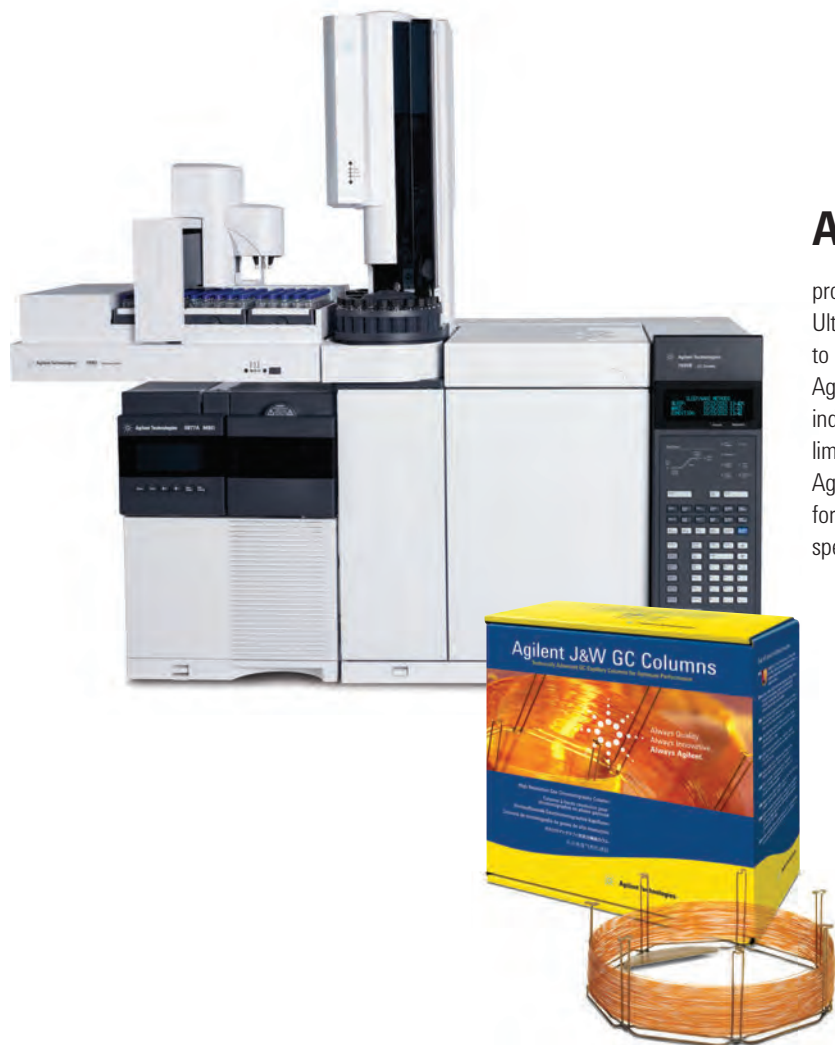


GC AND GC/MS

Achieve excellent, reproducible performance for difficult samples

For over 40 years, Agilent has broken new ground with innovations in Gas Chromatography. We continue our leadership tradition by offering the industry's broadest selection of GC and GC/MS columns and supplies. All are manufactured to Agilent's exact specifications to minimize downtime and ensure consistent, high-quality results that you can rely on.



Agilent Ultra Inert solutions

provide the flow path inertness vital to analytical success. Ultra Inert split and splitless liners are manufactured and tested to our highest level of scrutiny to ensure quality and consistency. Agilent J&W Ultra Inert GC columns are tested with the industry's most demanding test probe to reduce detection limits and produce more accurate data for difficult analytes. Agilent GC and GC/MS instruments bring together all elements for trace-level analysis, dramatically improving MS resolution, spectral integrity, and detection limits.

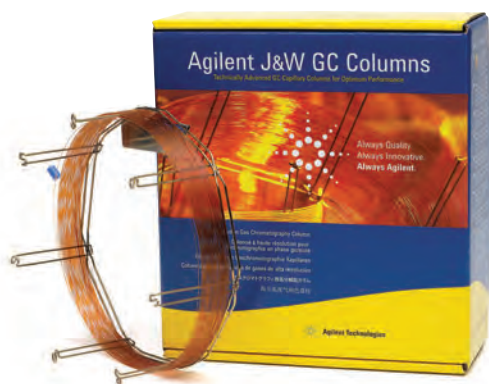


GC and GC/MS supplies

More samples, lower detection levels, with fewer analysts. These demands challenge laboratories to maximize the productivity and performance of their instrumentation. To help you stay ahead, Agilent is continuously improving our extensive portfolio of innovative, award winning GC columns and supplies, designed to help you resolve many of the day to day setbacks encountered in your lab. You can avoid downtime and your time can be better spent on meeting your analytical and business challenges.

For labs pushing the detection limits of trace level analysis on very active compounds, **Agilent Inert Flow Path solutions** ensure a reliably inert flow path for higher sensitivity, accuracy, and reproducibility. Install industry leading Agilent J&W GC columns with new proprietary design GC column nuts and ferrules to simplify your day yet maximize your GC and GC/MS systems output.

- Inert Flow Path components – Ultra Inert GC columns, Ultra Inert liners, Ultra Inert gold seals, UltiMetal Plus Capillary Flow Technology devices with Flexible Metal ferrules – have Agilent proprietary deactivation chemistries to ensure sample integrity.
- "Better Connectivity" with products such as Self Tightening column nuts, UltiMetal Plus Flexible Metal ferrules, and Ultra Inert liners in Touchless packaging improves productivity with ease of use and convenience.
- Full portfolio of premium GC products to support your lab needs – including Agilent CrossLab brand and Agilent Bulk supplies packaging.



Agilent J&W GC columns

deliver the best inertness for acids, bases, and mixed functional compounds, the lowest bleed levels, and the tightest column-to-column reproducibility. Mass Spec Grade GC columns (VF-ms, DB-ms and HP-ms) give you robust performance, low column bleed, and a wide range of selectivity. LTM column modules combine a fused silica capillary GC column with heating and temperature-sensing components for efficient column heating and cooling. What's more, integrated guard columns protect your analytical columns from non-volatile compounds in the sample matrix.

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PUT MORE THAN 40 YEARS OF RELENTLESS INNOVATION BEHIND YOUR EVERY RESULT

By continually raising the standards for technologies that support your routine analyses, Agilent's R&D efforts have led to breakthroughs such as:

- **New GC columns** that help you achieve higher levels of inertness and column-to-column reproducibility
- **LC column choices** that deliver the sensitivity and reliability you need for demanding applications
- **Cutting-edge sample preparation products** that promote reliable extraction and concentration
- **Fresh atomic and molecular spectroscopy ideas** for identifying and confirming targets and unknowns

Longtime Agilent customers have experienced our commitment firsthand. And now, we look forward to demonstrating how Agilent's approach to relentless innovation can work to your advantage, too.



CHEMICAL ANALYSIS SOLUTIONS

Food

From high-volume pesticide screening in food products to rapid identification of pathogens, Agilent understands the analytical needs of food producers, shippers, and regulators. Utilizing our easy-to-use analyzers and updated screening libraries, customers can quickly develop robust and reliable methods. Agilent's leading gas chromatography and mass spectrometry systems are widely regarded as valuable food testing techniques for an array of different analyses.

Environmental

Agilent offers more than 40 years of environmental testing and regulatory expertise. We help government and private labs with the full range of assays, from routine testing of soils for heavy metals to detection of pharmaceuticals in groundwater, in concentrations down to parts per trillion.

Energy & Chemicals

Agilent collaborates closely with process industry customers to offer analytical systems that meet their needs for separation, detection, throughput, and support. We'll even preconfigure custom or standard analyzers so they arrive at the lab ready-to-go. From crude oil, natural gas, and refining, to specialty chemicals and alternative fuels, Agilent provides the latest technologies and solutions to increase quality, safety, and profitability for energy and chemical labs, while meeting the industry's stringent quality requirements. Agilent leads the way in ASTM collaborations that have evolved – and will continue to evolve – into industry standards.

Forensics

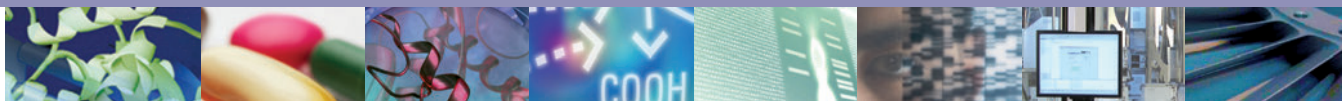
Whether testing for poisons in a forensics investigation, screening athletes for performance enhancing drugs, analyzing samples for recreational drugs, or checking a crime scene for explosive residue – lives and professions may be dependent on the accuracy of your equipment. Agilent Technologies leads the industry with a comprehensive portfolio of workflow solutions that provide the ability to identify, confirm and quantify thousands of substances.

Lab Informatics

The ways labs capture, analyze and share data profoundly affect their efficiency. Agilent offers a rich, integrated suite of software products built on customer-driven architectural values with the Agilent OpenLAB Software Suite. OpenLAB delivers superior performance and connection across multiple systems, providing open systems integration and investment protection. Our commitment is to deliver more value across each step in the life cycle of scientific data – from data collection and analysis to interpretation and management.

Materials Science

Agilent offers a newly expanded portfolio of instruments used for the research, manufacturing and testing of advanced materials, from precision optics to pulp and paper. Tools for atomic spectroscopy, molecular spectroscopy, chromatography, and X-ray crystallography all support continuous progress in materials science.



LIFE SCIENCE SOLUTIONS

Biopharmaceutical

Biotherapeutics have enormous potential to improve human health, with growing numbers of protein and antibody therapeutics to address unmet medical needs. At every development stage, from disease research to QA/QC and manufacturing, Agilent can help you make the right choices for moving therapeutics to market. We understand the biopharmaceutical workflow so our product families work together seamlessly, as engines of research, discovery, and development. Agilent columns deliver complete characterization of biomolecules using reversed-phase, size exclusion, ion exchange, and affinity chromatography. Our bio-inert supplies ensure that every part of your workflow delivers the performance you need to optimize your bio-separation.

Pharmaceutical

You need the most efficient processes to evaluate drug candidates, determine efficacy, and ensure safety and compliance during development and manufacture. Agilent has worked with pharma companies for many years to ensure reliability and reproducibility for regulatory compliance, from lab-to-lab and around the world. Our pharma solutions provide high-throughput capability at every stage of the product lifecycle, with automated sample prep, industry-leading U/HPLC systems, the largest family of Fast LC columns, open access LC/MS, spectroscopy, and automated dissolution. A complete family of LC supplies and lamps help optimize every analysis and take day-to-day lab efficiency one step further.

Proteomics

Research into how large sets of proteins affect the health of an organism requires special sets of analytical tools. Agilent has built a formidable arsenal of liquid chromatograph/mass spectrometers, bioinformatics systems, multiple affinity protein removal columns, and OFFGEL electrophoresis for protein identification and protein biomarker discovery. Accurate-Mass mass spectrometry and the microfluidic HPLC-Chip/MS are two Agilent innovations speeding the work of proteomics researchers around the globe.

Metabolomics

Collections of small molecules are increasingly being seen as rich sources of biomarkers, but studying metabolites presents many challenges. The need for speed, accuracy, and powerful interpretation capabilities in looking at chemical profile snapshots is underscored because molecules are constantly entering, leaving or changing within the metabolome. Agilent's GC, LC, and MS portfolios, along with our excellent bioinformatics offerings, user-customizable METLIN metabolite database for LC/MS, and the industry's first commercial GC/MS retention time locked metabolite library align well with the needs of metabolomics researchers.

Genomics

Agilent is a global leader in microarrays, scanners, and NGS reagents used in a wide variety of genomic-based disease research experiments. Our SureSelect and HaloPlex Target Enrichment Systems dominate the category, streamlining next generation sequencing studies. Agilent offers a wide range of catalog CGH and gene expression microarrays and a highly-developed capability to produce custom arrays using our free online design tool, SureDesign. All Agilent microarrays feature highly sensitive, selective 60-mer probes, and, with as many as eight arrays printed on a slide, the cost per sample is cost-efficient.

Life Science Informatics

Mirroring its extensive instrument portfolio, Agilent offers the industry's most extensive suite of bioinformatics software, helping users derive knowledge from complex genomic, proteomic, metabolomic and other biological data. SureCall and CytoGenomics software analyzes NGS and aCGH data and the GeneSpring suite provides multi-omic analysis and visualization capabilities to help compare complex datasets to explore biological questions from multiple perspectives. The GeneSpring suite includes the GX module for microarray-based gene expression and genotyping data, the PA module for Pathway Analysis and multi-omic analysis and the MPP software, which analyzes mass spec data from proteomics and metabolomics experiments.

Lab Automation

To meet the skyrocketing demand for more throughput and automation, Agilent has substantially expanded its lab automation offerings. The Agilent line of liquid handlers and microplate processors are designed to streamline high-volume life science workflows. Agilent is also continually upgrading its advanced autosamplers for LC, GC, LC/MS and GC/MS, adding functionality and speed to reflect the performance of its advanced instruments.

Vacuum Technology

Agilent works with customers to solve vacuum challenges from experiments in high-energy physics to developing systems for nanotechnology. Agilent manufactures vacuum systems used in its own mass spectrometry instruments as well as those of other manufacturers. Agilent's vacuum technology has been proven by the most powerful physics experiment ever built, CERN's Big Bang machine, which was used in the discovery of the Higgs boson.



Get the Agilent Service Guarantee

Should your instrument require service while covered by an Agilent Advantage service agreement, we guarantee repair or we will replace your instrument for free.

No other company offers this level of commitment to keep your lab up and running at peak efficiency.

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Focus on what you do best

For over 40 years, Agilent has been building and maintaining the instruments you count on to stay competitive and successful. Trust us to protect your investment with a broad portfolio of services, backed by a global network of experienced service professionals dedicated to the productivity of your lab.

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Agilent offers a flexible range of service plans so that you can choose the level of coverage that is best for your lab.

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- **Agilent Advantage Silver** – Comprehensive coverage for dependable laboratory operations
- **Agilent Advantage Bronze** – Total repair coverage at a fixed annual price
- **Agilent Repair Service** – Basic coverage for reliable instrument repair

Agilent Advantage service plans include Agilent Remote Advisor for real-time remote monitoring and diagnostics. Through secure internet connections, you can interact with Agilent service professionals, receive detailed asset reports, and configure text or email alerts to notify you before problems occur – helping you to maximize instrument uptime and optimize laboratory workflows.

And for Agilent-quality service on analytical instruments from other leading manufacturers, Agilent CrossLab services offer the same quality coverage you have come to expect from the expert Agilent engineers you know and trust.



Laboratory decision makers and users ranked Agilent as their first choice for general laboratory compliance services.

Agilent Compliance Services

Equipment qualification that meets the most stringent requirements

Enterprise Edition Compliance was developed to streamline qualification delivery compliance across your entire lab. Used worldwide in regulated labs, including standards organizations and regulatory agencies, Enterprise Edition enables you to:

- Improve qualification efficiency by harmonizing protocols across platforms to ensure greater efficiency and minimize regulatory risk
- Standardize your entire compliance operation with robust test designs that work with all your instruments
- Add, remove or reconfigure tests based upon your unique user requirements
- Reduce staff review time significantly with consistently formatted, computer generated, tamper-proof reports

Agilent Education and Consulting Services

Our best minds, working for you

Make the most of your instrument with training and consulting from the same experts who designed the instruments, software and processes you use every day.

- Classroom, online, and on-site training in instrument operation, troubleshooting and maintenance
- Customized consulting services to meet your lab's unique needs

The Agilent Value Promise – 10 Years of Guaranteed Value

In addition to continually evolving products, we offer something else unique to the industry – our 10-year value promise guarantee. The Agilent Value Promise guarantees you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of the system toward an upgraded model. Not only does Agilent ensure a reliable purchase now, but we also ensure that your investment is just as valuable in the future.

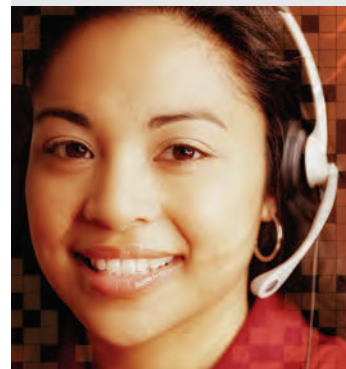
For more detailed information, please go to www.agilent.com/chem/services or contact your local Agilent Services and Support representative.



Technical Support at work for you

Have a hardware, software, application, instrument repair or troubleshooting question? Agilent's technical experts are available to answer your questions. With years of laboratory experience, our technical support specialists can provide in-depth knowledge and experience.

For questions pertaining to supplies found in this catalog, contact your local Agilent office or Authorized Agilent Distributor or visit www.agilent.com/chem/techsupport



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- Get fast sales and product assistance by phone. Simply use the scroll-down menu to select your country.
- Receive email assistance using our convenient online forms.

Agilent J&W GC columns

The story behind Agilent J&W GC Columns

In 2000, Agilent Technologies, the inventor of fused silica GC tubing, merged with J&W Scientific, the creator of the first GC stationary phase made from cross-linked siloxane polymers. In 2010, Agilent acquired Varian adding PLOT, Select, VF, CP-Sil, UltiMetal, and packed to the existing Ultra Inert, High Efficiency, LTM, PAH, and Custom GC columns. Our foundation of GC expertise, combined with these vital acquisitions, we have built Agilent J&W into the most extensive and innovative GC column offering in the world.

Put over 40 years of Agilent quality and innovation behind your every separation

Agilent J&W offers the broadest portfolio of the most innovative GC columns in the world, with over 3500 part numbers. Our portfolio offers the best inertness for acids/bases/mixed functional compounds, the lowest bleed levels and the tightest column-to-column reproducibility. So when you put industry-leading Agilent J&W GC columns to work in your lab, you can have the utmost confidence in your column, and in every separation.



The most inert and lowest bleed columns for sensitivity and performance

Agilent J&W columns have the widest range of standard, GC/MS and Ultra Inert stationary phases proven to deliver consistent column inertness and exceptionally low column bleed with high upper temperature limits, ensuring accurate peak identification and quantification. Column bleed can decrease spectral integrity, reduce uptime, and shorten column life. Column activity contributes to severe peak tailing, as well as compound loss or degradation for active compounds (e.g. acids and bases), leading to inaccurate quantification.

Better precision for better results

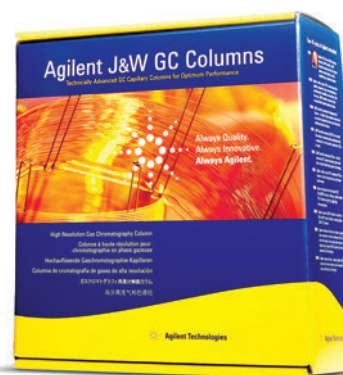
Agilent J&W columns adhere to tight retention factor (k) specifications, promoting consistent retention and separation. They also feature narrow retention indexes and a high number of theoretical plates per meter, ensuring narrow peaks and improving the resolution of closely eluting peaks.

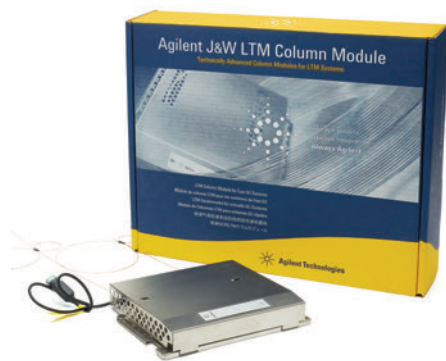
The industry's tightest quality control specifications

Agilent's industry-leading testing ensures the most reliable qualitative and quantitative results, and unmatched column-to-column reproducibility, for your most challenging compounds. Offering the industry's only Ultra Inert testing, we test each column for peak height ratios and tailing for acids, bases, and other chromatographically demanding compounds so you can have utmost confidence in your trace-level separations.

And, with Agilent's industry-leading instruments, services, global technical support, and quick shipment from Agilent regional logistic centers, Agilent's whole solution provides you with even more confidence in your column, and in your every separation.

To learn more about Agilent J&W GC columns please visit www.agilent.com/chem/mygccolumns





LTM II standard format with 5 in column toroid

Agilent J&W LTM II Column Modules

Agilent J&W LTM II Low Thermal Mass Column Modules for 7890A/B Series GC Systems

Available in a wide variety of Wall Coated Open Tubular (WCOT) and select Porous Layer Open Tubular (PLOT) column configurations.

- The capacity to run up to four column modules simultaneously – with four different temperature programs – to maximize your productivity
- Rapid temperature programming rates for higher analysis speeds
- Faster cooling times – as low as one minute or less – to decrease idling and downtime
- Excellent retention time repeatability and performance – comparable to conventional GC

All LTM II column modules are packaged with:

- Two 1 m guard columns (one each for the inlet and detector) fused silica the same id as the analytical column
- Flexible Metal ferrules that fit the dimensions of the analytical and guard columns



Agilent J&W LTM II Low Thermal Mass Column Modules for 7890A/B Series GC Systems

This LTM column technology is designed specifically for Agilent 5975T GC/MS systems. These modules include an integrated 3 in LTM capillary column toroid assembly with heated transfer lines, cooling fan assembly and sheet metal enclosure. Replacement column toroid assemblies are also available. Benefits of the LTM column modules include:

- Faster heating and cooling times – as low as one minute or less – for more rapid analytical cycle times
- Excellent retention time repeatability and performance comparable to conventional GC
- Less power consumption for longer in-field operation
- Integrated module design to facilitate easy column module change in the field

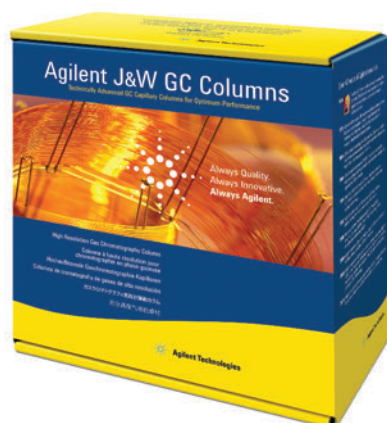
Shorten analytical cycle times and boost your high speed gas chromatography capabilities

Agilent J&W LTM column modules combine a high quality fused silica capillary column with heating and temperature sensing components for a low thermal mass column assembly. The LTM column module contains a patented design which heats and cools the column very efficiently for significantly shorter analytical cycle times compared to conventional air-bath GC oven techniques, while simultaneously using less power.

Agilent offers LTM technology for our popular 7890 and 6890 Series GC systems, and the 5975T GC/MS.

For more information, visit www.agilent.com/chem/LTMcol





GC Capillary Columns

More than just essential products... reliable results!

With the highest inertness, lowest bleed levels, and the tightest column-to-column reproducibility, Agilent J&W GC Capillary columns perform better than any columns on the market.

Ultra Inert Columns – allow you to perform trace level analysis – including the analysis of acids, bases, or other active compounds – with the utmost confidence. They also help ensure an inert GC flow path that is essential for sensitivity, performance, and the integrity of your analytical results.

High Efficiency Columns – are ideal for applications that require reduced analysis time, such as high-throughput screening, fast process monitoring, fast QC analyses, and fast method development.

Low-bleed GC/MS Columns – are specifically designed to chromatograph a broad range of trace-level samples, and offer low bleed and high inertness even at higher temperatures.

Premium Polysiloxane Columns – are stable, robust, and versatile and are available in a wide variety of stationary phases.

Polyethylene Glycol (PEG) Columns – offer a variety of unique phase characteristics to meet the varying needs of your laboratory, thanks to Agilent's strict quality control of the cross-linking and deactivation processes.

Specialty Columns – meet Agilent's uncompromising standards for high-temperature, life science, pesticide, petroleum, semivolatile, and volatile applications.

PLOT Columns – deliver superior separation for compounds that are gases at room temperature. They are also ideal for analyzing fixed gases, low molecular weight hydrocarbon isomers, volatile polymer compounds, and reactive analytes such as gases, amines, and hydrides.

On the following pages you will find details on our complete line of innovative Agilent J&W GC columns. For more information, contact your local Agilent representative or Agilent Authorized Distributor. Or you can order online at www.agilent.com/chem/store.

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Column Selection Principles

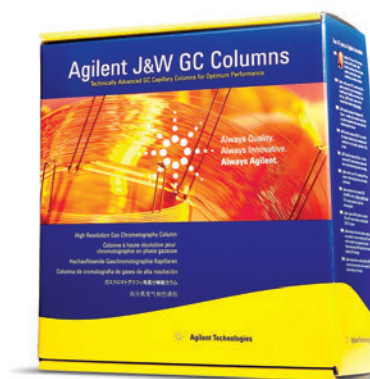
Narrow your choices, save time, and reduce trial and error

Selecting the right capillary column for your application can be an uncertain (and sometimes difficult) task. If possible, you should begin by consulting sample applications provided by GC manufacturers and suppliers – or described in published Application Notes.

In addition, the following pages will help you:

- Choose a stationary phase – your most critical decision – based on factors such as selectivity, polarity, and phenyl content.
- Understand how column diameter influences factors like efficiency, solute retention, head pressure, and carrier gas flow rates.
- Determine which column length will affect solute retention, column head pressure, column bleed – and cost.
- Appreciate the difference between thin-film and thick-film columns with regard to capacity, inertness, bleed, and upper temperature limit.

While there are no foolproof techniques, shortcuts, tricks or secrets to column selection, there are some guidelines and concepts that simplify the process. There are four major column parameters to consider: stationary phase, diameter, length, and film thickness.





Selecting Stationary Phases

Choosing the best stationary phase is the most important decision when selecting a capillary column. Unfortunately, it is also the most difficult and ambiguous decision. The most reliable method is to consult the large collection of example applications provided by column manufacturers, GC manufacturers and in published literature. While an exact example application may not be available, enough information can usually be obtained to simplify the decision or reduce the number of potential columns. The most difficult situation is when no previous information is available. Stationary phase selection is much easier even if only one chromatogram is available for all or most of the sample compounds. The most reliable method is to consult the large collection of example applications provided by GC column and hardware manufacturers and published in literature.

The concepts of stationary phase selectivity and polarity are very useful when selecting stationary phases. For best performance, start with the general purpose Agilent J&W Ultra Inert 1 ms and 5ms columns to get the lowest column bleed and column activity for a wide range of analytes, including active compounds and trace level samples.

Synonymous use of the terms polarity and selectivity is not accurate, but it is very common. Selectivity is determined by the physicochemical interactions of the solute molecules with the stationary phase. Polarity is determined by the structure of the stationary phase. Polarity does have an effect on separation; however, it is only one of the many stationary phase properties that influence peak separation (see the next section on polarity).

Selectivity can be thought of as the ability of the stationary phase to differentiate between two solute molecules by differences in their chemical or physical properties. Separation is obtained if the interactions between the stationary phase and solutes are different. For liquid or gum stationary phase (polysiloxanes and polyethylene glycols), there are three major interactions: dispersion, dipole, and hydrogen bonding. The following is a simplified and condensed explanation of the interactions for polysiloxane and polyethylene glycol stationary phases.

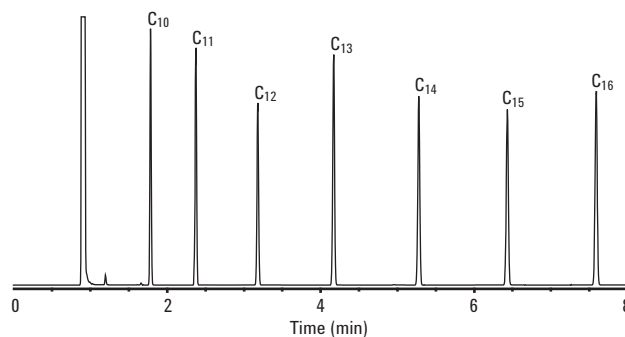
Dispersion is the dominant interaction for all polysiloxane and polyethylene glycol stationary phases. Dispersion can be simplified into the concept of volatility. Simply stated, the more volatile a solute, the faster it elutes from the column (i.e., shorter retention time). However, this order can be altered by the effect of solute and stationary phase polarities, and the other interactions. Solute boiling points are sometimes used as a measure of compound volatility. That is, compounds elute in the order of their increasing boiling points. Unfortunately, boiling points cannot be universally applied to the dispersion interactions. Boiling points are fairly valid when dealing with compounds with similar structures, functional groups or homologous series (**Figure 1**). When dealing with compounds with mixed functional groups, the boiling points simplification often fails (**Figure 2**). If compound boiling points differ by more than 30 °C, they usually can be separated by most stationary phases (there are exceptions). If compound boiling points differ by less than 10 °C, the boiling point simplification becomes less certain and more likely to be in error (except for compounds in a homologous series).

Figure 1: Boiling Point Elution Order for Homologous Series**Column:** DB-1, 15 m x 0.25 mm, 0.25 μ m

Carrier: Helium at 30 cm/s

Oven: 60 °C for 1 min, 60-180 °C at 20 °C/min

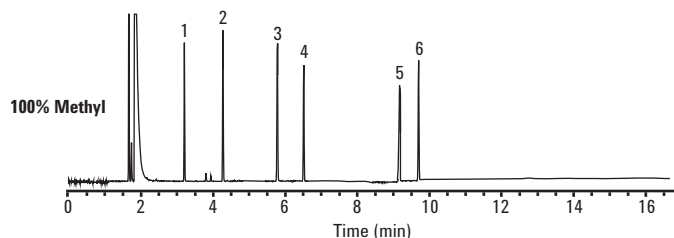
| | Boiling Point (°C) |
|-------------------------------------|--------------------|
| 1. n-Decane (C ₁₀) | 174 |
| 2. n-Undecane (C ₁₁) | 196 |
| 3. n-Dodecane (C ₁₂) | 216 |
| 4. n-Tridecane (C ₁₃) | 234 |
| 5. n-Tetradecane (C ₁₄) | 253 |
| 6. n-Pentadecane (C ₁₅) | 268 |
| 7. n-Hexadecane (C ₁₆) | 287 |



Homologous series of hydrocarbons. The solutes elute in order of their increasing boiling points; however, the peaks are not spaced in proportion to their respective boiling points.

Figure 2: Deviation from Boiling Point Order**Column:** DB-1, 30 m x 0.25 mm, 0.25 μ m

| | Boiling Point (°C) |
|--------------------------------|--------------------|
| 1. Toluene | 111 |
| 2. Hexanol | 157 |
| 3. Phenol | 182 |
| 4. Decane (C ₁₀) | 174 |
| 5. Naphthalene | 219 |
| 6. Dodecane (C ₁₂) | 216 |



Solutes outside of the homologous series do not elute in the boiling point order.

If the stationary phase is capable of dipole interaction, it enhances its power to separate solutes whose dipole moments are different. Only some stationary phases are able to exploit this interaction. Polyethylene glycols, and cyanopropyl and trifluoropropyl substituted polysiloxanes readily undergo the dipole interactions; methyl or phenyl substituted groups do not undergo a dipole interaction (**Table 1**). The amount of peak separation for solutes with different dipoles often changes if a stationary phase with a different interaction is used (**Figure 3**). If the dipole difference between compounds is small, a greater amount of the appropriate group is needed (e.g., a 50% cyanopropylphenyl-methyl polysiloxane instead of a 14% cyanopropylphenyl-methyl polysiloxane). It is difficult to accurately predict the magnitude of the separation change for all of the peaks. Empirical results have shown that dipole interaction stationary phases are well suited for samples containing compounds that have base or central structures to which different groups are attached in various positions. Examples include substituted aromatics, halocarbons, pesticides and drugs.

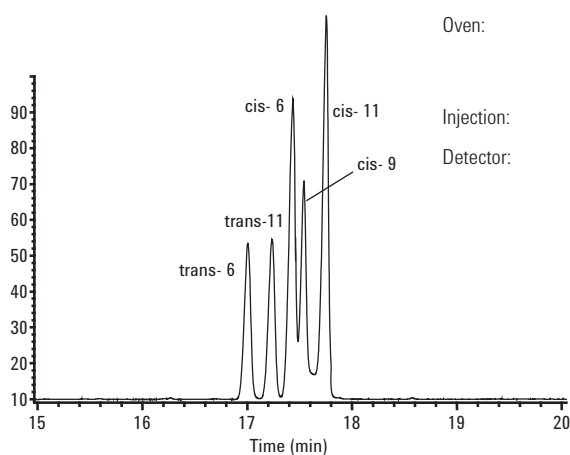
Table 1: Stationary Phase Interactions

| Functional Group | Dispersion | Dipole | Hydrogen Bonding |
|------------------|------------|--------------|------------------|
| Methyl | Strong | None | None |
| Phenyl | Strong | None to weak | Weak |
| Cyanopropyl | Strong | Very strong | Moderate |
| Trifluoropropyl | Strong | Moderate | Weak |
| PEG | Strong | Strong | Moderate |

Figure 3: Dipole Interactions

Column: HP-88, 30 m x 0.25 mm, 0.25 μ m

Molecular weight and boiling points are virtually identical for these fatty acid methyl ester (FAME) isomers, with only the dipole interactions due to the hydrogen isomeric positions on the molecules being different. Only strong dipole interactions in the stationary phase can provide chromatographic separation for these types of compounds.



C-18:1 cis and trans isomers on HP-88

Carrier: Hydrogen, 2 mL/min constant flow

Oven: 120 °C, 1 min, 10 °C/min to 175 °C, 10 min
5 °C/min to 210 °C, 5 min
5 °C/min to 230 °C, 5 min

Injection: 1 μ L

Detector: FID, 250 °C

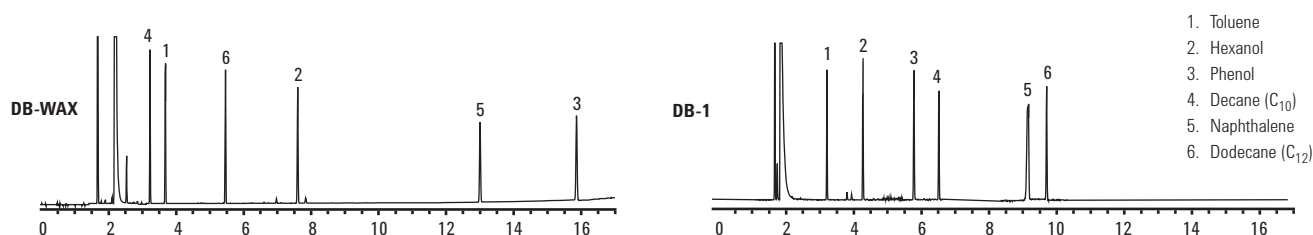
The hydrogen bonding interaction occurs if there is hydrogen bonding between the solute molecules and the stationary phase. **Table 2** lists the types of compounds that can form hydrogen bonds along with their relative bonding strengths. It is the difference in the strength of the hydrogen bonding that is critical. The same stationary phases that undergo dipole interactions also undergo hydrogen bonding interactions. The amount of peak separation for solutes whose hydrogen bonding potentials differ often changes if a stationary phase with a different amount of hydrogen bonding interaction is used (**Figure 4**). If the hydrogen bonding difference between compounds is small, a great amount of the appropriate group is needed (e.g., a polyethylene glycol instead of a 14% cyanopropylphenyl-methyl polysiloxane). It is difficult to accurately predict the magnitude of the separation change for all of the peaks. Sometimes the desired separation is obtained, but another set of peaks now co-elute with the new stationary phase.

Table 2: Relative Hydrogen Bonding Strengths

| Strength | Compounds |
|--------------|------------------------------------|
| Strong | Alcohols, carboxylic acids, amines |
| Moderate | Aldehydes, esters, ketones |
| Weak to none | Hydrocarbons, halocarbons, ethers |

Figure 4: Hydrogen Bonding Interactions

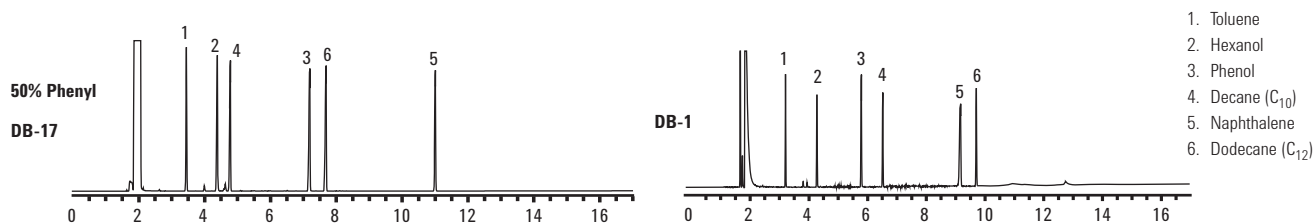
Column: 15 m x 0.25 mm, 0.25 μ m



DB-1 does not undergo hydrogen bonding interactions. The change in the elution order of hexanol and phenol with DB-WAX is a combination of the dipole and hydrogen bonding interaction.

Figure 5: Phenyl Content Retention

Column: 15 m x 0.25 mm, 0.25 μ m



The aromatics increase in retention relative to the hydrocarbons for the DB-17 columns. DB-17 contains 50% phenyl substitution. DB-1 contains no phenyl substitution.

Another stationary phase characteristic that may effect retention in a predictable manner is the phenyl content. In general, the higher the phenyl content of the stationary phase, the higher the retention of aromatic solutes relative to aliphatic solutes. This does not mean that aromatic solutes are more retained (e.g., higher *k*) by high phenyl content stationary phases, but that aromatic solutes are more retained relative to aliphatic solutes. **Figure 5** shows an example of this retention behavior.

Polarity

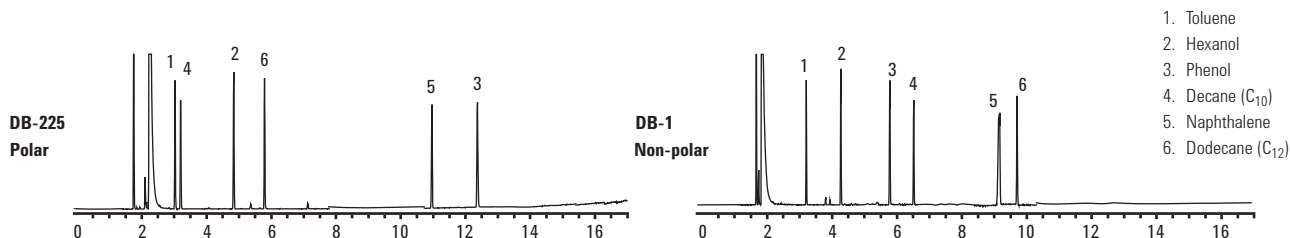
Stationary phase polarity is determined by the polarity of the substituted groups and their relative amounts. **Table 3** lists a variety of stationary phases in order of their increasing polarity. Polarity is often erroneously used to select columns or to determine separation characteristics. Stationary phase polarity is only one of many factors that affect retention and separation.

While polarity is not directly related to selectivity, it has a pronounced effect on compound retention, thus separation. For compounds of similar volatility, greater retention is obtained for solutes with polarities similar to the stationary phase. In other words, polar compounds are more strongly retained by a polar stationary phase than a less polar stationary phase, and vice versa. This effect can be seen in **Figure 6**. The changes in retention and elution order can be largely attributed to the changes in stationary phase polarity. Changes in the amount of phenyl substitution, and dipole and hydrogen bonding interactions also contribute to the changes; however, it is difficult to assess the magnitude of their individual contributions.

Separation and efficiency have to be considered together and not as separate column attributes, as each contributes to peak resolution. When the stationary phase provides adequate resolution between peaks, higher efficiency is not needed. Shorter or larger diameter columns and less than optimal GC conditions can be used in these situations. When resolution is not adequate, there is a need for higher column efficiency.

Figure 6: Polarity – Retention Relationship

Column: 15 m x 0.25 mm, 0.25 μ m



The alcohols (polar) increase in retention relative to hydrocarbon (non-polar) for the DB-225 column. DB-225 is more polar than DB-1.

In addition to retention, stationary phase polarity influences other column characteristics. There is a general trend between stationary phase polarity and column lifetime, temperature limits, bleed and efficiency. Column life, temperature limits and efficiency tend to be higher for more non-polar stationary phases. These are general trends and not absolute certainties. Low bleed stationary phases sometimes go against this trend.

Table 3: Stationary Phase Polarity

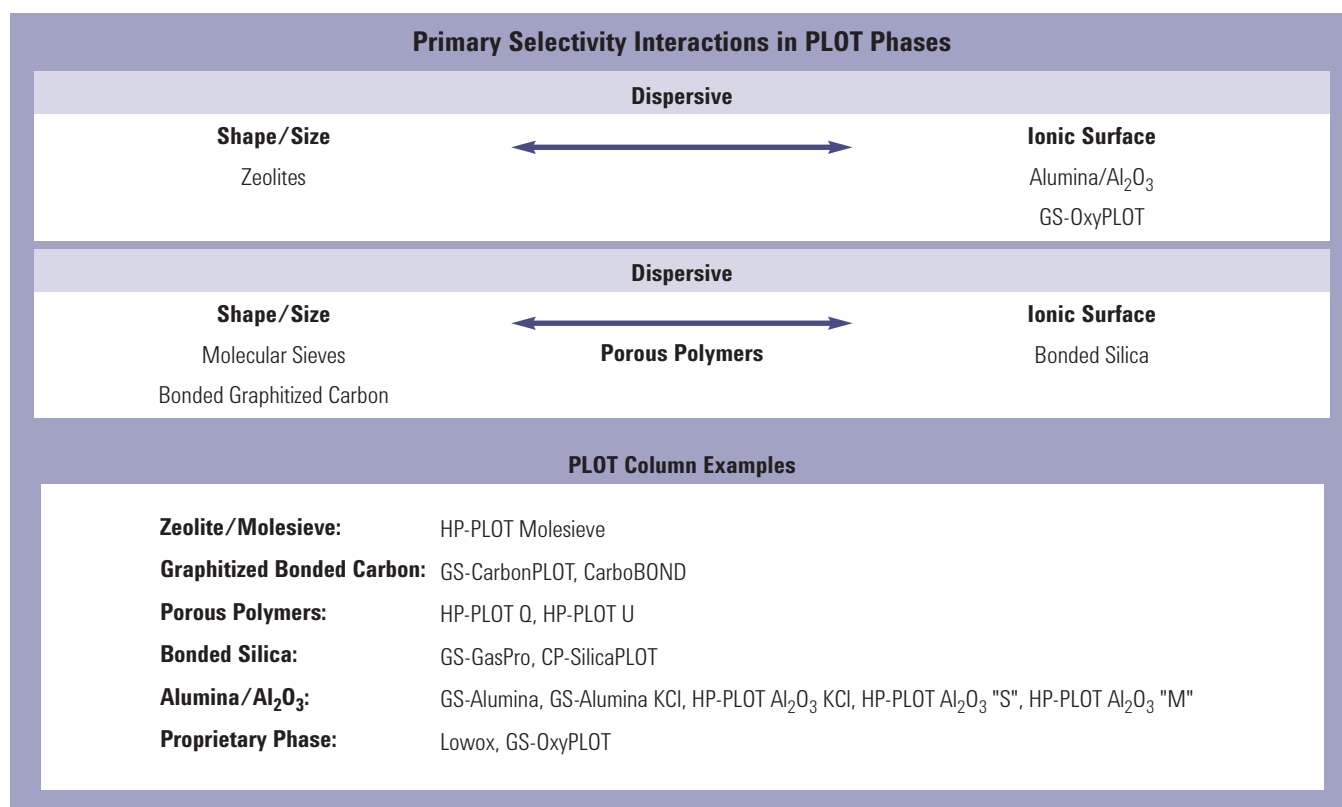
| Low Polarity | | | Mid Polarity | | | High Polarity | | |
|-------------------|--------------------|------------------|------------------|--------------|-----------|---------------|-------------------|---------|
| CP-Sil 2 | DB & HP-1ms UI | DB & HP-5ms UI | DB-XLB | DB-225ms | DB-ALC1 | HP-88 | DB-WAX | CP-TCEP |
| DB-MTBE | DB & HP-1ms | DB & HP-5ms | VF-Xms | DB-225 | DB-Dioxin | CP-Sil 88 | DB-WAXetr | |
| CP-Select CB MTBE | VF-1 ms | VF-5ms | DB-35ms UI | CP-Sil 43 CB | DB-200 | DB-23 | HP-INNOWax | |
| | DB & HP-1 | DB & HP-5 | DB & VF-35ms | VF-1701 ms | VF-200ms | VF-23 ms | VF-WAXms | |
| | CP-Sil 5 CB | CP-Sil 8 CB | DB & HP-35 | DB-1701 | DB-210 | | CP-Wax 57 CB | |
| | Ultra 1 | Ultra 2 | DB & VF-17ms | CP-Sil 19 CB | DX-4 | | DB & HP-FFAP | |
| | DB-1ht | VF-DA | DB-17 | DB-ALC2 | | | DB-WAX FF | |
| | DB-2887 | DB-5.625 | HP-50+ | DX-1 | | | CP-FFAP CB | |
| | DB-Petro/PONA | DB & VF-5ht | DB-17ht | | | | CP-WAX 58 FFAP CB | |
| | CP-Sil PONA CB | CP-Sil PAH CB | DB-608 | | | | CP-WAX 52 CB | |
| | DB-HT SimDis | Select Biodiesel | DB-TPH | | | | CP-WAX 51 | |
| | CP-SimDis | SE-54 | DB-502.2 | | | | CP-Carbowax 400 | |
| | CP-Volamine | | HP-VOC | | | | Carbowax 20M | |
| | Select Mineral Oil | | DB-VRX | | | | HP-20M | |
| | HP-101 | | DB-624 | | | | CAM | |
| | SE-30 | | DB-624ms/UI | | | | | |
| | DB-Sulfur SCD | | VF-624ms | | | | | |
| | | | DB-Select 624 UI | | | | | |
| | | | DB-1301 | | | | | |
| | | | VF-1301ms | | | | | |
| | | | CP-Sil 13 CB | | | | | |

Gas-Solid or PLOT Columns

PLOT (Porous Layer Open Tubular) columns are intended for the separation of very volatile solutes (primarily gases) without the need for cryogenic or sub-ambient cooling of the oven. Separations that would require column temperatures below 35 °C, even with thick film liquid stationary phase can be obtained at temperatures above 35 °C with PLOT columns.

Gas-solid or PLOT column stationary phases are physically different than polysiloxanes and polyethylene glycols. Gas-solid stationary phase are small, porous particles. The particles are stuck to the inner wall of the capillary tubing using a binder or similar means. Solute are separated based on differences in their adsorption properties. Since the particles are porous, size and shape differentiation also occurs.

Alumina PLOT columns are well suited for the separation of C₁-C₁₀ hydrocarbons and small aromatics. The KCl version of the Alumina PLOT column changes the retention order for some of the hydrocarbons. The PLOT Q column provides slightly better separation for C₁-C₃ hydrocarbons, but C₄ and higher hydrocarbons are better separated with an Alumina PLOT column. PLOT Q exhibits extremely long retention times and very broad peaks for C₆ and higher hydrocarbons and aromatics. PLOT Q separates sulfur gases from each other and from most light hydrocarbons. Molesieve PLOT columns are used to separate many noble and permanent gases. GS-GasPro columns combine many of the features of the various other PLOT columns. Light hydrocarbons, inorganic gases and solvents are some of the samples suitable for GS-GasPro.



Stationary Phase Selection Summary

1. If no information or ideas about which stationary phase to use is available, start with a DB-1 or DB-5.
2. Low-bleed ("ms") columns are usually more inert and have higher temperature limits. Ultra Inert 1ms, 5ms, and 35ms columns provide the lowest column bleed and highest column inertness for a wide range of analytes, including active compounds and trace level samples.
3. Use the least polar stationary phase that provides satisfactory resolution and analysis times. Non-polar stationary phases have superior lifetimes compared to polar phases.
4. Use a stationary phase with a polarity similar to that of the solutes. This approach works more times than not; however, the best stationary phase is not always found using this technique.
5. If poorly separated solutes possess different dipoles or hydrogen bonding strengths, change to a stationary phase with a different amount (not necessarily more) of the dipole or hydrogen bonding interaction. Other co-elutions may occur upon changing the stationary phase, thus the new stationary phase may not provide better overall resolution.
6. If possible, avoid using a stationary phase that contains a functionality that generates a large response with a selective detector. For example, cyanopropyl containing stationary phases exhibit a disproportionately large baseline rise (due to column bleed) with NPDs.
7. A DB-1 or DB-5, DB-1701, DB-17, and DB-WAX cover the widest range of selectivities with the smallest number of columns.
8. PLOT columns are used for the analysis of gaseous samples at above ambient column temperatures.

TIPS & TOOLS

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Table 4:
Column Efficiency vs. Diameter

| Column ID Diameter (mm) | Theoretical Plates/Meter |
|-------------------------|--------------------------|
| 0.10 | 12,500 |
| 0.18 | 6,600 |
| 0.20 | 5,940 |
| 0.25 | 4,750 |
| 0.32 | 3,710 |
| 0.45 | 2,640 |
| 0.53 | 2,240 |

 Maximum efficiency for a solute with $k=5$

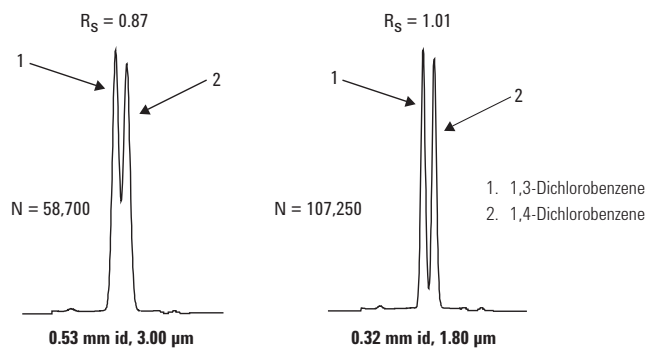
Column Diameter

Column diameter has an influence over five parameters of primary concern. They are efficiency, retention, pressure, carrier gas flow rate, and capacity.

Column efficiency (N/m) is inversely proportional to column diameter. The efficiencies listed in **Table 4** show that smaller diameter columns have higher theoretical plates per meter. Resolution is a square root function of the theoretical plate number. Therefore, doubling column efficiency theoretically increases resolution only by 1.41 times (the square root of 2), but closer to 1.2-1.3 times in real practice. Smaller diameter columns are used when peak separation is small and high column efficiency (i.e., narrow peaks) is needed. **Figure 7** shows the difference in resolution for two different diameter columns.

Solute retention is inversely proportional to column diameter, for isothermal temperature conditions. For temperature program conditions, the change is $1/3-1/2$ of the isothermal value. Column diameters are rarely selected based on retention. **Figure 7** shows the difference in retention for two different diameter columns.

Column head pressure is approximately an inverse squared function of the column radius. For example, a 0.25 mm id column requires about 1.7 times the head pressure of a 0.32 mm id column of the same length (also, carrier gas and temperature). Column head pressures increase or decrease dramatically with changes in column diameter. Column diameters of 0.18 mm id or larger are used for standard GC analysis due to the very high pressures needed for smaller diameter columns. Wider diameter columns, especially shorter ones (e.g., 15 m x 0.32 mm id), are impractical for use in GC/MS systems. The vacuum at the exit of the column greatly reduces the required head pressure, and it is difficult to maintain or control very low head pressures.

Figure 7: Column Diameter – Comparison of Resolution and Retention
Column: DB-624, 30 m


At constant pressure, **carrier gas flow rates** increase as column diameters increase. For applications or hardware requiring high flow rates, larger diameter columns are normally used. Headspace and purge & trap systems require higher carrier gas flow rates for proper operation. 0.45 or 0.53 mm id columns are used with these systems so that the higher flow rates can be used. Special considerations must be taken if small diameter columns are used in these types of systems. This includes the use of cryogenic interfaces or ovens, or interfacing through split injectors. Added complexity and/or cost, or sample loss, are involved with these techniques. For applications or hardware requiring low carrier gas flow rates, smaller diameter columns are normally used. GC/MS is the typical system requiring low carrier gas flow rates, and therefore, 0.25 mm id and smaller id columns are used in these applications.

Column capacity increases as the column diameter increases. The actual column capacity also depends on the stationary phase, solute and film thickness. **Table 5** lists typical capacity ranges for a variety of column diameters.

Table 5: Column Capacity in ng

| Film Thickness (μm) | Column Inside Diameter (mm) | | | |
|----------------------------------|-----------------------------|-----------|-----------|-----------|
| | 0.18-0.20 | 0.25 | 0.32 | 0.53 |
| 0.10 | 20-35 | 25-50 | 35-75 | 50-100 |
| 0.25 | 35-75 | 50-100 | 75-125 | 100-250 |
| 0.50 | 75-150 | 100-200 | 125-250 | 250-500 |
| 1.00 | 150-250 | 200-300 | 250-500 | 500-1000 |
| 3.00 | | 400-600 | 500-800 | 1000-2000 |
| 5.00 | | 1000-1500 | 1200-2000 | 2000-3000 |

Column Diameter Selection Summary

1. Use **0.15, 0.18 or 0.25 mm id columns** when higher column efficiencies are needed. 0.15 and 0.18 mm id columns are especially well suited for GC/MS systems with low pumping capacities. Smaller diameter columns have the lowest capacities and require the highest head pressures.
2. Use **0.32 mm id columns** when higher sample capacity is needed. They often provide better resolution of earlier eluting solutes for splitless injections or large injection volumes ($>2 \mu\text{L}$) than 0.25 mm id columns.
3. Use **0.45 mm id columns** when only a Megabore direct injector is available and higher column efficiency is desired. Well suited for high carrier gas flow rate situations, such as with purge & trap, headspace samplers, and valve injection applications.
4. Use **0.53 mm id columns** when only a Megabore direct injector is available. Well suited for high carrier gas flow rate situations, such as with purge & trap and headspace samplers. 0.53 mm id columns have the highest sample capacities at constant d_f .



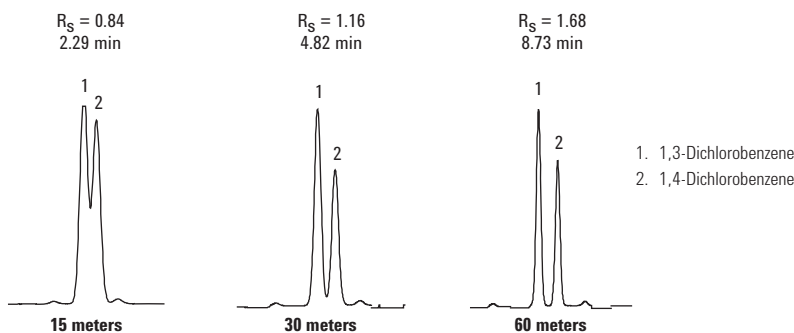
Column Length

Column length influences three parameters of major concern. They are efficiency, retention (analysis time) and carrier gas pressure.

Column efficiency (N) is proportional to column length. Resolution is a square root function of the theoretical plate number. For example, doubling column length (thus efficiency) theoretically increases resolution by only 1.41 times (closer to 1.2-1.3 times in practice). Longer columns are used when peak separation is small and high column efficiency (i.e., narrow peaks) is needed. **Figure 8** shows the difference in resolution for three different lengths.

Figure 8: Column Length – Comparison of Resolution and Retention

Column: DB-624
 15 m x 0.53 mm, 0.30 μ m
 30 m x 0.53 mm, 0.30 μ m
 60 m x 0.53 mm, 0.30 μ m



Solute retention is proportional to column length for isothermal temperature conditions. For temperature program conditions, the change is 1/3-1/2 of the isothermal value. When efficiency is increased by lengthening the column, there is a significant increase in analysis time. **Figure 8** shows the difference in retention for three different lengths.

Column head pressure is nearly proportional to column length. Pressure is usually not an issue unless the column has a very small or large diameter. Long, small diameter columns require extremely high head pressures, and short, wide diameter columns require very low head pressures. Neither situation is very practical and may be a limiting factor. Choice of carrier gas will also have an impact on column pressure.

Column bleed increases as column length increases. Longer columns have more stationary phase, thus more degradation products are produced. The increase in bleed with longer columns is not large and should not be a deterrent to using a longer column when one is necessary.

Column cost is directly related to column length. Doubling column length nearly doubles the price of the column. When efficiency is increased by lengthening the column, there is a significant increase in column cost. When considered in conjunction with the increase in analysis time, lengthening the column should be the last reasonable option for increasing efficiency.

Shorter columns cost more per meter than longer columns. Cutting longer columns into shorter lengths seems like a good method to save money, but it is not recommended. The quality of the smaller pieces cannot be guaranteed and may not be the same as the original, intact column. Theoretically, each piece should provide satisfactory and consistent results. In practice, this does not always occur. The probability of individual piece variation is higher when shorter pieces are cut from the original column. Greater variability between individual pieces is observed as column length, film thickness and stationary phase polarity increases, and column diameter decreases. Finally, there is the increased chance of tubing breakage when rewinding the shorter columns on other cages. Technically, cutting a column into shorter pieces voids the performance warranty.

Column Length Selection Summary

1. Start with **25-30 meter columns** when the best length is unknown.
2. **10-15 meter columns** are well suited for samples containing very well separated solutes or very few solutes. Shorter lengths are used for very small diameter columns to reduce head pressures.
3. **50-60 meter columns** should be used when resolution is not possible by other means (smaller diameter, different stationary phase, change in column temperature). Best suited for complex samples containing a large number of solutes. Long columns have long analysis times and higher cost.

Column Film Thickness

Column film thickness influences five major parameters: retention, resolution, bleed, inertness and capacity.

For isothermal conditions, solution retention is directly proportional to film thickness. For temperature program conditions, the change is 1/3-1/2 of the isothermal value. Thicker film columns are used to obtain higher retention for very volatile solutes. Volatile solutes normally requiring cryogenic (subambient) cooling with standard film thickness columns can be sufficiently retained at temperatures above 30 °C. Changing to a thicker film column has a net effect of providing equal or greater retention at a higher column temperature. Thicker film columns are typically used for volatile compounds like solvents and select gases. Thinner film columns are used to reduce the retention of highly retained solutes. Highly retained solutes can be eluted faster or at a lower temperature. Changing to a thinner film column has the net effect of providing equal or less retention at a lower column temperature. Thinner film columns are typically used for high boiling or molecular weight compounds. **Figure 9** shows the difference in retention for two different film thicknesses.

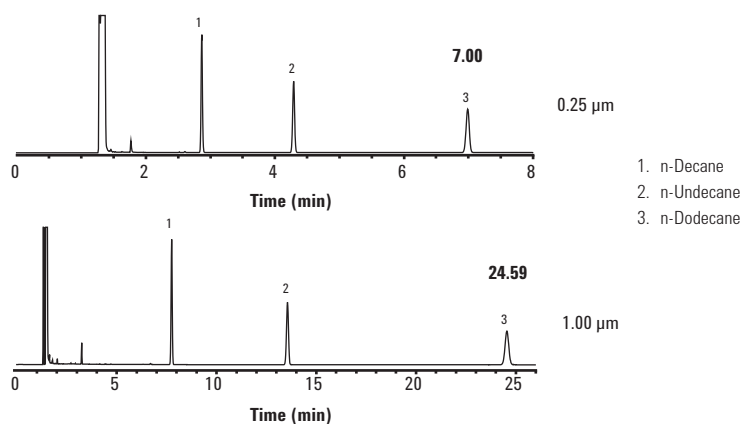
Solutes with k values less than 2 are very difficult to resolve due to insufficient retention by the column. Changing to a thicker film column results in better resolution since solute retention is increased. The resolution improvement depends on the solute k value for the original column. For solutes with k values of about 5 or less, increasing their retention results in improved resolution. For solute peaks with values of 5-10, increasing their retention provides a small to moderate increase in resolution. For peaks with k values above 10, increasing their retention often results in no resolution improvement and sometimes a loss of resolution. Increasing film thickness to improve the resolution of early eluting peaks may result in a resolution loss for later eluting peaks.

Figure 9: Column Film Thickness – Comparison of Resolution and Retention

Column: DB-1, 30 m x 0.32 mm

Carrier: Helium at 38 cm/s

Oven: 100 °C isothermal



For a given stationary phase, column bleed increases as film thickness increases. Since thicker film columns are more retentive, later eluting peaks may shift into a region of much higher column bleed when increasing film thickness. The upper temperature limits of thick film columns may be lower due to their higher bleed levels.

Thicker film columns are more inert. There is more stationary phase to shield the solutes from the tubing surface. Peak tailing for active compounds can often be reduced or eliminated with a thicker film column.

Thicker film columns have higher solute capacities. When one solute is present in significantly higher amounts, the resulting broad peak may interfere or co-elute with an adjacent peak. Changing to a thicker film column may reduce peak broadening, thus co-eluting. **Table 5** lists typical capacity ranges for a variety of film thickness.

Column Film Thickness Selection Summary

1. For **0.18-0.32 mm id columns**, a film thickness of 0.18-0.25 μm is average or standard (i.e., not thin or thick) and used for most analyses.
2. For **0.45-0.53 mm id columns**, a film thickness of 0.8-1.5 μm is average or standard (i.e., not thin or thick) and used for most analyses.
3. **Thick film columns** are used to retain and resolve volatile solutes (e.g., light solvents, gases). Thick columns are more inert and have higher capacities. Thick film columns exhibit higher column bleed and decreased upper temperature limits.
4. **Thin film columns** are used to minimize the retention of high boiling, high molecular weight solutes (e.g., steroids, triglycerides). Thin film columns are less inert, have lower capacities and exhibit lower column bleed.



GC Column Application and Method Guides

| Application | Specific Application | Agilent Phases |
|-------------------------------|--|---|
| Biodiesel | EN14105 Free/Total Glycerin | Biodiesel, Select Biodiesel |
| | ASTM D6584 Free/Total Glycerin | Biodiesel, Select Biodiesel |
| | EN14103 FAME Analysis | Biodiesel, Select Biodiesel |
| | EN14110 Residual Methanol | Biodiesel, Select Biodiesel |
| | EN14106 Free Glycerol | Select Biodiesel |
| Chiral | Chiral γ -lactones and terpenes | CycloSil-B |
| | Optical isomers of acids, alcohols, amino acids, aromatic hydrocarbons, diols, flavors, aromas, ketones, organic acids and phenols | Cyclodex-B |
| | Chiral compounds using a nitrogen selective detector | HP-Chiral β |
| | Optical isomers of acids, alcohols, amino acids, aromatic, diols, flavor, aromas, ketones, organic acids and phenols | CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19 |
| | Amino acids, optical isomers | CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19 |
| Foods, Flavors and Fragrances | FAME up to C ₂₆ , cis, trans, fast resolution FAME | Select FAME |
| | Best separation for cis, trans FAME analyses up to 260 °C | HP-88, CP-Sil 88 for FAME |
| | Volatiles | CP-Carbowax 400 for Volatiles in Alcohol |
| | Unsaturated triglycerides | CP-TAP CB for Triglycerides |
| | Flavors, aromas, free fatty acids C ₁ -C ₂₆ | DB-WAX, HP-WAX, CP-FFAP CB |
| | Glycols, diols, alcohols | CP-Wax 57 CB for Glycols and Alcohols, DB-WAX |
| Life Sciences | Blood alcohol analysis | DB-ALC1 and DB-ALC2 |
| | Drugs of abuse confirmation | DB-5ms EVDX |
| | USP solvents, common solvents | DB-Select 624UI for <467>, DB-624, VF-624ms |
| | Drugs of abuse confirmation | DB-35ms Ultra Inert, VF-DA |
| Pesticides | Organochlorine pesticides and PCBs | DB-CLP1 and DB-CLP2, DB-35ms Ultra Inert, DB-17ms, DB-XLB |
| | Chlorinated pesticides and PCBs | DB-608 |
| | Trace levels of pesticides in food and environmental samples | DB-35ms Ultra Inert, DB-XLB, VF-1701 Pesticides, DB-1701P |
| | Chlorinated, nitrogen, phosphorus pesticides | CP-Sil 8 CB for Pesticides, DB-35ms Ultra Inert, DB-5ms Ultra Inert |
| | Chlorinated, nitrogen, phosphorus pesticides, trace level DDT and Endrin | CP-Sil 19 CB for Pesticides, DB-35ms, DB-XLB |

(Continued)

| Application | Specific Application | Agilent Phases |
|---|--|--|
| Polycyclic Aromatic Hydrocarbons | EU regulated PAHs | DB-EUPAH |
| | PAHs in environmental and food samples | Select PAH |
| | C ₅ -C ₈₀ , PAH and polar compounds | CP-Sil PAH CB UltiMetal |
| | EU and EPA regulated PAHs | VF-17ms for PAH |
| Petroleum | Simulated distillation using ASTM Method D2887 | DB-2887 |
| | C ₅ -C ₁₂₀ simulated distillation | DB-HT SimDis, CP-SimDist UltiMetal |
| | PONA and PIANO analysis | HP-PONA, DB-Petro, CP-Sil PONA CB |
| | ASTM D5134 | CP-Sil PONA for ASTM D5134 |
| | C ₁ -C ₁₀ hydrocarbons | Select Al ₂ O ₃ MAPD, Alumina PLOT PT family |
| | C ₁ -C ₆ alcohols, aromatic C ₆ -C ₁₀ | CP-TCEP for Alcohols in Gasoline |
| | Sulfur impurities in propylene streams | DB-Select SCD, Select Low Sulfur |
| | Polar and non-polar volatile compounds, especially chlorosilanes with different substituents such as alkyl groups, or groups with ether, hydroxy and nitrile bonds | Select Silanes |
| | C ₁ -C ₆ amines, alcohols, NH ₃ , water, solvents, ethanol amines | CP-Volamine |
| | C ₃ -C ₂₀ amines, alkanol amines | CP-Sil 8 CB for Amines |
| | C ₃ -C ₈ amines and diamines | CP-Wax for Volatile Amines and Diamines |
| | C ₄ -C ₁₀ amines, diamines and aromatic amines | CP-Wax 51 for Amines |
| | Oxygenates in C ₁ -C ₁₀ hydrocarbons | CP-Lowox, GS-OxyPLOT |
| | C ₁ -C ₁₀ hydrocarbons | GS-OxyPLOT |
| | Methanol, formaldehyde and formic acid in water | CP-Sil 5 CB for Formaldehyde |
| | C ₁ -C ₁₂ hydrocarbons | CP-Squalane |
| | Volatile oxygenates and halogenated hydrocarbons | CP-Propox |
| | Semivolatiles | Polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs) |
| Dioxins and dibenzo furan | | CP-Sil 88 for Dioxins, DB-Dioxin |
| EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols | | DB-UI 8270D, DB-5ms Ultra Inert, DB-5.625, HP-5ms Semivolatile |
| PCB, detailed analysis | | CP-Sil 5/C18 CB for PCB |
| PCB | | CP-Sil 8 CB for PCB, DB-XLB |

(Continued)

| Application | Specific Application | Agilent Phases |
|-------------|---|--------------------------------------|
| Volatiles | EPA Methods 502.2, 524.2 and 8260 | DB-624 Ultra Inert, DB-VRX |
| | Volatile priority pollutants and residual solvents | DB-624 Ultra Inert, DB-624, VF-624ms |
| | Halogenated hydrocarbons and solvents | CP-Select 624 CB |
| | EPA Methods 502.2, 524.2 and 8260 | HP-VOC |
| | EPA Method 502.2 | DB-502.2 |
| | MTBE in soil and water | DB-MTBE |
| | Oxygenates and solvents | CP-Select CB for MTBE |
| | Total petroleum hydrocarbons (TPHs), soil analysis, and LUFT | DB-TPH |
| | C ₅ -C ₄₀ hydrocarbons | Select Mineral Oil |
| Metal | High temperature analysis and process applications | UltiMetal and DB-ProSteel |
| Non-Bonded | Amino acid derivatives, essential oils | HP-101 |
| | Drugs, glycols, pesticides, steroids | HP-17 |
| | Amines, basic compounds | CAM |
| | Alcohols, free acids, essential oils, ethers, glycols, solvents | Carbowax 20M and HP-20M |
| | Generic | SE-30 and SE-54 |



TIPS & TOOLS

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EPA Method

| Drinking Water | | | |
|----------------|--|--|------------|
| EPA Method | Application | Recommended Column | Part No. |
| 501, 501.3 | Measurement of trihalomethanes in drinking water by GC/MS and selected ion monitoring | DB-VRX, 30 m x 0.25 mm, 1.40 μ m | 122-1534 |
| | | DB-624, 30 m x 0.25 mm, 1.40 μ m | 122-1334 |
| | | VF-624ms, 30 m x 0.25 mm, 1.40 μ m | CP9102 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 μ m | 122-1334UI |
| 502.2 | Volatile organic compounds in water by purge and trap capillary column GC with photoionization and electrolytic conductivity detectors in series | DB-VRX, 60 m x 0.25 mm, 1.40 μ m | 122-1564 |
| | | DB-624, 60 m x 0.25 mm, 1.40 μ m | 122-1364 |
| | | VF-624ms, 60 m x 0.25 mm, 1.40 μ m | CP9103 |
| | | DB-624 Ultra Inert, 60 m x 0.25 mm, 1.40 μ m | 122-1364UI |
| | | VF-624ms, 30 m x 0.25 mm, 1.40 μ m | CP9102 |
| 503.1 | Volatile aromatic and unsaturated organic compounds in water by purge and trap gas chromatography | DB-VRX, 30 m x 0.25 mm, 1.40 μ m | 122-1534 |
| | | DB-624, 30 m x 0.25 mm, 1.40 μ m | 122-1334 |
| 504.1 | 1,2-Dibromoethane (EDB) and 1,2-dibromo-3-chloropropane (DB CP), GC, microextraction | DB-CLP1, 30 m x 0.32 mm, 0.25 μ m | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 μ m | 123-8336 |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 μ m | 122-1534 |
| | | DB-624, 30 m x 0.25 mm, 1.40 μ m | 122-1334 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 μ m | 122-1334UI |
| | | VF-1ms, 30 m x 0.32 mm, 1.00 μ m | CP8926 |
| 505 | Analysis of organohalide pesticides and commercial polychlorinated biphenyl (PCB) products in water by microextraction and GC | VF-1701ms, 30 m x 0.32 mm, 1.00 μ m | CP9163 |
| | | DB-CLP1, 30 m x 0.32 mm, 0.25 μ m | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 μ m | 123-8336 |
| | | DB-XLB, 30 m x 0.25 mm, 0.50 μ m | 122-1236 |
| | | VF-1ms, 30 m x 0.32 mm, 1.00 μ m | CP8926 |
| 506 | Determination of phthalate and adipate esters in drinking water by liquid-liquid extraction or liquid-solid extraction and GC with photoionization detection | VF-17ms, 30 m x 0.32 mm, 0.50 μ m | CP8991 |
| | | DB-5ms, 30 m x 0.25 mm, 0.25 μ m | 122-5532 |
| | | VF-5ms, 30 m x 0.32 mm, 0.25 μ m | CP8955 |
| 507 | Determination of nitrogen and phosphorus-containing pesticides in water by GC with a nitrogen phosphorus detector | VF-1ms, 30 m x 0.32 mm, 0.25 μ m | CP8924 |
| | | DB-35ms, 30 m x 0.25 mm, 0.25 μ m | 122-3832 |
| | | DB-5ms, 30 m x 0.25 mm, 0.25 μ m | 122-5532 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m | CP9074 |
| | | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m | CP9070 |

(Continued)

Drinking Water

| EPA Method | Application | Recommended Column | Part No. |
|------------|--|--|--------------|
| 508 | Determination of chlorinated pesticides in water by GC with an electron capture detector | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | DB-608, 30 m x 0.32 mm, 0.50 µm | 123-1730 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |
| | | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9070 |
| 508.1 | Determination of chlorinated pesticides, herbicides, and organohalides by liquid-solid extraction and electron capture GC | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |
| 515 | Determination of chlorinated herbicides in drinking water | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-5532UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 19091S-433UI |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-0732 |
| 515.3 | Determination of chlorinated acids in drinking water by liquid-liquid extraction, derivatization and GC with electron capture detection | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-5532UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 19091S-433UI |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-0732 |
| | | VF-1701ms, 30 m x 0.25 mm, 0.25 µm | CP9151 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 515.4 | Determination of chlorinated acids in drinking water by liquid-liquid microextraction, derivatization, and fast GC with electron capture detection | DB-5ms Ultra Inert, 20 m x 0.18 mm, 0.18 µm | 121-5522UI |
| | | HP-5ms Ultra Inert, 20 m x 0.18 mm, 0.18 µm | 19091S-577UI |
| | | DB-1701, 20 m x 0.18 mm, 0.18 µm | 121-0722 |
| | | VF-1701ms, 30 m x 0.25 mm, 0.25 µm | CP9151 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 521 | Determination of nitrosamines in drinking water by solid phase extraction and capillary column gas chromatography with large volume injection and chemical ionization tandem mass spectrometry (MS/MS) | DB-5ms Ultra Inert, 30 m x 0.25 mm, 1.00 µm | 122-5533UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 1.00 µm | 19091S-233UI |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |

(Continued)

Drinking Water

| EPA Method | Application | Recommended Column | Part No. |
|------------|---|---|--------------|
| 524.2 | Measurement of purgeable organic compounds in water by capillary GC/MS | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-624, 60 m x 0.25 mm, 1.40 µm | 122-1364 |
| | | DB-624 Ultra Inert, 60 m x 0.25 mm, 1.40 µm | 122-1364UI |
| | | HP-VOC, 60 m x 0.20 mm, 1.10 µm | 19091R-306 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 |
| | | DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 |
| | | DB-624 Ultra Inert, 60 m x 0.25 mm, 1.40 µm | 122-1364UI |
| | | VF-624ms, 30 m x 0.25 mm, 1.40 µm | CP9102 |
| | | VF-624ms, 60 m x 0.25 mm, 1.40 µm | CP9103 |
| 525, 525.2 | Determination of organic compounds in drinking water by liquid-solid extraction and capillary column GC/MS | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |
| 526 | Determination of selected semivolatile organic compounds in drinking water by solid phase extraction and capillary column GC/MS | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 527 | Determination of selected pesticides and flame retardants in drinking water by solid phase extraction and capillary column GC/MS | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 528 | Determination of phenols in drinking water by solid phase extraction and capillary column GC/MS | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 529 | Determination of explosives and related compounds in drinking water by solid phase extraction and capillary column GC/MS | DB-5ms Ultra Inert, 15 m x 0.25 mm, 0.25 µm | 122-5512UI |
| | | HP-5ms Ultra Inert, 15 m x 0.25 mm, 0.25 µm | 19091S-431UI |
| | | VF-5ms, 15 m x 0.25 mm, 0.25 µm | CP8939 |
| 551 | Determination of chlorination disinfection byproducts and chlorinated solvents in drinking water by liquid-liquid extraction and gas chromatography with electron capture detection | DB-5ms, 30 m x 0.25 mm, 1.00 µm | 122-5533 |
| | | DB-1, 30 m x 0.25 mm, 1.00 µm | 122-1033 |
| | | DB-210, 30 m x 0.25 mm, 0.50 µm | 122-0233 |
| | | VF-1301ms, 30 m x 0.25 mm, 1.00 µm | CP9054 |
| 551.1 | Determination of chlorination disinfection byproducts, chlorinated solvents, and halogenated pesticides/herbicides in drinking water by liquid-liquid extraction and GC with electron capture detection | DB-5ms, 30 m x 0.25 mm, 1.00 µm | 122-5533 |
| | | DB-1, 30 m x 0.25 mm, 1.00 µm | 122-1033 |
| | | DB-1301, 30 m x 0.25 mm, 1.00 µm | 122-1333 |
| | | VF-1ms, 30 m x 0.25 mm, 1.00 µm | CP8913 |
| | | VF-1301ms, 30 m x 0.25 mm, 1.00 µm | CP9054 |

(Continued)

Drinking Water

| EPA Method | Application | Recommended Column | Part No. |
|------------|--|--|--------------|
| 552 | Determination of haloacetic acids in drinking water by liquid-liquid extraction, derivatization, and gas chromatography with electron capture detection | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-0732 |
| | | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-5532UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 19091S-433UI |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 552.1 | Determination of haloacetic acids and dalapon in drinking water by ion-exchange liquid-solid extraction and gas chromatography with an electron capture detector | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| 552.2 | Determination of haloacetic acids and dalapon in drinking water by liquid-liquid extraction, derivatization GC with electron capture detection | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | VF-1701ms, 30 m x 0.25 mm, 0.25 µm | CP9151 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 552.3 | Determination of haloacetic acids and dalapon in drinking water by liquid-liquid microextraction, derivatization, and GC with electron capture detection | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-0732 |
| | | VF-1701ms, 30 m x 0.25 mm, 0.25 µm | CP9151 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 556 | Determination of carbonyl compounds in drinking water by pentafluorobenzylhydroxylamine derivatization and capillary GC with electron capture detection | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-0732 |
| | | VF-1701ms, 30 m x 0.25 mm, 0.25 µm | CP9151 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |

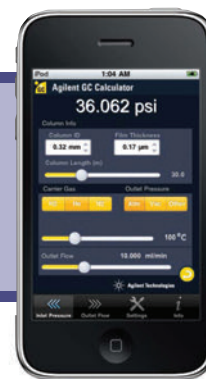
Waste Water

| EPA Method | Application | Column | Part No. |
|------------|----------------------------|--|------------|
| 601 | Purgeable halocarbons | DB-VRX, 60 m x 0.25 mm, 1.40 μ m | 122-1564 |
| | | DB-624, 75 m x 0.45 mm, 2.55 μ m | 124-1374 |
| | | DB-624, 60 m x 0.25 mm, 1.40 μ m | 122-1364 |
| | | VF-624ms, 75 m x 0.53 mm, 3.00 μ m | CP9108 |
| | | VF-624ms, 60 m x 0.32 mm, 1.80 μ m | CP9105 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 602 | Purgeable aromatics | DB-624, 75 m x 0.53 mm, 3.00 μ m | 125-1374 |
| | | DB-624, 30 m x 0.25 mm, 1.40 μ m | 122-1334 |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 μ m | 122-1534 |
| | | VF-624ms, 75 m x 0.53 mm, 3.00 μ m | CP9108 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| | | VF-624ms, 30 m x 0.25 mm, 1.40 μ m | CP9102 |
| 603 | Acrolein and acrylonitrile | DB-624, 30 m x 0.25 mm, 1.40 μ m | 122-1334 |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 μ m | 122-1534 |
| | | VF-WAXms, 30 m x 0.25 mm, 1.00 μ m | CP9206 |
| | | VF-624ms, 30 m x 0.25 mm, 1.40 μ m | CP9102 |
| 604 | Phenols | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 μ m | 122-1232 |
| | | VF-5ms, 60 m x 0.32 mm, 1.80 μ m | CP9105 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 605 | Benzidines | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | DB-608, 30 m x 0.25 mm, 0.25 μ m | 122-6832 |
| 606 | Phthalate esters | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | DB-608, 30 m x 0.25 mm, 0.25 μ m | 122-6832 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 607 | Nitrosamines | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | CP-Sil 8 CB for Amines, 30 m x 0.32 mm, 1.00 μ m | CP7596 |

(Continued)

TIPS & TOOLS

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| Waste Water | | | |
|-------------|---|--|------------|
| EPA Method | Application | Column | Part No. |
| 608 | Organochlorine pesticides and PCBs | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | DB-17ms, 30 m x 0.32 mm, 0.25 µm | 123-4732 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |
| | | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9070 |
| | | VF-17ms, 30 m x 0.25 mm, 0.25 µm | CP8982 |
| 609 | Nitroaromatics and isophorone | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| | | DB-5ms, 30 m x 0.25 mm, 0.50 µm | 122-5536 |
| | | DB-608, 30 m x 0.25 mm, 0.25 µm | 122-6832 |
| | | VF-5ms, 30 m x 0.53 mm, 1.50 µm | CP8976 |
| | | VF-5ms, 30 m x 0.25 mm, 0.50 µm | CP8945 |
| 610 | Polynuclear aromatic hydrocarbons | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-5532UI |
| | | DB-5ms, 30 m x 0.32 mm, 0.25 µm | 123-5532 |
| | | DB-17ms, 30 m x 0.25 mm, 0.25 µm | 122-4732 |
| | | VF-17ms, 30 m x 0.25 mm, 0.25 µm | CP8982 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 611 | Haloethers | VF-5ms, 30 m x 0.53 mm, 1.50 µm | CP8976 |
| | | VF-5ms, 30 m x 0.25 mm, 0.50 µm | CP8945 |
| 612 | Chlorinated hydrocarbons | DB-5ms, 30 m x 0.32 mm, 0.50 µm | 123-5536 |
| | | HP-5ms, 30 m x 0.32 mm, 0.50 µm | 19091S-113 |
| | | DB-1, 30 m x 0.32 mm, 0.50 µm | 123-103E |
| | | VF-5ms, 30 m x 0.25 mm, 0.10 µm | CP8943 |
| | | VF-35ms, 30 m x 0.25 mm, 0.25 µm | CP8877 |
| | | VF-200ms, 30 m x 0.25 mm, 1.00 µm | CP8860 |
| 613 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | DB-5ms Ultra Inert, 60 m x 0.25 mm, 0.25 µm | 122-5562UI |
| | | CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 µm | CP7588 |
| | | VF-5ms, 60 m x 0.25 mm, 0.10 µm | CP8948 |
| 614 | The determination of organophosphorus pesticides in municipal and industrial wastewater | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |
| | | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-5532UI |
| 615 | Chlorinated herbicides | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9070 |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |

(Continued)

Waste Water

| EPA Method | Application | Column | Part No. |
|------------|---|---|--------------|
| 619 | Triazine pesticides | DB-35ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-3832UI |
| | | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | VF-17ms, 30 m x 0.25 mm, 0.50 μ m | CP8983 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 622 | The determination of organophosphorus pesticides in municipal and industrial wastewater | DB-35ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-3832UI |
| | | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| 624 | Purgeables | DB-VRX, 60 m x 0.25 mm, 1.40 μ m | 122-1564 |
| | | DB-624, 60 m x 0.25 mm, 1.40 μ m | 122-1364 |
| | | HP-VOC, 60 m x 0.20 mm, 1.10 μ m | 19091R-306 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 μ m | 121-1524 |
| | | DB-624, 20 m x 0.18 mm, 1.00 μ m | 121-1324 |
| | | VF-624ms, 75 m x 0.53 mm, 3.00 μ m | CP9108 |
| | | VF-624ms, 60 m x 0.32 mm, 1.80 μ m | CP9105 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 625 | Base/ neutrals and acids | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.50 μ m | 19091S-133UI |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m | CP9074 |
| | | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m | CP9070 |
| | | VF-200ms, 30 m x 0.25 mm, 0.25 μ m | CP8858 |
| 1613 | Tetra- through octa-chlorinated dioxins and furans by isotope dilution HRGC/HRMS | DB-5ms Ultra Inert, 60 m x 0.25 mm, 0.25 μ m | 122-5562UI |
| | | CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m | CP7588 |
| | | VF-5ms, 60 m x 0.25 mm, 0.25 μ m | CP8960 |
| 1624 | Volatile organic compounds by isotope dilution GC/MS | DB-624, 60 m x 0.25 mm, 1.40 μ m | 122-1364 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 1625 | Semivolatile organic compounds by isotope dilution GC/MS | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 122-5532UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 μ m | 19091S-433UI |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 μ m | CP8944 |
| 8021 | Volatile halogenated & aromatic organic compounds | DB-VRX, 60 m x 0.25 mm, 1.40 μ m | 122-1564 |
| | | DB-624, 60 m x 0.25 mm, 1.40 μ m | 122-1364 |

| Solid Waste | | | |
|---------------------|---|---|------------|
| EPA Method | Application | Column | Part No. |
| 8010 | Volatile halogenated organic compounds list by EPA method 8021 | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| 8011 | 1,2-Dibromoethane and 1,2-dibromo-3-chloropropane by microextraction and GC | DB-624, 30 m x 0.25 mm, 1.40 µm | 122-1334 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 µm | 122-1334UI |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 µm | 122-1534 |
| | | VF-1ms, 30 m x 0.32 mm, 0.25 µm | CP8924 |
| 8015 | Nonhalogenated organics by GC | DB-624, 30 m x 0.25 mm, 1.40 µm | 122-1334 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 µm | 122-1334UI |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 µm | 122-1534 |
| 8015c | Nonhalogenated organics by GC | DB-WAX, 30 m x 0.25 mm, 0.50 µm | 122-7033 |
| | | DB-5, 30 m x 0.25 mm, 1.00 µm | 122-5033 |
| | | HP-5, 30 m x 0.25 mm, 1.00 µm | 19091J-233 |
| | | VF-WAXms, 30 m x 0.53 mm, 1.00 µm | CP9215 |
| | | CP-Sil 8 CB, 30 m x 0.53 mm, 1.50 µm | CP8736 |
| | | | |
| 8020 | Volatile aromatic organic compounds list by EPA method 8021 | DB-624, 30 m x 0.25 mm, 1.40 µm | 122-1334 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 µm | 122-1334UI |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 µm | 122-1534 |
| 8021, CLP Volamines | Volatile halogenated & aromatic organic compounds | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| 8021b | Aromatic and halogenated volatiles by GC | VF-624ms, 60 m x 0.53 mm, 3.00 µm | CP9107 |
| | | VF-624ms, 60 m x 0.25 mm, 1.40 µm | CP9103 |
| 8031 | Acrylonitrile by GC | DB-624, 30 m x 0.25 mm, 1.40 µm | 122-1334 |
| | | DB-624 Ultra Inert, 30 m x 0.25 mm, 1.40 µm | 122-1334UI |
| | | DB-VRX, 30 m x 0.25 mm, 1.40 µm | 122-1534 |
| | | PoraBOND Q, 25 m x 0.53 mm, 10.00 µm | CP7354 |
| 8032 | Acrylamide by GC | CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 2.00 µm | CP7654 |
| 8033 | Acetonitrile by GC with nitrogen phosphorus detection | DB-WAX, 15 m x 0.25 mm, 0.50 µm | 122-7013 |
| | | HP-INNOWax, 15 m x 0.25 mm, 0.50 µm | 19091N-231 |
| | | VF-WAXms, 15 m x 0.53 mm, 1.00 µm | CP9226 |
| 8040, 8041, 8041a | Phenols by gas chromatography | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| | | VF-5ms, 30 m x 0.53 mm, 1.50 µm | CP8976 |
| | | VF-1701ms, 30 m x 0.53 mm, 1.00 µm | CP9171 |
| | | VF-17ms, 30 m x 0.53 mm, 1.00 µm | CP9001 |

(Continued)

| Solid Waste | | | |
|-----------------------------|---|---|-----------------|
| EPA Method | Application | Column | Part No. |
| 8060 | Phthalate esters | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| 8061 | Phthalate esters by GC with electron capture detection (GC/ECD) | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| | | VF-1701ms, 30 m x 0.53 mm, 1.00 µm | CP9171 |
| 8070, 8070a | Nitrosamines by gas chromatography | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | CP-Sil 8 CB for Amines, 30 m x 0.53 mm, 1.00 µm | CP7597 |
| | | VF-17ms, 30 m x 0.53 mm, 1.50 µm | CP9002 |
| 8081, 8081a | Organochlorine pesticides by gas chromatography | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms, 30 m x 0.32 mm, 0.25 µm | 123-3832 |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |
| | | VF-35ms, 30 m x 0.25 mm, 1.00 µm | CP8879 |
| 8082, CLP Pesticides, 8082a | Polychlorinated biphenyls (PCBs) by gas chromatography | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms, 30 m x 0.32 mm, 0.25 µm | 123-3832 |
| | | DB-XLB, 30 m x 0.32 mm, 0.50 µm | 123-1236 |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |
| | | VF-35ms, 30 m x 0.25 mm, 1.00 µm | CP8879 |
| 8090 | Nitroaromatics and isophorone | DB-5ms, 30 m x 0.25 mm, 1.00 µm | 122-5533 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| | | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| 8091 | Nitroaromatics and cyclic ketones by GC | VF-5ms, 30 m x 0.53 mm, 1.50 µm | CP8976 |
| | | VF-1701ms, 30 m x 0.53 mm, 1.00 µm | CP9171 |
| 8095 | Explosives by GC | DB-225, 15 m x 0.53 mm, 1.00 µm | 125-2212 |
| | | HP-5, 15 m x 0.53 mm, 1.50 µm | 19095J-321 |
| | | DB-5, 15 m x 0.53 mm, 1.50 µm | 125-5012 |
| | | VF-1ms, 15 m x 0.53 mm, 1.50 µm | CP8967 |
| 8100 | Polynuclear aromatic hydrocarbons | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | DB-5ms, 30 m x 0.32 mm, 0.25 µm | 123-5532 |
| | | DB-1ms, 30 m x 0.25 mm, 0.25 µm | 122-0132 |
| | | DB-17ms, 30 m x 0.25 mm, 0.25 µm | 122-4732 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |

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| Solid Waste | | | |
|--------------|--|---|--------------|
| EPA Method | Application | Column | Part No. |
| 8111 | Haloethers by GC | DB-5ms, 30 m x 0.25 mm, 1.00 µm | 122-5533 |
| | | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| | | DB-1701, 30 m x 0.25 mm, 1.00 µm | 122-0733 |
| | | VF-1701ms, 30 m x 0.53 mm, 1.00 µm | CP9171 |
| 8120 | Chlorinated hydrocarbons by gas chromatography | DB-5ms, 30 m x 0.32 mm, 0.50 µm | 123-5536 |
| | | HP-5ms, 30 m x 0.32 mm, 0.50 µm | 19091S-113 |
| | | DB-1, 30 m x 0.32 mm, 0.50 µm | 123-103E |
| 8121 | Chlorinated hydrocarbons by GC: capillary column technique | DB-5ms, 30 m x 0.32 mm, 0.50 µm | 123-5536 |
| | | HP-5ms, 30 m x 0.32 mm, 0.50 µm | 19091S-113 |
| | | DB-1, 30 m x 0.32 mm, 0.50 µm | 123-103E |
| | | VF-200ms, 30 m x 0.53 mm, 1.00 µm | CP8868 |
| | | VF-WAXms, 30 m x 0.53 mm, 1.00 µm | CP9215 |
| | | VF-5ms, 30 m x 0.53 mm, 1.50 µm | CP8976 |
| | | VF-1701ms, 30 m x 0.53 mm, 1.00 µm | CP9171 |
| 8131 | Aniline and selected derivatives by GC | DB-5ms Ultra Inert, 30 m x 0.25 mm, 1.00 µm | 122-5533UI |
| | | HP-5ms Ultra Inert, 30 m x 0.25 mm, 0.50 µm | 19091S-133UI |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| | | CP-Sil 8 CB for Amines, 30 m x 0.25 mm, 0.25 µm | CP7598 |
| 8140 | Organophosphorus pesticides by GC-NPD | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |
| | | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| 8141a, 8141b | Organophosphorus compounds by gas chromatography: capillary column technique | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |
| | | DB-5ms, 30 m x 0.25 mm, 0.25 µm | 122-5532 |
| | | VF-200ms, 30 m x 0.53 mm, 1.00 µm | CP8868 |
| | | VF-35ms, 30 m x 0.53 mm, 1.00 µm | CP8888 |
| | | VF-5ms, 30 m x 0.53 mm, 1.00 µm | CP8975 |
| | | VF-1ms, 30 m x 0.53 mm, 1.00 µm | CP8969 |
| 8150 | Chlorinated herbicides | DB-35ms, 30 m x 0.32 mm, 0.25 µm | 123-3832 |

(Continued)

Solid Waste

| EPA Method | Application | Column | Part No. |
|---|--|--|---|
| 8151, 8151b | Chlorinated herbicides by GC using methylation or pentafluorobenzoylation derivatization: capillary column technique | DB-CLP1, 30 m x 0.32 mm, 0.25 µm | 123-8232 |
| | | DB-CLP2, 30 m x 0.32 mm, 0.50 µm | 123-8336 |
| | | DB-35ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-3832UI |
| | | DB-5ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 123-5532UI |
| | | HP-5ms Ultra Inert, 30 m x 0.32 mm, 0.25 µm | 19091S-413UI |
| | | VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9074 |
| | | VF-5ms, 30 m x 0.32 mm, 1.00 µm | CP8957 |
| | | VF-35ms, 30 m x 0.25 mm, 0.25 µm | CP8877 |
| 8240 | Volatile chlorinated and aromatic hydrocarbons | VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm | CP9070 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 |
| | | DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 |
| | | DB-624 Ultra Inert, 60 m x 0.25 mm, 1.40 µm | 122-1364UI |
| | | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| | | HP-VOC, 60 m x 0.20 mm, 1.10 µm | 19091R-306 |
| | | VF-624ms, 60 m x 0.25 mm, 1.40 µm | CP9103 |
| 8260/CLP-VOCs | Volatile organic compounds by gas chromatography/mass spectroscopy (GC/MS): capillary column technique method | DB-624 Ultra Inert, 60 m x 0.25 mm, 1.40 µm | 122-1364UI |
| | | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 |
| 8260b | Volatile organic compounds by GC/MS | DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 |
| | | DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |
| | | VF-624ms, 60 m x 0.32 mm, 1.80 µm | CP9105 |
| | | DB-624 Ultra Inert, 60 m x 0.32 mm, 1.80 µm | 123-1364UI |
| | | 8261 | Volatile organic compounds by vacuum distillation in combination with GC/MS spectrometry (VD/GC/MS) |
| DB-608, 30 m x 0.53 mm, 0.50 µm | 125-6837 | | |
| DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 | | |
| DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 | | |
| DB-624 Ultra Inert, 20 m x 0.18 mm, 1.00 µm | 121-1324UI | | |
| VF-624ms, 60 m x 0.25 mm, 1.40 µm | CP9103 | | |

(Continued)

Solid Waste

| EPA Method | Application | Column | Part No. |
|-------------|---|--|------------|
| 8270, 8270d | Semivolatile organic compounds by gas chromatography/mass spectrometry (GC/MS) | DB-UI 8270D Ultra Inert, 30 m x 0.25 mm, 0.25 µm | 122-9732 |
| | | DB-UI 8270D, 20 m x 0.18 mm, 0.36 µm | 121-9723 |
| | | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| | | VF-5ms, 30 m x 0.25 mm, 0.50 µm | CP8945 |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |
| 8275a | Semivolatile organic compounds (PAHs and PCBs) in soils/sludges and solid wastes using thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) | DB-5ms, 30 m x 0.25 mm, 1.00 µm | 122-5533 |
| | | HP-5ms, 30 m x 0.25 mm, 0.50 µm | 19091S-133 |
| | | VF-5ms, 30 m x 0.25 mm, 0.25 µm | CP8944 |
| | | VF-5ms, 30 m x 0.25 mm, 0.50 µm | CP8945 |
| | | VF-5ms, 30 m x 0.25 mm, 1.00 µm | CP8946 |
| 8280b | Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS) | DB-5ms Ultra Inert, 60 m x 0.25 mm, 0.25 µm | 122-5562UI |
| | | CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 µm | CP8751 |
| 8290b | Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS) | DB-5ms Ultra Inert, 60 m x 0.25 mm, 0.25 µm | 122-5562UI |
| | | CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 µm | CP8751 |
| | | CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 µm | CP7588 |
| 8410 | Gas chromatography/Fourier transform infrared (GC/FTIR) spectrometry for semivolatile organics: capillary column | HP-5ms, 30 m x 0.32 mm, 1.00 µm | 19091S-213 |
| | | DB-5ms, 30 m x 0.32 mm, 1.00 µm | 123-5533 |
| | | VF-5ms, 30 m x 0.32 mm, 0.25 µm | CP8955 |
| 8430 | Analysis of bis(2-chloroethyl) ether and hydrolysis products by direct aqueous injection (GC/FTIR) | DB-WAX, 30 m x 0.25 mm, 0.50 µm | 122-7033 |
| | | HP-INNOWax, 30 m x 0.25 mm, 0.50 µm | 19091N-233 |
| | | VF-WAXms, 30 m x 0.53 mm, 1.00 µm | CP9215 |



TIPS & TOOLS

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United States Pharmacopoeia (USP) GC Phases

| USP | Phase Composition | Agilent Phase Recommendation |
|-----|--|---|
| G1 | Dimethylpolysiloxane oil | HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, HP-1ms UI, DB-1ms UI, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS |
| G2 | Dimethylpolysiloxane gum | HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, HP-1ms UI, DB-1ms UI, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS, CP-SimDist |
| G3 | 50% Phenyl 50% methylpolysiloxane | DB-17*, HP-50+*, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS |
| G5 | 3-cyanopropyl polysiloxane | DB-23, VF-23ms, Select for FAME, CP-Sil 88 |
| G6 | Trifluoropropylmethylpolysilicone | DB-200, DB-210, VF-200ms |
| G7 | 50% 3-cyanopropyl 50% phenylmethylsilicone | DB-225, DB-225ms, CP-Sil 43 CB |
| G8 | 80% Bis(3-cyanopropyl) 20% 3-cyanopropylphenylpolysiloxane or 90% 3-cyanopropyl 10% phenylmethylsiloxane | HP-88, VF-23ms |
| G14 | Polyethylene glycol (average molecular weight of 950-1,050) | DB-WAX, VF-WAXms, CP-Wax 52 CB |
| G15 | Polyethylene glycol (average molecular weight of 3,000-3,700) | DB-WAX, VF-WAXms, CP-Wax 52 CB |
| G16 | Polyethylene glycol (average molecular weight of 15,000) | DB-WAX*, VF-WAXms, CP-Wax 52 CB |
| G17 | 75% Phenyl 25% methylpolysiloxane | DB-17, HP-50+, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS |
| G19 | 25% Phenyl 25% cyanopropylmethylsilicone | DB-225*, DB-225ms, CP-Sil 43 CB |
| G20 | Polyethylene glycol (average molecular weight of 380-420) | DB-WAX, VF-WAXms, CP-Wax 52 CB |
| G25 | Polyethylene glycol TPA (Carbowax 20M terephthalic acid) | DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB |
| G27 | 5% Phenyl 95% methylpolysiloxane | DB-5*, HP-5*, HP-5ms*, DB-5ms, VF-5ms, DB-5ms UI, HP-5ms UI, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS |
| G28 | 25% Phenyl 75% methylpolysiloxane | DB-35, HP-35, DB-35ms, VF-35ms, DB-35ms UI |
| G32 | 20% Phenylmethyl 80% dimethylpolysiloxane | DB-35, HP-35, DB-35ms, VF-35ms |
| G35 | Polyethylene glycol & diepoxide esterified with nitroterephthalic acid | DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB |
| G36 | 1% Vinyl 5% phenylmethylpolysiloxane | DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS |
| G38 | Phase G1 plus a tailing inhibitor | DB-1, HP-1, HP-1ms, DB-1ms, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS |
| G39 | Polyethylene glycol (average molecular weight of 1,500) | DB-WAX, VF-WAXms, CP-Wax 52 CB |
| G41 | Phenylmethyldimethylsilicone (10% phenyl substituted) | DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS |
| G42 | 35% Phenyl 65% dimethylvinylsiloxane | DB-35*, HP-35*, DB-35ms, VF-35ms, DB-35ms UI |
| G43 | 6% Cyanopropylphenyl 94% dimethylpolysiloxane | DB-624*, DB-1301, VF-624ms, VF-1301ms, CP-1301, DB-Select 624 UI |
| G45 | Divinylbenzene-ethylene glycol-dimethacrylate | HP-PLOT U*, CP-PoraBOND U, CP-PoraPLOT U |
| G46 | 14% Cyanopropylphenyl 86% methylpolysiloxane | DB-1701*, VF-1701ms, CP-Sil 19 CB, CP-Sil 19 CB Low Bleed/MS |

*Indicates an exact equivalent

TIPS & TOOLS

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| ASTM Methods | | | |
|--------------|--|---|--------------|
| Method | Title | Recommended Agilent Column | Part No. |
| D1945 | Standard Test Method for the Analysis of Natural Gas by GC | HP-PLOT Molesieve, 15 m x 0.53 mm, 50.00 µm | 19095P-MS9 |
| | | HP-PLOT Q PT, 15 m x 0.53 mm, 40.00 µm | 19095P-Q03PT |
| | | CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm | CP7537 |
| | | PoraPLOT Q-HT, 10 m x 0.53 mm, 20.00 µm | CP7558 |
| D1946 | Standard Test Method for the Analysis of Reformed Gas by GC | HP-PLOT Molesieve, 15 m x 0.53 mm, 50.00 µm | 19095P-MS9 |
| | | HP-PLOT Q PT, 15 m x 0.53 mm, 40.00 µm | 19095P-Q03PT |
| | | CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm | CP7537 |
| | | CP-Molsieve 5Å, 25 m x 0.25 mm, 30.00 µm | CP7533 |
| D1983 | Standard Test Method for Fatty Acid Composition by Gas-Liquid Chromatography of Methyl Esters | DB-WAX, 30 m x 0.25 mm, 0.25 µm | 122-7032 |
| D2163 | Standard Test Method for the Analysis of Liquefied Petroleum (LP) Gases and Propene Concentrates by GC | HP-PLOT Al ₂ O ₃ KCl PT, 30 m x 0.53 mm, 15.00 µm | 19095P-K23PT |
| | | HP-PLOT Al ₂ O ₃ S PT, 30 m x 0.53 mm, 15.00 µm | 19095P-S23PT |
| D2195 | Standard Test Methods for Pentaerythritol | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D2268 | Standard Test Method for Analysis of High-Purity n-Heptane and Isooctane by Capillary GC | DB-1, 60 m x 0.25 mm, 0.50 µm | 122-106E |
| D2306 | Standard Test Method for C ₈ Aromatic Hydrocarbons by GC | HP-INNOWax, 60 m x 0.25 mm, 0.25 µm | 19091N-136 |
| D2360 | Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC | HP-INNOWax, 60 m x 0.32 mm, 0.25 µm | 19091N-116 |
| D2426 | Standard Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by GC | DB-1, 30 m x 0.53 mm, 5.00 µm | 125-1035 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D2427 | Standard Test Method for Determination of C ₂ through C ₅ Hydrocarbons in Gasoline by GC | DB-1, 30 m x 0.53 mm, 5.00 µm | 125-1035 |
| | | GS-Alumina PT, 30 m x 0.53 mm, | 115-3532PT |
| | | CP-Al ₂ O ₃ /KCl PT, 50 m x 0.53 mm, 10.00 µm | CP7518PT |
| D2245 | Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints | CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm | CP7488 |
| D2504 | Standard Test Method for Noncondensable Gases in C ₂ and Lighter Hydrocarbon Products by GC | HP-PLOT Molesieve, 30 m x 0.53 mm, 50.00 µm | 19095P-MS0 |
| | | CarboBOND, 25 m x 0.53 mm, 10.00 µm | CP7374 |
| D2505 | Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by GC | GS-GasPro, 60 m x 0.32 mm | 113-4362 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D2580 | Standard Test Method for Phenols in Water by Gas-Liquid Chromatography | CP-FFAP CB, 25 m x 0.53 mm, 1.00 µm | CP7486 |
| D2593 | Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by GC | GS-Alumina PT, 30 m x 0.53 mm | 115-3532PT |
| | | CP-Al ₂ O ₃ /KCl PT, 50 m x 0.32 mm, 5.00 µm | CP7515PT |
| | | CP-Al ₂ O ₃ /KCl PT, 50 m x 0.53 mm, 10.00 µm | CP7518PT |
| D2712 | Standard Test Method for Hydrocarbon Traces in Propylene Concentrates by GC | GS-Alumina PT, 50 m x 0.53 mm | 115-3552PT |
| D2743 | Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography | CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm | CP7488 |
| D2804 | Standard Test Method for Purity of Methyl Ethyl Ketone by GC | DB-WAX, 30 m x 0.53 mm, 1.00 µm | 125-7032 |
| | | DB-210, 15 m x 0.53 mm, 1.00 µm | 125-0212 |
| | | CP-Wax 52 CB, 30 m x 0.32 mm, 0.50 µm | CP8763 |
| | | CP-Wax 52 CB, 30 m x 0.53 mm, 1.00 µm | CP8738 |
| D2887 | Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC | DB-2887, 10 m x 0.53 mm, 3.00 µm | 125-2814 |
| | | CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.88 µm | CP7570 |
| | | CP-SimDist UltiMetal, 10 m x 0.53 mm, 2.65 µm | CP7582 |
| | | CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.17 µm | CP7532 |
| Extended D2887 | Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC, to C ₆₀ | HP-1, 10 m x 0.53 mm, 0.88 µm | 19095Z-021 |
| | | HP-1, 5 m x 0.53 mm, 0.88 µm | 19095Z-020 |
| D2908 | Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection GC | CP-Select 624 CB, 30 m x 0.32 mm, 1.80 µm | CP7414 |
| | | CP-Select 624 CB, 75 m x 0.53 mm, 3.00 µm | CP7417 |
| | | CP-Wax 52 CB, 30 m x 0.32 mm, 0.50 µm | CP8763 |
| | | CP-Wax 52 CB, 30 m x 0.53 mm, 1.00 µm | CP8738 |
| D3054 | Standard Test Method for Analysis of Cyclohexane by GC | DB-1, 60 m x 0.32 mm, 0.50 µm | 123-106E |
| D3168 | Standard Practice for Qualitative Identification of Polymers in Emulsion Paints | CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 µm | CP8760 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D3257 | Standard Test Method for Aromatics in Mineral Spirits by GC | DB-624, 30 m x 0.53 mm, 3.00 µm | 125-1334 |
| D3271 | Standard Practice for Direct Injection of Solvent-Reducible Paints into a Gas Chromatograph for Solvent Analysis | PoraPLOT Q, 25 m x 0.53 mm, 20.00 µm | CP7554 |
| | | CP-Wax 52 CB, 30 m x 0.53 mm, 1.00 µm | CP8738 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D3328 | Standard Test Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography | CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm | CP8687 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm | CP8677 |
| D3329 | Standard Test Method for Purity of Methyl Isobutyl Ketone by GC | DB-WAX, 30 m x 0.53 mm, 1.00 µm | 125-7032 |
| | | DB-624, 30 m x 0.45 mm, 2.55 µm | 124-1334 |
| | | CP-Wax 52 CB, 60 m x 0.53 mm, 1.00 µm | CP8798 |
| D3432 | Standard Test Method for Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by GC | HP-1ms, 30 m x 0.32 mm, 1.00 µm | 19091S-713 |
| D3447 | Standard Test Method for Purity of Halogenated Organic Solvents | DB-624, 30 m x 0.53 mm, 3.00 µm | 125-1334 |
| D3452 | Standard Practice for Rubber – Identification by Pyrolysis-Gas Chromatography | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D3465 | Standard Test Method for Purity of Monomeric Plasticizers by Gas Chromatography | CP-Sil 5 CB, 25 m x 0.32 mm, 0.52 µm | CP8430 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D3524 | Standard Test Method for Diesel Fuel Diluent in Used Diesel Engine Oils by Gas Chromatography | CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 µm | CP7592 |
| D3545 | Standard Test Method for Alcohol Content and Purity of Acetate Esters by GC | DB-624, 30 m x 0.53 mm, 3.00 µm | 125-1334 |
| D3606 | Standard Test Method for Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography | VF-1ms, 15 m x 0.25 mm, 0.10 µm | CP8906 |
| | | CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm | CP7525 |
| D3687 | Standard Test Method for Analysis of Organic Vapors Collected by the Activated Charcoal Tube Adsorption Method | DB-WAX, 30 m x 0.53 mm, 1.00 µm | 125-7032 |
| | | DB-WAX, 30 m x 0.45 mm, 0.85 µm | 124-7032 |
| | | CP-Wax 52 CB, 30 m x 0.32 mm, 0.50 µm | CP8763 |
| | | CP-Wax 52 CB, 30 m x 0.53 mm, 1.00 µm | CP8738 |
| D3695 | Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection GC | DB-WAX, 30 m x 0.53 mm, 1.00 µm | 125-7032 |
| | | CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 µm | CP7592 |
| D3710 | Standard Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by GC | DB-2887, 10 m x 0.53 mm, 3.00 µm | 125-2814 |
| D3749 | Standard Test Method for Residual Vinyl Chloride Monomer in Poly(Vinyl Chloride) Resins by Gas Chromatographic Headspace Technique | PoraBOND Q, 10 m x 0.32 mm, 5.00 µm | CP7350 |
| | | PoraBOND Q PT, 10 m x 0.53 mm, 10.00 µm | CP7353PT |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D3760 | Standard Test Method for Analysis of Isopropylbenzene (Cumene) by GC | DB-WAX, 60 m x 0.32 mm, 0.25 µm | 123-7062 |
| | | HP-1, 50 m x 0.32 mm, 0.52 µm | 19091Z-115 |
| | | CP-Xylenes, 50 m x 0.53 mm | CP7428 |
| D3792 | Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph | PoraBOND Q PT, 25 m x 0.32 mm, 5.00 µm | CP7351PT |
| | | PoraBOND Q PT, 25 m x 0.53 mm, 10.00 µm | CP7354PT |
| D3797 | Standard Test Method for Analysis of o-Xylene by GC | HP-INNOWax, 60 m x 0.32 mm, 0.50 µm | 19091N-216 |
| | | CP-Xylenes, 50 m x 0.53 mm | CP7428 |
| D3798 | Standard Test Method for Analysis of p-Xylene by GC | HP-INNOWax, 60 m x 0.32 mm, 0.50 µm | 19091N-216 |
| | | CP-Xylenes, 50 m x 0.53 mm | CP7428 |
| D3871 | Standard Test Method for Purgeable Organic Compounds in Water Using Headspace Sampling | DB-VRX, 75 m x 0.45 mm, 2.55 µm | 124-1574 |
| D3876 | Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography | CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 µm | CP8760 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm | CP8735 |
| D3893 | Standard Test Method for Purity of Methyl Amyl Ketone and Methyl Isoamyl Ketone by GC | DB-VRX, 30 m x 0.45 mm, 2.55 µm | 124-1534 |
| D3973 | Standard Test Method for Low-Molecular Weight Halogenated Hydrocarbons in Water | DB-VRX, 30 m x 0.45 mm, 2.55 µm | 124-1534 |
| D4059 | Standard Test Method for Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography | CP-Sil 8 CB for PCB, 50 m x 0.25 mm, 0.25 µm | CP7482 |
| D4275 | Standard Test Method for Determination of Butylated Hydroxy Toluene (BHT) in Polymers of Ethylene and Ethylene – Vinyl Acetate (EVA) Copolymers by Gas Chromatography | CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm | CP8687 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm | CP8677 |
| D4322 | Standard Test Method for Residual Acrylonitrile Monomer Styrene-Acrylonitrile Copolymers and Nitrile Rubber by Headspace Gas Chromatography | PoraBOND Q PT, 25 m x 0.53 mm, 10.00 µm | CP7354PT |
| D4367 | Standard Test Method for Benzene in Hydrocarbon Solvents by Gas Chromatography | VF-1ms, 15 m x 0.25 mm, 0.10 µm | CP8906 |
| | | CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm | CP7525 |
| D4415 | Standard Test Method for Determination of Dimer in Acrylic Acid | DB-FFAP, 30 m x 0.32 mm, 0.25 µm | 123-3232 |
| D4424 | Standard Test Method for Butylene Analysis by GC | HP-PLOT Al ₂ O ₃ S PT, 50 m x 0.53 mm, 15.00 µm | 19095P-S25PT |
| | | CP-Al ₂ O ₃ /Na ₂ SO ₄ , 25 m x 0.53 mm, 10.00 µm | CP7567 |
| D4443 | Standard Test Method for Residual Vinyl Chloride Monomer Content in PPB Range in Vinyl Chloride Homo- and Co-Polymers by Headspace GC | DB-VRX, 30 m x 0.45 mm, 2.55 µm | 124-1534 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D4492 | Standard Test Method for Analysis of Benzene by Gas Chromatography | CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm | CP7525 |
| D4509 | Standard Test Methods for Determining the 24-Hour Gas (AIR) Space Acetaldehyde Content of Freshly Blown PET Bottles | PoraBOND Q PT, 25 m x 0.32 mm, 5.00 µm | CP7351PT |
| | | PoraBOND Q PT, 25 m x 0.53 mm, 10.00 µm | CP7354PT |
| D4534 | Test Method for Benzene Content of Cyclic Products by Gas Chromatography | CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm | CP7525 |
| D4735 | Standard Test Method for Determination of Trace Thiophene in Refined Benzene by GC | DB-FFAP, 30 m x 0.45 mm, 0.85 µm | 124-3232 |
| | | CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm | CP7614 |
| D4768 | Standard Test Method for Analysis of 2,6-Ditertiary-Butyl Para-Cresol and 2,6-Ditertiary-Butyl Phenol in Insulating Liquids by Gas Chromatography | CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm | CP7614 |
| D4864 | Standard Test Method for Determination of Traces of Methanol in Propylene Concentrates by GC | DB-WAX, 30 m x 0.45 mm, 0.85 µm | 124-7032 |
| D4947 | Standard Test Method for Chlordane and Heptachlor Residues in Indoor Air | DB-5, 30 m x 0.53 mm, 1.50 µm | 125-5032 |
| | | DB-608, 30 m x 0.53 mm, 0.83 µm | 125-1730 |
| D4961 | Standard Test Method for GC Analysis of Major Organic Impurities in Phenol Produced by the Cumene Process | DB-FFAP, 30 m x 0.45 mm, 0.85 µm | 124-3232 |
| | | HP-PLOT Q PT, 15 m x 0.53 mm, 40.00 µm | 19095P-Q03PT |
| D4983 | Standard Test Method for Cyclohexylamine Morpholine and Diethylaminoethanol in Water and Condensed Steam by Direct Aqueous Injection GC | HP-5ms, 30 m x 0.32 mm, 1.00 µm | 19091S-213 |
| | | CAM, 30 m x 0.53 mm, 1.00 µm | 115-2132 |
| D5008 | Standard Test Method for Ethyl Methyl Pentanol Content and Purity Value of 2-Ethylhexanol by GC | HP-1, 15 m x 0.53 mm, 5.00 µm | 19095Z-621 |
| | | HP-INNOWax, 30 m x 0.32 mm, 0.25 µm | 19091N-113 |
| D5060 | Standard Test Method for Determining Impurities in High-Purity Ethylbenzene by GC | HP-INNOWax, 60 m x 0.32 mm, 0.50 µm | 19091N-216 |
| | | CP-Wax 52 CB, 60 m x 0.32 mm, 0.50 µm | CP8773 |
| D5075 | Standard Test Method for Nicotine in Indoor Air | DB-5, 30 m x 0.53 mm, 1.50 µm | 125-5032 |
| | | DB-5, 30 m x 0.32 mm, 1.00 µm | 123-5033 |
| D5134 | Standard Test Method for Detailed Analysis of Petroleum Naphthas Through n-Nonane by Capillary GC | HP-PONA, 50 m x 0.20 mm, 0.50 µm | 19091S-001 |
| | | CP-Sil PONA for ASTM D5134, 50 m x 0.21 mm, 0.50 µm | CP7531 |
| D5135 | Standard Test Method for Analysis of Styrene by Capillary GC | HP-INNOWax, 60 m x 0.32 mm, 0.50 µm | 19091N-216 |
| | | CP-Wax 52 CB, 60 m x 0.32 mm, 0.50 µm | CP8773 |
| D5175 | Standard Test Method for Organohalide Pesticides and Polychlorinated Biphenyls in Water by Microextraction and GC | DB-1, 30 m x 0.32 mm, 1.00 µm | 123-1033 |
| | | DB-608, 30 m x 0.32 mm, 0.50 µm | 123-1730 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D5303 | Standard Test Method for Trace Carbonyl Sulfide in Propylene by GC | GS-GasPro, 30 m x 0.32 mm | 113-4332 |
| | | HP-PLOT Q PT, 30 m x 0.53 mm, 40.00 µm | 19095P-Q04PT |
| D5307 | Standard Test Method for Determination of Boiling Range Distribution of Crude Petroleum by GC | HP-1, 7.5 m x 0.53 mm, 5.00 µm | 19095Z-627 |
| D5310 | Standard Test Method for Tar Acid Composition by Capillary GC | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | DB-225ms, 30 m x 0.25 mm, 0.25 µm | 122-2932 |
| D5316 | Standard Test Method for 1, 2-Dibromoethane and 1, 2-Dibromo-3-Chloropropane in Water by Microextraction and GC | HP-1ms, 30 m x 0.32 mm, 1.00 µm | 19091S-713 |
| | | DB-624, 30 m x 0.45 mm, 2.55 µm | 124-1334 |
| D5317 | Standard Test Method for Determination of Chlorinated Organic Acid Compounds in Water by GC with Electron Capture Detector | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-7732 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| | | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |
| D5320 | Standard Test Method for Determination of 1, 1-Trichloroethane and Methylene Chloride in Stabilized Trichloroethylene and Tetrachloroethylene | DB-1, 30 m x 0.53 mm, 3.00 µm | 125-1034 |
| | | DB-VRX, 30 m x 0.32 mm, 1.80 µm | 123-1534 |
| D5399 | Standard Test Method for Boiling Point Distribution of Hydrocarbon Solvents by GC | DB-2887, 10 m x 0.53 mm, 3.00 µm | 125-2814 |
| D5441 | Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBD) by GC | HP-PONA, 50 m x 0.20 mm, 0.50 µm | 19091S-001 |
| | | DB-Petro, 100 m x 0.25 mm, 0.50 µm | 122-10A6E |
| D5442 | Standard Test Method for Analysis of Petroleum Waxes by GC | DB-1, 25 m x 0.32 mm, 0.25 µm | 123-1022 |
| | | DB-5, 15 m x 0.25 mm, 0.25 µm | 122-5012 |
| D5475 | Standard Test Method for Nitrogen- and Phosphorus-Containing Pesticides in Water by GC with a Nitrogen Phosphorus Detector | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-7732 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| | | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |
| D5480 | Standard Test Method for Engine Oil Volatility by GC | DB-PS1, 15 m x 0.53 mm, 0.15 µm | 145-1011 |
| D5501 | Standard Test Method for Determination of Ethanol Content of Denatured Fuel Ethanol by GC | HP-1, 100 m x 0.25 mm, 0.50 µm | 19091Z-530 |
| D5504 | Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence | DB-Sulfur SCD, 70 m x 0.53 mm, 4.30 µm | G3903-63003 |
| | | CP-Sil 5 CB for Sulfur, 30 m x 0.32 mm, 4.00 µm | CP7529 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D5507 | Standard Test Method for Determination of Trace Organic Impurities in Monomer Grade Vinyl Chloride by Capillary Column/Multi-dimensional GC | HP-PLOT Q PT, 15 m x 0.53 mm, 40.00 µm | 19095P-Q03PT |
| | | HP-PLOT U PT, 30 m x 0.53 mm, 20.00 µm | 19095P-U04PT |
| D5508 | Standard Test Method for Determination of Residual Acrylonitrile Monomer in Styrene-Acrylonitrile Co-polymer Resins and Nitrile-Butadiene Rubber by Headspace Capillary GC | HP-PLOT Q PT, 30 m x 0.53 mm, 40.00 µm | 19095P-Q04PT |
| D5580 | Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, C ₉ and Heavier Aromatics, and Total Aromatics in Finished Gasoline by GC | DB-1, 30 m x 0.53 mm, 5.00 µm | 125-1035 |
| | | CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm | CP7525 |
| | | CP-Sil 5 CB, 30 m x 0.53 mm, 5.00 µm | CP8775 |
| | | VF-1ms, 15 m x 0.25 mm, 0.10 µm | CP8906 |
| D5599 | Standard Test Method for Determination of Oxygenates in Gasoline by GC and Oxygen Selective Flame Ionization Detection | DB-5, 30 m x 0.25 mm, 0.25 µm | 122-5032 |
| D5623 | Standard Test Method for Sulfur Compounds in Light Petroleum Liquids by GC and Sulfur Selective Detection | DB-Sulfur SCD, 60 m x 0.32 mm, 4.20 µm | G3903-63001 |
| | | HP-1, 30 m x 0.32 mm, 4.00 µm | 19091Z-613 |
| D5713 | Standard Test Method for Analysis of High Purity Benzene for Cyclohexane Feedstock by Capillary GC | DB-Petro, 50 m x 0.20 mm, 0.50 µm | 128-1056 |
| D5739 | Standard Practice for Oil Spill Source Identification by GC and Positive Ion Electron Impact Low Resolution Mass Spectrometry | DB-5, 30 m x 0.25 mm, 0.25 µm | 122-5032 |
| | | DB-TPH, 30 m x 0.32 mm, 0.25 µm | 123-1632 |
| D5769 | Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasoline by GC/MS | HP-1, 60 m x 0.25 mm, 1.00 µm | 19091Z-236 |
| D5790 | Standard Test Method for Measurement of Purgeable Organic Compounds in Water by Capillary Column GC/MS | DB-VRX, 60 m x 0.25 mm, 1.40 µm | 122-1564 |
| | | DB-VRX, 20 m x 0.18 mm, 1.00 µm | 121-1524 |
| | | DB-624, 60 m x 0.25 mm, 1.40 µm | 122-1364 |
| | | DB-624, 20 m x 0.18 mm, 1.00 µm | 121-1324 |
| D5812 | Standard Test Method for Determination of Organochlorine Pesticides in Water by Capillary Column GC | HP-5ms, 30 m x 0.25 mm, 0.25 µm | 19091S-433 |
| | | DB-1701, 30 m x 0.25 mm, 0.25 µm | 122-7732 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| | | DB-35ms, 30 m x 0.25 mm, 0.25 µm | 122-3832 |

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| ASTM Methods | | | |
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| Method | Title | Recommended Agilent Column | Part No. |
| D5917 | Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC and External Calibration | HP-INNOWax, 60 m x 0.32 mm, 0.25 µm | 19091N-116 |
| D5974 | Standard Test Method for Fatty and Rosin Acids in Tall Oil Fraction Products by Capillary GC | DB-23, 60 m x 0.25 mm, 0.25 µm | 122-2362 |
| D5986 | Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C ₈ -C ₁₂ Aromatics and Total Aromatics in Finished Gasoline by GC/FTIR | HP-1, 60 m x 0.53 mm, 5.00 µm | 19095Z-626 |
| D6144 | Standard Test Method for Trace Impurities in Alpha-Methylstyrene by Capillary GC | HP-1, 60 m x 0.25 mm, 1.00 µm | 19091Z-236 |
| D6159 | Standard Test Method for Determination of Hydrocarbon Impurities in Ethylene by GC | HP-PLOT Al ₂ O ₃ KCl PT, 50 m x 0.53 mm, 15.00 µm | 19095P-K25PT |
| | | GS-Alumina PT, 50 m x 0.53 mm | 115-3552PT |
| | | DB-1, 30 m x 0.53 mm, 5.00 µm | 125-1035 |
| D6160 | Standard Test Method for Determination of PCBs in Waste Materials by GC | HP-5ms, 30 m x 0.32 mm, 0.25 µm | 19091S-413 |
| | | DB-XLB, 30 m x 0.25 mm, 0.25 µm | 122-1232 |
| D6352 | Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 °C by GC | DB-HT Sim Dis, 5 m x 0.53 mm, 0.15 µm | 145-1001 |
| D6387 | Standard Test Methods for Composition of Turpentine and Related Terpene Products by Capillary Gas Chromatography | CP-Wax 52 CB, 30 m x 0.32 mm, 0.50 µm | CP8763 |
| | | CP-Wax 52 CB, 30 m x 0.53 mm, 1.00 µm | CP8738 |
| D6417 | Standard Test Method for Estimation of Engine Oil Volatility by Capillary GC | DB-HT Sim Dis, 5 m x 0.53 mm, 0.15 µm | 145-1001 |
| D6584 | Standard Test Method for Determination of Total Monoglyceride, Total Diglyceride, Total Triglyceride, and Free and Total Glycerin in B-100 Biodiesel Methyl Esters by Gas Chromatography | Select Biodiesel, 15 m x 0.32 mm, 0.10 µm | CP9078 |
| D6806 | Standard Practice for Analysis of Halogenated Organic Solvents and Their Admixtures by Gas Chromatography | CP-Sil 5 CB, 50 m x 0.53 mm, 5.00 µm | CP7685 |
| E1616 | Standard Test Method for Analysis of Acetic Anhydride Using GC | HP-1, 50 m x 0.32 mm, 0.52 µm | 19091Z-115 |
| E1863 | Standard Test Method for Analysis of Acrylonitrile by GC | DB-WAXetr, 60 m x 0.32 mm, 1.00 µm | 123-7364 |
| E0202 | Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols | DB-624, 30 m x 0.53 mm, 3.00 µm | 125-1334 |
| | | CP-Wax 57 CB for Glycols and Alcohols, 25 m x 0.25 mm, 0.20 µm | CP7615 |
| E0475 | Standard Test Method for Assay of Di-tert-Butyl Peroxide Using GC | HP-5, 30 m x 0.53 mm, 5.00 µm | 19095J-623 |

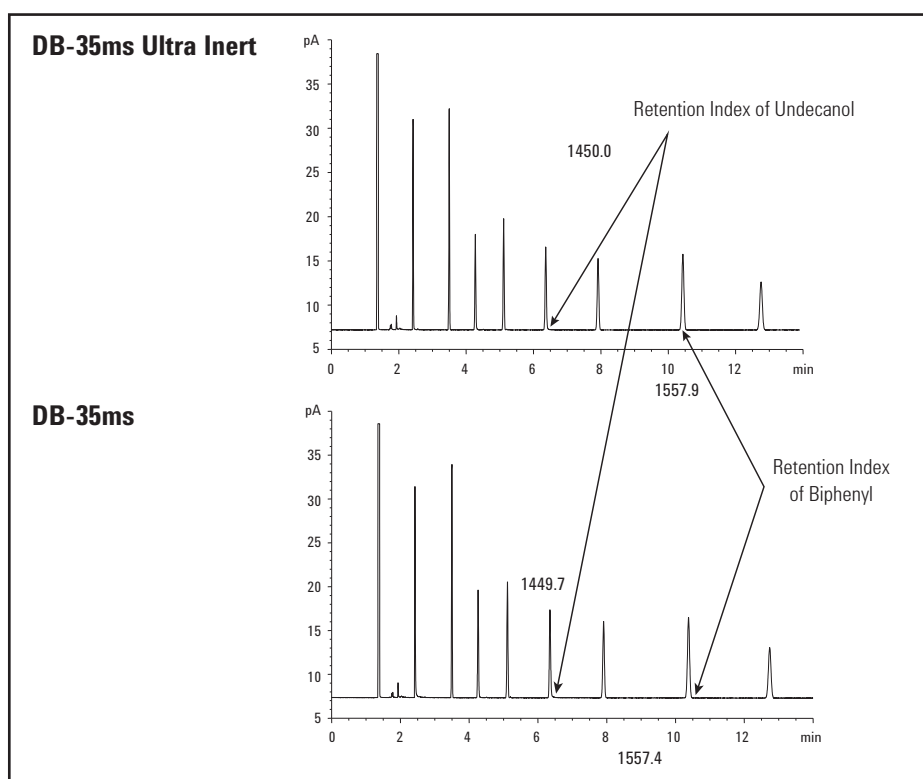
GC Capillary Columns

Agilent J&W Ultra Inert GC Columns

Perform trace-level analysis with the utmost confidence

As the GC industry's premier measurement company, Agilent is uniquely positioned to ensure the inertness of the surfaces your sample touches, so you can achieve the parts-per-billion – or parts-per-trillion – detection levels for your most demanding analyses. Agilent Ultra Inert components work together to deliver industry-leading results: the Agilent GC instrument, Ultra Inert liner and Agilent J&W Ultra Inert GC column family.

The Agilent J&W Ultra Inert GC column family pushes industry standards for consistent column inertness and exceptionally low column bleed, resulting in lower detection limits and more accurate data for difficult analytes. Each Ultra Inert column is tested with the industry's most demanding test probe mixture and we prove it with a performance summary sheet shipped with each column.



With Agilent J&W Ultra Inert GC columns, selectivity remains the same, allowing you to confidently integrate Ultra Inert columns into your current methods.

The industry's most rigorous test probe mixture ensures consistent column inertness – and results

A strong test probe mixture can highlight deficiencies in column activity, while a weak mixture can actually mask such deficiencies.

The test probes in Agilent's Ultra Inert test probe mixture have low molecular weights, low boiling points and no steric shielding of their active groups. These characteristics allow the probative portion of the test molecules to penetrate – and fully interact with – the stationary phase and column surface.

Commonly used, less demanding test probes

| | | |
|-----------------------|------------------------|--------------------|
| 1. 1-Octanol | 4. 2,6-Dimethylaniline | 7. 1-Decanol |
| 2. n-Undecane | 5. n-Dodecane | 8. n-Tridecane |
| 3. 2,6-Dimethylphenol | 6. Naphthalene | 9. Methyldecanoate |

TIPS & TOOLS

Clearly Better Inertness

To learn more and order your free poster, visit www.agilent.com/chem/inert

Ensuring an inert GC flow path has never been more critical

An excellent sample can become useless, however, if the active and inert components are simply masked by the column activity.

A low inert flow path can cause peak splitting and appear flat. It can mask or fully activate contaminants, which can result in misinterpretation of column condition present in the sample.

Resolving or verifying suspect analysis results requires better productivity and faster your bottom line.

Invaluable results can be lost, ultimately, compromised in terms of environmental safety, food quality, and consumer drug abuse prevention.

The poster provides vital education to help you lower your detection limit and sensitivity quality prior analysis by ensuring the most inert flow path.

Optimizing your GC flow path for inertness

Sample inlet

GC column

Detector

GC MS/MS

Top 5 TIPS for GC flow path INERTNESS

- 1 Maximize the inlet
- 2 Purge sample lines at all stages
- 3 Select a column with optimized inertness
- 4 Remember your detector
- 5 Use a gas purifier

Agilent Ultra Inert test probes

Agilent J&W Ultra Inert GC columns

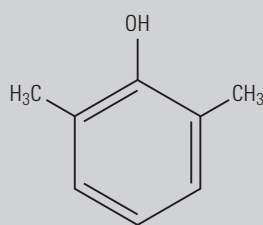
Agilent GC MS/MS and GC instruments

Agilent Technologies

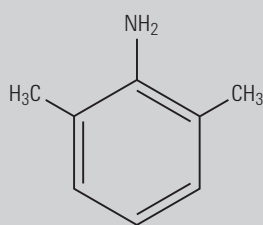
Agilent's more demanding Ultra Inert test probe mixture for 5ms, 1ms, and 35ms Ultra Inert columns

| Ultra Inert 5ms Columns | | | Ultra Inert 1ms Columns | | | Ultra Inert 35ms Columns | | |
|-------------------------|---------------------|--------------------|-------------------------|---------------------|--------------------|--------------------------|---------------------|--------------------|
| Elution Order | Test Probe | Functional Test | Elution Order | Test Probe | Functional Test | Elution Order | Test Probe | Functional Test |
| 1. | 1-Propionic acid | Basicity | 1. | 1-Propionic acid | Basicity | 1. | 1-Octene | Polarity |
| 2. | 1-Octene | Polarity | 2. | 1-Octene | Polarity | 2. | 1-Butyric acid | Basicity |
| 3. | n-Octane | Hydrocarbon marker | 3. | n-Octane | Hydrocarbon marker | 3. | n-Nonane | Hydrocarbon marker |
| 4. | 4-Picoline | Acidity | 4. | 1,2-Butanediol | Silanol | 4. | 4-Picoline | Acidity |
| 5. | n-Nonane | Hydrocarbon marker | 5. | 4-Picoline | Acidity | 5. | n-Propylbenzene | Polarity |
| 6. | Trimethyl phosphate | Acidity | 6. | Trimethyl phosphate | Acidity | 6. | 1-Heptanol | Silanol, Polarity |
| 7. | 1,2-Pentanediol | Silanol | 7. | n-Propylbenzene | Hydrocarbon marker | 7. | 1,2-Pentanediol | Silanol |
| 8. | n-Propylbenzene | Hydrocarbon marker | 8. | 1-Heptanol | Silanol | 8. | 3-Octanone | Polarity |
| 9. | 1-Heptanol | Silanol | 9. | 3-Octanone | Polarity | 9. | Trimethyl phosphate | Acidity |
| 10. | 3-Octanone | Polarity | 10. | tert-Butylbenzene | Hydrocarbon marker | 10. | tert-Butylbenzene | Hydrocarbon marker |
| 11. | n-Decane | Efficiency | 11. | n-Decane | Efficiency | 11. | n-Undecane | Efficiency |

Chemical Structures

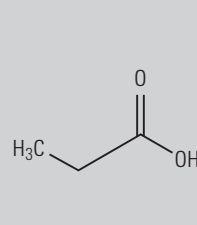


2,6-Dimethylphenol

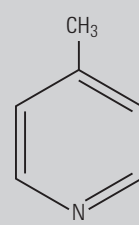


2,6-Dimethylaniline

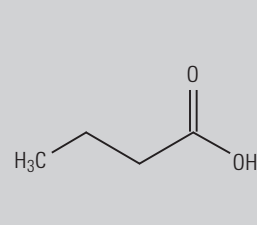
Weak probe molecules: The acidic and basic portions of these molecules are shielded by the two methyl groups on their phenyl rings, making them less probative.



1-Propionic acid



4-Picoline



1-Butyric acid

Strong probe molecules: The probes in Agilent's Ultra Inert test probe mixture are highly probative of the stationary phase and surface. Note, too, that the active end of each compound is available to interact with any active sites on the column.

DB-1ms Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|-------------------|-------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-0122UI</i> | |
| 0.25 | 15 | 0.25 | -60 to 325/350 | 122-0112UI | |
| | 30 | 0.25 | -60 to 325/350 | 122-0132UI | 122-0132UIE |
| | 60 | 0.25 | -60 to 325/350 | 122-0162UI | |
| 0.32 | 15 | 0.25 | -60 to 325/350 | 123-0112UI | |
| | 30 | 0.25 | -60 to 325/350 | 123-0132UI | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

HP-1ms Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|-----------------------|---------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091S-677UI</i> |
| 0.25 | 15 | 0.25 | -60 to 325/350 | 19091S-931UI |
| | 30 | 0.25 | -60 to 325/350 | 19091S-933UI |
| | | 0.50 | -60 to 325/350 | 19091S-633UI |
| | | 1.00 | -60 to 325/350 | 19091S-733UI |
| 0.32 | 15 | 0.25 | -60 to 325/350 | 19091S-911UI |
| | 25 | 0.52 | -60 to 325/350 | 19091S-612UI |
| | 30 | 0.25 | -60 to 325/350 | 19091S-913UI |
| | | 1.00 | -60 to 325/350 | 19091S-713UI |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

Similar Phases: SPB-1, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, ZB-1, AT-1, MDN-1, ZB-1, ZB-1ms

TIPS & TOOLS

Learn how to ensure an inert GC flow path with the *Agilent Ultra Inert Solutions Brochure*.
Order yours at www.agilent.com/chem/Ulorder



DB-5ms Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|----------------|-----------------------|-------------------|-------------|-------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5522UI</i> | | <i>121-5522UILTM</i> |
| | | <i>0.36</i> | <i>-60 to 325/350</i> | <i>121-5523UI</i> | | <i>121-5523UILTM</i> |
| 0.25 | 15 | 0.25 | -60 to 325/350 | 122-5512UI | | 122-5512UILTM |
| | | 1.00 | -60 to 325/350 | 122-5513UI | | |
| | 25 | 0.25 | -60 to 325/350 | 122-5522UI | | 122-5522UILTM |
| | | 30 | 0.25 | -60 to 325/350 | 122-5532UI | 122-5532UIE |
| | 0.50 | | -60 to 325/350 | 122-5536UI | | 122-5536UILTM |
| | 1.00 | | -60 to 325/350 | 122-5533UI | | 122-5533UILTM |
| | 50 | 0.25 | -60 to 325/350 | 122-5552UI | | |
| | 60 | 0.25 | -60 to 325/350 | 122-5562UI | | |
| 1.00 | | -60 to 325/350 | 122-5563UI | | | |
| 0.32 | 30 | 0.25 | -60 to 325/350 | 123-5532UI | 123-5532UIE | |
| | | 0.50 | -60 to 325/350 | 123-5536UI | | |
| | | 1.00 | -60 to 325/350 | 123-5533UI | | |
| | 60 | 1.00 | -60 to 325/350 | 123-5563UI | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, ZB-5MSi, SLB-5ms, Equity-5

HP-5ms Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------------------------|------------|-------------|-----------------------|---------------------|--------------|-------------------------|
| HP-5ms Ultra Inert | | | | | | |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091S-577UI</i> | | <i>19091S-577UILTM</i> |
| 0.25 | 15 | 0.25 | -60 to 325/350 | 19091S-431UI | | 19091S-431UILTM |
| | | 30 | 0.25 | -60 to 325/350 | 19091S-433UI | 19091S-433UIE |
| | 0.50 | | -60 to 325/350 | 19091S-133UI | | 19091S-133UILTM |
| | 1.00 | | -60 to 325/350 | 19091S-233UI | | 19091S-233UILTM |
| | 60 | 0.25 | -60 to 325/350 | 19091S-436UI | | |
| 0.32 | 30 | 0.25 | -60 to 325/350 | 19091S-413UI | | 19091S-413UILTM |
| | | 1.00 | -60 to 325/350 | 19091S-213UI | | 19091S-213UILTM |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, SLB-5ms, Equity-7

DB-35ms Ultra Inert

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|-------------|------------|------------------------|------------------------------------|-------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>50 to 340/360</i> | <i>121-3822UI</i> |
| 0.25 | 15 | 0.25 | 50 to 340/360 | 122-3812UI |
| | 30 | 0.25 | 50 to 340/360 | 122-3832UI |
| 0.32 | 15 | 0.25 | 50 to 340/360 | |
| | 30 | 0.25 | 50 to 340/360 | 123-3832UI |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

Similar Phases: Rtx-35, Rtx-35ms, Rxi-35Sil MS, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-34, ZB-35, ZB-35 ht

DB-624 Ultra Inert

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|-------------|------------|------------------------|------------------------------------|-------------------|
| <i>0.18</i> | <i>20</i> | <i>1.00</i> | <i>-20 to 260</i> | <i>121-1324UI</i> |
| 0.25 | 30 | 1.40 | -20 to 260 | 122-1334UI |
| | 60 | 1.40 | -20 to 260 | 122-1364UI |
| 0.32 | 30 | 1.80 | -20 to 260 | 123-1334UI |
| | 60 | 1.80 | -20 to 260 | 123-1364UI |
| 0.53 | 30 | 3.00 | -20 to 260 | 125-1334UI |
| | 75 | 3.00 | -20 to 260 | 125-1374UI |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Complete your Ultra Inert flow path with the industry leading Agilent Ultra Inert Inlet Liner, www.agilent.com/chem/uiliner



DB-Select 624 UI for <467>

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|----------------|-------------------|------------------|-------------------------|------------------|
| 0.25 | 30 | 1.40 | 40 to 260/260 | 122-0334UI |
| | 60 | 1.40 | 40 to 260/260 | 122-0364UI |
| 0.32 | 30 | 1.80 | 40 to 260/260 | 123-0334UI |
| | 60 | 1.80 | 40 to 260/260 | 123-0364UI |
| 0.53 | 30 | 3.00 | 40 to 260/260 | 125-0334UI |

DB-UI 8270D Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|----------------|-------------------|------------------|-------------------------|---|
| <i>0.18</i> | <i>20</i> | <i>0.36</i> | <i>-60 to 325/350</i> | <i>121-9723</i> <i>621-9723, 6/pk*</i> |
| 0.25 | 30 | 0.25 | -60 to 325/350 | 122-9732 |
| | | | -60 to 325/350 | 622-9732, 6/pk* |
| | | 0.50 | -60 to 325/350 | 122-9736 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

*Only available in the U.S.



Agilent J&W High Efficiency GC Capillary Columns

High efficiency, high-throughput, and high resolution without the high costs

This leading-edge column technology is ideal for applications that require faster run times, such as high-throughput screening, fast process monitoring, and fast method development. In fact, Agilent High Efficiency GC columns can reduce your sample run time by 50% or more without compromising resolution.

Unlike other manufacturers' 0.1 mm id columns, Agilent's 0.15 and 0.18 mm id High Efficiency Capillary GC columns are compatible with all standard pressure capillary GC and GC/MS instruments – without expensive high-pressure modifications. They also give you:

- The flexibility to choose between helium and hydrogen carrier gases. You can stay with a helium carrier if you wish to simplify method development, or switch to a hydrogen carrier to further reduce your analysis time.
- The ability to separate samples using less carrier gas, which can lead to longer intervals between cylinder changes, increased uptime, and a lower cost per sample.

In addition, these flexible columns easily adapt to a wide variety of environmental, petrochemical, flavor/fragrance, clinical toxicology, and pharmaceutical sample matrices.

The Agilent J&W High Efficiency GC columns throughout this section are displayed using italicized descriptions and part numbers in the ordering tables.

Low-bleed GC/MS Columns

There is a rapidly increasing population of benchtop GC/MS instruments in analytical laboratories that analyze a widening range of trace level, higher temperature samples. These samples require increasingly inert, lower bleed, higher temperature columns. In response to this growing need, Agilent Technologies designed several "ms" columns to chromatograph a broader range of low level samples and generate lower bleed even at higher temperatures.

What makes an Agilent J&W low-bleed column exceptional? Unique polymer chemistry and proprietary surface deactivation, both of which have contributed to columns that adhere to the tightest quality control specifications in the industry for bleed, inertness, selectivity and efficiency. Agilent J&W "ms" columns utilize special surface deactivation and siloxane chemistries which enhance the chromatographic performance of siloxane polymers.

The mass spectrum of septum bleed can look very much like GC column bleed, so the two are often confused. An easy way to tell the two apart: column bleed will be indicated by a rise in the baseline, not peaks. If you see bleed peaks, these generally come from lower quality septa or septa being used beyond their operating limits. To minimize septa contributions to background bleed, use quality Agilent BTO, Long-Life, or Advanced Green septa.



TIPS & TOOLS

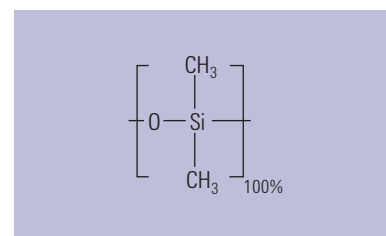
Check out Agilent's complete line of sample preparation products for any type of GC and GC/MS analysis at www.agilent.com/chem/sampleprep



DB-1ms

- 100% Dimethylpolysiloxane
- Identical selectivity to DB-1
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Improved acid performance compared to standard 100% dimethylpolysiloxane columns
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- 340/360 °C upper temperature limit
- Excellent general purpose column
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-1, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, ZB-1, AT-1, MDN-1, ZB-1, ZB-1ms



Structure of DB-1ms

DB-1ms

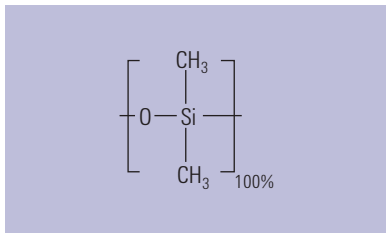
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 | |
|-------------|------------|-------------|-----------------------|-----------------|-----------|--------------------|--|
| | | | | | | LTM II Module | |
| 0.10 | 10 | 0.10 | -60 to 340/360 | 127-0112 | | 127-0112LTM | |
| | | 0.40 | -60 to 340/360 | 127-0113 | | | |
| | 20 | 0.10 | -60 to 340/360 | 127-0122 | | | |
| | | 0.40 | -60 to 340/360 | 127-0123 | | 127-0123LTM | |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 340/360</i> | <i>121-0122</i> | | <i>121-0122LTM</i> | |
| 0.20 | 12 | 0.33 | -60 to 340/350 | 128-0112 | | | |
| | 25 | 0.33 | -60 to 340/350 | 128-0122 | 128-0122E | 128-0122LTM | |
| 0.25 | 15 | 0.25 | -60 to 340/360 | 122-0112 | 122-0112E | 122-0112LTM | |
| | | 30 | 0.10 | -60 to 340/360 | 122-0131 | | |
| | 60 | 0.25 | -60 to 340/360 | 122-0132 | 122-0132E | | |
| | | 0.25 | -60 to 340/360 | 122-0162 | | | |
| 0.32 | 15 | 0.25 | -60 to 340/360 | 123-0112 | | | |
| | | 30 | 0.10 | -60 to 340/360 | 123-0131 | | |
| | 60 | 0.25 | -60 to 340/360 | 123-0132 | | | |
| | | 0.25 | -60 to 340/360 | 123-0162 | | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Learn how the Agilent 5975T LTM GC/MSD can deliver the rapid, reliable results you need in the field or in the lab,
www.agilent.com/chem/5975T





Structure of HP-1ms

HP-1ms

- 100% Dimethylpolysiloxane
- Identical selectivity to HP-1
- Non-polar
- Low bleed characteristics
- Excellent general purpose column
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rtx-1ms, Rxi-1ms, MDN-1, AT-1, ZB-1ms, Equity-1

HP-1ms

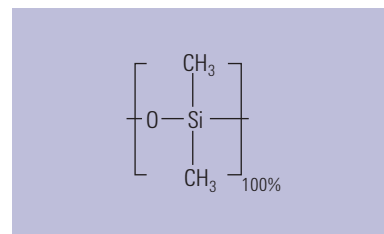
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module | |
|-------------|------------|----------------|-----------------------|-------------------|-------------|-------------------------|--|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091S-677</i> | | <i>19091S-677LTM</i> | |
| 0.20 | 25 | 0.33 | -60 to 325/350 | 19091S-602 | 19091S-602E | | |
| 0.25 | 15 | 0.25 | -60 to 325/350 | 19091S-931 | | | |
| | | 0.10 | -60 to 325/350 | 19091S-833 | | 19091S-833LTM | |
| | | 0.25 | -60 to 325/350 | 19091S-933 | 19091S-933E | 19091S-933LTM | |
| | | 0.50 | -60 to 325/350 | 19091S-633 | | 19091S-633LTM | |
| | | 1.00 | -60 to 325/350 | 19091S-733 | 19091S-733E | 19091S-733LTM | |
| 0.32 | 60 | 0.25 | -60 to 325/350 | 19091S-936 | 19091S-936E | | |
| | | 15 | 0.25 | -60 to 325/350 | 19091S-911 | | |
| | | 25 | 0.52 | -60 to 325/350 | 19091S-612 | | |
| | | 30 | 0.25 | -60 to 325/350 | 19091S-913 | 19091S-913E | |
| | | 1.00 | -60 to 325/350 | 19091S-713 | | 19091S-713LTM | |
| 60 | 0.25 | -60 to 325/350 | 19091S-916 | | | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

VF-1ms

- Highly inert, non-polar 100% dimethylpolysiloxane phase, low-bleed GC column providing increased sensitivity over a broad array of applications
- Ultra low bleed specification of 1 pA at 325 °C (30 m, 0.25 mm, 0.25 µm) for trace analysis with MS
- QC test results for retention index, efficiency, selectivity and bleed is reported with every column
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-1ms, Rxi-1ms, MDN-1, AT-1, ZB-1ms, Equity-1



Structure of VF-1ms

VF-1ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|---------------|-----------|
| 0.10 | 10 | 0.10 | -60 to 325/350 | CP8900 | |
| | | 0.40 | -60 to 325/350 | CP8901 | |
| | 20 | 0.10 | -60 to 325/350 | CP8902 | |
| | | 0.40 | -60 to 325/350 | CP8903 | |
| <i>0.15</i> | <i>10</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9030</i> | |
| | <i>15</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP5881</i> | |
| | <i>20</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9031</i> | |
| | | <i>0.60</i> | <i>-60 to 325/350</i> | <i>CP9032</i> | |
| 0.20 | 12 | 0.33 | -60 to 325/350 | CP8904 | |
| | 25 | 0.33 | -60 to 325/350 | CP8905 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)



Column shown with EZ-GRIP

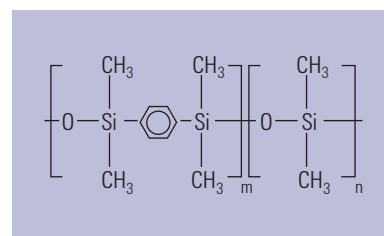
VF-1ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | |
|---------|------------|-----------|------------------|----------------|-----------|--|
| 0.25 | 15 | 0.10 | -60 to 325/350 | CP8906 | | |
| | | 0.25 | -60 to 325/350 | CP8907 | | |
| | | 1.00 | -60 to 325/350 | CP8908 | CP890815 | |
| | 25 | 0.25 | -60 to 325/350 | CP8909 | | |
| | | 0.40 | -60 to 325/350 | CP8910 | | |
| | 30 | 0.10 | -60 to 325/350 | CP8911 | | |
| | | 0.25 | -60 to 325/350 | CP8912 | CP891215 | |
| | | 1.00 | -60 to 325/350 | CP8913 | | |
| | 50 | 0.25 | -60 to 325/350 | CP8914 | | |
| | | 0.40 | -60 to 325/350 | CP8915 | | |
| | 60 | 0.25 | -60 to 325/350 | CP8916 | | |
| | | 1.00 | -60 to 325/350 | CP8917 | | |
| 0.32 | 15 | 0.10 | -60 to 325/350 | | | |
| | | 0.25 | -60 to 325/350 | CP8919 | | |
| | | 1.00 | -60 to 325/350 | | | |
| | 25 | 0.25 | -60 to 325/350 | CP8921 | | |
| | | 0.40 | -60 to 325/350 | CP8922 | | |
| | 30 | 0.10 | -60 to 325/350 | CP8923 | | |
| | | 0.25 | -60 to 325/350 | CP8924 | | |
| | | 0.50 | -60 to 325/350 | CP8925 | | |
| | 50 | 1.00 | -60 to 325/350 | CP8926 | | |
| | | 0.25 | -60 to 325/350 | | | |
| | 60 | 0.40 | -60 to 325/350 | CP8928 | | |
| | | 0.25 | -60 to 325/350 | CP8929 | | |
| | 60 | 1.00 | -60 to 325/350 | CP8930 | | |
| | | | | | | |
| | 0.53 | 15 | 0.50 | -60 to 325/350 | CP8965 | |
| | | | 1.50 | -60 to 325/350 | CP8967 | |
| | | 30 | 0.50 | -60 to 325/350 | CP8968 | |
| | | | 1.00 | -60 to 325/350 | CP8969 | |
| 1.50 | | | -60 to 310/335 | CP8970 | | |

DB-5ms

- Phenyl Arylene polymer virtually equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-5TA
- Close equivalent to USP Phase G27
- Test mix available

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, ZB-5MSi, SLB-5ms, Equity-5



Structure of DB-5ms



TIPS & TOOLS

Learn more about the Agilent 7890B GC System at www.agilent.com/chem/7890BGC

DB-5ms

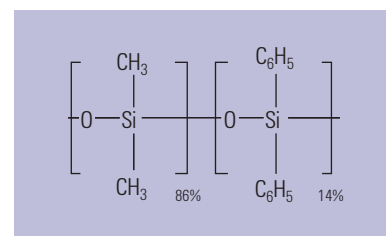
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|-------------|------------|----------------|-----------------------|-----------------|------------------|--------------------|
| | | | | | | LTM II Module |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5522</i> | <i>121-5522E</i> | <i>121-5522LTM</i> |
| | | <i>0.36</i> | <i>-60 to 325/350</i> | <i>121-5523</i> | | <i>121-5523LTM</i> |
| | <i>40</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5542</i> | | |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 128-5512 | | |
| | 25 | 0.33 | -60 to 325/350 | 128-5522 | | 128-5522LTM |
| | 50 | 0.33 | -60 to 325/350 | 128-5552 | | |
| 0.25 | 15 | 0.10 | -60 to 325/350 | 122-5511 | | 122-5511LTM |
| | | 0.25 | -60 to 325/350 | 122-5512 | | 122-5512LTM |
| | | 0.50 | -60 to 325/350 | 122-5516 | | |
| | | 1.00 | -60 to 325/350 | 122-5513 | | |
| | 25 | 0.25 | -60 to 325/350 | 122-5522 | | 122-5522LTM |
| | | 0.40 | -60 to 325/350 | | | |
| | 30 | 0.10 | -60 to 325/350 | 122-5531 | | |
| | | 0.25 | -60 to 325/350 | 122-5532 | 122-5532E | 122-5532LTM |
| | | 0.50 | -60 to 325/350 | 122-5536 | 122-5536E | |
| | | 1.00 | -60 to 325/350 | 122-5533 | 122-5533E | 122-5533LTM |
| | 50 | 0.25 | -60 to 325/350 | 122-5552 | | |
| | 60 | 0.10 | -60 to 325/350 | 122-5561 | | |
| 0.25 | | -60 to 325/350 | 122-5562 | 122-5562E | | |
| 1.00 | | -60 to 325/350 | 122-5563 | | | |
| 0.32 | 15 | 0.10 | -60 to 325/350 | 123-5511 | | |
| | | 0.25 | -60 to 325/350 | 123-5512 | | 123-5512LTM |
| | | 1.00 | -60 to 325/350 | 123-5513 | | 123-5513LTM |
| | 25 | 0.52 | -60 to 325/350 | 123-5526 | | |
| | 30 | 0.10 | -60 to 325/350 | 123-5531 | | |
| | | 0.25 | -60 to 325/350 | 123-5532 | 123-5532E | |
| | | 0.50 | -60 to 325/350 | 123-5536 | | 123-5536LTM |
| | | 1.00 | -60 to 325/350 | 123-5533 | | 123-5533LTM |
| | 60 | 0.10 | -60 to 325/350 | 123-5561 | | |
| | | 0.25 | -60 to 325/350 | 123-5562 | | |
| | | 0.50 | -60 to 325/350 | 123-5566 | | |
| | | 1.00 | -60 to 325/350 | 123-5563 | | |
| 0.53 | 15 | 1.50 | -60 to 300/320 | 125-5512 | | |
| | 30 | 0.50 | -60 to 300/320 | 125-5537 | | |
| | | 1.00 | -60 to 300/320 | 125-553J | | 125-553JLTM |
| | | 1.50 | -60 to 300/320 | 125-5532 | | 125-5532LTM |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



HP-5ms

- (5%-Phenyl)-methylpolysiloxane
- Identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27



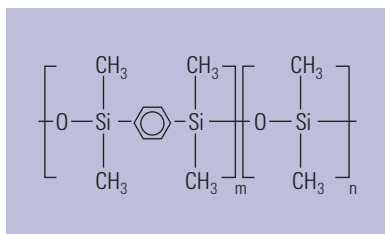
Structure of HP-5ms

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, SLB-5ms, Equity-5

HP-5ms

| ID | | | | | | 7890/6890 |
|-------------|------------|----------------|-----------------------|-------------------|-------------|----------------------|
| (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | LTM II Module |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091S-577</i> | | <i>19091S-577LTM</i> |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 19091S-101 | | 19091S-101LTM |
| | 25 | 0.33 | -60 to 325/350 | 19091S-102 | 19091S-102E | 19091S-102LTM |
| | 50 | 0.33 | -60 to 325/350 | 19091S-105 | | |
| 0.25 | 15 | 0.10 | -60 to 325/350 | 19091S-331 | | 19091S-331LTM |
| | | 0.25 | -60 to 325/350 | 19091S-431 | | 19091S-431LTM |
| | | 1.00 | -60 to 325/350 | 19091S-231 | | |
| | 30 | 0.10 | -60 to 325/350 | 19091S-333 | | |
| | | 0.25 | -60 to 325/350 | 19091S-433 | 19091S-433E | 19091S-433LTM |
| | | 0.50 | -60 to 325/350 | 19091S-133 | | |
| | | 1.00 | -60 to 325/350 | 19091S-233 | 19091S-233E | |
| | 60 | 0.10 | -60 to 325/350 | 19091S-336 | | |
| 0.25 | | -60 to 325/350 | 19091S-436 | 19091S-436E | | |
| 0.32 | 25 | 0.52 | -60 to 325/350 | 19091S-112 | 19091S-112E | |
| | | 0.10 | -60 to 325/350 | 19091S-313 | | |
| | 30 | 0.25 | -60 to 325/350 | 19091S-413 | 19091S-413E | 19091S-413LTM |
| | | 0.50 | -60 to 325/350 | 19091S-113 | | |
| | | 1.00 | -60 to 325/350 | 19091S-213 | | |
| 60 | 0.25 | -60 to 325/350 | 19091S-416 | | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-5ms

VF-5ms

- Highly inert 5% phenylmethyl column for increased sensitivity, accuracy and instrument uptime
- Minimal column bleed improves sensitivity – ultra low bleed specification of 1 pA at 325 °C (30 m x 0.25 mm, 0.25 µm)
- Slightly higher polarity than VF-1ms, results in improved selectivity for aromatic compounds; selectivity and excellent inertness make these columns applicable for a wide range of semi-polar and even polar compounds
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- QC test results for retention index, efficiency, selectivity and bleed is reported with every column
- Supplied with EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, ZB-5MSi, SLB-5ms, Equity-5

VF-5ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|-------------|-----------------------|-----------------------|---------------|-----------|
| 0.10 | 10 | 0.40 | -60 to 325/350 | CP8934 | |
| <i>0.15</i> | <i>10</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9034</i> | |
| | <i>15</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9035</i> | |
| | <i>20</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9036</i> | |
| | | <i>0.30</i> | <i>-60 to 325/350</i> | <i>CP9037</i> | |
| | <i>0.60</i> | <i>-60 to 325/350</i> | <i>CP9038</i> | | |
| 0.20 | <i>40</i> | <i>0.15</i> | <i>-60 to 325/350</i> | <i>CP9039</i> | |
| | 12 | 0.33 | -60 to 325/350 | CP8935 | |
| | 25 | 0.33 | -60 to 325/350 | CP8936 | |
| | 50 | 0.33 | -60 to 325/350 | CP8937 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

TIPS & TOOLS

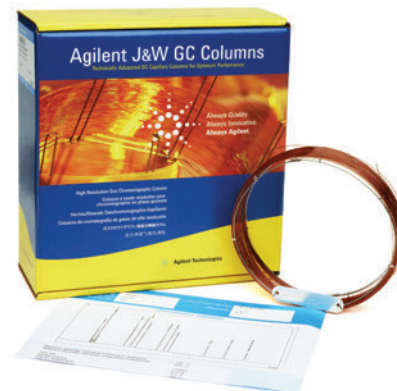


As part of Agilent's ongoing commitment to be your partner in chromatography, we have created a series of GC Troubleshooting videos, featuring Daron Decker, GC Applications Specialist, and Herb Brooks, Agilent Service Engineer. To view the videos, visit www.agilent.com/chem/gctroubleshooting



VF-5ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|----------------|------------------|-----------|-----------|
| 0.25 | 15 | 0.10 | -60 to 325/350 | CP8938 | |
| | | 0.25 | -60 to 325/350 | CP8939 | |
| | | 0.50 | -60 to 325/350 | CP8963 | |
| | | 1.00 | -60 to 325/350 | CP8940 | |
| | 25 | 0.25 | -60 to 325/350 | CP8941 | |
| | 30 | 0.10 | -60 to 325/350 | CP8943 | |
| | | 0.25 | -60 to 325/350 | CP8944 | CP8944I5 |
| | | 0.50 | -60 to 325/350 | CP8945 | |
| | | 1.00 | -60 to 325/350 | CP8946 | |
| | 50 | 0.25 | -60 to 325/350 | CP8947 | |
| | 60 | 0.10 | -60 to 325/350 | CP8948 | |
| | | 0.25 | -60 to 325/350 | CP8960 | |
| 1.00 | | -60 to 325/350 | CP8949 | | |
| 0.32 | 15 | 0.10 | -60 to 325/350 | CP8950 | |
| | | 0.25 | -60 to 325/350 | CP8951 | |
| | 25 | 0.52 | -60 to 325/350 | CP8953 | |
| | 30 | 0.25 | -60 to 325/350 | CP8955 | |
| | | 0.50 | -60 to 325/350 | CP8956 | |
| | | 1.00 | -60 to 325/350 | CP8957 | |
| | 50 | 0.25 | -60 to 325/350 | CP8958 | |
| | | 0.40 | -60 to 325/350 | CP8959 | |
| | 60 | 0.25 | -60 to 325/350 | CP8961 | |
| | | 1.00 | -60 to 325/350 | CP8962 | |
| 0.53 | 15 | 0.50 | -60 to 325/350 | CP8971 | |
| | 30 | 0.50 | -60 to 325/350 | CP8974 | |
| | | 1.00 | -60 to 325/350 | CP8975 | |
| | | 1.50 | -60 to 310/335 | CP8976 | |



Column on 5 in cage

DB-XLB

- Exceptionally low bleed
- Low polarity
- Extended temperature limit of 340/360 °C
- Unique selectivity
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Excellent for pesticides, herbicides, PCBs and PAHs
- Ideal for GC/MS
- Bonded and cross-linked
- Solvent rinsable

Note: DB-XLB is designed for inhibiting column bleed at high temperatures. It also appears to have inadvertently inherited an exceptional ability for separating many PCB congeners when used with MS detection. This stellar performance was maximized after careful optimization of the column dimensions, temperature programs, and carrier gas flow conditions.

(Frame, G. *Analytical Chemistry News & Features*, Aug. 1, 1997, 468A-475A)

Similar Phases: Rtx-XLB, MDN-12, ZB-XLB, ZB-XLB HT

DB-XLB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|----------------------|-----------------|----------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>30 to 340/360</i> | <i>121-1222</i> | |
| | <i>30</i> | <i>0.18</i> | <i>30 to 340/360</i> | <i>121-1232</i> | |
| 0.20 | 25 | 0.33 | 30 to 340/360 | 128-1222 | |
| 0.25 | 15 | 0.10 | 30 to 340/360 | 122-1211 | 122-1211LTM |
| | | 0.25 | 30 to 340/360 | 122-1212 | |
| | 30 | 0.10 | 30 to 340/360 | 122-1231 | |
| | | 0.25 | 30 to 340/360 | 122-1232 | 122-1232LTM |
| | | 0.50 | 30 to 340/360 | 122-1236 | |
| | 60 | 1.00 | 30 to 340/360 | 122-1233 | |
| 0.32 | 30 | 0.25 | 30 to 340/360 | 123-1232 | |
| | | 0.50 | 30 to 340/360 | 123-1236 | |
| | 60 | 0.25 | 30 to 340/360 | 123-1262 | |
| 0.53 | 15 | 1.50 | 30 to 320/340 | 125-1212 | |
| | 30 | 1.50 | 30 to 320/340 | 125-1232 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

VF-Xms

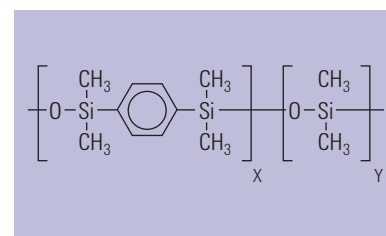
- High arylene modified phase for accurate results
- Isothermal applications up to 340 °C for a broad application range
- Ideal for confirmational analyses – more polar alternative to 5% phenyl columns
- Ultra low bleed delivers ultimate sensitivity and signal-to-noise ratio
- Provides exceptionally high selectivity for semivolatle compounds such as pesticides and delivers high resolution with short analysis time
- Very unique selectivity for chlorinated compounds
- QC test results for retention index, efficiency, selectivity and bleed is reported with every column
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-XLB, MDN-12, ZB-XLB, ZB-XLB HT

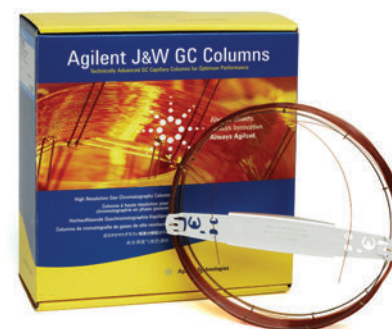
VF-Xms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|----------------------|---------------|
| <i>0.15</i> | <i>20</i> | <i>0.15</i> | <i>30 to 340/360</i> | <i>CP9041</i> |
| 0.20 | 25 | 0.33 | 30 to 340/360 | CP8801 |
| 0.25 | 30 | 0.10 | 30 to 340/360 | CP8805 |
| | | 0.25 | 30 to 340/360 | CP8806 |
| | | 0.50 | 30 to 340/360 | CP8807 |
| 0.32 | 60 | 0.25 | 30 to 340/360 | CP8809 |
| | 30 | 0.25 | 30 to 340/360 | CP8813 |
| | 60 | 0.25 | 30 to 340/360 | CP8816 |

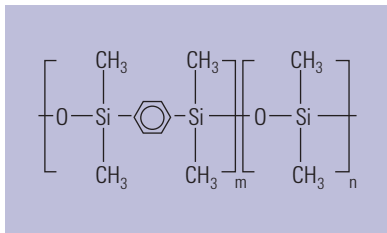
Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-Xms



Column shown with EZ-GRIP



Structure of DB-35ms

DB-35ms

- Virtually equivalent to a (35%-phenyl)-methylpolysiloxane
- Mid-polarity
- Very low bleed characteristics, ideal for GC/MS
- Extended temperature limit of 340/360 °C
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-35ms
- Close equivalent to USP Phase G42

Similar Phases: Rtx-35, Rtx-35ms, Rxi-35Sil MS, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-34, ZB-35, ZB-35 ht

DB-35ms

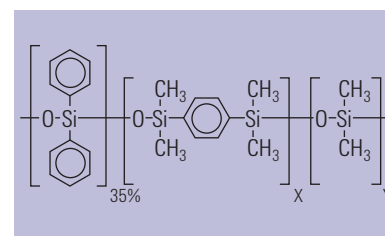
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|----------------------|-----------------|-----------|----------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>50 to 340/360</i> | <i>121-3822</i> | | |
| 0.20 | 15 | 0.33 | 50 to 340/360 | 128-3812 | | |
| | 25 | 0.33 | 50 to 340/360 | 128-3822 | | |
| 0.25 | 15 | 0.25 | 50 to 340/360 | 122-3812 | | |
| | 30 | 0.15 | 50 to 340/360 | 122-3831 | | |
| | 30 | 0.25 | 50 to 340/360 | 122-3832 | 122-3832E | 122-3832LTM |
| | 60 | 0.25 | 50 to 340/360 | 122-3862 | | |
| 0.32 | 15 | 0.25 | 50 to 340/360 | 123-3812 | | |
| | 30 | 0.25 | 50 to 340/360 | 123-3832 | 123-3832E | |
| 0.53 | 30 | 0.50 | 50 to 320/340 | 125-3837 | | |
| | 30 | 1.00 | 50 to 320/340 | 125-3832 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

VF-35ms

- Stabilized arylene-modified equivalent of a 35% phenylmethyl phase
- Ideal for dual column confirmational analyses
- Ultra low bleed, highly stable column with a programmable maximum temperature of 360 °C
- Medium polarity column ideal for trace environmental and chemical analyses
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-35, Rtx-35ms, Rxi-35Sil MS, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-34, ZB-35, ZB-35 ht

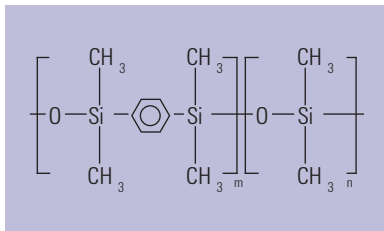


Structure of VF-35ms

VF-35ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|----------------------|---------------|
| <i>0.15</i> | <i>10</i> | <i>0.15</i> | <i>40 to 340/360</i> | <i>CP5887</i> |
| | <i>20</i> | <i>0.15</i> | <i>40 to 340/360</i> | <i>CP5889</i> |
| 0.20 | 15 | 0.33 | 40 to 340/360 | CP8872 |
| | 25 | 0.33 | 40 to 340/360 | CP8873 |
| 0.25 | 15 | 0.25 | 40 to 340/360 | CP8874 |
| | | 0.10 | 40 to 340/360 | CP8875 |
| | 30 | 0.25 | 40 to 340/360 | CP8877 |
| | | 0.50 | 40 to 340/360 | CP8878 |
| | | 1.00 | 40 to 340/360 | CP8879 |
| | 60 | 0.25 | 40 to 340/360 | CP8880 |
| 0.32 | 30 | 0.25 | 40 to 340/360 | CP8882 |
| | | 0.50 | 40 to 340/360 | CP8883 |
| | | 1.00 | 40 to 340/360 | CP8884 |
| 0.53 | 30 | 1.00 | 40 to 325/350 | CP8888 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of DB-17ms

DB-17ms

- Virtually equivalent to (50%-phenyl)-methylpolysiloxane
- 320/340 °C upper temperature limit
- Very low bleed mid-polarity column, ideal for GC/MS
- Excellent inertness for active compounds
- Enhanced mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Excellent choice for CLP pesticides

Similar Phases: Rxi-17Sil MS, Rtx-50, 007-17, SP-2250, SPB-50, BPX-50, SPB-17, AT-50

DB-17ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|-------------|------------|-------------|----------------------|-----------------|-----------|--------------------|
| | | | | | | LTM II Module |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>40 to 320/340</i> | <i>121-4722</i> | | <i>121-4722LTM</i> |
| 0.25 | 15 | 0.15 | 40 to 320/340 | 122-4711 | | 122-4711LTM |
| | | 0.25 | 40 to 320/340 | 122-4712 | | 122-4712LTM |
| | 30 | 0.15 | 40 to 320/340 | 122-4731 | | |
| | | 0.25 | 40 to 320/340 | 122-4732 | 122-4732E | 122-4732LTM |
| 0.32 | 15 | 0.25 | 40 to 320/340 | 123-4712 | | |
| | 30 | 0.25 | 40 to 320/340 | 123-4732 | | 123-4732LTM |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



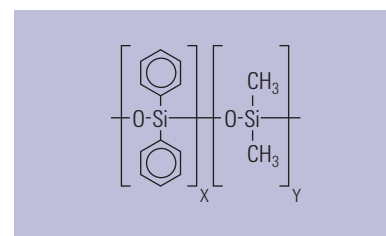
TIPS & TOOLS

View the latest GC column focused applications, products and educational resources at www.agilent.com/chem/myGCColumns

VF-17ms

- 50% phenyl/50% dimethylpolysiloxane, medium polarity phase
- Ultra low bleed
- Proprietary deactivation technology and manufacturing process improves column stability, resulting in improved column-to-column repeatability and column lifetimes
- Ideal for environmental and clinical methods
- Ultra low bleed specification at 2 pA at 325 °C (0.25 mm x 30 m, 0.25 µm)
- Ideal EPA confirmation column for ultimate confidence
- Bonded and cross-linked
- Solvent rinsable
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rxi-17Sil MS, Rtx-50, 007-17, SP-2250, SPB-50, BPX-50, SPB-17, AT-50

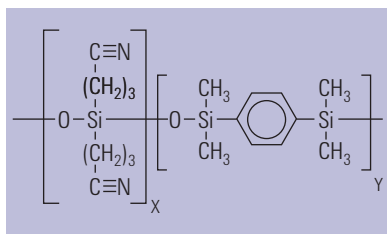


Structure of VF-17ms

VF-17ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|----------------------|---------------|-----------|
| 0.10 | 10 | 0.20 | 40 to 330/360 | CP8977 | |
| <i>0.15</i> | <i>10</i> | <i>0.15</i> | <i>40 to 330/360</i> | <i>CP5882</i> | |
| | <i>15</i> | <i>0.15</i> | <i>40 to 330/360</i> | <i>CP5883</i> | |
| | <i>20</i> | <i>0.15</i> | <i>40 to 330/360</i> | <i>CP5884</i> | |
| 0.25 | 15 | 0.25 | 40 to 330/360 | CP8979 | |
| | 15 | 0.50 | 40 to 330/360 | CP8980 | |
| | 30 | 0.15 | 40 to 330/360 | CP8981 | |
| | | | | CP8982 | CP898215 |
| | | | | CP8983 | |
| | 60 | 0.25 | 40 to 330/360 | CP8984 | |
| 0.32 | 15 | 0.15 | 40 to 330/360 | CP8986 | |
| | 30 | 0.25 | 40 to 330/360 | CP8990 | |
| | | 0.50 | 40 to 330/360 | CP8991 | |
| 0.53 | 15 | 1.00 | 40 to 330/360 | CP8996 | |
| | | 1.50 | 40 to 310/340 | CP8998 | |
| | 30 | 1.00 | 40 to 310/340 | CP9001 | |
| | | 1.50 | 40 to 310/340 | CP9002 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-23ms

VF-23ms

- High polarity and highly substituted cyanopropyl low bleed phase
- Engineered for accurate analysis of very polar analytes
- 100% bonded phase permits column rinsing to enhance column lifetime
- Operating temperature up to 260 °C
- Expands application ranges to higher molecular weight compounds
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SP-2330, Rtx-2330, 007-23, AT-Silar, BPX-70, SP-2340

VF-23ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|---------------|-----------|
| 0.25 | 30 | 0.15 | 40 to 260/260 | CP8821 | |
| | | 0.25 | 40 to 260/260 | CP8822 | CP882215 |
| | 60 | 0.25 | 40 to 260/260 | CP8824 | CP882415 |
| 0.32 | 30 | 0.25 | 40 to 260/260 | CP8827 | |
| | | 60 | 0.15 | 40 to 260/260 | CP8828 |
| | | | 0.25 | 40 to 260/260 | CP8829 |
| 0.53 | 30 | 0.50 | 40 to 245/245 | CP8831 | |

VF-200ms

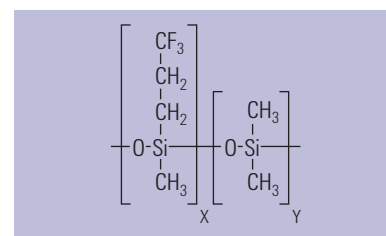
- Trifluoropropyl phase has very high temperature stability and can be used routinely up to 350 °C
- Ideally suited for analyses of ketones, aldehydes, nitro- or chloro-containing compounds, PAHs, unsaturated compounds, silanes, and CFCs
- Optimized deactivation for symmetrical peak shape
- Ultra-low bleed for trace analysis
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-200

VF-200ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | |
|-------------|------------|--------------|---------------------|---------------|-----------|----------|
| <i>0.15</i> | <i>20</i> | <i>0.15</i> | <i>0 to 325/350</i> | <i>CP5891</i> | | |
| | | <i>0.60</i> | <i>0 to 325/350</i> | <i>CP5892</i> | | |
| 0.25 | 15 | 0.25 | 0 to 325/350 | CP8855 | | |
| | | 30 | 0.10 | 0 to 325/350 | CP8857 | |
| | | | 0.25 | 0 to 325/350 | CP8858 | |
| | | | 0.50 | 0 to 325/350 | CP8859 | CP885915 |
| | | | 1.00 | 0 to 325/350 | CP8860 | |
| 60 | 0.25 | 0 to 325/350 | CP8861 | | | |
| 0.32 | 30 | 0.50 | 0 to 325/350 | CP8864 | | |
| | | 1.00 | 0 to 325/350 | CP8865 | | |
| 0.53 | 30 | 0.50 | 0 to 300/325 | CP8867 | | |
| | | 1.00 | 0 to 300/325 | CP8868 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-200ms

DB-225ms

- Virtually equivalent to (50%-cyanopropylphenyl)-methylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMES)
- Low bleed
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G7

Similar Phases: SP-2330, Rtx-225, BP-225, OV-225, 007-225, AT-225

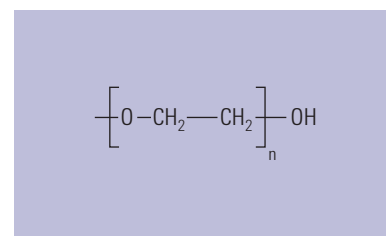
DB-225ms

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | | | LTM II Module |
| 0.25 | 15 | 0.25 | 40 to 240 | 122-2912 | | 122-2912LTM |
| | 30 | 0.25 | 40 to 240 | 122-2932 | 122-2932E | 122-2932LTM |
| | 60 | 0.25 | 40 to 240 | 122-2962 | | |
| 0.32 | 30 | 0.25 | 40 to 240 | 123-2932 | | |

VF-WAXms

- Specially designed WAX phase designed for accurate MS results with polar compounds
- Operating temperature range of 20 °C to 250 °C
- Improves signal-to-noise ratio for trace analyses
- Ideal for GC/MS food, flavor and fragrance applications, especially where trace analyses are required
- Ultra low bleed provides increased sensitivity and extended column lifetime at higher temperatures
- Improved performance with no change in the typical selectivity of PEG
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, Rtx-WAX, ZB-WAX, ZB-WAX plus



Structure of VF-WAXms

VF-WAXms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|----------------------|---------------|-----------|
| 0.10 | 10 | 0.10 | 20 to 250/260 | CP9219 | |
| | | 0.20 | 20 to 250/260 | CP9218 | |
| | 20 | 0.10 | 20 to 250/260 | CP9229 | |
| <i>0.15</i> | <i>15</i> | <i>0.15</i> | <i>20 to 250/260</i> | <i>CP9201</i> | |
| | <i>20</i> | <i>0.15</i> | <i>20 to 250/260</i> | <i>CP9220</i> | |
| | <i>30</i> | <i>0.15</i> | <i>20 to 250/260</i> | <i>CP9202</i> | |
| 0.25 | 15 | 0.25 | 20 to 250/260 | CP9203 | |
| | | 0.50 | 20 to 250/260 | CP9221 | |
| | 25 | 0.20 | 20 to 250/260 | CP9204 | |
| | | 30 | 0.25 | 20 to 250/260 | CP9205 |
| | 0.50 | | 20 to 250/260 | CP9222 | |
| | 1.00 | | 20 to 240 | CP9206 | |
| | 60 | 0.25 | 20 to 250/260 | CP9207 | |
| | | 0.50 | 20 to 240 | CP9223 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

VF-WAXms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.32 | 30 | 0.25 | 20 to 250/260 | CP9212 | |
| | | 0.50 | 20 to 250/260 | CP9210 | |
| | | 1.00 | 20 to 240 | CP9211 | |
| | 60 | 0.25 | 20 to 250/260 | CP9214 | |
| | | 0.50 | 20 to 240 | CP9225 | |
| | | 1.00 | 20 to 230 | CP9213 | |
| 0.53 | 15 | 1.00 | 20 to 250/260 | CP9226 | |
| | | 2.00 | 20 to 240 | | |
| | 30 | 1.00 | 20 to 240 | CP9215 | |
| | | 2.00 | 20 to 230 | CP9216 | |
| | 60 | 1.00 | 20 to 230 | CP9228 | |
| | | 2.00 | 20 to 220 | CP9217 | |



TIPS & TOOLS

As a special MS-type phase, the VF-WAXms column generates less bleed, and therefore less noise and higher signal-to-noise ratios for critical components.

VF-624ms and VF-1301ms

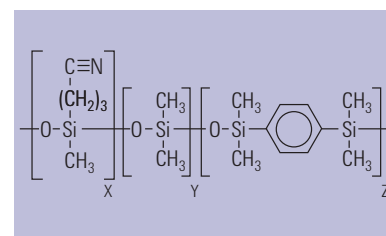
- VF-624ms is designed for analyzing solvents according to EPA Methods 524, 624 and 8260, as well as USP 467
- VF-1301ms ultra-low-bleed thin-film has a similar selectivity to 624 and is suitable for semivolatile organic solvents, as well as PCBs and pesticides
- Enhanced selectivity for USP 467 eliminates co-elution of benzene and 1,2-dichloroethane
- Mid polarity
- Low bleed
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: AT-624, Rxi-624 Sil MS, Rtx-624, PE-624, 007-624, 007-502, ZB-624

VF-624ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|---------------|-----------|
| <i>0.15</i> | <i>15</i> | <i>0.84</i> | <i>-40 to 280/300</i> | <i>CP9101</i> | |
| | <i>20</i> | <i>0.84</i> | <i>-40 to 280/300</i> | <i>CP9100</i> | |
| | <i>30</i> | <i>0.84</i> | <i>-40 to 280/300</i> | <i>CP9109</i> | |
| | <i>40</i> | <i>0.84</i> | <i>-40 to 280/300</i> | <i>CP9110</i> | |
| 0.25 | 30 | 1.40 | -40 to 280/300 | CP9102 | CP910215 |
| | 60 | 1.40 | -40 to 280/300 | CP9103 | CP910315 |
| 0.32 | 30 | 1.80 | -40 to 280/300 | CP9104 | CP910415 |
| | 60 | 1.80 | -40 to 280/300 | CP9105 | |
| 0.53 | 30 | 3.00 | -40 to 280/300 | CP9106 | CP910615 |
| | 60 | 3.00 | -40 to 265/280 | CP9107 | |
| | 75 | 3.00 | -40 to 265/280 | CP9108 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-624ms and VF-1301ms

Similar Phases: Rtx-1301, PE-1301

VF-1301ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.10 | 10 | 1.00 | -40 to 280/300 | CP9066 |
| 0.25 | 30 | 0.25 | -40 to 280/300 | CP9053 |
| | | 1.00 | -40 to 280/300 | CP9054 |
| | 60 | 0.25 | -40 to 280/300 | CP9055 |
| | | 1.00 | -40 to 280/300 | CP9056 |
| 0.32 | 15 | 0.25 | -40 to 280/300 | CP9057 |
| | | 1.00 | -40 to 280/300 | CP9058 |
| 0.53 | 15 | 1.00 | -40 to 280/300 | CP9062 |
| | 30 | 1.00 | -40 to 280/300 | CP9063 |
| | | 1.50 | -40 to 280/300 | CP9064 |

TIPS & TOOLS



Ensure a lifetime of peak performance and maximum productivity with Agilent's comprehensive GC supplies portfolio. Learn more at www.agilent.com/chem/GCsupplies



VF-1701ms

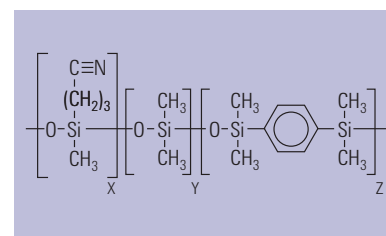
- Ultra-low bleed 14% cyanopropyl/phenyl/86% polydimethylsiloxane phase
- Mid polarity
- Ideal for pesticides, PCBs and semi-volatile organic compounds
- Highly inert for difficult analytes such as p,p'-DDT
- Deactivated for accurate trace analysis
- Engineered for reduced bleed, (bleed specification is 2 pA at 280 °C for a 0.25 mm x 60 m, 0.25 µm id column)
- 0.15 mm id columns available for high efficiency GC and GC/MS analyses
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SPB-1701, Rtx-1701, BP-10, OV-1701, 007-1701, ZB-1701

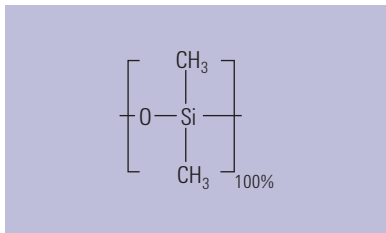
VF-1701ms

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|---------------|-----------|
| <i>0.15</i> | <i>20</i> | <i>0.15</i> | <i>-20 to 280/300</i> | <i>CP9145</i> | |
| 0.25 | 30 | 0.15 | -20 to 280/300 | CP9150 | |
| | | 0.25 | -20 to 280/300 | CP9151 | CP915115 |
| | | 1.00 | -20 to 280/300 | CP9152 | CP915215 |
| | 60 | 0.25 | -20 to 280/300 | CP9154 | |
| 0.32 | 30 | 0.25 | -20 to 280/300 | CP9162 | |
| | | 1.00 | -20 to 280/300 | CP9163 | |
| | 60 | 0.25 | -20 to 280/300 | CP9165 | |
| | | 1.00 | -20 to 280/300 | CP9166 | |
| 0.53 | 30 | 0.50 | -20 to 280/300 | CP9170 | |
| | | 1.00 | -20 to 280/300 | CP9171 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of VF-1701ms



Structure of DB-1

Premium Polysiloxane Columns

Polysiloxanes are the most common stationary phases. They are available in the greatest variety and are stable, robust and versatile. Standard polysiloxanes are characterized by the repeating siloxane backbone. Each silicon atom contains two functional groups. The type and percent level of substitution of the groups distinguish each stationary phase and its properties.

DB-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

Similar Phases: SPB-1, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, ZB-1, AT-1, MDN-1, ZB-1

DB-1

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|----------------|------------------|----------------|-------------|---------------|
| | | | | | | LTM II Module |
| 0.05 | 10 | 0.05 | -60 to 325/350 | 126-1012 | | |
| | | 0.20 | -60 to 325/350 | 126-1013 | | |
| 0.10 | 5 | 0.12 | -60 to 325/350 | 127-100A | | 127-100ALTM |
| | | 0.10 | -60 to 325/350 | 127-1012 | 127-1012E | |
| | 0.40 | -60 to 325/350 | 127-1013 | 127-1013E | 127-1013LTM | |
| | | 0.10 | -60 to 325/350 | 127-1022 | 127-1022E | |
| | 0.40 | -60 to 325/350 | 127-1023 | | 127-1023LTM | |
| | | 40 | 0.20 | -60 to 325/350 | 127-1046 | 127-1046E |
| | 0.40 | -60 to 325/350 | 127-1043 | | | |

(Continued)

DB-1

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|-------------|------------|-------------|-----------------------|-----------------|------------------|---------------------|
| | | | | | | LTM II Module |
| <i>0.15</i> | <i>10</i> | <i>1.20</i> | <i>-60 to 325/350</i> | <i>12A-1015</i> | | <i>12A-1015LTM</i> |
| <i>0.18</i> | <i>10</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-1012</i> | <i>121-1012E</i> | <i>121-1012LTM</i> |
| | | <i>0.20</i> | <i>-60 to 325/350</i> | <i>121-101A</i> | | <i>121-101ALTM</i> |
| | | <i>0.40</i> | <i>-60 to 325/350</i> | <i>121-1013</i> | | <i>121-1013LTM</i> |
| | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-1022</i> | <i>121-1022E</i> | <i>121-1022LTM</i> |
| | | <i>0.40</i> | <i>-60 to 325/350</i> | <i>121-1023</i> | | <i>121-1023LTM</i> |
| | <i>40</i> | <i>0.40</i> | <i>-60 to 325/350</i> | <i>121-1043</i> | | |
| <i>0.20</i> | <i>12</i> | <i>0.33</i> | <i>-60 to 325/350</i> | <i>128-1012</i> | | <i>128-1012LTM</i> |
| | <i>25</i> | <i>0.33</i> | <i>-60 to 325/350</i> | <i>128-1022</i> | | <i>128-1022LTM</i> |
| | <i>30</i> | <i>0.80</i> | <i>-60 to 325/350</i> | <i>128-1034</i> | | |
| | <i>50</i> | <i>0.33</i> | <i>-60 to 325/350</i> | <i>128-1052</i> | | |
| <i>0.25</i> | <i>15</i> | <i>0.10</i> | <i>-60 to 325/350</i> | <i>122-1011</i> | | |
| | | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-1012</i> | | <i>122-1012LTM</i> |
| | | <i>1.00</i> | <i>-60 to 325/350</i> | <i>122-1013</i> | | |
| | <i>25</i> | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-1022</i> | | <i>122-1022LTM</i> |
| | <i>30</i> | <i>0.10</i> | <i>-60 to 325/350</i> | <i>122-1031</i> | | |
| | | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-1032</i> | <i>122-1032E</i> | <i>122-1032LTM*</i> |
| | | <i>0.50</i> | <i>-60 to 325/350</i> | <i>122-103E</i> | | <i>122-103ELTM</i> |
| | | <i>1.00</i> | <i>-60 to 325/350</i> | <i>122-1033</i> | <i>122-1033E</i> | <i>122-1033LTM</i> |
| | <i>50</i> | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-1052</i> | | |
| | <i>60</i> | <i>0.10</i> | <i>-60 to 325/350</i> | <i>122-1061</i> | | |
| | | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-1062</i> | | |
| | | <i>0.50</i> | <i>-60 to 325/350</i> | <i>122-106E</i> | | |
| | | <i>1.00</i> | <i>-60 to 325/350</i> | <i>122-1063</i> | | |
| | <i>100</i> | <i>0.50</i> | <i>-60 to 325/350</i> | <i>122-10AE</i> | | |
| | <i>150</i> | <i>1.00</i> | <i>-60 to 325/350</i> | <i>122-10G3</i> | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

DB-1

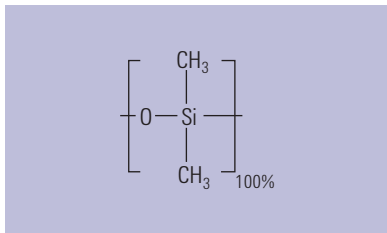
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 | |
|---------|------------|----------------|------------------|-----------|-----------|---------------|-------------|
| | | | | | | LTM II Module | |
| 0.32 | 15 | 0.10 | -60 to 325/350 | 123-1011 | | 123-1011LTM | |
| | | 0.25 | -60 to 325/350 | 123-1012 | | 123-1012LTM | |
| | | 1.00 | -60 to 325/350 | 123-1013 | | | |
| | | 3.00 | -60 to 280/300 | 123-1014 | | | |
| | | 5.00 | -60 to 280/300 | 123-1015 | | 123-1015LTM | |
| | 25 | 0.12 | -60 to 325/350 | 123-1027 | | | |
| | | 0.25 | -60 to 325/350 | 123-1022 | | | |
| | | 0.52 | -60 to 325/350 | 123-1026 | | | |
| | | 1.05 | -60 to 325/350 | 123-102F | | | |
| | 30 | 0.10 | -60 to 325/350 | 123-1031 | | | |
| | | 0.25 | -60 to 325/350 | 123-1032 | | | 123-1032LTM |
| | | 0.50 | -60 to 325/350 | 123-103E | | | 123-103ELTM |
| | | 1.00 | -60 to 325/350 | 123-1033 | 123-1033E | | 123-1033LTM |
| | | 1.50 | -60 to 300/320 | 123-103B | | | 123-103BLTM |
| | | 3.00 | -60 to 280/300 | 123-1034 | | | |
| | | 5.00 | -60 to 280/300 | 123-1035 | | | 123-1035LTM |
| | 50 | 0.25 | -60 to 325/350 | 123-1052 | | | |
| | | 0.52 | -60 to 325/350 | 123-1056 | | | |
| | | 1.05 | -60 to 325/350 | 123-105F | | | |
| | | 1.20 | -60 to 325/350 | 123-105C | | | |
| 5.00 | | -60 to 280/300 | 123-1055 | | | | |
| 60 | 0.10 | -60 to 325/350 | 123-1061 | | | | |
| | 0.25 | -60 to 325/350 | 123-1062 | 123-1062E | | | |
| | 0.50 | -60 to 325/350 | 123-106E | | | | |
| | 1.00 | -60 to 325/350 | 123-1063 | 123-1063E | | | |
| | 1.50 | -60 to 300/320 | 123-106B | 123-106BE | | | |
| | 2.00 | -60 to 280/300 | 123-106G | | | | |
| | 3.00 | -60 to 280/300 | 123-1064 | 123-1064E | | | |
| | 5.00 | -60 to 280/300 | 123-1065 | 123-1065E | | | |
| 0.45 | 30 | 1.27 | -60 to 325/350 | 124-1032 | | | |
| | | 2.55 | -60 to 260/280 | 124-1034 | | | |

(Continued)



DB-1

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|------------------------|------------------------------------|-----------|-------------|---------------|
| | | | | | | LTM II Module |
| 0.53 | 5 | 2.65 | -60 to 325/350 | 125-100B | | |
| | | 5.00 | -60 to 325/350 | 125-1005 | | 125-1005LTM |
| 7.5 | 1.50 | -60 to 325/350 | 125-1002 | | | |
| 10 | 2.65 | -60 to 260/280 | 125-10HB | 125-10HBE | 125-10HBLTM | |
| | | 5.00 | -60 to 260/280 | 125-10H5 | | |
| 15 | 0.15 | -60 to 340/360 | 125-1011 | 125-1011E | 125-1011LTM | |
| | | -60 to 320/340 | 125-101K | | | |
| | | -60 to 300/320 | 125-1017 | | | |
| | | -60 to 300/320 | 125-101J | | | |
| | | -60 to 300/320 | 125-1012 | 125-1012E | 125-1012LTM | |
| | | -60 to 260/280 | 125-1014 | | | |
| | | -60 to 260/280 | 125-1015 | | | 125-1015LTM |
| 25 | 1.00 | -60 to 300/320 | 125-102J | | | |
| | | -60 to 260/280 | 125-1025 | | | 125-1025LTM |
| 30 | 0.10 | -60 to 340/360 | 125-1039 | | | |
| | | -60 to 320/340 | 125-103K | 125-103KE | 125-103KLTM | |
| | | -60 to 300/320 | 125-1037 | | | |
| | | -60 to 300/320 | 125-103J | | | 125-103JLTM |
| | | -60 to 300/320 | 125-1032 | | | 125-1032LTM |
| | | -60 to 260/280 | 125-103B | | | |
| | | -60 to 260/280 | 125-1034 | 125-1034E | 125-1034LTM | |
| | | -60 to 260/280 | 125-1035 | 125-1035E | 125-1035LTM | |
| 50 | 5.00 | -60 to 260/280 | 125-1055 | | | |
| 60 | 1.00 | -60 to 300/320 | 125-106J | 125-106JE | | |
| | | -60 to 300/320 | 125-1062 | 125-1062E | | |
| | | -60 to 260/280 | 125-1064 | | | |
| | | -60 to 260/280 | 125-1065 | 125-1065E | | |
| 105 | 5.00 | -60 to 260/280 | 125-10B5 | | | |



Structure of HP-1

HP-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column – "Industry Standard"
- Wide range of applications
- Superior performance for low molecular weight alcohols (<C₅)
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

Similar Phases: SPB-1, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, ZB-1, AT-1, MDN-1, ZB-1

HP-1

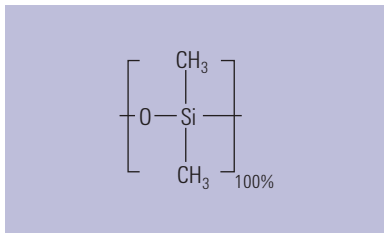
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|-----------------------|-------------------|--------------------|-------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091Z-577</i> | <i>19091Z-577E</i> | |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 19091-60312 | | |
| | 17 | 0.11 | -60 to 325/350 | 19091Z-008 | | |
| | 25 | 0.11 | -60 to 325/350 | 19091Z-002 | | 19091Z-002LTM |
| | | 0.33 | -60 to 325/350 | 19091Z-102 | 19091Z-102E | |
| | | 0.50 | -60 to 325/350 | 19091Z-202 | | 19091Z-202LTM |
| | 50 | 0.11 | -60 to 325/350 | 19091Z-005 | | |
| | | 0.33 | -60 to 325/350 | 19091Z-105 | | |
| | | 0.50 | -60 to 325/350 | 19091Z-205 | | |
| 0.25 | 15 | 0.10 | -60 to 325/350 | 19091Z-331 | | |
| | | 0.25 | -60 to 325/350 | 19091Z-431 | | |
| | | 1.00 | -60 to 325/350 | 19091Z-231 | | |
| | 30 | 0.10 | -60 to 325/350 | 19091Z-333 | | |
| | | 0.25 | -60 to 325/350 | 19091Z-433 | 19091Z-433E | |
| | | 1.00 | -60 to 325/350 | 19091Z-233 | 19091Z-233E | |
| | 60 | 0.25 | -60 to 325/350 | 19091Z-436 | | |
| | | 1.00 | -60 to 325/350 | 19091Z-236 | 19091Z-236E | |
| | | 100 | 0.50 | -60 to 325/350 | 19091Z-530 | 19091Z-530E |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

HP-1

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------|------------|----------------|------------------|-------------|-------------|----------------------------|
| 0.32 | 15 | 0.25 | -60 to 325/350 | 19091Z-411 | | |
| | | 1.00 | -60 to 325/350 | 19091Z-211 | | |
| | 25 | 0.17 | -60 to 325/350 | 19091Z-012 | | 19091Z-012LTM |
| | | 0.52 | -60 to 325/350 | 19091Z-112 | 19091Z-112E | |
| | | 1.05 | -60 to 325/350 | 19091Z-212 | | |
| | 30 | 0.10 | -60 to 325/350 | 19091Z-313 | | 19091Z-313LTM |
| | | 0.25 | -60 to 325/350 | 19091Z-413 | 19091Z-413E | |
| | | 1.00 | -60 to 325/350 | 19091Z-213 | 19091Z-213E | |
| | | 3.00 | -60 to 260/280 | 19091Z-513 | 19091Z-513E | |
| | | 4.00 | -60 to 260/280 | 19091Z-613 | | 19091Z-613LTM |
| | | 5.00 | -60 to 260/280 | 19091Z-713 | 19091Z-713E | 19091Z-713LTM |
| | 50 | 0.17 | -60 to 325/350 | 19091Z-015 | | |
| | | 0.52 | -60 to 325/350 | 19091Z-115 | 19091Z-115E | |
| | | 1.05 | -60 to 325/350 | 19091Z-215 | | |
| | 60 | 0.25 | -60 to 325/350 | 19091Z-416 | | |
| 1.00 | | -60 to 325/350 | 19091Z-216 | 19091Z-216E | | |
| 5.00 | | -60 to 260/280 | 19091Z-716 | | | |
| 0.53 | 5 | 0.15 | -60 to 320/400 | 19095Z-220 | | |
| | | 0.88 | -60 to 320/400 | 19095Z-020 | | |
| | | 2.65 | -60 to 260/280 | 19095S-100 | 19095S-100E | |
| | 7.5 | 5.00 | -60 to 260/280 | 19095Z-627 | | |
| | 10 | 0.88 | -60 to 300/320 | 19095Z-021 | 19095Z-021E | 19095Z-021LTM |
| | | 2.65 | -60 to 260/280 | 19095Z-121 | 19095Z-121E | 19095Z-121LTM |
| | 15 | 0.15 | -60 to 320/400 | 19095Z-221 | 19095Z-221E | |
| | | 1.50 | -60 to 300/320 | 19095Z-321 | | |
| | | 3.00 | -60 to 260/280 | 19095Z-421 | | |
| | | 5.00 | -60 to 260/280 | 19095Z-621 | | |
| | 30 | 0.88 | -60 to 300/320 | 19095Z-023 | 19095Z-023E | 19095Z-023LTM |
| | | 1.50 | -60 to 300/320 | 19095Z-323 | 19095Z-323E | |
| | | 2.65 | -60 to 260/280 | 19095Z-123 | 19095Z-123E | 19095Z-123LTM |
| | | 3.00 | -60 to 260/280 | 19095Z-423 | 19095Z-423E | |
| | | 5.00 | -60 to 260/280 | 19095Z-623 | 19095Z-623E | 19095Z-623LTM |
| | 60 | 5.00 | -60 to 260/280 | 19095Z-626 | | |



Structure of CP-Sil 5 CB

CP-Sil 5 CB

- 100% Dimethylpolysiloxane
- Non-polar
- General purpose phase
- Bonded and cross-linked
- Solvent rinsable
- Available in fused silica or UltiMetal
- Separation almost entirely based on boiling points, making this column suitable for a wide range of applications with a broad temperature range
- High temperature limit
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SPB-1, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, ZB-1, AT-1, MDN-1, ZB-1

CP-Sil 5 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|---------------|-----------|
| 0.10 | 10 | 0.10 | -60 to 330/350 | CP7311 | |
| | | 0.12 | -60 to 330/350 | CP7310 | |
| <i>0.15</i> | <i>10</i> | <i>0.12</i> | <i>-60 to 330/350</i> | <i>CP7684</i> | |
| | | <i>2.00</i> | <i>-60 to 325/350</i> | <i>CP7682</i> | |
| | <i>25</i> | <i>0.12</i> | <i>-60 to 330/350</i> | <i>CP7694</i> | |
| | | <i>1.20</i> | <i>-60 to 325/350</i> | <i>CP7693</i> | |
| | | <i>2.00</i> | <i>-60 to 325/350</i> | <i>CP7692</i> | |
| | | | | | |
| 0.20 | 25 | 0.33 | -60 to 325/350 | CP7622 | |
| 0.25 | 10 | 0.12 | -60 to 330/350 | CP7700 | |
| | | 0.25 | -60 to 330/350 | CP8510 | |
| | 25 | 0.12 | -60 to 330/350 | CP7710 | |
| | | 0.25 | -60 to 330/350 | CP7441 | |
| | | 0.40 | -60 to 325/350 | CP7709 | |
| | | 1.20 | -60 to 325/350 | CP7670 | CP7670I5 |
| | 30 | 0.10 | -60 to 330/350 | CP8710 | |
| | | 0.25 | -60 to 330/350 | CP8741 | CP8741I5 |
| | | 1.00 | -60 to 325/350 | CP8770 | |
| | 50 | 0.12 | -60 to 330/350 | CP7720 | |
| | | 0.25 | -60 to 330/350 | CP7443 | CP7443I5 |
| | | 0.40 | -60 to 325/350 | CP7719 | |
| | 60 | 0.25 | -60 to 330/350 | CP8743 | |
| | | 1.00 | -60 to 325/350 | CP8780 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

CP-Sil 5 CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|-----------|
| 0.32 | 10 | 0.12 | -60 to 330/350 | CP7730 | |
| | | 1.20 | -60 to 325/350 | CP7758 | |
| | 15 | 0.10 | -60 to 330/350 | CP8529 | |
| | | 0.25 | -60 to 325/350 | CP8530 | |
| | | 3.00 | -60 to 325/350 | CP8550 | |
| | | 1.00 | -60 to 325/350 | CP8540 | |
| | | 5.00 | -60 to 300/325 | CP8560 | |
| | 25 | 0.12 | -60 to 330/350 | CP7740 | |
| | | 0.25 | -60 to 325/350 | CP7442 | |
| | | 0.40 | -60 to 325/350 | CP7739 | |
| | | 0.52 | -60 to 325/350 | CP8430 | |
| | | 1.20 | -60 to 325/350 | CP7760 | |
| | | 5.00 | -60 to 300/325 | CP7680 | CP7680I5 |
| | 30 | 0.25 | -60 to 325/350 | CP8742 | |
| | | 1.00 | -60 to 325/350 | CP8760 | |
| | | 3.00 | -60 to 310/335 | CP8687 | CP8687I5 |
| | | 5.00 | -60 to 300/325 | CP8688 | CP8688I5 |
| | 50 | 0.12 | -60 to 330/335 | CP7750 | CP7750I5 |
| | | 0.25 | -60 to 325/350 | CP7444 | |
| | | 0.40 | -60 to 325/350 | CP7749 | CP7749I5 |
| 1.20 | | -60 to 325/350 | CP7770 | CP7770I5 | |
| 5.00 | | -60 to 300/325 | CP7690 | CP7690I5 | |
| 60 | 0.25 | -60 to 325/350 | CP8744 | | |
| | 1.00 | -60 to 325/350 | CP8870 | | |
| | 3.00 | -60 to 310/335 | CP8689 | | |
| | 5.00 | -60 to 300/325 | CP8690 | CP8690I5 | |

(Continued)

CP-Sil 5 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | |
|---------|------------|----------------|------------------|-----------|-----------|--|
| 0.53 | 10 | 1.00 | -60 to 315/340 | CP7625 | | |
| | | 2.00 | -60 to 305/330 | CP7620 | | |
| | | 5.00 | -60 to 290/325 | CP7645 | | |
| | 15 | 0.15 | -60 to 330/350 | CP8673 | | |
| | | 1.50 | -60 to 305/330 | CP8674 | | |
| | | 3.00 | -60 to 300/325 | CP8675 | | |
| | | 5.00 | -60 to 290/325 | CP8676 | | |
| | 20 | 5.00 | -60 to 290/325 | CP8774 | | |
| | 25 | 1.00 | -60 to 315/340 | CP7635 | | |
| | | 2.00 | -60 to 305/330 | CP7630 | | |
| | | 5.00 | -60 to 290/325 | CP7675 | | |
| | 30 | 1.50 | -60 to 305/330 | CP8735 | CP873515 | |
| | | 2.00 | -60 to 305/330 | CP8730 | | |
| | | 3.00 | -60 to 300/325 | CP8677 | | |
| | | 5.00 | -60 to 290/325 | CP8775 | | |
| | 50 | 1.00 | -60 to 315/340 | CP7695 | | |
| | | 2.00 | -60 to 305/330 | CP7640 | | |
| | | 5.00 | -60 to 290/325 | CP7685 | CP768515 | |
| 60 | 1.50 | -60 to 305/330 | CP8799 | | | |
| | 5.00 | -60 to 290/325 | CP8685 | | | |
| 100 | 0.50 | -60 to 325/350 | CP7608 | | | |
| | 5.00 | -60 to 290/325 | CP7688 | | | |

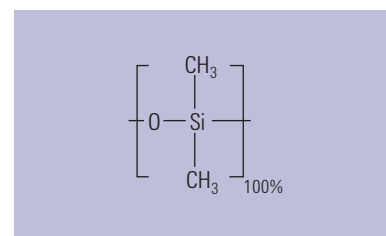
CP-Sil 5 CB UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 10 | 2.00 | -60 to 325/350 | CP7150 |
| | | 5.00 | -60 to 325/350 | CP6666 |
| | 25 | 0.50 | -60 to 325/350 | CP7135 |
| | | 2.00 | -60 to 325/350 | CP7160 |
| | | 5.00 | -60 to 325/350 | CP6670 |
| | 50 | 1.00 | -60 to 325/350 | CP7140 |
| | | 2.00 | -60 to 325/350 | CP7170 |
| | | 5.00 | -60 to 325/350 | CP6671 |

Ultra 1

- 100% Dimethylpolysiloxane
- Non-polar
- Equivalent to HP-1 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-1, Rtx-1, BP-1, 007-1(MS)



Structure of Ultra 1

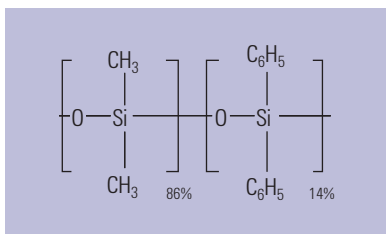
Ultra 1

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|----------------|-------------|
| 0.20 | 12 | 0.33 | -60 to 325/350 | 19091A-101 | |
| | | 0.11 | -60 to 325/350 | 19091A-008 | |
| | 17 | 0.33 | -60 to 325/350 | 19091A-108 | |
| | | 0.11 | -60 to 325/350 | 19091A-002 | |
| | 25 | 0.33 | -60 to 325/350 | 19091A-102 | 19091A-102E |
| | | | 0.11 | -60 to 325/350 | 19091A-005 |
| 0.32 | 25 | 0.33 | -60 to 325/350 | 19091A-105 | |
| | | 0.17 | -60 to 325/350 | 19091A-012 | |
| | 50 | 0.52 | -60 to 325/350 | 19091A-112 | |
| | | 0.17 | -60 to 325/350 | 19091A-015 | |
| | 50 | 0.52 | -60 to 325/350 | 19091A-115 | |

TIPS & TOOLS

Agilent CrossLab GC supplies, including CrossLab Ultra Inert liners, perform seamlessly with a variety of instruments regardless of make or model, including Varian (now Bruker), PerkinElmer, Shimadzu, and Thermo Scientific GC systems. Learn more at www.agilent.com/chem/CrossLab





Structure of Ultra 2

Ultra 2

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Equivalent to HP-5 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-5, Rtx-5, BP-5, CB-5, 007-5, 2B-5

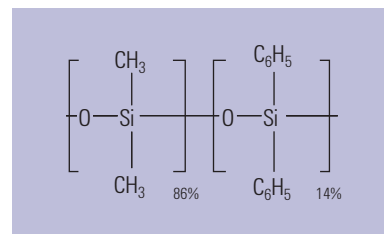
Ultra 2

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|------------|-------------|---------------|
| | | | | | | LTM II Module |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 19091B-101 | | 19091B-101LTM |
| | | 0.11 | -60 to 325/350 | 19091B-002 | | |
| | 50 | 0.33 | -60 to 325/350 | 19091B-102 | 19091B-102E | 19091B-102LTM |
| | | 0.11 | -60 to 325/350 | 19091B-005 | | |
| | | 0.33 | -60 to 325/350 | 19091B-105 | 19091B-105E | |
| 0.32 | 25 | 0.17 | -60 to 325/350 | 19091B-012 | 19091B-012E | |
| | | 0.52 | -60 to 325/350 | 19091B-112 | | 19091B-112LTM |
| | 50 | 0.17 | -60 to 325/350 | 19091B-015 | | |
| | | 0.52 | -60 to 325/350 | 19091B-115 | 19091B-115E | |

DB-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

Similar Phases: SPB-5, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, ZB-5, AT-5, MDN-5, ZB-5



Structure of DB-5

DB-5

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|-------------|------------|-------------|-----------------------|-----------------|------------------|--------------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.10 | 10 | 0.10 | -60 to 325/350 | 127-5012 | 127-5012E | 127-5012LTM |
| | | 0.17 | -60 to 325/350 | 127-501E | | 127-501ELTM |
| | | 0.33 | -60 to 325/350 | 127-501N | | |
| | | 0.40 | -60 to 325/350 | 127-5013 | | 127-5013LTM |
| 20 | | 0.10 | -60 to 325/350 | 127-5022 | | |
| | | 0.40 | -60 to 325/350 | 127-5023 | | |
| <i>0.15</i> | <i>10</i> | <i>1.20</i> | <i>-60 to 300/320</i> | <i>12A-5015</i> | | <i>12A-5015LTM</i> |
| <i>0.18</i> | <i>10</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5012</i> | <i>121-5012E</i> | <i>121-5012LTM</i> |
| | | <i>0.40</i> | <i>-60 to 325/350</i> | <i>121-5013</i> | | <i>121-5013LTM</i> |
| | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5022</i> | <i>121-5022E</i> | <i>121-5022LTM</i> |
| | | <i>0.40</i> | <i>-60 to 325/350</i> | <i>121-5023</i> | | <i>121-5023LTM</i> |
| <i>40</i> | | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5042</i> | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

DB-5

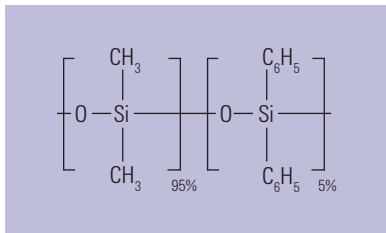
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 | |
|---------|------------|----------------|------------------|----------------|-----------|---------------|-------------|
| | | | | | | LTM II Module | |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 128-5012 | | | |
| | 15 | 0.20 | -60 to 325/350 | 128-50H7 | | | |
| | 25 | 0.33 | -60 to 325/350 | 128-5022 | | 128-5022LTM | |
| | 50 | 0.33 | -60 to 325/350 | 128-5052 | | | |
| 0.25 | 15 | 0.10 | -60 to 325/350 | 122-5011 | | | |
| | | 0.25 | -60 to 325/350 | 122-5012 | | 122-5012LTM | |
| | | 0.50 | -60 to 325/350 | 122-501E | | | |
| | | 1.00 | -60 to 325/350 | 122-5013 | | | |
| | 25 | 0.25 | -60 to 325/350 | 122-5022 | | | |
| | 30 | 0.10 | -60 to 325/350 | 122-5031 | | | |
| | | 0.25 | -60 to 325/350 | 122-5032 | 122-5032E | 122-5032LTM | |
| | | 0.50 | -60 to 325/350 | 122-503E | | 122-503ELTM | |
| | | 1.00 | -60 to 325/350 | 122-5033 | 122-5033E | 122-5033LTM | |
| | 50 | 0.25 | -60 to 325/350 | 122-5052 | | | |
| | 60 | 0.10 | -60 to 325/350 | 122-5061 | | | |
| | | 0.25 | -60 to 325/350 | 122-5062 | | | |
| | | 0.50 | -60 to 325/350 | 122-506E | | | |
| | | 1.00 | -60 to 325/350 | 122-5063 | | | |
| | 0.32 | 10 | 0.50 | -60 to 325/350 | 123-500E | | 123-500ELTM |
| | | | 1.00 | -60 to 325/350 | 123-500 | | |
| 15 | | 0.10 | -60 to 325/350 | 123-5011 | | | 123-5011LTM |
| | | 0.25 | -60 to 325/350 | 123-5012 | 123-5012E | 123-5012LTM | |
| | | 1.00 | -60 to 325/350 | 123-5013 | 123-5013E | 123-5013LTM | |
| 25 | | 0.17 | -60 to 325/350 | 123-502D | | | |
| | | 0.25 | -60 to 325/350 | 123-5022 | | 123-5022LTM | |
| | | 0.52 | -60 to 325/350 | 123-5026 | | | |
| | | 1.05 | -60 to 325/350 | 123-502F | | | |
| 30 | | 0.10 | -60 to 325/350 | 123-5031 | | | |
| | | 0.25 | -60 to 325/350 | 123-5032 | 123-5032E | 123-5032LTM | |
| | | 0.50 | -60 to 325/350 | 123-503E | | 123-503ELTM | |
| | | 1.00 | -60 to 325/350 | 123-5033 | 123-5033E | | |
| | | 1.50 | -60 to 325/350 | 123-503B | | 123-503BLTM | |
| 50 | | 0.25 | -60 to 325/350 | 123-5052 | | | |
| | | 0.52 | -60 to 325/350 | 123-5056 | | | |
| | 1.00 | -60 to 325/350 | 123-5053 | | | | |
| 60 | 0.25 | -60 to 325/350 | 123-5062 | | | | |
| | 1.00 | -60 to 325/350 | 123-5063 | | | | |

(Continued)



DB-5

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage | 7890/6890 | | |
|---------|------------|------------------------|------------------------------------|----------------|-----------|---------------|-------------|--|
| | | | | | | LTM II Module | | |
| 0.45 | 30 | 0.42 | -60 to 300/320 | 124-5037 | | | | |
| | | 1.27 | -60 to 300/320 | 124-5032 | | | | |
| 0.53 | 10 | 2.65 | -60 to 260/280 | 125-50HB | | | | |
| | | 15 | 0.25 | -60 to 300/320 | 125-501K | | | |
| | | | 0.50 | -60 to 300/320 | 125-5017 | | | |
| | 1.00 | | -60 to 300/320 | 125-501J | | | | |
| | 25 | 5.00 | 1.50 | -60 to 300/320 | 125-5012 | 125-5012E | 125-5012LTM | |
| | | | | -60 to 260/280 | 125-5025 | | | |
| | 30 | 0.25 | | -60 to 300/320 | 125-503K | | | |
| | | | | -60 to 300/320 | 125-5037 | | | |
| | | | | -60 to 300/320 | 125-503D | | | |
| | | | | -60 to 300/320 | 125-503J | | | |
| | | | | -60 to 300/320 | 125-5032 | 125-5032E | 125-5032LTM | |
| | | | | -60 to 260/280 | 125-503B | | | |
| | | | | -60 to 260/280 | 125-5034 | | | |
| 60 | 5.00 | | -60 to 260/280 | 125-5035 | 125-5035E | 125-5035LTM | | |
| | | 1.50 | -60 to 300/320 | 125-5062 | | | | |
| | | 5.00 | -60 to 260/280 | 125-5065 | 125-5065E | | | |



Structure of HP-5

HP-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

Similar Phases: SPB-5, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, ZB-5, AT-5, MDN-5, ZB-5

HP-5

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|-----------------------|-------------------|--------------------|----------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>19091J-577</i> | <i>19091J-577E</i> | <i>19091J-577LTM</i> |
| 0.20 | 12 | 0.33 | -60 to 325/350 | 19091J-101 | | |
| | 17 | 0.33 | -60 to 325/350 | 19091J-108 | | |
| | 25 | 0.11 | -60 to 325/350 | 19091J-002 | | |
| | | 0.33 | -60 to 325/350 | 19091J-102 | 19091J-102E | |
| | | 0.50 | -60 to 325/350 | 19091J-202 | | |
| | 50 | 0.11 | -60 to 325/350 | 19091J-005 | | |
| | | 0.33 | -60 to 325/350 | 19091J-105 | 19091J-105E | |
| | | 0.50 | -60 to 325/350 | 19091J-205 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

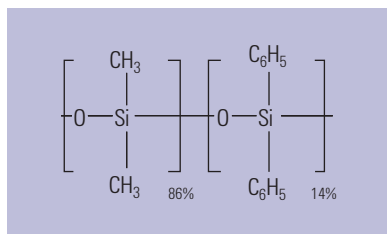
HP-5

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | | | 7890/6890 |
|---------|------------|----------------|------------------|-------------|-------------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 5 | 0.10 | -60 to 325/350 | 19091J-330 | | 19091J-330LTM |
| | 15 | 0.25 | -60 to 325/350 | 19091J-431 | 19091J-431E | |
| | | 1.00 | -60 to 325/350 | 19091J-231 | | |
| | 30 | 0.10 | -60 to 325/350 | 19091J-333 | | |
| | | 0.25 | -60 to 325/350 | 19091J-433 | 19091J-433E | 19091J-433LTM |
| | | 1.00 | -60 to 325/350 | 19091J-233 | | 19091J-233LTM |
| | 60 | 0.25 | -60 to 325/350 | 19091J-436 | 19091J-436E | |
| 1.00 | | -60 to 325/350 | 19091J-236 | | | |
| 0.32 | 15 | 0.25 | -60 to 325/350 | 19091J-411 | | 19091J-411LTM |
| | 25 | 0.17 | -60 to 325/350 | 19091J-012 | | |
| | | 0.52 | -60 to 325/350 | 19091J-112 | 19091J-112E | |
| | | 1.05 | -60 to 325/350 | 19091J-212 | | |
| | 30 | 0.10 | -60 to 325/350 | 19091J-313 | | |
| | | 0.25 | -60 to 325/350 | 19091J-413 | 19091J-413E | 19091J-413LTM |
| | | 0.50 | -60 to 325/350 | 19091J-113 | 19091J-113E | 19091J-113LTM |
| | | 1.00 | -60 to 325/350 | 19091J-213 | 19091J-213E | |
| | 50 | 0.17 | -60 to 325/350 | 19091J-015 | | |
| | | 0.52 | -60 to 325/350 | 19091J-115 | 19091J-115E | |
| | | 1.05 | -60 to 325/350 | 19091J-215 | 19091J-215E | |
| 60 | 0.25 | -60 to 325/350 | 19091J-416 | | | |
| | 1.00 | -60 to 325/350 | 19091J-216 | 19091J-216E | | |
| 0.53 | 10 | 2.65 | -60 to 260/280 | 19095J-121 | 19095J-121E | 19095J-121LTM |
| | 15 | 1.50 | -60 to 300/320 | 19095J-321 | | |
| | | 5.00 | -60 to 260/280 | 19095J-621 | | |
| | 30 | 0.88 | -60 to 300/320 | 19095J-023 | 19095J-023E | |
| | | 1.50 | -60 to 300/320 | 19095J-323 | 19095J-323E | |
| | | 2.65 | -60 to 260/280 | 19095J-123 | 19095J-123E | |
| | | 5.00 | -60 to 260/280 | 19095J-623 | 19095J-623E | |

TIPS & TOOLS

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Structure of CP-Sil 8 CB

CP-Sil 8 CB

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- General purpose phase
- Bonded and cross-linked
- Solvent rinsable
- Low bleed
- High column-to-column reproducibility
- Wide choice of dimensions available
- Available in fused silica and UltiMetal
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SPB-5, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, ZB-5, AT-5, MDN-5, ZB-5

CP-Sil 8 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|-----------------------|---------------|-----------|
| <i>0.15</i> | <i>10</i> | <i>0.12</i> | <i>-60 to 330/350</i> | <i>CP7884</i> | |
| 0.25 | 15 | 0.25 | -60 to 330/350 | CP8511 | |
| | | 1.00 | -60 to 325/350 | CP8521 | |
| 25 | 25 | 0.12 | -60 to 330/350 | CP7711 | |
| | | 0.25 | -60 to 330/350 | CP7451 | |
| | | 1.20 | -60 to 325/350 | CP7671 | |
| 30 | 30 | 0.25 | -60 to 330/350 | CP8751 | |
| | | 1.00 | -60 to 325/350 | CP8771 | |
| 50 | 50 | 0.12 | -60 to 330/350 | CP7721 | |
| | | 0.25 | -60 to 330/350 | CP7453 | CP7453I5 |
| | | 0.40 | -60 to 325/350 | CP7769 | |
| 60 | 60 | 0.10 | -60 to 325/350 | CP8750 | |
| | | 0.25 | -60 to 330/350 | CP8753 | |
| | | 1.00 | -60 to 325/350 | CP8781 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

CP-Sil 8 CB

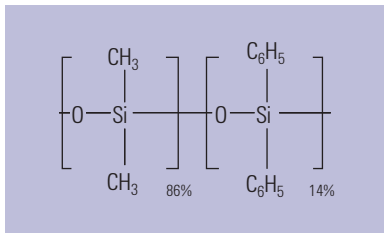
| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | |
|---------|------------|-----------|------------------|----------------|-----------|--|
| 0.32 | 10 | 0.12 | -60 to 330/350 | CP7731 | | |
| | | 5.00 | -60 to 300/325 | CP8014 | | |
| | 15 | 0.25 | -60 to 325/350 | CP8531 | | |
| | | 1.00 | -60 to 325/350 | CP8541 | | |
| | 25 | 0.12 | -60 to 330/350 | CP7741 | CP77415 | |
| | | 0.25 | -60 to 325/350 | CP7452 | | |
| | | 0.40 | -60 to 325/350 | CP7779 | | |
| | | 0.52 | -60 to 325/350 | CP8431 | | |
| | | 1.20 | -60 to 325/350 | CP7761 | | |
| | | 5.00 | -60 to 300/325 | CP7681 | | |
| | | 30 | 0.10 | -60 to 330/350 | CP8791 | |
| | 50 | 0.25 | -60 to 325/350 | CP8752 | | |
| | | 1.00 | -60 to 325/350 | CP8761 | | |
| | | 5.00 | -60 to 300/325 | CP7691 | CP76915 | |
| | 60 | 0.25 | -60 to 325/350 | CP8754 | | |
| | | 1.00 | -60 to 325/350 | CP8871 | | |
| | 0.53 | 10 | 2.00 | -60 to 305/330 | CP7621 | |
| | | | 5.00 | -60 to 290/325 | CP7646 | |
| 15 | | 1.50 | -60 to 305/330 | CP8678 | | |
| 25 | | 2.00 | -60 to 305/330 | CP7631 | | |
| | | 1.00 | -60 to 315/340 | CP7636 | | |
| | | 5.00 | -60 to 290/325 | CP7656 | | |
| 30 | | 0.50 | -60 to 325/350 | CP8716 | | |
| | | 1.50 | -60 to 305/330 | CP8736 | CP873615 | |
| | | 5.00 | -60 to 290/325 | CP8756 | | |
| 50 | | 1.00 | -60 to 315/340 | CP7696 | | |
| | | 2.00 | -60 to 305/330 | CP7641 | | |
| | | 5.00 | -60 to 290/325 | CP7666 | | |
| 60 | | 1.50 | -60 to 305/330 | CP8796 | | |
| 100 | | 5.00 | -60 to 290/325 | CP7676 | | |



Column shown with EZ-GRIP

CP-Sil 8 CB UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 25 | 5.00 | -60 to 325/350 | CP6680 |
| | 50 | 0.50 | -60 to 325/350 | CP7196 |



Structure of CP-Sil 13 CB
(with 14% phenyl substitution)

CP-Sil 13 CB

- 14% Phenyl/86% dimethylpolysiloxane
- Mid polarity phase
- Specially developed for the analysis of medium polarity compounds
- Ideal for confirmational analyses using ECD
- Bonded and cross-linked
- Solvent rinsable
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: Rtx-20

CP-Sil 13 CB

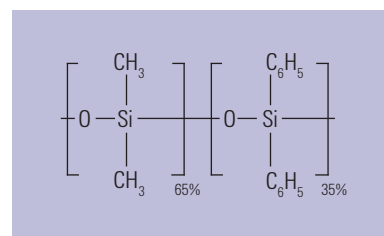
| ID (mm) | Length (m) | Film (μ m) | Temp Limits ($^{\circ}$ C) | 7 in Cage | 5 in Cage |
|-------------|------------|-----------------|-----------------------------|---------------|-----------|
| <i>0.15</i> | <i>25</i> | <i>0.40</i> | <i>-25 to 300/330</i> | <i>CP7813</i> | |
| 0.25 | 25 | 0.20 | -25 to 300/330 | CP7906 | |
| | | 1.20 | -25 to 300/330 | CP7977 | |
| | 50 | 0.20 | -25 to 300/330 | CP7907 | |
| | | 0.40 | -25 to 300/330 | CP7917 | |
| 0.32 | 25 | 0.20 | -25 to 300/330 | CP7926 | CP7926I5 |
| | | 0.40 | -25 to 300/330 | CP7936 | |
| | | 1.20 | -25 to 300/330 | CP7946 | |
| | 50 | 0.40 | -25 to 300/330 | CP7937 | |
| | | 1.20 | -25 to 300/330 | CP7947 | |
| | | | | | |
| 0.53 | 25 | 1.00 | -25 to 300/330 | CP7619 | |
| | | 2.00 | -25 to 300/330 | CP7649 | |
| | 50 | 1.00 | -25 to 300/330 | CP7629 | |
| | | 2.00 | -25 to 300/330 | CP7659 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

DB-35

- (35%-Phenyl)-methylpolysiloxane
- Mid polarity – slightly more polar than HP-35
- Low bleed
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

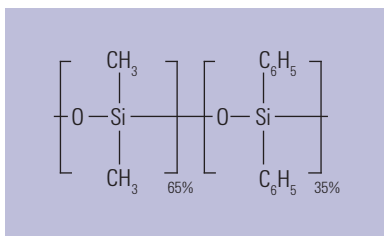
Similar Phases: Rtx-35, Rtx-35ms, Rxi-35Sil MS, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-34, ZB-35, ZB-35 ht



Structure of DB-35

DB-35

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | | | LTM II Module |
| 0.25 | 30 | 0.25 | 40 to 300/320 | 122-1932 | | |
| | 60 | 0.25 | 40 to 300/320 | 122-1962 | | |
| 0.32 | 30 | 0.25 | 40 to 300/320 | 123-1932 | | |
| | | 0.50 | 40 to 300/320 | 123-1933 | 123-1933E | 123-1933LTM |
| 0.53 | 15 | 1.00 | 40 to 280/300 | 125-1912 | | |
| | 30 | 0.50 | 40 to 280/300 | 125-1937 | | |
| | | 1.00 | 40 to 280/300 | 125-1932 | | 125-1932LTM |



Structure of HP-35

HP-35

- (35%-Phenyl)-methylpolysiloxane
- Mid polarity – slightly less polar than DB-35
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

Similar Phases: Rtx-35ms, Rxi-35Sil MS, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-34, ZB-35, ZB-35 ht

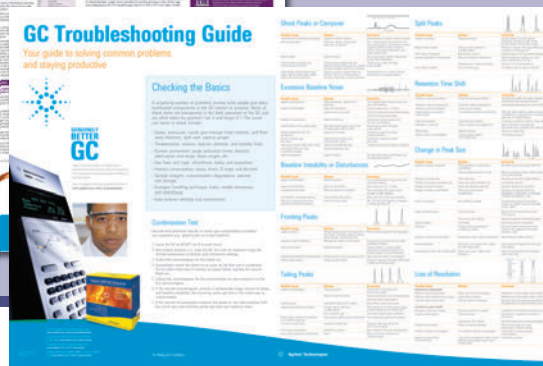
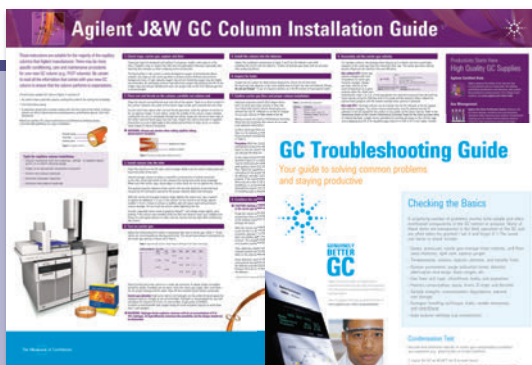
HP-35

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|------------|-------------|---------------|
| | | | | | | LTM II Module |
| 0.25 | 15 | 0.25 | 40 to 300/320 | 19091G-131 | 19091G-131E | 19091G-131LTM |
| | 30 | 0.25 | 40 to 300/320 | 19091G-133 | | |
| 0.32 | 30 | 0.25 | 40 to 300/320 | 19091G-113 | | |
| | | 0.50 | 40 to 300/320 | 19091G-213 | | |



TIPS & TOOLS

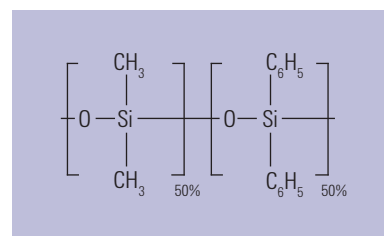
Order your free GC troubleshooting and GC column installation posters at www.agilent.com/chem/GCposteroffer



DB-17

- (50%-Phenyl)-methylpolysiloxane
- Mid polarity – slightly more polar than HP-50+
- Excellent for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

Similar Phases: Rtx-50, 007-17(MPS-50), SP-2250, SPB-50, ZB-50, AT-50

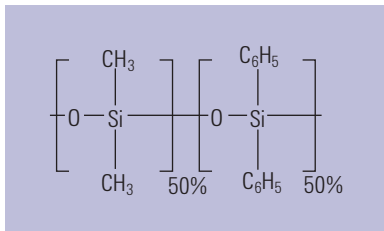


Structure of DB-17

DB-17

| ID (mm) | Length | | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|-----------|---------------|----------------------|-----------------|-----------|----------------------------|
| | (m) | Film (µm) | | | | |
| 0.10 | 10 | 0.10 | 40 to 280/300 | 127-1712 | | 127-1712LTM |
| | | 0.20 | 40 to 280/300 | 127-1713 | | |
| | 20 | 0.10 | 40 to 280/300 | 127-1722 | | |
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>40 to 280/300</i> | <i>121-1722</i> | | <i>121-1722LTM</i> |
| | | <i>0.30</i> | <i>40 to 280/300</i> | <i>121-1723</i> | | |
| 0.25 | 15 | 0.25 | 40 to 280/300 | 122-1712 | | |
| | | 0.50 | 40 to 280/300 | 122-1713 | 122-1713E | |
| | 30 | 0.15 | 40 to 280/300 | 122-1731 | 122-1731E | |
| | | 0.25 | 40 to 280/300 | 122-1732 | 122-1732E | 122-1732LTM |
| | | 0.50 | 40 to 280/300 | 122-1733 | | |
| 60 | 0.25 | 40 to 280/300 | 122-1762 | | | |
| 0.32 | 15 | 0.15 | 40 to 280/300 | 123-1711 | | |
| | | 0.25 | 40 to 280/300 | 123-1712 | | |
| | | 0.50 | 40 to 280/300 | 123-1713 | | |
| | 30 | 0.15 | 40 to 280/300 | 123-1731 | | |
| | | 0.25 | 40 to 280/300 | 123-1732 | 123-1732E | 123-1732LTM |
| | | 0.50 | 40 to 280/300 | 123-1733 | 123-1733E | |
| | | 60 | 0.25 | 40 to 280/300 | 123-1762 | |
| 0.53 | 5 | 2.00 | 40 to 280/300 | 125-1704 | | |
| | 15 | 0.25 | 40 to 260/280 | 125-1711 | | |
| | | 0.50 | 40 to 260/280 | 125-1717 | | |
| | | 1.00 | 40 to 260/280 | 125-1712 | | 125-1712LTM |
| | | 1.50 | 40 to 260/280 | 125-1713 | | 125-1713LTM |
| | 30 | 0.25 | 40 to 260/280 | 125-1731 | | |
| | | 0.50 | 40 to 260/280 | 125-1737 | | |
| | | 1.00 | 40 to 260/280 | 125-1732 | 125-1732E | 125-1732LTM |
| | | 1.50 | 40 to 260/280 | 125-1733 | | |
| 60 | | 1.00 | 40 to 260/280 | 125-1762 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of HP-50+

HP-50+

- (50%-Phenyl)-methylpolysiloxane
- Mid polarity – slightly less polar than DB-17
- Excellent for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

Similar Phases: Rtx-50, 007-17(MPS-50), SP-2250, SPB-50, ZB-50, AT-50

HP-50+

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | |
|---------|------------|-----------|------------------|------------|---------------|
| | | | | 7 in Cage | 5 in Cage |
| 0.20 | 12 | 0.31 | 40 to 280/300 | 19091L-101 | |
| 0.25 | 5 | 0.15 | 40 to 280/300 | 19091L-330 | 19091L-330LTM |
| | 15 | 0.25 | 40 to 280/300 | 19091L-431 | 19091L-431LTM |
| | 30 | 0.15 | 40 to 280/300 | 19091L-333 | |
| | | 0.25 | 40 to 280/300 | 19091L-433 | 19091L-433LTM |
| 0.32 | 30 | 0.50 | 40 to 280/300 | 19091L-133 | |
| | | 0.25 | 40 to 280/300 | 19091L-413 | 19091L-413E |
| | 60 | 0.25 | 40 to 280/300 | 19091L-113 | 19091L-113E |
| 0.53 | 15 | 1.00 | 40 to 260/280 | 19095L-021 | 19095L-021LTM |
| | 30 | 0.50 | 40 to 260/280 | 19095L-523 | |
| | | 1.00 | 40 to 260/280 | 19095L-023 | 19095L-023E |

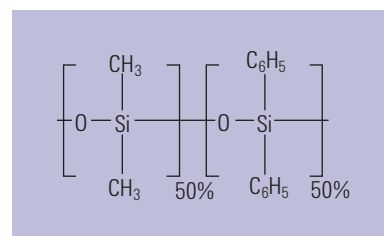
CP-Sil 24 CB

- 50% Phenyl/50% dimethylpolysiloxane
- Mid polarity phase
- Specially suitable for analysis of amines, drugs and pesticides
- Ideal for analysis using ECD
- Excellent confirmation column in combination with CP-Sil 5 CB or CP-Sil 8 CB
- Bonded and cross-linked
- Solvent rinsable
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

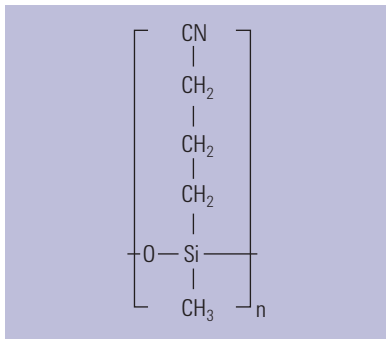
Similar Phases: Rtx-50, 007-17(MPS-50), SP-2250, SPB-50, ZB-50, AT-50

CP-Sil 24 CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|---------------|-----------|
| 0.25 | 15 | 0.25 | 40 to 280/300 | CP7820 | |
| | 30 | 0.25 | 40 to 280/300 | CP7821 | |
| | | 0.50 | 40 to 280/300 | CP7824 | |
| 0.32 | 60 | 0.25 | 40 to 280/300 | CP7822 | CP782215 |
| | 15 | 0.25 | 40 to 280/300 | CP7830 | |
| | 30 | 0.25 | 40 to 280/300 | CP7831 | |
| 0.53 | 30 | 60 | 0.25 | 40 to 280/300 | CP7832 |
| | | 0.50 | 40 to 280/300 | CP7834 | CP183415 |
| | | 1.00 | 40 to 265/290 | CP7871 | CP787115 |



Structure of CP-Sil 24 CB



Structure of DB-23

DB-23

- (50%-Cyanopropyl)-methylpolysiloxane
- High polarity
- Designed for separation of fatty acid methyl esters (FAMES)
- Excellent resolution for cis- and trans-isomers
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-23
- Close equivalent to USP Phase G5

Similar Phases: SP-2330, Rtx-2330, 007-23, AT-Silar, BPX-70, SP-2340

DB-23

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|-------------|------------|-------------|----------------------|-----------------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| <i>0.18</i> | <i>20</i> | <i>0.20</i> | <i>40 to 250/260</i> | <i>121-2323</i> | | |
| 0.25 | 15 | 0.25 | 40 to 250/260 | 122-2312 | | |
| | | 30 | 0.15 | 40 to 250/260 | 122-2331 | |
| | 60 | 0.25 | 40 to 250/260 | 122-2332 | 122-2332E | 122-2332LTM |
| | | 0.15 | 40 to 250/260 | 122-2361 | 122-2361E | |
| 0.32 | 30 | 0.25 | 40 to 250/260 | 123-2332 | 123-2332E | |
| | 60 | 0.25 | 40 to 250/260 | 123-2362 | | |
| 0.53 | 15 | 0.50 | 40 to 230/240 | 125-2312 | | |
| | 30 | 0.50 | 40 to 230/240 | 125-2332 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

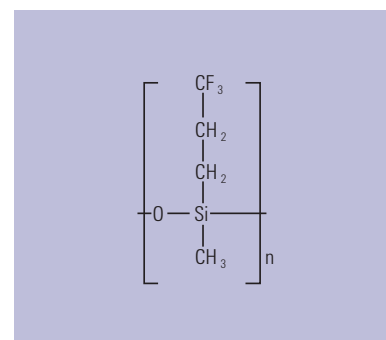
DB-200

- (35% Trifluoropropyl)-methylpolysiloxane
- 300/320 °C temperature limit
- Mid polarity – more polar than DB-1701 or DB-17
- Ideal for difficult-to-separate positional isomers
- Unique interactions with compounds containing nitro, halogen and carbonyl groups
- Low ECD bleed
- Unique selectivity
- Close equivalent to USP Phase G6

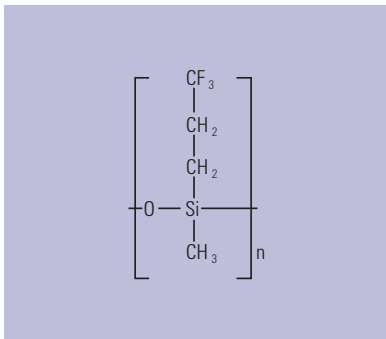
Similar Phases: Rtx-200

DB-200

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|---------------|
| | | | | | LTM II Module |
| 0.25 | 30 | 0.25 | 30 to 300/320 | 122-2032 | 122-2032LTM |
| | | 0.50 | 30 to 300/320 | 122-2033 | 122-2033LTM |
| 0.32 | 30 | 0.25 | 30 to 300/320 | 123-2032 | |
| | | 0.50 | 30 to 300/320 | 123-2033 | |
| 0.53 | 30 | 1.00 | 30 to 280/300 | 125-2032 | |



Structure of DB-200



Structure of DB-210

DB-210

- (50%-Trifluoropropyl)-methylpolysiloxane
- High polarity
- Excellent for US EPA Methods 8140 and 609
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-210
- Close equivalent to USP Phase G6

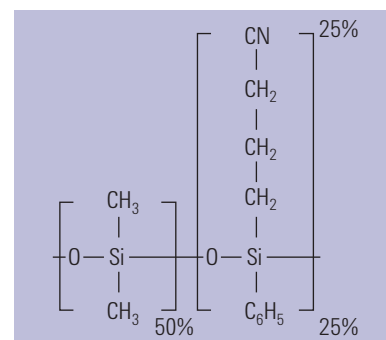
Similar Phases: SP-2401

DB-210

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 15 | 0.25 | 45 to 240/260 | 122-0212 | | |
| | 30 | 0.25 | 45 to 240/260 | 122-0232 | 122-0232E | |
| | | 0.50 | 45 to 240/260 | 122-0233 | | |
| 0.32 | 15 | 0.50 | 45 to 240/260 | 123-0213 | | |
| | 30 | 0.25 | 45 to 240/260 | 123-0232 | | |
| | | 0.50 | 45 to 240/260 | 123-0233 | | |
| 0.53 | 15 | 1.00 | 45 to 220/240 | 125-0212 | | |
| | 30 | 1.00 | 45 to 220/240 | 125-0232 | | 125-0232LTM |

DB-225

- (50%-Cyanopropylphenyl)-dimethylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMEs)
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-225
- Close equivalent to USP Phase G7



Structure of DB-225

Similar Phases: SP-2330, Rtx-225, BP-225, OV-225, 007-225, AT-225

DB-225

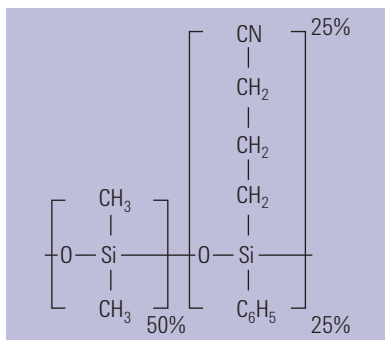
| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|------------------------|------------------------------------|-----------------|-----------|-------------------------|
| 0.10 | 20 | 0.10 | 40 to 220/240 | 127-2222 | | |
| <i>0.18</i> | <i>20</i> | <i>0.20</i> | <i>40 to 220/240</i> | <i>121-2223</i> | | |
| 0.25 | 15 | 0.25 | 40 to 220/240 | 122-2212 | | 122-2212LTM |
| | 30 | 0.15 | 40 to 220/240 | 122-2231 | | |
| | | 0.25 | 40 to 220/240 | 122-2232 | | 122-2232LTM |
| 0.32 | 30 | 0.25 | 40 to 220/240 | 123-2232 | 123-2232E | |
| 0.53 | 15 | 1.00 | 40 to 200/220 | 125-2212 | | |
| | 30 | 0.50 | 40 to 200/220 | 125-2237 | | |
| | | 1.00 | 40 to 200/220 | 125-2232 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Need assistance selecting a column for your method? Contact our chromatography technical specialists at www.agilent.com/chem/TechRep





Structure of CP-Sil 43 CB

CP-Sil 43 CB

- 25% Cyanopropyl/25% phenyl/50% dimethylpolysiloxane phase
- Mid polarity
- Separates aromatic from aliphatic hydrocarbons with selectivity equivalent to OV-255
- Bonded and cross-linked
- Solvent rinsable
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SP-2330, Rtx-225, BP-225, OV-225, 007-225, AT-225

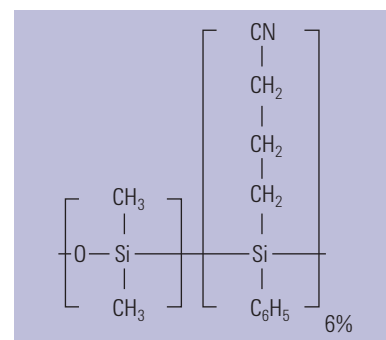
CP-Sil 43 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 25 | 0.20 | 45 to 200/225 | CP7715 |
| | 50 | 0.20 | 45 to 200/225 | CP7725 |
| 0.32 | 25 | 0.20 | 45 to 200/225 | CP7745 |

DB-1301

- (6%-Cyanopropyl-phenyl) methylpolysiloxane
- Equivalent to USP Phase G43
- Low/mid polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

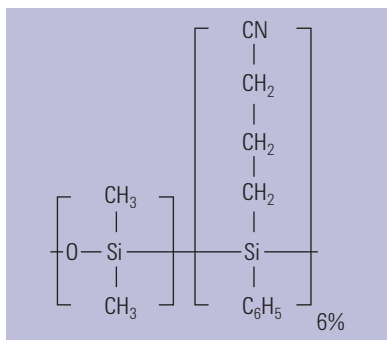
Similar Phases: Rtx-1301, PE-1301



Structure of DB-1301

DB-1301

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | | | LTM II Module |
| 0.25 | 30 | 0.25 | -20 to 280/300 | 122-1332 | 122-1332E | |
| | | 1.00 | -20 to 280/300 | 122-1333 | | |
| | 60 | 0.25 | -20 to 280/300 | 122-1362 | | |
| | | 1.00 | -20 to 280/300 | 122-1363 | 122-1363E | |
| 0.32 | 30 | 0.25 | -20 to 280/300 | 123-1332 | | |
| | | 1.00 | -20 to 280/300 | 123-1333 | | |
| | 60 | 1.00 | -20 to 280/300 | 123-1363 | | |
| 0.53 | 15 | 1.00 | -20 to 260/280 | 125-1312 | | |
| | 30 | 1.00 | -20 to 260/280 | 125-1332 | | |
| | | 1.50 | -20 to 260/280 | 125-1333 | | 125-1333LTM |



Structure of CP-1301

CP-1301

- 6% Cyanopropyl-phenyl/94% dimethylpolysiloxane
- Mid polarity
- Ideal for analysis of herbicides, pesticides and many pharmaceutical products
- High column-to-column reproducibility
- Good inertness for better quality of data, even with thick films
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rtx-1301, PE-1301

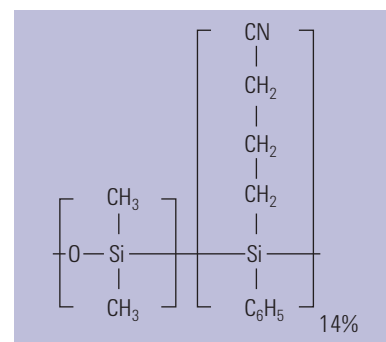
CP-1301

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 60 | 1.00 | -25 to 265/280 | CP8605 |
| 0.32 | 30 | 0.25 | -25 to 280/280 | CP8607 |
| | | 1.00 | -25 to 265/280 | CP8610 |
| 0.53 | 30 | 1.00 | -25 to 265/280 | CP8613 |

DB-1701

- (14% Cyanopropyl-phenyl)-methylpolysiloxane
- Low/mid polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

Similar Phases: SPB-1701, Rtx-1701, BP-10, OV-1701, 007-1701, ZB-1701



Structure of DB-1701

DB-1701

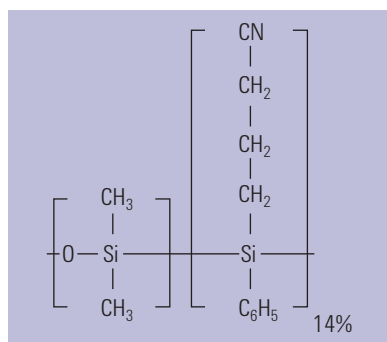
| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 | |
|-------------|------------|----------------|-----------------------|-----------------|-----------|---------------|--------------------|
| | | | | | | LTM II Module | |
| 0.10 | 20 | 0.10 | -20 to 280/300 | 127-0722 | | | |
| | | 0.40 | -20 to 280/300 | 127-0723 | | | |
| <i>0.18</i> | <i>10</i> | <i>0.40</i> | <i>-20 to 280/300</i> | <i>121-0713</i> | | | |
| | <i>20</i> | <i>0.18</i> | <i>-20 to 280/300</i> | <i>121-0722</i> | | | <i>121-0722LTM</i> |
| 0.25 | 15 | 0.25 | -20 to 280/300 | 122-0712 | | | |
| | | 1.00 | -20 to 280/300 | 122-0713 | | | 122-0713LTM |
| | 30 | 0.15 | -20 to 280/300 | 122-0731 | | | |
| | | 0.25 | -20 to 280/300 | 122-0732 | 122-0732E | | 122-0732LTM |
| | | 1.00 | -20 to 280/300 | 122-0733 | 122-0733E | | 122-0733LTM |
| | | 60 | 0.15 | -20 to 280/300 | 122-0761 | | |
| | | 0.25 | -20 to 280/300 | 122-0762 | | | |
| | | 0.50 | -20 to 280/300 | 122-0766 | | | |
| | 1.00 | -20 to 280/300 | 122-0763 | 122-0763E | | | |
| 0.32 | 15 | 0.25 | -20 to 280/300 | 123-0712 | | | 123-0712LTM |
| | | 1.00 | -20 to 280/300 | 123-0713 | | | |
| | 30 | 0.15 | -20 to 280/300 | 123-0731 | | | |
| | | 0.25 | -20 to 280/300 | 123-0732 | 123-0732E | | |
| | | 1.00 | -20 to 280/300 | 123-0733 | 123-0733E | | |
| | | 50 | 1.00 | -20 to 280/300 | 123-0753 | | |
| | 60 | 0.25 | -20 to 280/300 | 123-0762 | | | |
| | | 1.00 | -20 to 280/300 | 123-0763 | 123-0763E | | |
| 0.53 | 15 | 1.00 | -20 to 260/280 | 125-0712 | 125-0712E | | 125-0712LTM |
| | 30 | 0.25 | -20 to 260/280 | 125-0731 | | | |
| | | 0.50 | -20 to 260/280 | 125-0737 | | | |
| | | 1.00 | -20 to 260/280 | 125-0732 | 125-0732E | | |
| | | 1.50 | -20 to 260/280 | 125-0733 | | | |
| | 60 | 1.00 | -20 to 260/280 | 125-0762 | 125-0762E | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Agilent also offers DB-624 columns for the analysis of volatile priority pollutants and residual solvents.





Structure of CP-Sil 19 CB

CP-Sil 19 CB

- 14% Cyanopropyl-phenyl/86% dimethylpolysiloxane
- Mid polarity
- Ideal for many environmental, food and beverage, and pharmaceutical applications
- Useful as confirmation column
- Bonded and cross-linked
- Solvent rinsable
- Broad range of configurations available
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SPB-1701, Rtx-1701, BP-10, OV-1701, 007-1701, ZB-1701

CP-Sil 19 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | |
|-------------|------------|-------------|-----------------------|----------------|--------|
| <i>0.15</i> | <i>25</i> | <i>0.50</i> | <i>-25 to 275/300</i> | <i>CP7340</i> | |
| 0.25 | 10 | 0.20 | -25 to 275/300 | CP7702 | |
| | | 0.20 | -25 to 275/300 | CP7712 | |
| | | 0.40 | -25 to 275/300 | CP7809 | |
| | | 1.20 | -25 to 275/300 | CP7672 | |
| | 30 | 0.25 | -25 to 275/300 | CP8712 | |
| | | 1.00 | -25 to 275/300 | CP8562 | |
| | 50 | 0.20 | -25 to 275/300 | CP7722 | |
| | 60 | 0.25 | -25 to 275/300 | CP8722 | |
| | 0.32 | 10 | 0.20 | -25 to 275/300 | CP7732 |
| | | | 0.25 | -25 to 275/300 | CP8542 |
| 0.20 | | | -25 to 275/300 | CP7742 | |
| 0.40 | | | -25 to 275/300 | CP7829 | |
| 25 | | 1.20 | -25 to 275/300 | CP7762 | |
| | | 0.25 | -25 to 275/300 | CP8842 | |
| 30 | | 1.00 | -25 to 275/300 | CP8762 | |
| | | 0.20 | -25 to 275/300 | CP7752 | |
| 50 | | 0.40 | -25 to 275/300 | CP7839 | |
| | | 1.20 | -25 to 275/300 | CP7772 | |
| | | 0.15 | -25 to 275/300 | CP8662 | |
| 60 | | 1.00 | -25 to 275/300 | CP8772 | |
| | | 0.53 | 2.00 | -25 to 275/300 | CP7647 |
| 0.53 | | 25 | 1.00 | -25 to 275/300 | CP7637 |
| | 2.00 | | -25 to 275/300 | CP7657 | |
| | 30 | 1.00 | -25 to 275/300 | CP8737 | |
| | 50 | 2.00 | -25 to 275/300 | CP7667 | |
| | | 1.00 | -25 to 275/300 | CP7697 | |

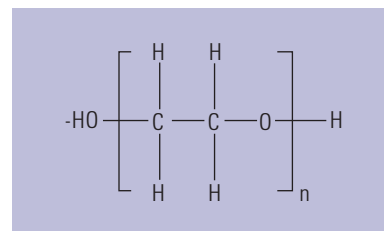
Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

Polyethylene Glycol (PEG) Columns

Agilent offers a full range of PEG columns. Even though each phase is based on the polyethylene glycol polymer, strict control of the cross-linking and deactivation processes result in a variety of unique phase characteristics to meet your varying analysis needs.

DB-WAX and DB-WaxFF

- Polyethylene glycol (PEG)
- Equivalent to USP Phase G16
- High polarity
- Lower temperature limit of 20 °C is the lowest of any bonded PEG phase; improves resolution of low boiling point analytes
- Column-to-column reproducibility
- Bonded and cross-linked
- Exact replacement of HP-WAX
- Solvent rinsable
- DB-WaxFF is a highly reproducible, specially tested microbore DB-Wax for fragrance analysis



Structure of polyethylene glycol (PEG)
This structure is applicable for all
WAX and FFAP phases.

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, Rtx-WAX, ZB-WAX, ZB-WAX plus

DB-WAX and DB-WaxFF

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------------|------------|-------------|----------------------|-----------------|------------------|-------------------------|
| DB-WAX | | | | | | |
| 0.05 | 10 | 0.05 | 20 to 250/260 | 126-7012 | | |
| | | 0.10 | 20 to 240/250 | 126-7013 | | |
| 0.10 | 10 | 0.10 | 20 to 250/260 | 127-7012 | 127-7012E | 127-7012LTM |
| | | 0.20 | 20 to 240/250 | 127-7013 | | 127-7013LTM |
| | 20 | 0.10 | 20 to 250/260 | 127-7022 | | 127-7022LTM |
| | | 0.20 | 20 to 240/250 | 127-7023 | 127-7023E | 127-7023LTM |
| <i>0.18</i> | <i>10</i> | <i>0.18</i> | <i>20 to 250/260</i> | <i>121-7012</i> | | <i>121-7012LTM</i> |
| | <i>20</i> | <i>0.18</i> | <i>20 to 250/260</i> | <i>121-7022</i> | | <i>121-7022LTM</i> |
| | | <i>0.30</i> | <i>20 to 240/250</i> | <i>121-7023</i> | | <i>121-7023LTM</i> |
| | <i>40</i> | <i>0.18</i> | <i>20 to 250/260</i> | <i>121-7042</i> | <i>121-7042E</i> | |
| | | <i>0.30</i> | <i>20 to 240/250</i> | <i>121-7043</i> | | |
| 0.20 | 25 | 0.20 | 20 to 250/260 | 128-7022 | | |
| | 30 | 0.20 | 20 to 250/260 | 128-7032 | | 128-7032LTM |
| | 50 | 0.20 | 20 to 250/260 | 128-7052 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

DB-WAX and DB-WaxFF

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------------|-----------------|------------------------|------------------------------------|------------|-----------|---------------|
| | | | | | | LTM II Module |
| DB-WAX | | | | | | |
| 0.25 | 15 | 0.25 | 20 to 250/260 | 122-7012 | 122-7012E | 122-7012LTM |
| | | 0.50 | 20 to 240/250 | 122-7013 | | 122-7013LTM |
| | 30 | 0.15 | 20 to 250/260 | 122-7031 | | |
| | | 0.25 | 20 to 250/260 | 122-7032 | 122-7032E | 122-7032LTM |
| | | 0.50 | 20 to 240/250 | 122-7033 | 122-7033E | 122-7033LTM |
| | 60 | 0.15 | 20 to 250/260 | 122-7061 | | |
| | | 0.25 | 20 to 250/260 | 122-7062 | 122-7062E | |
| 0.50 | | 20 to 240/250 | 122-7063 | 122-7063E | | |
| 0.32 | 15 | 0.25 | 20 to 250/260 | 123-7012 | | 123-7012LTM |
| | | 0.50 | 20 to 240/250 | 123-7013 | | 123-7013LTM |
| | 30 | 0.15 | 20 to 250/260 | 123-7031 | | |
| | | 0.25 | 20 to 250/260 | 123-7032 | 123-7032E | 123-7032LTM |
| | | 0.50 | 20 to 240/250 | 123-7033 | 123-7033E | 123-7033LTM |
| | 60 | 0.25 | 20 to 250/260 | 123-7062 | | |
| | | 0.50 | 20 to 240/250 | 123-7063 | 123-7063E | |
| 0.45 | 30 | 0.85 | 20 to 230/240 | 124-7032 | | |
| 0.53 | 15 | 0.50 | 20 to 230/240 | 125-7017 | | |
| | | 1.00 | 20 to 230/240 | 125-7012 | 125-7012E | |
| | 30 | 0.25 | 20 to 230/240 | 125-7031 | | 125-7031LTM |
| | | 0.50 | 20 to 230/240 | 125-7037 | | |
| | | 1.00 | 20 to 230/240 | 125-7032 | 125-7032E | 125-7032LTM |
| | 60 | 1.00 | 20 to 230/240 | 125-7062 | 125-7062E | |
| | DB-WaxFF | | | | | |
| 0.10 | 20 | 0.20 | 20 to 240/250 | 127-7023FF | | |

DB-WAXetr

- Polyethylene glycol (PEG)
- Extended temperature range (etr)
- High polarity
- Excellent column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G16

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, Rtx-WAX, ZB-WAX, ZB-WAX plus

DB-WAXetr

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|------------------------|------------------------------------|-----------|-----------|---------------|
| | | | | | | LTM II Module |
| 0.20 | 25 | 0.40 | 30 to 250/260 | 128-7323 | | |
| 0.25 | 30 | 0.25 | 30 to 260/280 | 122-7332 | 122-7332E | 122-7332LTM |
| | | 0.50 | 30 to 250/260 | 122-7333 | | |
| | 60 | 0.25 | 30 to 260/280 | 122-7362 | | |
| | | 0.50 | 30 to 250/260 | 122-7363 | | |
| 0.32 | 15 | 0.25 | 30 to 260/280 | 123-7312 | | |
| | | 1.00 | 30 to 250/260 | 123-7314 | | |
| | 30 | 0.25 | 30 to 260/280 | 123-7332 | | |
| | | 0.50 | 30 to 250/260 | 123-7333 | | |
| | | 1.00 | 30 to 250/260 | 123-7334 | | 123-7334LTM |
| | 50 | 1.00 | 30 to 250/260 | 123-7354 | 123-7354E | |
| | 60 | 0.25 | 30 to 260/280 | 123-7362 | | |
| | | 0.50 | 30 to 250/260 | 123-7363 | | |
| 1.00 | | 30 to 250/260 | 123-7364 | | | |
| 0.53 | 15 | 1.00 | 30 to 240/260 | 125-7312 | | |
| | | 2.00 | 50 to 230/250 | 125-7314 | | |
| | 30 | 1.00 | 30 to 240/260 | 125-7332 | 125-7332E | |
| | | 1.50 | 30 to 230/240 | 125-7333 | | 125-7333LTM |
| | | 2.00 | 50 to 230/250 | 125-7334 | 125-7334E | |
| | 60 | 1.00 | 30 to 240/260 | 125-7362 | | |

HP-INNOWax

- Polyethylene glycol (PEG)
- High polarity
- Highest upper temperature limits of the bonded PEG phases
- Column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G16

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, ZB-WAX, ZB-WAX+

HP-INNOWax

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|----------------------|-------------------|--------------------|-------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>40 to 260/270</i> | <i>19091N-577</i> | <i>19091N-577E</i> | <i>19091N-577LTM</i> |
| <i>0.20</i> | <i>25</i> | <i>0.20</i> | <i>40 to 260/270</i> | <i>19091N-102</i> | | <i>19091N-102LTM</i> |
| | | <i>0.40</i> | <i>40 to 260/270</i> | <i>19091N-202</i> | | |
| | <i>50</i> | <i>0.20</i> | <i>40 to 260/270</i> | <i>19091N-105</i> | <i>19091N-105E</i> | |
| | | <i>0.40</i> | <i>40 to 260/270</i> | <i>19091N-205</i> | <i>19091N-205E</i> | |
| <i>0.25</i> | <i>5</i> | <i>0.15</i> | <i>40 to 260/270</i> | <i>19091N-030</i> | | <i>19091N-030LTM</i> |
| | | <i>0.10</i> | <i>40 to 260/270</i> | <i>19091N-331</i> | | |
| | | <i>0.25</i> | <i>40 to 260/270</i> | <i>19091N-131</i> | <i>19091N-131E</i> | |
| | | <i>0.50</i> | <i>40 to 260/270</i> | <i>19091N-231</i> | | |
| | <i>30</i> | <i>0.15</i> | <i>40 to 260/270</i> | <i>19091N-033</i> | | |
| | | <i>0.25</i> | <i>40 to 260/270</i> | <i>19091N-133</i> | <i>19091N-133E</i> | <i>19091N-133LTM</i> |
| | | <i>0.50</i> | <i>40 to 260/270</i> | <i>19091N-233</i> | <i>19091N-233E</i> | |
| | | <i>0.15</i> | <i>40 to 260/270</i> | <i>19091N-036</i> | | |
| <i>0.32</i> | <i>15</i> | <i>0.25</i> | <i>40 to 260/270</i> | <i>19091N-111</i> | | |
| | | <i>0.15</i> | <i>40 to 260/270</i> | <i>19091N-013</i> | | <i>19091N-013LTM</i> |
| | | <i>0.25</i> | <i>40 to 260/270</i> | <i>19091N-113</i> | <i>19091N-113E</i> | |
| | <i>60</i> | <i>0.50</i> | <i>40 to 260/270</i> | <i>19091N-213</i> | <i>19091N-213E</i> | |
| | | <i>0.25</i> | <i>40 to 260/270</i> | <i>19091N-116</i> | | |
| | | <i>0.50</i> | <i>40 to 260/270</i> | <i>19091N-216</i> | <i>19091N-216E</i> | |
| <i>0.53</i> | <i>15</i> | <i>1.00</i> | <i>40 to 240/250</i> | <i>19095N-121</i> | | |
| | <i>30</i> | <i>1.00</i> | <i>40 to 240/250</i> | <i>19095N-123</i> | <i>19095N-123E</i> | <i>19095N-123LTM</i> |
| | <i>60</i> | <i>1.00</i> | <i>40 to 240/250</i> | <i>19095N-126</i> | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Column shown with EZ-GRIP

CP-Wax 52 CB

- Polyethylene glycol phase
- High polarity
- Wider temperature range than non-bonded polyethylene glycols
- Bonded and cross-linked
- Solvent rinsable
- High resolution of low boiling point analytes
- High polarity provides separations for a broad range of applications
- Excellent reproducibility and temperature stability for a variety of EPA and ASTM methods
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Note: We recommend the UltiMetal column when working in rugged environments with process or portable instruments.

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, HP-INNOWax, Rtx-WAX, ZB-WAX, ZB-WAX+

CP-Wax 52 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|---------------|----------------------|---------------|-----------|
| 0.10 | 10 | 0.10 | 20 to 250/265 | CP7334 | |
| | | 0.20 | 20 to 250/265 | CP7335 | |
| <i>0.15</i> | <i>15</i> | <i>0.12</i> | <i>20 to 250/265</i> | <i>CP7791</i> | |
| | <i>25</i> | <i>0.25</i> | <i>20 to 250/265</i> | <i>CP7792</i> | |
| 0.20 | 30 | 0.20 | 20 to 250/265 | CP7775 | |
| | 50 | 0.20 | 20 to 250/265 | CP7785 | |
| 0.25 | 10 | 0.20 | 20 to 250/265 | CP7703 | |
| | 15 | 0.25 | 20 to 250/265 | CP8513 | |
| | 25 | 0.20 | 20 to 250/265 | CP7713 | CP7713I5 |
| | | | 20 to 250/265 | CP7673 | CP7673I5 |
| | 30 | 0.15 | 20 to 250/265 | CP8745 | |
| | | 0.25 | 20 to 250/265 | CP8713 | CP8713I5 |
| | | 0.50 | 20 to 250/265 | CP8746 | |
| | 50 | 0.20 | 20 to 250/265 | CP7723 | CP7723I5 |
| 60 | 0.25 | 20 to 250/265 | CP8723 | | |
| | 0.50 | 20 to 250/265 | CP8748 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

(Continued)

CP-Wax 52 CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|-----------|
| 0.32 | 10 | 1.00 | 20 to 250/265 | CP7628 | |
| | | 0.15 | 20 to 250/265 | CP8533 | |
| | | 0.25 | 20 to 250/265 | CP8543 | |
| | | 0.50 | 20 to 250/265 | CP8553 | |
| | 25 | 0.20 | 20 to 250/265 | CP7743 | |
| | | 0.40 | 20 to 250/265 | CP7879 | |
| | | 1.20 | 20 to 250/265 | CP7763 | |
| | 30 | 0.25 | 20 to 250/265 | CP8843 | |
| | | 0.50 | 20 to 250/265 | CP8763 | |
| | 50 | 0.20 | 20 to 250/265 | CP7753 | |
| | | 0.40 | 20 to 250/265 | CP7889 | |
| | | 1.20 | 20 to 250/265 | CP7773 | CP7773I5 |
| | 60 | 0.25 | 20 to 250/265 | CP8853 | |
| | | 0.50 | 20 to 250/265 | CP8773 | |
| 1.20 | | 20 to 250/265 | CP8073 | CP8073I5 | |
| 0.53 | 10 | 2.00 | 20 to 250/265 | CP7648 | |
| | 15 | 1.00 | 20 to 250/265 | CP8718 | |
| | 25 | 1.00 | 20 to 250/265 | CP7638 | |
| | | 2.00 | 20 to 250/265 | CP7658 | CP7658I5 |
| | 30 | 1.00 | 20 to 250/265 | CP8738 | CP8738I5 |
| | 50 | 1.00 | 20 to 250/265 | CP7698 | CP7698I5 |
| | | 2.00 | 20 to 250/265 | CP7668 | |
| | 60 | 1.00 | 20 to 250/265 | CP8798 | |
| | 100 | 2.00 | 20 to 250/265 | CP7678 | |

CP-Wax 52 CB UltiMetal

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | Part No. | |
|---------|------------|------------------------|------------------------------------|---------------|--------|
| 0.53 | 10 | 0.50 | 20 to 250/275 | CP7128 | |
| | | 1.00 | 20 to 250/275 | CP7148 | |
| | 25 | 2.00 | 20 to 250/275 | CP7178 | |
| | | 50 | 1.00 | 20 to 250/275 | CP7168 |
| | | | 2.00 | 20 to 250/275 | CP7179 |

DB-FFAP

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 40 °C to 250 °C
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

Note: We do not recommend the use of water or methanol to rinse DB-FFAP GC columns.

Similar Phases: Stabilwax-DA, Nukol, 007-FFAP, BP21, AT-1000, OV-351

DB-FFAP

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------|------------|-----------|------------------|-----------|-----------|-------------------------|
| 0.10 | 10 | 0.10 | 40 to 250 | 127-3212 | | 127-3212LTM |
| | 15 | 0.10 | 40 to 250 | 127-32H2 | | 127-32H2LTM |
| 0.25 | 15 | 0.25 | 40 to 250 | 122-3212 | | |
| | 30 | 0.25 | 40 to 250 | 122-3232 | 122-3232E | 122-3232LTM |
| | | 0.50 | 40 to 250 | 122-3233 | | |
| | 60 | 0.25 | 40 to 250 | 122-3262 | 122-3262E | |
| | | 0.50 | 40 to 250 | 122-3263 | | |
| 0.32 | 15 | 0.25 | 40 to 250 | 123-3212 | | |
| | 25 | 0.50 | 40 to 250 | 123-3223 | | |
| | 30 | 0.25 | 40 to 250 | 123-3232 | 123-3232E | 123-3232LTM |
| | | 0.50 | 40 to 250 | 123-3233 | | 123-3233LTM |
| | | 1.00 | 40 to 250 | 123-3234 | | 123-3234LTM |
| | 50 | 0.50 | 40 to 250 | 123-3253 | | |
| | 60 | 0.25 | 40 to 250 | 123-3262 | | |
| 0.50 | | 40 to 250 | 123-3263 | | | |
| | 1.00 | 40 to 250 | 123-3264 | | | |
| 0.45 | 30 | 0.85 | 40 to 250 | 124-3232 | | |
| 0.53 | 10 | 1.00 | 40 to 250 | 125-32H2 | | |
| | 15 | 0.50 | 40 to 250 | 125-3217 | | 125-3217LTM |
| | | 1.00 | 40 to 250 | 125-3212 | | |
| | 30 | 0.25 | 40 to 250 | 125-3231 | | |
| | | 0.50 | 40 to 250 | 125-3237 | | |
| | | 1.00 | 40 to 250 | 125-3232 | 125-3232E | |
| | | 1.50 | 40 to 250 | 125-3233 | | |
| | 60 | 1.00 | 40 to 250 | 125-3262 | | |

HP-FFAP

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 60 °C to 240/250 °C (230/240 °C for 0.53 mm)
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

Note: We do not recommend the use of water or methanol to rinse HP-FFAP GC columns.

Similar Phases: Stabilwax-DA, Nukol, 007-FFAP, BP21, AT-1000, OV-351

HP-FFAP

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|------------|-------------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.20 | 25 | 0.33 | 60 to 240/250 | 19091F-102 | 19091F-102E | 19091F-102LTM |
| | 50 | 0.33 | 60 to 240/250 | 19091F-105 | 19091F-105E | |
| 0.25 | 30 | 0.25 | 60 to 240/250 | 19091F-433 | 19091F-433E | 19091F-433LTM |
| 0.32 | 25 | 0.50 | 60 to 240/250 | 19091F-112 | 19091F-112E | 19091F-112LTM |
| | 30 | 0.25 | 60 to 240/250 | 19091F-413 | | |
| | 50 | 0.50 | 60 to 240/250 | 19091F-115 | 19091F-115E | |
| 0.53 | 10 | 1.00 | 60 to 240 | 19095F-121 | | 19095F-121LTM |
| | 15 | 1.00 | 60 to 240 | 19095F-120 | 19095F-120E | |
| | 30 | 1.00 | 60 to 240 | 19095F-123 | 19095F-123E | 19095F-123LTM |

TIPS & TOOLS

Agilent also offers CAM columns for amine analysis.



CP-Wax 58 FFAP CB

- Nitroterephthalic acid-modified polyethylene glycol phase
- High polarity
- Ideal for analysis of acidic compounds, such as phenols, underivatized and derivatized free fatty acids
- Highest polarity bonded wax column for analyzing polar compounds
- Chemically-bonded
- Solvent rinsable
- High inertness provides excellent peak shape
- Supplied with an EZ-GRIP to simplify column installation, coupling and operation

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, Rtx-WAX, ZB-WAX

CP-Wax 58 FFAP CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.20 | 25 | 0.30 | 20 to 250/275 | CP7787 | |
| | 50 | 0.30 | 20 to 250/275 | CP7797 | |
| 0.25 | 25 | 0.20 | 20 to 250/275 | CP7717 | CP771715 |
| | 50 | 0.20 | 20 to 250/275 | CP7727 | |
| 0.32 | 25 | 0.20 | 20 to 250/275 | CP7747 | |
| | | 1.20 | 20 to 250/275 | CP7767 | |
| | 50 | 0.20 | 20 to 250/275 | CP7757 | |
| | | 0.50 | 20 to 250/275 | CP7778 | |
| | | 1.20 | 20 to 250/275 | CP7777 | |
| 0.53 | 15 | 0.50 | 20 to 250/275 | CP7665 | |
| | | 1.00 | 20 to 250/275 | CP7614 | |
| | 50 | 2.00 | 20 to 250/275 | CP7654 | |
| | | 1.00 | 20 to 250/275 | CP7624 | |
| | | 2.00 | 20 to 250/275 | CP7664 | |



TIPS & TOOLS

View the latest GC column focused applications, products and educational resources at www.agilent.com/chem/myGCColumns

Carbowax 20M and HP-20M

- Polyethylene glycol, MW 20,000
- Equivalent to USP Phase G16

Similar Phases: Rt-CW20M F&F

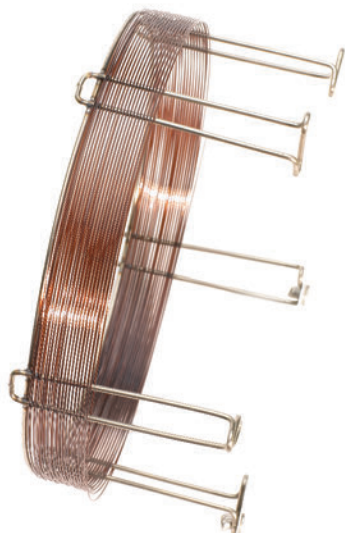
Because the Carbowax 20M and the HP-20M are not bonded or cross-linked, we do not recommend solvent rinsing. DB-WAX is the recommended bonded alternate for the HP-20M.

Carbowax 20M

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | |
|---------|------------|-----------|------------------|-----------|---------------|
| | | | | 7 in Cage | LTM II Module |
| 0.25 | 30 | 0.25 | 60 to 220/240 | 112-2032 | 112-2032LTM |
| 0.32 | 30 | 0.25 | 60 to 220/240 | 113-2032 | |

HP-20M

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|------------|-------------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.20 | 25 | 0.10 | 60 to 220 | 19091W-102 | | |
| | 50 | 0.10 | 60 to 220 | 19091W-105 | | |
| 0.32 | 25 | 0.30 | 60 to 220 | 19091W-012 | 19091W-012E | 19091W-012LTM |
| | 50 | 0.30 | 60 to 220 | 19091W-015 | 19091W-015E | |
| 0.53 | 10 | 1.33 | 60 to 220 | 19095W-121 | | |
| | 30 | 1.33 | 60 to 220 | 19095W-123 | | |



Specialty Columns

Agilent chemists have developed many columns with unique characteristics designed to solve the most difficult separation problems of a given method. As a result, we offer a comprehensive line of specialty or "select" columns for a variety of applications to enhance the standard phase portfolio. With columns for volatiles, pesticides, petrochemicals and more – Agilent exceeds standard QA/QC procedures for the manufacturing and testing of all of our specialty columns to ensure they meet the stringent demands for their application. These columns offer reliable, accurate results with the shortest run times possible on complex sample lists and matrices.

High Temperature Columns

DB-1ht

- 100% Dimethylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400 °C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rxi-1HT, Stx-1ht, ZB-1ht

DB-1ht

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 15 | 0.10 | -60 to 400 | 122-1111 | 122-1111E | |
| | 30 | 0.10 | -60 to 400 | 122-1131 | | |
| 0.32 | 15 | 0.10 | -60 to 400 | 123-1111 | | 123-1111LTM |
| | 30 | 0.10 | -60 to 400 | 123-1131 | 123-1131E | |
| 0.53 | 30 | 0.17 | -60 to 400 | 125-1131 | | |

DB-5ht

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400 °C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: HT5, Stx-5ht, ZB-5ht



DB-5ht

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 15 | 0.10 | -60 to 400 | 122-5711 | 122-5711E | 122-5711LTM |
| | 30 | 0.10 | -60 to 400 | 122-5731 | | 122-5731LTM |
| 0.32 | 10 | 0.10 | -60 to 400 | 123-5701 | | 123-5701LTM |
| | 15 | 0.10 | -60 to 400 | 123-5711 | 123-5711E | |
| | 30 | 0.10 | -60 to 400 | 123-5731 | 123-5731E | |

DB-17ht

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity
- Extended upper temperature limit of 365 °C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Improved resolution for triglycerides
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rtx-65TG, BPX50

DB-17ht

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|---------------|
| | | | | | LTM II Module |
| 0.25 | 5 | 0.15 | 40 to 340/365 | 122-1801 | 122-1801LTM |
| | 15 | 0.15 | 40 to 340/365 | 122-1811 | |
| | 30 | 0.15 | 40 to 340/365 | 122-1831 | 122-1831LTM |
| 0.32 | 15 | 0.15 | 40 to 340/365 | 123-1811 | |
| | 30 | 0.15 | 40 to 340/365 | 123-1831 | |
| | 60 | 0.15 | 40 to 340/365 | 123-1861 | |



TIPS & TOOLS

Learn more about the Agilent 7890B GC System at www.agilent.com/chem/7890BGC

VF-5ht and VF-5ht UltiMetal

- Enhanced selectivity improves column longevity and reduces downtime
- Superior detector performance provides improved detection limits
- For analyses of high boiling compounds by exhibiting ultra low bleed at high temperatures
- Optimized sensitivity and accuracy for analysis of high molecular weight compounds
- Identical selectivity as VF-5ms (bleed spec of 30 m x 0.25 mm column is <5 pA at 400 °C)
- UltiMetal technology renders the stainless steel inert and enhances bonding of the stationary phase for improved column lifetime and excellent peak shape

Similar Phases: ZB-5ht, Rxi-5ht

VF-5ht

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 15 | 0.10 | -60 to 400/400 | CP9045 |
| | 30 | 0.10 | -60 to 400/400 | CP9046 |
| 0.32 | 10 | 0.10 | -60 to 400/400 | CP9044 |
| | 15 | 0.10 | -60 to 400/400 | CP9047 |
| | 30 | 0.10 | -60 to 400/400 | CP9048 |

Similar Phases: ZB-5ht, Rxi-5ht

VF-5ht UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.25 | 15 | 0.10 | -60 to 430/450 | CP9090 | |
| | | 0.10 | -60 to 430/450 | CP9091* | |
| | 30 | 0.10 | -60 to 430/450 | CP9092 | |
| | | 0.10 | -60 to 430/450 | CP9093* | |
| 0.32 | 15 | 0.10 | -60 to 430/450 | CP9094 | CP9094I5 |
| | | 0.10 | -60 to 430/450 | CP9095* | |
| | 30 | 0.10 | -60 to 430/450 | CP9096 | |
| | | 0.10 | -60 to 430/450 | CP9097* | |

*These configurations include a 2 m x 0.53 mm id UltiMetal retention gap which are pre-connected to the VF-5ht UltiMetal column with a high temperature column connector.

Petroleum Columns

Petroleum applications vary greatly in character. From noble gases to simulated distillation, Agilent offers a broad range of columns designed to meet the needs of the petroleum/petrochemical chromatographer. Refer to the PLOT column section for columns for the analysis of light gases.

Lowox

- Unique selectivity for a wide range of oxygenates
- Minimal particle loss preserves detector performance
- Industry proven for process and portable GC applications (ASTM D7059)
- Analyze trace level oxygenate impurities in gas and liquid hydrocarbon streams
- High polarity
- Ideal for monitoring catalyst contamination by oxygenates

Lowox

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|-----------|
| 0.53 | 10 | 10.00 | 0 to 350/350 | CP8587 | CP858715 |

GS-OxyPLOT

- Accurate analysis of ppm/ppb level oxygenates in C_1 to C_{10} hydrocarbons
- Strong selectivity for a wide range of oxygenates (ethers, alcohols, aldehydes, and ketones) in complex matrixes such as gaseous hydrocarbons, motor fuels, and crude oil
- Suitable for ASTM methods for oxygenates
- Very high column stability (upper temperature limit of 350°C) with no column bleed
- Stable phase coating virtually eliminates particle generation and detector spiking
- Excellent for low concentration, quantitative GC analysis
- Ideal for selective heart-cutting applications

GS-OxyPLOT

| ID (mm) | Length (m) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------------------|-----------|-----------|
| 0.53 | 10 | 350 | 115-4912 | 115-4912E |

CP-Sil 5 CB for Formaldehyde

- Optimized for analysis of formaldehyde, water and methanol
- Trace analysis of sulfur compounds possible
- Partial permanent gas analysis possible (especially in switching systems)
- Non-polar phase provides accurate separations based on volatility
- High inertness, elutes sulfur components without absorption for high quality data and low detection limits
- Highest efficiency for this apolar column with the thickest film

CP-Sil 5 CB for Formaldehyde

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 60 | 8.00 | -60 to 300/325 | CP7475 |

HP-PONA

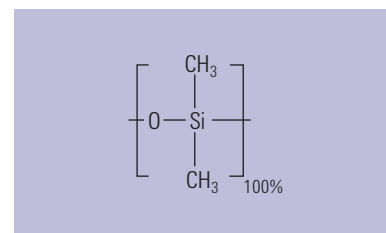
- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- Tested to ensure the resolution of m-xylene from p-xylene and of cyclopentane from 2,3-dimethylbutane
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

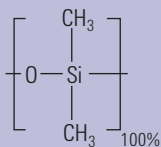
Similar Phases: Petrocol DH, SPB-1, 007-1, Rtx-1, MXT-1, Rtx-1PONA, Rtx-DHA

HP-PONA

| Description | ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|-------------|---------|------------|------------------------|------------------------------------|------------|-------------|
| HP-PONA | 0.20 | 50 | 0.50 | -60 to 325/350 | 19091S-001 | 19091S-001E |
| HP-1 | 0.20 | 50 | 0.50 | -60 to 325/350 | 19091Z-205 | 19091Z-205E |
| HP-1 | 0.25 | 100 | 0.50 | -60 to 325/350 | 19091Z-530 | 19091Z-530E |



Structure of HP-PONA



Structure of CP-Sil PONA CB

CP-Sil PONA CB

- High resolution analysis of paraffins, olefins, naphthalenes and aromatics in complex hydrocarbon mixtures
- Engineered for hydrocarbon analysis according to ASTM (DHA method)
- Inert to polar compounds for highly accurate data
- Excellent column-to-column reproducibility

Similar Phases: Petrocol DH, SPB-1, 007-1, Rtx-1, MXT-1

CP-Sil PONA CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.21 | 50 | 0.50 | 250/275 | CP7531 | CP753115 |
| 0.25 | 100 | 0.50 | 250/275 | CP7530 | |
| 0.25 | 150 | 1.00 | 250/275 | CP7945 | |

CP-Sil PONA for ASTM D5134

- Optimized PONA analysis for ASTM D5134
- Exact dimensions as specified in the ASTM method for full compliance
- Inert to polar additives

CP-Sil PONA for ASTM D5134

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.21 | 50 | 0.50 | 250/275 | CP7531 |

DB-Petro

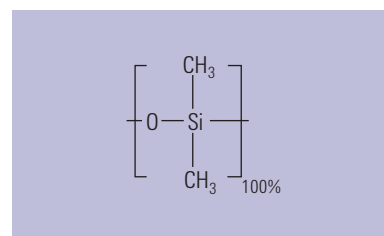
- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

Similar Phases: Petrocol DH, SPB-1, 007-1, Rtx-1, MXT-1

DB-Petro

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.20 | 50 | 0.50 | -60 to 325/350 | 128-1056 | |
| 0.25 | 100 | 0.50 | -60 to 325/350 | 122-10A6 | 122-10A6E |



Structure of DB-Petro



HP-1 Aluminum Clad

- 100% Dimethylpolysiloxane
- Aluminum clad fused silica tubing
- For high temperature simulated distillation
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: MXT-1

HP-1 Aluminum Clad

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|------------|
| 0.53 | 5 | 0.09 | 0 to 350/450 | 19095S-205 |
| | 10 | 0.09 | 0 to 350/450 | 19095S-200 |

DB-2887

- 100% Dimethylpolysiloxane
- Specifically designed for simulated distillation using ASTM Method D2887
- Rapid conditioning, fast run time and low bleed when compared to packed columns
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Petrocol EX2887, MXT-2887, MXT-1, Rtx-2887

DB-2887

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | | | LTM II Module |
| 0.53 | 10 | 3.00 | -60 to 350 | 125-2814 | 125-2814E | 125-2814LTM |



DB-HT SimDis

- 100% Dimethylpolysiloxane
- "Boiling point" phase for high temperature simulated distillation
- Durable stainless steel tubing
- 430 °C upper temperature limit
- Distillation range of C₆ to C₁₁₀₊
- Low bleed, even at 430 °C
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Petrocol EX2887, MXT-2887, Rtx-2887, AC Controls High Temp Sim Dist, AT-2887, ZB-1XT SimDist

DB-HT SimDis

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 5 | 0.10 | -60 to 400/430 | 145-1009 |
| | | 0.15 | -60 to 400/430 | 145-1001 |

TIPS & TOOLS



For fast simulated distillation for ASTM method D7798-13, see the LTM columns.

Turn to page 447.

CP-SimDist

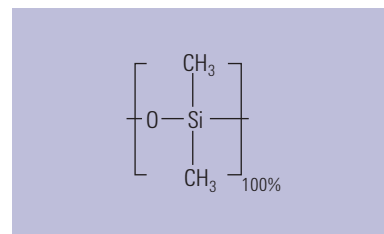
- For simulated distillation analysis up to C₁₀₀
- High temperature non-polar stationary phase
- Low bleed improves quantitation
- High temperature polyimide coating extends lifetime

CP-SimDist fused silica columns are guaranteed for simulated distillation up to C₁₀₀. These columns are low bleed, typically only 4-5 pA at 400 °C. The high temperature stationary phase and polyimide coating extend column lifetime.

Similar Phases: Petrocol EX2887, MXT-2887, Rtx-2887, AC Controls High Temp Sim Dist, AT-2887, ZB-1XT SimDist

CP-SimDist

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.32 | 10 | 0.10 | 375/400 | CP7521 | |
| 0.53 | 5 | 0.17 | 375/400 | CP7522 | CP752215 |
| | 10 | 0.10 | 375/400 | CP7541 | |



Structure of CP-SimDist

TIPS & TOOLS

For optimum performance, ferrules should be replaced every time the column is replaced and during column maintenance.

Turn to page 37.



CP-SimDist UltiMetal

- Designed for ASTM D2887 and the extended D2887 method compliance
- Low bleed
- Extended analysis to C₁₂₀ with maximum temperature of 450 °C
- UltiMetal tubing for excellent durability (same id as 0.53 mm id fused silica)
- Excellent retention time repeatability and column lifetime due to special deactivation of UltiMetal surface

Similar Phases: Petrocol EX2887, MXT-2887, Rtx-2887, AC Controls High Temp Sim Dist, AT-2887, ZB-1XT SimDist

CP-SimDist UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.53 | 5 | 0.09 | 450/450 | CP7569 | CP7569I5 |
| | | 0.17 | 450/450 | CP7532 | CP7532I5 |
| | | 0.88 | 450/450 | CP7570 | |
| | | 2.65 | 400/400 | CP7571 | |
| | 10 | 0.17 | 450/450 | CP7542 | |
| | | | 0.06 | 450/450 | CP6540 |
| | | 0.53 | 450/450 | CP7592 | |
| | | | 0.88 | 450/450 | CP7512 |
| | | 1.20 | 450/450 | CP7562 | |
| | | 2.65 | 400/400 | CP7582 | |
| | | 5.00 | 400/400 | CP7572 | |
| | | 20 | 0.11 | 450/450 | CP7593 |
| | 25 | 0.06 | 450/450 | CP6550 | |

CP-Sil 2 CB

- Lowest polarity bonded stationary phase available
- Superior replacement to squalane
- Unique selectivity toward cyclic hydrocarbons
- Separation almost entirely based on boiling point
- Stable at temperatures up to 200 °C

CP-Sil 2 CB

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 25 | 0.25 | 25 to 200/200 | CP7714 |
| 0.32 | 50 | 0.25 | 25 to 200/200 | CP7754 |
| | 25 | 1.20 | 25 to 200/200 | CP7764 |

CP-TCEP for Alcohols in Gasoline

- Engineered for analysis of alcohols in gasoline
- Excellent peak shape for accurate separations of alcohols
- Temperature stability to 135 °C for high productivity
- Unique selectivity separates benzene after n-dodecane

Similar Phases: Rt-TCEP

CP-TCEP

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.25 | 50 | 0.40 | 135/140 | CP7525 | CP752515 |

DB-Sulfur SCD

- Engineered for sulfur chemiluminescence detection (SCD) to provide low bleed performance and reduced SCD ceramic tube fouling
- Extends SCD signal stability which greatly reduces instrument downtime and operational cost for detector maintenance
- Excellent peak shape for a wide range of reactive sulfur compounds from H₂S, COS, mercaptans and thiophenes
- 100% Dimethyl polysiloxane stationary phase (PDMS) as specified in ASTM methods such as D5623 and D5504
- Custom configurations are available through the custom column shop, www.agilent.com/chem/CustomColumn

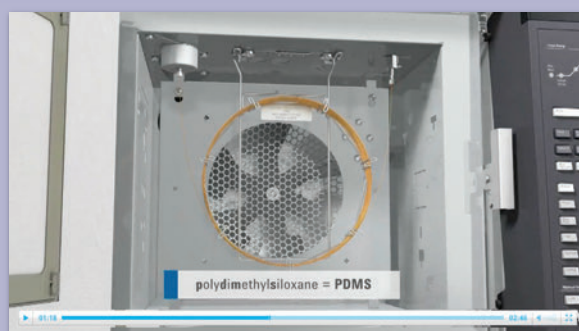
DB-Sulfur SCD

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-------------|
| 0.32 | 40 | 0.75 | -60 to 270/290 | G3903-63002 |
| | 40 | 3.00 | -60 to 25/270 | G3903-63004 |
| | 60 | 4.20 | -60 to 25/270 | G3903-63001 |
| 0.53 | 70 | 4.30 | -60 to 25/270 | G3903-63003 |

TIPS & TOOLS



J&W DB-Sulfur SCD GC Columns are optimized for low bleed and enhanced SCD signal stability. To view a video with more information, visit www.agilent.com/chem/db-sulfur_scd



Select Low Sulfur

- Highest degree of column inertness provides excellent peak shape for active compounds
- Low detection limits for sulfur compounds
- Unique selectivity prevents co-elution and matrix interferences in propylene streams
- Highly permeable PLOT stationary phase provides high retention of volatile compounds
- Unique QC testing results in consistent column inertness performance
- Mechanical stability results in no particle loss

Select Low Sulfur

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage |
|---------|------------|------------------|-----------|
| 0.32 | 60 | 185 | CP8575 |

CP-Sil 5 CB for Sulfur

- Optimized for analysis of volatile sulfur compounds
- Trace analysis of sulfur compounds to C₇ mercaptan for high productivity
- Non-polar phase provides accurate separations based on volatility
- High inertness, elutes SO₂ for high quality data and low detection limits

CP-Sil 5 CB for Sulfur

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.32 | 30 | 4.00 | -60 to 300/325 | CP7529 |



Select for Permanent Gases/CO₂ Column, CP7429

Select for Permanent Gases – Dual Column

- Set of two parallel columns: CP-Molsieve 5Å for permanent gases and PoraBOND Q for CO₂ analysis
- Isothermal separation at temperatures >40 °C eliminates the need for cryogenics
- Temperature stability up to 300 °C allows short regeneration times and improves efficiency
- One injector, one detector simplifies operation
- Engineered for fast separation, low level analysis and quantification of argon/oxygen
- Separates permanent gases and CO₂ in a single run
- Coupled, tested and securely mounted on EZ-GRIP column mount
- For resolution of the difficult-to-separate argon/oxygen and helium/neon pairs, use CP7530 Select Permanent Gases/HR (High Resolution) column

Select for Permanent Gases – Dual Column

| Description | Temp Limits (°C) | 7 in Cage |
|--|------------------|-----------|
| Select Permanent Gases/CO ₂ | 300/325 | CP7429 |
| Select Permanent Gases/HR | 300/325 | CP7430 |

Select Al₂O₃ MAPD

- Aluminum oxide PLOT column for the analysis of reactive hydrocarbons such as methyl acetylene and propadiene (MAPD)
- Optimized to improve sensitivity and response
- Faster run improves operating efficiency
- Two-fold higher response for MAPD, especially important when running impurity analyses

Similar Phases: Rt-Alumina BOND/MAPD, MXT-Alumina BOND/MAPD

Select Al₂O₃ MAPD

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage |
|---------|------------|------------------|-----------|
| 0.32 | 25 | -100 to 200/200 | CP7433 |
| | 50 | -100 to 200/200 | CP7431 |
| 0.53 | 50 | -100 to 200/200 | CP7432 |

Agilent J&W Biodiesel Capillary GC Columns

Biofuels are becoming more attractive as a viable supplement or alternative to petroleum-based fuels. Agilent J&W Biodiesel Capillary GC columns are purposely designed and application-optimized for the analysis of biodiesel to meet ASTM and CEN testing standards.

Biodiesel EN14105 Free/Total Glycerin and Biodiesel ASTM D6584 Free/Total Glycerin

- Designed for the analysis of free and total glycerin in B100 according to EN14105 or ASTM D6584
- Specially processed for extended temperature limit of 400 °C
- High temperature, polyimide-coated fused silica tubing
- Excellent peak shape and extended column life
- Bonded and cross-linked
- Solvent rinsable
- Retention gaps please order p/n 160-BD65-5 (5 m x 0.53 mm)

Biodiesel EN14103 FAME Analysis

- Specially designed for the analysis of esters and linoleic acid methyl esters in B100 using EN14103
- Bonded and cross-linked
- Solvent rinsable

Biodiesel EN14110 Residual Methanol

- Specially designed for the determination of trace methanol in B100 using EN14110
- Bonded and cross-linked
- Solvent rinsable



Biodiesel Capillary GC Columns

| Description | ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|--|---------|------------|-----------|------------------|------------|
| Biodiesel ASTM D6584 Free/Total Glycerin | 0.32 | 15 | 0.10 | -60 to 400 | 123-BD11 |
| Biodiesel EN14105 Free/Total Glycerin | 0.32 | 10 | 0.10 | -60 to 400 | 123-BD01 |
| Biodiesel EN14103 FAME Analysis | 0.32 | 30 | 0.25 | 40 to 260/270 | 1909BD-113 |
| Biodiesel EN14110 Residual Methanol | 0.32 | 30 | 1.80 | 20 to 260/280 | 123-BD34 |

Biodiesel Test Samples

| Description | Part No. |
|---|-----------|
| Biodiesel MSTFA kit, 10 x 1 mL ampoules N-Methyl-N-(trimethylsilyl)trifluoro-acetamide for ASTM method D6584 | 5190-1407 |
| Biodiesel D6584 kit 2 internal standard solutions, 1 mL, 5/pk and 2 internal standard solutions, 5 mL | 5190-1408 |
| Biodiesel E14105 kit, 4 x 1 mL ampoules 4 standard solutions | 5190-1409 |
| Biodiesel Monoglyceride kit, 3 x 1 mL ampoules | 5190-1410 |



Select Biodiesel

- Complete set of biodiesel columns for full compliance and ease-of-use
- UltiMetal stainless steel technology provides high accuracy and longevity
- Pre-tested for complete confidence in results
- Good column lifetime when operating at temperatures up to 400 °C
- UltiMetal stainless steel column with ultra stable stationary phase
- Convenient pre-coupled retention gap that is leak tested

Technical Specifications

| Method | Analytes | Column | Injector Type | Analysis Time (min) |
|------------|--|---------------------------------|--------------------------------|---------------------|
| ASTM D6584 | Free and total glycerine | Select Biodiesel for Glycerides | On-column | 32 |
| EN14103 | Ester and linoleic acid methyl esters | Select Biodiesel for FAME | Split/splitless | 30 |
| EN14105 | Free and total glycerine; mono, di- and tri-glycerides | Select Biodiesel for Glycerides | On-column | 35 |
| EN14106 | Free glycerol | Select Biodiesel for Glycerides | Split/splitless | 10 |
| EN14110 | Methanol | Select Biodiesel for Methanol | Headspace with split/splitless | 10 |

Select Biodiesel

| Description | ID (mm) | Length (m) | Film (µm) | 7 in Cage |
|---|---------|------------|-----------|-----------|
| For glycerides, UltiMetal, with 2 m retention gap | 0.32 | 15 | 0.10 | CP9078 |
| For glycerides, UltiMetal | 0.32 | 15 | 0.10 | CP9079 |
| For glycerides, UltiMetal, with 2 m retention gap | 0.32 | 10 | 0.10 | CP9076 |
| For glycerides, UltiMetal | 0.32 | 10 | 0.10 | CP9077 |
| For FAME, fused silica | 0.32 | 30 | 0.25 | CP9080 |
| For Methanol, fused silica | 0.32 | 30 | 3.00 | CP9083 |
| UltiMetal retention gap, methyl deactivated | 0.53 | 2 | | CP6530 |

Select Silanes

- Stabilized trifluoropropyl-methyl polysiloxane phase for optimized ppm level analysis of silanes
- High capacity and retention
- Low bleed
- Reduced surface activity provides excellent peak shape
- Thick film offers high sample loading capacity and retention
- Typical applications include alkylated chlorosilanes at % levels as well as impurity analysis
- Valved, direct and split/splitless injections are possible

Select Silanes

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 30 | 1.80 | 0 to 270/300 | CP7434 |
| | 60 | 1.80 | 0 to 270/300 | CP7435 |
| 0.53 | 60 | 3.00 | 0 to 270/300 | CP7437 |

CP-Volamine

- Non-polar stationary phase
- Excellent stability for samples containing water expands the application range
- Maximum temperature of 265 °C for enhanced productivity
- Highly inert providing sharp amine peaks for accurate results
- Produces symmetrical peaks due to MPD (Multi-Purpose Deactivation) technology
- Excellent performance even when the sample contains high percentages of water
- Ideal for analyzing volatile amines like MMA, DMA and TMA (monomethyl, dimethyl and trimethyl amine)

Similar Phases: Rtx-Volatile Amines

CP-Volamine

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|------------------|-----------|-----------|
| 0.32 | 15 | 265/300 | CP7446 | |
| | 30 | 265/300 | CP7447 | CP744715 |
| | 60 | 265/275 | CP7448 | CP744815 |

CP-Sil 8 CB for Amines

- Base deactivated 5% phenyl polydimethylpolysiloxane
- Optimized inertness performance for a broad range of amine compounds
- Thermal stability up to 350 °C enables separations of amines up to C₂₀ as well as alkanolamines
- Base deactivated columns also available as CP-Wax for Amines

Similar Phases: Rtx-5 Amine

CP-Sil 8 CB for Amines

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|------------------|---------------|-----------|
| <i>0.15</i> | <i>25</i> | <i>2.00</i> | <i>325/350</i> | <i>CP7599</i> | |
| 0.25 | 30 | 0.25 | 325/350 | CP7598 | CP7598I5 |
| | 30 | 0.50 | 325/350 | CP7595 | CP7595I5 |
| 0.32 | 30 | 1.00 | 325/350 | CP7596 | CP7596I5 |
| 0.53 | 30 | 1.00 | 325/350 | CP7597 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

CP-Wax for Volatile Amines and Diamines

Similar Phases: Stabilwax DB

CP-Wax for Volatile Amines and Diamines

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.32 | 25 | 1.20 | 220/220 | CP7422 |
| 0.53 | 25 | 2.00 | 220/220 | CP7424 |

PoraPLOT Amines

- Unique PLOT columns specially designed for high retention of very volatile amines
- High efficiency at temperatures above ambient eliminates the need for cryogenics
- High sensitivity for amines and ammonia

PoraPLOT Amines

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 25 | 10.00 | -100 to 220/220 | CP7591 |
| 0.53 | 25 | 20.00 | -100 to 220/220 | CP7594 |

Pesticides Columns

Agilent J&W low-bleed columns are ideal for the analysis of pesticides. Not only do they produce less bleed than a standard polymer, which improves the signal-to-noise ratio and minimum detectable quantities, but they also have higher upper temperature limits which allow for faster run times. Agilent also offers several common phases with additional pesticide-specific testing to ensure performance for your application.

Note: For CLP pesticides and other methods using electron capture detectors, see DB-35ms, DB-17ms and DB-XLB.

DB-CLP1 and DB-CLP2

- Universal column pair designed for pesticides analyses
- EPA Methods: CLP (Contract Lab Program) pesticides, 504.1, 505, 508.1, 551, 552.3, 8081B, 8082A, 8154A
- Ideal for dual column, dual ECD GC analyses
- DB-CLP1 and DB-CLP2 columns are regularly used in sets. Connect them together easily with an Agilent Ultra Inert, universal press fit Y-splitter (5190-6980), or an UltiMetal Plus deactivated CFT un-purged splitter (G3184-60065)
- Mid polarity stabilized phases provide fast and low bleed reliable analyses
- Special testing includes pesticides for proof of performance and column to column reproducibility
- DB-CLP1 primary, DB-CLP2 confirmation

DB-CLP1 and DB-CLP2

| Description | ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|---------|------------|-----------|------------------|-----------|
| DB-CLP1 | 0.32 | 30 | 0.25 | 50 to 340/360 | 123-8232 |
| DB-CLP2 | 0.32 | 30 | 0.50 | 50 to 340/360 | 123-8336 |



TIPS & TOOLS

Check out Agilent's complete line of sample preparation products for any type of GC and GC/MS analysis at www.agilent.com/chem/sampleprep



VF-5 Pesticides

- Specially designed for the determination of trace levels of pesticide residue
- Highly inert for enhanced ECD and MS detection
- Tested with key pesticides including endrin and aldrin for optimal performance and consistency of results
- Low bleed

VF-5 Pesticides

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 30 | 0.25 | -60 to 325/350 | CP9074 |
| | 50 | 0.25 | -60 to 325/350 | CP9073 |
| 0.32 | 30 | 0.25 | -60 to 325/350 | CP9075 |

TIPS & TOOLS

Tips and tricks for making better connections...

- It's important to use ferrules and nuts appropriate for your application, so graphite/polyimide ferrules and Agilent Self Tightening column nuts for oxygen detectors, or UltiMetal Plus Flexible Metal ferrules for ultimate flow path inertness
- Never over tighten fittings to avoid soft ferrules extruding into the fitting, contaminating or creating active sites in the flow path
- Install column at the correct and consistent height, critical for accurate and reproducible results
- Reduce and eliminate leaks at the MS interface with the Agilent Self Tightening column nuts that give you a tight connection without expensive upgrades or adaptors

Watch the animation that shows how to make better column connections in a GC or GC/MS, at www.agilent.com/chem/mbcvideo



DB-1701P

- Low/mid-polarity
- Exact replacement of HP-PAS1701
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-1701, Rtx-1701, BP-10, CB-1701, OV-1701, 007-1701, ZB-1701P

DB-1701P

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|---------------|
| | | | | | LTM II Module |
| 0.25 | 30 | 0.25 | -20 to 280/300 | 122-7732 | 122-7732LTM |
| 0.32 | 25 | 0.25 | -20 to 280/300 | 123-7722 | |
| | 30 | 0.25 | -20 to 280/300 | 123-7732 | |
| 0.53 | 30 | 1.00 | -20 to 260/280 | 125-7732 | |

VF-1701 Pesticides

- Specially designed for the determination of trace levels of pesticide residues
- Columns individually tested with key pesticides, including endrin and aldrin
- Highly inert for improved detection limits for trace pesticide determination
- Proven performance with ECD or MS detection
- Ultra low bleed to improve sensitivity

VF-1701 Pesticides

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 30 | 0.25 | -20 to 280/300 | CP9070 |
| | 50 | 0.25 | -20 to 280/300 | CP9072 |
| 0.32 | 30 | 0.25 | -20 to 280/300 | CP9071 |

CP-Sil 8 CB for Pesticides

- Linear column response down to femtogram level for improved productivity
- Excellent inertness – tested with DDTs to provide very reliable data
- Can be used with on-column injection techniques
- Integrated retention gap helps avoid problems with solvent condensation allowing repeated splitless injections without phase deterioration

CP-Sil 8 CB for Pesticides

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 50 | 0.12 | 300/325 | CP7481 |
| 0.53 | 50 | 0.25 | 300/325 | CP7504 |

CP-Sil 19 CB for Pesticides

- Ideal as a confirmation column for reliable results
- Specified for EPA and CLP analytes for ultimate compliance
- Supplied with a coupled retention gap for on-column injection for best detection limits

CP-Sil 19 CB for Pesticides

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 30 | 0.25 | 275/300 | CP7406 |
| | 50 | 0.20 | 275/300 | CP7407 |
| 0.53 | 30 | 1.00 | 260/275 | CP7409 |

DB-608

- Specifically designed for the analysis of chlorinated pesticides and PCBs
- US EPA Methods: 608, 508, 8080
- Excellent inertness and recoveries without pesticide breakdown
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-608

Similar Phases: SPB-608, NON-PAKD Pesticide, 007-608

DB-608

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 LTM II Module |
|---------|------------|-----------|------------------|-----------|----------------------------|
| 0.25 | 30 | 0.25 | 40 to 280/300 | 122-6832 | |
| 0.32 | 30 | 0.50 | 40 to 280/300 | 123-1730 | 123-1730LTM |
| 0.53 | 30 | 0.50 | 40 to 260/280 | 125-6837 | |
| | | 0.83 | 40 to 260/280 | 125-1730 | |

HP-PAS5

- Non-polar
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-5, RSL-200, Rtx-5, BP-5, CB-5, OV-5, 007-2 (MPS-5), SE-52, SE-54, XTI-5, PTE-5, CC-5, ZB-5

HP-PAS5

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|------------|
| 0.32 | 25 | 0.52 | -60 to 325/350 | 19091S-010 |

Rapid-MS

- Equivalent to 5% phenyl, 95% dimethylpolysiloxane
- Fast analysis time improves productivity
- Reduce analysis time by 3-5x for temperature programmed, and up to 10x for isothermal runs
- The film thickness from 0.1 to 1 μm ensures high loadability and higher sensitivity
- Low bleed

Note: Rapid-MS columns utilize the high optimal carrier gas velocity obtained when a separation is performed under reduced pressure for fast analysis times

Rapid-MS

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.53 | 10 | 0.12 | -60 to 325/325 | CP8131 |
| | | 0.25 | -60 to 325/325 | CP8132 |
| | | 0.50 | -60 to 325/325 | CP8133 |
| | | 1.00 | -60 to 325/325 | CP8134 |

Restriction for Rapid-MS

| Description | Part No. |
|--|----------|
| Restriction for Rapid-MS, fused silica, 0.1 mm id, 0.6 m, 5/pk | CP8121 |

PAH Columns

Select PAH

- Full separation for all PAH isomers avoids false positives and inaccurate results
- Full separation of EPA PAHs in less than 7 minutes and EU PAHs in less than 30 minutes, including separation of chrysene, triphenylene and benzo(a)fluoranthene (type b, j, and k)
- Fast results with no need for further analysis
- Low bleed enhances sensitivity

Select PAH

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|----------------------|---------------|
| <i>0.15</i> | <i>15</i> | <i>0.10</i> | <i>40 to 325/350</i> | <i>CP7461</i> |
| 0.25 | 30 | 0.15 | 40 to 325/350 | CP7462 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

DB-EUPAH

- Specially designed for analysis of EU regulated PAHs
- Individually tested with application-specific QC test probe mixture
- Great resolution of critical isomers, e.g. benzo(b,j,k)fluoranthenes
- Superb thermal stability for accurate analysis of high boiling PAHs, e.g. dibenzopyrenes
- Excellent signal-to-noise ratio
- Optimized column dimensions for proven performance

DB-EUPAH

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|----------------------|-----------------|
| <i>0.18</i> | <i>20</i> | <i>0.14</i> | <i>40 to 320/340</i> | <i>121-9627</i> |
| 0.25 | 60 | 0.25 | 40 to 320/340 | 122-96L2 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

CP-Sil PAH CB UltiMetal

- Separates all 16 PAHs according to EPA Method 610
- High temperature, low bleed phase
- Virtually unbreakable UltiMetal stainless steel capillary column
- Maximum temperature of 400/425 °C

CP-Sil PAH CB UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 25 | 0.12 | 400/425 | CP7440 |

Semivolatiles Columns

Semivolatiles are usually extracted from soil samples or other environmental matrixes. GC columns with precise retention time reproducibility and good mass spectrometer performance are key enablers for these often demanding analyses.

DB-UI 8270D for Semivolatiles

- Designed for EPA Method 8270D and other regulated GC/MS semivolatiles analysis
- Special semivolatiles testing ensures poof of column to column performance for trace level analysis
- Excellent 2,4-dinitrophenol response
- Ultra inertness and low bleed
- Available in convenient and economical 6 packs (6 for the price of 5)

DB-UI 8270D for Semivolatiles

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|-------------|------------|------------------------|------------------------------------|------------------------|
| <i>0.18</i> | <i>20</i> | <i>0.36</i> | <i>-60 to 325/350</i> | <i>121-9723</i> |
| | | | <i>-60 to 325/350</i> | <i>621-9723, 6/pk*</i> |
| <i>0.25</i> | <i>30</i> | <i>0.25</i> | <i>-60 to 325/350</i> | <i>122-9732</i> |
| | | | <i>-60 to 325/350</i> | <i>622-9732, 6/pk*</i> |
| | | <i>0.50</i> | <i>-60 to 325/350</i> | <i>122-9736</i> |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

*Only available in the US

CP-Sil 8 CB for PCB

- Engineered for the analysis of PCBs according to DIN method 51527
- Ideal for trace level ECD detection of PCBs
- High temperature stability provides low bleed and extended lifetime

CP-Sil 8 CB for PCB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 50 | 0.25 | 300/325 | CP7482 |

DB-5.625

- Close equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed to exhibit excellent inertness for EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols*
- Surpasses EPA performance criteria for semivolatiles
- Inert for base, neutral and acidic compounds
- High temperature limit with excellent thermal stability and low bleed
- Bonded and cross-linked
- Solvent rinsable

*Pentachlorophenol, 2,4-dinitrophenol, carbazole, and N-nitrosodiphenylamine used to test response factors.

Similar Phases: XTI-5, Rtx-5, PTE-5, BPX-5

DB-5.625

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|-----------------------|-----------------|
| <i>0.18</i> | <i>20</i> | <i>0.18</i> | <i>-60 to 325/350</i> | <i>121-5621</i> |
| | | <i>0.36</i> | <i>-60 to 325/350</i> | <i>121-5622</i> |
| 0.25 | 30 | 0.25 | -60 to 325/350 | 122-5631 |
| | | 0.50 | -60 to 325/350 | 122-5632 |
| | | 1.00 | -60 to 325/350 | 122-5633 |
| | 60 | 0.25 | -60 to 325/350 | 122-5661 |
| 0.32 | 30 | 0.25 | -60 to 325/350 | 123-5631 |
| | | 0.50 | -60 to 325/350 | 123-5632 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

HP-5ms Semivolatile

- (5%-Phenyl)-methylpolysiloxane, identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Specifically tested for inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27

Similar Phases: Rtx-5ms, Rxi-5ms, Rxi-5Sil MS, PTE-5, BPX-5, AT-5ms, ZB-5ms, SLB-5ms, Equity-6



HP-5ms Semivolatile

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|------------|
| 0.25 | 30 | 0.50 | -60 to 325/350 | 19091S-139 |

CP-Sil 5/C18 CB for PCB

- Engineered for high resolution PCB analysis
- Lower polarity than 100% polydimethylpolysiloxane due to its C₁₈ substitution
- Provides high signal-to-noise ratios for ECD detectors
- Optimized column length for separation of critical isomer pairs:
28/31, 56/60, 149/118, 105/153/132 and 170/190

CP-Sil 5/C18 CB for PCB

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 50 | 0.10 | 275/300 | CP7477 |
| | 100 | 0.10 | 275/300 | CP7476 |

DB-Dioxin

- Specifically engineered for the analysis of polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs)
- Resolves 2,3,7,8-TCDD and 2,3,7,8-TCDF from all other isomers in one run
- Low bleed
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

Similar Phases: SP-2331, 007-23, Rtx-2332, Rtx-Dioxin

DB-Dioxin

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 60 | 0.15 | 40 to 250/270 | 122-2461 |
| | | 0.25 | 40 to 250/270 | 122-2462 |

CP-Sil 88 for Dioxins

- High polarity stationary phase with specific selectivity for dioxins and dibenzofuran separations
- Integrated retention gap eliminates leaks and extends column lifetime with splitless injections
- 2,3,7,8-TCDD can be determined at low concentrations
- For fast runtimes, thin film configurations are available with maximum temperature program limit of 270 °C

Similar Phases: SP-2560, SP-2340, SP-2330, BPX-70, BPX-90

CP-Sil 88 for Dioxins

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 50 | 0.20 | 50 to 225/240 | CP7588 |
| | 60 | 0.10 | 50 to 250/270 | CP7498 |

Volatiles Columns

Agilent offers a selection of advanced polymer chemistries for increasingly demanding volatiles applications. Whether for a primary analytical column or as a complementary confirmation column, Agilent J&W capillaries are chromatographers' first choice.

DB-624 Ultra Inert

- Environmental volatile organic compounds (VOCs) methods
- Excellent for US EPA Methods: 501.3, 502.2, 503.1, 524.2, 601, 602, 8010, 8015, 8020, 8240, 8260
- Industrial chemical analyses – solvents, petrochemicals, specialty chemicals
- Food and beverage – alcohols, fusel oils
- Pharmaceutical residual solvents per USP <467>
- Ultra inertness processing expands application range with excellent peak shape for low molecular weight acidic compounds
- UI testing ensures premium performance column to column
- Identical selectivity to the industry standard DB-624 – upgrade with no change in method required
- Optimized by the inventors of DB-624

DB-624 Ultra Inert

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|-------------|------------|-------------|-------------------|-------------------|
| <i>0.18</i> | <i>20</i> | <i>1.00</i> | <i>-20 to 260</i> | <i>121-1324UI</i> |
| 0.25 | 30 | 1.40 | -20 to 260 | 122-1334UI |
| | 60 | 1.40 | -20 to 260 | 122-1364UI |
| 0.32 | 30 | 1.80 | -20 to 260 | 123-1334UI |
| | 60 | 1.80 | -20 to 260 | 123-1364UI |
| 0.53 | 30 | 3.00 | -20 to 260 | 125-1334UI |
| | 75 | 3.00 | -20 to 260 | 125-1374UI |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Don't forget, we have special offers throughout the year. To learn more, visit www.agilent.com/chem/specialoffers



DB-624

- Specifically designed for the analysis of volatile priority pollutants and residual solvents
- No cryogenics needed for US EPA Method 502.2
- Excellent for US EPA Methods: 501.3, 502.2, 503.1, 524.2, 601, 602, 8010, 8015, 8020, 8240, 8260, and USP 467
- Excellent inertness for active compounds
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-624
- Equivalent to USP Phase G43

Similar Phases: AT-624, Rxi-624 Sil MS, Rtx-624, PE-624, 007-624, 007-502, ZB-624

DB-624

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|-------------------|-----------------|------------------|----------------------------|
| <i>0.18</i> | <i>20</i> | <i>1.00</i> | <i>-20 to 260</i> | <i>121-1324</i> | <i>121-1324E</i> | <i>121-1324LTM</i> |
| 0.20 | 25 | 1.12 | -20 to 260 | 128-1324 | 128-1324E | 128-1324LTM |
| 0.25 | 30 | 1.40 | -20 to 260 | 122-1334 | 122-1334E | 122-1334LTM |
| | 60 | 1.40 | -20 to 260 | 122-1364 | 122-1364E | |
| 0.32 | 30 | 1.80 | -20 to 260 | 123-1334 | 123-1334E | 123-1334LTM |
| | 60 | 1.80 | -20 to 260 | 123-1364 | 123-1364E | |
| 0.45 | 30 | 2.55 | -20 to 260 | 124-1334 | | 124-1334LTM |
| | 75 | 2.55 | -20 to 260 | 124-1374 | | |
| 0.53 | 15 | 3.00 | -20 to 260 | 125-1314 | | |
| | 30 | 3.00 | -20 to 260 | 125-1334 | 125-1334E | 125-1334LTM |
| | 60 | 3.00 | -20 to 260 | 125-1364 | 125-1364E | |
| | 75 | 3.00 | -20 to 260 | 125-1374 | 125-1374E | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

CP-Select 624 CB

- 6% Cyanopropyl, 94% dimethylpolysiloxane
- EPA volatiles methods 524.2, 624 and 8015
- Specified by Pharmacopoeia V.3.3.9 for residual solvents
- Excellent column-to-column reproducibility
- Low bleed

Similar Phases: AT-624, Rtx-624, PE-624, 007-624, 007-502, ZB-624

CP-Select 624 CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|-------------|------------|------------------------|------------------------------------|---------------|-----------|
| <i>0.15</i> | <i>25</i> | <i>0.84</i> | <i>265/280</i> | <i>CP7411</i> | |
| 0.25 | 30 | 1.40 | 265/280 | CP7412 | |
| | 60 | 1.40 | 265/280 | CP7413 | |
| 0.32 | 30 | 1.80 | 265/280 | CP7414 | |
| | 60 | 1.80 | 265/280 | CP7415 | |
| 0.53 | 30 | 3.00 | 265/280 | CP7416 | CP741615 |
| | 75 | 3.00 | 265/280 | CP7417 | |
| | 105 | 3.00 | 265/280 | CP7418 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

DB-VRX

- Unique selectivity engineered for optimum resolution of volatiles analysis:
US EPA Methods 502.2, 524.2 and 8260
- 0.45 mm id columns provide more plates per meter compared to 0.53 mm id columns for the fewest co-elutions for GC method (an industry first)*
- No subambient cooling required to resolve the six "gases"
- Fast run time:
<30 minutes for optimum sample throughput
<8 minutes with 0.18 mm id
- Low polarity
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

*Two co-elutions: 1) m- and p-xylene, for which US EPA does not require separation, and 2) 1,1,2,2-tetrachloroethane and o-xylene which are separated by detectors PID and ELCD, respectively. **Note to GC/MS analysts:** These co-eluting compounds have different primary characteristic ions of 83 and 106, respectively.

Similar Phases: VOCOL, NON-PAKD, Rtx-Volatiles, PE-Volatiles, 007-624, Rtx-VRX, Rtx-VGC

DB-VRX

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|-------------|------------|-------------|-------------------|-----------------|------------------|----------------------------|
| <i>0.18</i> | <i>20</i> | <i>1.00</i> | <i>-10 to 260</i> | <i>121-1524</i> | | <i>121-1524LTM</i> |
| | <i>40</i> | <i>1.00</i> | <i>-10 to 260</i> | <i>121-1544</i> | <i>121-1544E</i> | |
| 0.25 | 30 | 1.40 | -10 to 260 | 122-1534 | | 122-1534LTM |
| | 60 | 1.40 | -10 to 260 | 122-1564 | 122-1564E | |
| 0.32 | 30 | 1.80 | -10 to 260 | 123-1534 | | |
| | 60 | 1.80 | -10 to 260 | 123-1564 | | |
| 0.45 | 30 | 2.55 | -10 to 260 | 124-1534 | | |
| | 75 | 2.55 | -10 to 260 | 124-1574 | | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

HP-VOC

- Selectivity engineered for US EPA Methods 502.2, 524.2 and 8260
- Low polarity – slightly more polar than DB-VRX
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: NON-PAKD, Rtx-Volatiles, PE-Volatiles, 007-624, Rtx-VRX, Rtx-VGC

HP-VOC

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|------------|
| 0.20 | 30 | 1.10 | -60 to 280/290 | 19091R-303 |
| | 60 | 1.10 | -60 to 280/290 | 19091R-306 |
| 0.32 | 60 | 1.80 | -60 to 280/290 | 19091R-316 |
| | 90 | 1.80 | -60 to 280/290 | 19091R-319 |
| 0.53 | 90 | 3.00 | -60 to 280/290 | 19095R-429 |
| | 105 | 3.00 | -60 to 280/290 | 19095R-420 |

TIPS & TOOLS

As part of Agilent's ongoing commitment to be your partner in chromatography, we have created a series of GC Troubleshooting videos, featuring Daron Decker, GC Applications Specialist, and Herb Brooks, Agilent Service Engineer. To view the videos, visit www.agilent.com/chem/gctroubleshooting



DB-502.2

- Available in 105 m for volatiles analyses
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

DB-502.2

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 60 | 1.80 | 0 to 260/280 | 123-1464 |
| 0.53 | 105 | 3.00 | 0 to 260/280 | 125-14A4 |

DB-MTBE

- Low polarity stationary phase
- Resolves MTBE from 2-methylpentane and 3-methylpentane for better quantitation
- Engineered for purge and trap injection without the need for cryofocusing
- Bonded and cross-linked
- Solvent rinsable

DB-MTBE

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.45 | 30 | 2.55 | 35 to 260/280 | 124-0034 |

CP-Select CB for MTBE

- Engineered for analysis of MTBE in reformulated gasoline
- Unique selectivity for MTBE
- Broad dynamic range for quantification of MTBE
- Ideal as primary or confirmation column

CP-Select CB for MTBE

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 50 | 0.25 | 200/200 | CP7528 |

DB-TPH

- Specifically designed for the analysis of total petroleum hydrocarbons (TPHs), soil analysis, and LUFT
- Three analyses in one injection – gas range organics, diesel range organics and motor oil
- Fast run time
- Bonded and cross-linked
- Solvent rinsable

DB-TPH

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 30 | 0.25 | -10 to 320 | 123-1632 |

TIPS & TOOLS

For a precision cut on your capillary column, use Agilent's GC column cutting tool (p/n 5183-4620).



Select Mineral Oil

- Stabilized non-polar bonded phase engineered for fast mineral oil analysis
- Optimized selectivity for reliable Total Petroleum Hydrocarbon (TPH) results per DIN H53 N-ISO 9377-2 methods
- C₄ to C₄₀ hydrocarbons can be analyzed in less than ten minutes
- Low bleed
- Available in fused silica or UltiMetal
- Fast run time
- High temperature stability up to 375/400 °C
- Available in economical 3 and 6 packs

Note: For optimal injection performance, use the 4 m x 0.53 mm id retention gap

Similar Phases: Rtx-Mineral Oil

Select Mineral Oil

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | Unit | 7 in Cage | 5 in Cage |
|----------------------|------------|-----------|------------------|------|-----------|-----------|
| 0.32 | 15 | 0.10 | -60 to 390/400 | 1/pk | CP7491 | CP749115 |
| | 15 | 0.10 | -60 to 390/400 | 3/pk | CP749103 | |
| | 15 | 0.10 | -60 to 390/400 | 6/pk | CP749106 | |
| Retention gap | | | | | | |
| 0.53 | 4.0 | | -60 to 325/350 | 3/pk | CP8015 | |



TIPS & TOOLS

Ensure highest quality gas while keeping gas lines clean and leak-free with Agilent's high-capacity gas filter. Learn more at www.agilent.com/chem/gasclean



Food, Flavors and Fragrances Columns

Food and flavor analyses place stringent demands on capillary columns. Samples have many components that are difficult to resolve and column-to-column reproducibility becomes critical. Agilent J&W GC columns are ideal for meeting these needs. Our rigorous quality control specifications and extensive QC testing ensure that the column you buy today will perform just like the column you buy tomorrow.

HP-88

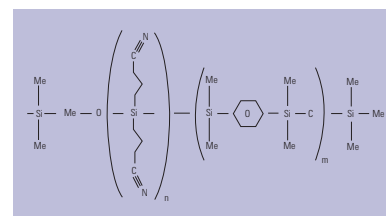
- (88%-Cyanopropyl)aryl-polysiloxane
- 250/320 °C upper temperature limits
- High polarity
- Designed for separation of cis-trans fatty acid methyl esters (FAMES)
- Even better separation than DB-23 of cis-trans isomers

Note: Because HP-88 is not bonded or cross-linked, we do not recommend solvent rinsing.

Similar Phases: SP-2560, SP-2340, SP-2330, BPX-70, BPX-90

HP-88

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|---------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 100 | 0.20 | 0 to 250/260 | 112-88A7 | 112-88A7E | |
| | 60 | 0.20 | 0 to 250/260 | 112-8867 | 112-8867E | |
| | 30 | 0.20 | 0 to 250/260 | 112-8837 | 112-8837E | 112-8837LTM |



Structure of HP-88

CP-Sil 88

- High selectivity towards positional and geometric isomers for ease-of-use
- Highly substituted cyanopropyl phase
- Highest polarity, non-chemically bonded and stabilized

Similar Phases: SP-2560, SP-2340, SP-2330, BPX-70, BPX-90

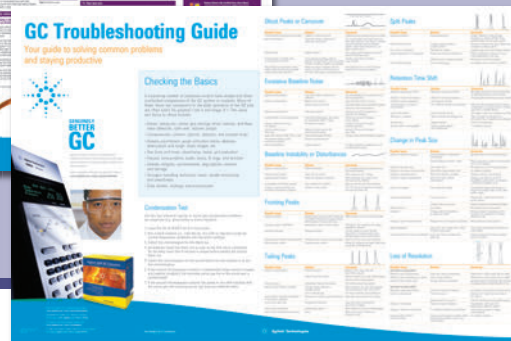
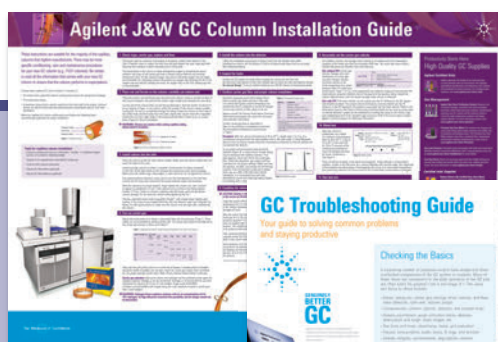
CP-Sil 88

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 25 | 0.20 | 50 to 225/240 | CP6172 |
| | 50 | 0.20 | 50 to 225/240 | CP6173 |
| 0.32 | 25 | 0.20 | 50 to 225/240 | CP6174 |
| | 50 | 0.20 | 50 to 225/240 | CP6175 |



TIPS & TOOLS

Order your free GC troubleshooting and GC column installation posters at www.agilent.com/chem/GCposteroffer



Select FAME

- Tuned for optimal cis-trans separation of FAMES, especially C₁₈ isomers
- Excellent peak shape and separation for FAME isomers – especially if one component is present at a higher concentration
- Bonded and cross-linked
- Low bleed
- High efficiency and column loadability
- Column length up to 200 m available for detailed analysis of the C_{18:1} isomer cluster

Select FAME

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|------------------|-----------|-----------|
| 0.25 | 50 | 275/290 | CP7419 | CP741915 |
| | 100 | 275/290 | CP7420 | |
| | 200 | 275/290 | CP7421 | |

CP-Sil 88 for FAME

- Optimized for analysis of FAME cis/trans isomers
- High polarity stationary phase provides improved efficiency and higher productivity
- Use for FAME separations in the C₆ to C₂₆ range

CP-Sil 88 for FAME

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.25 | 50 | 0.20 | 225/240 | CP7488 |
| | 60 | 0.20 | 225/240 | CP7487 |
| | 100 | 0.20 | 225/240 | CP7489 |

CP-Wax 57 CB

- Unique high polarity bonded wax column
- Industry proven for the analysis of alcohols in the brewing and wine/spirits industry
- Excellent inertness for optimum peak shape of alcohols and glycols
- Offered in 0.15 mm id for significantly high speed throughput

Similar Phases: SUPELCOWAX 10, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, Rtx-WAX, ZB-WAX

CP-Wax 57 CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|-------------|------------|------------------------|------------------------------------|----------------|-----------|
| <i>0.15</i> | <i>30</i> | <i>0.12</i> | <i>20 to 200/225</i> | <i>CP97721</i> | |
| 0.25 | 25 | 0.20 | 20 to 200/225 | CP97713 | |
| | 50 | 0.20 | 20 to 200/225 | CP97723 | CP9772315 |
| | 60 | 0.40 | 20 to 200/225 | CP8120 | |
| 0.32 | 25 | 0.20 | 20 to 200/225 | CP97743 | |
| | | 1.20 | 20 to 200/225 | CP97763 | |
| | 50 | 0.20 | 20 to 200/225 | CP97753 | CP9775315 |
| | | 1.20 | 20 to 200/225 | CP97773 | |
| 0.53 | 25 | 1.00 | 20 to 200/225 | CP97638 | |
| | 25 | 2.00 | 20 to 200/225 | CP97658 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

CP-Carbowax 400 for Volatiles in Alcohol

- Designed for the analysis of volatiles in alcoholic beverages
- High resolution for amyl alcohols for accurate quality control
- High efficiency
- Special testing ensures performance and column-to-column reproducibility

CP-Carbowax 400 for Volatiles in Alcohol

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 50 | 0.20 | 60/80 | CP7527 |

CP-Wax 57 CB for Glycols and Alcohols

- Optimized for the analysis of glycols, diols and alcohols
- Unique, high polarity wax phase
- Symmetrical peaks providing the most accurate results
- Cross-linked and bonded phase delivers robustness and enhanced column lifetime

CP-Wax 57 CB for Glycols and Alcohols

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 25 | 0.20 | 200/200 | CP7615 |
| 0.53 | 25 | 0.50 | 225/250 | CP7617 |

CP-TAP CB for Triglycerides

- Engineered phase for detailed analysis of triglycerides
- Separates complete triglyceride pattern in less than 16 minutes
- Separation based on carbon number and degree of unsaturation
- Stabilized phase for low bleed and enhanced column lifetime
- Available in fused silica and UltiMetal

CP-TAP CB for Triglycerides

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 25 | 0.10 | 350/360 | CP7483 |

CP-TAP CB UltiMetal

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 25 | 0.10 | 355/370 | CP7463 |

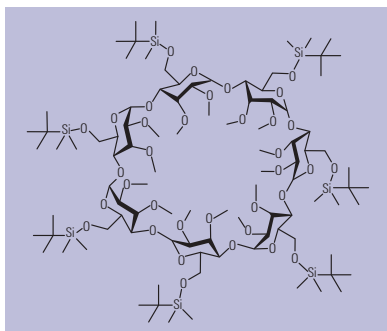
CP-FFAP CB for Free Fatty Acids in Dairy Products

- Ideal for flavors, aromas and free fatty acids C₁-C₂₆
- Separates C₂-C₂₄ acids in one run without derivatization
- Chemically-bonded for excellent longevity
- Water and solvent resistant

CP-FFAP CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|-------------|------------|-------------|------------------|---------------|-----------|
| <i>0.15</i> | 25 | <i>0.25</i> | 250/275 | <i>CP7686</i> | |
| 0.32 | 25 | 0.30 | 250/275 | CP7485 | CP748515 |
| 0.53 | 25 | 1.00 | 250/275 | CP7486 | |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers



Structure of CycloSil-B

CycloSil-B

- 30% Heptakis (2,3-di-O-methyl-6-O-t-butyl dimethylsilyl)-β-cyclodextrin in DB-1701
- Chiral separations without chiral-specific derivatization
- New stationary phase for improved resolution of many chiral separations
- Ideal for many chiral γ-lactones and terpenes

Note: Because CycloSil-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

Similar Phases: LIPODEX C, Rt-β DEXm, β-DEX 110, β-DEX 120

CycloSil-B

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 7890/6890 LTM II Module |
|---------|------------|-----------|------------------|-----------|----------------------------|
| 0.25 | 30 | 0.25 | 35 to 260/280 | 112-6632 | 112-6632LTM |
| 0.32 | 30 | 0.25 | 35 to 260/280 | 113-6632 | 113-6632LTM |

Cyclodex-B

- 10.5% β -cyclodextrin in DB-1701
- Chiral separations without chiral-specific derivatization
- Broad range of resolving potential
- Excellent peak shape

Note: Because Cyclodex-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

Similar Phases: LIPODEX C, Rt- β DEXm, β -DEX 110, β -DEX 120

Cyclodex-B

| ID (mm) | Length (m) | Film (μ m) | Temp Limits ($^{\circ}$ C) | 7890/6890 | | |
|---------|------------|-----------------|-----------------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| 0.25 | 30 | 0.25 | 50 to 230/250 | 112-2532 | 112-2532E | 112-2532LTM |
| | 60 | 0.25 | 50 to 230/250 | 112-2562 | | |
| 0.32 | 30 | 0.25 | 50 to 230/250 | 113-2532 | 113-2532E | |

HP-Chiral β

- β -cyclodextrin in (35%-phenyl)-methylpolysiloxane
- Chiral separations without chiral-specific derivatization
- Phenyl-based polymer provides low bleed and does not interfere with nitrogen-specific detectors
- Available in two concentrations of β -cyclodextrin: 10% and 20%
- 20% β -cyclodextrin best choice for initial screening

Similar Phases: LIPODEX C, Rt- β DEXm, β -DEX 110, β -DEX 120

HP-Chiral β

| ID (mm) | Length (m) | Film (μ m) | Temp Limits ($^{\circ}$ C) | 7 in Cage | 5 in Cage |
|---------------------------------------|------------|-----------------|-----------------------------|-------------|--------------|
| HP-Chiral 10β | | | | | |
| 0.25 | 30 | 0.25 | 30 to 240/250 | 19091G-B133 | |
| HP-Chiral 20β | | | | | |
| 0.25 | 30 | 0.25 | 30 to 240/250 | 19091G-B233 | 19091G-B233E |
| 0.32 | 30 | 0.25 | 30 to 240/250 | 19091G-B213 | |

CP-Chirasil Val

- Designed for separations of optically active compounds including amino acids
- Both antipode phases are available (D and L) for maximum versatility
- Stabilized chiral phase, over 50% cross-linked for longevity
- Tested for separation of amino acid enantiomers
- Low bleed

Note: On Chirasil-L Val, D-amino acids elute before the L-amino acids, while on Chirasil-D-Val, this elution order is reversed. This is especially valuable when determining the optical purity of these compounds. Selecting the column from which the minor compound elutes before the major enantiomers results in the lowest detection levels.

CP-Chirasil Val

| Description | ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|-------------|---------|------------|------------------------|------------------------------------|-----------|-----------|
| Antipode D | 0.25 | 25 | 0.08 | 200/200 | CP7494 | |
| Antipode L | 0.25 | 25 | 0.12 | 200/200 | CP7495 | CP749515 |

CP-Chirasil-Dex CB

- Cyclodextrin bonded to dimethylpolysiloxane for homogeneous enantioselectivity throughout the column
- High resolution factor between isomers across a broad application range
- Chemically bonded phase for excellent longevity
- No need for derivatization improved productivity
- Low elution temperature of polar compounds
- Suitable for all injection techniques

Similar Phases: LIPODEX C, Rt- β DEXm, β -DEX 110, β -DEX 120

CP-Chirasil-Dex CB

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|-----------|
| 0.25 | 25 | 0.25 | 200/200 | CP7502 | CP750215 |
| 0.32 | 25 | 0.25 | 200/200 | CP7503 | |

CP-Cyclodextrin- β -2,3,6-M-19

- Unique selectivity for optical and positional isomer separations
- High efficiency enables wide range of applications
- Separates o-, m-, and p-xylenes
- Excellent peak shape for underivatized polar compounds

CP-Cyclodextrin- β -2,3,6-M-19

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|-----------|
| 0.25 | 25 | 0.25 | 225/250 | CP7500 | CP750015 |
| | 50 | 0.25 | 225/250 | CP7501 | |

TIPS & TOOLS

Agilent CrossLab GC supplies, including CrossLab Ultra Inert liners, perform seamlessly with a variety of instruments regardless of make or model, including Varian (now Bruker), PerkinElmer, Shimadzu, and Thermo Scientific GC systems. Learn more at www.agilent.com/chem/CrossLab



TIPS & TOOLS

Tips and tricks for making better connections...

- It's important to use ferrules and nuts appropriate for your application, so graphite/polyimide ferrules and Agilent Self Tightening column nuts for oxygen detectors, or UltiMetal Plus Flexible Metal ferrules for ultimate flow path inertness
- Never over tighten fittings to avoid soft ferrules extruding into the fitting, contaminating or creating active sites in the flow path
- Install column at the correct and consistent height, critical for accurate and reproducible results
- Reduce and eliminate leaks at the MS interface with the Agilent Self Tightening column nuts that give you a tight connection without expensive upgrades or adaptors



Watch the animation that shows how to make better column connections in a GC or GC/MS, at www.agilent.com/chem/mbcvideo



Life Sciences Columns

The life sciences offer some difficult challenges to capillary GC chromatographers. These include complex sample matrixes, the necessity for low level detection and the chemically active characteristics of many of the samples. In response to this, Agilent offers a line of columns which are designed specifically for drugs of abuse testing.

DB-ALC1 and DB-ALC2

- Reliable blood alcohol analysis
- Optimized primary and confirmation column pair for US blood alcohol analysis
- DB-ALC1 and DB-ALC2 columns are regularly used in sets. Connect them together easily with an Agilent Ultra Inert, universal press fit Y-splitter (5190-6980), or an UltiMetal Plus deactivated CFT un-purged splitter (G3184-60065)
- Faster GC run times
- Improved resolution of key ethanol/acetone peaks
- Available in 0.32 and 0.53 mm id
- Bonded and cross-linked

Similar Phases: Rtx-BAC1, Rtx-BAC2, ZB-BAC-1, ZB-BAC-2

DB-ALC1 and DB-ALC2

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7890/6890 | | |
|----------------|------------|-----------|------------------|-----------|-----------|---------------|
| | | | | 7 in Cage | 5 in Cage | LTM II Module |
| DB-ALC1 | | | | | | |
| 0.32 | 30 | 1.80 | 20 to 260/280 | 123-9134 | | 123-9134LTM |
| 0.53 | 30 | 3.00 | 20 to 260/280 | 125-9134 | 125-9134E | |
| DB-ALC2 | | | | | | |
| 0.32 | 30 | 1.20 | 20 to 260/280 | 123-9234 | 123-9234E | |
| 0.53 | 30 | 2.00 | 20 to 260/280 | 125-9234 | | |

VF-DA

- Engineered for drugs of abuse confirmation testing
- High recovery for trace level analysis and excellent resistance to direct methanol injections
- Ultra low bleed

VF-DA

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.20 | 12 | Optimized | -60 to 325/350 | CP8964 |

DB-5ms EVDX

- Specially configured and tested for drugs of abuse confirmation
- Drug test mix included: caffeine, glutethimide, lidocaine, phenobarbital, EDDP, methaqualone, methadone, cocaine, desipramine, carbamazepine
- DB-5ms EVDX is equivalent to (5%-phenyl)-methylpolysiloxane
- Consistent retention and peak shape
- Low bleed for GC/MS analysis
- Bonded and cross-linked
- Solvent rinsable

DB-5ms EVDX

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.20 | 25 | 0.33 | -60 to 325/350 | 128-8522 |

DB-Select 624 UI for <467>

- Engineered to optimize pharmaceutical residual solvents analysis per USP Method <467>
- Ultra inertness and low bleed
- Resolution of USP regulated critical pairs, also separates benzene and 1,2-dichloroethane
- Identical selectivity to the popular VF-624 ms – upgrade with no changes in method
- UI testing ensures premium performance column to column

DB-Select 624 UI for <467>

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|------------|
| 0.25 | 30 | 1.40 | 40 to 260/260 | 122-0334UI |
| | 60 | 1.40 | 40 to 260/260 | 122-0364UI |
| 0.32 | 30 | 1.80 | 40 to 260/260 | 123-0334UI |
| | 60 | 1.80 | 40 to 260/260 | 123-0364UI |
| 0.53 | 30 | 3.00 | 40 to 260/260 | 125-0334UI |

HP-Fast Residual Solvent

- Equivalent to USP Phase G43
- Thinner film reduces run time by 2.5 times and increases Minimum Detection Limit (MDL) by 2 times compared to standard film thickness used for this method
- Bonded and cross-linked

Similar Phases: PE-624, 007-624, 007-502, ZB-624

HP-Fast Residual Solvent

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------|------------|-----------|------------------|------------|-------------|----------------------------|
| 0.53 | 30 | 1.00 | -20 to 260 | 19095V-420 | 19095V-420E | 19095V-420LTM |

Metal Columns

DB-ProSteel and UltiMetal columns are engineered to combine the robustness of stainless steel with advanced surface deactivation for excellent peak shape.

- Configured for high temperature analyses such as simulated distillation
- Wide variety of stationary phases and configurations available
- Ideal for portable and process GC applications
- Superior replacement for MXT/Silcosteel columns

Metal Columns

| Phase | ID (mm) | Length (m) | Film (µm) | 7 in Cage | 5 in Cage | |
|--|---------|------------|------------------|-----------|-----------|------|
| Simulated distillation/high temperature | | | | | | |
| DB-HT Sim Dis | 0.53 | 5 | 0.10 | 145-1009 | | |
| | | | 0.15 | 145-1001 | | |
| DB-PS2887 | 0.53 | 10 | 3.00 | 145-2814 | | |
| CP-SimDist UltiMetal | 0.53 | 5 | 0.09 | CP7569 | CP7569I5 | |
| | | | 0.17 | CP7532 | CP7532I5 | |
| | | | 0.88 | CP7570 | | |
| | | | 2.65 | CP7571 | | |
| | | 10 | 0.06 | CP6540 | | |
| | | | 0.17 | CP7542 | | |
| | | | 0.53 | CP7592 | | |
| | | | 0.88 | CP7512 | | |
| | | | 1.20 | CP7562 | | |
| | | | 2.65 | CP7582 | | |
| | | | 5.00 | CP7572 | | |
| | | | 20 | 0.11 | CP7593 | |
| | | | 25 | 0.06 | CP6550 | |
| | | | VF-5ht UltiMetal | 0.25 | 15 | 0.10 |
| 0.10 | CP9094 | CP9094I5 | | | | |
| 0.32 | 30 | 0.10 | | CP9092 | | |
| | | 0.10 | | CP9096 | | |

(Continued)

Metal Columns

| Phase | ID (mm) | Length (m) | Film (µm) | 7 in Cage | 5 in Cage | |
|--|----------|---------------|-----------|-----------|-----------|----------|
| Simulated distillation/high temperature | | | | | | |
| VF-5ht UltiMetal | 0.25 | 15 | 0.10 | CP9091 | | |
| with retention gap UltiMetal | 0.32 | 15 | 0.10 | CP9095 | | |
| | 0.25 | 30 | 0.10 | CP9093 | | |
| | 0.32 | 30 | 0.10 | CP9097 | | |
| Standard phases and PEG | | | | | | |
| DB-PS1 | 0.53 | 15 | 0.15 | 145-1011 | | |
| | | 30 | 1.50 | 145-1032 | | |
| CP-Sil 5 CB | 0.53 | 10 | 2.00 | CP7150 | | |
| | | | 5.00 | CP6666 | | |
| | | | 25 | 0.50 | CP7135 | |
| | | | 1.00 | CP7130 | | |
| | | 2.00 | CP7160 | | | |
| | | 5.00 | CP6670 | | | |
| | | 50 | 1.00 | CP7140 | | |
| | | | 2.00 | CP7170 | | |
| | | | 5.00 | CP6671 | | |
| | | DB-HT Sim Dis | 0.53 | 5 | 0.10 | 145-1009 |
| 0.15 | 145-1001 | | | | | |
| DB-PS2887 | 0.53 | 10 | 3.00 | 145-2814 | | |
| CP-SimDist UltiMetal, 6/pk | 0.53 | 5 | 0.09 | CP67569 | | |
| CP-SimDist UltiMetal | 0.53 | 5 | 0.09 | CP7569 | | |
| | | | 0.17 | CP7532 | | |
| | | | 0.88 | CP7570 | | |
| | | | 2.65 | CP7571 | | |
| | | | 10 | 0.06 | CP6540 | |
| | | 0.17 | CP7542 | | | |
| | | 0.53 | CP7592 | | | |
| | | 0.88 | CP7512 | | | |
| | | 1.20 | CP7562 | | | |
| | | 2.65 | CP7582 | | | |
| | | 5.00 | CP7572 | | | |
| | | 20 | 0.11 | CP7593 | | |
| | | 25 | 0.06 | CP6550 | | |

(Continued)



Metal Columns

| Phase | ID (mm) | Length (m) | Film (μm) | 7 in Cage | 5 in Cage |
|--|---------|------------|------------------------|-----------|-----------|
| Standard phases and PEG | | | | | |
| CP-Sil 8 CB UltiMetal | 0.53 | 25 | 5.00 | CP6680 | |
| | | 50 | 0.50 | CP7196 | |
| | | | | | CP6681 |
| CP-Sil 13 CB UltiMetal | 0.53 | 25 | 1.00 | CP7141 | |
| DB-PSWAX | 0.53 | 30 | 1.00 | 145-7032 | |
| CP-Wax 52 CB UltiMetal | 0.53 | 10 | 1.00 | CP7148 | |
| | | 25 | 2.00 | CP7178 | |
| | | 50 | 1.00 | CP7168 | |
| | | | 2.00 | CP7179 | |
| PLOT columns | | | | | |
| PoraPLOT Q UltiMetal | 0.53 | 10 | 20.00 | CP6953 | |
| | | 25 | 20.00 | CP6954 | |
| CP-Al ₂ O ₃ /KCl UltiMetal | 0.53 | 50 | 10.00 | CP6918 | |
| CP-Al ₂ O ₃ /Na ₂ SO ₄ UltiMetal | 0.53 | 50 | 10.00 | CP6968 | |
| CP-Molsieve 5Å UltiMetal | 0.53 | 10 | 50.00 | CP6937 | |
| | | 25 | 50.00 | CP6938 | CP693815 |
| Select application columns | | | | | |
| DB-PS624 | 0.53 | 30 | 3.00 | 145-1334 | |
| CP-Sil PAH CB UltiMetal | 0.25 | 25 | 0.12 | CP7440 | |
| CP-TAP CB | 0.25 | 25 | 0.10 | CP7463 | |
| Select Biodiesel | 0.32 | 10 | 0.10 | CP9076 | |
| With retention gap | | 15 | 0.10 | CP9078 | |
| Select Biodiesel | 0.32 | 10 | 0.10 | CP9077 | |
| | | 15 | 0.10 | CP9079 | |



Column shown with EZ-GRIP

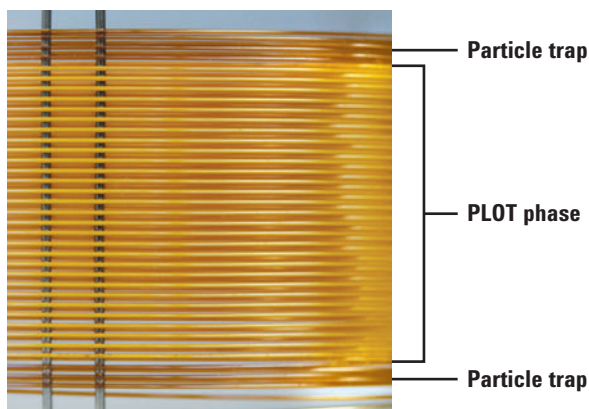
PLOT Columns

PLOT columns are ideal for separating compounds that are gases at room temperatures. Agilent Technologies offers a comprehensive line of PLOT columns for analysis of fixed gases, low molecular weight hydrocarbon isomers, volatile polar compounds and reactive analytes such as sulfur gases, amines and hydrides. Our PLOT phases are offered in dimensions from 0.25 to 0.53 mm id, allowing for easy column selection for various detector and system requirements. For GC/MS systems, we offer several small diameter columns with truly bonded and immobilized stationary phases, eliminating potential detector fouling due to particle generation.

PLOT PT

Agilent J&W PLOT PT columns are engineered to improve lab operations. Unlike current techniques used to prevent PLOT stationary phase particles from shedding downstream, the integral particle traps of the PLOT PT columns remove the aggravation of connecting separate traps. Operation is more convenient and there is no risk from leaks. The integrated particle-trapping technology on both ends of PLOT PT GC columns reduces downtime. What's more, with PLOT PT you can now use GC/MS for detailed, qualitative and quantitative analysis and due to the dual ended particle traps the PLOT PT columns can also be used for backflush applications. No other PLOT column offers this level of worry-free operation for your GC or GC/MS system.

Agilent J&W PLOT PT columns are available in porous polymers Q and U, Aluminum oxide and Molesieve stationary phases.



PLOT PT – with integrated particle traps

| Phase | ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | Part No. |
|---|---------|------------|-----------|------------------|--------------|
| PoraBOND Q PT | 0.25 | 10 | 3.00 | -100 to 300/300 | CP7348PT |
| PoraBOND Q PT | 0.32 | 25 | 5.00 | -100 to 300/300 | CP7351PT |
| PoraBOND Q PT | 0.32 | 50 | 5.00 | -100 to 300/300 | CP7352PT |
| PoraBOND Q PT | 0.53 | 10 | 10.00 | -100 to 300/300 | CP7353PT |
| PoraBOND Q PT | 0.53 | 25 | 10.00 | -100 to 300/300 | CP7354PT |
| PoraPLOT Q PT | 0.32 | 10 | 10.00 | -100 to 250/250 | CP7550PT |
| PoraPLOT Q PT | 0.32 | 25 | 10.00 | -100 to 250/250 | CP7551PT |
| PoraPLOT Q PT | 0.53 | 25 | 20.00 | -100 to 250/250 | CP7554PT |
| PoraPLOT Q-HT PT | 0.32 | 5 | 10.00 | -100 to 290/290 | CP7557PT |
| HP-PLOT Q PT | 0.32 | 15 | 20.00 | -60 to 270/290 | 19091P-Q03PT |
| HP-PLOT Q PT | 0.32 | 30 | 20.00 | -60 to 270/290 | 19091P-Q04PT |
| HP-PLOT Q PT | 0.53 | 15 | 40.00 | -60 to 270/290 | 19095P-Q03PT |
| HP-PLOT Q PT | 0.53 | 30 | 40.00 | -60 to 270/290 | 19095P-Q04PT |
| GS-Q PT | 0.53 | 30 | | -60 to 250 | 115-3432PT |
| PoraPLOT U PT | 0.53 | 25 | 20.00 | -100 to 190/190 | CP7584PT |
| HP-PLOT U PT | 0.53 | 30 | 20.00 | -60 to 190 | 19095P-U04PT |
| HP-PLOT Al ₂ O ₃ KCl PT | 0.32 | 50 | 8.00 | -60 to 200 | 19091P-K15PT |
| HP-PLOT Al ₂ O ₃ KCl PT | 0.53 | 30 | 15.00 | -60 to 200 | 19095P-K23PT |
| HP-PLOT Al ₂ O ₃ KCl PT | 0.53 | 50 | 15.00 | -60 to 200 | 19095P-K25PT |
| PoraPLOT U PT | 0.53 | 25 | 20.00 | -100 to 190/190 | CP7584PT |
| CP-Al ₂ O ₃ /KCl PT | 0.32 | 50 | 5.00 | -100 to 200/200 | CP7515PT |
| CP-Al ₂ O ₃ /KCl PT | 0.53 | 25 | 10.00 | -100 to 200/200 | CP7517PT |
| CP-Al ₂ O ₃ /KCl PT | 0.53 | 50 | 10.00 | -100 to 200/200 | CP7518PT |
| CP-Al ₂ O ₃ /Na ₂ SO ₄ PT | 0.32 | 50 | 5.00 | -100 to 200/200 | CP7565PT |
| CP-Al ₂ O ₃ /Na ₂ SO ₄ PT | 0.53 | 50 | 10.00 | -100 to 200/200 | CP7568PT |
| HP-PLOT Al ₂ O ₃ S PT | 0.32 | 25 | 8.00 | -60 to 200 | 19091P-S12PT |
| HP-PLOT Al ₂ O ₃ S PT | 0.32 | 50 | 8.00 | -60 to 200 | 19091P-S15PT |
| HP-PLOT Al ₂ O ₃ S PT | 0.53 | 30 | 15.00 | -60 to 200 | 19095P-S23PT |
| HP-PLOT Al ₂ O ₃ S PT | 0.53 | 50 | 15.00 | -60 to 200 | 19095P-S25PT |
| GS-Alumina PT | 0.53 | 30 | | -60 to 200 | 115-3532PT |
| GS-Alumina PT | 0.53 | 50 | | -60 to 200 | 115-3552PT |
| HP-PLOT Al ₂ O ₃ M PT | 0.53 | 50 | 15.00 | -60 to 200 | 19095P-M25PT |
| CP-Molsieve 5A PT | 0.32 | 30 | 10.00 | -200 to 300 | CP7534PT |
| CP-Molsieve 5A PT | 0.32 | 25 | 30.00 | -200 to 300 | CP7536PT |
| CP-Molsieve 5A PT | 0.53 | 25 | 50.00 | -200 to 300 | CP7538PT |
| CP-Molsieve 5A PT | 0.53 | 50 | 50.00 | -200 to 300 | CP7539PT |

PoraBOND Q

- Bonded PLOT column for more reliable results for analysis of volatile solvents and hydrocarbons
- Extended analysis offers broad application range
- 300/320 °C temperature limits
- Engineered for high stability, withstands repeated water injections
- Proprietary manufacturing technique results in very pure porous polymer with virtually no catalytic activity, allowing operation to 320 °C without decomposition
- Bonding technology results in greatly reduced particle shedding, reduces the needs for particle traps

Similar Phases: Rt-Q BOND, Rt-QPLOT, SupelQ PLOT

PoraBOND Q

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|-----------|----------|
| 0.25 | 10 | 3.00 | -100 to 300/300 | CP7347 | | CP7348PT |
| | 25 | 3.00 | -100 to 300/320 | CP7348 | | |
| 0.32 | 10 | 5.00 | -100 to 300/320 | CP7350 | CP7350I5 | |
| | 25 | 5.00 | -100 to 300/320 | CP7351 | CP7351I5 | CP7351PT |
| | 50 | 5.00 | -100 to 300/320 | CP7352 | CP7352I5 | CP7352PT |
| 0.53 | 10 | 10.00 | -100 to 300/320 | CP7353 | CP7353I5 | CP7353PT |
| | 25 | 10.00 | -100 to 300/320 | CP7354 | CP7354I5 | CP7354PT |
| | 50 | 10.00 | -100 to 300/320 | CP7355 | | |

PoraBOND U

- Highly stable polar-bonded porous polymer with maximum operating temperature of 300 °C
- Reduced bleed for low detection limits and fast stabilization time
- Bonded PLOT column for excellent longevity
- Ideal for use with method that pressure programs or valve switching

Similar Phases: Rt-U-BOND

PoraBOND U

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.32 | 25 | 7.00 | -100 to 300/300 | CP7381 |



PoraPLOT Q and PoraPLOT Q-HT

- Recommended for column switching systems that analyze a broad range of polar and apolar volatile compounds
- Water elutes as a sharp peak enabling quantitation
- Retention of target compounds is not influenced by water in the sample
- Long term stability provides repeatable retention times
- Available in fused silica and UltiMetal

Similar Phases: Rt-Q BOND, Rt-QPLOT, SupelQ PLOT

PoraPLOT Q

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|-----------|----------|
| 0.25 | 10 | 8.00 | -100 to 250/250 | CP7548 | | |
| | 25 | 8.00 | -100 to 250/250 | CP7549 | | |
| 0.32 | 10 | 10.00 | -100 to 250/250 | CP7550 | CP7550I5 | CP7550PT |
| | 25 | 10.00 | -100 to 250/250 | CP7551 | CP7551I5 | CP7551PT |
| | 50 | 10.00 | -100 to 250/250 | CP7552 | | |
| 0.53 | 10 | 20.00 | -100 to 250/250 | CP7553 | | |
| | 25 | 20.00 | -100 to 250/250 | CP7554 | CP7554I5 | CP7554PT |
| | 50 | 20.00 | -100 to 250/250 | CP7555 | | |

PoraPLOT Q UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 10 | 20.00 | -100 to 250/250 | CP6953 |
| | 25 | 20.00 | -100 to 250/250 | CP6954 |

PoraPLOT Q-HT

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|----------|
| 0.32 | 10 | 10.00 | -100 to 290/290 | CP7556 | |
| | 25 | 10.00 | -100 to 290/290 | CP7557 | CP7557PT |
| 0.53 | 10 | 20.00 | -100 to 290/290 | CP7558 | |
| | 25 | 20.00 | -100 to 290/290 | CP7559 | |

HP-PLOT Q

- Bonded polystyrene-divinylbenzene based column
- Polarity between Porapak-Q and Porapak-N
- Excellent column for C₁-C₃ isomers and alkanes to C₁₂, CO₂, methane, air/CO, oxygenated compounds, sulfur compounds and solvents
- Replaces packed gas-solid columns
- Separates ethane, ethylene and ethyne (acetylene)
- Improved resolution in less time than conventional packed columns
- Minimal conditioning time required – 1 hour
- Preferred "Q" column due to its robust nature



Similar Phases: Rt-QPLOT, SupelQ PLOT

HP-PLOT Q

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 | |
|---------|------------|-----------|------------------|------------|-------------|---------------|--------------|
| | | | | | | LTM II Module | PLOT PT |
| 0.32 | 15 | 20.00 | -60 to 270/290 | 19091P-Q03 | | 19091P-Q03LTM | 19091P-Q03PT |
| | 30 | 20.00 | -60 to 270/290 | 19091P-Q04 | 19091P-Q04E | 19091P-Q04LTM | 19091P-Q04PT |
| 0.53 | 15 | 40.00 | -60 to 270/290 | 19095P-Q03 | 19095P-Q03E | 19095P-Q03LTM | 19095P-Q03PT |
| | 30 | 40.00 | -60 to 270/290 | 19095P-Q04 | 19095P-Q04E | 19095P-Q04LTM | 19095P-Q04PT |

GS-Q

- Porous divinylbenzene homopolymer
- Polarity between Porapak-Q and Porapak-N
- Separates ethane, ethylene and ethyne (acetylene)
- Not recommended for quantification of polar compounds
- Minimal conditioning time required – 1 hour

Similar Phases: Rt-QPLOT, SupelQ PLOT

GS-Q

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT | 7890/6890 |
|---------|------------|------------------|-----------|-----------|------------|---------------|
| | | | | | | LTM II Module |
| 0.32 | 30 | -60 to 250 | 113-3432 | 113-3432E | | 113-3432LTM |
| 0.53 | 10 | -60 to 250 | 115-34H2 | | | |
| | 15 | -60 to 250 | 115-3412 | | | |
| | 25 | -60 to 250 | 115-3422 | | | |
| | 30 | -60 to 250 | 115-3432 | 115-3432E | 115-3432PT | |



TIPS & TOOLS

View the latest GC column focused applications, products and educational resources at www.agilent.com/chem/myGCcolumns

PoraPLOT U and PoraPLOT S

- The most polar porous polymer PLOT column ideal for halogenated compounds, C₁-C₆ hydrocarbons, ketones and solvents
- Excellent peak shape of polar and non-polar volatiles
- Water has no effect on retention times and elutes as a sharp quantifiable peak
- Reliable retention time repeatability

PoraPLOT U

Similar Phases: Rt-U-BOND

PoraPLOT U

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|----------|
| 0.25 | 25 | 8.00 | -100 to 190/190 | CP7579 | |
| 0.32 | 10 | 10.00 | -100 to 190/190 | CP7580 | |
| | 25 | 10.00 | -100 to 190/190 | CP7581 | |
| 0.53 | 10 | 20.00 | -100 to 190/190 | CP7583 | |
| | 25 | 20.00 | -100 to 190/190 | CP7584 | CP7584PT |

PoraPLOT S

- Divinylbenzene/vinylpyridine polymer for hydrocarbons and ketones
- Ideal for the analysis of medium polarity volatile including hydrocarbons and ketones
- Higher temperature limit than PoraPLOT U

Similar Phases: Rt-S-BOND, MXT-SBOND

PoraPLOT S

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 25 | 20.00 | -100 to 250/250 | CP7574 |

HP-PLOT U

- Bonded divinylbenzene/ethylene glycol dimethacrylate
- More polar than HP-PLOT Q
- Excellent column for C₁-C₇ hydrocarbons, CO₂, methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, and aldehydes
- Improved resolution in less time than conventional packed columns

Similar Phases: RTU PLOT

HP-PLOT U

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT | 7890/6890 |
|---------|------------|-----------|------------------|------------|-------------|--------------|---------------|
| | | | | | | | LTM II Module |
| 0.32 | 30 | 10.00 | -60 to 190 | 19091P-U04 | 19091P-U04E | | 19091P-U04LTM |
| 0.53 | 15 | 20.00 | -60 to 190 | 19095P-U03 | | | |
| | 30 | 20.00 | -60 to 190 | 19095P-U04 | 19095P-U04E | 19095P-U04PT | 19095P-U04LTM |

HP-PLOT Al₂O₃ KCl

- Least "polar" alumina phase
- Aluminum oxide deactivated with KCl
- Standard column choice for light hydrocarbon analysis – C₁-C₈ hydrocarbon isomers
- Low retention of olefins relative to comparable paraffin
- Excellent for quantitation of dienes, especially propadiene and butadiene from ethylene and propylene streams
- Recommended phase for many ASTM methods
- Preferred KCl deactivated alumina

Similar Phases: Rt-Alumina PLOT, Alumina PLOT, Al₂O₃/KCl, AB-PLOT Al₂O₃ KCl, AT-Alumina

HP-PLOT Al₂O₃ KCl

| ID (mm) | Length (m) | Film (μm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT | 7890/6890 |
|---------|------------|-----------|------------------|------------|-------------|--------------|---------------|
| | | | | | | | LTM II Module |
| 0.25 | 30 | 5.00 | -60 to 200 | 19091P-K33 | | | 19091P-K33LTM |
| 0.32 | 50 | 8.00 | -60 to 200 | 19091P-K15 | 19091P-K15E | 19091P-K15PT | |
| 0.53 | 30 | 15.00 | -60 to 200 | 19095P-K23 | | 19095P-K23PT | 19095P-K23LTM |
| | 50 | 15.00 | -60 to 200 | 19095P-K25 | 19095P-K25E | 19095P-K25PT | |

GS-Alumina KCl

- Least "polar" alumina phase
- Aluminum oxide deactivated with KCl
- Good choice for light hydrocarbon analysis
- Good resolution of propadiene and butadiene from ethylene and propylene streams

Similar Phases: $\text{Al}_2\text{O}_3/\text{KCl}$, $\text{Al}_2\text{O}_3/\text{Na}_2\text{SO}_4$, Rt-Alumina PLOT, Alumina PLOT, AB-PLOT Al_2O_3 KCl, AT-Alumina

GS-Alumina KCl

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
|---------|------------|------------------|-----------|-----------|------------|
| 0.53 | 30 | -60 to 200 | 115-3332 | | |
| | 50 | -60 to 200 | 115-3352 | 115-3352E | 115-3352PT |

CP-Al₂O₃/KCl and CP-Al₂O₃/Na₂SO₄

- Aluminum oxide PLOT columns offer high selectivity for separating ppm levels of C₁-C₅ hydrocarbons in process streams
- High capacity thick films
- No need for sub-ambient cooling
- Choice of two selectivities covers a broad range of applications
- Available in fused silica and UltiMetal

Note: The KCl deactivation salt results in a relatively apolar Al₂O₃ surface while the Na₂SO₄ deactivation provides a polar surface. Unsaturated compounds such as ethylene and acetylene (ethyne) are retained longer.

Selectivity Through KCl or Na₂SO₄ Deactivation

Note: Aluminum oxide PLOT columns are deactivated using KCl or Na₂SO₄ treatments which provide a reproducible and stable deactivation up to 200 °C. The KCl salt deactivation results in a relatively apolar Al₂O₃ surface, while the Na₂SO₄ deactivation provides a polar surface. Unsaturated compounds such as ethylene and acetylene (ethyne) are retained longer.

Similar Phases: Al₂O₃/KCl, Rt-Alumina PLOT, Alumina PLOT, RT-Alumina BOND/KCl, Alumina chloride PLOT, AB-PLOT Al₂O₃ KCl

CP-Al₂O₃/KCl

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|-----------|----------|
| 0.25 | 25 | 4.00 | -100 to 200/200 | CP7576 | | |
| | 50 | 4.00 | -100 to 200/200 | CP7577 | | |
| 0.32 | 10 | 5.00 | -100 to 200/200 | CP7511 | | |
| | 25 | 5.00 | -100 to 200/200 | CP7519 | | |
| | 50 | 5.00 | -100 to 200/200 | CP7515 | CP7515I5 | CP7515PT |
| 0.53 | 25 | 10.00 | -100 to 200/200 | CP7517 | | CP7517PT |
| | 50 | 10.00 | -100 to 200/200 | CP7518 | | CP7518PT |

CP-Al₂O₃/KCl UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 50 | 10.00 | -100 to 200/200 | CP6918 |

Similar Phases: Al₂O₃/Na₂SO₄, Rt-Alumina PLOT, Alumina PLOT, Rt-Alumina BOND/Na₂SO₄, MXT-AluminaBOND/Na₂SO₄, Alumina sulfate PLOT

CP-Al₂O₃/Na₂SO₄

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
|---------|------------|-----------|------------------|-----------|-----------|----------|
| 0.25 | 25 | 4.00 | -100 to 200/200 | CP7586 | | |
| | 50 | 4.00 | -100 to 200/200 | CP7587 | | |
| 0.32 | 50 | 5.00 | -100 to 200/200 | CP7565 | CP7565I5 | CP7565PT |
| 0.53 | 25 | 10.00 | -100 to 200/200 | CP7567 | | |
| | 50 | 10.00 | -100 to 200/200 | CP7568 | | CP7568PT |

CP-Al₂O₃/Na₂SO₄ UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage |
|---------|------------|-----------|------------------|-----------|
| 0.53 | 50 | 10.00 | -100 to 200/200 | CP6968 |

HP-PLOT Al₂O₃ S

- Middle range of "polarity" for alumina phases
- Aluminum oxide deactivated with sodium sulfate
- Excellent general use column for light hydrocarbon analysis – C₁-C₈ hydrocarbon isomers
- Best for resolving acetylene from butane and propylene from isobutane

Similar Phases: Al₂O₃/Na₂SO₄, Rt-Alumina PLOT, Alumina PLOT, Rt-Alumina BOND/Na₂SO₄, MXT-AluminaBOND/Na₂SO₄, Alumina sulfate PLOT, AT-Alumina

HP-PLOT Al₂O₃ S

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT | 7890/6890 LTM II Module |
|---------|------------|-----------|------------------|------------|-------------|--------------|----------------------------|
| 0.25 | 30 | 5.00 | -60 to 200 | 19091P-S33 | | | |
| 0.32 | 25 | 8.00 | -60 to 200 | 19091P-S12 | | 19091P-S12PT | 19091P-S12LTM |
| | 50 | 8.00 | -60 to 200 | 19091P-S15 | 19091P-S15E | 19091P-S15PT | |
| 0.53 | 15 | 15.00 | -60 to 200 | 19095P-S21 | | | |
| | 30 | 15.00 | -60 to 200 | 19095P-S23 | | 19095P-S23PT | |
| | 50 | 15.00 | -60 to 200 | 19095P-S25 | 19095P-S25E | 19095P-S25PT | |



GS-Alumina

- Most "polar" alumina phase
- Aluminum oxide with proprietary deactivation
- Excellent general use column for light hydrocarbon analysis – C₁-C₈ hydrocarbon isomers
- Separates C₁-C₄ saturated and unsaturated hydrocarbons
- Best for resolving cyclopropane from propylene
- Faster, more efficient, and provides more sensitivity than packed equivalents
- Minimal conditioning time required
- Preferred substitution for sodium sulfate deactivated Alumina because of its regenerative nature



Note: Alumina columns have a tendency to adsorb water and CO₂ which, over time, results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully water saturated GS-Alumina columns regenerate in 7 hours or less at 200 °C.

Similar Phases: Al₂O₃/KCl, Al₂O₃/Na₂SO₄, Rt-Alumina PLOT, Alumina PLOT, AB-PLOT Al₂O₃ KCl, AT-Alumina

GS-Alumina

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage | PLOT PT |
|---------|------------|------------------|-----------|------------|
| 0.53 | 30 | -60 to 200 | 115-3532 | 115-3532PT |
| | 50 | -60 to 200 | 115-3552 | 115-3552PT |

HP-PLOT Al₂O₃ M

- Most "polar" alumina phase (similar to GS-Alumina)
- Aluminum oxide deactivated with proprietary deactivation
- Good general use column for light hydrocarbon analysis – C₁-C₈ hydrocarbon isomers
- Good for resolving acetylene from butane and propylene from isobutane

Similar Phases: AB-PLOT Al₂O₃ M, BGB-PLOT Al₂O₃ M, AT-Alumina

HP-PLOT Al₂O₃ M

| ID | | | | | | |
|------|------------|-----------|------------------|------------|-------------|--------------|
| (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT |
| 0.32 | 50 | 8.00 | -60 to 200 | 19091P-M15 | 19091P-M15E | |
| 0.53 | 30 | 15.00 | -60 to 200 | 19095P-M23 | | |
| | 50 | 15.00 | -60 to 200 | 19095P-M25 | | 19095P-M25PT |

GS-GasPro

- Unique bonded silica PLOT column technology
- Excellent choice for light hydrocarbons and sulfur gases
- Retention stability not affected by water
- Separates CO and CO₂ on a single column
- Ideal PLOT column for GC/MS – no particles

Similar Phases: CP-Silica PLOT

GS-GasPro

| ID (mm) | Length (m) | Temp Limits (°C) | 7 in Cage |
|---------|------------|------------------|-----------|
| 0.32 | 5 | -80 to 260/300 | 113-4302 |
| | 15 | -80 to 260/300 | 113-4312 |
| | 30 | -80 to 260/300 | 113-4332 |
| | 60 | -80 to 260/300 | 113-4362 |

CP-SilicaPLOT

- No influence of water on retention times
- Elution of CO₂ and sulfur gases at ppm levels
- Separates cyclopropane from propylene
- Ideal for a wide range of applications such as COS in ethylene, freons, hydrocarbons, propylene and sulfur compounds
- High selectivity for C₁-C₄ isomers in the presence of water
- No negative influence on retention or peak shape when water is present in the sample
- Inert surface preparation results in no decomposition pentadienes or freons

Similar Phases: GS-GasPro

CP-SilicaPLOT

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.25 | 30 | 3.00 | -80 to 225/225 | CP8564 | |
| 0.32 | 15 | 4.00 | -80 to 225/225 | CP8566 | |
| | 30 | 4.00 | -80 to 225/225 | CP8567 | |
| | 60 | 4.00 | -80 to 225/225 | CP8568 | |
| 0.53 | 30 | 6.00 | -80 to 225/225 | CP8570 | CP857015 |
| | 60 | 6.00 | -80 to 225/225 | CP8571 | |

TIPS & TOOLS

Ensure a lifetime of peak performance and maximum productivity with Agilent's comprehensive GC supplies portfolio. Learn more at www.agilent.com/chem/GCsupplies



CarboBOND and CarboPLOT P7

- Single column solution for ASTM D2505 for higher productivity
- Stable and robust for high repeatability of results
- Available in bonded and PLOT versions for improved versatility and enhanced productivity

CarboBOND

CarboBOND

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.53 | 25 | 5.00 | -100 to 200/300 | CP7371 |
| | | 10.00 | -100 to 200/300 | CP7374 |
| | 50 | 5.00 | -100 to 200/300 | CP7372 |
| | | 10.00 | -100 to 200/300 | CP7375 |

CarboPLOT P7

CarboPLOT P7

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.53 | 10 | 25.00 | -200 to 115/115 | CP7513 |
| | 25 | 25.00 | -200 to 115/115 | CP7514 |

GS-CarbonPLOT

- High stability, bonded carbon layer stationary phase
- Unique selectivity for inorganic and organic gases
- Extended temperature limit of 360 °C
- Ideal for GC/MS – no particle generation
- Retention stability not affected by water

Similar Phases: Carbopack, CLOT, Carboxen-1006 PLOT

GS-CarbonPLOT

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 7890/6890 |
|---------|------------|-----------|------------------|-----------|---------------|
| | | | | | LTM II Module |
| 0.32 | 15 | 1.50 | 0 to 360 | 113-3112 | |
| | 30 | 1.50 | 0 to 360 | 113-3132 | |
| | | 3.00 | 0 to 360 | 113-3133 | 113-3133LTM |
| | 60 | 1.50 | 0 to 360 | 113-3162 | |
| 0.53 | 15 | 3.00 | 0 to 360 | 115-3113 | |
| | 30 | 3.00 | 0 to 360 | 115-3133 | 115-3133LTM |

HP-PLOT Molesieve

- A PLOT column for the analysis of permanent gases
- O₂, N₂, CO and CH₄ resolve in less than 5 min
- Durable molecular sieve 5Å coating minimizes baseline spiking and damage to multiport valves
- Select a thick film for Ar/O₂ separation without cryogenic cooling
- Select thin film HP-PLOT Molesieve columns for routine air monitoring applications
- Replaces GS-Molesieve

Note: Molecular sieve columns will absorb water, which, over time results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully saturated HP-PLOT Molesieve columns regenerate in 7 hours or less at 200 °C.

Similar Phases: Rt-Msieve 5A, MXT-Msieve 5A

HP-PLOT Molesieve

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | 7890/6890 LTM II Module |
|---------|------------|------------|------------------|------------|---------------|-------------------------|
| 0.32 | 15 | 25.00 | -60 to 300 | 19091P-MS7 | | 19091P-MS7LTM |
| | | 12.00 | -60 to 300 | 19091P-MS4 | 19091P-MS4E | |
| | 25.00 | -60 to 300 | 19091P-MS8 | | 19091P-MS8LTM | |
| 0.53 | 15 | 25.00 | -60 to 300 | 19095P-MS5 | | |
| | | 50.00 | -60 to 300 | 19095P-MS9 | | |
| | 30 | 25.00 | -60 to 300 | 19095P-MS6 | 19095P-MS6E | |
| | | 50.00 | -60 to 300 | 19095P-MS0 | 19095P-MS0E | 19095P-MS0LTM |

CP-Molsieve 5Å

- Separate argon and oxygen at ambient temperature to reduce costs
- High efficiency for increased productivity
- Symmetrical peaks for accurate results

Similar Phases: Rt-Msieve 5A, MXT-Msieve 5A, Mol Sieve 5A PLOT

CP-Molsieve 5Å

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage | PLOT PT* |
|---------|------------|-----------|------------------|-----------|-----------|----------|
| 0.25 | 25 | 30.00 | -200 to 350/350 | CP7533 | | |
| 0.32 | 10 | 30.00 | -200 to 350/350 | CP7535 | CP7535I5 | |
| | 25 | 30.00 | -200 to 350/350 | CP7536 | | CP7536PT |
| | 30 | 10.00 | -200 to 350/350 | CP7534 | CP7534I5 | CP7534PT |
| | 50 | 30.00 | -200 to 350/350 | CP7540 | CP7540I5 | |
| 0.53 | 10 | 50.00 | -200 to 350/350 | CP7537 | | |
| | 15 | 15.00 | -200 to 350/350 | CP7543 | | |
| | 25 | 50.00 | -200 to 350/350 | CP7538 | CP7538I5 | CP7538PT |
| | 30 | 15.00 | -200 to 350/350 | CP7544 | | |
| | 50 | 50.00 | -200 to 350/350 | CP7539 | | CP7539PT |

* CP-Molsieve 5Å PT columns have a lower operating temperature of 300 °C

CP-Molsieve 5Å UltiMetal

| ID (mm) | Length (m) | Film (µm) | Temp Limits (°C) | 7 in Cage | 5 in Cage |
|---------|------------|-----------|------------------|-----------|-----------|
| 0.53 | 10 | 50.00 | -200 to 350/350 | CP6937 | |
| | 25 | 50.00 | -200 to 350/350 | CP6938 | CP6938I5 |

Particle Traps for use with PLOT Columns

Though highly stabilized, it is impossible to guarantee that no particles will dislodge from the column wall. When used in valve-switching applications, the use of a particle trap can prevent scarring of the column switching valve rotors and changes in flow restriction.

Agilent highly recommends using PLOT PT columns with integrated particle traps but for those analysts who prefer to install individual particle traps, a variety of fused silica and UltiMetal fused silica particle traps are available.

Particle Traps for use with PLOT Columns

| ID (mm) | Length (m) | Part No. |
|---------|------------|-----------|
| 0.32 | 2.5 | 5181-3351 |
| 0.53 | 2.5 | 5181-3352 |

Particle Traps for PoraPLOT Columns

| ID (mm) | Length (m) | Material | Part No. |
|---------|------------|--------------|----------|
| 0.32 | 2.5 | Fused Silica | CP4016 |
| 0.53 | 2.5 | Fused Silica | CP4017 |
| 0.53 | 2.5 | UltiMetal | CP4018* |

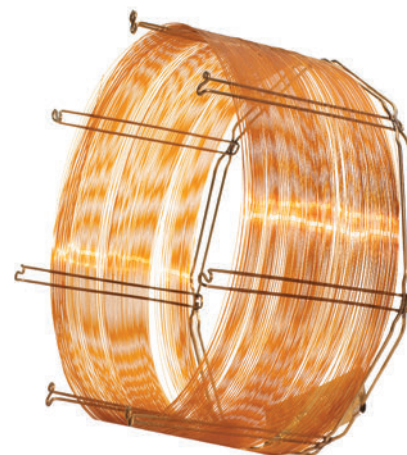
*Includes CP-UltiMetal connector

Particle Trap Connectors for PoraPLOT Columns

| ID (mm) | Material | Unit | Part No. |
|-----------|--------------|-------|----------|
| 0.25/0.32 | Fused Silica | 10/pk | CP4788 |
| 0.53 | Fused Silica | 10/pk | CP4789 |
| 0.25 | UltiMetal | 5/pk | CP4795 |
| 0.53 | UltiMetal | 5/pk | CP4796 |

Columns with Non-Bonded Stationary Phases

Whenever possible, Agilent recommends the use of bonded and cross-linked polymers. Bonded polymers are more rugged, will have longer lifetimes and can be solvent rinsed. However, Agilent recognizes that some methods have been developed on non-bonded phases and therefore maintains these columns to support established methods.



HP-101

- 100% Dimethylpolysiloxane

Because HP-101 columns are not bonded or cross-linked, we do not recommend solvent rinsing.

HP-101

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage | 5 in Cage |
|---------|------------|------------------------|------------------------------------|------------|-------------|
| 0.20 | 25 | 0.20 | -60 to 280 | 19091Y-102 | |
| 0.32 | 25 | 0.30 | -60 to 280 | 19091Y-012 | 19091Y-012E |
| | 50 | 0.30 | -60 to 280 | 19091Y-015 | |

HP-17

- 50% Phenyl and 50% methyl siloxane

Because HP-17 columns are not bonded or cross-linked, we do not recommend solvent rinsing.

HP-17

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|------------|
| 0.53 | 10 | 2.00 | 25 to 260/280 | 19095L-121 |

CAM

- Base deactivated polyethylene glycol
- Specifically designed for amine analysis
- Excellent peak shape for primary amines
- Replaces HP-Basicwax

Because CAM columns are not bonded or cross-linked, we do not recommend solvent rinsing.

CAM

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7890/6890 | |
|---------|------------|------------------------|------------------------------------|-----------|---------------|
| | | | | 7 in Cage | LTM II Module |
| 0.25 | 15 | 0.25 | 60 to 220/240 | 112-2112 | |
| | 30 | 0.25 | 60 to 220/240 | 112-2132 | |
| | | 0.50 | 60 to 220/240 | 112-2133 | 112-2133LTM |
| | 60 | 0.25 | 60 to 220/240 | 112-2162 | |
| 0.32 | 30 | 0.25 | 60 to 220/240 | 113-2132 | 113-2132LTM |
| | | 0.50 | 60 to 220/240 | 113-2133 | |
| 0.53 | 30 | 1.00 | 60 to 200/220 | 115-2132 | 115-2132LTM |

DX-1 and DX-4

- DX-1: 90% Dimethylpolysiloxane 10% polyethylene glycol
- DX-4: 15% Dimethylpolysiloxane 85% polyethylene glycol

Because DX series GC columns are not bonded and cross-linked, we do not recommend solvent rinsing.

DX-1

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 30 | 1.00 | 50 to 250/270 | 123-6133 |

DX-4

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 30 | 0.25 | 50 to 250/270 | 122-6432 |
| | 60 | 0.25 | 50 to 250/270 | 122-6462 |
| 0.32 | 15 | 0.25 | 50 to 250/270 | 123-6412 |
| | 30 | 0.25 | 50 to 250/270 | 123-6432 |

SE-30 and SE-54

- SE-30: 100% Dimethylpolysiloxane
- SE-54: (5%-Phenyl)(1%-vinyl)-methylpolysiloxane

Because SE series GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

SE-30

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.32 | 30 | 0.25 | 0 to 325/350 | 113-3032 |

SE-54

| ID (mm) | Length (m) | Film (μm) | Temp Limits ($^{\circ}\text{C}$) | 7 in Cage |
|---------|------------|------------------------|------------------------------------|-----------|
| 0.25 | 30 | 0.25 | 0 to 325/350 | 112-5432 |
| | 60 | 0.25 | 0 to 325/350 | 112-5462 |
| 0.32 | 30 | 0.25 | 0 to 325/350 | 113-5432 |

Guard Columns

- DuraGuard and EZ-Guard columns with "built-in" guard columns, no press-fit connectors
- Minimize front-end contamination and increase column lifetime
- Aid in focusing sample onto the front of the column for better peak shape
- Minimize MSD contamination originating from the column (when used as transfer line to the MS detector)

Guard columns (or retention gaps) are often added to the front of the analytical column to protect against contamination, or to act as a band-focusing device for liquid samples introduced by on-column and splitless injection techniques.

When resolution or response in a chromatogram diminishes, remove a coil from the guard column so that peak shapes will improve. By removing a coil, the column length is shortened and peaks will elute somewhat faster. For best results, check the integration time windows of your data system.



DuraGuard

DuraGuard

| Phase | ID (mm) | Length (m) | Film (μm) | Guard Length (m) | Part No. |
|-----------------|-------------|------------|------------------------|------------------|-------------------|
| DB-1 | 0.25 | 30 | 0.25 | 10 | 122-1032G |
| DB-XLB | 0.25 | 30 | 0.25 | 10 | 122-1232G |
| DB-5ms | 0.25 | 30 | 0.25 | 10 | 122-5532G |
| | | | 0.50 | 10 | 122-5536G |
| | | | 1.00 | 10 | 122-5533G |
| | 60 | 0.25 | 10 | 122-5562G | |
| | 0.53 | 30 | 0.50 | 10 | 125-5537G |
| <i>DB-5.625</i> | <i>0.25</i> | <i>30</i> | <i>0.25</i> | <i>5</i> | <i>122-5631G5</i> |
| DB-1701 | 0.53 | 30 | 1.00 | 10 | 125-0732G |
| DB-624 | 0.53 | 30 | 3.00 | 5 | 125-1334G5 |

Agilent J&W High Efficiency GC columns are displayed using italicized descriptions and part numbers

TIPS & TOOLS

Column contamination from sample matrix components is the number one cause of column failure. Use Agilent DuraGuard GC columns with built-in guard if you do not want to use column connectors.





A special tab clearly distinguishes the EZ-Guard guard column section from the analytical column



EZ-Guard

EZ-Guard

| Phase | ID (mm) | Length (m) | Film (μm) | Guard Length (m) | Part No. |
|-----------|---------|------------|------------------------|------------------|----------|
| VF-1ms | 0.20 | 12 | 0.33 | 5 | CP9023 |
| | | | 0.25 | 5 | CP9010 |
| | | | 0.25 | 10 | CP9011 |
| VF-5ms | 0.25 | 15 | 0.25 | 5 | CP9021 |
| | | | 0.25 | 5 | CP9012 |
| | | | 0.25 | 10 | CP9013 |
| | | | 0.50 | 5 | CP9014 |
| | | | 0.50 | 10 | CP9015 |
| | | | 0.25 | 5 | CP9016 |
| VF-Xms | 0.25 | 30 | 0.10 | 10 | CP9022 |
| | | | 0.25 | 10 | CP9019 |
| VF-17ms | 0.25 | 30 | 0.25 | 5 | CP9024 |
| | | | 0.25 | 10 | CP9025 |
| VF-1701ms | 0.25 | 30 | 0.25 | 5 | CP9176 |
| | | | 0.25 | 10 | CP9177 |
| VF-35ms | 0.25 | 30 | 0.25 | 5 | CP9026 |
| | | | 0.25 | 10 | CP9027 |

LTM Column Modules

Shorten analytical cycle times and boost your high speed gas chromatography capabilities

Agilent J&W LTM column modules combine a high quality fused silica capillary column with heating and temperature sensing components for a low thermal mass column assembly. The LTM column module contains a patented design which heats and cools the column very efficiently for significantly shorter analytical cycle times compared to conventional air-bath GC oven techniques, while simultaneously using less power.

Agilent offers LTM technology for our popular 7890 and 6890 Series GC systems, and the 5975T GC/MS.

For more information, visit www.agilent.com/chem/LTMcol



LTM II standard format with 5 in column toroid

Agilent J&W LTM II Low Thermal Mass Column Modules for 7890A/B Series GC Systems

Available in a wide variety of Wall Coated Open Tubular (WCOT) and select Porous Layer Open Tubular (PLOT) column configurations.

- The capacity to run up to four column modules simultaneously – with four different temperature programs – to maximize your productivity
- Rapid temperature programming rates for higher analysis speeds
- Faster cooling times – as low as one minute or less – to decrease idling and downtime
- Excellent retention time repeatability and performance – comparable to conventional GC

All LTM II column modules are packaged with:

- Two 1 m guard columns (one each for the inlet and detector) fused silica the same id as the analytical column
- Flexible Metal ferrules that fit the dimensions of the analytical and guard columns

TIPS & TOOLS

For information on Agilent UltiMetal Plus Flexible Metal ferrules, **turn to page 43.**



TIPS & TOOLS

When replacing LTM columns, be sure to turn off the instrument power to avoid damage to the column heater and temperature sensing circuitry.





LTM Solution for Ultra Sensitive THCA Application

Specially configured LTM II columns for high sensitivity THCA triple quadrupole GC/MS application, per application note 5990-7535EN.

- Accurate and robust method for detection of THCA metabolite in hair
- Fast analysis run time
- High sensitivity 0.01 pg/mg LOQ

LTM II Columns

| Phase | Description | ID (mm) | Length (m) | Film (µm) | Part No. |
|---------|-----------------------------|---------|------------|-----------|-------------|
| DB-17ms | 5 m DuraGuard and long legs | 0.25 | 15 | 0.25 | G3900-65001 |
| DB-1ms | With long column legs | 0.25 | 15 | 0.25 | G3903-65002 |
| DB-1 | Transfer line | 0.15 | 1 | 1.20 | G3903-61004 |

TIPS & TOOLS



For more information on THCA detection, view this Application Note on-line: *Rapid, Robust and Sensitive Detection of 11-nor-Δ⁹-Tetrahydrocannabinol-9-Carboxylic Acid in Hair* (publication # 5990-7535EN), www.agilent.com/chem/library



LTM Solution for Fast Simulated Distillation, ASTM D7798-13 and ASTM D2887

Simulated distillation is the preferred method for characterizing boiling point distributions of petroleum fractions because it requires less labor than physical distillation. Simulated distillation determines quantitative mass yield (% off) based on the boiling points for the components in feedstocks and finished petroleum-based materials. Using these results, producers can make informed decisions about process optimization and efficiency. A standard simulated distillation run takes about 20 to 30 min. However, with LTM technology, this time can be reduced to 2.5 min, greatly increasing the analyst's productivity.

ASTM recently released a new method, ASTM D7798-13, for fast simulated distillation, and so Agilent developed the Fast Simulated Distillation Analyzer (G3445B#658) to address this new method. Note that this method is similar to ASTM D2887. The new method does not address high temperature simulated distillation or extended simulated distillation. For ASTM D7798-13, Agilent uses the standard 0.25 μm film column configuration (calibration mix $\text{C}_5\text{-C}_{44}$). For fast LTM analysis of ASTM D2887, with Agilent analyzer G3445B#653, the 0.5 μm film column is used (calibration mix $\text{C}_5\text{-C}_{40}$).

LTM II Columns

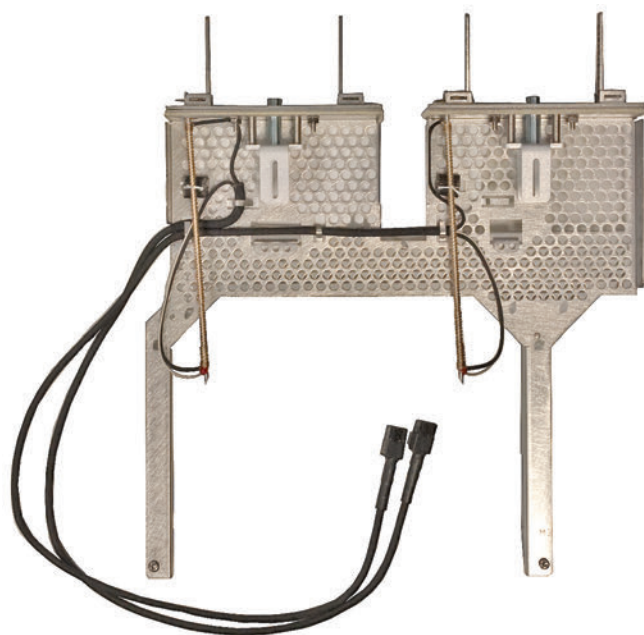
| Phase | Description | ID (mm) | Length (m) | Film (μm) | Part No. |
|-------------|-------------|---------|------------|------------------------|-------------|
| DB-Sim-Dist | LTM II | 0.25 | 4 | 0.25 | G3900-65004 |
| DB-Sim-Dist | LTM II | 0.25 | 4 | 0.50 | G3900-65003 |

LTM II Transfer Line Module

The LTM II transfer line module provides the interface between the standard LTM II 5 in column module and the GC oven. The transfer line module has two heated tubes (transfer lines) through which the column leads pass from the LTM column module into the oven. These transfer lines are temperature programmable to prevent cold spots in the sample path between the GC oven and the LTM column assembly. Each LTM column module attaches to a transfer line module, and the resulting module assembly inserts into slots in the LTM oven door.

LTM II Transfer Line Module

| Description | Part No. |
|-----------------------------------|-------------|
| LTM II transfer line module, 5 in | G3900-64016 |



Agilent J&W LTM Column Modules for Transportable 5975T GC/MSD Systems

This LTM column technology is designed specifically for Agilent 5975T GC/MS systems. These modules include an integrated 3 in LTM capillary column toroid assembly with heated transfer lines, cooling fan assembly and sheet metal enclosure. Replacement column toroid assemblies are also available.

Benefits of the LTM column modules include:

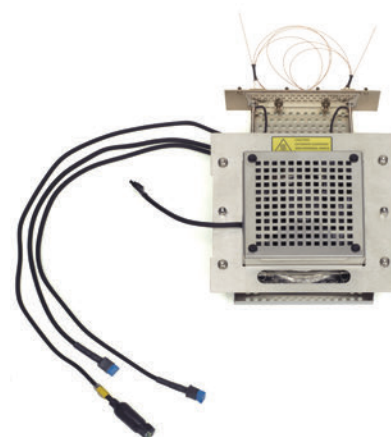
- Faster heating and cooling times – as low as one minute or less – for more rapid analytical cycle times
- Excellent retention time repeatability and performance comparable to conventional GC
- Less power consumption for longer in-field operation
- Integrated module design to facilitate easy column module change in the field



5975T LTM GC/MSD



Replacement column toroid for
LTM 5975T column modules



5975T complete column module

TIPS & TOOLS

Although LTM technology allows very fast temperature programming and fast cycle times, operating under maximum conditions will shorten the lifetime of the LTM column heating circuitry especially for extended 24 hour continuous operation. If you have flexibility in your GC method and/or setup, there are three simple things you can do to improve your LTM Column Module life:

1. Lowering the maximum temperature
2. Lowering the ramp rate during heating
3. Use shorter column lengths. With less thermal mass, heater circuitry generally lasts longer.



Custom LTM Column Ordering

Custom LTM columns are ordered using p/n 100-2000LTM

- Long legs 30 cm column ends (total column length includes the 30 cm column ends)
- **Note:** Long legs are standard for 5975T LTM columns
- Non-standard columns – custom column length, 3 in small format and other special request LTM columns

Note: When requesting quote for custom LTM columns, please specify the following:

- Instrument model, e.g. 7890 or 5975T
- LTM column format: 5 in standard or 3 in small format
- For 5975T, please indicate whether it is for a complete column module or replacement column toroid

Contact your local Agilent office or Authorized Agilent Distributor to receive a quote for your custom column needs. You can find order forms in the back of Agilent's Essential Chromatography Catalog.

Customers in the United States, Canada, and Puerto Rico can request a custom column quote online at www.agilent.com/chem/CustomColumn



Custom LTM II standard format (5 in) with long legs

**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (μm) | Part No. |
|--------------|---------|------------|------------------------|-------------|
| CAM | 0.25 | 30 | 0.25 | 112-2133LTM |
| | 0.32 | 30 | 0.25 | 113-2132LTM |
| | 0.53 | 30 | 1.00 | 115-2132LTM |
| Carbowax 20M | 0.25 | 30 | 0.25 | 112-2032LTM |
| Cyclodex-B | 0.25 | 30 | 0.25 | 112-2532LTM |
| CycloSil-B | 0.25 | 30 | 0.25 | 112-6632LTM |
| | 0.32 | 30 | 0.25 | 113-6632LTM |
| DB-1 | 0.10 | 5 | 0.12 | 127-100ALTM |
| | | 10 | 0.40 | 127-1013LTM |
| | | 20 | 0.40 | 127-1023LTM |
| | 0.15 | 10 | 1.20 | 12A-1015LTM |
| | 0.18 | 10 | 0.18 | 121-1012LTM |
| | | | 0.20 | 121-101ALTM |
| | | | 0.40 | 121-1013LTM |
| | 20 | | 0.18 | 121-1022LTM |
| | | | 0.40 | 121-1023LTM |
| | | | | |
| | 0.20 | 12 | 0.33 | 128-1012LTM |
| | | 25 | 0.33 | 128-1022LTM |
| | 0.25 | 15 | 0.25 | 122-1012LTM |
| | | 25 | 0.25 | 122-1022LTM |
| | | 30 | 0.25 | 122-1032LTM |
| | | | 0.50 | 122-103ELTM |
| | | | 1.00 | 122-1033LTM |
| | | | | |
| | 0.32 | 5 | 0.33 | 123-100ALTM |
| | | 15 | 0.10 | 123-1011LTM |
| | 0.25 | | 123-1012LTM | |
| | 5.00 | | 123-1015LTM | |
| | 30 | | 0.25 | 123-1032LTM |
| 0.50 | | | 123-103ELTM | |
| 1.00 | | | 123-1033LTM | |
| 1.50 | | | 123-103BLTM | |
| 5.00 | | | 123-1035LTM | |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (µm) | Part No. | |
|---------|---------|------------|-------------|-------------|-------------|
| DB-1 | 0.53 | 5 | 5.00 | 125-1005LTM | |
| | | 10 | 2.65 | 125-10HBLTM | |
| | | 15 | 0.15 | 125-1011LTM | |
| | | | 1.50 | 125-1012LTM | |
| | | | 5.00 | 125-1015LTM | |
| | | | 25 | 5.00 | 125-1025LTM |
| | | 30 | 0.25 | 125-103KLTM | |
| | | | 1.00 | 125-103JLTM | |
| | | | 1.50 | 125-1032LTM | |
| | | | 3.00 | 125-1034LTM | |
| | | | 5.00 | 125-1035LTM | |
| DB-1301 | 0.53 | 30 | 1.50 | 125-1333LTM | |
| DB-17 | 0.10 | 10 | 0.10 | 127-1712LTM | |
| | | 0.18 | 20 | 0.18 | 121-1722LTM |
| | | 0.25 | 30 | 0.25 | 122-1732LTM |
| | | 0.32 | 30 | 0.25 | 123-1732LTM |
| | | 0.53 | 15 | 1.00 | 125-1712LTM |
| | | | 15 | 1.50 | 125-1713LTM |
| 30 | 1.00 | | 125-1732LTM | | |
| DB-1701 | 0.18 | 20 | 0.18 | 121-0722LTM | |
| | | 0.25 | 15 | 1.00 | 122-0713LTM |
| | | | 30 | 0.25 | 122-0732LTM |
| | | | 30 | 1.00 | 122-0733LTM |
| | | 0.32 | 15 | 0.25 | 123-0712LTM |
| | | 0.53 | 15 | 1.00 | 125-0712LTM |
| | | DB-1701P | 0.25 | 30 | 0.25 |
| DB-17ht | 0.25 | 5 | 0.15 | 122-1801LTM | |
| | | 30 | 0.15 | 122-1831LTM | |
| DB-17ms | 0.18 | 20 | 0.18 | 121-4722LTM | |
| | | 0.25 | 15 | 0.15 | 122-4711LTM |
| | | | 15 | 0.25 | 122-4712LTM |
| | | | 30 | 0.25 | 122-4732LTM |
| | | 0.32 | 30 | 0.25 | 123-4732LTM |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (μm) | Part No. |
|----------|---------|------------|------------------------|-------------|
| DB-1ht | 0.25 | 30 | 0.10 | 122-1131LTM |
| | 0.32 | 5 | 0.25 | 123-1102LTM |
| | | 15 | 0.10 | 123-1111LTM |
| DB-1ms | 0.10 | 10 | 0.10 | 127-0112LTM |
| | | 20 | 0.40 | 127-0123LTM |
| | 0.18 | 20 | 0.18 | 121-0122LTM |
| | 0.20 | 25 | 0.33 | 128-0122LTM |
| | 0.25 | 15 | 0.25 | 122-0112LTM |
| | | 30 | 0.25 | 122-0132LTM |
| DB-200 | 0.25 | 30 | 0.25 | 122-2032LTM |
| | | | 0.50 | 122-2033LTM |
| DB-210 | 0.53 | 30 | 1.00 | 125-0232LTM |
| DB-225 | 0.25 | 15 | 0.25 | 122-2212LTM |
| | | 30 | 0.25 | 122-2232LTM |
| DB-225ms | 0.25 | 15 | 0.25 | 122-2912LTM |
| | | 30 | 0.25 | 122-2932LTM |
| DB-23 | 0.25 | 30 | 0.25 | 122-2332LTM |
| DB-2887 | 0.53 | 10 | 3.00 | 125-2814LTM |
| DB-35 | 0.32 | 30 | 0.50 | 123-1933LTM |
| | | | 1.00 | 125-1932LTM |
| DB-35ms | 0.25 | 30 | 0.25 | 122-3832LTM |
| DB-5 | 0.10 | 10 | 0.10 | 127-5012LTM |
| | | | 0.17 | 127-501ELTM |
| | | | 0.40 | 127-5013LTM |
| | 0.15 | 10 | 1.20 | 12A-5015LTM |
| | | | 0.18 | 121-5012LTM |
| | 0.18 | 10 | 0.40 | 121-5013LTM |
| | | | 0.18 | 121-5022LTM |
| | | | 0.40 | 121-5023LTM |
| | 0.20 | 25 | 0.33 | 128-5022LTM |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (µm) | Part No. |
|--------|---------|------------|-------------|-------------|
| DB-5 | 0.25 | 10 | 0.25 | 122-5002LTM |
| | | 15 | 0.25 | 122-5012LTM |
| | | 30 | 0.25 | 122-5032LTM |
| | | | 0.50 | 122-503ELTM |
| | | | 1.00 | 122-5033LTM |
| | 0.32 | 5 | 1.00 | 123-5003LTM |
| | | 10 | 0.50 | 123-500ELTM |
| | | 15 | 0.10 | 123-5011LTM |
| | | | 0.25 | 123-5012LTM |
| | | | 1.00 | 123-5013LTM |
| | | | 25 | 0.25 |
| | | 30 | 0.25 | 123-5032LTM |
| | | | 0.50 | 123-503ELTM |
| | | | 1.50 | 123-503BLTM |
| | | | 5.00 | 123-5035LTM |
| 0.53 | 15 | 1.50 | 125-5012LTM | |
| | 30 | 1.50 | 125-5032LTM | |
| | | 5.00 | 125-5035LTM | |
| DB-5ht | 0.25 | 15 | 0.10 | 122-5711LTM |
| | | 30 | 0.10 | 122-5731LTM |
| | 0.32 | 10 | 0.10 | 123-5701LTM |
| DB-5ms | 0.18 | 20 | 0.18 | 121-5522LTM |
| | | | 0.36 | 121-5523LTM |
| | 0.20 | 25 | 0.33 | 128-5522LTM |
| | 0.25 | 15 | 0.10 | 122-5511LTM |
| | | | 0.25 | 122-5512LTM |
| | | | 25 | 0.25 |
| | | 30 | 0.25 | 122-5532LTM |
| | | | 1.00 | 122-5533LTM |
| | 0.32 | 15 | 0.25 | 123-5512LTM |
| | | | 1.00 | 123-5513LTM |
| | | 30 | 0.50 | 123-5536LTM |
| | | | 1.00 | 123-5533LTM |
| | 0.53 | 30 | 1.50 | 125-5532LTM |
| | | | 1.00 | 125-553JLTM |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (μm) | Part No. |
|--------------------|---------|------------|------------------------|---------------|
| DB-5ms Ultra Inert | 0.18 | 20 | 0.18 | 121-5522UULTM |
| | | | 0.36 | 121-5523UULTM |
| | 0.25 | 15 | 0.25 | 122-5512UULTM |
| | | | 0.25 | 122-5522UULTM |
| | | | 0.25 | 122-5532UULTM |
| | | | 0.50 | 122-5536UULTM |
| | | | 1.00 | 122-5533UULTM |
| DB-608 | 0.32 | 30 | 0.50 | 123-1730LTM |
| DB-624 | 0.18 | 20 | 1.00 | 121-1324LTM |
| | | | 1.12 | 128-1314LTM |
| | 0.20 | 10 | 1.12 | 128-1324LTM |
| | | | 1.40 | 122-1334LTM |
| | | | 1.80 | 123-1334LTM |
| | 0.32 | 30 | 1.80 | 123-1334LTM |
| | 0.45 | 30 | 2.55 | 124-1334LTM |
| 0.53 | 30 | 3.00 | 125-1334LTM | |
| DB-ALC1 | 0.32 | 30 | 1.80 | 123-9134LTM |
| DB-FFAP | 0.10 | 10 | 0.10 | 127-3212LTM |
| | | | 0.10 | 127-32H2LTM |
| | 0.25 | 30 | 0.25 | 122-3232LTM |
| | | | 0.25 | 123-3232LTM |
| | | | 0.50 | 123-3233LTM |
| | 0.32 | 30 | 1.00 | 123-3234LTM |
| 0.50 | | | 125-3217LTM | |
| DB-VRX | 0.18 | 20 | 1.00 | 121-1524LTM |
| | | | 0.25 | 30 |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (µm) | Part No. |
|---------------|---------|------------|-------------|-------------|
| DB-WAX | 0.10 | 10 | 0.10 | 127-7012LTM |
| | | | 0.20 | 127-7013LTM |
| | | 20 | 0.10 | 127-7022LTM |
| | | | 0.20 | 127-7023LTM |
| | 0.18 | 10 | 0.18 | 121-7012LTM |
| | | | 0.30 | 121-7013LTM |
| | | 20 | 0.18 | 121-7022LTM |
| | | | 0.30 | 121-7023LTM |
| | 0.20 | 30 | 0.20 | 128-7032LTM |
| | 0.25 | 15 | 0.25 | 122-7012LTM |
| | | | 0.50 | 122-7013LTM |
| | | | 0.25 | 122-7032LTM |
| | | 30 | 0.25 | 122-7032LTM |
| | | | 0.50 | 122-7033LTM |
| | | | 0.50 | 122-7033LTM |
| | 0.32 | 15 | 0.25 | 123-7012LTM |
| 0.50 | | | 123-7013LTM | |
| | 30 | 0.25 | 123-7032LTM | |
| | | 0.50 | 123-7033LTM | |
| | | 0.50 | 123-7033LTM | |
| 0.53 | 30 | 0.25 | 125-7031LTM | |
| | | 1.00 | 125-7032LTM | |
| DB-WAXetr | 0.25 | 30 | 0.25 | 122-7332LTM |
| | | | 1.00 | 123-7334LTM |
| | | | 1.50 | 125-7333LTM |
| DB-XLB | 0.25 | 15 | 0.10 | 122-1211LTM |
| | | 30 | 0.25 | 122-1232LTM |
| GS-CarbonPLOT | 0.32 | 30 | 3.00 | 113-3133LTM |
| | | | 3.00 | 115-3133LTM |
| GS-Q | 0.32 | 30 | 0.00 | 113-3432LTM |

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**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (μm) | Part No. |
|--------|---------|---------------|------------------------|---------------|
| HP-1 | 0.20 | 25 | 0.11 | 19091Z-002LTM |
| | | | 0.50 | 19091Z-202LTM |
| | 0.32 | 25 | 0.17 | 19091Z-012LTM |
| | | | 30 | 0.10 |
| | | 30 | 4.00 | 19091Z-613LTM |
| | | | 5.00 | 19091Z-713LTM |
| | | | 0.53 | 10 |
| | 30 | 2.65 | 19095Z-121LTM | |
| | | 0.88 | 19095Z-023LTM | |
| | | 2.65 | 19095Z-123LTM | |
| 5.00 | | 19095Z-623LTM | | |
| HP-1ms | 0.18 | 20 | 0.18 | 19091S-677LTM |
| | | 30 | 0.10 | 19091S-833LTM |
| | 0.25 | 30 | 0.25 | 19091S-933LTM |
| | | | 0.50 | 19091S-633LTM |
| | | | 1.00 | 19091S-733LTM |
| | 0.32 | 30 | 1.00 | 19091S-713LTM |
| HP-20M | 0.32 | 25 | 0.30 | 19091W-012LTM |
| HP-35 | 0.25 | 15 | 0.25 | 19091G-131LTM |
| HP-5 | 0.18 | 20 | 0.18 | 19091J-577LTM |
| | | 0.25 | 5 | 0.10 |
| | 30 | | 0.25 | 19091J-433LTM |
| | 30 | | 1.00 | 19091J-233LTM |
| | 0.32 | 15 | 0.25 | 19091J-411LTM |
| | | 30 | 0.25 | 19091J-413LTM |
| | | | 0.50 | 19091J-113LTM |
| | 0.53 | 10 | 2.65 | 19095J-121LTM |
| | HP-50+ | 0.25 | 5 | 0.15 |
| 15 | | | 0.25 | 19091L-431LTM |
| 30 | | | 0.25 | 19091L-433LTM |
| 0.53 | | 15 | 1.00 | 19095L-021LTM |

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TIPS & TOOLS

 For more information about LTM II Column Modules, visit www.agilent.com/chem/ltmlcol_ii


**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (µm) | Part No. | |
|--------------------------|---------|------------|-----------|-----------------|---------------|
| HP-5ms | 0.18 | 20 | 0.18 | 19091S-577LTM | |
| | | 12 | 0.33 | 19091S-101LTM | |
| | | 25 | 0.33 | 19091S-102LTM | |
| | 0.25 | 15 | 0.10 | 19091S-331LTM | |
| | | | 0.25 | 19091S-431LTM | |
| | 0.32 | 30 | 0.25 | 19091S-433LTM | |
| | | | 0.50 | 19091S-111LTM | |
| | | | 0.25 | 19091S-413LTM | |
| HP-5ms Ultra Inert | 0.18 | 20 | 0.18 | 19091S-577UILTM | |
| | | | 0.25 | 19091S-431UILTM | |
| | | | 0.25 | 19091S-433UILTM | |
| | | | 0.50 | 19091S-133UILTM | |
| | 0.32 | 30 | 1.00 | 19091S-233UILTM | |
| | | | 0.25 | 19091S-413UILTM | |
| | | | 1.00 | 19091S-213UILTM | |
| HP-88 | 0.25 | 30 | 0.20 | 112-8837LTM | |
| HP-Fast Residual Solvent | 0.53 | 30 | 1.00 | 19095V-420LTM | |
| HP-FFAP | 0.20 | 25 | 0.33 | 19091F-102LTM | |
| | | 30 | 0.25 | 19091F-433LTM | |
| | 0.32 | 25 | 0.50 | 19091F-112LTM | |
| | | 0.53 | 10 | 1.00 | 19095F-121LTM |
| | | | 30 | 1.00 | 19095F-123LTM |
| HP-INNOWax | 0.18 | 20 | 0.18 | 19091N-577LTM | |
| | | 25 | 0.20 | 19091N-102LTM | |
| | 0.25 | 5 | 0.15 | 19091N-030LTM | |
| | | 30 | 0.25 | 19091N-133LTM | |
| | 0.32 | 30 | 0.15 | 19091N-013LTM | |
| | | | 1.00 | 19095N-123LTM | |

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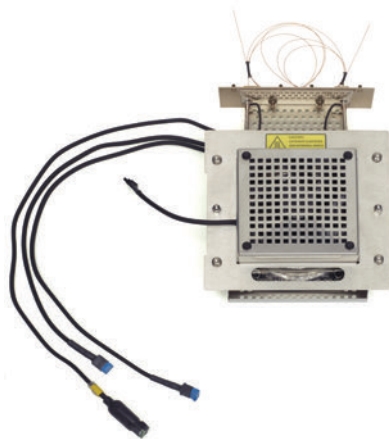


**Agilent J&W LTM II Low Thermal Mass Column Modules
for 7890A/B Series GC Systems**

| Phase | ID (mm) | Length (m) | Film (μm) | Part No. |
|--|---------|------------|------------------------|---------------|
| HP-PLOT Al ₂ O ₃ KCl | 0.25 | 30 | 5.00 | 19091P-K33LTM |
| | 0.53 | 30 | 15.00 | 19095P-K23LTM |
| HP-PLOT Al ₂ O ₃ S | 0.32 | 25 | 8.00 | 19091P-S12LTM |
| HP-PLOT Molesieve | 0.32 | 15 | 25.00 | 19091P-MS7LTM |
| | | 30 | 25.00 | 19091P-MS8LTM |
| | 0.53 | 30 | 50.00 | 19095P-MS0LTM |
| HP-PLOT Q | 0.32 | 15 | 20.00 | 19091P-Q03LTM |
| | | 30 | 20.00 | 19091P-Q04LTM |
| | 0.53 | 15 | 40.00 | 19095P-Q03LTM |
| | | 30 | 40.00 | 19095P-Q04LTM |
| HP-PLOT U | 0.32 | 30 | 10.00 | 19091P-U04LTM |
| | 0.53 | 30 | 20.00 | 19095P-U04LTM |
| Ultra 2 | 0.20 | 12 | 0.33 | 19091B-101LTM |
| | | 25 | 0.33 | 19091B-102LTM |
| | 0.32 | 25 | 0.52 | 19091B-112LTM |



Replacement column toroid for LTM 5975T column modules



LTM 5975T column module

Agilent J&W LTM Column Modules for Transportable 5975T GC/MSD Systems

| Phase | ID (mm) | Length (m) | Film (µm) | Toroid Assembly | Column Module | |
|--------------------|---------|------------|-----------|-----------------|---------------|-------------|
| DB-5ms Ultra Inert | 0.18 | 20 | 0.18 | 221-5522UILTM | G3900-63014 | |
| | 0.25 | 15 | 0.25 | 222-5512UILTM | G3900-63031 | |
| | | 30 | 0.25 | 222-5532UILTM | G3900-63005 | |
| HP-5ms Ultra Inert | 0.18 | 20 | 0.18 | 29091S-577UILTM | G3900-63039 | |
| | 0.25 | 15 | 0.25 | 29091S-431UILTM | G3900-63038 | |
| | | 30 | 0.25 | 29091S-433UILTM | G3900-63001 | |
| DB-1 | 0.25 | 30 | 0.25 | 222-1032LTM | G3900-63002 | |
| DB-1ms | 0.18 | 20 | 0.18 | 221-0122LTM | G3900-63009 | |
| | | 15 | 0.25 | 222-0112LTM | G3900-63016 | |
| | | 30 | 0.25 | 222-0132LTM | G3900-63017 | |
| DB-1ht | 0.25 | 15 | 0.10 | 222-1111LTM | G3900-63018 | |
| | | 30 | 0.10 | 222-1131LTM | G3900-63019 | |
| HP-1ms | 0.18 | 20 | 0.18 | 29091S-677LTM | G3900-63040 | |
| | | 0.25 | 30 | 0.10 | 29091S-833LTM | G3900-63041 |
| | | | 15 | 0.25 | 29091S-931LTM | G3900-63042 |
| DB-5ms | 0.18 | 20 | 0.18 | 221-5522LTM | G3900-63013 | |
| | | 0.25 | 15 | 0.25 | 222-5512LTM | G3900-63030 |
| | | | 30 | 0.25 | 222-5532LTM | G3900-63004 |
| DB-5ht | 0.25 | 30 | 0.10 | 222-5731LTM | G3900-63033 | |
| | | 15 | 0.10 | 222-5711LTM | G3900-63032 | |

(Continued)



Agilent J&W LTM Column Modules for Transportable 5975T GC/MSD Systems

| Phase | ID (mm) | Length (m) | Film (μm) | Toroid Assembly | Column Module |
|------------|---------|------------|------------------------|-----------------|---------------|
| HP-5ms | 0.25 | 30 | 0.25 | 29091S-433LTM | G3900-63007 |
| DB-35ms | 0.18 | 20 | 0.18 | 221-3822LTM | G3900-63011 |
| | 0.25 | 15 | 0.25 | 222-3812LTM | G3900-63026 |
| | | 30 | 0.25 | 222-3832LTM | G3900-63027 |
| DB-17ms | 0.18 | 20 | 0.18 | 221-4722LTM | G3900-63012 |
| | 0.25 | 15 | 0.25 | 222-4712LTM | G3900-63028 |
| | | 30 | 0.25 | 222-4732LTM | G3900-63029 |
| DB-225ms | 0.25 | 15 | 0.25 | 222-2912LTM | G3900-63022 |
| | | 30 | 0.25 | 222-2932LTM | G3900-63023 |
| DB-1701 | 0.25 | 30 | 0.25 | 222-0732LTM | G3900-63003 |
| DB-WAX | 0.25 | 15 | 0.50 | 222-7013LTM | G3900-63034 |
| | | 30 | 0.50 | 222-7033LTM | G3900-63035 |
| HP-INNOWax | 0.18 | 20 | 0.18 | 29091N-577LTM | G3900-63036 |
| | 0.25 | 30 | 0.25 | 29091N-133LTM | G3900-63008 |
| DB-FFAP | 0.25 | 15 | 0.25 | 222-3212LTM | G3900-63024 |
| | | 30 | 0.25 | 222-3232LTM | G3900-63025 |
| DB-608 | 0.18 | 20 | 0.18 | 221-6822LTM | G3900-63015 |
| DB-VRX | 0.18 | 20 | 1.00 | 221-1524LTM | G3900-63006 |
| | 0.25 | 30 | 1.40 | 222-1534LTM | G3900-63021 |
| DB-624 | 0.18 | 20 | 1.00 | 221-1324LTM | G3900-63010 |
| | 0.25 | 30 | 1.40 | 222-1334LTM | G3900-63020 |
| HP-VOC | 0.20 | 30 | 1.12 | 29091R-303LTM | G3900-63037 |

TIPS & TOOLS

For more information about LTM Column Modules for 5975T, visit www.agilent.com/chem/5975t_ltm_col



Fused Silica Tubing

Deactivated Tubing

Deactivated tubing can be used as retention gaps, guard columns, or transfer lines. Our standard deactivation process is a phenyl methyl deactivation – the preferred choice for most applications due to its inertness and robustness.

Deactivated Fused Silica

| ID (mm) | OD (mm) | Length (m) | Part No. |
|---------|---------|------------|--------------|
| 0.05 | 0.36 | 1 | 160-2655-1 |
| | | 5 | 160-2655-5 |
| | | 10 | 160-2655-10 |
| 0.10 | 0.19 | 1 | 160-1010-1 |
| | | 5 | 160-1010-5 |
| | | 10 | 160-1010-10 |
| | 0.36 | 1 | 160-2635-1 |
| | | 5 | 160-2635-5 |
| | | 5 | 19091-60620E |
| | | 10 | 160-2635-10 |
| 0.15 | 0.36 | 1 | 160-2625-1 |
| | | 5 | 160-2625-5 |
| | | 10 | 160-2625-10 |
| 0.18 | 0.34 | 1 | 160-2615-1 |
| | | 5 | 160-2615-5 |
| | | 10 | 160-2615-10 |
| 0.20 | 0.36 | 1 | 160-2205-1 |
| | | 5 | 160-2205-5 |
| | | 10 | 160-2205-10 |

(Continued)

Deactivated Fused Silica

| ID (mm) | OD (mm) | Length (m) | Part No. |
|---------|---------|------------|-------------|
| 0.25 | 0.36 | 1 | 160-2255-1 |
| | | 5 | 160-2255-5 |
| | | 10 | 160-2255-10 |
| | | 30 | 160-2255-30 |
| 0.32 | 0.43 | 1 | 160-2325-1 |
| | | 5 | 160-2325-5 |
| | | 10 | 160-2325-10 |
| | | 30 | 160-2325-30 |
| 0.45 | 0.67 | 1 | 160-2455-1 |
| | | 5 | 160-2455-5 |
| | | 10 | 160-2455-10 |
| 0.53 | 0.67 | 1 | 160-2535-1 |
| | | 5 | 160-2535-5 |
| | | 10 | 160-2535-10 |
| | | 30 | 160-2535-30 |
| 0.53 | 0.70 | 5 | CP8003* |

* 7 in cage

Deactivated Fused Silica High Temperature (400 °C)

| ID (mm) | OD (mm) | Length (m) | Part No. |
|---------|---------|------------|-------------|
| 0.05 | 0.36 | 5 | 160-2815-5 |
| 0.10 | 0.36 | 5 | 160-2825-5 |
| 0.25 | 0.35 | 5 | 160-2845-5 |
| | | 10 | 160-2845-10 |
| 0.32 | 0.43 | 5 | 160-2855-5 |
| | | 10 | 160-2855-10 |
| 0.53 | 0.67 | 5 | 160-2865-5 |
| | | 10 | 160-2865-10 |

Retention Gaps

| ID (mm) | OD (mm) | Length (m) | Connector | Unit | Part No. |
|---------|---------|------------|-----------|------|----------|
| 0.25 | 0.36 | 2.5 | Universal | 5/pk | CP8007 |
| 0.32 | 0.45 | 2.5 | Universal | 5/pk | CP8008 |
| | | 2.5 | 0.32/0.25 | 5/pk | CP8129 |
| | | 2.5 | 0.32/0.32 | 5/pk | CP8128 |
| 0.53 | 0.70 | 2.5 | Universal | 5/pk | CP8009 |
| | | 2.5 | 0.53/0.25 | 5/pk | CP8135 |
| | | 2.5 | 0.53/0.32 | 5/pk | CP8134 |
| | | 4.0 | Universal | 3/pk | CP8015 |

Retention Gaps Apolar Deactivated

| ID (mm) | OD (mm) | Length (m) | Unit | Part No. |
|---------|---------|------------|------|----------|
| 0.25 | 0.36 | 10 | 6/pk | CP8016 |

Retention Gaps Medium Polar Deactivated

| ID (mm) | OD (mm) | Length (m) | Connector | Unit | Part No. |
|---------|---------|------------|-----------|------|----------|
| 0.25 | 0.36 | 2.5 | Universal | 5/pk | CP8017 |
| 0.32 | 0.45 | 2.5 | Universal | 5/pk | CP8018 |
| 0.53 | 0.70 | 2.5 | Universal | 5/pk | CP8019 |

Retention Gaps Polar Deactivated

| ID (mm) | OD (mm) | Length (m) | Connector | Unit | Part No. |
|---------|---------|------------|-----------|------|----------|
| 0.25 | 0.36 | 2.5 | Universal | 5/pk | CP8087 |
| 0.32 | 0.45 | 2.5 | Universal | 5/pk | CP8088 |
| 0.53 | 0.70 | 2.5 | Universal | 5/pk | CP8089 |



Retention Gaps in Three Polarities

A package of 3 apolar, 1 medium polar and 1 polar deactivated

| ID (mm) | OD (mm) | Length (m) | Connector | Unit | Part No. |
|---------|---------|------------|-----------|------|----------|
| 0.25 | 0.36 | 2.5 | Universal | 5/pk | CP8070 |
| 0.32 | 0.45 | 2.5 | Universal | 5/pk | CP8080 |
| 0.53 | 0.70 | 2.5 | Universal | 5/pk | CP8090 |

Restriction for Rapid-MS

| ID (mm) | OD (mm) | Length (m) | Unit | Part No. |
|---------|---------|------------|------|----------|
| 0.1 | 0.39 | 0.6 | 5/pk | CP8121 |

Guard Column MSD

| ID (mm) | OD (mm) | Length (m) | Unit | Part No. |
|---------|---------|------------|------|----------|
| 0.53 | 0.70 | 5 | 1/pk | CP8186 |
| | | | 6/pk | CP68186 |

Large Volume Guard

| ID (mm) | OD (mm) | Length (m) | Unit | Part No. |
|---------|---------|------------|------|----------|
| 0.53 | 0.70 | 10 | 1/pk | CP8187 |
| | | | 6/pk | CP68187 |
| 0.53 | 0.70 | 12 | 1/pk | CP108194 |

Undeactivated Fused Silica

Undeactivated tubing or bare fused silica is commonly used for capillary electrophoresis. It can also be used for transfer lines and other applications where inertness is not critical.

Undeactivated Fused Silica

| ID (mm) | OD (mm) | Length (m) | Part No. |
|---------|---------|------------|-------------|
| 0.02 | 0.36 | 5 | 160-2660-5 |
| 0.05 | 0.36 | 5 | 160-2650-5 |
| | | 10 | 160-2650-10 |
| 0.075 | 0.36 | 5 | 160-2644-5 |
| | | 10 | 160-2644-10 |
| 0.10 | 0.36 | 5 | 160-2634-5 |
| | | 10 | 160-2634-10 |
| 0.18 | 0.34 | 5 | 160-2610-5 |
| | | 10 | 160-2610-10 |
| 0.20 | 0.36 | 5 | 160-2200-5 |
| | | 10 | 160-2200-10 |
| 0.25 | 0.36 | 5 | 160-2250-5 |
| | | 10 | 160-2250-10 |
| 0.32 | 0.43 | 5 | 160-2320-5 |
| | | 10 | 160-2320-10 |
| | | 50 | 19091-21050 |
| 0.53 | 0.67 | 5 | 160-2530-5 |
| | | 10 | 160-2530-10 |

Stainless Steel Tubing

UltiMetal Plus Stainless Steel Capillary Tubing

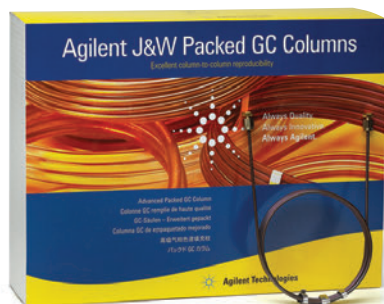
UltiMetal Plus stainless steel capillary tubing can be used as retention gaps, guard columns, or transfer lines.

UltiMetal Plus Stainless Steel Capillary Tubing

| Description | ID (mm) | OD (mm) | Length (m) | Part No. |
|---------------------------------|---------|---------|------------|----------|
| UltiMetal Plus transfer line | 0.25 | 1.59 | 2 | CP6571 |
| UltiMetal Plus transfer line | 0.25 | 1.59 | 10 | CP6572 |
| UltiMetal Plus transfer line | 0.75 | 1.59 | 2 | CP6573 |
| UltiMetal Plus transfer line | 0.75 | 1.59 | 10 | CP6574 |
| UltiMetal Plus guard column | 0.25 | 0.5 | 2 | CP6575 |
| UltiMetal Plus guard column | 0.53 | 0.8 | 2 | CP6576 |
| UltiMetal Plus guard column | 0.53 | 0.8 | 5 | CP6577 |
| UltiMetal Plus guard column | 0.53 | 0.8 | 10 | CP6578 |
| UltiMetal Plus capillary tubing | 0.25 | 0.5 | 50 | CP6579 |
| UltiMetal Plus capillary tubing | 0.32 | 0.5 | 50 | CP6580 |
| UltiMetal Plus capillary tubing | 0.53 | 0.8 | 50 | CP6581 |

ProSteel Deactivated

| ID (mm) | OD (mm) | Length (m) | Part No. |
|---------|---------|------------|------------|
| 0.53 | 0.67 | 5 | 160-4535-5 |



Agilent J&W Packed GC Columns

Agilent J&W Packed GC Columns are designed and manufactured to offer excellent and reproducible performance for all sample types associated with packed column separations, most important in the hydrocarbon processing industry.

The highly efficient and rigorous packing technology used in Agilent J&W Packed GC Columns assures column-to-column reproducibility and ultimate efficiency, while the UltiMetal treated stainless steel tubing allows for improved inertness and peak shape performance.

You can choose from a wide range of tubing materials – including stainless steel, UltiMetal, nickel, glass, copper and PTFE – plus hundreds of stationary phases, packings, and supports. All Agilent J&W Packed GC Columns can bend to fit Agilent and non-Agilent instruments with no impact on performance.

And, you can create your custom configurations by visiting www.agilent.com/chem/packedcolumnordering

Carbosieve S-II

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|----------------|---------|---------|--------|-------------|-----------------|
| 20 in (0.51 m) | 1/8 | 2 | 80/100 | G3591-81105 | G3591-80105 |

15% Carbowax 1540

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|-------|-------------|-----------------|-------------|
| 15 ft (4.57 m) | 1/8 | 2 | Chromosorb WHP | 60/80 | G3591-81095 | G3591-80095 | G3591-82095 |

5% Carbowax 20M (G16, G\$1)

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|----------------|---------|-------------|-----------------|-------------|
| 7.22 ft (2.2 m) | 1/8 | 2 | Chromosorb WHP | 100/120 | G3591-81084 | G3591-80084 | G3591-82084 |

10% Carbowax 20M (G16, G\$1)

| Length | OD (in) | ID (mm) | Support | Mesh | Stainless Steel |
|---------------|---------|---------|----------------|--------|-----------------|
| 6.56 ft (2 m) | 1/8 | 2 | Chromosorb WHP | 80/100 | G3591-70016 |

10% Carbowax 20M (G16, G\$1) + 2% KOH

| Length | OD (in) | ID (mm) | Support | Mesh | Stainless Steel |
|-----------------|---------|---------|----------------|--------|-----------------|
| 5.91 ft (1.8 m) | 1/8 | 2 | Chromosorb WHP | 80/100 | G3591-70012 |

20% Carbowax 20M (G16, G\$1)

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|----------------|---------|-------------|-----------------|-------------|
| 9.84 ft (3 m) | 1/8 | 2 | Chromosorb WHP | 100/120 | G3591-81099 | G3591-80099 | G3591-82099 |

7% Carbowax M + 3% Polyphenoether 6 ring + 2% KOH

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Nickel |
|---------------|---------|---------|----------------|--------|-------------|-------------|
| 4 ft (1.22 m) | 1/8 | 2 | Chromosorb WAW | 80/100 | G3591-81050 | G3591-82050 |

Carboxen-1000

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|----------------|---------|---------|-------|-------------|-----------------|
| 10 ft (3.05 m) | 1/8 | 2 | 60/80 | G3591-81055 | G3591-80055 |

Chromosorb 101

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|---------------|---------|---------|--------|-------------|-----------------|
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81021 | G3591-80021 |

Chromosorb 102

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|--------|-------------|-----------------|-------------|
| 2 ft (0.61 m) | 1/8 | 2 | 80/100 | G3591-81139 | G3591-80139 | G3591-82139 |

25% DC-200 (500 cSt)

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 15 ft (4.57 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81001 | G3591-80001 | G3591-82001 |

30% DC-200 (500 cSt)

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|---------|-------------|-----------------|-------------|
| 20 ft (6.1 m) | 1/8 | 2 | Chromosorb PAW | 100/120 | G3591-81140 | G3591-80140 | G3591-82140 |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81082 | G3591-80082 | G3591-82082 |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 60/80 | CP2058* | | |

*Preconditioned and pretested

35% DC-200 (500 cSt)

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 3 ft (0.91 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81039 | G3591-80039 | G3591-82039 |
| 5 ft (1.52 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81027 | G3591-80027 | |
| 10 ft (3.05 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81030 | G3591-80030 | |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81032 | G3591-80032 | G3591-82032 |

15% Hallcomid M-18

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|----------------|---------|-------------|-----------------|-------------|
| 9.84 ft (3 m) | 1/8 | 2 | Chromosorb WHP | 100/120 | G3591-81067 | G3591-80067 | G3591-82067 |

30% DC 200/500

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel |
|----------------|---------|---------|----------------|-------|-------------|-----------------|
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb PAW | 60/80 | G3591-81160 | G3591-80160 |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 60/80 | G3591-81161 | G3591-80161 |



HayeSep A

| Length | OD (in) | ID (mm) | Mesh | UltiMetal |
|-----------------|---------|---------|--------|---------------|
| 1.31 ft (0.4 m) | 1/8 | 2.1 | 80/100 | G3591-81211** |
| 2 ft (0.61 m) | 1/16 | 1 | 80/100 | G3591-81212* |
| 5 ft (1.52 m) | 1/8 | 2.1 | 80/100 | G3591-81210* |
| 5.58 ft (1.7 m) | 1/16 | 1 | 80/100 | G3591-81213* |

*Specially coiled for Large Valve Oven, 41 mm mandrel

**Specially coiled for Large Valve Oven, 25 mm mandrel

HayeSep D

| Length | OD (in) | ID (mm) | Mesh | Stainless Steel |
|---------------|---------|---------|--------|-----------------|
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | G3591-80158 |

HayeSep DB

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|---------|-------------|-----------------|-------------|
| 30 ft (9.14 m) | 1/8 | 2 | 100/120 | G3591-81088 | G3591-80088 | G3591-82088 |

HayeSep N

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|--------|-------------|-----------------|-------------|
| 1.64 ft (0.5 m) | 1/8 | 2 | 80/100 | G3591-81156 | G3591-80156 | |
| 1.64 ft (0.5 m) | 1/16 | 1 | 80/100 | CP1307* | | |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81037 | G3591-80037 | G3591-82037 |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | CP2068* | | |
| 7 ft (2.13 m) | 1/8 | 2 | 60/80 | G3591-81060 | G3591-80060 | |
| 8 ft (2.44 m) | 1/8 | 2 | 80/100 | G3591-81011 | G3591-80011 | G3591-82011 |
| 20 ft (6.1 m) | 1/8 | 2 | 80/100 | G3591-81045 | G3591-80045 | |

*Preconditioned and pretested

HayeSep N + HayeSep R 1:1

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|---------------|---------|---------|-------|-------------|-----------------|
| 8 ft (2.44 m) | 1/8 | 2 | 45/60 | G3591-81091 | G3591-80091 |

HayeSep P

| Length | OD (in) | ID (mm) | Mesh | UltiMetal |
|---------------|---------|---------|--------|-----------|
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | CP2062 |

HayeSep Q

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|------------------|---------|---------|--------|-------------|-----------------|-------------|
| 0.82 ft (0.25 m) | 1/16 | 1 | 80/100 | CP1308* | | |
| 1.64 ft (0.5 m) | 1/8 | 2 | 80/100 | G3591-81023 | G3591-80023 | G3591-82023 |
| 1.64 ft (0.5 m) | 1/8 | 2 | 80/100 | CP81073* | | |
| 3 ft (0.91 m) | 1/8 | 2 | 80/100 | G3591-81020 | G3591-80020 | G3591-82020 |
| 3.28 ft (1 m) | 1/8 | 2 | 80/100 | G3591-81146 | G3591-70007 | |
| 3.28 ft (1 m) | 1/8 | 2 | 80/100 | CP81069* | | |
| 3.9 ft (1.2 m) | 1/8 | 2 | 80/100 | | | G3591-82159 |
| 4 ft (1.22 m) | 1/8 | 2 | 80/100 | G3591-81019 | G3591-80019 | |
| 4.92 ft (1.5 m) | 1/16 | 1 | 80/100 | CP1305* | | |
| 5.91 ft (1.8 m) | 1/8 | 2 | 80/100 | | G3591-70011 | |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81004 | G3591-80004 | G3591-82004 |
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | | G3591-70005 | |
| 8 ft (2.44 m) | 1/8 | 2 | 80/100 | G3591-81047 | G3591-80047 | |
| 9 ft (2.74 m) | 1/8 | 2 | 80/100 | G3591-81033 | G3591-80033 | G3591-82033 |
| 9.84 ft (3 m) | 1/8 | 2 | 80/100 | | G3591-70006 | |
| 10 ft (3.05 m) | 1/8 | 2 | 80/100 | G3591-81002 | G3591-80002 | G3591-82002 |
| 12 ft (3.66 m) | 1/8 | 2 | 80/100 | G3591-81121 | G3591-80121 | G3591-82121 |

*Preconditioned and pretested

HayeSep R

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|--------|-------------|-----------------|-------------|
| 3.28 ft (1 m) | 1/8 | 2 | 80/100 | CP86678* | | |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81102 | G3591-80124 | G3591-82102 |
| 8.53 ft (2.6 m) | 1/8 | 2 | 80/100 | CP86677* | | |
| 12 ft (3.66 m) | 1/8 | 2 | 80/100 | G3591-81100 | G3591-80100 | |
| 12 ft (3.66 m) | 1/8 | 2 | 80/100 | CP2055* | | |

*Preconditioned and pretested

HayeSep T

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | PTFE |
|-----------------|---------|---------|--------|-------------|-------------|
| 1.64 ft (0.5 m) | 1/8 | 2 | 80/100 | G3591-81143 | |
| 1.64 ft (0.5 m) | 1/8 | 2.4 | 60/80 | | G3591-74001 |

MolSieve 5Å

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|---------|---------------|-----------------|-------------|
| 1 ft (0.30 m) | 1/8 | 2 | 60/80 | G3591-81077 | G3591-80077 | |
| 1.64 ft (0.5 m) | 1/8 | 2 | 60/80 | G3591-81147 | | |
| 1.97 ft (0.6 m) | 1/4 | 4 | 80/100 | | G3591-70004 | |
| 3 ft (0.91 m) | 1/8 | 2 | 60/80 | G3591-81103 | G3591-80103 | |
| 3 ft (0.91 m) | 1/8 | 2 | 80/100 | G3591-81074 | G3591-80074 | |
| 3 ft (0.91 m) | 1/8 | 2 | 100/120 | G3591-81075 | G3591-80075 | |
| 3.28 ft (1 m) | 1/8 | 2 | 80/100 | | G3591-70008 | |
| 3.28 ft (1 m) | 1/8 | 2 | 60/80 | CP81025* | | |
| 3.28 ft (1 m) | 1/8 | 2 | 60/80 | G3591-81149 | | |
| 4 ft (1.22 m) | 1/8 | 2 | 45/60 | G3591-81090 | G3591-80090 | |
| 4 ft (1.22 m) | 1/8 | 2 | 60/80 | G3591-81104 | G3591-80104 | G3591-82104 |
| 4.92 ft (1.5 m) | 1/16 | 1 | 80/100 | CP1306* | | |
| 5 ft (1.52 m) | 1/8 | 2 | 80/100 | CP2046 | | |
| 6 ft (1.83 m) | 1/8 | 2 | 45/60 | CP2065 | | |
| 6 ft (1.83 m) | 1/8 | 2 | 60/80 | G3591-81017 | G3591-80017 | G3591-82017 |
| 6.56 ft (2 m) | 1/8 | 2 | 45/60 | | G3591-70013 | |
| 6.56 ft (2 m) | 1/8 | 2 | 60/80 | | G3591-70002 | |
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | | G3591-70003 | |
| 7 ft (2.13 m) | 1/8 | 2 | 45/60 | G3591-81062 | G3591-80062 | |
| 7 ft (2.13 m) | 1/8 | 2.1 | 60/80 | G3591-81209** | | |
| 8 ft (2.44 m) | 1/8 | 2 | 60/80 | G3591-81022 | G3591-80022 | G3591-82022 |
| 9 ft (2.74 m) | 1/8 | 2 | 60/80 | G3591-81046 | G3591-80046 | |
| 9 ft (2.74 m) | 1/8 | 2 | 80/100 | G3591-81064 | G3591-80064 | G3591-82064 |
| 10 ft (3.05 m) | 1/8 | 2 | 80/100 | CP2045 | | |
| 13.1 ft (4 m) | 1/8 | 2 | 80/100 | CP1483* | | |
| 15 ft (4.57 m) | 1/8 | 2 | 45/60 | G3591-81061 | G3591-80061 | |
| 20 ft (6.1 m) | 1/8 | 2 | 45/60 | | G3591-80107 | |
| 20 ft (6.1 m) | 1/8 | 2 | 60/80 | G3591-81056 | G3591-80056 | |
| 25 ft (7.62 m) | 1/8 | 2 | 60/80 | G3591-81065 | G3591-80065 | |

*Preconditioned and pretested

**Specially coiled for Large Valve Oven, 41 mm mandrel

MolSieve 13X

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|--------|--------------|-----------------|-------------|
| 2 ft (0.61 m) | 1/8 | 2 | 45/60 | G3591-81031 | G3591-80031 | |
| 3 ft (0.91 m) | 1/8 | 2 | 45/60 | G3591-81028 | G3591-80028 | |
| 3 ft (0.91 m) | 1/8 | 2 | 45/60 | CP2059* | | |
| 3.94 ft (1.2 m) | 1/16 | 1 | 80/100 | CP1309* | | |
| 4 ft (1.22 m) | 1/8 | 2 | 45/60 | G3591-81012 | G3591-80012 | G3591-82012 |
| 4.9 ft (1.5 m) | 1/8 | 2 | 80/100 | G3591-81085 | G3591-80085 | |
| 4.92 ft (1.5 m) | 1/8 | 2 | 80/100 | CP81071* | | |
| 6 ft (1.83 m) | 1/8 | 2 | 60/80 | G3591-81035 | G3591-80035 | G3591-82035 |
| 6.56 ft (2 m) | 1/16 | 1 | 80/100 | G3591-81214* | | |
| 9 ft (2.74 m) | 1/8 | 2 | 45/60 | G3591-81054 | G3591-80054 | |
| 9.84 ft (3 m) | 1/8 | 2 | 45/60 | | G3591-70017 | |
| 9.84 ft (3 m) | 1/8 | 2 | 80/100 | | G3591-70015 | |
| 10 ft (3.05 m) | 1/8 | 2 | 45/60 | G3591-81003 | G3591-80003 | G3591-82003 |
| 10 ft (3.05 m) | 1/16 | 1 | 60/80 | G3591-81097 | G3591-80097 | |
| 10 ft (3.05 m) | 1/8 | 2 | 60/80 | G3591-81101 | G3591-80101 | G3591-82101 |
| 10 ft (3.05 m) | 1/8 | 2 | 80/100 | G3591-81043 | G3591-80043 | G3591-82043 |
| 12 ft (3.66 m) | 1/8 | 2 | 60/80 | G3591-81058 | G3591-80058 | |
| 15 ft (4.57 m) | 1/8 | 2 | 45/60 | G3591-81098 | G3591-80098 | |

*Preconditioned and pretested

**Specially coiled for Large Valve Oven, 41 mm mandrel

1.5% OV-101

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel |
|---------------|---------|---------|----------------|---------|-------------|-----------------|
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb GHP | 100/120 | G3591-81162 | G3591-80162 |

10% OV-101

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 2.6 ft (0.79 m) | 1/8 | 2 | Chromosorb WHP | 60/80 | G3591-81048 | G3591-80048 | G3591-82048 |
| 5 ft (1.52 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81093 | G3591-80093 | G3591-82093 |

20% OV-101

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 4 ft (1.22 m) | 1/8 | 2 | Chromosorb WHP | 80/100 | G3591-81025 | G3591-80025 | G3591-82025 |



10% PEG-20M

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|--------------|--------|-------------|-----------------|-------------|
| 6.56 ft (2 m) | 1/8 | 2 | Chromosorb W | 80/100 | G3591-81119 | G3591-80119 | G3591-82119 |

20% PEG-20M

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|--------------|--------|-------------|-----------------|-------------|
| 6.56 ft (2 m) | 1/8 | 2 | Chromosorb W | 80/100 | G3591-81122 | G3591-80122 | G3591-82122 |
| 13.1 ft (4 m) | 1/8 | 2 | Chromosorb W | 80/100 | G3591-81123 | G3591-80123 | G3591-82123 |

Porapak N

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|--------|-------------|-----------------|-------------|
| 3 ft (0.91 m) | 1/8 | 2 | 80/100 | G3591-81072 | G3591-80072 | G3591-82072 |
| 3.9 ft (1.2 m) | 1/8 | 2 | 60/80 | G3591-81087 | G3591-80087 | G3591-82087 |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81036 | G3591-80036 | G3591-82036 |
| 8.2 ft (2.5 m) | 1/8 | 2 | 50/80 | G3591-81086 | G3591-80086 | |
| 9 ft (2.74 m) | 1/8 | 2 | 80/100 | G3591-81044 | G3591-80044 | G3591-82044 |
| 12 ft (3.66 m) | 1/8 | 2 | 60/80 | G3591-81059 | G3591-80059 | |

Porapak N + Porapak R 1:1

| Length | OD (in) | ID (mm) | Mesh | Stainless Steel |
|----------------|---------|---------|-------|-----------------|
| 12 ft (3.66 m) | 1/8 | 2 | 50/80 | G3591-80110 |

Porapak Q

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|---------|-------------|-----------------|-------------|
| 3 ft (0.91 m) | 1/8 | 2 | 80/100 | G3591-81135 | G3591-80135 | G3591-82135 |
| 3.28 ft (1 m) | 1/8 | 2 | 80/100 | | G3591-70014 | |
| 5.91 ft (1.8 m) | 1/8 | 2 | 80/100 | | G3591-70010 | |
| 6 ft (1.83 m) | 1/8 | 2 | 60/80 | G3591-81136 | G3591-80136 | G3591-82136 |
| 6 ft (1.83 m) | 1/8 | 2 | 80/100 | G3591-81013 | G3591-80013 | G3591-82013 |
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | | G3591-70001 | |
| 8 ft (2.44 m) | 1/8 | 2 | 60/80 | G3591-81137 | G3591-80137 | G3591-82137 |
| 8.2 ft (2.5 m) | 1/8 | 2 | 80/100 | G3591-81083 | G3591-80083 | |
| 9 ft (2.74 m) | 1/8 | 2 | 80/100 | G3591-81016 | G3591-80016 | G3591-82016 |
| 9.84 ft (3 m) | 1/8 | 2 | 80/100 | | G3591-70009 | |
| 13 ft (3.96 m) | 1/8 | 2 | 80/100 | G3591-81053 | G3591-80053 | G3591-82053 |
| 15 ft (4.57 m) | 1/8 | 2 | 80/100 | G3591-81066 | G3591-80066 | |
| 25 ft (7.62 m) | 1/8 | 2 | 100/120 | G3591-81052 | G3591-80052 | |
| 30 ft (9.14 m) | 1/16 | 1 | 80/100 | G3591-81096 | G3591-80096 | |

Porapak QS

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|--------|-------------|-----------------|-------------|
| 4.92 ft (1.5 m) | 1/8 | 2 | 50/80 | | G3591-70018 | |
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | G3591-81157 | G3591-80157 | |
| 8 ft (2.44 m) | 1/8 | 2 | 80/100 | G3591-81051 | G3591-80051 | G3591-82051 |

Porapak R

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|-------|-------------|-----------------|-------------|
| 6 ft (1.83 m) | 1/8 | 2 | 60/80 | G3591-81106 | G3591-80106 | G3591-82106 |

Porapak T

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|-----------------|---------|---------|--------|-------------|-----------------|
| 1.5 ft (0.46 m) | 1/8 | 2 | 80/100 | G3591-81138 | G3591-80138 |
| 6.56 ft (2 m) | 1/8 | 2 | 80/100 | G3591-81120 | G3591-80120 |

10% SE-30

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal |
|-----------------|---------|---------|--------------|--------|-----------|
| 2.5 ft (0.76 m) | 1/8 | 2 | Chromosorb W | 80/100 | CP2073 |

20% Sebaconitrile

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81029 | G3591-80029 | G3591-82029 |
| 19.7 ft (6 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81071 | G3591-80071 | |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 60/80 | G3591-81176 | G3591-80176 | G3591-82176 |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81026 | G3591-80026 | G3591-82026 |

20% Sebaconitrile/2% H₃PO₄

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81015 | G3591-80015 | G3591-82015 |
| 30 ft (9.14 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81014 | G3591-80014 | G3591-82014 |

Silica Gel

| Length | OD (in) | ID (mm) | Mesh | UltiMetal | Stainless Steel |
|----------------|---------|---------|-------|-------------|-----------------|
| 2 ft (0.61 m) | 1/8 | 2 | 60/80 | G3591-81141 | G3591-80141 |
| 4 ft (1.22 m) | 1/8 | 2 | 60/80 | G3591-81142 | G3591-80142 |
| 6 ft (1.83 m) | 1/8 | 2 | 60/80 | | G3591-80108 |
| 10 ft (3.05 m) | 1/8 | 2 | 60/80 | CP2050 | |

0.1% SP-1000

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|------------|--------|-------------|-----------------|-------------|
| 7 ft (2.13 m) | 1/8 | 2 | Carbopak C | 80/100 | G3591-81063 | G3591-80063 | G3591-82063 |

15% SP-2100

| Length | OD (in) | ID (mm) | Support | Mesh | Stainless Steel |
|-----------------|---------|---------|----------------|--------|-----------------|
| 1.64 ft (0.5 m) | 1/16 | 1 | Chromosorb PAW | 80/100 | G3591-80170 |
| 7.22 ft (2.2 m) | 1/16 | 1 | Chromosorb PAW | 80/100 | G3591-80171 |

25% SP-2100

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel |
|-----------------|---------|---------|----------------|--------|-------------|-----------------|
| 1.64 ft (0.5 m) | 1/16 | 1 | Chromosorb PAW | 80/100 | G3591-81007 | G3591-80007 |
| 5.7 ft (1.75 m) | 1/16 | 1 | Chromosorb PAW | 80/100 | G3591-81008 | G3591-80008 |
| 15 ft (4.57 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81068 | G3591-80068 |

20% TCEP

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|------------------|---------|---------|----------------|--------|--------------|-----------------|-------------|
| 1.84 ft (0.56 m) | 1/16 | 0.75 | Chromosorb PAW | 80/100 | G3591-81215* | | |
| 1.84 ft (0.56 m) | 1/16 | 1 | Chromosorb PAW | 80/100 | G3591-81006 | G3591-80006 | |
| 5 ft (1.52 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81094 | G3591-80094 | |
| 15 ft (4.57 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81049 | G3591-80049 | G3591-82049 |

* Specially coiled for Large Valve Oven, 41 mm mandrel

10% UC W982

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|-----------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 1.5 ft (0.46 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81034 | G3591-80034 | |
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81040 | G3591-80040 | G3591-82040 |

12% UC W982

| Length | OD (in) | ID (mm) | Support | Mesh | UltiMetal | Stainless Steel | Nickel |
|---------------|---------|---------|----------------|--------|-------------|-----------------|-------------|
| 2 ft (0.61 m) | 1/8 | 2 | Chromosorb PAW | 80/100 | G3591-81000 | G3591-80000 | G3591-82000 |



TIPS & TOOLS

To learn more about Agilent J&W Packed GC Columns please visit www.agilent.com/chem/packedcolumns



Custom GC Column Ordering

Even though we offer over a thousand readily available columns, Agilent recognizes that sometimes you need something a little out of the ordinary. That's why we developed our Custom Column Shop. If you can't find what you're looking for in our standard order guides, we will design, build, and test capillary GC columns to meet your needs.

- We can create columns with non-standard lengths or unusual film thickness.
- We can connect columns together in series or as dual columns.
- We recognize that sometimes customers have specific column performance requirements for their applications that might not be met with standard test mixes. As a result, we can also custom-test your columns with your desired test mixture and test conditions to meet specific performance requirements.
- We can create DuraGuard or EZ-Guard columns with an integrated guard column (retention gap). Most phases can be manufactured with a built-in guard column, which means you get the advantages of a guard column without the union. Available in DB, CP and VF phases.

Custom columns are ordered using the p/ns below. Be sure to provide the details of your desired custom service or column including phase, length, id, and film thickness.

- 100-2000 Custom Capillary DB & HP columns
- 100-6000 Custom Capillary CP & VF columns
- 100-9000 UltiMetal treated tubing and parts
- 100-2000 LTM – Custom Low Thermal Mass column configurations
- 100-5000 Custom packed columns or bulk phases/supports

Contact your local Agilent office or Authorized Agilent Distributor to receive a quote for your custom column needs. You can find order forms in the back of Agilent's Essential Chromatography Catalog.

Customers in the United States, Canada, and Puerto Rico can request a custom column quote online at www.agilent.com/chem/CustomColumn



Agilent J&W GC Column Test Standards

Compare your column's performance to the test chromatogram shipped with your Agilent J&W column. The column test standard contains components that test the column for resolution characteristics, efficiency, and inertness. The test mixes are supplied at a concentration of 250 ng/μL in 2 mL vials. Match the phase and column diameter in the chart below to find the test mix for your column.

Agilent J&W GC Column Test Standards

| Column Description | Microbore (0.05 & 0.10 mm ID) Part No. | Capillary (0.18 & 0.32 mm ID) Part No. | Megabore (0.45 & 0.53 mm ID) Part No. |
|--------------------|--|--|---|
| OV-351 | | 200-0032 | |
| DB-1ht | | 200-0010 | |
| DB-1 | 200-0010 | 200-0310 | 200-0110 |
| DB-5 | 200-0010 | 200-0310 | 200-0110 |
| DB-5ht | | 200-0010 | |
| DB-5ms | | 200-0185 | 200-0185 |
| DB-624 | | 200-0113 | 200-0113 |
| DB-2887 | | | 200-0110 |
| DB-WAX | 200-0070 | 200-0370 | 200-0070 |
| DB-WAXetr | | 200-0370 | 200-0070 |
| SE-30 | | 200-0010 | |
| SE-52 | | 200-0010 | |
| SE-54 | | 200-0010 | 200-0010 |
| HP-1 | | 5080-8858 | 8500-6812 |
| HP-5 | | 5080-8858 | 8500-6812 |
| HP-FFAP | 8500-6813 | 8500-6813 | 8500-6813 |
| GS-OxyPLOT | | | 5188-5379 |

Test Standards for Agilent J&W CP and VF Columns

| Test Mix 31 Hazardous, 1/pk | Part No. |
|-----------------------------|----------|
| VF-1ms | CP0031 |
| VF-5ms | CP0031 |
| VF-17ms | CP0031 |
| VF-35ms | CP0031 |
| VF-Xms | CP0031 |
| VF-1301ms | CP0031 |
| VF-200ms | CP0031 |
| VF Rapid-MS | CP0031 |
| CP-Sil 5 CB | CP0031 |
| CP-Sil 8 CB | CP0031 |
| CP-Sil 24 CB | CP0031 |
| CP-1301 | CP0031 |

TIPS & TOOLS

Ensure highest quality gas while keeping gas lines clean and leak-free with Agilent's high-capacity gas filter. Learn more at www.agilent.com/chem/gasclean





Column Installation and Troubleshooting

Quick reference guides and tips to ensure peak performance

Agilent J&W GC columns are backed by decades of chromatography experience, so you can count on superior quality and dependability. And you can help ensure maximum performance, efficiency, and column life by implementing the most current installation and troubleshooting procedures.

In this section, you'll discover tips, techniques, and easy reference guides that will help you:

- Confidently install any capillary column
- Condition and test new columns
- Alleviate and avoid column performance degradation due to thermal damage, oxygen damage, and other factors
- Pinpoint and fix the most common column problems

So you'll expand your hours of continuous operation, decrease downtime, and get the reproducible results that your lab demands.

Capillary Column Installation

Quick Reference Guide

For more detailed installation information, refer to the GC Column Installation Guide which is provided with your column, or visit www.agilent.com/chem/columninstall

Precolumn Installation Check List

1. Replace oxygen, moisture, and hydrocarbon traps as needed.
2. Clean the injection port, replace critical injection port seals, replace injection port liners, and change septa as needed.
3. Check detector seals, and replace as necessary. Clean or replace detector jets as necessary.
4. Carefully inspect the column for damage or breakage.
5. Check your GC manufacturer's gas pressure requirements and verify gas cylinder delivery pressures to ensure that an adequate supply of carrier, makeup, and fuel gases are available. Minimum recommended carrier gas purity percentages are: helium 99.995% and hydrogen 99.995%, with H₂O <1 ppm and O₂ <0.5 ppm.
6. Gather the necessary installation tools: You will need a column cutter, column nuts, column nut wrench, ferrules, a magnifying loupe, and typewriter correction fluid.

Installing the Column

1. Uncoil approximately 0.5 m of tubing (1 coil ~ 0.5 m) from the column basket at both ends of the column for injector and detector installation. Avoid using sharp bends in the tubing.
2. Mount the column in the oven. Use a handling bracket if available.
3. Install the column nut and graphite/polyimide or graphite ferrule at each column end; pull the nut and ferrule down the tubing approximately 15 cm (**Table 6**).
4. Score (scratch) the column. Use a light touch to score the column about 4 to 5 cm from each end.

(Continued)

Table 6:

Ferrule Sizes

| Column ID (mm) | Ferrule ID (mm) |
|----------------|-----------------|
| 0.10 | 0.4 |
| 0.18 | 0.4 |
| 0.20 | 0.4 |
| 0.25 | 0.4 |
| 0.32 | 0.5 |
| 0.45 | 0.8 |
| 0.53 | 0.8 |



5. Make a clean break. Grasp the column between the thumb and forefinger as close to the score point as possible. Gently pull and bend the column. The column should part easily. If the column does not break easily, do not force it. Score the column again in a different place (farther from the end than before) and try again for a clean break.
6. Use a magnifying loupe to inspect the cut. Make sure the cut is square across the tubing with no polyimide or "glass" fragments at the end of the tube.
7. Install the column in the inlet. Check the GC manufacturer's instrument manual for the correct insertion distance in the injection port type being used. Slide the column nut and ferrule to the proper distance and then mark the correct distance on the column with typewriter correction fluid just behind the column nut. Allow the fluid to dry. Insert the column into the injector. Finger tighten the column nut until it starts to grab the column, and then tighten the nut an additional 1/4 to 1/2 turn, so that the column cannot be pulled from the fitting when gentle pressure is applied. Verify that the correct column insertion distance has been maintained by looking at the typewriter correction fluid mark.
8. Turn on the carrier gas and establish the proper flow rate. Set head pressure, split flow, and septum purge flow to appropriate levels. See **Table 7** for nominal head pressures. If fusing a split/splitless inlet, check that the purge (split) valve is "on" (open).
9. Confirm carrier gas flow through the column. Immerse the end of the column in a vial of solvent and check for bubbles.
10. Install the column into the detector. Check the instrument manufacturer's manual for the proper insertion distance.
11. Check for leaks. **This is very important.** Do not heat the column without thoroughly checking for leaks.
12. Establish proper injector and detector temperatures.
13. Establish proper makeup and detector gas flows. Ignite or turn "on" the detector.
14. Purge the column for a minimum of 10 min at ambient temperature. Add the appropriate additional purge time following inlet or trap maintenance.
15. Inject non-retained substance to check for proper injector installation. Examples: butane or methane (FID), headspace vapors from acetonitrile (NPD), headspace vapors from methylene chloride (ECD), air (TCD), argon (mass spectrometer). Proper installation is indicated by a symmetrical non-retained peak. If tailing is observed, reinstall the column into the inlet.

TIPS & TOOLS



Learn more about Agilent's top-ranked service and support at www.agilent.com/chem/services

Conditioning and Testing the Column

1. Set oven temperature 20 °C above the maximum temperature of the analysis or at the maximum temperature of the column (whichever is lower) for 2 hours. If after 10 min at the upper temperature the background does not begin to fall, immediately cool the column and check for leaks.
2. If you are using polyimide or graphite/polyimide ferrules, recheck column nut tightness after the conditioning process.
3. Confirm final proper average linear velocity by injecting a non-retained substance again.

Table 7:

| Approximate Head Pressures (psig) | | | | | | | |
|-----------------------------------|----------------|-------|-------|-------|-------|------|-------|
| Column Length (m) | Column ID (mm) | | | | | | |
| | 0.1 | 0.18 | 0.2 | 0.25 | 0.32 | 0.45 | 0.53 |
| 10 | 35-45 | 5-13 | | | | | |
| 12 | | | 10-15 | | | | |
| 15 | | | | 8-12 | 5-13 | | 1-2 |
| 20 | 75-100 | 10-20 | | | | | |
| 25 | | | 20-30 | | | | |
| 30 | | | | 15-25 | 10-20 | 3-5 | 2-4 |
| 40 | | 35-50 | | | | | |
| 50 | | | 30-60 | | 15-25 | | |
| 60 | | | | 30-45 | 20-30 | 6-10 | 4-8 |
| 75 | | | | | | 8-14 | 5-13 |
| 105 | | | | 60-80 | | | 10-15 |

Causes of Column Performance Degradation

Column Breakage

Fused silica columns break wherever there is a weak point in the polyimide coating. The polyimide coating protects the fragile but flexible fused silica tubing. The continuous heating and cooling of the oven, vibrations caused by the oven fan, and being wound on a circular cage all place stress on the tubing. Eventually breakage occurs at a weak point. Weak spots are created where the polyimide coating is scratched or abraded. This usually occurs when a sharp point or edge is dragged over the tubing. Column hangers and tags, metal edges in the GC oven, column cutters, and miscellaneous items on the lab bench are just some of the common sources of sharp edges or points.

It is rare for a column to spontaneously break. Column manufacturing practices tend to expose any weak tubing and eliminate it from use in finished columns. Larger diameter columns are more prone to breakage. This means that greater care and prevention against breakage must be taken with 0.45-0.53 mm id tubing than with 0.18-0.32 mm id tubing.

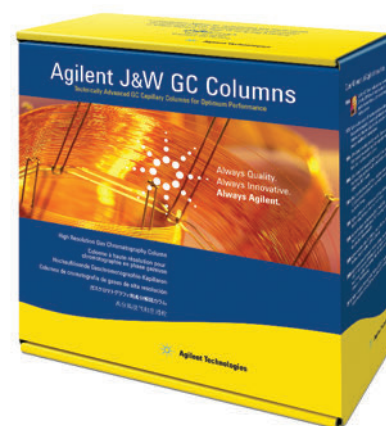
A broken column is not always fatal. If a broken column was maintained at a high temperature either continuously or with multiple temperature program runs, damage to the column is very likely. The back half of the broken column has been exposed to oxygen at elevated temperatures which rapidly damages the stationary phase. The front half is fine since carrier gas flowed through this length of column. If a broken column has not been heated or only exposed to high temperatures or oxygen for a very short time, the back half has probably not suffered any significant damage.

A union can be installed to repair a broken column. Any suitable union will work to rejoin the column. Problems with dead volume (peak tailing) may occur with improperly installed unions.

Thermal Damage

Exceeding a column's upper temperature limit results in accelerated degradation of the stationary phase and tubing surface. This results in the premature onset of excessive column bleed, peak tailing for active compounds and/or loss of efficiency (resolution). Fortunately, thermal damage is a slower process, thus prolonged times above the temperature limit are required before significant damage occurs. Thermal damage is greatly accelerated in the presence of oxygen. Overheating a column with a leak or high oxygen levels in the carrier gas results in rapid and permanent column damage.

Setting the GC's maximum oven temperature at or only a few degrees above the column's temperature limit is the best method to prevent thermal damage. This prevents the accidental overheating of the column. If a column is thermally damaged, it may still be functional. Remove the column from the detector. Heat the column for 8-16 hours at its isothermal temperature limit. Remove 10-15 cm from the detector end of the column. Reinstall the column and condition as usual. The column usually does not return to its original performance; however, it is often still functional. The life of the column will be reduced after thermal damage.



Oxygen Damage

Oxygen is an enemy to most capillary GC columns. While no column damage occurs at or near ambient temperatures, severe damage occurs as the column temperature increases. In general, the temperature and oxygen concentration at which significant damage occurs is lower for polar stationary phases. It is constant exposure to oxygen that is the problem. Momentary exposure such as an injection of air or a very short duration septum nut removal is not a problem.

A leak in the carrier gas flow path (e.g., gas lines, fittings, injector) is the most common source of oxygen exposure. As the column is heated, very rapid degradation of the stationary phase occurs. This results in the premature onset of excessive column bleed, peak tailing for active compounds and/or loss of efficiency (resolution). These are the same symptoms as for thermal damage. Unfortunately, by the time oxygen damage is discovered, significant column damage has already occurred. In less severe cases, the column may still be functional but at a reduced performance level. In more severe cases, the column is irreversibly damaged.

Maintaining an oxygen and leak-free system is the best prevention against oxygen damage. Good GC system maintenance includes periodic leak checks of the gas lines and regulators, regular septa changes, using high quality carrier gases, installing and changing oxygen traps, and changing gas cylinders before they are completely empty.



Chemical Damage

There are relatively few compounds that damage stationary phases. Introducing nonvolatile compounds (e.g., salts) in a column often degrades performance, but damage to the stationary phase does not occur. These residues can often be removed and performance returned by solvent rinsing the column.

Inorganic or mineral bases and acids are the primary compounds to avoid introducing into a column. The acids include hydrochloric (HCl), sulfuric (H₂SO₄), nitric (HNO₃), phosphoric (H₃PO₄), and chromic (CrO₃). The bases include potassium hydroxide (KOH), sodium hydroxide (NaOH), and ammonium hydroxide (NH₄OH). Most of these acids and bases are not very volatile and accumulate at the front of the column. If allowed to remain, the acids or bases damage the stationary phase. This results in the premature onset of excessive column bleed, peak tailing for active compounds and/or loss of efficiency (resolution). The symptoms are very similar to thermal and oxygen damage. Hydrochloric acid and ammonium hydroxide are the least harmful of the group. Both tend to follow any water that is present in the sample. If the water is not or only poorly retained by the column, the residence time of the HCl and NH₄OH in the column is short. This tends to eliminate or minimize any damage by these compounds. Thus, if HCl or NH₄OH are present in a sample, using conditions or a column with no water retention will render these compounds relatively harmless to the column.

The only organic compounds that have been reported to damage stationary phases are perfluoroacids. Examples include trifluoroacetic, pentafluoropropanoic, and heptafluorobutyric acid. They need to be present at high levels (e.g., 1% or higher). Most of the problems are experienced with splitless or megabore direct injections where large volumes of the sample are deposited at the front of the column.

Since chemical damage is usually limited to the front of the column, trimming or cutting 0.5-1 m from the front of the column often eliminates any chromatographic problems. In more severe cases, five or more meters may need to be removed. The use of a guard column or retention gap will minimize the amount of column damage; however, frequent trimming of the guard column may be necessary. The acid or base often damages the surface of the deactivated fused silica tubing which leads to peak shape problems for active compounds.

Column Contamination

Column contamination is one of the most common problems encountered in capillary GC. Unfortunately, it mimics a very wide variety of problems and is often misdiagnosed as another problem. A contaminated column is usually not damaged, but it may be rendered useless.

There are two basic types of contaminants: nonvolatile and semivolatile. Nonvolatile contaminants or residues do not elute and accumulate in the column. The column becomes coated with these residues which interfere with the proper partitioning of solutes in and out of the stationary phase. Also, the residues may interact with active solutes resulting in peak adsorption problems (evident as peak tailing or loss of peak size). Active solutes are those containing a hydroxyl (-OH) or amine (-NH) group, and some thiols (-SH) and aldehydes. Semivolatile contaminants or residues accumulate in the column, but eventually elute. Hours to days may elapse before they completely leave the column. Like nonvolatile residues, they may cause peak shape and size problems, and, in addition, are usually responsible for many baseline problems (instability, wander, drift, ghost peaks, etc.).

Contaminants originate from a number of sources, with injected samples being the most common. Extracted samples are among the worst types. Biological fluids and tissues, soils, waste and ground water, and similar types of matrixes contain high amounts of semivolatile and nonvolatile materials. Even with careful and thorough extraction procedures, small amounts of these materials are present in the injected sample. Several to hundreds of injections may be necessary before the accumulated residues cause problems. Injection techniques such as on-column, splitless, and megabore direct place a large amount of sample into the column, thus column contamination is more common with these injection techniques.

Occasionally, contaminants originate from materials in gas lines and traps, ferrule and septa particles, or anything coming in contact with the sample (vials, solvents, syringes, pipettes, etc.). These types of contaminants are probably responsible when a contamination problem suddenly develops and similar samples in previous months or years did not cause any problems.

Minimizing the amount of semivolatile and nonvolatile sample residues is the best method to reduce contamination problems. Unfortunately, the presence and identity of potential contaminants are often unknown. Rigorous and thorough sample cleanup is the best protection against contamination problems. The use of a guard column or retention gap often reduces the severity or delays the onset of column contamination induced problems. If a column becomes contaminated, it is best to solvent rinse the column to remove the contaminants.

Maintaining a contaminated column at high temperatures for long periods of time (often called baking-out a column) is not recommended. Baking-out a column may convert some of the contaminating residues into insoluble materials that cannot be solvent rinsed from the column. If this occurs, the column cannot be salvaged in most cases. Sometimes the column can be cut in half and the back half may still be useable. Baking-out a column should be limited to 1-2 hours at the isothermal temperature limit of the column.

TIPS & TOOLS

Column contamination from sample matrix components is the number one cause of column failure. Use Agilent DuraGuard GC columns with built-in guard if you do not want to use column connectors.





Column rinse kit, 430-3000

Solvent Rinsing Columns

Solvent rinsing columns involves removing the column from the GC and passing milliliters of solvent through the column. Any residues soluble in the rinse solvents are washed from the column. Injecting large volumes of solvent while the column is still installed is not rinsing and doing so will not remove any contaminants from the column. **A capillary GC column must have a bonded and cross-linked stationary phase before it can be solvent rinsed.** Solvent rinsing a non-bonded stationary phase results in severe damage to the column.

A column rinse kit is used to force solvent through the column (see picture). The rinse kit is attached to a pressurized gas source (N_2 or He), and the column is inserted into the rinse kit. Solvent is added to the vial, and the vial is pressurized using the gas source. The pressure forces solvent to flow through the column. Residues dissolve into the solvent and are backflushed out of the column with the solvent. The solvent is then purged from the column, and the column is properly conditioned.

Before rinsing a column, cut about 0.5 meter from the front (i.e., injector end) of the column. Insert the detector end of the column into the rinse kit. Multiple solvents are normally used to rinse columns. Each successive solvent must be miscible with the previous one. High boiling point solvents should be avoided especially as the last solvent. The sample matrix solvent(s) is often a good choice.

Methanol, methylene chloride and hexane are recommended and work very well for the majority of cases. Acetone can be substituted for methylene chloride to avoid using halogenated solvents; however, methylene chloride is one of the best rinsing solvents. If aqueous based samples (e.g., biological fluids and tissues) were injected, use water before the methanol. Some residues originating from aqueous based samples are only soluble in water and not organic solvents. Water and alcohols (e.g., methanol, ethanol, isopropanol) should be used to rinse bonded polyethylene glycol based stationary phases (e.g., DB-WAX, DB-WAXetr, DB-FFAP, HP-INNOWax) **only as a last resort.**

Table 8 lists the suggested solvent volumes for different diameter columns. Using larger solvent volumes is not harmful, but rarely better and merely wasteful. After adding the first solvent, pressurize the rinse kit, but stay below 20 psi. Use the highest pressure that keeps the solvent flow rate below 1 mL/min. Except for most 0.53 mm id columns, the rinse kit pressure will reach 20 psi before the flow rate reaches 1 mL/min. Longer rinse times are required when using heavy or viscous solvents, and for longer or smaller diameter columns. When all or most of the first solvent has entered the column, add the next solvent. The previous solvent does not have to vacate the column before the next solvent is started through the column.

After the last solvent has left the column, allow the pressurizing gas to flow through the column for 5-10 min. Install the column in the injector and turn on the carrier gas. Allow the carrier gas to flow through the column for 5-10 min. Attach the column to the detector (or leave it unattached if preferred). Using a temperature program starting at 40-50 °C, heat the column at 2-3 °/min until the upper temperature limit is reached. Maintain this temperature for 1-4 hours until the column is fully conditioned.

Column Storage

Capillary columns should be stored in their original box when removed from the GC. Place a GC septa over the ends to prevent debris from entering the tubing. Upon reinstallation of the column, the column ends need to be trimmed by 2-4 cm to ensure that a small piece of septa is not lodged in the column.

If a column is left in a heated GC, there should always be carrier gas flow. The carrier gas flow can be turned off only if the oven, injector, detector and transfer lines are turned off (i.e., not heated). Without carrier gas flow, damage to the heated portion of the column occurs.

Table 8:

Solvent Volumes for Rinsing Columns

| Column ID (mm) | Solvent Volume (mL) |
|----------------|---------------------|
| 0.18-0.2 | 3-4 |
| 0.25 | 4-5 |
| 0.32 | 6-7 |
| 0.45 | 7-8 |
| 0.53 | 10-12 |

Using larger volumes will not damage the column





Evaluating the Problem

The first step in any troubleshooting effort is to step back and evaluate the situation. Rushing to solve the problem often results in a critical piece of important information being overlooked or neglected. In addition to the problem, look for any other changes or differences in the chromatogram. Many problems are accompanied by other symptoms. Retention time shifts, altered baseline noise or drift, or peak shape changes are only a few of the other clues that often point to or narrow the list of possible causes. Finally, make note of any changes or differences involving the sample. Solvents, vials, pipettes, storage conditions, sample age, extraction, preparation techniques, or any other factor influencing the sample environment can be responsible.

Checking the Obvious

A surprising number of problems involve fairly simple and often overlooked components of the GC system or analysis. Many of these items are transparent in the daily operation of the GC and are often taken for granted ("set it and forget it"). The areas and items to check include:

- Gases: pressures, carrier gas average linear velocity, and flow rates (detector, split vent, septum purge)
- Temperatures: column, injector, detector, and transfer lines
- System parameters: purge activation times, detector attenuation and range, mass ranges, etc.
- Gas lines and traps: cleanliness, leaks, and expiration
- Injector consumables: septa, liners, O-rings, and ferrules
- Sample integrity: concentration, degradation, solvent, and storage
- Syringes: handling technique, leaks, needle sharpness, and cleanliness
- Data system: settings and connections

The Most Common Problems

Ghost Peaks or Carryover

System contamination is responsible for most ghost peaks or carryover problems. If the extra ghost peaks are similar in width to the sample peaks (with similar retention times), the contaminants were likely introduced into the column at the same time as the sample. The extra compounds may be present in the injector (i.e., contamination) or in the sample itself. Impurities in solvents, vials, caps and syringes are only some of the possible sources. Injecting sample and solvent blanks may help to find possible sources of the contaminants. If the ghost peaks are much broader than the sample peaks, the contaminants were most likely already in the column when the injection was made. These compounds were still in the column when a previous GC run was terminated. They elute during a later run and are often very broad. Sometimes numerous ghost peaks from multiple injections overlap and elute as a hump or blob. This often takes on the appearance of baseline drift or wander.

Increasing the final temperature or time in the temperature program is one method to minimize or eliminate a ghost peak problem. Alternatively, a short bake out after each run or series of runs may remove the highly retained compounds from the column before they cause a problem.

Condensation Test

Use this test whenever injector or carrier gas contamination problems are suspected (e.g., ghost peaks or erratic baseline).

1. Leave the GC at 40-50 °C for 8 or more hours.
2. Run a blank analysis (i.e., start the GC, but with no injection) using the normal temperature conditions and instrument settings.
3. Collect the chromatogram for this blank run.
4. Immediately repeat the blank run as soon as the first one is completed. Do not allow more than 5 min to elapse before starting the second blank run.
5. Collect the chromatogram for the second blank run and compare it to the first chromatogram.
6. If the second chromatogram contains a substantially larger amount of peaks and baseline instability, the incoming carrier gas line or the carrier gas is contaminated.
7. If the second chromatogram contains few peaks or very little baseline drift, the carrier gas and incoming carrier gas lines are relatively clean.

Troubleshooting Guides

Excessive Baseline Noise

| Possible Cause | Solution | Comments |
|--|---|--|
| Injector contamination | Clean the injector; replace liner, gold seal | Try a condensation test; gas lines may also need cleaning |
| Column contamination | Bake out the column | Limit the bake out to 1-2 hours |
| | Solvent rinse the column | Only for bonded and cross-linked phases Check for inlet contamination |
| Detector contamination | Clean the detector | Usually the noise increases over time and not suddenly |
| Contaminated or low quality gases | Use better grade gases; also check for expired gas traps or leaks | Usually occurs after changing a gas cylinder |
| Column inserted too far into the detector | Reinstall the column | Consult GC manual for proper insertion distance |
| Incorrect detector gas flow rates | Adjust the flow rates to the recommended values | Consult GC manual for proper flow rates |
| Leak when using an MS, ECD, or TCD | Find and eliminate the leak | Usually at the column fittings or injector |
| Old detector filament, lamp or electron multiplier | Replace appropriate part | |
| Septum degradation | Replace septum | For high temperature applications use an appropriate septum |

Baseline Instability or Disturbances

| Possible Cause | Solution | Comments |
|--|---------------------------------|--|
| Injector contamination | Clean the injector | Try a condensation test; gas lines may also need cleaning |
| Column contamination | Bake out the column | Limit a bake out to 1-2 hours |
| Unequilibrated detector | Allow the detector to stabilize | Some detectors may require up to 24 hours to fully stabilize |
| Incompletely conditioned column | Fully condition the column | More critical for trace level analyses |
| Change in carrier gas flow rate during the temperature program | Normal in many cases | MS, TCD and ECD respond to changes in carrier gas flow rate |

Tailing Peaks

| Possible Cause | Solution | Comments |
|--|---|--|
| Column contamination | Trim the column | Remove 0.5-1 m from the front of the column |
| | Solvent rinse the column | Only for bonded and cross-linked phases Check for inlet contamination |
| Column activity | Irreversible; replace the column | Only affects active compounds |
| Solvent-phase polarity mismatch | Change sample solvent to a single solvent | More tailing for the early eluting peaks or those closest to the solvent front |
| | Use a retention gap | 3-5 m retention gap is sufficient |
| Solvent effect violation for splitless or on-column injections | Decrease the initial column temperature | Peak tailing decreases with retention |
| Too low of a split ratio | Increase the split ratio | Flow from split vent should be 20 mL/min or higher |
| Poor column installation | Reinstall the column | More tailing for early eluting peaks |
| Some active compounds always tail | None | Most common for amines and carboxylic acids |

Split Peaks

| Possible Cause | Solution | Comments |
|------------------------------------|---|--|
| Injection technique | Change technique | Usually related to erratic plunger depression or having sample in the syringe needle; Use an auto injector |
| Mixed sample solvent | Change sample solvent to a single solvent | Worse for solvents with large differences in polarity or boiling points |
| Poor column installation | Reinstall the column | Usually a large error in the insertion distance |
| Sample degradation in the injector | Reduce the injector temperature | Peak broadening or tailing may occur if the temperature is too low |
| | Change to an on-column injection | Requires an on-column injector |
| Poor sample focusing | Use a retention gap | For splitless and on-column injection |

Retention Time Shift

| Possible Cause | Solution | Comments |
|--|--|--|
| Change in carrier gas velocity | Check the carrier gas velocity | All peaks will shift in the same direction by approximately the same amount |
| Change in column temperature | Check the column temperature | Not all peaks will shift by the same amount |
| Change in column dimension | Verify column identity | |
| Large change in compound concentration | Try a different sample concentration | May also affect adjacent peaks; Sample overloading is corrected with an increase in split ratio or sample dilution |
| Leak in the injector | Leak check the injector | A change in peak size usually occurs |
| Blockage in a gas line | Clean or replace the plugged line | More common for the split line; also check flow controllers and solenoids |
| Septum leak | Replace septum | Check for needle barb |
| Sample solvent incompatibility | Change sample solvent to a single solvent Use a retention gap | For splitless injection |

Change in Peak Size

| Possible Cause | Solution | Comments |
|--|---|--|
| Change in detector response | Check gas flows, temperatures and settings | All peaks may not be equally affected |
| | Check background level or noise | May be caused by system contamination and not the detector |
| Change in the split ratio | Check split ratio | All peaks may not be equally affected |
| Change in the purge activation time | Check the purge activation line | For splitless injection |
| Change in injection volume | Check the injection technique | Injection volumes are not linear |
| Change in sample concentration | Check and verify sample concentration | Changes may also be caused by degradation, evaporation, or variances in sample temperature or pH |
| Leak in the syringe | Use a different syringe | Sample leaks past the plunger or around the needle; Leaks are not often readily visible |
| Column contamination | Trim the column | Remove 0.5-1 m from the front of the column |
| | Solvent rinse the column | Only for bonded and cross-linked phases |
| Column activity | Irreversible | Only affects active compounds |
| Coelution | Change column temperature or stationary phase | Decrease column temperature and check for the appearance of a peak shoulder or tail |
| Change in injector discrimination | Maintain the same injector parameters | Most severe for split injections |
| Sample flashback | Inject less, use a larger liner, reduce the inlet temperature | Less solvent and higher flow rates are most helpful |
| Decomposition from inlet contamination | Clean the injector; replace liner, gold seal | Only use deactivated liners and glass wool in the inlet |

Loss of Resolution

| Possible Cause | Solution | Comments |
|---|--|---|
| Decrease in separation | | |
| Different column temperature | Check the column temperature | Differences in other peaks will be visible |
| Different column dimensions or phase | Verify column identity | Differences in other peaks will be visible |
| Coelution with another peak | Change column temperature | Decrease column temperature and check for the appearance of a peak shoulder or tail |
| Increase in peak width | | |
| Change in carrier gas velocity | Check the carrier gas velocity | A change in the retention time also occurs |
| Column contamination | Trim the column | Remove 0.5-1 m from the front of the column |
| | Solvent rinse the column | Only for bonded and cross-linked phases |
| Change in the injector | Check the injector settings | Typical areas: split ratio, liner, temperature, injection volume |
| Change in sample concentration | Try a different sample concentration | Peak widths increase at higher concentrations |
| Improper solvent effect, lack of focusing | Lower oven temperature, better solvent, sample phase polarity match, use a retention gap | For splitless injection |

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| Order Date | Purchase Order or Credit Card Number & Expiration | Taxable Y or N? | Yes | No |
| Name: | | If No, please provide Certificate # | | |
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| Phone: | | Fax: | | |
| Company: | | Email: | | |
| | Shipping Address | Billing Address | | |
| Company: | | | | |
| Street: | | | | |
| Room/Bldg/Dept: | | | | |
| City: | | | | |
| State/Province/Country: | | | | |
| Zip/Postal Code: | | | | |
| Deliver to: | | | | |
| Part Number | Description | Quantity | Price | Total Cost |
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| Special Instructions: | | | Subtotal: | |
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| | | | Total: | |
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| Room/Bldg/Dept: | | | | |
| City: | | | | |
| State/Province/Country: | | | | |
| Zip/Postal Code: | | | | |
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| Part Number | Description | Quantity | Price | Total Cost |
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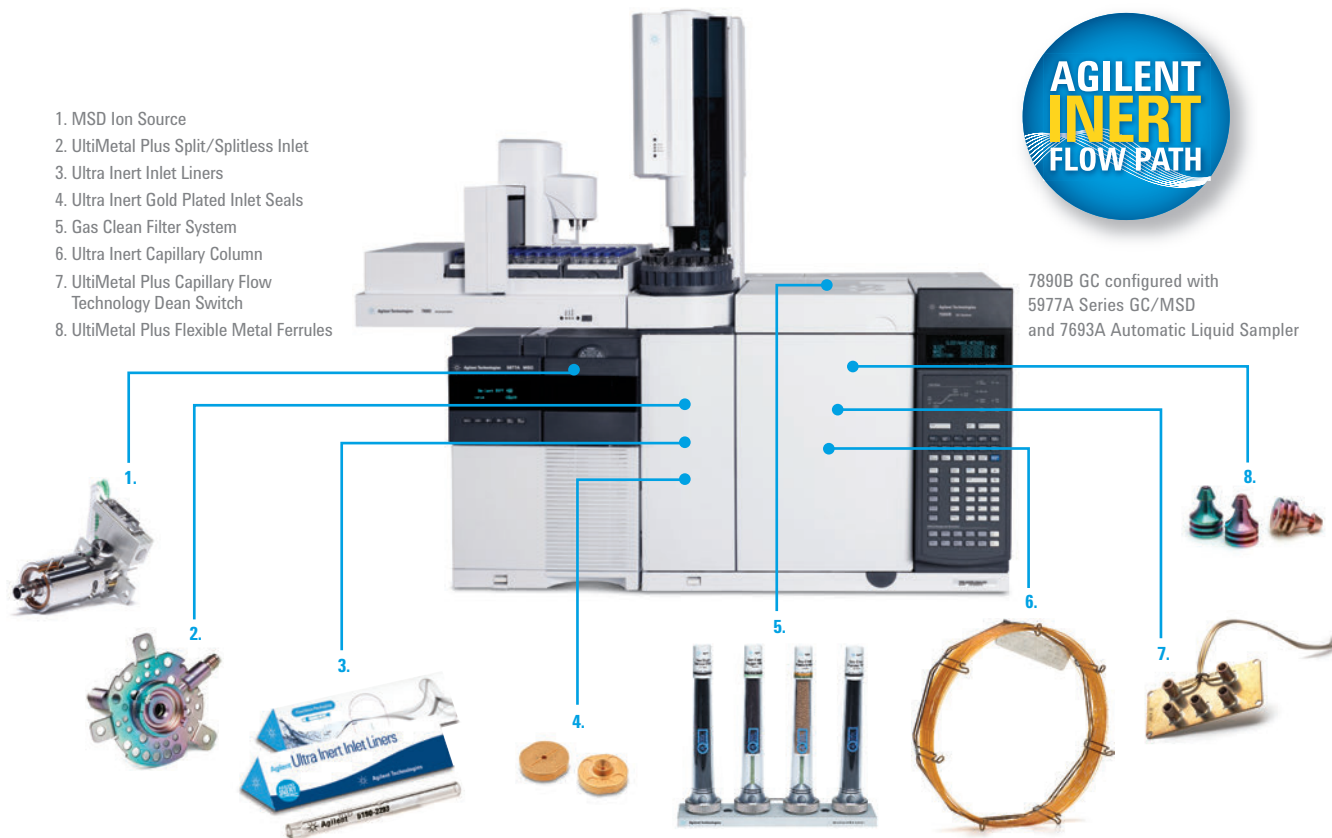
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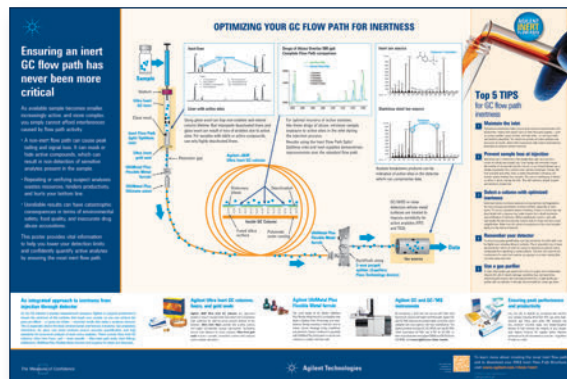
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