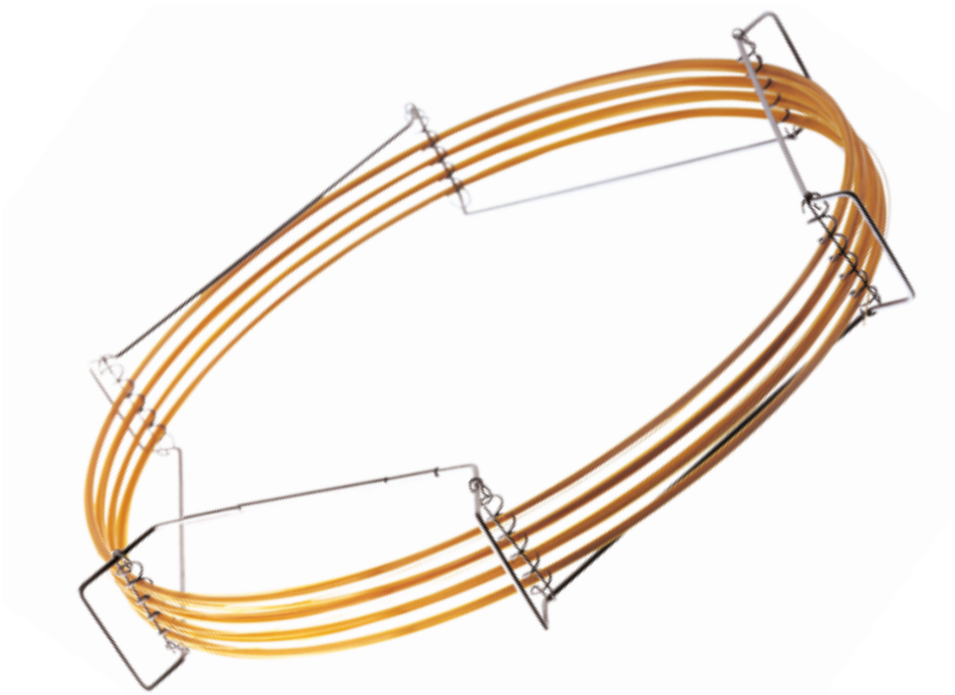
SGE GC columns



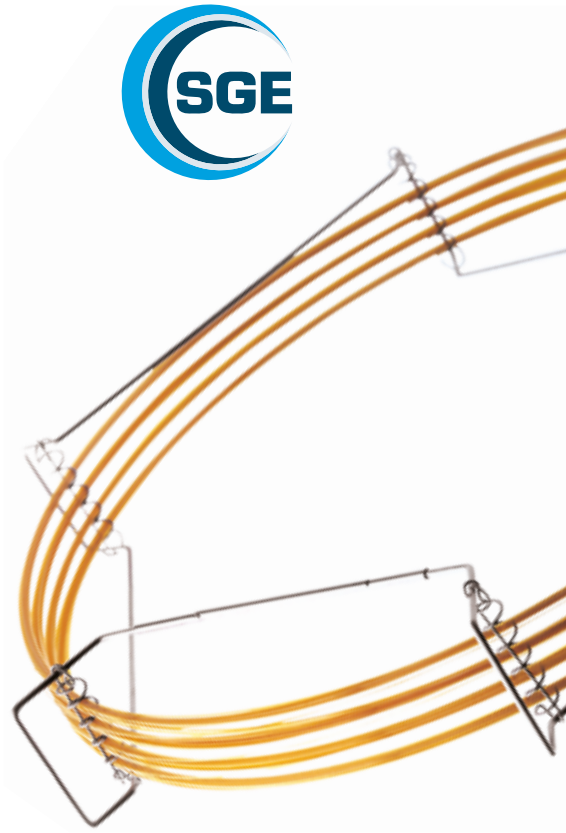
Minimal bleed | Highly inert
Temperature stable

Engineered for science

Analytical Columns

Contents

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)	X			Doubling column length increases resolution by ~ 40%
Internal diameter (mm)	X			The smaller the column ID, the greater the efficiency and better the resolution
Film thickness (µm)		X		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			X	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

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

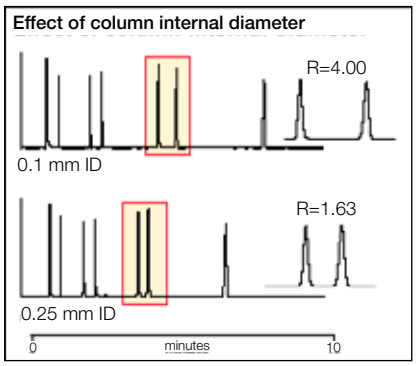
IA is the retention index of compound A (from corrected retention times) which elutes between two n-paraffins separated by either one or two carbon numbers.

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



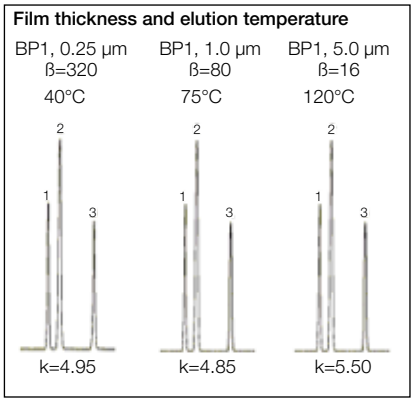
Effect of column internal diameter

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:

$$ß = d/4d_f$$

where:

ß = 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 ß 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 ß 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

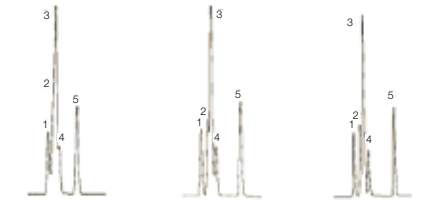
Effect of column length

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.

Effect of column length

Phase: BP20, 0.5 µm
Temperature: 170°C, isothermal
Linear velocity: 25 cm/sec, He

Components
1. o-Ethylphenol
2. p-Cresol
3. 2,4-Xylenol
4. 2,5-Xylenol
5. 2-iso-Propylphenol



12 m x 0.32 mm ID
Efficiency (effective plates): 25,000

25 m x 0.32 mm ID
Efficiency (effective plates): 50,000

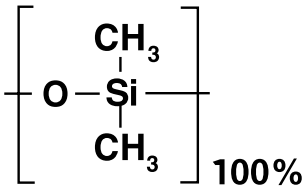
50 m x 0.32 mm ID
Efficiency (effective plates): 100,000

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.

BP1

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.

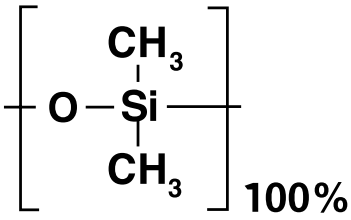
Operating temperature: 0.1-1 µm film thickness: -60°C to 340/360°C.
1.5-3 µm film thickness: -60°C to 300/320°C.
3-5 µm film thickness: -60°C to 280/300°C.

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)	Part number
0.1	10	0.1	054022
0.22	12	0.25	054046
0.22	25	0.25	054047
0.22	30	0.25	054050
0.22	50	0.25	054048
0.22	50	1	054054
0.22	60	0.25	054051
0.25	15	0.1	054039
0.25	15	0.25	054043
0.25	30	0.25	054044
0.25	30	1	054056
0.25	60	0.25	054045
0.32	12	0.5	054064
0.32	12	1	054070
0.32	25	0.5	054065
0.32	25	1	054071
0.32	30	0.25	054062
0.32	30	0.5	054068
0.32	30	3	054073
0.32	50	0.5	054066
0.32	50	1	054072
0.32	50	5	054082
0.32	60	0.5	054069
0.53	12	1	054086
0.53	25	1	054087
0.53	25	5	054095
0.53	30	1	054090
0.53	30	3	054808
0.53	30	5	054806
0.53	50	5	054096
0.53	60	5	054807
0.32	30	1	054813
0.25	30	0.5	054820
0.32	60	1	054810

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.

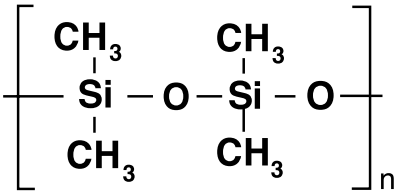
Operating temperature: Polyimide clad, 0.1-0.9 µm film thickness: -30°C to 400°C.
Polyimide clad, 2.65 µm film thickness: -30°C to 370°C.

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

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.1	10	0.1	054777
0.53	6	2.65	0548025
0.53	10	0.1	054803
0.53	10	0.9	054801
0.53	10	2.65	054802

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.

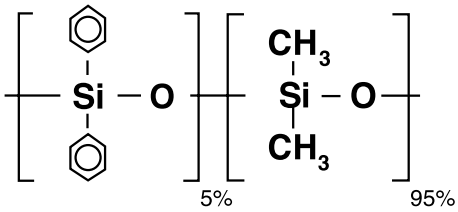
Suitable replacement for: CP-Sil 5 CB, DB-1, DB-Petro, Elite-1ms, HP-1ms, Petrocol DH, Rtx-1, SPB-1, SPB-1 SULFUR, TG-1MS, Ultra 1, VB-1, VF-1ms, ZB-1.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.25	30	0.25	054795
0.25	60	0.25	054793
0.32	30	0.25	054798

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°C.
> 1.5 µm film thickness: -60°C to 280/300°C.

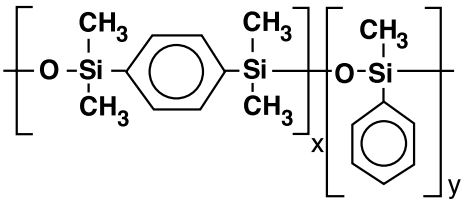
Suitable replacement for: CP-Sil 8 CB, DB-5, Elite-5, HP-5, MDN-5, PTE-5, Rtx-5, SPB-5, Ultra 2, VB-5, ZB-5.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.22	25	0.25	054168
0.25	15	0.25	054182
0.25	30	0.25	054183
0.25	30	1	054203
0.25	60	0.25	054184
0.32	25	0.5	054186
0.32	30	0.25	054177
0.32	30	0.5	054216
0.32	30	1	054189
0.53	30	1	054195
0.53	30	5	054196

BP5MS

5% Phenyl Polysilphenylene-siloxane

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



Application areas: 5% GCMS analyses

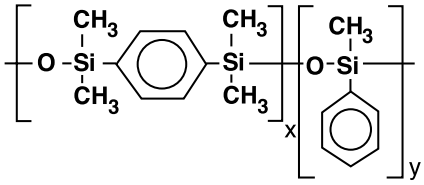
Operating temperature: 0.1-0.25 µm film thickness: -40°C to 330/350°C.

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

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.18	20	0.18	054301
0.25	15	0.25	054308
0.25	30	0.25	054310

BPX5

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.

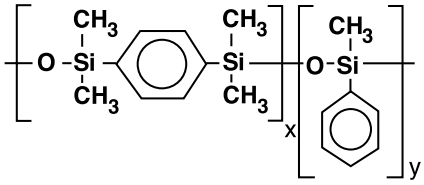
Operating temperature: 0.1-1.5 µm film thickness: -40°C to 360/370°C.
> 1.5 µm film thickness: -40°C to 350/360°C.

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)	Part number
0.1	10	0.1	054099
0.15	25	0.25	054104
0.22	12	0.25	054112
0.22	25	0.25	054113
0.22	50	0.25	054114
0.25	7	0.25	054149
0.25	15	0.25	054100
0.25	15	0.1	0542170
0.25	15	1	054121
0.25	30	0.25	054101
0.25	30	0.1	0541011
0.25	60	0.25	054102
0.25	30	0.5	0541025
0.25	30	1	054122
0.25	60	1	054123
0.32	12	0.25	054118
0.32	25	0.25	054119
0.32	15	0.25	054144
0.32	30	0.25	054145
0.32	60	0.25	054146
0.32	25	0.5	054125
0.32	30	0.5	0541205
0.32	6	1	0541261
0.32	12	1	054127
0.32	30	1	054153
0.32	50	1	054129
0.32	60	1	054154
0.53	12	1	054130
0.53	25	1	054131
0.53	25	0.25	054134
0.53	30	0.5	0541345
0.53	30	1.5	0541348
0.53	30	1	054148
0.53	30	3	054160

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.

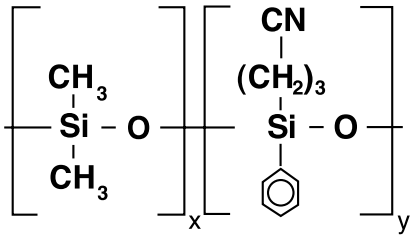
Operating temperature: 0.1-0.5 µm film thickness: 10°C to 330/360°C.

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)	Part number
0.1	10	0.1	054699
0.25	30	0.25	054701
0.25	60	0.25	054702
0.32	30	0.5	0547158

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.

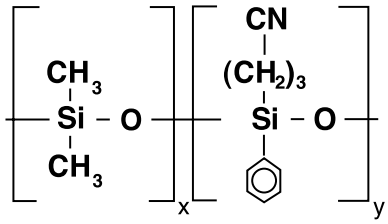
Operating temperature: 1.4-3 µm film thickness: 0°C to 230/240°C.

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)	Part number
0.25	15	1.4	054839
0.25	30	1.4	054840
0.25	60	1.4	054842
0.32	30	1.8	054832
0.32	60	1.8	054841
0.53	30	3	054836
0.53	50	3	054835
0.53	60	3	054838

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.

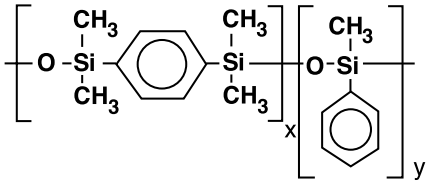
Operating temperature: 0.25-0.5 µm film thickness: -20°C to 280/300°C.
1 µm film thickness: -20°C to 260/280°C.

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)	Part number
0.22	25	0.25	054253
0.25	30	0.25	054256
0.32	25	0.5	054268
0.32	30	0.25	054259
0.32	30	1	054270
0.53	25	1	054280
0.53	30	1	054283

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)	Part number
0.1	10	0.1	054740
0.15	30	0.15	054741
0.25	15	0.25	054750
0.25	30	0.25	054751
0.25	60	0.25	054752
0.32	30	0.25	054761
0.53	30	1	054772

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)	Part number
0.22	25	0.25	054421
0.22	30	0.25	054424
0.22	50	0.25	054422
0.25	30	0.25	054427
0.25	60	0.25	054428
0.25	30	0.5	054415
0.25	30	1	054439
0.32	30	0.25	054433
0.32	50	0.25	054431
0.32	25	0.5	054436
0.32	30	0.5	054438
0.32	50	0.5	054437
0.32	25	1	054442
0.53	30	1	054444
0.53	30	1	054451
0.53	60	1	0544515
0.53	25	2	054456

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)	Part number
0.22	25	0.25	054462
0.25	30	0.25	054465
0.25	60	0.25	054466
0.32	25	0.25	054468
0.32	30	0.25	054471
0.32	50	0.25	054469
0.32	50	0.5	054480
0.53	30	0.5	054477
0.53	30	1	054478

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.

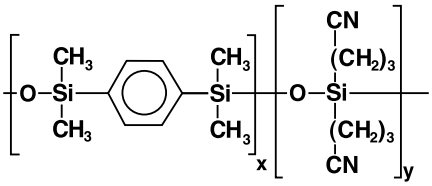
Suitable replacement for: AT-Wax, CP-Wax 52 CB, DB-Wax, Elite-WAX, HP-20M, HP-INNOWax, Nukol, Rtx-Wax, Stabilwax, SUPELCOWAX 10, TG-WaxMS, VB-WAX, ZB-WAX.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.1	10	0.1	0547100
0.25	30	0.25	054796
0.25	60	0.25	054791
0.25	30	1	054787
0.32	30	0.25	054788
0.32	60	0.25	054789
0.32	30	0.5	054797
0.32	60	0.5	054792
0.53	30	0.5	054786
0.53	30	1	054785

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.

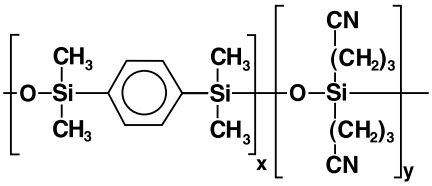
Suitable replacement for: CP-Sil 88, DB-23, Rtx-2330, SP-2330, SP-2380, VF-23ms, ZB-FAME.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.1	10	0.2	054600
0.22	25	0.25	054602
0.22	30	0.25	054612
0.22	50	0.25	054603
0.22	60	0.25	054613
0.25	30	0.25	054622
0.25	60	0.25	054623
0.25	120	0.25	054624
0.32	25	0.25	054606
0.32	30	0.25	054616
0.32	50	0.25	054607
0.32	60	0.25	054617
0.53	30	0.5	054620

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).

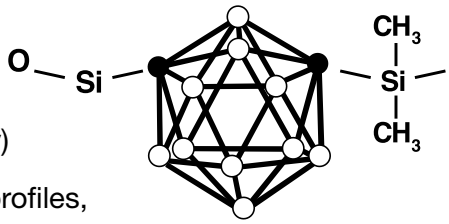
Operating temperatures: 0.25-0.5 µm film thickness: 80°C to 280°C.

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)	Part number
0.25	15	0.25	054570
0.25	30	0.25	054580
0.25	60	0.25	054590
0.25	100	0.25	054596
0.32	30	0.5	054583

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.

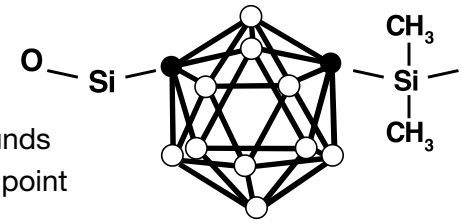
Operating temperature: 0.1-0.5 µm film thickness: 10°C to 380/400°C.

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

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.22	12	0.1	054631
0.22	25	0.1	054632
0.25	15	0.1	054633
0.25	30	0.1	054634
0.32	12	0.1	054641
0.32	25	0.1	054642
0.32	30	0.5	054668
0.53	6	0.1	054655
0.53	12	0.15	054657
0.53	25	0.15	054658

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)	Part number
0.22	25	0.25	054675
0.22	50	0.25	054676
0.25	30	0.25	054677
0.25	60	0.25	054683
0.32	25	0.25	054680

HT8-PCB

8% Phenyl (equiv.) Polycarborane siloxane

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

Part number	Part description and detail
HT8-PCB	
054236	0.25 mm ID x 60 m length HT8-PCB GC capillary column
Fast PCB	
054690	0.1 mm ID x 10 m length Fast PCB GC capillary column

GC PLOT columns | SGE

The analysis of gases and volatiles has historically been challenging for gas chromatographers. The need to maintain resolution for very volatile compounds has meant that many methods are still based on traditional packed columns. This is limiting as packed columns offer low resolution and are often dedicated to one specific analysis.

BP BOND Q

Features and benefits

- Highly stable column can withstand repeated water injections
- Reduced need for particle trap due to minimal particle shredding
- Broad application range – ideal for volatile solvent and hydrocarbon analysis

Recommended applications

- Volatile solvents
- Hydrocarbons

Product specifications

- 100% Divinylbenzene

Operating temperature: 3-5 µm film thickness: -100°C to 300/320°C.

Suitable replacement for: PoraBOND Q, Rt-Q-BOND, Rt-QPLOT, SupelQ PLOT, TracePLOT TG-BOND Q.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.25	10	3	0570123
0.25	25	3	0570223
0.32	10	5	0570135
0.32	25	5	0570235
0.32	50	5	0570535

BP BOND U

Features and benefits

- Maximum temperature extended from 190°C to 300°C
- Bleed reduction provides lower detection limits and faster stabilization times
- Ideal for applications such as trace Hydrogen Sulfide (H_2S), Carbonyl Sulfide (COS) and mercaptans in hydrocarbon streams

Recommended applications

- Trace H_2S, COS and mercaptans in hydrocarbon streams

Product specifications

- Divinylbenzene Ethylene Glycol / Dimethylacrylate

Operating temperature: 7 µm film thickness: 300°C.

Suitable replacement for: PoraBOND U, Rt-U-BOND, TracePLOT TG-BOND U.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.32	10	7	0571137
0.32	25	7	0571237

BP BOND Molsieve 5A

Features and benefits

- Reduction in analysis times of up to 75% compared with packed columns
- Baseline separation of argon (Ar) / oxygen (O_2) achieved at ambient temperatures
- Fast elution of carbon monoxide (CO) with symmetrical peaks

Recommended applications

- Separation of permanent gases
- Refinery or natural gases

Product specifications

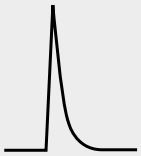
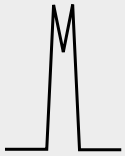
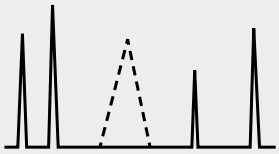
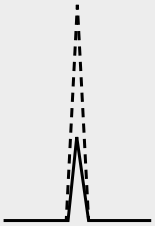
- Molecular Sieve (5A)

Operating temperature: 30 µm film thickness: -20°C to 350/350°C.

Suitable replacement for: CP-Molsieve 5A, Mol Sieve 5A PLOT, MXT-Msieve 5A, Rt-Msieve 5A, TracePLOT TG-BOND Msieve 5A.

ID (mm)	Length (m)	Film thickness (µm)	Part number
0.25	10	30	0572123
0.25	25	30	0572223
0.32	10	30	0572133
0.32	25	30	0572233
0.32	50	30	0572533

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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