have thin films, are generally better suited for high molecular weight compounds and are characterized by large β values.

Film thickness (μm)	Column ID (μm)					
	100	150	220	250	320	530
	Phase ratio					
0.1	250	-	550	625	800	1325
0.15	-	-	-	-	-	883
0.25	-	150	220	250	320	530
0.5	-	75	110	125	160	265
1.0	-	-	55	63	80	132
3.0	-	-	-	-	27	44
5.0	-	-	-	-	16	26

Keeping a similar phase ratio when changing column internal diameters will ensure that your chromatographic parameters will not need substantial changes.

Column length

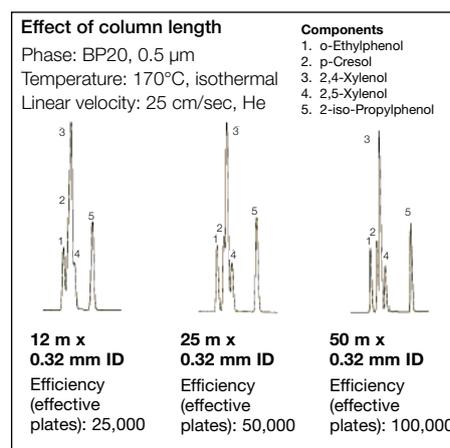
Effect of column length

Always try to select the shortest column length that will provide the required resolution for the application (12-30 m).

If the maximum column length available is being used and resolution of the sample mixture is still inadequate, try changing the stationary phase or internal diameter.

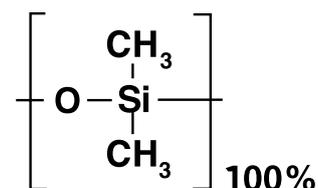
Resolution is proportional to the square root of the column efficiency. Therefore, doubling the column length will only increase the resolving power of the column by approximately 40%.

The three chromatograms give an indication of how column length influences the resolution of a mixture.



100% Dimethyl Polysiloxane

- Classic dimethyl polysiloxane technology with high temperature cross-linking
- Excellent general purpose GC column
- Low bleed
- Non-polar
- Suitable for all routine analyses



Application areas: Suitable for analysis of hydrocarbons, aromatics, pesticides, phenol, herbicides, amines.

Operating temperature: 0.1-1 µm film thickness: -60°C to 340/360°C.

>1-3 µm film thickness: -60°C to 300/320°C.

>3-5 µm film thickness: -60°C to 280/300°C.

Suitable replacement for: CP-Sil 5 CB, DB-1, DB-Petro, Elite-1, HP-1, HP-1ms, Petrocol DH, Rtx-1, SPB-1, SPB-1 SULFUR, Ultra 1, VB-1, VF-1ms, ZB-1.

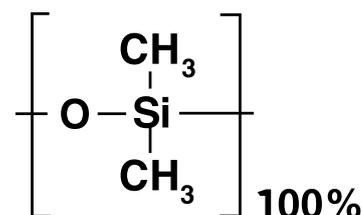
ID (mm)	Length (m)	Film thickness (µm)	Fisher Scientific Cat. No.
0.1	10	0.1	15278623
0.22	12	0.25	10298760
0.22	25	0.25	10045400
0.22	30	0.25	15208633
0.22	50	0.25	10229050
0.22	50	1	15228633
0.22	60	0.25	16672602
0.25	15	0.1	15288623
0.25	15	0.25	15298623
0.25	30	0.25	12654945
0.25	30	1	15238633
0.25	60	0.25	12945531
0.32	12	0.5	16682602
0.32	12	1	12653016
0.32	25	0.5	10441031
0.32	25	1	10107540
0.32	30	0.25	12975531
0.32	30	0.5	15258633
0.32	30	3	15278633
0.32	50	0.5	16692602
0.32	50	1	12985531
0.32	50	5	15288633
0.32	60	0.5	15268633
0.53	12	1	10762372
0.53	25	1	16602612
0.53	25	5	15228643
0.53	30	1	15208643
0.53	30	3	16632622
0.53	30	5	15208713
0.53	50	5	12965531
0.53	60	5	15218713
0.32	30	1	12664945
0.25	30	0.5	15258713
0.32	60	1	15228713

BPX1



100% Dimethyl Polysiloxane

- Non-polar column
- Dimensionally stabilized phase
- Low bleed
- Specifically designed for high temperature hydrocarbon analysis
- Ideal for simulated distillation



Application areas: ASTM methods D2887 and D6532.

Operating temperature: Polyimide clad, 0.1-0.9 μm film thickness: -30°C to 400°C.
Polyimide clad, 2.65 μm film thickness: -30°C to 370°C.

Suitable replacement for: DB-2887, DB-HT, Elite-SimDist, HP-1, Petrocol 2887, Petrocol EX2887, Rtx-2887.

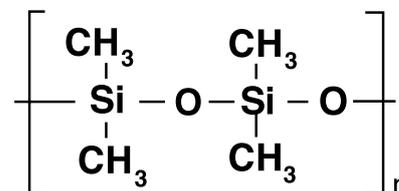
ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.1	10	0.1	12915541
0.53	6	2.65	12945541
0.53	10	0.1	12925541
0.53	10	0.9	12935541
0.53	10	2.65	12955541

SolGel-1ms™



100% Dimethyl Polysiloxane in a Sol-Gel matrix

- A robust, inert, high temperature, non-polar phase for use with mass spectrometers
- Highly inert
- Less bleed - better MS library identification, less ion source maintenance, and better sensitivity
- Also suitable for use with all non-MS detectors



Application areas: Recommended for highly active compounds.

Operating temperature: 0.25 μm film thickness: 0°C to 340/360°C.

Suitable replacement for: CP-Sil 5 CB, DB-1, DB-Petro, Elite-1ms, HP-1ms, Petrocol DH, Rtx-1, SPB-1, SPB-1 SULFUR, TG-1MS, Ultra 1, VB-1, VF-1ms, ZB-1.

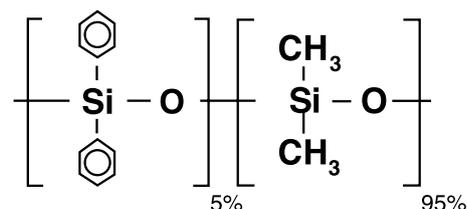
ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.25	30	0.25	12905531
0.25	60	0.25	12915531
0.32	30	0.25	10511823

BP5



5% Phenyl / 95% Dimethyl Polysiloxane

- Excellent general purpose GC column
- Low bleed
- Non-polar
- High temperature



Application areas: Aromatics, pesticides, herbicides, drugs of abuse, hydrocarbons.

Operating temperature: 0.25-1.5 μm film thickness: -60°C to $320/340^{\circ}\text{C}$.
>1.5 μm film thickness: -60°C to $280/300^{\circ}\text{C}$.

Suitable replacement for: CP-Sil 8 CB, DB-5, Elite-5, HP-5, MDN-5, PTE-5, Rtx-5, SPB-5, Ultra 2, VB-5, ZB-5.

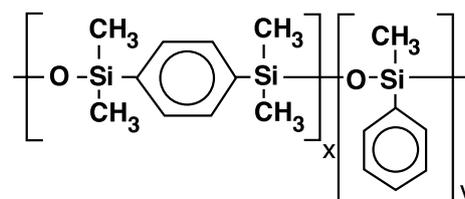
ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.22	25	0.25	10025290
0.25	15	0.25	15268653
0.25	30	0.25	10037959
0.25	30	1	15218663
0.25	60	0.25	12985551
0.32	25	0.5	16672612
0.32	30	0.25	12965551
0.32	30	0.5	12995551
0.32	30	1	12674945
0.53	30	1	15288653
0.53	30	5	15298653

BP5MS



5% Phenyl Polysilphenylene-siloxane

- Perfect for your 5% GCMS analysis
- Optimized silphenylene content for general purpose MS analyses



Application areas: 5% GCMS analyses

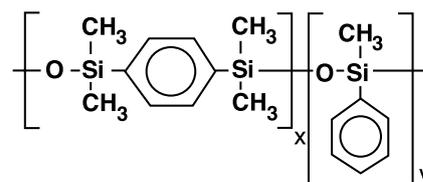
Operating temperature: 0.1-0.25 μm film thickness: -40°C to $330/350^{\circ}\text{C}$.

Suitable replacement for: CP-Sil 8 CB, DB-5ms, Elite-5ms, RTX-5ms, TG-5SiIMS, VF-5ms, ZB-5ms.

ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.18	20	0.18	12924005
0.25	15	0.25	12934005
0.25	30	0.25	12914005

5% Phenyl Polysilphenylene-siloxane

- High temperature
- General purpose GC column - suitable for over 80% of all routine analyses performed by gas chromatography
- Very low bleed - ideal for trace analysis
- Non-polar
- Extremely inert
- Ideal for GCMS



Application areas: Ultra trace analyses, pesticides/herbicides, hydrocarbons, solvents, phenols, amines, GCMS and other specific detector applications.

Operating temperature: 0.1-1.5 µm film thickness: -40°C to 360/370°C.

>1.5 µm film thickness: -40°C to 350/360°C.

Suitable replacement for: AT-5ms, CP-Sil 8 CB, DB-5, DB-5ms, DB-5.625, Elite-5ms, HP-5, HP-5ms, MDN-5S, Rtx-5MS, Rxi-5Sil MS, SPB-5, TG-5MS, TG-5SilMS, Ultra 2, VB-5, VF-5ms, XTI-5, ZB-5, ZB-5ms.

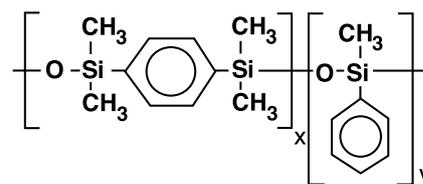
ID (mm)	Length (m)	Film thickness (µm)	Fisher Scientific Cat. No.
0.1	10	0.1	10661813
0.15	25	0.25	10451031
0.22	12	0.25	10567342
0.22	25	0.25	10268810
0.22	50	0.25	10320941
0.25	7	0.25	16652612
0.25	15	0.25	12905561
0.25	15	0.1	15228663
0.25	15	1	15288643
0.25	30	0.25	10386762
0.25	30	0.1	15238643
0.25	60	0.25	12684945
0.25	30	0.5	10774282
0.25	30	1	15298643
0.25	60	1	15208653
0.32	12	0.25	10567532
0.32	25	0.25	10442341
0.32	15	0.25	10177200
0.32	30	0.25	10616021
0.32	60	0.25	10208670
0.32	25	0.5	10430081
0.32	30	0.5	16612612
0.32	6	1	15218653
0.32	12	1	10300711
0.32	30	1	15228653
0.32	50	1	10055400
0.32	60	1	16662612
0.53	12	1	10025450
0.53	25	1	16622612
0.53	25	0.25	10269190
0.53	30	0.5	15124079
0.53	30	1.5	16632612
0.53	30	1	16642612
0.53	30	3	15248653

BPX35



35% Phenyl Polysilphenylene-siloxane

- Mid polarity column
- Ideal for conformational analysis
- Inert
- Equivalent to USP phase G42
- High temperature
- Low bleed



Application areas: Environmental analyses, pesticides/herbicides, drugs of abuse, pharmaceuticals, polynuclear aromatic hydrocarbons, GCMS applications.

Operating temperature: 0.1-0.5 μm film thickness: 10°C to 330/360°C.

Suitable replacement for: DB-35, DB-35ms, Elite-35ms, HP-35, MDN-35, Rtx-35, SPB-35, TG-35MS, VF-35ms, ZB-35.

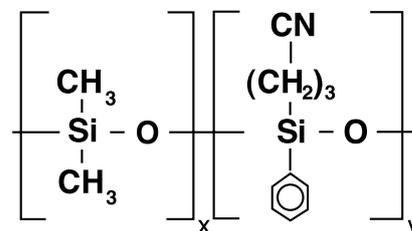
ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.1	10	0.1	15208703
0.25	30	0.25	10102882
0.25	60	0.25	12945551
0.32	30	0.5	15228703

BP624



Cyanopropylphenyl Polysiloxane

- US EPA method 624 optimized column
- Designed for volatiles analysis
- Ideal for EPA methods 624, 8240 and 8260 and method SW-846



Application areas: EPA method 624, drinking water volatiles, chlorinated hydrocarbons solvents.

Operating temperature: 1.4-3 μm film thickness: 0°C to 230/240°C.

Suitable replacement for: AT-624, CP-Select 624 CB, DB-624, Elite-624, HP-VOC, OV-624, 007-624, Rtx-624, TG-624, VOCOL, ZB-624.

ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.25	15	1.4	16642622
0.25	30	1.4	12925581
0.25	60	1.4	15278713
0.32	30	1.8	12985571
0.32	60	1.8	12935581
0.53	30	3	12760720
0.53	50	3	12915581
0.53	60	3	10222703

BP10 (1701)



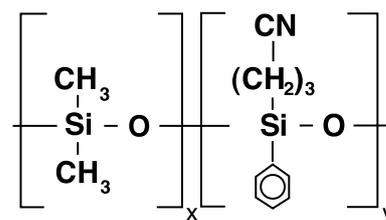
14% Cyanopropylphenyl Polysiloxane

- Ideal for organochlorine pesticides analysis
- Highly inert
- Low bleed

Application areas: Environmental analyses (EPA methods 608 and 8081), pesticides/herbicides, drugs of abuse, pharmaceuticals.

Operating temperature: 0.25-0.5 μm film thickness: -20°C to 280/300°C.
1 μm film thickness: -20°C to 260/280°C.

Suitable replacement for: CP-Sil 19 CB, 007-1701, DB-1701, Elite-1701, HP-1701, Rtx-1701, TG-1701, VF-1701ms, ZB-1701.



ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.22	25	0.25	10025300
0.25	30	0.25	12995531
0.32	25	0.5	10761654
0.32	30	0.25	12905541
0.32	30	1	15278663
0.53	25	1	10259240
0.53	30	1	15288663

BPX50



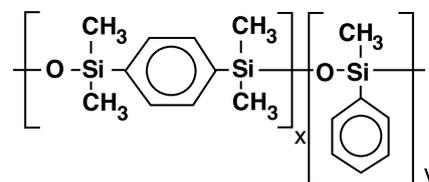
50% Phenyl Polysilphenylene-siloxane

- Mid polarity
- Inert
- Low bleed
- High temperature
- Ideal for a range of EPA methods and pharmaceutical applications

Application areas: EPA methods 604, 608, 8060, 8081, triazines/herbicides, drug screening, steroids and a variety of pharmaceutical applications.

Operating temperature: 0.1-1 μm film thickness: 80°C to 330/350°C.

Suitable replacement for: AT-50, CP-Sil 24 CB, DB-17, Elite-17, HP-17, OPTIMA 17MS, Rtx-50, Rxi-17, SPB-17, SPB-50, 007-17, VF-17ms, ZB-50.



ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.1	10	0.1	12965561
0.15	30	0.15	12975561
0.25	15	0.25	12915561
0.25	30	0.25	12694945
0.25	60	0.25	12985561
0.32	30	0.25	12935561
0.53	30	1	15258703

BP20 (WAX)



Polyethylene Glycol

- Industry standard wax column
- Polar phase
- Cross-linked for stability and washing



Application areas: Alcohol, free acids, fatty acid methyl esters, aromatics, solvents, essential oils.

Operating temperature: 0.1-1 μm film thickness: 20°C to 260/280°C.

>1 μm film thickness: 20°C to 240/260°C.

Suitable replacement for: Carbowax 20M, CP-Wax 52 CB, DB-WAX, Elite-WAX, HP-20M, HP-INNOWax RH-WAX, Rtx-Wax, Stabilwax, SUPELCOWAX 10, TG-WaxMS, VF-WAXms, ZB-WAX.

ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.22	25	0.25	10360751
0.22	30	0.25	15238673
0.22	50	0.25	10665441
0.25	30	0.25	12664955
0.25	60	0.25	12925591
0.25	30	0.5	15228673
0.25	30	1	15278673
0.32	30	0.25	12965581
0.32	50	0.25	10742372
0.32	25	0.5	12674955
0.32	30	0.5	12935591
0.32	50	0.5	12985581
0.32	25	1	15298673
0.53	30	1	15218683
0.53	30	1	12995581
0.53	60	1	15248683
0.53	25	2	16682612

BP21 (FFAP)



Polyethylene Glycol (PEG) – TPA Treated

- Nitroterephthalic acid modified PEG
- Polar phase
- Ideal for low molecular weight acids



Application areas: Volatile free acids, fatty acid methyl esters, alcohols, aldehydes, acrylates, ketones.

Operating temperature: 0.25-1 µm film thickness: 35°C to 240/250°C.

Suitable replacement for: CP-Wax 58 FFAP CB, DB-FFAP, Elite-FFAP, HP-FFAP, Stabilwax-DA, TG-WaxMS A, ZB-FFAP.

ID (mm)	Length (m)	Film thickness (µm)	Fisher Scientific Cat. No.
0.22	25	0.25	12945591
0.25	30	0.25	12915601
0.25	60	0.25	16692612
0.32	25	0.25	12975591
0.32	30	0.25	15268683
0.32	50	0.25	12985591
0.32	50	0.5	12925601
0.53	30	0.5	12935601
0.53	30	1	15288683

SolGel-WAX™



Polyethylene Glycol (PEG) in a Sol-Gel matrix

- Bonded polyethylene glycol
- Very robust high temperature column
- Less susceptible to damage by oxygen than conventional wax phases
- Polar phase
- Low bleed and inert



Application areas: Recommended for highly active compounds.

Operating temperature: 0.1-1 µm film thickness: 30°C to 260/280°C.

Suitable replacement for: AT-Wax, CP-Wax 52 CB, DB-Wax, Elite-WAX, HP-20M, HP-INNOWax, Nukol, Rtx-Wax, Stabilwax, SUPELCOWAX 10, TG-WaxMS, VB-WAX, ZB-WAX.

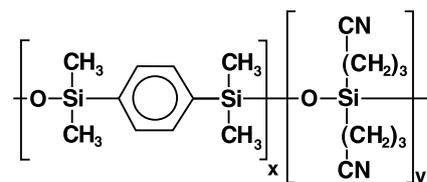
ID (mm)	Length (m)	Film thickness (µm)	Fisher Scientific Cat. No.
0.1	10	0.1	15218703
0.25	30	0.25	10434015
0.25	60	0.25	10284982
0.25	30	1	15288703
0.32	30	0.25	16622622
0.32	60	0.25	10675853
0.32	30	0.5	12654955
0.32	60	0.5	12935531
0.53	30	0.5	15278703
0.53	30	1	15144079

BPX70



70% Cyanopropyl Polysilphenylene-siloxane

- High temperature
- Custom designed for separation of fatty acid methyl esters (FAMES)
- Industry standard column for FAME analysis
- Ideal for cis/trans isomer separation
- Polar phase



Application areas: Fatty acid methyl esters, carbohydrates, pharmaceuticals, GCMS applications.

Operating temperature: 0.2-0.5 μm film thickness: 50°C to 250/260°C.

Suitable replacement for: CP-Sil 88, DB-23, Rtx-2330, SP-2330, SP-2380, VF-23ms, ZB-FAME.

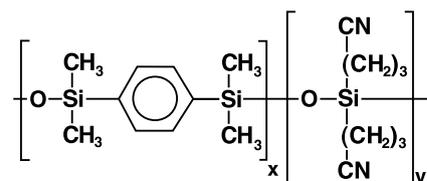
ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.1	10	0.2	12614955
0.22	25	0.25	10422191
0.22	30	0.25	10461201
0.22	50	0.25	10310611
0.22	60	0.25	10731032
0.25	30	0.25	12624955
0.25	60	0.25	12634955
0.25	120	0.25	10463912
0.32	25	0.25	10432191
0.32	30	0.25	10576762
0.32	50	0.25	10451201
0.32	60	0.25	10441041
0.53	30	0.5	10451041

BPX90



90% Cyanopropyl Polysilphenylene-siloxane

- Unique bonded phase
- Highly polar
- Thermally stable



Application areas: Fast separation of fragrances, aromatics, petrochemical, pesticides, PCBs and isomers of Fatty Acid Methyl Esters (FAMES).

Operating temperatures: 0.25-0.5 μm film thickness: 80°C to 280°C.

Suitable replacement for: CP-Sil 88, DB-23, HP-23, Rtx-2330, SP-2330, SP-2380, TG-POLAR.

ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.25	15	0.25	12995561
0.25	30	0.25	12644955
0.25	60	0.25	12905571
0.25	100	0.25	16602622
0.32	30	0.5	15298683

HT5



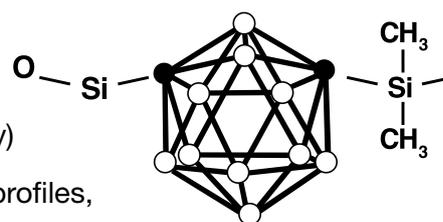
5% Phenyl (equiv.) Polycarborane siloxane

- Ultra high temperature column range
- Unique phase – no equivalent phases
- Ideal for simulated distillation applications (petroleum industry)

Application areas: Simulated distillation, general hydrocarbon profiles, pesticides/herbicides, GCMS applications.

Operating temperature: 0.1-0.5 μm film thickness: 10°C to 380/400°C.

Suitable replacement for: No equivalents, unique ultra high temperature column.



ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.22	12	0.1	10731992
0.22	25	0.1	10655831
0.25	15	0.1	10641803
0.25	30	0.1	10192872
0.32	12	0.1	10665831
0.32	25	0.1	10557722
0.32	30	0.5	16612622
0.53	6	0.1	15238693
0.53	12	0.15	10646401
0.53	25	0.15	10508112

HT8



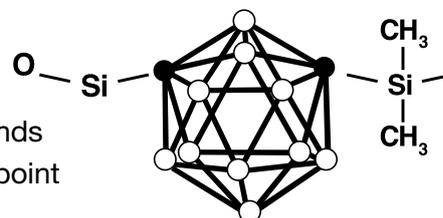
8% Phenyl (equiv.) Polycarborane siloxane

- High temperature
- Low bleed
- Preferred column for polychlorinated biphenyl (PCB) compounds
- Separates PCBs on ortho ring substitution as well as boiling point
- Ideal for environmental analyses

Application areas: PCB congener analyses, nitro-substituted aromatics, polynuclear aromatic hydrocarbons, pesticides/herbicides.

Operating temperature: 0.1-0.25 μm film thickness: -20°C to 360/370°C.

Suitable replacement for: No equivalents, unique ultra high temperature column.



ID (mm)	Length (m)	Film thickness (μm)	Fisher Scientific Cat. No.
0.22	25	0.25	10157060
0.22	50	0.25	10462531
0.25	30	0.25	10257493
0.25	60	0.25	10432905
0.32	25	0.25	10701232

8% Phenyl (equiv.) Polycarborane siloxane

- Unique ultra high temperature column optimizes for 209 PCB congener separations
- Optimized for 209 PCB congener separations

Fisher Scientific Cat. No.	Part description and detail
HT8-PCB	
10793364	0.25 mm ID x 60 m length HT8-PCB GC capillary column
Fast HT8-PCB	
15298693	0.1 mm ID x 10 m length Fast HT8-PCB GC capillary column

Gas filters

Clean gas | Accurate analysis
Easily installed



Gas filters are an essential part of your GC analysis as contaminants in gases can significantly impact the quality of results. Oxygen, hydrocarbons and moisture can lead to problems such as noisy baselines, moisture entering the GC column, excessive bleed and septa degradation.

Even if carrier gas is of the highest quality, contaminants can be picked up from every part of the gas line. Therefore, a gas filter is needed to ensure that maximum productivity is achieved.



Clean gas

Gas filters are designed to provide fast stabilization times to reduce gas consumption, and provide clean gas to GC and GCMS systems.

Accurate analysis

Inserting a gas filter in the gas line significantly reduces impurity levels, thus improving trace analysis.

Easily installed

The gas filter system consists of two key parts: the filters and the connecting unit. The connecting unit has inlet and outlet connectors for the gas lines. The connecting unit can be bench or wall-mounted and is available in 1, 2 and 4 port configurations and for 1/4" and 1/8" gas lines.

Enhanced gas quality for maximum productivity

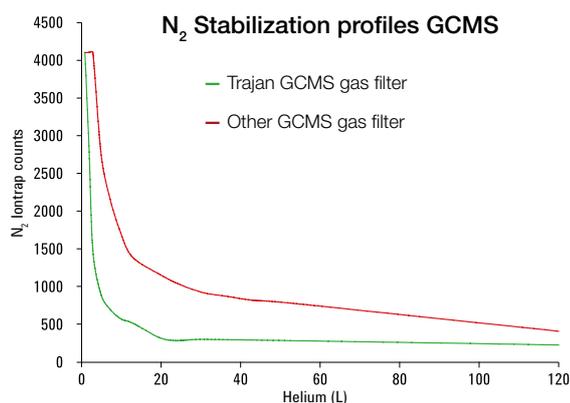


Figure 1 shows the fast stabilization rate (the N_2 mass measured by mass spectrometry) of a GCMS after replacement of the filter.

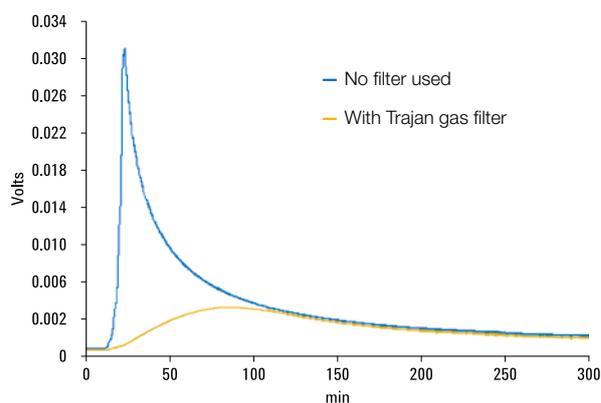


Figure 2 shows the difference in bleed levels of two GC columns due to moisture exposure with and without a filter when running a temperature program (50°C to 350°C, 20°C/min). When no filter is used, an extreme rise in the bleed profile is clearly visible due to moisture in the carrier gas. By using gas filters, a normal bleed profile is achieved with the removal of all moisture in the carrier gas.

Gas filter selection guide

Technique	Recommended filter(s)	Advantages
GCMS	Carrier gas	High data accuracy, lower maintenance
GC column	Moisture and oxygen	Longer lifetime
Electron capture detectors (GC)	Moisture and oxygen	High sensitivity
Thermal conductivity detectors (GC)	Moisture and oxygen	High sensitivity, lower maintenance
Flame ionization detectors (GC)	Two hydrocarbon	High sensitivity
Photoionization detectors (GC)	Oxygen and hydrocarbon	High sensitivity

Gas filter technical specifications

	Oxygen filter	Moisture filter	Hydrocarbon filter	Carrier gas filter
Function	Removes oxygen as well as traces of sulfur and chlorine compounds from the carrier gas	Removes water, oil and other foreign material from the carrier gas	Removes organic compounds from gas streams	Single combination filter; removes water, oxygen and organic compounds
Indicator color change	From green to gray	From green to pale brown	No indicator	Oxygen: from green to gray Moisture: from green to pale brown Hydrocarbons: no indicator
Capacity	150 mL oxygen	7.2 g water	Approximately 7 g, depending on impurities	100 mL oxygen, 1 g water, organics depending on impurities
Outlet concentration at operating flow of 1-10 L/min	<50 ppb	<0.1 ppm	<0.1 ppm	Oxygen <50 ppb Moisture <0.1 ppm Organics <0.1 ppm

Gas filters

Gas filters

Fisher Scientific Cat. No.	Part description and detail
15760969	Gas filter - Hydrocarbon
15750969	Gas filter - Moisture
15740969	Gas filter - Oxygen
15770969	Gas filter - Carrier gas

Connecting units

Fisher Scientific Cat. No.	Part description and detail
15720959	Gas filter connecting unit 1/4" (high flow)
15730959	Gas filter connecting unit 1/8" (high flow)
15780959	Gas filter connecting unit 1/4" (4 position)
15790959	Gas filter connecting unit 1/8" (4 position)
15760959	Gas filter connecting unit 1/4" (2 position)
15770959	Gas filter connecting unit 1/8" (2 position)
15740959	Gas filter connecting unit 1/4" (1 position)
15750959	Gas filter connecting unit 1/8" (1 position)

Gas filter kits

Fisher Scientific Cat. No.	Part description and detail
15700969	Gas filter kit - Carrier gas 1/4" (1 gas filter, connecting unit - 1 position)
15710969	Gas filter kit - Carrier gas 1/8" (1 gas filter, connecting unit - 1 position)
15720969	Gas filter kit - FID 1/4" (4 gas filters, connecting unit - 4 position)
15730969	Gas filter kit - FID 1/8" (4 gas filters, connecting unit - 4 position)

Big Trap gas filter

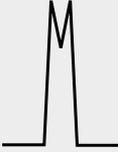
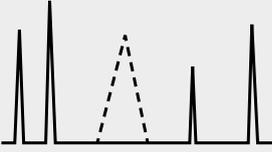
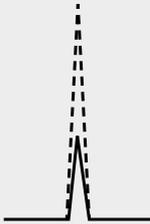
For bulk purification applications or where several instruments are plumbed from a single source, a Big Trap gas filter is an ideal solution. A one-piece heavy walled aluminium tube provides 750 cm³ of capacity and a pressure rating up to 250 psig.



Big Traps

Fisher Scientific Cat. No.	Part description and detail
15730979	Big Trap gas filter 1/4" - Hydrocarbon
15740979	Big Trap gas filter 1/8" - Hydrocarbon
15710979	Big Trap gas filter 1/4" - Moisture
15720979	Big Trap gas filter 1/8" - Moisture
15790969	Big Trap gas filter 1/4" - Oxygen
15700979	Big Trap gas filter 1/8" - Oxygen
15750979	Big Trap gas filter 1/4" - Universal
15760979	Big Trap gas filter 1/8" - Universal
15780969	Big Trap mounting clip, PK2

Basic troubleshooting guide

Problem	Reason	Resolution
Peak fronting 	Column overload	Reduce sample concentration or injection volume
	Incorrect polarity of column for compound	Use correct column
Peak tailing 	Column is active	Remove first meter of column, recheck; replace column if necessary
	Active inlet liner	Replace liner with clean, deactivated liner
	Incorrect column for analysis	Use correct column
	Incorrect column installation	Check inlet and outlet connections, and for any cold spots
Peak splitting 	Poor injection technique	Refine injection technique
	Mixed solvents	Use only single solvent system
	Poor resolution	Use different column or change temperature profile
Ghost peaks 	Run GC without injection; if ghost peaks disappear then the problem is probably the syringe or solvent; if ghost peaks are still evident then the problem is either the septum or the breakdown of the phase.	
	Contaminated syringe or solvents	Clean syringe thoroughly and replace solvents
	Septum bleed	Replace with Trajan septa
	Breakdown of column phase	Choose different phase which restricts breakdown
	Too large an injection volume	Decrease injection volume
Specific peaks low response 	Column is active	Remove first meter of column; recheck; replace column if necessary
	Active inlet liner	Replace liner with clean, deactivated liner
	Incorrect calculation of sample	Verify calculations
	FID altered gas flows	Readjust gas flows

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GC consumables

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