



GC AND GC/MS

Your Essential Resource for Columns & Supplies

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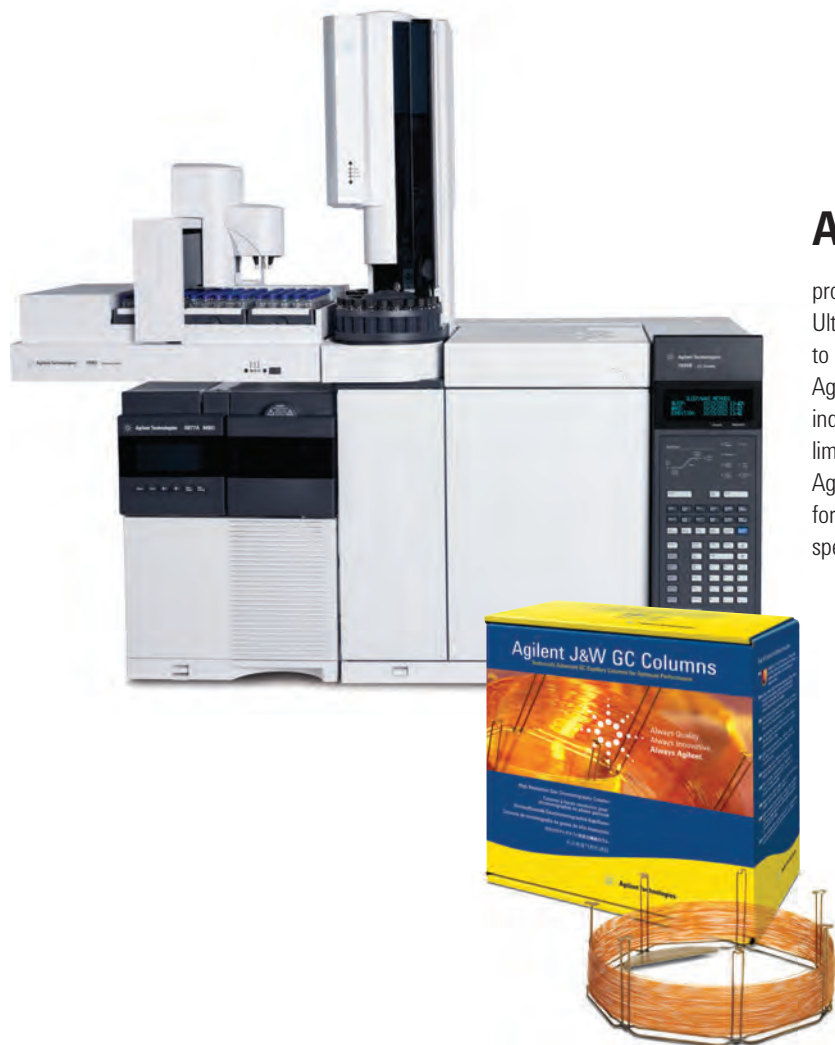


Agilent Technologies

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.

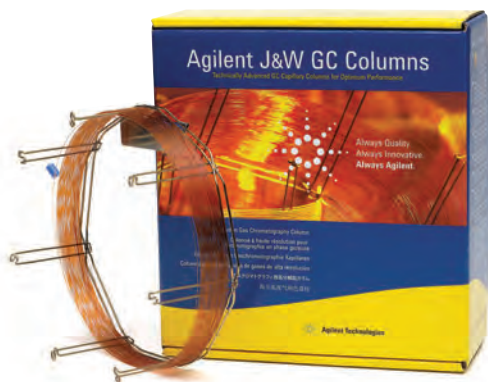


GC and GC/MS supplies

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.

Table of Contents

| | | | |
|--|-----------|--|------------|
| Agilent Solutions, Services and Support | 4 | Detector Systems..... | 92 |
| Featured Products | 8 | Flame Ionization Detector (FID)..... | 92 |
| Agilent Parts and Supplies | 14 | Electron Capture Detector (ECD) | 100 |
| GC and GC/MS Maintenance Schedule | 14 | Thermal Conductivity Detector (TCD) | 103 |
| Bulk GC Supplies..... | 16 | Flame Photometric Detector (FPD)..... | 108 |
| Inlet Septa | 17 | Nitrogen Phosphorus Detector (NPD) | 116 |
| Inlet Liners..... | 24 | Nitrogen and Sulfur Chemiluminescence Detectors | 122 |
| Agilent Ultra Inert Liners | 26 | GC Standards | 124 |
| Capillary Column Ferrules and Nuts | 34 | 7820A GC System..... | 125 |
| GC Column Connection Supplies | 40 | GC/MS Parts and Supplies | 141 |
| Capillary Flow Technology Supplies..... | 42 | MSD Contamination | 142 |
| Press-fit Capillary Column Connectors | 44 | Ion Source..... | 149 |
| Graphpak Capillary Connectors | 45 | MSD Filaments..... | 162 |
| Large Valve Oven..... | 46 | Vent Valve Supplies | 163 |
| Valves and Loops | 47 | Gas Clean Filters | 164 |
| Sample Introduction Systems..... | 50 | Quadrupole Mass Filter..... | 164 |
| Agilent Vials and Closures for GC, GC/MS and GC/HS ... | 56 | MSD Electron Multipliers and Replacement Horn | 165 |
| Headspace Vials and Closures | 56 | Vacuum Systems and Pumps | 166 |
| High Performance Septa..... | 57 | Diffusion Pump..... | 168 |
| CombiPAL Headspace Vials and Closures | 59 | Quiet Cover | 169 |
| Crimping and Decapping Tools | 60 | Foreline Pump..... | 170 |
| Teledyne Tekmar Purge and Trap Supplies | 62 | 7000 Triple Quadrupole GC/MS | 171 |
| Markes Thermal Desorption | 65 | 7200 Q-TOF for GC/MS..... | 175 |
| Inlet Systems | 67 | 240-MS Ion Trap Parts and Supplies | 178 |
| Split/Splitless Inlets..... | 69 | 220-MS Parts and Supplies..... | 180 |
| Multimode Inlet..... | 76 | GC/MS Standards..... | 181 |
| Cool On-Column Inlets..... | 78 | Agilent Syringes | 183 |
| Programmable Temperature Vaporizer (PTV) Inlets ... | 81 | | |
| Purged Packed Inlets | 88 | | |

| | | | |
|--|------------|--------------------------------------|------------|
| Agilent CrossLab GC Parts and Supplies | 192 | Applications | 500 |
| Product Introductions | 193 | Environmental | 501 |
| Supplies for Bruker, Varian GC Systems | 206 | Hydrocarbons | 501 |
| Supplies for PerkinElmer GC Systems | 221 | Pesticides and Herbicides | 506 |
| Supplies for Shimadzu GC Systems | 227 | Semivolatiles | 532 |
| Supplies for Thermo Scientific GC Systems | 234 | Volatiles | 544 |
| Supplies for CTC GC Autosamplers | 239 | Air Analysis | 549 |
| Agilent J&W GC Columns | 240 | Food, Flavor and Fragrance | 554 |
| Column Selection | 247 | Energy and Fuels | 576 |
| Column Selection Principles | 247 | Industrial Chemical | 602 |
| GC Column Application and Method Guides | 262 | Forensic Toxicology and Pharma | 635 |
| Agilent J&W Ultra Inert GC Columns | 286 | Indices | 652 |
| Agilent J&W High Efficiency GC Capillary Columns | 293 | Ordering Information | 684 |
| Low-bleed GC/MS Columns | 294 | | |
| Premium Polysiloxane Columns | 318 | | |
| Polyethylene Glycol (PEG) Columns | 351 | | |
| Specialty Columns | 362 | | |
| PLOT Columns | 420 | | |
| Columns with Non-Bonded Stationary Phases | 441 | | |
| Guard Columns | 445 | | |
| LTM Column Modules | 447 | | |
| Fused Silica Tubing | 464 | | |
| Stainless Steel Tubing | 469 | | |
| Packed GC Columns | 470 | | |
| Custom GC Column Ordering | 481 | | |
| GC Column Test Standards | 482 | | |
| Column Installation and Troubleshooting | 484 | | |



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

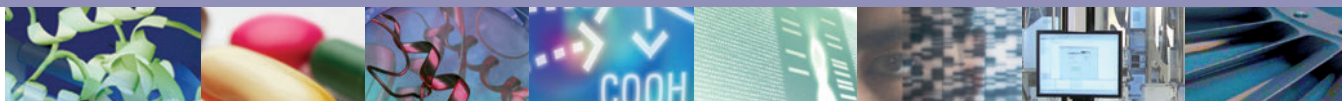
Whether testing for poisons in a forensics investigation, screening athletes for performance enhancing drugs, analyzing samples for recreational drugs, or checking a crime scene for explosive residue – lives and professions may be dependent on the accuracy of your equipment. Agilent Technologies leads 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.

Agilent Service and Support for Instrument Systems

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.

Agilent Advantage Service Plans

The best service available for your Agilent instruments

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

- **Agilent Advantage Gold** – Priority-one coverage for ultimate uptime and productivity
- **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.

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

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

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.

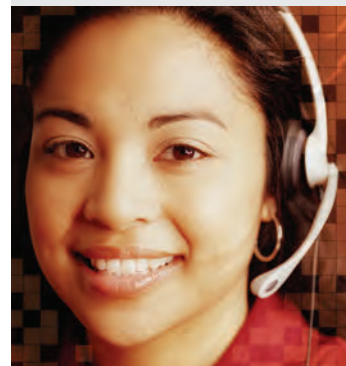
For more detailed information, please go to www.agilent.com/chem/services or contact your local Agilent Services and Support representative.



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



Need more information?

Visit www.agilent.com/chem/contactus to:

- Locate your nearest Agilent office or distributor for expert technical support.
- 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 GC and GC/MS Systems

Achieve the highest level of Productivity and Performance

The industry leader in Gas Chromatography

The Agilent 7890B GC

Gives you everything you need to take your lab to the next level of performance, including advanced separation capabilities and powerful productivity tools.



The Agilent 7820A GC

An affordable, high-quality solution for small- to medium-sized labs that require routine analyses using standard GC methods.

The Agilent 6850 Series II GC

An excellent choice for any laboratory where bench space, ease of use, and independent channel flexibility are important.



The Agilent 7697A Headspace Sampler

The new 7697A Headspace Sampler from Agilent uses advanced designs based on our industry-leading gas chromatography architecture.

The broadest selection of GC and GC/MS systems, support, and supplies in the industry

The Agilent 490 Micro GC and 490-PRO



The right GC solution if you want the ability to measure anywhere, and get the results you need in seconds.

The customer-proven worldwide bestseller, Agilent 5977 Series GC/MSD

5977A GC/MSD



Superior performance, reliability, and productivity with industry-leading 7890B GC.

5975T LTM GC/MSD



Compact, transportable GC/MS with fast, lab-quality performance.

5977E GC/MSD



Affordable GC/MSD with economical 7820 GC.

More GC/MS/MS choices to suit your applications and budgets



Agilent 7010 Triple Quadrupole GC/MS

For laboratories preparing to measure tomorrow's regulated levels today, the 7010 Triple Quadrupole GC/MS delivers uncompromising results. It is well suited for high-volume labs that cannot afford downtime for routine maintenance.

Agilent 7000C Triple Quadrupole GC/MS – EASILY UPGRADABLE!

The most precise, reliable choice for laboratories that need a cost-effective, proven solution to meet today's LODs.



Your choice for exceptional qualitative analysis, Agilent 7200 Q-TOF GC/MS

The world's first Q-TOF GC/MS combines the proven separation power of Agilent's 7890B GC with the high detection selectivity and accurate mass information of a TOF analyzer.



Customized to get you
on the **FAST TRACK**



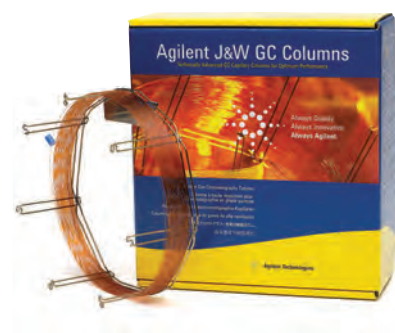
Agilent Analyzers and Application Kits

Bringing a new application online can stretch your lab to the limit. Agilent GC, Micro GC, GC/MS, and GC/MS/MS analyzers are factory preconfigured and pre-tested to get you up and running in the shortest possible time.

Agilent Gas Clean Filters

The Agilent Gas Clean Filter System provides enhanced gas quality for maximum productivity. Clean gases reduce the risk of column damage, sensitivity loss, and instrument downtime. Oxygen, hydrocarbons and moisture can cause loss of sensitivity and accuracy of the GC, and damage your column and consumables. Inserting a Gas Clean Filter System in the gas line immediately before the instrument inlet greatly reduces the level of impurities and helps you detect any problems before they occur.

Turn to page 164.



Ultra Inert GC Columns

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. And, each column is tested with the most demanding Ultra Inert test probe mixture in the industry, and an individual performance summary sheet is shipped with each column.

Turn to page 286.

For labs that need to perform trace level analysis on very active compounds, **Agilent Inert Flow Path solutions** ensure a reliably inert flow path for higher sensitivity, accuracy, and reproducibility.

Ultra Inert Liners

Agilent Ultra Inert Inlet liners provide a robust, reproducible and reliable inert flow path, even when containing wool. These liners are rigorously tested and certified to ensure exceptional batch-to-batch uniformity, low bleed and superior coverage, even with highly active compounds.

Turn to page 26.



Bulk GC Supplies

Ideal for high-usage laboratories, Agilent bulk gas chromatography supplies provide the high quality and consistency of Agilent chromatography supplies in convenient and economical packaging.

Turn to page 16.

Agilent CrossLab

Agilent CrossLab GC Supplies

CrossLab is a growing portfolio of supplies critical to instrument performance and productivity, regardless of the instrument manufacturer. They are backed by our risk-free, compatibility warranty for your confidence, not compromise. In the unlikely event of a problem, we guarantee:

- 90-day refund on supplies
- A technical support consultation
- Free instrument repair or service if required

CrossLab is more than supplies:

- Over 40 years of chromatography expertise
- The right supplies for both routine and challenging applications
- Hassle-free operations and reproducible results
- High-quality products manufactured to Agilent standards
- Technical and application support
- Dependable worldwide availability and delivery
- Convenience of consolidating purchasing
- 90-day risk-free money back guarantee

Confidence not Compromise

You've come to expect the highest quality from Agilent. Now we offer you that same confidence and quality in our CrossLab supplies, designed for other major brand instruments in your lab.

As further evidence of our confidence in these products, Agilent Services choose CrossLab supplies to service all major instrument brands.

With CrossLab, Agilent stands behind you, your instruments and your laboratory.



Agilent CrossLab GC supports instruments from Bruker/Varian, CTC, PerkinElmer, Thermo, Shimadzu, and more. The comprehensive range includes premium non-stick inlet septa, Ultra Inert inlet liners, liner O-rings, column ferrules and nuts, autosampler syringes, and vials and closures.

Turn to page 192.

Agilent Parts and Supplies

GC and GC/MS Maintenance Schedule

| Item | Typical Schedule | Actions/Comments |
|---|------------------------------|--|
| Gas Management | | |
| Gas purifiers (carrier gas and detector gas) | Every 6 to 12 months | Replacement schedule is based on capacity and grade of gas. In general, replace non-indicating traps every 6 to 12 months or when indicating traps start to change color. |
| Internal split vent trap | Every 6 months* | Replace to prevent material backing up into EPC control and to avoid costly repair. |
| External split vent trap | Every 6 months* | Replace to prevent sample analytes from escaping into the laboratory environment. |
| Flow meter calibration | Every 1 to 2 years | Re-calibrate electronic flow meters – follow recommended schedule for the unit (shown on the calibration certificate). |
| Sample Introduction and Inlets | | |
| Syringes and/or syringe needles | Every 3 months* | Replace syringe if dirt is noticeable in the syringe, if it cannot be cleaned, if the plunger doesn't slide easily, or if clogged. Replace needle if septa wear is abnormal or the needle becomes clogged. |
| Inlet liner | Weekly* | Check often. Replace when dirt is visible in the liner or if chromatography is degraded. |
| Liner O-rings | Monthly* | Replace with every liner change. |
| Inlet septum | Daily* | Check often. Replace when signs of deterioration are visible (gaping holes, fragments in inlet liner, poor chromatography, low column pressure, etc.) |
| Inlet hardware | Every 6 months Every year | Check for leaks and clean. Check parts and replace when parts are worn, scratched, or broken. |
| Inlet gold or stainless steel seal | Monthly* | For highest level of reproducibility, change inlet seal with every liner change, but minimally replace monthly or when scratched, corroded, or if there is build-up of non-volatile sample components. |

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.

(Continued)



GC and GC/MS Maintenance Schedule

| Item | Typical Schedule | Actions/Comments |
|----------------------------------|-----------------------------|---|
| Columns | | |
| Front-end maintenance | Weekly-monthly* | Remove 1/2 to 1 m from the front of the column when experiencing chromatographic problems (peak tailing, decreased sensitivity, retention time changes, etc.). Replace inlet liner and septum, and clean inlet as necessary. Guard column may be useful for increasing column lifetime. |
| Solvent rinse | As needed | Perform when chromatography degradation is due to column contamination. Only for bonded and cross-linked phases. |
| Replacement | As needed | Replace when trimming and/or solvent rinsing no longer restore chromatographic performance. |
| Ferrules | As needed | Replace when changing columns and inlet/detector parts. |
| Detectors | | |
| FID/NPD jets and collector | As needed | Clean when deposits are present. Replace when they become scratched, bent, or damaged, or when having difficulty lighting FID or keeping flame lit. |
| NPD bead | As needed | Replace when signal drifts or there is a dramatic change in sensitivity. |
| FID | Every 6 months | Measure hydrogen, air, and makeup gas flows. |
| TCD | As needed | Thermally clean by "baking out" when a wandering baseline, increased noise, or a change in response is present. Replace when thermal cleaning does not resolve the problem. |
| ECD | Every 6 months or as needed | Wipe test. Thermally clean by "baking out" when baseline is noisy, or the output value is abnormally high. Replace when thermal cleaning does not resolve the problem. |
| FPD | Every 6 months or as needed | Measure hydrogen, air, and makeup gas flows. Clean/replace FPD windows and seals when detector sensitivity is reduced. |
| NCD and SCD | Every 3 months* | Change pump oil, oil coalescing filter and chemical trap. |
| Mass Selective Detectors | | |
| Tune MSD | As needed | Keep plenty of PFTBA (p/n 05971-60571) on hand. |
| Check the calibration vial | Every 6 months | Vial can be refilled without venting the system. |
| Replace the foreline pump oil | Every 6 months | Check the fluid weekly. Change when the fluid becomes discolored or every 6 months. |
| Replace the diffusion pump fluid | Every year or as needed | Check the fluid weekly. Too little fluid will cause the pump to run at a higher temperature, resulting in degradation and loss of high vacuum. Change when the fluid is discolored or contains particulates. |
| Clean the ion source | As needed | Clean when performance deteriorates to remove contamination and to restore the electrostatic properties of the ion lens system. Replace scratched parts to maintain optimal performance. |

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.

Bulk GC Supplies

Ideal for high usage laboratories, our bulk supplies provide the quality and consistency of Agilent chromatography supplies in convenient and economical packaging. We currently offer Agilent inlet liners, septa, gold inlet seals, and liner O-rings in bulk packaging.

- Economical and convenient packaging
- Overall cost of ownership reduced
- Same great quality Agilent products



Single taper splitless liner, no wool, 5190-2270



Ultra Inert gold plated seal and washer, 5190-6144



Liner O-rings, 5190-2269



Non-stick BTO septa, 5190-3157

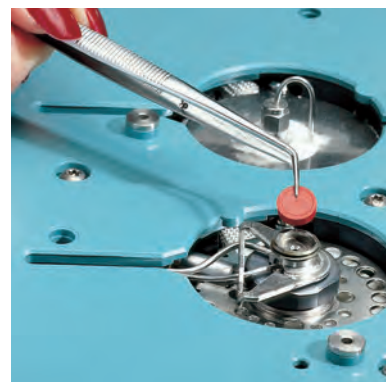
Bulk GC Supplies

| Description | Unit | Part No. |
|---|--------|-----------|
| Ultra Inert Liners | | |
| Ultra Inert liner, low pressure drop, glass wool | 100/pk | 5190-3173 |
| Ultra Inert splitless liner, single taper, no wool | 100/pk | 5190-3170 |
| Ultra Inert splitless liner, single taper, glass wool | 100/pk | 5190-3171 |
| Ultra Inert split liner, straight, glass wool | 100/pk | 5190-3172 |
| Liners | | |
| Single taper split liner, low pressure drop | 100/pk | 5190-2275 |
| Single taper splitless liner, no wool | 100/pk | 5190-2270 |
| Single taper splitless liner, glass wool | 100/pk | 5190-2271 |
| Double taper splitless liner, no wool | 100/pk | 5190-2272 |
| Seals | | |
| Ultra Inert gold plated seal, includes washer | 50/pk | 5190-6149 |
| Certified gold plated seal kit, includes washer | 10/pk | 5190-2209 |
| O-Rings | | |
| Non-stick fluorocarbon O-ring for Flip Top | 100/pk | 5190-2268 |
| Certified non-stick fluorocarbon O-ring | 100/pk | 5190-2269 |
| Septa | | |
| Non-stick BTO septa, 11 mm | 400/pk | 5190-3157 |
| Non-stick Advanced Green septa, 11 mm | 400/pk | 5190-3158 |

Inlet Septa

Septa are available for a variety of different applications and have different upper temperature limits. Lower temperature septa are usually softer, seal better, and can withstand more punctures (injections) than their high-temperature counterparts. If septa are used above their recommended temperatures, they can leak or decompose, causing sample loss, lower column flow, decreased column life, and ghosting. To minimize problems:

- Use within the recommended temperature range
- Change regularly
- Install the retainer nut "finger tight"
- Use septum purge when available
- Use autoinjectors
- Use sharp syringe needles



Premium Non-Stick Septa

Agilent premium non-stick inlet septa are designed and manufactured to provide a reliable non-contaminating seal. Our tri-fold blister pack ensures that each septum remains clean and ready to use.

- Proprietary plasma treatment prevents sticking and unnecessary inlet cleaning
- Innovative blister packaging keeps each septum clean and ready for use
- Center point guides the needle for easy penetration, less coring and longer life
- Precision molding assures accurate fit in the inlet
- Each batch is tested for bleed on Agilent 7890 GC-FID
- Premium formulations selected for sealing and chromatographic cleanliness
- No need to bake septa before using



Inlet Septa

Summary of Premium Inlet Septum Characteristics

| Septum Type | Bleed | Lifetime | Temperature Limits |
|---|-------|----------|-------------------------------|
| Non-Stick BTO (Bleed and Temperature Optimized) | ✓✓✓ | ✓ | to 400 °C injection port temp |
| Non-Stick Advanced Green | ✓✓ | ✓✓ | to 350 °C |
| Non-Stick Long-Life | ✓ | ✓✓✓ | to 350 °C |

✓✓✓ = best ✓✓ = very good ✓ = good

TIPS & TOOLS

Need inlet septa for your non-Agilent instruments? Check the Agilent CrossLab septa starting on page 199.





Inlet Septa

Non-Stick Bleed and Temperature Optimized (BTO) Septa

- Extended temperature range, lowest bleed
- Maximum injection port temperature 400 °C
- Plasma treatment eliminates sticking in the injection port
- Pre-conditioned; ready to use
- Blister packaging for cleanliness and convenience
- Ideal for use with low-bleed, "Mass Spec" capillary columns

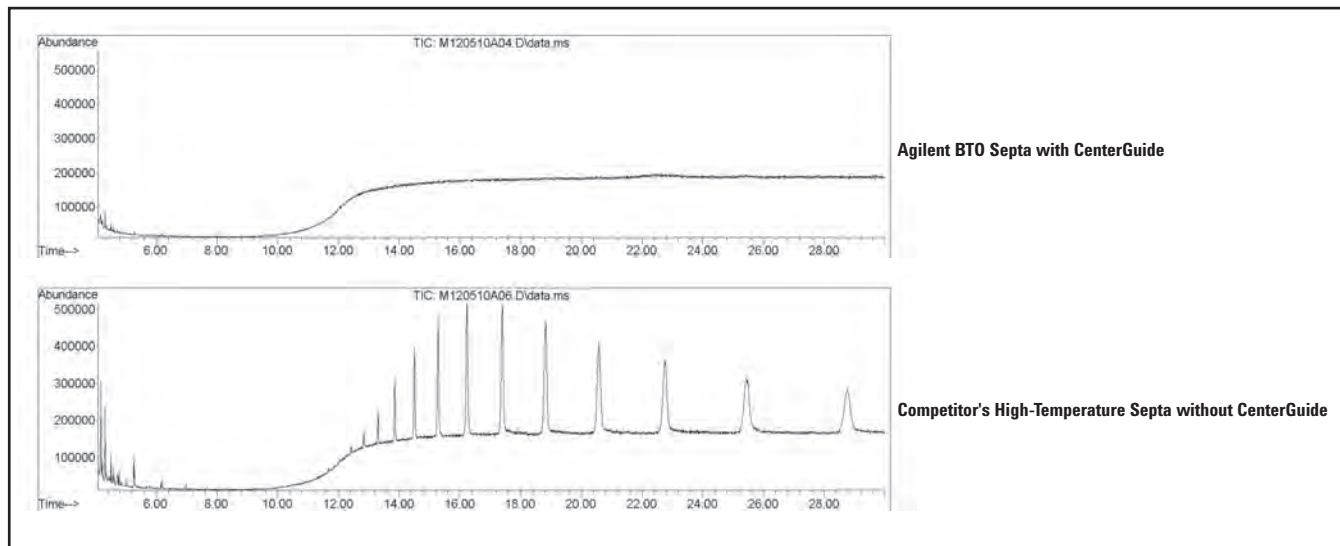


BTO septa, 5183-4757

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Unit | Part No. |
|--|--------|---------------|
| Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 100/pk | 5183-4757-100 |
| Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 400/pk | 5190-3157 |
| 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4758 |

Comparison of septum purity: TIC profile of isooctane extractions



Non-Stick Advanced Green Septa

- True long-life, high temperature green septa
- More injections per septum
- Plasma treatment eliminates sticking in the injection port
- Maximum injection port temperature 350 °C
- High-performance alternative to competitors' "green" septa
- Blister packaging for cleanliness and convenience

Non-Stick Advanced Green Septa

| Description | Unit | Part No. |
|---|--------|---------------|
| 11 mm septa | 50/pk | 5183-4759 |
| 11 mm septa | 100/pk | 5183-4759-100 |
| 11 mm septa | 400/pk | 5190-3158 |
| 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4760 |



Advanced green septa, 5183-4759

Non-Stick Long-Life Septa

- The preferred septa for autosamplers
- Pre-pierced for extended life and reduced coring
- Ideal for overnight runs
- Up to 400 injections per septum
- Plasma treatment eliminates sticking
- Maximum injection port temperature 350 °C
- Soft, 45 durometer, easy on autosampler needles
- Blister packaging for cleanliness and convenience

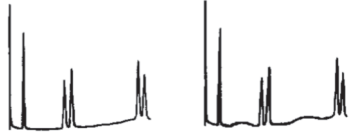

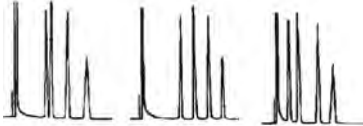
Non-Stick Long-Life Septa

| Description | Unit | Part No. |
|---|--------|---------------|
| Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| Non-stick long-life septa, 11 mm | 100/pk | 5183-4761-100 |
| 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4762 |



Long-life septa, 5183-4761

Septa Troubleshooting

| Symptom | Possible Causes | Remedy |
|---|---|---|
| <p>Extra Peaks/Humps</p>  | <p>Septum bleed</p> | <p>Turn off injector heater. If extra peaks disappear, use septum specified for higher temperature or analyze at lower inlet temperature.</p> |
| <p>Baseline Change After Large Peak</p>  | <p>Large leak at septum during injection and for a short time thereafter (common with large diameter needles)</p> | <p>Replace septum and use smaller diameter needles.</p> |
| <p>Retention Times Prolonged</p>  | <p>Carrier gas leaks at septum or column connection</p> | <p>Check for leaks. Replace septum or tighten connections if necessary.</p> |



General Purpose Septa

Agilent's general purpose septa are made from an enhanced injection-molded silicone rubber. The septa material, gray in color, is specified to withstand over 200 automatic injections at an injection port temperature of 350 °C.

General Purpose Septa

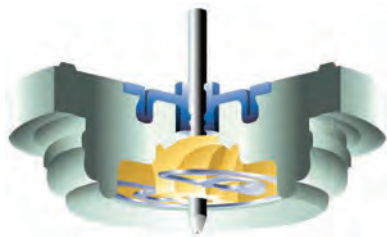
| Description | Unit | Part No. |
|--|--------|---------------|
| 11 mm septa | 50/pk | 5080-8896-50 |
| 11 mm septa | 100/pk | 5080-8894-100 |
| 9.5 mm (3/8 in) septa* | 50/pk | 5080-8728-50 |
| 9.5 mm (3/8 in) septa* | 100/pk | 5080-8728-100 |
| 5 mm through-hole septa for on-column inlets, automatic or manual injections** | 25/pk | 5181-1260 |
| 5 mm septa for high column backpressure, on-column inlets** | 25/pk | 5181-1261 |

*For 5700 series and 5830/40 GCs

**5 mm septa are packaged in glass jars



General purpose gray septa



Merlin Microseal

- Low bleed, longer life alternative to standard septa for split/splitless injection and SPME
- Requires 23-gauge syringe needle
- Has a lifetime of more than 2000 injections, depending on samples and operating conditions
- Greatly reduced instrument downtime for septa changes and injection port liner changes due to septa particulates
- Two distinct sealing mechanisms: double O-ring type seal around the syringe needle and spring assisted duckbill to seal the injection port
- Temperature range 50-400 °C

Merlin Microseal

| Description | Part No. |
|---|-----------|
| Merlin Microseal SPME replacement seal, 23-gauge, 1/pk | 392609902 |
| General Purpose Merlin Microseal (3-100 psi) | |
| Merlin Microseal starter kit, general purpose Includes Microseal septum and nut | 5182-3442 |
| Merlin Microseal general purpose replacement septum 3-100 psi | 5182-3444 |
| Merlin Microseal high pressure nut | 5182-3445 |
| High sample volume septum kit Contains general purpose Merlin Microseal, six 23-gauge syringes, 500 vials and caps | 5181-8839 |
| Low Pressure Merlin Microseal (1-45 psi) | |
| Merlin Microseal kit, low pressure Includes nut and septum | 5181-8816 |
| Merlin Microseal kit, low pressure Includes nut and 2 septa | 5181-8833 |
| Merlin Microseal low pressure replacement septum | 5181-8815 |
| Microseal PTFE nut liners, 2/pk | 5182-0853 |

(Continued)

Merlin Microseal

| Description | Part No. |
|---|-------------|
| For Bruker/Varian GCs* | |
| Merlin Microseal SPME kit, 1079 23-gauge, 1/pk | 392609901 |
| Merlin Microseal adapter kit for 1177 inlets Contains adapter, nut and general purpose Merlin Microseal septum | 392609903 |
| Syringes for Merlin Microseal | |
| Autosampler syringe, Gold Standard, 5 µL, 23-gauge | 9301-0892 |
| Autosampler syringe, Gold Standard plunger, 10 µL, 23-gauge | 9301-0713 |
| Autosampler syringe, Blue Line, 5 µL, 23-gauge | G4513-80213 |
| Autosampler syringe, Blue Line, 10 µL, 23-gauge | G4513-80209 |

*Varian GC systems are now Bruker products

TIPS & TOOLS

Agilent Blue Line autosampler syringes are specifically designed to support the higher productivity features of the 7693A ALS, while increasing plunger life and reducing costly downtime. Learn more at www.agilent.com/chem/BlueLineSyringes





Inlet Liners

Injection port liners have a variety of features to help vaporize the sample so that a true representation of the sample enters the column. Additionally, Agilent liners are individually packaged to maintain cleanliness until used. The part number and lot are silk screened on the liner for quality control and user convenience, and lot tracking is available for quality assurance.

Liner Dimensions Driven by Inlet Operation

Well-controlled glass dimensions promote better liner-to-liner consistency, ensuring GC system accuracy and reproducibility. That is why Agilent liners are made to the following precise tolerances:

Outer Diameter (OD)

- Larger od liners fit tightly to improve analyte recovery and limit sample migration onto the inlet's metal surface. Ideal for splitless injection.
- Smaller od liners are less resistant to carrier and split flow inside the inlet. Best for split injection.

Internal Diameter (ID)

- Ensures that the sample vapor is small enough to fit within the volume of the liner.
- Prevents backflash, sample loss into the septum purge, and split lines – all of which can lower reproducibility and sensitivity.

TIPS & TOOLS

Clearly Better Inertness

Confidently quantify active analytes with industry leading Inert Flow Path solutions



- Agilent industry leading GC/MS instruments
- Ultra Inert columns
- Ultra Inert liners

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

Length

- Regulates internal volume and ensures proper sealing between the septum and the inlet seal.
- Precise glass bumps on the bottom of the liner allow you to repeatably position the liner relative to the inlet bottom. This is especially critical if you install liners by measuring the distance from the O-ring to the top of the liner.

Tapers

| None | Bottom Tapers | Dual Tapers |
|--|---|---|
| <ul style="list-style-type: none"> • Straight tubes used in split injection with autosamplers | <ul style="list-style-type: none"> • Directs sample onto head of column and limits analyte exposure to bottom of inlet • Minimizes decomposition and discrimination | <ul style="list-style-type: none"> • Contain sample within glass liner limiting contact with metal inlet surface • Thought to limit loss through septum purge |

Glass Wool

- Less molecular weight discrimination
- Provides additional surface area for sample vaporization, increasing reproducibility
- Serves as a trap for non-volatiles

For split liners, Agilent specifies the placement of glass wool in the liner so that the syringe penetrates the glass wool, wiping the syringe, to provide the most repeatable results with Agilent autosampler and split/splitless inlet design thermal profile.

Agilent Ultra Inert deactivated liners are recommended for samples with active analytes – such as phenols, amines, organic acids, pesticides and drugs of abuse – that could be irreversibly adsorbed on active surfaces in the inlet.

Deactivation

Developed for your high sensitivity analyses, Ultra Inert deactivation provides extreme surface inertness – even for liners containing glass wool. Agilent Original deactivation is recommended for your everyday analyses. With use, even deactivated liners become active. Replace the liner regularly.

TIPS & TOOLS

Tight control of liner dimensions is critical to reproducibility of GC results.





Agilent Ultra Inert Liners

Ensure a reliably inert flow path – with or without glass wool

Whether you are analyzing difficult, active environmental samples or screening for drugs of abuse, our Ultra Inert Inlet liners help ensure an inert GC flow path for higher sensitivity, accuracy, and reproducibility, especially at trace levels.

For samples that contain active or labile compounds, labs typically use liners without wool to prevent degradation or loss of active analytes. However, with Agilent Ultra Inert deactivation, liners with wool are recommended for no loss of sensitivity. The benefits provided by wool, such as homogeneous sample mixing and vaporation, non-volatile residue trapping, and column and detector protection, are gained without compromising detection of active analytes. Plus, Ultra Inert liners are more stable than liners with other deactivations, as shown on the following page. More samples can be analyzed before inlet or column maintenance is required when using Ultra Inert liners with wool.



Certified performance

Each deactivation lot is certified to ensure efficient, consistent coverage using both acidic and basic probes at trace (2 ng) levels on-column. In addition, every liner is packaged with a Performance Certificate that you can peel and stick into your lab notebook for quick compliance reference.

Easy traceability: The deactivation lot number is printed directly on the Performance Certificate; the liner lot number and part number are permanently etched on glass.

Unequalled manufacturing and quality control deliver best-in-class liner deactivation performance

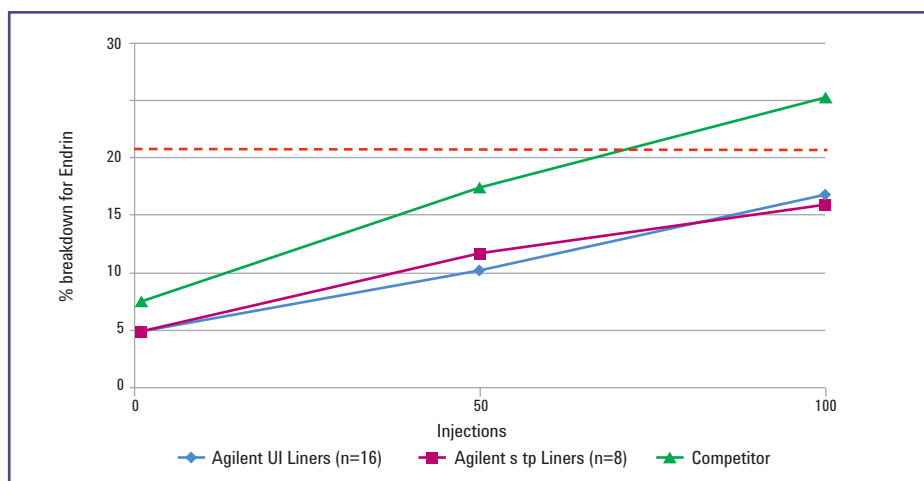
Agilent's proprietary manufacturing process produces Ultra Inert liners that are rigorously tested and certified to ensure exceptional batch-to-batch uniformity, low (to no) bleed or background contamination, and superior coverage – even with highly active compounds. This rigorous process includes:

- Lot testing to ensure reproducible deactivation coverage – and the stability of deactivation over time
- QC testing with probes specifically chosen to reveal activity
- A GC method that tests liner (not column or system) inertness
- The elimination of contamination – a common side effect of manufacturing and packaging



Touchless packaging – an Agilent exclusive – eliminates O-ring hassles

Ultra Inert Inlet liners are delivered in pharmaceutical-grade PTEG tubing approved by GC/MS extraction testing. But what really sets Agilent's packaging apart is a pre-installed O-ring that has been pre-cleaned, conditioned, and non-stick plasma treated. This unique touchless packaging allows you to quickly and easily install the new liner without searching for and installing the O-ring – saving time and improving productivity, without the risk of contamination from touching.



Agilent Ultra Inert Liners with wool are superior vs. the competition as shown in this endrin breakdown comparison.

To learn more about creating the most inert flow path, visit www.agilent.com/chem/inert



Single taper, Ultra Inert liner with glass wool, 5190-2293



Agilent Ultra Inert Liners

Agilent Ultra Inert Liners

Agilent Ultra Inert liners are the perfect companion to Agilent J&W Ultra Inert GC columns. They provide reproducible inertness liner after liner, maintained through a sequence of samples, and for a range of analytes. Agilent's Ultra Inert liners were developed – and are manufactured and certified – using a suite of tests specifically designed to ensure batch-to-batch uniformity.

- Exceptional batch-to-batch liner uniformity
- Low to no bleed or background contamination
- Superior coverage, allowing use of glass wool even with highly active compounds

Only Ultra Inert liners are delivered in Agilent's exclusive touchless packaging with a pre-cleaned, conditioned and non-stick plasma treated O-ring pre-installed. Touchless packaging aids in removal of the old liner, and easy installation of the new, clean, preconditioned liner – without risk of contamination from touching.



Agilent Ultra Inert Liners

| Description | Volume (μL) | ID (mm) | 1/pk | 5/pk | 25/pk | 100/pk* |
|--|-------------|---------|-----------|-----------|-----------|-----------|
| Split Inlet Liners | | | | | | |
| Low pressure drop, Ultra Inert Liner with glass wool | 870 | 4 | 5190-2295 | 5190-3165 | 5190-3169 | 5190-3173 |
| Straight, Ultra Inert Liner with glass wool | 990 | 4 | 5190-2294 | 5190-3164 | 5190-3168 | 5190-3172 |
| Splitless Inlet Liners | | | | | | |
| Single taper, Ultra Inert Liner | 900 | 4 | 5190-2292 | 5190-3162 | 5190-3166 | 5190-3170 |
| Single taper, Ultra Inert Liner with glass wool | 900 | 4 | 5190-2293 | 5190-3163 | 5190-3167 | 5190-3171 |
| Splitless, double taper Ultra Inert Liner, no wool | 800 | 4 | 5190-3983 | 5190-4007 | | |
| Dimpled, splitless, Ultra Inert Liner | 200 | 2 | 5190-2297 | 5190-4006 | | |
| Splitless, straight, Ultra Inert Liner | 250 | 2 | 5190-6168 | | | |
| Straight, Ultra Inert Liner | 60 | 1 | 5190-4047 | | | |
| Straight Ultra Inert Liner for SPME | 35 | 0.75 | 5190-4048 | | | |

*The 100/pk is not in the Touchless packaging. O-rings must be purchased separately, p/n 5190-2269.

TIPS & TOOLS



Ultra Inert gold seals prevent active sites from ruining your analysis

Unlike traditional machined seals, Agilent Ultra Inert gold inlet seals are manufactured using metal injection molding, followed by gold plating to ensure a smooth, consistent surface. We then apply our Ultra Inert chemistry on the gold to produce a leak-free seal that reduces active analyte adsorption.

Turn to page 67 for ordering information.

Agilent Original Deactivation Split Liners

Agilent single taper split liners are made to strict dimension specifications for optimal inlet performance and feature the tightest tolerances for od, id, taper, and glass wool placement. For ease-of-use and reproducibility, some liners have a positioning bead, a restriction to secure the position of the glass wool, and a feature to consistently self-position to the recommended height. The liners also feature Agilent's Original proprietary deactivation.

Agilent Original Deactivation Split Liners

| Description | Volume (µL) | ID (mm) | 1/pk | 5/pk | 25/pk | 100/pk |
|--|-------------|---------|-------------|------------|-----------|-----------|
| Single Taper Split Liners | | | | | | |
| Single taper, glass wool, deactivated, low pressure drop | 870 | 4 | 5183-4647 | 5183-4701 | 5183-4702 | 5190-2275 |
| Single taper, glass wool, deactivated | 870 | 4 | 5183-4711 | 5183-4712 | 5183-4713 | |
| Straight Split Liners | | | | | | |
| Straight, glass wool, non-deactivated | 990 | 4 | 19251-60540 | 5183-4691 | 5183-4692 | |
| Focus Liners | | | | | | |
| Deactivated with glass wool | 935 | 4 | | 210-4004-5 | | |
| Tapered, deactivated with glass wool | 880 | 4 | | 210-4022-5 | | |

TIPS & TOOLS

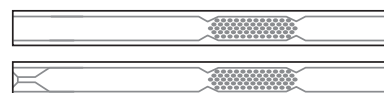
Agilent recommends part number 5190-2295 as the top split liner, and for splitless injection UI part number 5190-2293



Single taper split liner, 5183-4647, 5183-4711



Straight split liner, 19251-60540



Focus liners, 210-4004-5, 210-4022-5



View the Touchless Packaging demonstration video at www.agilent.com/chem/touchless

TIPS & TOOLS

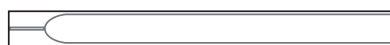
To learn more about our comprehensive portfolio of Agilent CrossLab GC supplies – including our Agilent CrossLab original deactivation liners – go to www.agilent.com/chem/CrossLab



Agilent Original Deactivation Splitless Liners

Agilent Original Deactivation Splitless Liners

| Description | Volume (μL) | ID (mm) | 1/pk | 5/pk | 25/pk | 100/pk |
|---|-------------|---------|-------------|------------|-----------|-----------|
| Single Taper Splitless Liners | | | | | | |
| Single taper, deactivated | 900 | 4 | 5181-3316 | 5183-4695 | 5183-4696 | 5190-2270 |
| Single taper, inert | 900 | 4 | 5181-3316i | | | |
| Single taper, glass wool, deactivated | 900 | 4 | 5062-3587 | 5183-4693 | 5183-4694 | 5190-2271 |
| Double Taper Splitless Liners | | | | | | |
| Double taper, deactivated | 800 | 4 | 5181-3315 | 5183-4705 | 5183-4706 | 5190-2272 |
| Straight Splitless Liners | | | | | | |
| Straight, deactivated, quartz | 250 | 2 | 5181-8818 | 5183-4703 | 5183-4704 | |
| Straight, non-deactivated, quartz | 250 | 2 | 18740-80220 | 5183-4707 | 5183-4708 | |
| Straight, non-deactivated | 990 | 4 | 210-3003 | 210-3003-5 | | |
| Direct Inlet Liners | | | | | | |
| Straight, non-deactivated (for gas samples, headspace, or purge & trap) | 140 | 1.5 | 18740-80200 | 5183-4709 | 5183-4710 | |



Single taper splitless liner, 5181-3316, 5181-3316i



Single taper, glass wool splitless liner, 5062-3587



Double taper splitless liner, 5181-3315



Straight, non-deactivated, quartz splitless liner, 18740-80220, 5181-8818



Straight, non-deactivated splitless liner, 210-3003



Direct inject liner, 18740-80200

TIPS & TOOLS



Need inlet liners and O-rings for your non-Agilent instruments? Check out the Agilent CrossLab inlet liners.

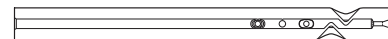
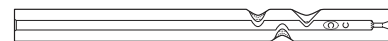
Turn to page 193.



Agilent Specialty Injection Liners

Agilent Specialty Injection Liners

| Description | Volume (µL) | ID (mm) | 1/pk | 5/pk | 25/pk |
|---|-------------|---------|-------------|-----------|-----------|
| MultiMode Inlet Heavy Matrix | | | | | |
| Dimpled | | | | | |
| Dimpled splitless single taper, deactivated | 200 | 2 | 5190-2296 | | |
| Ultra Inert Deactivated Dimpled Liners | | | | | |
| Dimpled, splitless, Ultra Inert Liner | 200 | 2 | 5190-2297 | 5190-4006 | |
| Manual Injection | | | | | |
| Straight split liner with cup, glass wool, and packing, 18740-60840 | 800 | 4 | 18740-60840 | 5183-4697 | 5183-4698 |
| SPME | | | | | |
| SPME, deactivated | 70 | 0.75 | 5188-6471 | | |
| SPME, Ultra Inert deactivation | 70 | 0.75 | 5190-4048 | | |
| Volatiles | | | | | |
| Volatiles Organic Analysis liner | 60 | 1 | 5190-4047 | | |



Single taper dimpled splitless liner, 5190-2296, 5190-2297



Straight split liner with cup, glass wool, and packing, 18740-60840

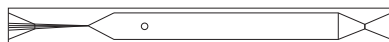
TIPS & TOOLS

With Agilent Parts Finder quickly locate replacement parts for your Agilent instruments. Finding and ordering a part is as simple as clicking on an instrument model, clicking to locate the part, adding the part to a parts list, and printing the list for easy ordering – go to www.agilent.com/chem/go2partsfinder





Single taper direct connect liner, G1544-80730



Dual taper direct connect liner, G1544-80700

Direct Connect

| Description | ID (mm) | Part No. |
|--|---------|-------------|
| Direct Connect | | |
| Direct column connect | 4 | G1544-80730 |
| Dual taper direct connect liner, splitless, Agilent proprietary deactivation | 4 | G1544-80700 |
| Single taper direct connect liner, splitless, deactivated, inert | 4 | G1544-80731 |

Programmed Temperature Vaporization (PTV) Liners

| Description | Volume (µL) | ID (mm) | Part No. |
|--|-------------|---------|-----------|
| PTV Liners | | | |
| PTV liner, single baffle, glass wool, deactivated | 180 | 2 | 5183-2038 |
| PTV liner, single baffle, deactivated | 200 | 2 | 5183-2036 |
| PTV liner, multi baffled, deactivated | 150 | 1.8 | 5183-2037 |
| PTV liner, sintered glass, deactivated | 112 | 1.5 | 5190-1426 |
| Liners for High Temperature PTV Inlet, G3506A | | | |
| PTV liner, high temperature, quartz | 713 | 3.4 | 5188-5313 |
| PTV liner, high temperature, borosilicate | 668 | 3.4 | 5188-5356 |

Liner O-Rings

- Liners are sealed in the inlet with O-rings or graphite seals
- Graphite seals are used when inlet temperatures exceed 350 °C
- Fluorocarbon O-ring seals are easier to replace than graphite that deforms and flakes apart

Only Agilent fluorocarbon liner O-rings are:

- Pre-cleaned, then conditioned to eliminate out-gassing of contaminants, which is especially important for trace, ECD and MSD analyses
- Plasma treated for a non-stick, contaminant-free surface that won't stick to the inlet metal surface
- Packaged for convenience and cleanliness in a novel dial package that delivers 1 clean O-ring at a time



Liner O-rings, 5188-5365

Liner O-Rings

| Description | Unit | Part No. |
|--|--------|-----------|
| Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| | 100/pk | 5190-2269 |
| Graphite O-ring for splitless liner | 10/pk | 5180-4173 |
| Graphite O-ring for split liner | 10/pk | 5180-4168 |
| Non-stick fluorocarbon liner O-ring for Flip Top | 10/pk | 5188-5366 |
| | 100/pk | 5190-2268 |
| High temperature PTV inlet liner fluorocarbon O-ring | 10/pk | 5188-5311 |



Non-stick fluorocarbon liner O-ring for Flip Top, 5188-5366



TIPS & TOOLS

Agilent's Ultra Inert GC liners are delivered in Touchless packaging with a certified, non-stick O-ring pre-installed.

Turn to page 28.



Capillary Column Ferrules and Nuts

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks, which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance.

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

To minimize problems, follow these general techniques for ferrule installation:

- Don't overtighten – finger tighten the column nut, then use wrench to tighten
- Maintain cleanliness
- Bake out ferrules prior to use (polyimide and polyimide/graphite only)
- Avoid contamination, such as fingerprint oils
- Inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them
- Change ferrules when new columns or injector/detector parts are installed

TIPS & TOOLS



Use Self Tightening column nuts with graphite/polyimide ferrules to provide a leak-free column connection, without the risk of overtightening.

Turn to page 40.



Self Tightening column nut

Ferrule Selection Recommendations

| Ferrule Type | Upper Temp. Limit | Usages | Advantages | Limitations |
|--|--------------------------|--|--|---|
| Graphite (100%) | 450 °C | <ul style="list-style-type: none"> • General purpose for capillary columns • Suitable for FID and NPD • Recommended for high temperature and cool on-column applications | <ul style="list-style-type: none"> • Easy-to-use stable seal • Higher temperature limit • Can be removed easily | <ul style="list-style-type: none"> • Not for MS or oxygen-sensitive detectors • Soft, easily deformed or destroyed • Possible system contamination |
| Polyimide/graphite (85%/15%) | 350 °C | <ul style="list-style-type: none"> • General purpose for capillary columns • Recommended for MS and oxygen-sensitive detectors • Most reliable leak-free connection | <ul style="list-style-type: none"> • Mechanically robust • Long lifetime | <ul style="list-style-type: none"> • Not reusable • Flows at elevated temperature • Must re-tighten frequently |
| Polyimide (100%) | 280 °C | <ul style="list-style-type: none"> • Isothermal operation • Can be reused or removed easily • Excellent sealing material when making metal or glass connections | <ul style="list-style-type: none"> • Mechanically robust • Long lifetime • Can be reused or removed easily | <ul style="list-style-type: none"> • Leaks after temperature cycle • Flows at elevated temperature • Must re-tighten frequently |
| UltiMetal Plus Flexible Metal Ferrules | 450 °C | <ul style="list-style-type: none"> • Designed for Capillary Flow Technology fittings • Compatible with Agilent inlet and detector fittings • Suitable with MS interface using the swaging nut G2855-20555 | <ul style="list-style-type: none"> • Inert surface • Robust seal • Pre-swaged for precise height into fitting | <ul style="list-style-type: none"> • Overtightening of stainless steel nut can damage fitting |

TIPS & TOOLS

Look for the following signals that indicate ferrule damage:

- Background noise from oxygen diffusing into the system
- Column bleed catalyzed by oxygen
- Sample degradation
- Sample loss
- Increase in detector signal/noise
- Poor retention time reproducibility



Short and Long Ferrules

Short Ferrules (height 3 mm)



Polyimide/graphite ferrules, 5181-3323



Universal column nut, 5181-8830

Standard fitting for Agilent GC inlet and detectors (FID, NPD, ECD) column connections use short ferrules and the Universal nut

Long Ferrules (height 3.6 mm)



Pre-conditioned long ferrule for MSD connection, 5062-3508



MS interface column nut, 05988-20066

Pre-conditioned graphite/polyimide ferrules are recommended with MSD Interface nut



Column nut for long or long two-hole ferrules, 05921-21170

Alternative nut for Agilent standard inlet or detector fittings used with long graphite/polyimide ferrules

TIPS & TOOLS

Agilent's Self Tightening column nut eliminates the need for retightening once and for all

This unique, self tightening stainless steel GC column nut delivers a tight connection – without expensive upgrades or adapters – and gives you the advantages of:

- Reliable performance
- Less wasted time
- Ease of use
- Faster maintenance

Learn how to install a column using the Self Tightening column nut, visit www.agilent.com/chem/STnut



Capillary Column Ferrules – for use with most brands of column, including DB, HP, CP, VF and Select columns

| Column ID (mm) | Ferrule Nom ID | UltiMetal Plus Flexible Metal Ferrule Part No. | Graphite Short Ferrule Part No. | Polyimide Short Ferrule Part No. | 85% Polyimide/15% Graphite Short Ferrule Part No. | Pre-Conditioned Long Ferrule 85% Polyimide/15% Graphite for MSD connection Part No. |
|----------------|----------------|--|---------------------------------|----------------------------------|---|---|
| 0.025-0.05 | 0.4 | | 500-2114 | 5062-3515 | 5062-3516 | 5062-3507 |
| 0.075 | 0.4 | | 500-2114 | 5062-3515 | 5062-3516 | 5062-3507 |
| 0.1-0.25 | 0.4 | G3188-27501 | 500-2114 | 5181-3322 | 5181-3323 | 5062-3508 |
| 0.1-0.25* | 0.5 | | 5080-8853 | 5062-3513 | 5062-3514 | 5062-3508 |
| 0.32 | 0.5 | G3188-27502 | 5080-8853 | 5062-3513 | 5062-3514 | 5062-3506 |
| 0.45 | 0.8 | G3188-27503 | 500-2118 | 5062-3511 | 5062-3512 | 5062-3538 |
| 0.53 | 0.8 | G3188-27503 | 500-2118 | 5062-3511 | 5062-3512 | 5062-3538 |

*FactorFour, CP and VF brand columns made prior to 2013 have a larger od and require a 0.5 mm ferrule. The column test chromatogram confirms the ferrule size needed.

Specialty Application Capillary Column Ferrules

| Column ID (mm) | Ferrule Nom ID | UltiMetal Plus Flexible Metal Ferrule Part No. | Graphite Short Ferrule Part No. | Polyimide Short Ferrule Part No. | 85% Polyimide/15% Graphite Short Ferrule Part No. | Pre-Conditioned Long Ferrule 85% Polyimide/15% Graphite for MSD Part No. |
|--|----------------|--|---------------------------------|----------------------------------|---|--|
| 0.32 CP-SilicaPLOT | 0.8 | | 500-2118 | 5062-3511 | 5062-3512 | 5062-3538 |
| 0.25 and 0.32 UltiMetal Plus column tubing | | G3188-27505 | | | | |
| 0.53 UltiMetal Plus column tubing | | G3188-27506 | | | | |
| No hole | | | | | 5190-4054 | 5181-3308 |

For additional capillary column ferrule selection, please refer to our CrossLab portfolio. **Turn to page 195.**



UltiMetal Plus Flexible Metal ferrules, G3188-27501



Polyimide ferrule, 5181-3322



Polyimide/graphite ferrules, 5181-3323



Graphite ferrules, 5080-8853



Polyimide/graphite ferrule, 5062-3514

Recommended MS Interface Connections

| Description | Part No. |
|---|-------------|
| Recommended | |
| Nut | |
| Self Tightening column nut, for MS interface | 5190-5233 |
| Ferrule | |
| 250 µm Polyimide/graphite ferrule, 10/pk | 5181-3323 |
| 320 µm Polyimide/graphite ferrule, 10/pk | 5062-3514 |
| Tools | |
| MS interface column installation tool | G1099-20030 |
| Column installation tool for 5975T | G3880-20030 |
| Traditional | |
| Nut | |
| MS interface column nut, female | 05988-20066 |
| Ferrule | |
| 0.4 mm Polyimide/graphite ferrule, 10/pk | 5062-3508 |
| 0.5 mm Polyimide/graphite ferrule, 10/pk | 5062-3506 |
| Tools | |
| MS interface column installation tool | G1099-20030 |
| Column installation tool for 5975T | G3880-20030 |
| Alternative | |
| Nut | |
| Swaging nut, for MS interface with Flexible Metal ferrules | G2855-20555 |
| Ferrule | |
| UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, 10/pk | G3188-27501 |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, 10/pk | G3188-27502 |
| Tools | |
| Ferrule pre-swaging tool | G2855-60200 |

TIPS & TOOLS

Tips and tricks for making better connections...



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



Recommended Inlet Connections

| Description | Part No. |
|---|-------------|
| Recommended | |
| Nut | |
| Self Tightening column nut, for inlet/detector | 5190-6194 |
| Ferrule | |
| 250 µm Polyimide/graphite ferrule, 10/pk | 5181-3323 |
| 320 µm Polyimide/graphite ferrule, 10/pk | 5062-3514 |
| Tools | |
| Column installation pre-swaging tool, graphite ferrules | G3440-80217 |
| Traditional | |
| Nut | |
| Universal column nut, 2/pk | 5181-8830 |
| Ferrule | |
| 250 µm Polyimide/graphite ferrule, 10/pk | 5181-3323 |
| 320 µm Polyimide/graphite ferrule, 10/pk | 5062-3514 |
| Tools | |
| Column installation pre-swaging tool, graphite ferrules | G3440-80217 |
| Inert Flow Path | |
| Nut | |
| Column nut for long or long two-hole ferrules | 05921-21170 |
| Ferrule | |
| UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, 10/pk | G3188-27501 |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, 10/pk | G3188-27502 |
| Tools | |
| Column installation pre-swaging tool, metal ferrules | G3440-80218 |



TIPS & TOOLS

Ensuring an inert GC flow path has never been more critical. Access IFP resources here:
www.agilent.com/chem/inertflowpath



GC Column Connection Supplies

The correct tools and supplies make proper GC column installation easier and ensure consistent, robust, leak-free connections and reliable results.

New Self Tightening column nuts have a unique, stainless steel design that delivers a tight connection – without expensive upgrades or adapters. An innovative spring-driven piston continuously presses against the short graphite/polyimide ferrule – maintaining a leak-free seal even after hundreds of injections. It is especially well suited for oxygen sensitive detectors, such as mass spec and ECD.



Self Tightening column nut



Self Tightening column nut, for MS interface, 5190-5233



Universal column nut, 5181-8830



MS interface column nut, 05988-20066



Column installation pre-swaging tool, metal ferrules, G3440-80218



Column installation pre-swaging tool, graphite ferrules, G3440-80217

Column Nuts

| Description | Part No. |
|--|-------------|
| Short Nuts | |
| Self Tightening column nut, for MS interface | 5190-5233 |
| Self Tightening column nut, for inlet/detector | 5190-6194 |
| Universal column nut, 1/16 in hex, 2/pk | 5181-8830 |
| Finger tight column nut for 530 µm columns* | 5020-8293 |
| Finger tight column nut for 320 µm columns and smaller* | 5020-8292 |
| Blanking plug, finger tight style | 5020-8294 |
| 6850 column nut, 2/pk | 5183-4732 |
| Extended column nut, VI inlet | G3504-20504 |
| High Temperature SimDis PTV inlet, 4 mm hex | 5188-5312 |
| Long Nuts | |
| MS interface column nut, female | 05988-20066 |
| Column nut for long or long two-hole ferrules | 05921-21170 |
| Accessories | |
| Swaging nut, for MS interface with Flexible Metal ferrules | G2855-20555 |
| Open end wrench, 1/4 and 5/16 in | 8710-0510 |
| Column installation pre-swaging tool, metal ferrules | G3440-80218 |
| Column installation pre-swaging tool, graphite ferrules | G3440-80217 |

*For use with graphite ferrules only

Specialty Ferrules, 85% Polyimide/15% Graphite

| Ferrule ID (mm) | Column ID (mm) | Unit | Part No. |
|---|------------------|-------|-----------|
| Two Hole | | | |
| 0.5 | 0.1 | 10/pk | 5181-3388 |
| 0.5 | 0.10, 0.20, 0.25 | 10/pk | 5062-3580 |
| 0.5 | 0.32 | 10/pk | 5062-3581 |
| No Hole | | | |
| Capillary column long ferrule | | 10/pk | 5181-3308 |
| Capillary column short ferrule | | 10/pk | 5190-4054 |
| High Temperature PTV Inlet SS/Graphite | | | |
| 0.4 | 0.32 | 10/pk | 5188-5315 |
| 0.4 | 0.53 | 10/pk | 5188-5314 |

Straight Ferrules

| Description | Unit | Part No. |
|-------------------------------------|-------|-----------|
| 1/4 in PTFE | 10/pk | 0100-1378 |
| 1/4 in Graphite | 10/pk | 0100-1324 |
| 1/8 in PTFE | 10/pk | 0100-1365 |
| 1/8 in Graphite | 10/pk | 0100-1325 |
| 1/8 in 85% Polyimide/15% graphite | 10/pk | 0100-1332 |
| 1/16 in PTFE | 10/pk | 0100-1375 |
| 1/16 in Graphite | 10/pk | 0100-1326 |
| 1/16 in VG-2 Polyimide/40% graphite | 10/pk | 0100-1379 |
| 1/4 in 85% Polyimide/15% graphite | 10/pk | 0100-1331 |



1/8 in 85% Polyimide/15% graphite, 0100-1332

Reducing Ferrules

| Description | Unit | Part No. |
|--|-------|-----------|
| 1/8 to 1/16 in Polyimide | 10/pk | 0100-1342 |
| 1/8 to 1/16 in VG-1 Polyimide, 15% graphite | 10/pk | 0100-1344 |
| 1/16 in to 0.4 mm VG-2 Polyimide, 40% graphite | 10/pk | 0100-1381 |

Ferrules for LTM Rapid Heating/Cooling System

| Description | Original Design (5/pk) | 2010+ Ultimate Union (10/pk) |
|---|------------------------|------------------------------|
| For use with 0.25-0.4 mm id LTM columns | 5190-1437 | G3188-27501 |
| For use with 0.4-0.5 mm id LTM columns | 5190-1438 | G3188-27502 |
| For use with 0.5-0.8 mm id LTM columns | 5190-1439 | G3188-27503 |



UltiMetal Plus Flexible Metal ferrules, G3188-27501

Ferrules and Nuts for NCD and SCD

| Description | Part No. |
|----------------------------------|-------------|
| Spare column nut and ferrule kit | G6600-80018 |

Capillary Flow Technology Supplies

Agilent offers a family of GC accessories based on our proprietary Capillary Flow Technology. These accessories increase system productivity and performance:

- Deans switch device simplifies the analysis of complex samples
- Purged Effluent Splitter for inert, leak-free column effluent splitting



Ultimate Union

Ultimate Union

The Ultimate Union is part of Agilent's Capillary Flow Technology family, providing extremely low dead volume column connections. Like the QuickSwap, Deans Switch and Purged Effluent Splitter, the Ultimate Union uses special fittings and SilTite ferrules to create an inert, leak-free and robust seal that doesn't need re-tightening after temperature cycles.

Each Agilent Ultimate Union kit contains:

- 1 Union (your choice of UltiMetal Plus deactivated, or non-deactivated)
- 1 Oven wall clip
- 2 Internal nuts, p/n G2855-20530
- 1 Swaging nut, p/n G2855-20555
- 1 5/pk of UltiMetal Plus Flexible Metal ferrules for 0.25 mm column

Ultimate Union Kits, Fittings and Ferrules

| Description | Part No. |
|-------------------------------------|-------------|
| Ultimate union kit, deactivated | G3182-61580 |
| Ultimate union kit, non-deactivated | G3182-61581 |



TIPS & TOOLS

UltiMetal Plus ferrules can be used to install columns in the Split/Splitless inlet using the long column nut, p/n 05921-21170

Fittings, Ferrules and Supplies

For leak-free, low dead volume and inert column connections with capillary flow accessories, such as the Deans Switch or QuickSwap MS Interface, use SilTite ferrules and specified nuts. For Capillary Flow devices, use deactivated fused silica tubing. Do not use tubing that has been coated with stationary phase.

Fittings, Ferrules and Supplies

| Description | Unit | Part No. |
|--|-------|-------------|
| Internal nut | | G2855-20530 |
| Swaging nut, for MS interface with Flexible Metal ferrules | | G2855-20555 |
| Tee, inert | | G3184-60065 |
| Column storage fitting | | G2855-20590 |
| UltiMetal Plus Flexible Metal ferrule with 0.4 mm id | 10/pk | G3188-27501 |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id | 10/pk | G3188-27502 |
| UltiMetal Plus Flexible Metal ferrule with 0.8 mm id | 10/pk | G3188-27503 |
| Ferrule pre-swaging tool | | G2855-60200 |

Column/Retention Gap Installation Supplies

| Description | Part No. |
|---|-------------|
| 250 µm retention gap, one 5 m piece | 160-2255-5 |
| 320 µm retention gap, one 5 m piece | 160-2325-5 |
| 530 µm retention gap, 5 m length | 160-2535-5 |
| Fused silica, deactivated, 0.15 mm x 1 m | 160-2625-1 |
| Fused silica, deactivated, 0.15 mm x 5 m | 160-2625-5 |
| Fused silica, deactivated, 0.15 mm x 10 m | 160-2625-10 |



Internal nut, G2855-20530



Swaging nut, G2855-20555



Tee, inert, G3184-60065



UltiMetal Plus Flexible Metal ferrules, G3188-27501



Ferrule pre-swaging tool, G2855-60200

Press-fit Capillary Column Connectors

In the past it was necessary to use press-fit connectors with specific dimensions to connect columns of those dimensions. Modern press-fit connectors are "laser-milled" to provide highly reproducible taper angles throughout the length of the press-fit, ensuring an excellent seal. Agilent's Press-fit capillary column connectors are treated with Agilent Ultra Inert deactivation to provide a robust and inert flow path.



Ultra Inert universal press fit connector, 5190-6979



Ultra Inert universal press fit Y-splitter, 5190-6980

Ultra Inert Press-fit Column Connectors

| Description | Unit | Part No. |
|--|-------|-----------|
| Ultra Inert universal press fit connector | 10/pk | 5190-6979 |
| Ultra Inert universal press fit Y-splitter | | 5190-6980 |

Graphpak Capillary Connectors

Graphpak Capillary Column Connectors (2.5 mm)*

| Column ID (mm) | Connector ID (mm) | Part No. |
|--|-------------------|-----------|
| Capillary Detector Port Connector | | |
| 0.32/0.25 | 0.4 | 5021-7166 |
| 0.53 | 0.7 | 5021-7164 |
| Capillary Divider for Simultaneous Sampling | | |
| 0.32/0.25 | 0.53 | 5021-7148 |
| 0.53 | 0.7 | 5021-7146 |
| Capillary Injection Port Connector | | |
| 0.2 | 0.3 | 5021-7169 |
| 0.32/0.25 | 0.4 | 5021-7170 |
| 0.53 | 0.7 | 5021-7168 |

*The 2.5 mm Graphpak is not compatible with the Graphpak 2M used for the PTV.

Note: Order ferrules in addition to the connector to fit your column. Ferrules must be ordered separately.

Ferrules for Connectors

| Column ID (mm) | ID (mm) | Unit | Part No. |
|---------------------------------|---------|-------|-----------|
| 0.2 | 0.3 | 10/pk | 5021-7136 |
| 0.32/0.25 | 0.4 | 10/pk | 5021-7137 |
| 0.53 | 0.7 | 10/pk | 5021-7134 |
| Graphpak plug ferrule | | 10/pk | 5021-7133 |
| Replacement Graphpak column nut | | 5/pk | 5062-3525 |



Graphpak connector for Agilent capillary detectors



Graphpak divider for simultaneous sampling



Capillary injection port connector, 5021-7170



Large Valve Oven

The Agilent Large Valve Oven (LVO) for GC is a versatile, high capacity external oven, which can be configured to support complex, multi-valve GC applications. The LVO supports several standard Agilent multi-valve Analyzers such as RGA and NGA, and is also available as a highly customizable option on the 7890B GC. Precisely engineered for thermal isolation from the GC oven, the LVO provides a homogeneous isothermal environment for up to six columns and/or valves, and convenient open-access for maintenance, adjustment or customization. Accessibility, capacity and thermal uniformity make the Agilent LVO a premium GC valving option, especially suited to support the rising trend of combining multiple complex analysis on a single GC platform.

For more information please visit agilent.com/chem/largevalveoven

Valves and Loops

Gas Sampling General Purpose Valves

| Description | Part No. |
|--|-----------|
| 6-port replacement valve WE series, 400 psi, 225 °C | 5062-9508 |
| 6-port replacement valve WE series, Hastelloy C, 400 psi, 225 °C | 5062-9509 |
| 10-port replacement valve WE series, 400 psi, 225 °C | 5062-9510 |
| 10-port replacement valve WE series, Hastelloy C, 400 psi, 225 °C | 5062-9511 |
| 6-port replacement valve WT series, 300 psi, 350 °C | 0101-0584 |
| 10-port replacement valve WT series, 300 psi, 350 °C | 0101-0585 |
| 4-port replacement valve WE series, 400 psi, 225 °C | 0101-0946 |
| 4-port replacement valve WT series, 300 psi, 350 °C | 0101-0947 |
| 14-port replacement valve UWE series, Hastelloy C, 400 psi, 225 °C | 0101-1472 |
| 14-port replacement valve UWE series, 400 psi, 225 °C | 0101-1473 |
| 4-port replacement valve WE series, Hastelloy C, 400 psi, 225 °C | 5062-3519 |



General purpose gas sampling valves

Liquid Sampling General Purpose Valves

| Description | Part No. |
|---|-----------|
| 0.2 µL replacement valve UWP series, 1,000 psi, 75 °C | 0101-0636 |
| 0.5 µL replacement valve UWP series, 1,000 psi, 75 °C | 0101-0637 |
| 1.0 µL replacement valve UWP series, 1,000 psi, 75 °C | 0101-0638 |
| 0.5 µL replacement valve UWP series, 5,000 psi, 75 °C | 0101-0639 |



General purpose liquid sampling valves

Replacement Rotors for Gas Sampling Valves

| Description | Part No. |
|---|-----------|
| 6-port replacement rotor WE series, 400 psi, 225 °C | 5181-7459 |
| 10-port replacement rotor WE series, 400 psi, 225 °C | 5181-7460 |
| 6-port valve, replacement rotor, WT series, 300 psi, 350 °C | 1535-4952 |
| 10-port replacement rotor WT series, 300 psi, 350 °C | 1535-4954 |
| 4-port replacement rotor WE series, 400 psi, 225 °C | 5190-6981 |
| 14-port replacement rotor UWE series, 400 psi, 225 °C | 5190-6982 |



Front ferrules, stainless steel, 5181-1292

Valve Supplies

| Description | Part No. |
|--|-------------|
| 1/16 in stainless steel nut, 10/pk | 5181-1291 |
| 1/16 in front ferrule, stainless steel, 10/pk | 5181-1292 |
| Straight metering valve, 1/16 in, stainless steel, for LSVs as a sample-out restrictor or as a flow-balancer for 10-100 mL/min | 0101-0355 |
| Micrometering valve, std temperature, Viton O-ring, 225 °C max, for flow balancing gas flows of 2-175 mL/min | 0101-0633 |
| Micrometering valve, Hastelloy C body, Viton O-ring, 225 °C max, for flow balancing gas flows of 2-175 mL/min | G3440-20003 |
| Micrometering valve, high temperature, Kalrez O-ring, 350 °C max, for flow balancing gas flows of 2-175 mL/min | 0101-0948 |
| Micrometering valve, UltiMetal + treated body, Viton O-ring, 225 °C max, for flow balancing gas flows of 2-175 mL/min | G3480-60663 |
| Air driven valve actuator for Small Valve Oven (box), short shaft | 19325-60660 |
| Air driven valve actuator for Large Valve Oven (box), long shaft | G3507-60660 |
| 10-port Actuator limiter | 18900-21000 |
| 14-port Actuator limiter (for LVO only) | G3480-20002 |
| Angle metering valve, 1/16 in, stainless steel | 0101-0403 |
| 7 µm gas line filter, 7 µm (filtering element) 1/8 in x 1/8 in connectors Swagelok type gas line filter (stainless steel) | 0101-0532 |
| 2 µm (filtering screen) 1/8 in x 1/16 in connectors Valco type reducing gas line filter (stainless steel) | 0101-1001 |
| 2 µm (filtering frit) 1/8 in x 1/16 in connectors Valco type reducing gas line filter (Hastelloy C) | G3440-20008 |
| 2 µm replacement 1/8 in frits in Hastelloy C for Valco type reducing gas line filter | G3440-20007 |

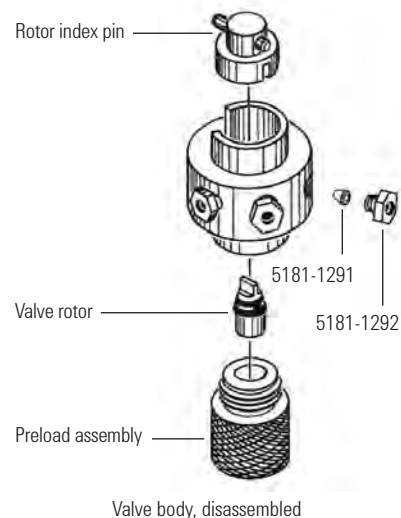
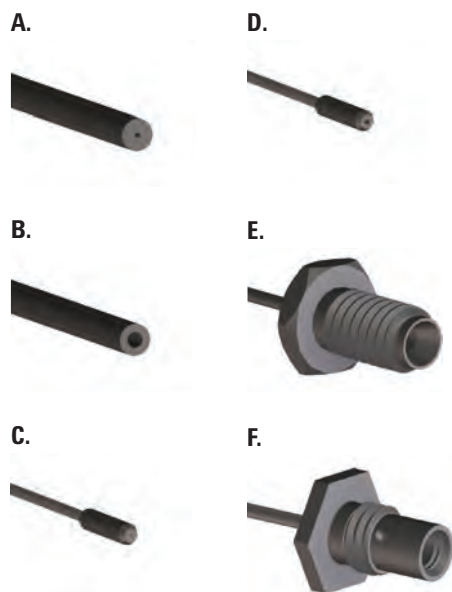
Valve Loops for GC

Includes loop, nut and ferrule, 1/16 in

| Description | Stainless Steel Part No. | Nickel Part No. | Hastelloy Part No. | UltiMetal Plus Part No. |
|-----------------------|--------------------------|-----------------|--------------------|-------------------------|
| Sample loop, 0.25 cc | 0101-0303 | 0101-0956 | | G1540-30024 |
| Sample loop, 0.50 cc | 0101-0282 | 0101-0957 | G3440-20005 | G1540-30025 |
| Sample loop, 1.00 cc | 0101-0299 | 0101-0954 | | G1540-30026 |
| Sample loop, 2.00 cc | 0101-0300 | 0101-0955 | | G1540-30027 |
| Sample loop, 5.00 cc | 0101-0301 | | | G1540-30028 |
| Sample loop, 10.00 cc | 0101-0302 | | | |
| Sample loop, 25 µL | 0101-0304 | | | |
| Sample loop, 50 µL | 0101-0667 | | | |
| Sample loop, 100 µL | 0101-0666 | | G3440-20004 | |

Valve Tubing Assemblies

| Description | Part No. | Stainless Steel Part No. | UltiMetal Plus Part No. | Nickel Part No. |
|--|-------------|--------------------------|-------------------------|-----------------|
| A. Tube, 1/16 in, 0.010 in x 1000 mm | | G3440-20033 | G3440-60033 | |
| B. Tube, 1/16 in, 0.031 in x 1000 mm | | G3440-20035 | G3440-60035 | G3440-20037 |
| C. Tube, 1/16 in, 0.010 in x 1000 mm w/adapter (Modified Detector Line) | | G3440-60600 | G3440-60610 | G3440-60620 |
| D. Tube, 1/16 in, 0.031 in x 1000 mm w/adapter (PPI Carrier Line) | | G3440-60300 | G3440-60310 | |
| E. Tube, 1/16 in, 0.038 in x 975 mm, packed col line w/bulkhead | | G3440-60336 | G3440-60236 | G3440-60136 |
| F. Tube, 1/16 in, 0.010 in x 1000 mm, CPM | | G3440-60333 | G3440-60233 | |
| Tube, 1/16 in, 0.020 in x 1000 mm, CPM | | G3440-60334 | G3440-60234 | |
| Swaging nut (for CFT connections) | G2855-20555 | | | |
| Internal nut (for CFT connections), 0.80 mm id for capillary column connections | G2855-20530 | | | |
| Internal nut (for CFT connections), 1.65 mm id for 1/16 in tubing connections | G2855-20532 | | | |
| Nut plate assembly for valve to column connection GC oven mounting (6 Pos.) | 05890-80660 | | | |
| Oven Right Side Nut Plate Assembly (8 Pos.) | G3440-81664 | | | |
| Oven Left Side Nut Plate Assembly (8 Pos.) | G3440-81665 | | | |
| UltiMetal Plus Flexible Metal 1/16 in ferrule, for 1/16 in tubing | | | G3188-20509 | |
| UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, for fused silica tubing 0.1-0.25 mm id, 10/pk | | | G3188-27501 | |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, for fused silica tubing 0.32 mm id, 10/pk | | | G3188-27502 | |
| UltiMetal Plus Flexible Metal ferrule with 0.8 mm id, for fused silica tubing 0.53 mm id, 10/pk | | | G3188-27503 | |
| UltiMetal Plus Flexible Metal ferrule with no hole, 10/pk | | | G3188-27504 | |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, for 0.25 and 0.32 mm id UltiMetal column tubing, 10/pk | | | G3188-27505 | |
| UltiMetal Plus Flexible Metal ferrule with 0.8 mm id, for 0.25 mm and 0.32 mm UltiMetal column tubing, 10/pk | | | G3188-27506 | |





7693A Automatic Liquid Sampler

Sample Introduction Systems

7693A Automatic Liquid Sampler Replacement Parts and Supplies

To support the higher productivity, performance, and flexibility offered by the 7693A ALS, Agilent has expanded its supplies offering. Agilent Blue Line autosampler syringes are specifically designed to support the 7693A, while increasing plunger life and reducing costly downtime. For cost-conscious laboratories, economical shell vials and caps provide quality at an attractive price. Additional accessories, such as color-coded sample trays and vial caps, add to system ease-of-use.

7693A Replacement Parts and Supplies

| Description | Unit | Part No. |
|--|-------|-------------|
| Gripper finger caps | 16/pk | G4514-60710 |
| Injector mounting post | | G4513-20561 |
| Dual parking post for autosampler | | 05890-61525 |
| Needle support insert, standard | | G4513-40525 |
| Needle support insert, on-column | | G4513-40529 |
| Vial rack, set of 3. Includes 3 white label tags | | G4514-67505 |
| Vial rack label kit | | G4525-60701 |
| Vial rack label kit, red | 3/pk | G4525-60702 |
| Vial rack label kit, yellow | 3/pk | G4525-60703 |
| Vial rack label kit, green | 3/pk | G4525-60704 |

Wash Vials (also for standards, diluents)

| Description | Unit | Part No. |
|---|--------|-------------|
| 4 mL wash vials with fill markings and caps | 25/pk | 5182-0551 |
| Diffusion caps for 4 mL vials | 12/pk | 07673-40180 |
| Septa for 4 mL vials* | 144/pk | 9301-1031 |
| 4 mL wash vial with screw caps | 144/pk | 9301-0723 |

*Septa for 4 mL vials should only be used for sample storage



Diffusion caps for 4 mL vials, 07673-40180

Automatic Liquid Sampler Supplies

Automatic Liquid Sampler Supplies

| Description | Part No. |
|--|-------------|
| Screw for mounting syringe | 07673-20570 |
| Quadrant tray (4 tray sections) | 18596-40015 |
| 7673 Basic Supply Kit Contains 6 10 μ L syringes, 23/26 gauge needles, 4 mL vials with diffusion caps (144/pk), 2 mL automatic sampler vials with screw caps (1,000/pk), GC septa (25/pk), vial racks (5/pk) | 07673-60840 |

Bar Code Reader Labels

| Description | Part No. |
|------------------------------|-----------|
| Labels numbered (1,000/roll) | |
| 1 to 1,000 | 5958-9450 |
| 1,001 to 2,000 | 5958-9441 |
| 2,001 to 3,000 | 5958-9442 |
| 3,001 to 4,000 | 5958-9443 |
| 4,001 to 5,000 | 5958-9444 |
| 5,001 to 6,000 | 5958-9445 |





7697A Headspace Sampler

7697A Headspace Sampler Supplies

The new 7697A Headspace Sampler from Agilent uses advanced designs based on our industry-leading gas chromatography architecture. The headspace sampling technique allows introduction of volatile compounds to the GC or GC/MS from virtually any sample matrix, while leaving unwanted components in a disposable sample vial. With up to 111 sample vial positions and removable vial racks, the 7697A supports nearly continuous operation to satisfy even the busiest laboratory.

- Built-in legendary Agilent pneumatics for superior control and easier setup
- Proven valve and loop sampling technology
- Fully-automatic sample vial leak checking and available bar code reader help ensure greater confidence in results method compatibility
- Instrument control software that is fully integrated in Agilent data systems
- Resource conserving programmable instrument scheduler

7697A Headspace Replacement Parts and Supplies

| Description | Part No. |
|---|-------------|
| Tray vial racks | G4556-60019 |
| Vial rack label | G4556-90500 |
| Split vent trap with 3 cartridges, 1/8 in Swagelok fitting | RDT-1020 |
| Leak test kit | G4556-67010 |
| Includes instruction sheet, no-hole ferrule, 1/8 in nylon tube fitting plug, headspace leak test vial, 1/16 in stainless steel ZDV plug, 11 mm low bleed septa (5/pk) | |
| UltiMetal Plus Inert sample probe | G4556-60125 |
| 6-port valve, replacement rotor, WT series, 300 psi, 350 °C | 1535-4952 |
| Standards | |
| OO/PV Headspace Sample | 5182-9733 |
| Contains 2 g/L t-butyl disulfide, 1,2-dichlorobenzene, and nitrobenzene in ethanol | |

(Continued)

TIPS & TOOLS



The transfer line heater assembly is 1 m in length and accommodates the following tubing types:

- Fused silica capillary of 0.25 mm, 0.32 mm, and 0.53 mm id with maximum od of 0.67 mm
- Metal capillary of 0.53 mm id, such as Agilent UltiMetal or ProSteel, with maximum od of 0.67 mm

For one transfer line, a piece of fused silica or ProSteel approximately 1 m in length is required in addition to one ferrule and one nut and reducing union. Order a ProSteel sleeve to protect the transfer line when operating above 200 °C. ProSteel operated above 200 °C in the transfer line without the sleeve can permanently bind to the heated conduit tube.

7697A Headspace Replacement Parts and Supplies

| Description | Part No. |
|--|-------------|
| Transfer Line Components | |
| Deactivated fused silica, 5 m length | |
| 0.25 mm | 160-2255-5 |
| 0.32 mm | 160-2325-5 |
| 0.45 mm | 160-2455-5 |
| 0.53 mm | 160-2535-5 |
| ProSteel deactivated stainless steel, 5 m length | |
| 0.53 mm | 160-4535-5 |
| Polyimide sleeve for ProSteel | 4177-0607 |
| Polyimide ferrule, 5/pk, 0.50 mm, 0.80 mm | 0100-2595 |
| Polyimide, Valco ferrule, 5/pk | |
| Ferrule, low thermal mass, column id 320 µm, 0.5 mm id, 5/pk | 5190-1438 |
| Ferrule, low thermal mass, column id up to 250 µm, 0.4 mm id, 5/pk | 5190-1437 |
| Nut and reducing union for 6 port valve and transfer line connection | 0100-2594 |
| Septum nut, transfer line, split/splitless and multimode inlets | G3452-60835 |

G3520A XLSI Accessory Supplies

| Description | Part No. |
|--|-------------|
| G3520A XLSI Accessory kit | |
| Ceramic wafer column cutter | 5181-8836 |
| Transfer line nut fitting | G3520-20210 |
| Column storage fitting | G2855-20590 |
| Magnifier, 3x, 6x, paddle, plastic | G2855-40001 |
| Plug for microfluidic manifold or unions | G2855-60570 |
| Ferrule pre-swaging tool | G2855-60200 |
| Ultra Inert Straight 2.0 mm liner | 5190-6168 |
| Transfer line support bracket | G3504-60620 |



7697A Headspace Sampler



The 12-vial 7697A Headspace Sampler is compatible with Agilent 7820 Series GC systems, and will also work with Agilent 7890B Series GC systems

G1888A Network Headspace Sampler Supplies

| Description | Part No. |
|--|-----------------|
| Stainless Steel Sample Loops | |
| Certified sample loop, 1 mL, deactivated | 5190-2265 |
| Certified sample loop, 3 mL, deactivated | 5190-2266 |
| Sample loop, 1 mL, deactivated | 2321700003 |
| Sample loop, 3 mL, deactivated | 2321700004 |
| Probes and Unions | |
| Sample probe, deactivated | 2322700011 |
| M6 union, brass | 2302533140 |
| Union, zero dead volume, deactivated | 2307230001 |
| Union | 2307232901 |
| Transfer Line Needles and Unions | |
| Needle only, headspace transfer line, deactivated 0.5 mm od | 2322590004 |
| Needle only, headspace transfer line, deactivated 0.7 mm od | 2322590005 |
| Strain relief septum nut | 6410090050 |
| Tubing | |
| Tubing, solenoids to 6-port valve, deactivated | 410105017 |
| Tubing, probe to 6-port valve, deactivated | 1300502506 |
| Transfer line, 1.45 m | G1890-60000 |
| Standards | |
| OO/PV Headspace Sample | 5182-9733 |
| Contains 2 g/L t-butyl disulfide, 1,2-dichlorobenzene, and nitrobenzene in ethanol | |
| PM Kits | |
| G1888A PM kit with 1 mL loop | G1888-60702 |
| G1888A PM kit with 3 mL loop | G1888-60703 |
| G1888A enhanced PM kit with valves, transfer line and vent tube | G1888-60704 |

G1883A Network Headspace Supplies

| Description | Part No. |
|--|-----------------|
| Needles | |
| Needle only, headspace transfer line, deactivated 0.5 mm od | 2322590004 |
| Needle for transfer line, 0.25 mm id, 0.5 mm od, nickel | 301-016-HSP |
| Needle only, headspace transfer line, deactivated 0.7 mm od | 2322590005 |
| Needle for transfer line, 0.4 mm id, 0.8 mm od, nickel | 301-015-HSP |
| Needle assembly vial probe, deactivated | 232-2790012-EHS |
| Needle assembly vial probe, nickel | 232-2790010-EHS |
| Fittings | |
| Union elbow M5 | 998-0000053-EHS |
| Transfer line nut | 19258-20830 |
| Transfer line ferrule | 19258-20870 |
| Union FF 6MB, 5-piece set | 325-062-HSP |
| Union T6 MB, 5-piece set, brass | 325-132-HSP |
| Union T5 MA | 325-185-HSP |
| Valves | |
| Restrictor, stainless steel | 321-002-HSP |
| Valve, solenoid vent Kalrez | 3600500001 |
| Valve, solenoid vial pressurization | 3600500002 |
| Tubing and Transfer Lines | |
| Sample loop, 1 mL, deactivated | 2321700003 |
| Sample loop, 1 mL, nickel | 321-055-HSP |
| Sample loop, 2 mL, nickel | 169-0013-HSP |
| Sample loop, 3 mL, deactivated | 2321700004 |
| Sample loop, 3 mL, nickel | 321-056-HSP |
| Oven adapter for 10 mL vials | 301-017-HSP |
| Tube, needle, 6-port valve, deactivated | 301-212-HSP |
| Tube, needle, 6-port valve, nickel | 301-169-HSP |
| Tube, vent-valve stainless steel | 301-170-HSP |
| Sensor tube, 125 mm PTFE | 321-057-HSP |
| Transfer line, deactivated, 1 m | 301-211-HSP |
| Transfer line, 1 m, nickel | 301-152-HSP |
| Transfer line, 80 cm, nickel | 301-011-HSP |
| Repair, Leak Test, and OQ/PV Supplies | |
| Strain relief septum nut | 301-205-HSP |
| Headspace leak test kit | G1888-60701 |
| OQ/PV Headspace Sample Contains 2 g/L t-butyl disulfide, 1,2-dichlorobenzene, and nitrobenzene in ethanol | 5182-9733 |



Agilent Vials and Closures for GC, GC/MS and GC/HS

Headspace Vials and Closures



Beveled-neck headspace vials are available in both 10 mL and 20 mL capacities, flat or rounded bottom. The 20 mm crimp caps provide a consistently secure seal. Agilent also offers cost-saving convenience packs with vials, caps, and septa packaged together.

- Certified for full warranted compatibility with Agilent autosamplers
- Choice of crimp or screw top vials
- Beveled top for maximum secure seal
- Two neck lengths available
- Choice of a pressure safety release cap at 45 psi
- Available in flat or rounded bottom designs



Clear headspace crimp top vials with graduation marks and write-on spot, 5190-2285



Amber headspace crimp top vials with graduation marks and write-on spot, 5190-2286

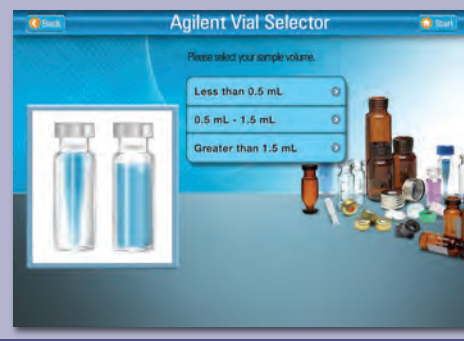
Certified Headspace Crimp Top Glass Vials

| Description | Unit | Flat Bottom | Rounded Bottom |
|---|--------|-------------|----------------|
| 10 mL, 23 x 46 mm | | | |
| Clear | 100/pk | 5182-0838 | 5183-4475 |
| Amber | 100/pk | 5067-0227 | 5190-2238 |
| Clear, graduation marks and write-on spot | 100/pk | 5190-2285 | |
| Amber, graduation marks and write-on spot | 100/pk | 5190-2287 | |
| 20 mL, 23 x 75 mm | | | |
| Clear | 100/pk | 5182-0837 | 5183-4474 |
| Amber | 100/pk | 5067-0226 | 5190-2239 |
| Amber, graduation marks and write-on spot | 100/pk | 5190-2286 | |
| Clear, graduation marks and write-on spot | 100/pk | 5190-2288 | |

TIPS & TOOLS



Agilent has made vial, cap and septum selection easy with its new Interactive Vial Selection Tool, available online in both desktop and mobile versions. The tool identifies the right vial and closures for your particular application, and provides the rationale for the choices offered. Visit www.agilent.com/chem/SelectVials

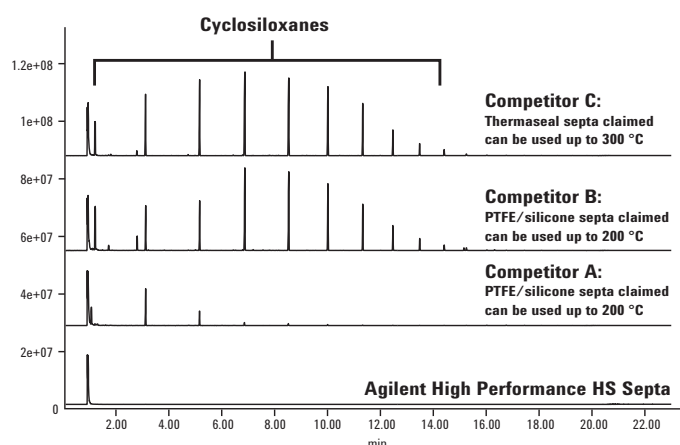


High Performance Septa

Agilent introduces the first septa that can withstand extreme temperatures and conditions for today's demanding headspace applications.

- Proven to withstand temperatures up to 300 °C with no degradation
- Leakproof
- Available in your choice of crimp or screw

Headspace screw top vial blank chromatogram comparison at 300 °C with different septa

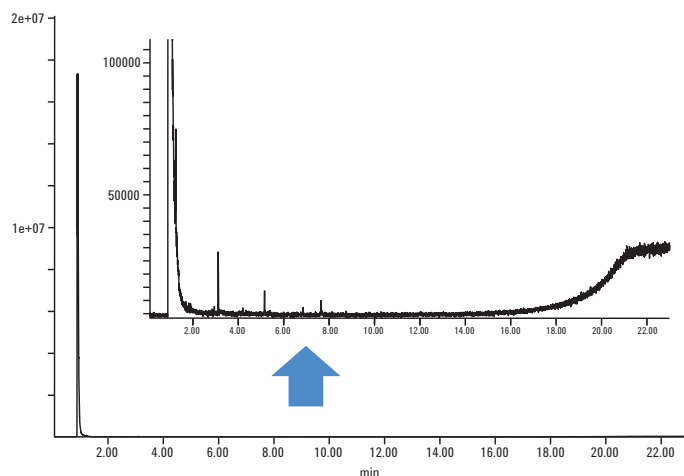


GC/MS conditions

| | |
|---------------------------------|--|
| Inlet: | Split mode w/ 10:1 ratio, 250 °C |
| Column: | DB-5ms Ultra Inert, 30 m x 0.25 mm, 0.25 µm, Constant flow: 2.5 mL/min |
| Oven: | 40 °C hold 1.5 min, then 15 °C/min to 325 °C and hold for 2.5 min, 23 min total run time |
| Thermal Aux/MS source/MS guard: | 250 °C/230 °C/150 °C |
| MSD: | Scan mode 25-550 m/z |

Vial blank sample chromatogram at 300 °C with Agilent High Performance HS Septa

Agilent High Performance Septa provide significantly cleaner blank background at high temperature HS testing. Even with small abundance scale, the 300 °C vial blank chromatogram with High Performance Septa only shows few siloxane peaks with very small abundance.



Headspace conditions

| | |
|--------------|---|
| Septa Type: | Agilent High Performance Septa, 5190-3986 |
| Temperature: | Oven/loop & valve/transfer line: 300 °C/300 °C/300 °C |
| Times: | GC cycle time: 32 min, Vial equilib time: 30 min |
| Vial: | Fill pressure: 15 psi, Fill flow: 50 mL/min, Loop fill ramp rate: 20 psi/min, Loop final pressure: 10 psi, Vial Size: 20 mL, Shaking: 1 |
| Carrier: | GC controlled |



TIPS & TOOLS

For information on CrossLab High Performance Septa, turn to page 199.

High Performance Septa

| Description | Unit | Agilent Certified Part No. | Compatible With |
|---|--------|----------------------------|--|
| 18 mm steel screw cap with High Performance Septa | 100/pk | 5190-3986 | 5188-2753, 5188-6537, 5188-5392, 5188-6538 |
| 20 mm steel crimp cap with High Performance Septa | 100/pk | 5190-3987 | 5182-0837, 5183-4474, 5067-0226, 5190-2239, 5182-0838, 5183-4475, 5067-0227, 5190-2238 |

20 mm Headspace Crimp Caps and Septa

| Cap Color | Septa Type | Specifications | Certified | 100/pk | 10000/pk |
|-------------------------------------|------------------------------|------------------|-----------|-----------|-----------|
| Silver aluminum | PTFE/silicone septa | -60 °C to 180 °C | ✓ | 5183-4477 | 5190-2257 |
| Silver aluminum with safety feature | PTFE/silicone septa | -60 °C to 180 °C | ✓ | 5183-4478 | |
| Silver aluminum | Molded PTFE/butyl septa | -40 °C to 125 °C | ✓ | 5183-4479 | 5190-2258 |
| Silver aluminum with safety feature | Molded PTFE/butyl septa | -40 °C to 125 °C | | 5183-4480 | |
| Silver aluminum | No septa | | | 9301-0721 | |
| Silver aluminum with safety feature | No septa | | | 9301-0718 | |
| Septa only | Gray PTFE/black butyl molded | -40 °C to 125 °C | | 9301-0976 | |
| Septa only | Tan PTFE/white silicone | -60 °C to 180 °C | | 9301-0719 | 5067-0234 |



Aluminum crimp caps, 5183-4477



Headspace vial convenience kit

Certified Headspace Vial Convenience Packs

| Septa Type | Vial Type | Cap Color | Specifications | Unit | Part No. |
|-------------------------------|-------------|-------------------------------------|----------------|--------|-----------|
| Molded PTFE/black butyl septa | Flat bottom | Silver aluminum with safety feature | <125 °C | 100/pk | 5182-0839 |
| PTFE/silicone septa | Flat bottom | Silver aluminum with safety feature | <180 °C | 100/pk | 5182-0840 |

CombiPAL Headspace Vials and Closures

Screw top vials and caps are recommended for the tightest seal and the most reproducible headspace results. CombiPAL headspace vials and caps are precision-threaded, making them an excellent choice for dependability and ease-of-use. They are ideal for applications in the environmental, food and beverage, industrial hygiene, drug analysis, and clinical chemistry industries.

CombiPAL Headspace Screw Top Vials

| Description | 100/pk |
|--------------------------|-----------|
| 10 mL, 23 x 46 mm | |
| Clear | 5188-5392 |
| Amber | 5188-6538 |
| 20 mL, 23 x 75 mm | |
| Clear | 5188-2753 |
| Amber | 5188-6537 |

CombiPAL 18 mm Screw Top Caps with Septa

| Cap Color | Septa Type | 100/pk |
|---------------------------|--|-----------|
| Silver aluminum, magnetic | PTFE/silicone septa (top white, bottom blue) | 5188-2759 |



Crimping and Decapping Tools

Electronic Crimpers and Decappers

Designed to replace awkward and bulky manual crimping pliers, the Agilent electronic handheld crimpers give tight, reproducible seals every time. Adjustable, slim steel jaws fit around closely spaced vials, enabling you to crimp vials directly in crowded autosampler trays. Using the same handheld design as the crimpers, Agilent's electronic decappers remove caps instantly and are designed for laboratories that recycle or reuse vials.

- More vials crimped per battery charge – new lithium ion battery lasts three times longer
- Increased crimping speed – new model is 50% more powerful (6.4 volt battery)
- Less hand strain – lighter weight means less effort
- Improved power signal – clearly shows when battery needs recharging
- Easily used in right or left hand – display on top for easier viewing
- More efficient charging – no overheating during recharging
- Extended productivity – significantly longer motor life



11 mm electronic crimper, 5190-3188



20 mm electronic crimper, 5190-3189



11 mm electronic decapper, 5190-3190



20 mm electronic decapper, 5190-3191

Electronic Crimpers and Decappers

| Description | Part No. |
|---|-----------|
| 11 mm electronic crimper with lithium battery | 5190-3188 |
| 20 mm electronic crimper with lithium battery | 5190-3189 |
| 11 mm electronic decapper with lithium battery | 5190-3190 |
| 20 mm electronic decapper with lithium battery | 5190-3191 |
| Replacement lithium battery for crimper and decapper | 5190-3192 |
| High power electronic crimping tool with power supply | 5190-4061 |
| 11 mm Crimper jaw set for HP electronic crimper | 5190-4062 |
| 11 mm Decapper jaw set for HP electronic crimp tool | 5190-4063 |
| 20 mm Crimper jaw set | 5190-4064 |
| 20 mm Decapper jaw set | 5190-4065 |
| Base for electronic crimping tool | 5190-4066 |
| 20 mm HP Crimping tool and jaw sets bundle | 5190-4067 |

Manual Crimpers and Decappers

Agilent's ergonomic manual crimpers and decappers remove the pain and discomfort of wrist strain with a lightweight, tailored design. Weighing 25-30% less than predecessors and eliminating sore, pinched hands, the new design dramatically improves your experience. Extensively tested with Agilent vials for optimal fit, and color-coded for ease-of-use, this tool is a necessity for every lab. The new crimpers are built for lasting performance: the 11 mm crimper will cap at least 100,000 caps and the 20 mm at least 60,000 before wear starts to impact performance.

- Comfortable, lightweight, ergonomically designed handles fit smoothly in the hand and eliminate pinching
- Top-mounted adjustment knob shows directionality for tightening/loosening
- Adjustment knob doubles as an indicator that the crimp (or decap) is complete
- Crimpers are color-coded with blue knobs and labels, decappers with orange
- Narrow jaws provide better vertical clearance over vials
- Bottom handle motion allows for better control and enhanced stability of crimping jaw
- Sturdy construction of rugged, fiber-reinforced resin with steel reinforcement in the handles



Manual Crimpers and Decappers

| Description | Part No. |
|--|-----------|
| Ergonomic manual crimper for 11 mm caps | 5040-4667 |
| Ergonomic manual decapper for 11 mm caps | 5040-4668 |
| Ergonomic manual crimper for 20 mm caps | 5040-4669 |
| Ergonomic manual decapper for 20 mm caps | 5040-4671 |



Ergonomic manual crimper, 5040-4667



Stratum PTC Sample Concentrator

Teledyne Tekmar Purge and Trap Supplies

Glassware for Teledyne Tekmar Purge and Trap Concentrators, 1/2 in Mount

| Description | Part No. |
|--|-----------|
| 5 mL frit sparger (glassware only) | 5182-0852 |
| 5 mL frit sparger kit with fittings | 5182-0846 |
| 25 mL frit sparger (glassware only) | 5182-0851 |
| 25 mL frit sparger kit with fittings | 5182-0845 |
| 5 mL fritless sparger (glassware only) | 5182-0850 |
| 5 mL fritless sparger kit with fittings | 5182-0844 |
| 25 mL fritless sparger (glassware only) | 5182-0849 |
| 25 mL fritless sparger kit with fittings | 5182-0796 |
| 5 mL needle sparger (glassware only) | 5182-0848 |
| 5 mL needle sparger kit | 5182-0795 |
| 25 mL needle sparger (glassware only) | 5182-0847 |
| 25 mL needle sparger kit | 5182-0794 |

Tekmar AQUATek 70 and AQUATek 100 Purge and Trap Autosampler Supplies

| Description | Part No. |
|--|-------------|
| Sample loop, 5 mL PEEK | 5190-3151 |
| Sample loop, 25 mL PEEK | 5190-3152 |
| Sample loop, 20 mL PEEK | 5190-3153 |
| Sample loop, 10 mL PEEK | 5190-3154 |
| Septa for 40 mL vials, pre-cleaned, 72/pkg | 14-3823-000 |
| Screw caps for 40 mL vials, 24/pkg | 14-6855-000 |

Traps for Teledyne Tekmar Stratum and Atomx Purge and Trap Concentrator

| Description | Part No. |
|--|-----------|
| Trap, BTEX + MTBE | 5188-8813 |
| Trap #5, OV-1/Tenax/Silica Gel/Charcoal | 5188-8814 |
| Trap #8, Carbopak B/Carbosieve S-III | 5188-8815 |
| Trap #9, Proprietary | 5188-8816 |
| Trap, Tenax/Silica Gel/Carbosieve S-III, #10 | 5188-8817 |
| Strat-Trap, Tenax/Silica Gel, #2 | 5188-8818 |
| Strat-Trap, Tenax/Silica Gel/Charcoal, #3 | 5188-8819 |
| Strat-Trap, OV-1/Tenax, #7 | 5190-1445 |
| Strat-Trap, Tenax, #1 | 5190-1446 |
| Trap, Vocab 3000, Stratum and Atomx P&T | 5188-8820 |
| Trap, Vocab 4000 | 5188-8821 |
| Trap, BTEX | 5188-8822 |
| Trap, Tenax, #1A | 5188-1447 |
| Trap, VPH, #11 | 5188-1448 |

Stratum and Atomx traps are U-shaped

Atomx VOC Autosampler Supplies

| Description | Part No. |
|--------------------------------------|-----------|
| Antifoam agent, Antifoam 1520, 10 mL | 5190-2235 |
| Syringe with side port, 27 mL | 5190-2234 |
| Vessel, amber IS, 15 mL | 5190-2233 |
| Frit sparge glassware kit, 25 mL | 5190-2232 |
| Fritless sparge glassware kit, 25 mL | 5190-2231 |

Traps for Teledyne Tekmar Velocity Purge and Trap Concentrator

| Description | Part No. |
|--|-------------|
| Trap, Vocab 3000, 7695 and 3100 P&T | 5182-0775 |
| Trap, Vocab 4000 (I Trap) | 5182-0774 |
| Trap, Tenax (A Trap) | 5182-0783 |
| Trap, Tenax/silica gel/charcoal (C Trap) | 5182-0781 |
| Trap, BTEX | 5182-0773 |
| DryFlow moisture trap | 14-8911-003 |

Velocity traps are straight



U-trap for Stratum and Atomx, Trap, BTEX + MTBE, 5188-8813



Atomx Purge and Trap Concentrator

TIPS & TOOLS

Compared to a frit sparger, the fritless sparger may be the better choice when a water sample has a tendency to foam. This sparger is not appropriate for soil samples, which tend to clog the capillary tube.





Agilent Archon Purge and Trap Autosampler



Agilent Archon Purge and Trap Autosampler with removable tray



Archon removable 51 position sample tray

Archon Purge and Trap Supplies

| Description | Part No. |
|---|------------|
| Vial kit, 40 mL, precleaned vials, caps, and septa, 72/pk | 5183-4741 |
| Water reservoir bottle without cap, 80 oz | DY50390600 |
| 22 mm septa, PTFE/silicone, 72/pk | 5190-3978 |
| 22 mm septa, EPA lowbleed, 60/pk | 5190-3976 |
| Syringe mount O-ring | DY50549500 |
| Water probe replacement kit, for S/N above 995, screw in mount | DY50573990 |
| Sparge probe replacement kit, for S/N above 13160, square base | DY70007791 |
| Sparge probe replacement kit, for S/N 995-13160, hexagonal base | DY50574190 |
| Sparge probe replacement kit, for S/N below 995, hexagonal base | DY50549290 |
| Standard reservoir | DY50548400 |
| Water transfer line | DY50551400 |
| I.S. pickup/waste lines | DY70001990 |
| Soil transfer line | DY50574500 |
| 75 µm screen for water probe | DY50559800 |
| Water probe, cleaned, for S/N 695-995, screw in mount | DY50549100 |
| Sparge probe cleaned, for S/N above 13160 | DY70007701 |
| 10 µm soil probe frit | DY50559900 |
| Valco rotor loop, 1 µL | DY50572600 |
| Flangeless nuts and ferrules, 8/pk | DY70008101 |
| PTFE stir bar for 40 mL vials | DY50295500 |
| Spin bar for soil vial | DY50402400 |
| Stir magnet | DY50546100 |
| Valco valve and actuator | DY50540700 |
| Glass barrel with decal, 26 mL | DY50296800 |
| Kit, chiller option, field | DY70008590 |
| Soil probe replacement kit, for SV S/N above 13160 | DY70007691 |
| Lower soil probe replacement kit, for SV units | DY50546390 |
| Soil probe replacement kit, for SV S/N 995-13160 | DY50574390 |

Markes Thermal Desorption

Agilent now offers a comprehensive line of supplies for Markes Thermal Desorption (TD) instrumentation. Thermal desorption allows the introduction of volatile and semivolatile compounds from a wide range of sample matrices, directly into a GC or GC/MS.

Markes Thermal Desorption Instrument Supplies

| Description | Unit | Part No. |
|--|-------|-------------|
| O-rings, Markes 7 mm cold trap seals | 10/pk | MKI-U-COV07 |
| O-rings, Markes 6 mm cold trap seals | 10/pk | MKI-U-COV06 |
| PTFE filter disks, 5.1 mm Markes TD | 10/pk | MKI-U-DISK1 |
| PTFE filter disks, 6.3 mm Markes TD | 10/pk | MKI-U-DISK3 |
| Quick fit connectors, Markes UNITY | 10/pk | MKI-C-QSC10 |
| O-ring insertion tool, Markes UNITY TDI | | MKI-Z-0285 |
| O-ring extraction tool, Markes UNITY TDI | | MKI-Z-0351 |
| O-rings, 010 Markes UNITY | 10/pk | MKI-U-COV10 |

Cold Traps

| Description | Unit | Part No. |
|--|------|-----------------|
| Cold trap, universal, UNITY | | MKI-U-T11GPC |
| Cold trap, universal, UNITY 2 | | MKI-U-T11GPC-2S |
| Cold trap, air toxics, C ₂ -C ₁₄ , UNITY 2 | | MKI-U-T3ATX-2S |
| Cold trap, air toxics, C ₂ -C ₁₄ , UNITY | | MKI-U-T3ATX |
| Cold trap, materials emissions, UNITY | | MKI-U-T12ME |
| Cold trap, materials emissions, UNITY 2 | | MKI-U-T12ME-2S |
| Cold trap for DHS applications, UNITY | | MKI-U-T13DHS |
| Cold trap for DHS applications, UNITY 2 | | MKI-U-T13DHS-2S |
| Cold trap, for EPA TO-15/TO-17 air toxics analysis methods, Markes UNITY 2 | | MKI-U-T15ATA-2S |
| Stainless steel Difflok cap, Markes UNITY | | MKI-MTD-1169 |
| Inert Difflok cap, Markes UNITY | | MKI-MTD-1204 |
| Cold trap, Tenax, UNITY | | MKI-U-T9TNX |
| Cold trap, Tenax, UNITY 2 | | MKI-U-T9TNX-2S |
| Cold trap, high boilers, C ₆ -C ₄₀ , UNITY 2 | | MKI-U-T1HBL-2S |
| Cold trap, ozone precursor, UNITY 2 | | MKI-U-T1703P-2S |
| Cold trap, sulfur, UNITY 2 | | MKI-U-T6SUL-2S |
| Cold trap, chemical weapons, C ₆ -C ₄₀ , UNITY 2 | | MKI-U-T10CW-2S |
| Cold trap, green house gases, UNITY 2 | | MKI-U-T16GHG-2S |



Markes Thermal Desorption system



Markes Thermal Desorption system

Standard TD Sorbent tube and related sampling accessories

| Description | Unit | Part No. |
|---|-------|-----------------|
| Empty stainless steel TD tubes | 10/pk | C-TBE10 |
| Tenax stainless steel tubes, preconditioned/capped | 10/pk | C-TBP1TC |
| Empty glass TD tubes | 10/pk | C-GT010 |
| PTFE inserts | 10/pk | C-PL010 |
| Long term TD tube storage caps | 10/pk | C-CF020 |
| Cap-LOK Tool for long term storage caps | | C-CPLOK |
| Diffusive sampling caps | 10/pk | C-DF010 |
| Bio-VOC breath samplers | 10/pk | C-BIO10 |
| Disposable card mouth piece for Bio-VOC | 10/pk | C-B010M |
| Tenax TA 34-60 Mesh, 10 g | | C-TNXTA |
| General purpose hydrophobic tubes, stainless steel Preconditioned and capped with 1/4 in brass storage caps. For pumped sampling n-C ₅ to n-C ₂₀ . | 10/pk | C-HY010C |
| Tenax/S'carb 'Sulphur' tubes Preconditioned and capped with 1/4 in brass storage caps. For odor and landfill gas analysis. | 10/pk | C-102SSC |
| Carbograph 1 stainless steel tubes Preconditioned and capped with 1/4 in brass storage caps. For pumped sampling C ₅ to C ₁₄ , plus diffusion of BTX. | 10/pk | C-TBP1C1C |
| Carb X stainless steel tubes Preconditioned and capped with 1/4 in brass storage caps. For pumped/diffusion of 1.3-butadiene & benzene. | 10/pk | C-TBP1CXC |
| Air toxics (TO-17) stainless steel tubes Preconditioned and capped with 1/4 in brass storage caps. For pumped sampling VOCs n-C ₃ to n-C ₁₂ . | 10/pk | C-AT010C |
| Universal stainless steel tubes Preconditioned and capped with 1/4 in brass storage caps. For pumped sampling VOCs/SVOCs n-C ₃ to n-C ₃₀ . | 10/pk | C-UN010C |
| Glass tubes with 1 cm Tenax For direct liquid injection | 10/pk | C-G1CM10 |
| Glass air toxics (TO-17) tubes Pre-packed with 2 carbon-based sorbents; preconditioned and capped with 1/4 in brass storage caps | 10/pk | C-GAT010C |
| CRS BTX Standards, 1 µg | 10/pk | C-BTX1UG |
| Cold trap alignment tool, Markes UNITY | | MKI-UTD-5064 |
| Split filter tube, stainless steel, 3 1/2 in, packed with charcoal | | MKI-SERUTD-5065 |

Inlet Systems

Split/Splitless Inlet Seals

For samples with active analytes or sensitive compounds, only Agilent combines the best mechanical sealing with an inert surface. Our Ultra Inert chemistry is applied on top of the gold plating to produce a leak-free seal that also reduces active analyte adsorption. This is a critical component of the Agilent Inert Flow Path.

Split/Splitless Inlet Seals

| Description | Unit | Part No. |
|--|-------|-------------|
| Ultra Inert gold plated seal with washer | | 5190-6144 |
| | 10/pk | 5190-6145 |
| | 50/pk | 5190-6149 |
| Gold plated inlet seal kit with washer | | 5188-5367 |
| | 10/pk | 5190-2209 |
| Gold plated seal with cross, split only | | 5182-9652 |
| Inlet seal, stainless steel | | 18740-20880 |

Note: Due to the deactivation process, the surface of the UI gold plated seal may have spots or darker colored areas. These are normal side effects of the deactivation process, and do not affect the performance or inertness of the seal.



Ultra Inert gold plated seal with washer, 5190-6145



Certified gold plated seal kit, 5190-2209



TIPS & TOOLS

Ensuring an inert GC flow path has never been more critical. Access IFP resources here:

www.agilent.com/chem/inertflowpath





Flip Top Inlet Sealing System

Agilent's Flip Top Inlet Sealing System is the faster, smarter way to change inlet liners on Agilent 7820, 6890, 6850 and 5890 GC systems.

- Cuts liner replacement time to as little as 30 seconds
- Eliminates frustrating searches for special wrenches or tools
- Improves inlet ergonomics – no more handling of heated parts, no more burns or scrapes
- Decreases downtime and increases productivity
- Minimizes exposure to ambient air, extending column life
- Easily installed by user in 15 minutes

Available exclusively from Agilent, the Flip Top has a levered arm that attaches to any 6890/6850/5890 insert weldment and locks to the injection port using an adapter ring screwed onto the inlet. Once installed, simply lift the arm of the Flip Top which releases the insert weldment from the injection port, and allows instant access to the liner. The process is simply reversed to reseal the weldment to the port.

Flip Top Inlet Sealing System

| Description | Unit | Part No. |
|--|--------|-----------|
| Flip Top Inlet Sealing System For 6890, 6850, 5890 only; not compatible with 7890 | | 5188-2717 |
| Non-stick fluorocarbon liner O-ring for Flip Top | 10/pk | 5188-5366 |
| | 100/pk | 5190-2268 |



Flip Top Inlet Sealing System installation kit,
5188-2717

Split/Splitless Inlets

The combined split/splitless inlet is the most popular inlet for capillary column gas chromatography. Because it can be used in either split or splitless mode, it provides a very effective combination that can cover most analysis requirements.

Split Inlet Troubleshooting

Split inlets are spared from most band-broadening phenomena, since the splitting process generates narrow peaks. Peak broadening or tailing is usually due to:

- Improper column installation
- Low inlet temperature
- Low split flow (<20 mL/min on 6890)
- Inlet and needle discrimination and decomposition

If your results are inaccurate or inconsistent:

- Check the column and reinstall if necessary
- Increase inlet temperature by 50 °C and compare results
- Check inlets and needles for wear and replace as necessary

Splitless Inlet Troubleshooting

Most problems encountered with a splitless injection are related to:

- Incorrect purge time
- Degradation
- Improper focusing
- Inappropriate column temperature
- Backflash

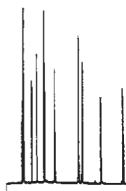
You can also improve the reproducibility and linearity of peak areas and avoid backflash by matching:

- Inlet temperature
- Liner volume
- Injection volume

Decomposition

Loss of peak area or generation of new peaks can sometimes be dramatically reduced by changing liner type or by deactivating the liner and inlet with silanizing reagents. Removing or reducing the amount of liner packing can also decrease inlet activity.

Column Troubleshooting



Normal Peaks

Correct column positioning in both injection port and FID



Tailing Solvent Peaks

Column positioned incorrectly in the injection port or possible ferrule particle in the carrier gas flow path



Wrong Peak Ratios

Column positioned in the inlet (either too far or not far enough; verify 4-6 mm installation distance)

For the most reproducible split injection results, try Agilent's low pressure drop split liner (p/n 5183-4647), with built in positioning bead, tight dimension tolerances, glass wool placement, and proprietary deactivation.

Split Mode Variables, Practices and Rationales

| Parameter | Selection/Setting | Rationale |
|-----------------------------|---|--|
| Inlet temperature | Try 250 °C or BP of last eluting compound | Ensures flash vaporization Minimizes inlet discrimination |
| Inlet liner | Large volume, deactivated | Minimizes backflash Minimizes degradation |
| Inlet packing | Silanized glass wool | Retains non-volatiles Minimizes inlet discrimination |
| | Glass beads or frit | Less active than wool |
| | None | Least active |
| Injection volume | 0.5-3 µL liquid | Split easily adjusted |
| | 0.10-10 mL gas | Split adjusted accordingly |
| Injection technique | Fast autoinjection | Less needle discrimination |
| | Hot-needle fast manual injection | Reproducible discrimination |
| Split ratio | 50:1 to 500:1 | Depends on sample and injection volume, and column id |
| Initial column temperatures | Not critical | Narrow initial peaks |
| Septum purge | 2-3 mL/min | Minimizes ghosting |

Splitless Mode Variables, Practices and Rationales

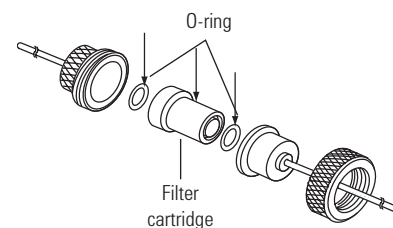
| Parameter | Selection/Setting | Rationale |
|---------------------|---|---|
| Inlet temperature | Just above highest boiling point of solutes (+20 °C) | Ensures flash vaporization Reduce if degradation occurs Use higher for dirty samples and higher-boiling solutes |
| Inlet liner | Large volume >0.8 mL | Use with autoinjector |
| | Small volume <0.2 mL | Use only for slow manual injections and gas injections |
| Inlet packing | None | Use only with slow injection Decreases degradation |
| | Silanized glass wool | Use for fast autoinjection and dirty samples |
| Injection volume | 0.5-2 µL liquid | Depends on solvent, liner and conditions |
| Injection technique | Fast autoinjection | Most reproducible Less needle discrimination |
| | Hot-needle slow manual | Inject 1-2 µL/s if narrow liner is used and >1 µL injection |
| | Hot-needle fast manual | Use for <1 µL injections |
| Split flow | 20-50 mL/min | Higher for concentrated samples |
| Splitless time | 20-80 s | Adjust according to column flow rate/liner type and sample conditions |
| Oven temperature | 10-25 °C below solvent BP | Necessary for solvent focusing |
| Column flow | Typical flow rates between 1 mL/min and 2 mL/min. Use of higher flow rates depends on separation conditions of compounds. | Change of flow rates can provide better chromatographic separation |
| Septum purge | 2-3 mL/min | Reduces ghosting and septum contamination |
| Quantification | Internal standard | Maximizes reproducibility |
| | External standard addition | Use only with constant injection volume |
| Retention gap | 1-3 m, deactivated (1-2 m per µL injected) | Promotes solvent and stationary phase focusing Protects analytical column from matrix contamination |

Split/ Splitless Inlet Maintenance

Changing the Split Vent Trap*

1. Remove the retaining clip.
2. Remove the old filter cartridge and two O-rings.
3. Verify the new O-rings are seated properly on the new filter cartridge.
4. Install the new filter cartridge then reassemble the trap. Do not fully tighten yet.
5. Place the filter trap assembly in the mounting bracket and install the retaining clip.
6. Fully tighten the split vent front weldment onto the trap.
7. Check for leaks.

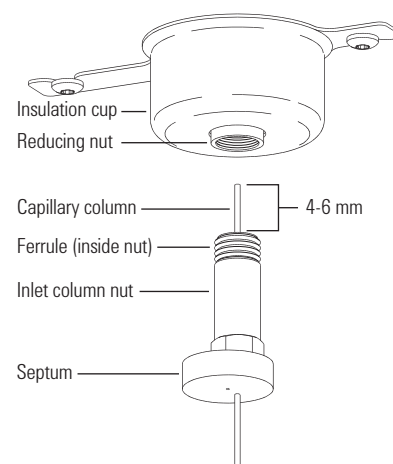
*Change every 6 months



Split vent trap, 5188-6495

Installing a Capillary Column in a Split/ Splitless Inlet

1. Prepare the column for installation.
2. Position the column so it extends 4 to 6 mm past the end of the ferrule.
3. Slide the septum to place the nut and ferrule in the correct position.
4. Insert the column in the inlet.
5. Slide the nut up the column to the inlet base and finger tighten the nut.
6. Adjust the column position so the septum is even with the bottom of the column nut.
7. Tighten the column nut an additional 1/4 to 1/2 turn. The column should not slide with a gentle tug.
8. Start carrier gas flow.
9. Verify flow by submerging the free end of the column in isopropanol. Look for bubbles.



WARNINGS & CAUTION

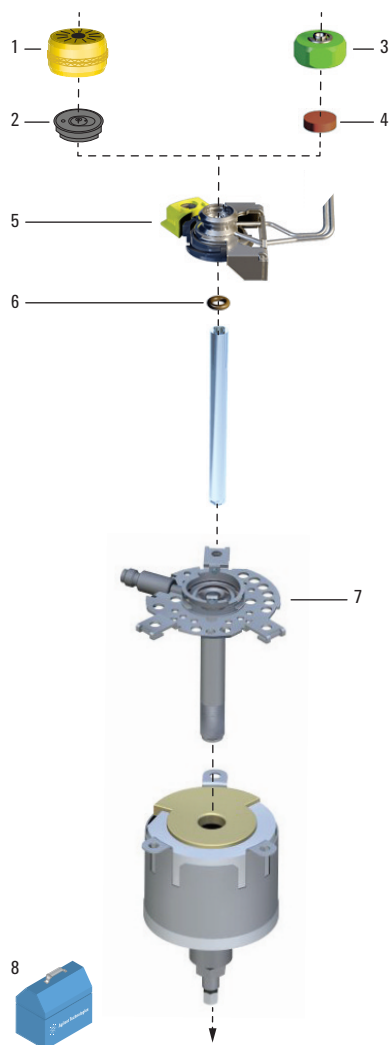
The split vent trap may contain residual amounts of any samples or other chemicals you have injected into the GC. Follow your company's safety procedures for handling these types of substances while replacing the trap filter cartridge.

TIPS & TOOLS

Tools for capillary column installation

Make sure your lab always has the tools you need to install columns correctly. We recommend a column cutting tool such as a diamond-, carbide-, or sapphire-tipped pencil, or a ceramic cutter, a supply of an appropriate nonretained compound, a column test mixture, an electronic flowmeter, and an electronic leak detector. The free Agilent J&W GC Column Installation Guide can help you make good connections for good chromatography, www.agilent.com/chem/gcinstallationguide





Split/Splitless Inlet assembly (top)

7890/6890/6850 Split/Splitless Inlet Supplies (Top)

| Item | Description | Unit | Part No. |
|------|--|--------|---------------|
| 1 | Merlin Microseal kit, low pressure | | 5181-8816 |
| | General purpose Merlin Microseal starter kit | | 5182-3442 |
| | Merlin Microseal high pressure nut | | 5182-3445 |
| 2 | Merlin Microseal low pressure replacement septum | | 5181-8815 |
| | Merlin Microseal general purpose replacement septum 3-100 psi | | 5182-3444 |
| 3 | Septum nut, purged inlets | | 18740-60835 |
| | Headspace septum retainer nut | | 18740-60830 |
| 4 | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| | | 100/pk | 5183-4757-100 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | | 100/pk | 5183-4761-100 |
| 5 | 7890 Top insert assembly, standard | | G3452-60730 |
| | 7890 Top insert, AC gang fitting weldment | | G3430-60011 |
| | 7890 Top insert assembly, valve | | G3480-67585 |
| | 7890 Insert weldment, UltiMetal Plus treated | | G3452-60586 |
| | 6890 Top insert assembly, standard | | G1544-60585 |
| 6 | Graphite O-ring for splitless liner | 10/pk | 5180-4173 |
| | | 10/pk | 5180-4168 |
| | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 7 | Cap inlet shell weldment assembly | | G3452-80570 |
| | 7890 Cap inlet shell weldment assembly, UltiMetal Plus treated | | G3452-60570 |
| 8 | QuickPick split inlet PM kit | | 5188-6493 |
| | QuickPick splitless vent and inlet PM kit | | 5188-6497 |
| | FID collector cleaning brush | | 8710-1346 |
| | QuickPick split vent and inlet PM kit | | 5188-6496 |
| | Column installation pre-swaging tool, metal ferrules | | G3440-80218 |
| | Column installation pre-swaging tool, graphite ferrules | | G3440-80217 |



Column installation pre-swaging tool, metal ferrules, G3440-80218

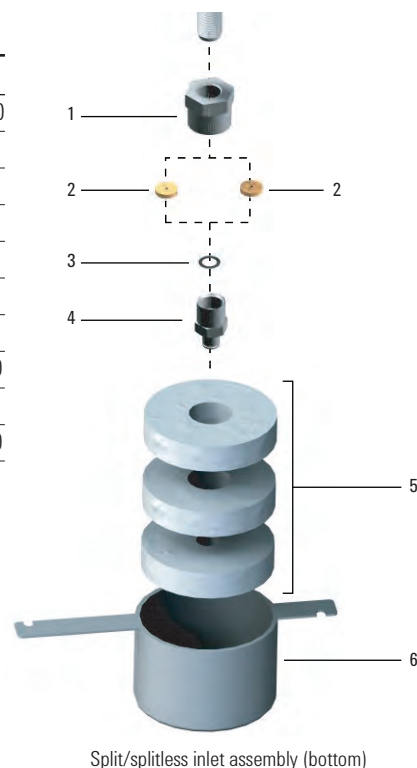
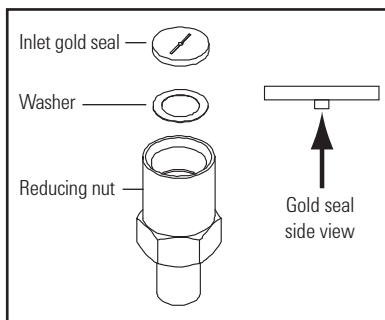


Column installation pre-swaging tool, graphite ferrules, G3440-80217

7890/6890/6850 Split/ Splitless Inlet Supplies (Bottom)

| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | Inlet heater weldment retaining nut | | G1544-20590 |
| 2 | Gold plated inlet seal kit with washer | | 5188-5367 |
| | Certified gold plated seal kit, includes washer | 10/pk | 5190-2209 |
| | Ultra Inert gold plated seal with washer | | 5190-6144 |
| | Ultra Inert gold plated seal with washer | 10/pk | 5190-6145 |
| | Gold plated seal with cross, split only | | 5182-9652 |
| 3 | Washers, 0.375 od | | 5061-5869 |
| 4 | Reducing nut for split/splitless inlet | | 18740-20800 |
| 5 | S/SL insulation kit, 3 pieces | | 5188-5241 |
| 6 | Cover, lower insulation | | 19243-00070 |

Gold seal on the split/splitless inlet



Split/splitless inlet assembly (bottom)



Reducing nut, 18740-20800



Gold plated seal kit, 5188-5367

TIPS & TOOLS

Agilent's Self Tightening column nut eliminates the need for retightening once and for all

This unique, self tightening stainless steel GC column nut delivers a tight connection – without expensive upgrades or adapters – and gives you the advantages of:

- Reliable performance
- Less wasted time
- Ease of use
- Faster maintenance



Learn how to install a column using the Self Tightening column nut, visit www.agilent.com/chem/STnut

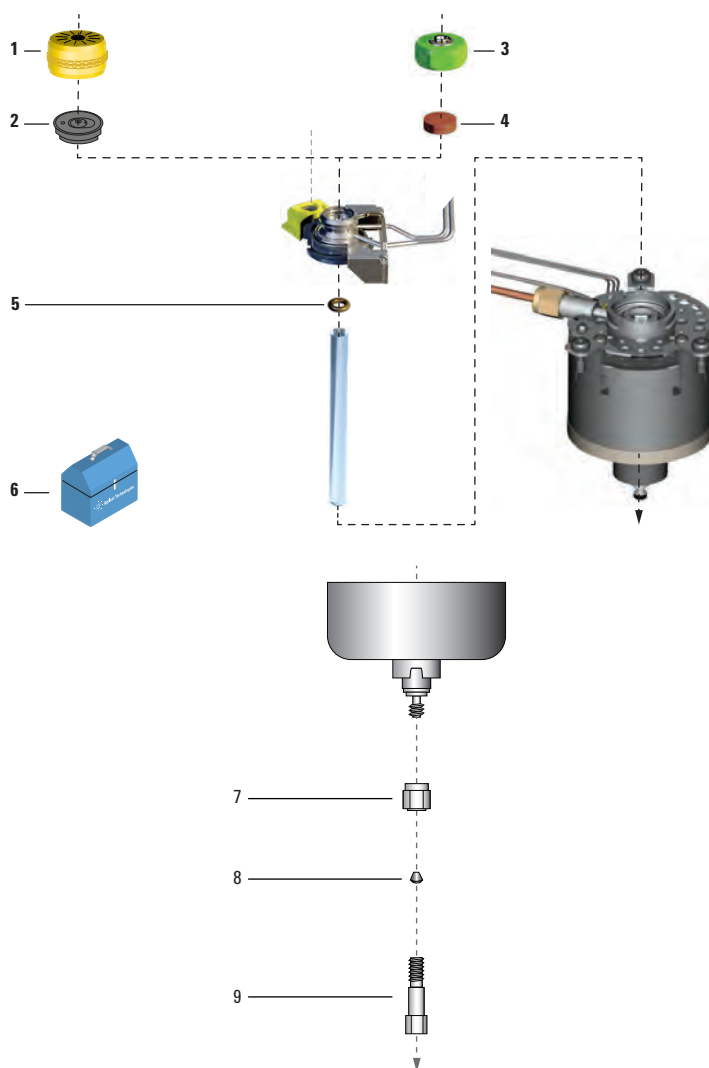
Multimode Inlet

Agilent's premium inlet – two inlets in one for maximum performance and flexibility for the 7890B GC

The MMI combines the functionality of the split/splitless and PTV inlets. Perform standard injection techniques when SOPs require; use large volume or temperature programs as needed.

Multimode Inlet Body

| Item | Description | Unit | Part No. |
|------|---|--------|---------------|
| 1 | Merlin cap | | 5182-3445 |
| | Merlin Microseal kit, low pressure | | 5181-8816 |
| | General purpose Merlin Microseal starter kit | | 5182-3442 |
| 2 | Merlin Microseal low pressure replacement septum | | 5181-8815 |
| | Merlin Microseal general purpose replacement septum 3-100 psi | | 5182-3444 |
| 3 | Septum nut, purged inlets | | 18740-60835 |
| | Headspace septum retainer nut | | 18740-60830 |
| 4 | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| | | 100/pk | 5183-4757-100 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | | 100/pk | 5183-4761-100 |
| 5 | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| | Graphite O-ring for split liner | 10/pk | 5180-4168 |
| | Graphite O-ring for splitless liner | 10/pk | 5180-4173 |
| 6 | Wrench for multimode inlet | | G3452-20512 |
| | Column installation pre-swaging tool, metal ferrules | | G3440-80218 |
| | Column installation pre-swaging tool, graphite ferrules | | G3440-80217 |
| 7 | Column nut adapter | | G3510-20018 |
| 8 | For complete offering of column ferrules, see page 37. | | |
| 9 | For complete offering of column nuts, see page 40. | | |



Exploded parts view of the Multimode Inlet

Installing a Capillary Column in a Multimode Inlet

1. Prepare the column for installation.
2. Thread the column adapter nut onto the base of the inlet and make sure it can spin freely.
3. Place a septum, capillary nut, and graphite ferrule on the column.
4. Score and snap off the end of the column.
5. Position the column so it extends 10-12 mm past the end of the ferrule.
6. Slide the septum to place the nut and ferrule in the correct position.
7. Insert the column in the inlet.
8. While holding the adapter with a wrench, thread the column nut into the inlet (but do not tighten).
9. Adjust the column position so that the septum contacts the bottom of the column nut. Finger tighten the column nut until it begins to grip the column.
10. While holding the inlet base with one wrench, use the second wrench to tighten the column nut an additional 1/4 to 1/2 turn so that the column cannot be pulled from the fitting with gentle pressure.

Cleaning the Multimode Inlet

Agilent recommends using the G3510-60820 Multimode Cleaning Kit, which ships with detailed cleaning instructions.

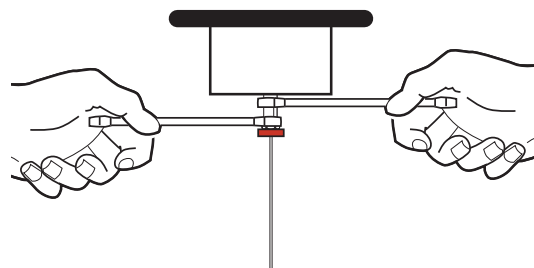
Depending on the inlet mode used, the liner installed, and the cleanliness of the sample, the frequency of cleaning may range from weekly to monthly. When establishing your cleaning frequency, start with a visual inspection of the inlet bottom whenever a liner is changed. A small ring of material will collect at the bottom of the inlet when dirty samples such as food extracts or solid waste extracts are injected. An initial cleaning schedule of every two weeks for dirty samples and every two months for clean samples is appropriate and can be adjusted subsequently.



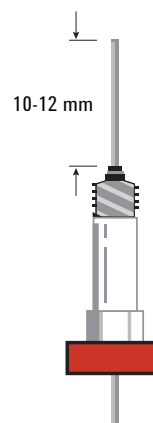
WARNINGS & CAUTION

The inside of the wall of the inlet is only 0.005 in thick and can be damaged with hard scrubbing.

Step 2



Step 5



TIPS & TOOLS

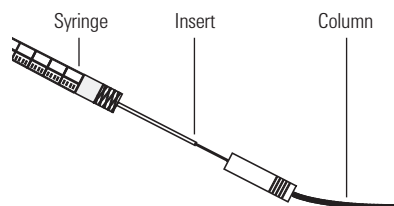
Because of temperature programmability, graphite is the preferred ferrule for the MMI. However, graphite/polyimide ferrules can be used with Self Tightening column nuts to prevent leaks.



Turn to page 36.

Cool On-Column Inlets

Cool On-Column Inlet Maintenance



Installing a Capillary Column into a Cool On-Column Inlet

1. Gently insert the column into the inlet until it bottoms.
2. Insert the column nut into the inlet fitting and finger tighten.
3. Tighten the column nut an additional 1/4 turn with a wrench or until the column does not move. Use two wrenches to support inlet (5/16 in and 1/4 in).
4. If using an automatic injection system with a 0.25 mm or 0.32 mm column, verify that the column installation by manually pushing the syringe into the inlet.

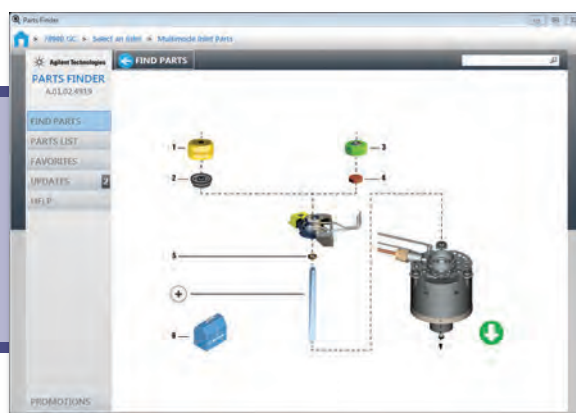
Checking the Needle-to-Column Size on the Cool On-Column Inlet

1. Check the needle-to-column size to make certain that the needle fits in the column.
2. Identify the correct insert for the column size. Use the insert that is the same size as the syringe needle to verify that the column you plan to use is the correct size.
3. Insert the column into one end of the insert.
4. Insert the syringe needle through the other end of the insert and into the column. If the needle cannot pass easily into the column, reverse the insert to try the needle and column in the other end.



TIPS & TOOLS

Download the Agilent Parts Finder Tool for simplified parts ordering and troubleshooting, www.agilent.com/chem/go2partsfinder



Changing the Septum on the Cool On-Column Inlet

1. Replace the septum.

If you are using a septum nut, grasp the knurling and unscrew. Remove the old septum with tweezers. Use tweezers to install a new septum. Push the septum into the septum nut until properly seated. Firmly tighten the nut.

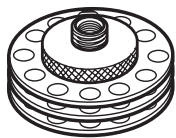
If you are using a cooling tower, grasp the three rings and unscrew. The spring and duck bill septum may pop out of the inlet when you remove the cooling tower. Be careful not to lose them. If they do not pop out, use a thin wire to remove them from the inlet. Insert the replacement duck bill septum into the spring and place in the inlet. Reattach the cooling tower assembly, then finger tighten.

2. Before making an injection, check the alignment of the entire assembly using the proper size syringe.
3. Restore the analytical method.
4. Reset the septum counter.

For 250/320 μm
automated injections

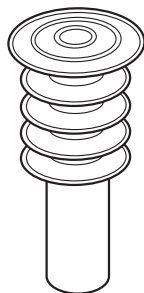


For 530 μm
automated injections

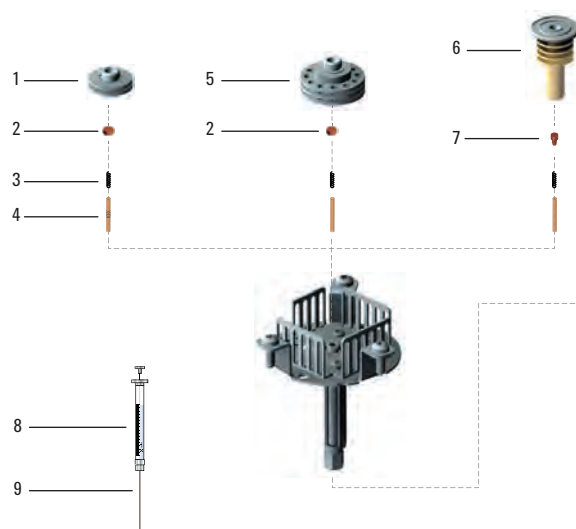


Septum

For 200 μm manual injections
with fused silica needle



Duck bill



Cool On-Column Inlet Parts

7890/6890 Cool On-Column Inlet Supplies

| Part No. | Description | Unit | Part No. |
|----------|---|-------|-------------|
| 1 | Septum nut for 320 µm columns | | 19245-80521 |
| 2 | 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4760 |
| | 5 mm through-hole septa | 25/pk | 5181-1260 |
| | 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4762 |
| | 5 mm septa through-hole for on-column, in glass jar | 50/pk | 5183-4758 |
| 3 | Spring | | 19245-60760 |
| 4 | Insert for 320 µm columns, 5 silver rings | | 19245-20525 |
| | Insert for 530 µm columns, no rings | | 19245-20580 |
| | Insert for 250 µm columns, 6 rings | | 19245-20515 |
| | Insert, 530 µm aluminum clad, 4 rings | | 19245-20780 |
| | Insert for 200 µm, 1 ring | | 19245-20510 |
| 5 | Septum nut base for 530 µm assembly | | G1545-80520 |
| 6 | Cooling tower assembly | | 19320-80625 |
| 7 | Duck bill | 10/pk | 19245-40050 |
| 8 | On-column syringe, fused silica (barrel only) | | 9301-0658 |
| | Removable needle, syringe only | | 5182-0836 |
| | Syringe ferrule, PTFE | | 0100-1389 |
| | On-column syringe, stainless steel | | 5182-9633 |
| 9 | Needle, on-column syringe, 3/pk | 3/pk | 5182-9645 |
| | Stainless steel needle for 0.25 mm column | 3/pk | 5182-0833 |
| | Stainless steel needle for 0.32 mm column | 3/pk | 5182-0831 |
| | Fused silica syringe needles | 6/pk | 19091-63000 |

Programmable Temperature Vaporizer (PTV) Inlets

PTV inlets combine the benefits of split, splitless and on-column inlets. The sample is usually injected into a cool liner, so syringe needle discrimination does not occur. Then the inlet temperature is increased to vaporize the sample. The user programs vent times and temperature to achieve the equivalent of split or splitless transfer of sample vapors to the column. PTV injection is considered the most universal sample introduction system because of its flexibility.

Advantages

- No syringe-needle discrimination
- Minimal inlet discrimination
- Use of large injection volumes
- Removal of solvent and low boiling components
- Trapping of nonvolatile components in liner
- Split or splitless operation
- Retention time and area reproducibility approaching cool on-column injection

PTV inlets are actively cooled before and during injection by Peltier devices or by forced gases (air, liquid N₂, or liquid CO₂). Cryogenic cooling of the inlet can reduce inlet temperature enough to thermally focus gas injections from other sampling devices in the liner. This is a distinct advantage of using PTV inlets in comparison to conventional inlets for coupling auxiliary sampling devices to capillary columns.

Post-injection, PTV inlets are heated using electrical heaters or preheated compressed air. Depending on design, inlet temperature ramps are either ballistic (i.e., ramped to the maximum temperature at an uncontrolled maximum rate) or programmable.



PTV Inlet Practices and Rationales (Cold Split/Splitless Modes)

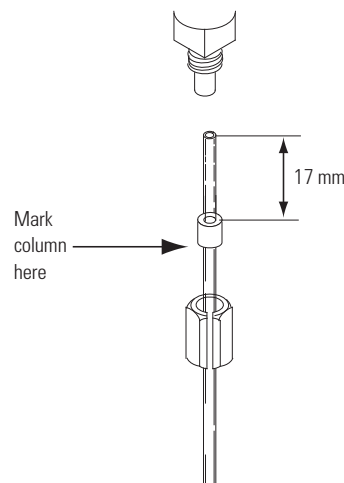
| Parameter | Selection/Setting | Rationale |
|-----------------------------|---|---|
| Injection mode | Cold split | For general use and sample screening |
| | Cold splitless | For trace analysis |
| | Cold solvent vent | LVI |
| Inlet temperature ramp rate | Adjustable (i.e., 2 °C/s to 720 °C/s max) | Use slower ramp rates for labile, complex, or large volume samples Use faster ramp rates for most samples Use faster ramp rates to shorten splitless purge delay time |
| | Ballistic | Simpler, less expensive instrumentation |
| Inlet liner | Straight with silanized wool | For general use |
| | Baffled | For labile samples |
| | Packed with an adsorbent | For focusing gaseous injections from auxiliary sampling devices |
| Injection volume | 0.1-1.5 µL | Use lower volumes for volatile solvents and fast ramp rates |
| | 5-50 µL for LVI | Use volumes larger than 1.5 µL only in solvent-elimination mode |
| Sample Injection technique | Autosampler or manual, fast or slow | Not critical for cold split and splitless modes |
| Oven temperature | 10-25 °C below solvent BP | For proper solvent effect in splitless mode |
| | Sample dependent | For split mode |
| Column flow | 30-50 cm/s | Clears inlet faster Less backflash |
| Septum purge | 1-5 mL/min | Minimizes ghosting |
| Quantification | Any method | Inherently reproducible Low discrimination in cold injection modes |
| Retention gap | 1-3 m, deactivated | Compensates for extended flooded zone and solvent-column incompatibility |



PTV Inlet Maintenance

Installing a Capillary Column into the PTV Inlet

1. Position the column so it extends 17 mm above the end of the ferrule. Mark the column behind the ferrule with correction fluid or a marker. Slide the nut over the column.
2. Insert the column into the adapter and finger tighten the column nut. Looking through the slot in the nut, adjust the column until the mark is correctly positioned below the Graphpak 2M ferrule.
3. Tighten the column nut an additional 1/8 to 1/4 turn with a wrench. Do not overtighten.



7890/6890 Septumless PTV Inlet Supplies

| Description | Column ID (mm) | Unit | Part No. |
|--|----------------|-------|-------------|
| Merlin Microseal high pressure nut | | | 5182-3445 |
| Merlin Microseal | | | 5182-3444 |
| Septumless head | | | G2617-60507 |
| Septum head | | | G2618-80500 |
| Septum nut, purged inlets | | | 18740-60835 |
| PTV inlet assembly | | | G2617-60506 |
| PTV LCO ₂ cooling jacket | | | G2617-60508 |
| PTV LN ₂ cooling jacket | | | G2619-60501 |
| Silver seal | | 5/pk | 5182-9763 |
| Graphpak 2M inlet adapter, 0.2 mm | 0.20 | | 5182-9754 |
| | 0.25-0.33 | | 5182-9761 |
| | 0.53 | | 5182-9762 |
| Ferrules for Graphpak 2M inlet, 0.2 mm | 0.20 | 10/pk | 5182-9756 |
| | 0.25 | 10/pk | 5182-9768 |
| | 0.32 | 10/pk | 5182-9769 |
| | 0.53 | 10/pk | 5182-9770 |

(Continued)

7890/6890 Septumless PTV Inlet Supplies

| Description | Column ID (mm) | Unit | Part No. |
|--|-----------------------|-------------|-----------------|
| Replacement Graphpak column nut | | | 5062-3525 |
| PTV insulation block | | | G2617-20510 |
| PTV Cryo insulator | | | G2617-60510 |
| PTFE ferrule (needle seal) | | 10/pk | 5182-9748 |
| Kalrez seal | | | 5182-9759 |
| Valve body | | | 5182-9757 |
| Pressure spring | | | 5182-9758 |
| Viton seal | | 5/pk | 5182-9775 |
| Sealing element | | | 5182-9760 |
| CO ₂ Cryo inline filter | | | 3150-0602 |
| Service kit for septumless head Contains Kalrez seal, valve body, and pressure spring | | | 5182-9747 |
| Graphpak 3D ferrules | | 5/pk | 5182-9749 |
| Assembly tool for Graphpak 3D ferrules | | | G2617-80540 |

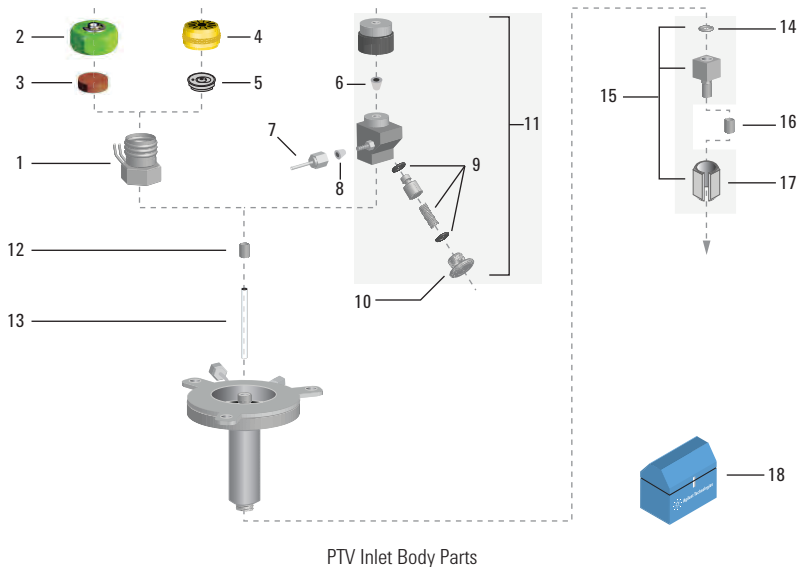
PTV Inlet Body

| Item | Description | Unit | Part No. |
|-------------|---|-------------|-----------------|
| 1 | Septum head | | G2618-80500 |
| 2 | Septum nut, purged inlets | | 18740-60835 |
| 3 | 11 mm septa | 50/pk | 5183-4759 |
| | | 100/pk | 5183-4759-100 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | | 100/pk | 5183-4761-100 |
| 4 | Merlin Microseal high pressure nut | | 5182-3445 |
| 5 | Merlin Microseal general purpose replacement septum 3-100 psi | | 5182-3444 |
| 6 | PTFE ferrule (needle seal) | | 5182-9748 |
| 7 | PTV column adapter tube (includes 1/6 in nut and ferrule) | | G2617-80550 |
| 8 | Straight ferrule, 1/16 in | 10/pk | 0100-1375 |
| 9 | Service kit for septumless head | | 5182-9747 |
| 10 | Sealing element | | 5182-9760 |
| 11 | Septumless head | | G2617-60507 |
| 12 | Graphpak 3D ferrules | 5/pk | 5182-9749 |
| 13 | PTV liner, high temperature, borosilicate | | 5188-5356 |
| | PTV liner, single baffle, deactivated | | 5183-2036 |
| | PTV liner, sintered glass, deactivated | | 5190-1426 |
| | PTV liner, high temperature, quartz | | 5188-5313 |

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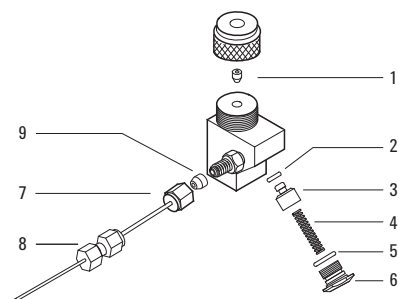
PTV Inlet Body

| Item | Description | Unit | Part No. |
|------|---|--------|-----------|
| 14 | Silver seal | | 5182-9763 |
| 15 | Graphpak 2M inlet adapter, 0.53 mm | | 5182-9762 |
| | Graphpak 2M inlet adapter, 0.32/0.25 mm | | 5182-9761 |
| | Graphpak 2M inlet adapter, 0.2 mm | | 5182-9754 |
| 16 | Ferrules for Graphpak 2M inlet, 0.32 mm | 10/pk | 5182-9769 |
| | Ferrules for Graphpak 2M inlet, 0.2 mm | 10/pk | 5182-9756 |
| | Ferrules for Graphpak 2M inlet, 0.25 mm | 10/pk | 5182-9768 |
| | Ferrules for Graphpak 2M inlet, 0.53 mm | 10/pk | 5182-9770 |
| 17 | Replacement Graphpak column nut | 5/pk | 5062-3525 |
| 18 | Swabs for cleaning GC/MS | 100/pk | 5080-5400 |
| | Injection port cleaning kit | | 480-0003 |
| | Septum tool, knurled handle | | 450-1000 |
| | Service kit for septumless head | | 5182-9747 |



PTV Septumless Head

| Item | Description | Part No. |
|------|---|-------------|
| | Septumless head | G2617-60507 |
| 1 | PTFE ferrule (needle seal) | 5182-9748 |
| 2 | Kalrez seal | 5182-9759 |
| 3 | Valve body | 5182-9757 |
| 4 | Pressure spring | 5182-9758 |
| 5 | Viton seal | 5182-9775 |
| 6 | Sealing element | 5182-9760 |
| 7 | PTV column adapter tube (includes 1/6 in nut and ferrule) | G2617-80550 |
| 8 | Septumless head weldment | G3500-80000 |
| 9 | Straight ferrule, 1/16 in, 10/pk | 0100-1375 |


Programmable Temperature Vaporizing (PTV) Liners

| Description | ID (mm) | Volume (µL) | Part No. |
|--|---------|-------------|-----------|
| Liners for Septumless PTV Inlet, G3501A, G3502A, G3503A | | | |
| PTV liner, single baffle, glass wool, deactivated | 2 | 180 | 5183-2038 |
| PTV liner, single baffle, deactivated | 2 | 200 | 5183-2036 |
| PTV liner, multi baffled, deactivated | 1.8 | 150 | 5183-2037 |
| PTV liner, sintered glass, deactivated | 1.5 | 112 | 5190-1426 |
| Liners for High Temperature PTV Inlet, G3506A | | | |
| PTV liner, high temperature, quartz | 3.4 | 713 | 5188-5313 |
| PTV liner, high temperature, borosilicate | 3.4 | 668 | 5188-5356 |

Syringes for Septumless and High Temperature PTV Inlets

| Volume (µL) | Description | Needle | Part No. |
|-------------|--|----------|-----------|
| 0.5 | Removable | 23/70/HP | 5182-9651 |
| 5 | Straight, fixed | 23/42/HP | 9301-0892 |
| 10 | Straight, fixed | 23/42/HP | 9301-0713 |
| 50 | Straight, fixed, for large volume injections | 23/42/HP | 5183-0318 |
| 100 | Straight, fixed, for large volume injections | 23/42/HP | 5183-2058 |

Purged Packed Inlets

Packed column analysis is frequently done when high efficiency separations are not needed or when gases are analyzed by gas-solid chromatography. Purged packed inlets are simple in both design and use. Few parameters need to be set, and all carrier gas flow flushes through the inlet into the column in the standard configuration.

Purged Packed Inlet Practices and Rationales

| Parameter | Selection/Setting | Rationale |
|----------------------------|----------------------------------|--|
| Inlet temperature | BP of solvent +50 °C | Ensures flash vaporization |
| | BP of major solute(s) | Use for neat samples |
| Insert type | 1/8 in stainless steel | Use for stainless steel column only |
| | 1/4 in stainless steel 530 µm | Inserts permit connection of columns up to 1/4 in od |
| Liner | Glass | Use to lower activity (replaceable) |
| Initial column temperature | Temperature programming | Sharpens peaks and reduces run time |
| Column type | 1/8 in packed stainless | Will not break |
| | 1/4 in packed glass 530 µm | Better for polar or labile compounds |
| Carrier gas flow | 10-40 mL/min | Use with N ₂ carrier gas |
| | 10-60 mL/min | Use with He or H ₂ carrier gas |

For more information on our new expanded and refreshed Agilent packed column portfolio, see page 470.

Purged Packed Inlet Troubleshooting

Purged packed inlets are active, have low volume and are generally flow controlled. This means that most packed column inlet problems involve sample decomposition, flashback, or leaks.

Decomposition

Diagnose inlet sample decomposition by comparing retention times for decomposition products to their standard retention times. Then try these options to improve results:

- Intracolumn direct injection
- Deactivated glass liners
- Lower inlet temperatures
- Remove column packing in the inlet zone
- Increase flow rates

Backflash

Large sample injections can exceed liner capacity and backflash into the gas supply lines and onto the septum. This can cause:

- Ghost peaks
- Sample losses
- Irreproducible peak areas
- Decomposition

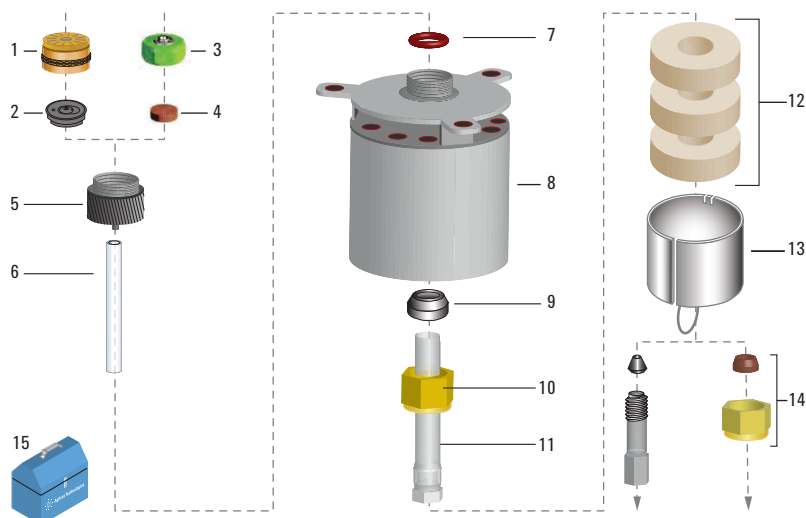
Leaks

Septum and column leaks can cause column degradation and stationary phase decompositions on flow-controlled column inlets.

- Change the septum on a regular basis and check column connections to help eliminate leak holes.
- Keep the oven and inlet at room temperature when not in use or while changing the septum.

Purged Packed Inlet

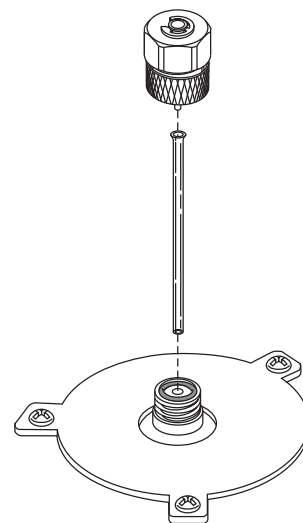
| Item | Description | Unit | Part No. |
|------|--|--------|--------------|
| 1 | Merlin Microseal high pressure nut | | 5182-3445 |
| 2 | Merlin Microseal general purpose replacement septum 3 to 100 psi | | 5182-3444 |
| | Merlin Microseal low pressure replacement septum | | 5181-8815 |
| 3 | Septum nut, purged inlets | | 18740-60835 |
| 4 | Non-stick advanced green septa, 11 mm | 50/pk | 5183-4759 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | General purpose gray septa 11 mm | 50/pk | 5080-8896-50 |
| | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| 5 | Packed port insert weldment | | 19243-80570 |
| 6 | Disposable glass insert, deactivated, 170 µL internal volume | | 5181-3382 |
| | Disposable glass liner, 170 µL internal volume | | 5080-8732 |
| 7 | O-ring, Viton | 12/pk | 5080-8898 |
| 8 | Inlet weldment | | G3451-80501 |
| 9 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 10 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 11 | Packed column adapter | | G1540-80013 |
| | 1/4 in column adapter | | 19243-80540 |
| | 1/8 in column adapter | | 19243-80530 |
| | 530 µm column adapter for use with glass liners | | 19244-80540 |
| 12 | Nut warmer insulation | | 19234-60715 |
| 13 | Nut warmer cup assembly | | 19234-60700 |
| 14 | For complete offering of column nuts, see page 40. | | |
| 15 | QuickPick purged packed inlet PM kit | | 5188-6498 |
| | Swabs for cleaning GC/MS | 100/pk | 5080-5400 |
| | Injection port cleaning kit | | 480-0003 |
| | Septum tool, knurled handle | | 450-1000 |



Purged packed inlet assembly

7890/6890/6850 Purged Packed Inlet Supplies

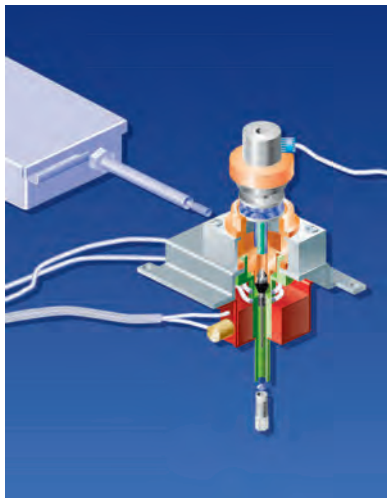
| Description | Unit | Part No. |
|---|-------|-------------|
| QuickPick purged packed inlet PM kit Includes 5 non-stick BTO septa, 1 O-ring, 1 ferrule, and 1 disposable glass liner | | 5188-6498 |
| Merlin Microseal | | 5182-3444 |
| Merlin Microseal high pressure nut | | 5182-3445 |
| Septum nut, purged inlets | | 18740-60835 |
| Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| Packed port insert weldment | | 19243-80570 |
| O-ring, Viton | 12/pk | 5080-8898 |
| Disposable glass liner, 170 µL internal volume | 25/pk | 5080-8732 |
| Disposable glass insert, deactivated, 170 µL internal volume | 5/pk | 5181-3382 |
| Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 1/4 in nut, brass | 10/pk | 5180-4105 |
| 530 µm column adapter for use with glass liners | | 19244-80540 |
| 1/8 in column adapter for use with glass liners | | 19243-80530 |
| 1/4 in column adapter for use with glass liners | | 19243-80540 |
| Nut warmer cup with insulation | | 19234-60720 |
| Universal column nut | 2/pk | 5181-8830 |
| Self Tightening column nut, for inlet/detector | | 5190-6194 |



How to install glass liner on Purged Packed Inlet

Nuts and Ferrules for 1/8 in Packed Columns

| Description | Unit | Part No. |
|--|-------|-----------|
| 1/8 in stainless steel nut and ferrule set | 20/pk | 5080-8751 |
| 1/8 in brass nut and ferrule set | 20/pk | 5080-8750 |
| Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |



Detector Systems

Flame Ionization Detector (FID)

The FID requires routine maintenance to ensure optimum performance. Maintenance requirements are application dependent, but Agilent recommends periodically cleaning or replacing the following items:

FID Routine Maintenance

| Item | Comments |
|--|---|
| FID Jet | A plugged jet results in longer retention times as the column exit/detector pressure increases. Once the jet becomes completely plugged, it is difficult to light or sustain a flame. |
| Ignitor Glow-Plug | Replace if corroded or burned out. |
| FID Collector/Insulators | Contamination can contribute to detector noise or loss of sensitivity. |
| Column Adapter/Seals For Adaptable FID only | Leaks at column fittings can result in difficulty lighting the FID or sustaining a flame after injection. |

Typical FID Problems

Condensation

Since the FID combustion process results in water formation, the detector temperature must be kept above 300 °C to prevent condensation. At detector block temperatures below 300 °C, the castle assembly drops below 100 °C, resulting in condensation and possible rusting. Such condensation, especially when combined with chlorinated or fluorinated solvents or samples, causes corrosion, with resulting increase in detector noise and loss of sensitivity.

Flame Ignition

If the flame goes out or will not light:

- Measure the hydrogen/air and makeup flow rates – Low H₂ or makeup flows indicate a plugged jet, or a leak at the column fitting. Measure each gas flow independently.
- Confirm that the ignitor is glowing during the FID ignition sequence.
- Check for partially or completely plugged jet – Formation of silica or carbon deposits at the tip of the jet can cause plugging. Incorrect capillary column installation can also cause plugging.

It is best to replace a plugged jet, rather than try to clean it.

- Check that the capillary column is not installed all the way to the jet tip (withdraw 1-2 mm).
- Check that the correct type of jet is installed for the column you are using.
- Check for leaking column or adapter fitting at the base of the FID.
- Check the lit offset value to make sure it is not too low or too high.
Adjust the value (normally set to 2.0 pA).

Injecting large volumes of aromatic solvent or water can cause the flame to go out. Switch to a non-aromatic solvent or reduce injection volume.

Increased FID Noise or Loss in Sensitivity

FID noise is affected by:

- The cleanliness of the GC gases and gas delivery system – Ensure that the carrier/H₂ and air purity is $\geq 99.9995\%$. Check traps and filters in the gas supply lines. The FID background signal should be ≤ 20 pA when the flame is lit and stabilized.
- Dirty collector/PTFE insulators – Clean or replace.
- Dirty jet – An incorrect flame pattern can increase noise or affect sensitivity.



FID collector assembly

TIPS & TOOLS

For optimal sensitivity, use Agilent gas purifiers to ensure cleanliness of your GC gases. **Turn to page 164.**





WHAT YOU NEED:

- Column
- Ferrule(s)
- Column nut
- Column cutter
- 1/4 in open end wrench
- Septum
- Isopropanol
- Lab tissue
- Lint-free gloves
- Column ferrule installation tool (p/n 19251-80680)



WARNINGS & CAUTION

- The oven and/or inlet may be hot enough to cause burns. If either is hot, wear heat-resistant gloves to protect your hands.
- Wear safety glasses to protect your eyes from flying particles while handling, cutting or installing glass or fused silica capillary columns. Use care in handling these columns to prevent puncture wounds.
- Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

Installing a Capillary Column in the FID

1. Gather the required supplies and tools.
2. Load the GC maintenance method and wait for the GC to become ready.
3. If using the adaptable detector, verify that the adapter is installed.
4. Place a septum, capillary column nut, and ferrule on the column.
5. Score the column using a glass scribing tool. The score must be square to ensure a clean break.
6. Break off the column end by supporting it against the column cutter opposite the scribe. Inspect the end with a magnifying loupe to make certain there are no burrs or jagged edges.
7. Wipe the column walls with a tissue dampened with isopropanol to remove fingerprints and dust.
8. Install the capillary column.

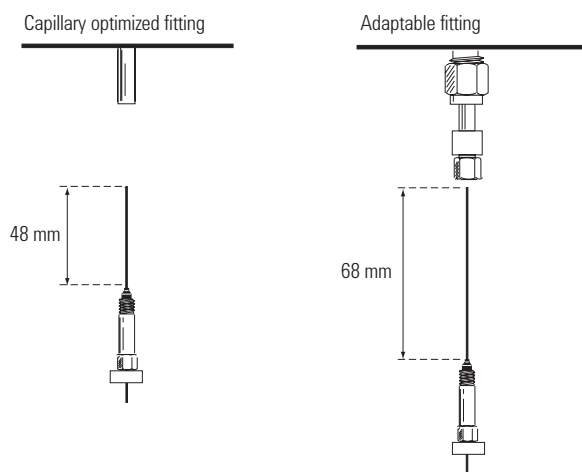
If the column id is greater than 0.1 mm:

- a. Gently insert the column into the detector until it bottoms; do not attempt to force it further.
- b. Finger tighten the column nut, then withdraw the column about 1 mm. Tighten the nut an additional 1/4 turn with a wrench.

If the column id is 0.1 mm or less, position the column so it extends above the ferrule by 48 mm (capillary optimized fitting) or 68 mm (adaptable fitting). Slide the septum up to hold the column nut and ferrule at this fixed position.

- c. Insert the column into the detector. Slide the nut and ferrule up the column to the detector base. Finger tighten the column nut until it grips the column.
- d. Adjust the column (not the septum) position so that the septum is even with the bottom of the column nut. Tighten the nut an additional 1/4 turn with a wrench.

Positioning the column



FID Jet Identification and Selection

Before ordering parts for FID maintenance, determine which type of FID is installed on your GC. The FID is available in two versions:

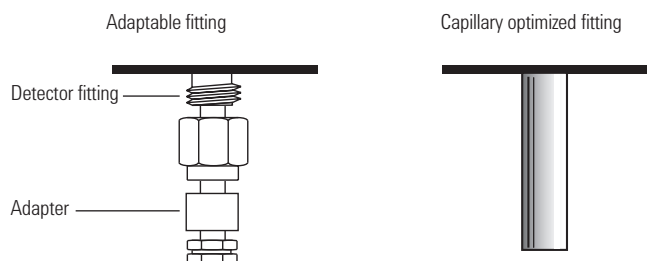
- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

To determine the type of FID installed on your GC, open the oven door and examine the fitting at the base of the detector. Compare to the following diagram.



Adaptable FID Jet, 19244-80560

Hint: Adaptable jets are longer than dedicated capillary jets.



FID Jets

| Item | Description | Part No. |
|------|--|-------------|
| 1 | Jet, 0.011 in/0.29 mm id tip, capillary dedicated | G1531-80560 |
| 2 | Jet, 0.018 in/0.47 mm id tip, capillary optimized | G1531-80620 |
| 3 | Jet, capillary adaptable, 0.011 in id tip | 19244-80560 |
| 4 | Jet, packed, high temperature, 0.018 in id tip | 19244-80620 |
| 5 | Jet, packed standard, 0.018 in id tip | 18710-20119 |
| 6 | Jet, packed wide-bore, 0.030 in id tip (for high-bleed applications) | 18789-80070 |



Jet Cleaning Procedure

Use Agilent FID Cleaning Kit, p/n 9301-0985

1. Run a cleaning wire through the top of the jet. Run it back and forth a few times until it runs smoothly. Be careful not to scratch the jet. (Do not force too large a wire or probe into the jet opening or the opening will become distorted. A loss of sensitivity, poor peak shape, and/or lighting difficulties may result if the opening is deformed.)
2. Fill an ultrasonic cleaning bath with aqueous detergent, and place the jet in the bath. Sonicate for five minutes.
3. Use a jet reamer to clean the inside of the jet.
4. Sonicate again for five min.

Note: from this point on, handle the parts only with forceps!

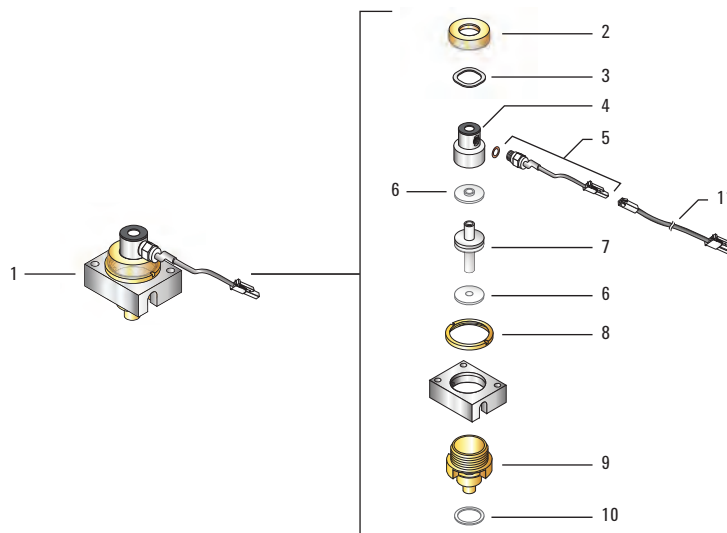
5. Remove the jet from the bath and rinse it thoroughly, first with hot tap water and then with a small amount of GC-grade methanol.
6. Blow the jet dry with a burst of compressed air or nitrogen, and then place the jet on a paper towel and allow to air dry.



FID cleaning kit, 9301-0985

7890/6890/6850 Flame Ionization Detector (FID) Supplies

| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 1 | FID collector assembly | | G1531-60690 |
| 2 | Collector nut | | 19231-20940 |
| 3 | Washer, spring, wavey, 19.0 to 19.81 mm id, 24.5 mm od | | 3050-1246 |
| 4 | Hastelloy ignitor castle (optional) | | 19231-21060 |
| | Ignitor castle | | 19231-20910 |
| 5 | Ignitor glow plug assembly | | 19231-60680 |
| 6 | Collector insulator | | G1531-20700 |
| 7 | Hastelloy collector body | | G1531-21090 |
| | Collector body | | G1531-20690 |
| 8 | Nut, collector spanner | | 19231-20980 |
| 9 | Collector housing | | G1531-20740 |
| 10 | Silicone gaskets, 0.890 in od/0.709 in id | 12/pk | 5180-4165 |
| 11 | FID ignitor cable, 7890A only | | G3431-60680 |

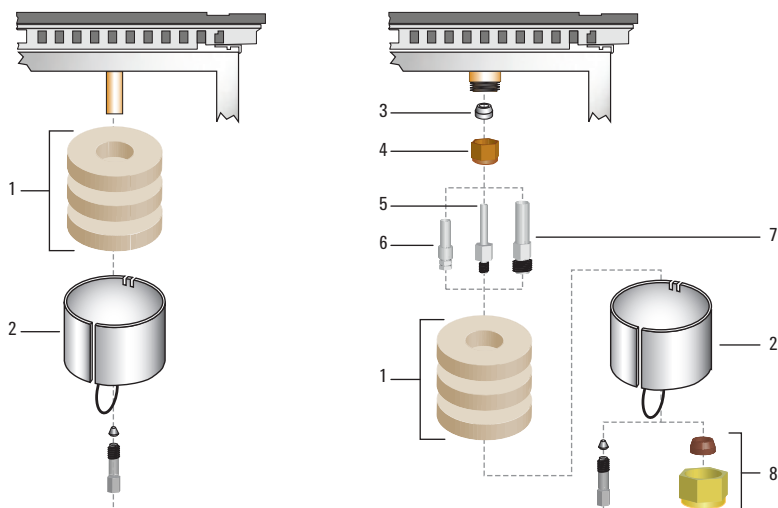


Flame Ionization Detector (FID) assembly

FID base assembly

| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 1 | Nut warmer insulation | | 19234-60715 |
| 2 | Nut warmer cup assembly | | 19234-60700 |
| 3 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 4 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 5 | FID/NPD 1/8 in packed column | | 19231-80520 |
| 6 | FID/NPD adapter for capillary column | | 19244-80610 |
| 7 | FID/NPD 1/4 in packed column | | 19231-80530 |
| 8 | 1/8 in stainless steel nut and ferrule set | 20/pk | 5080-8751 |
| | 1/8 in brass nut and ferrule set | 20/pk | 5080-8750 |
| | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| | 1/8 in nut, brass | 10/pk | 5180-4103 |
| | Universal column nut | 2/pk | 5181-8830 |

For complete offering of column ferrules, **see page 37**.



Capillary-optimized FID parts

Adaptable FID parts

FID base assembly



Electron Capture Detector (ECD)

The Agilent micro ECD is the most sensitive on the market, with a detection zone volume 10 times smaller than any other ECD. The replaceable liner serves as a physical stop for the column, ensuring reproducible column installation and decreasing column contamination of the cell.

Liner Selection

The only assembly that requires routine maintenance is the glass liner in the makeup gas assembly, especially for the μ ECD. All sample passes through the indent in the mixing liner of the μ ECD. The mixing liner should be replaced if there is a significant loss of sensitivity or any time the column is removed/reinstalled in the detector.

- Gigabore Liner (p/n 19233-20625): for original ECD design (5890 and 6890), brown, polyimide coating
- Mixing Liner (p/n G2397-20540): for μ ECD, clear glass with indent

Makeup Gas Adapter Maintenance/Installation Procedure

1. Remove the Makeup Gas Adapter from the ECD fitting with a 9/16 in wrench. Be careful not to stress the 1/16 in stainless steel gas supply tube.
2. Unscrew the end cap of the Makeup Gas Adapter and ultrasonically clean in solvent.
3. Remove the old liner.
4. Clean the Makeup Gas Adapter body with solvent in a Nalgene squeeze bottle.
5. Wipe the Makeup Gas Adapter with a clean laboratory wipe.
6. Install the replacement liner.
7. Reinstall the tip of the Makeup Gas Adapter and tighten securely.
8. Reinstall the Makeup Gas Adapter. Make sure it is fully inserted into the detector.
9. Reinstall the column.
10. Reinstall the insulation cup.

TIPS & TOOLS

Agilent's Self Tightening column nut eliminates the need for retightening once and for all

This unique, self tightening stainless steel GC column nut delivers a tight connection – without expensive upgrades or adapters – and gives you the advantages of:

- Reliable performance
- Less wasted time
- Ease of use
- Faster maintenance

Learn how to install a column using the Self Tightening column nut, visit www.agilent.com/chem/STnut



Thermal Cleaning

If your baseline is noisy or the output value is abnormally high (>1000 Hz), and you have determined that these problems are not being caused by leaks in the GC system, you may have contamination in the detector from column bleed and sample residues. To remove contamination, you should perform a thermal cleaning (bake out) of the detector. Bake out the detector at 20 to 30 degrees higher than normal operating temperature (375 °C max), with 50 to 100 mL/min of makeup gas flow.



WARNINGS & CAUTION

Detector disassembly and/or cleaning procedures other than thermal should be performed only by personnel trained and licensed appropriately to handle radioactive materials. Trace amounts of radioactive ⁶³Ni may be removed during other procedures, causing possible hazardous exposure to β and X-radiation.

Radioactivity Leak Test

Electron capture detectors must be tested for radioactive leakage at least every six months. Records of tests and results must be maintained for possible inspection by the Nuclear Regulatory Commission and/or responsible local agency. More frequent tests may be conducted when necessary.

The procedure used is a "wipe test". A Wipe Test Kit is supplied with each new detector. Refer to the information card supplied in the kit for instructions on performing the test.

Gas Purity

For successful EC detection, it's important that the carrier and purge gases are very clean and dry (99.9995% minimum purity). Moisture, oxygen, or other contaminants can result in higher detector response, but usually at the expense of both sensitivity and linear range. Always precondition the column before connection to the detector.

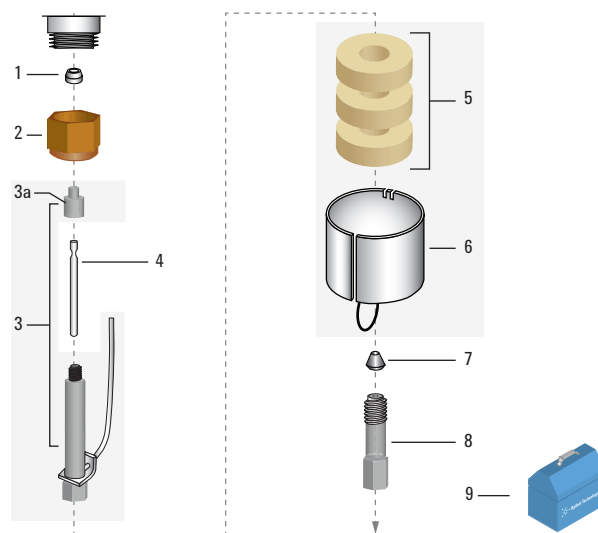
ECD Wipe Test

The Wipe Test Kit (p/n 18713-60050) included with each new ECD includes an information card with instructions for performing the test. Records of tests and results must be maintained for possible inspection by the Nuclear Regulatory Commission (NRC) and/or responsible state agency.

Electron Capture Detector (ECD) Supplies

| Item | Description | Unit | Part No. |
|------|---|---------------------|--------------|
| 1 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 2 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 3 | Micro ECD makeup gas adapter, 7890 | | G3433-63000 |
| | Micro ECD makeup gas adapter, 6890 | | G2397-80520 |
| 3a | ECD adapter end cap | | 19233-20755* |
| 4 | Fused silica liner for micro ECD makeup gas adapter | | G2397-20540* |
| 5 | Nut warmer insulation | | 19234-60715 |
| 6 | Nut warmer cup assembly | | 19234-60700 |
| 7 | For complete offering of column ferrules, see page 37. | | |
| 8 | For complete offering of column nuts, see page 40. | | |
| 9 | GC electron capture detector standard in isoctane | 3 x 0.5 mL ampoules | 18713-60040 |
| | Micro ECD wipe test kit | | 18713-60050 |

*Items 3a and 4 are supplied with item 3



Electron Capture Detector (ECD) assembly



ECD WARNINGS

Although beta particles at this energy level have little penetrating power – the surface layer of the skin or a few sheets of paper will stop most of them – they may be hazardous if the isotope is ingested or inhaled. For this reason the cell must be handled with care. Radioactive leak tests must be performed at the required intervals, the inlet and outlet fittings must be capped when the detector is not in use, corrosive chemicals must not be introduced into the detector, and the effluent from the detector must be vented outside the laboratory environment.

Thermal Conductivity Detector (TCD)

The TCD compares the thermal conductivities of two gas flows – pure carrier gas (also called the reference gas) and carrier gas plus sample components (also called column effluent).

Filament Maintenance

The primary maintenance for a TCD involves the filament. Most procedures involve improving filament life or keeping the filament from becoming damaged or contaminated. To avoid filament damage and contamination:

- Check for leaks
- Use gas purifiers to remove oxygen
- Avoid chemically-active sample components, such as acids and halogenated compounds
- Turn off the filament when not in use

Increasing Filament Lifetime

Use the following startup process to increase filament lifetime:

Purge the detector with carrier and makeup gas for 10-15 min before turning on the filaments.

This prevents oxidation of the filaments due to the presence of oxygen that has diffused into the cell under no flow conditions.

Cell Contamination

Cell contamination is a problem when a lower detector temperature is used to improve sensitivity. If the cell becomes contaminated, a solvent flush of the detector may help to remove the condensed material.

Thermal Cleaning

The TCD can become contaminated with deposits from such things as column bleed or dirty samples. A wandering baseline, increased noise level, or changes in response on a checkout chromatogram all indicate contamination. Thermal cleaning, or bakeout (heating the detector block to evaporate the contaminant), should be performed only after you have confirmed that the carrier gas and the flow system components are leak-free and contaminant-free.

Watch out for decreased sensitivity caused by samples that react with the filament, originating from oxygen-contaminated carrier gas, leaks in plumbing, or column bleeding. Samples with active components, such as acids and halogenated compounds can chemically attack the filament as well. Also, sample condensation will contaminate the detector cell if the temperature is too low.

Some types of contaminants can be removed by temperature bake out.

7890/6890/6850 Thermal Conductivity Detector (TCD) Supplies

| Description | Unit | Part No. |
|--|---------------------|-------------|
| For 1/8 in SS Packed Column Installation | | |
| Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 1/8 in nut, brass | 10/pk | 5180-4103 |
| For 1/4 in SS Packed Column Installation | | |
| Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 1/8 in nut, brass | 10/pk | 5180-4103 |
| 1/4 in packed column adapter | | G1532-20710 |
| Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 1/4 in nut, brass | 10/pk | 5180-4105 |
| For Capillary Column Installation (Standard) | | |
| TCD capillary column adapter | | G1532-80540 |
| Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 1/8 in nut, brass | 10/pk | 5180-4103 |
| Universal column nut | 2/pk | 5181-8830 |
| 6850 column nut | 2/pk | 5183-4732 |
| 530 µm, 1.0 mm id graphite ferrule | 10/pk | 5080-8773 |
| 320 µm, 0.5 mm id graphite ferrule | 10/pk | 5080-8853 |
| TCD sample | 3 x 0.5 mL ampoules | 18711-60060 |
| Solution of 0.33% C ₁₄ , C ₁₅ , and C ₁₆ normal alkanes in hexane (w/w). | | |
| FID and TCD sample | 3 x 0.5 mL ampoules | 18710-60170 |
| This sample is used for the HP 5880, 5890 and 6890 with a FID or TCD. Solution of 0.033% C ₁₄ , C ₁₅ , and C ₁₆ normal alkanes in hexane. | | |



1/8 in stainless steel packed column



1/4 in packed column adapter, G1532-20710



Standard design



WHAT YOU NEED:

- Front ferrule
- Back ferrule
- Column nut
- Column cutter
- 7/16 in wrench
- Lab tissue
- Lint-free gloves

Installing a Capillary Column in the TCD

1. Gather the required supplies and tools.
2. Assemble the ferrules and 1/8 in brass Swagelok nut on the column.
3. Score the column using a glass scribing tool. The score must be square to ensure a clean break.
4. Break off the column end by supporting it against the column cutter opposite the scribe. Inspect the end with a magnifying loupe to make certain that there are no burrs or jagged edges.
5. Wipe the column walls with a tissue dampened with isopropanol to remove fingerprints and dust.
6. Insert the column into the detector until it bottoms.
7. Slide the column nut and ferrules up the column to the detector and finger tighten the nut.
8. Pull out 1 mm of column. Tighten the nut an additional 1/4 turn with a wrench or until the column does not move.

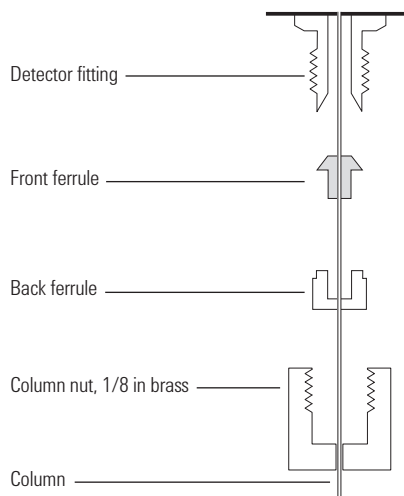


WARNINGS & CAUTION

- The oven and/or inlet may be hot enough to cause burns. If either is hot, wear heat-resistant gloves to protect your hands.
- Wear safety glasses to protect your eyes from flying particles while handling, cutting or installing glass or fused silica capillary columns. Use care in handling these columns to prevent puncture wounds.
- Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

TCD Ferrules

| Column ID (mm) | Back Ferrules, 10/pk | Front Ferrules, 10/pk |
|-------------------|----------------------|-----------------------|
| 0.53 | 5182-3477 | 5182-9673 |
| 0.32 | 5182-3477 | 5182-9676 |
| 0.25/0.2/0.1 | 5182-3477 | 5182-9677 |
| No hole | 5182-3477 | 5182-9679 |
| 1/8 in nut, brass | 5180-4103 | |



Determining the TCD Electronic Pressure Control (EPC)

If you have a 6890A or 6890A Plus GC, you may have an older design EPC flow manifold for the TCD. The older design requires removal of sheet metal panels to attach the TCD reference flow gas supply inside the GC. The new "Minifold" design allows TCD reference gas to be connected directly to the back of the GC. Replacement TCD filament block assemblies have different part numbers depending on the EPC design type.

Once you have determined the type of EPC module, consider ordering a passivated filament block assembly, which is recommended for fatty acid analysis or reactive/acidic samples.

TCD Filament Block Assemblies

| Instrument | Passivated | Applications | Specifications | EPC Design | Part No. |
|------------|------------|---|--|------------|-------------|
| 7890A | Yes | Standard TCD Analysis Gases/Hydrocarbons | Complete Detector Assembly Includes detector palette and heater/sensor assembly | Original | G3432-60220 |
| 7890A | Yes | Standard TCD Analysis Gases/Hydrocarbons | Complete Detector Assembly Includes detector palette and heater/sensor assembly Third detector, side mounted | Original | G3432-60221 |
| 6890 | No | Standard TCD Analysis Gases/Hydrocarbons | Filament Block Only Must reuse heater/sensor | Original | G1532-60675 |
| 6890 | No | Standard TCD Analysis Gases/Hydrocarbons | Filament Block Only Must reuse heater/sensor | Minifold | G1532-60685 |
| 6890 | Yes | Recommended for Fatty Acid Analysis | Filament Block Only Must reuse heater/sensor | Original | G1532-60690 |
| 6890/6850 | Yes | Recommended for Fatty Acid Analysis | Filament Block Only Must reuse heater/sensor | Minifold | G1532-60695 |
| 6890/6850 | No | | Complete Detector Assembly Includes detector palette and heater/sensor assembly | Minifold | G2630-61230 |

Flame Photometric Detector (FPD)

In 2005, Agilent released an improved FPD with minimum detectable levels (MDL) of 3.6 pg/s for sulfur and 60 fg/s for phosphorus. This is more than a 5 times improvement for sulfur. The updated design is based on a one-piece deactivated transfer line jet assembly and improved optics. Upgrade kits are available.

Operation

The FPD uses three gases: air and hydrogen to support the flame, and nitrogen makeup for capillary columns. The flow rates are critical for optimizing performance. Using nitrogen as a makeup gas is essential to obtaining low MDLs. Do not use helium for the makeup gas.

Recommended Gas Flows

| Detector Gas Flows | Phosphorus Mode | Sulfur Mode |
|--------------------|-----------------|-------------|
| Air | 100 mL/min | 60 mL/min |
| Hydrogen | 75 mL/min | 50 mL/min |
| Nitrogen makeup | 60 mL/min | 60 mL/min |

Maintenance

Managing gas purity; contamination from column bleed, sample residue, and corrosion; and air leaks can help keep your FPD at peak performance.

Gas Purity

Sulfur contamination is a common problem and causes noise and/or a higher baseline offset in the FPD. To minimize sulfur contamination and achieve the lowest MDLs, use at least 99.9995% pure gases, clean tubing, and regulators with metal diaphragms. To protect your FPD over its lifetime, Agilent recommends gas generators or supply gas filters designed to remove sulfur.

For more information on Gas Clean Filters, turn to page 164.

Contamination

The FPD is susceptible to buildup of residue on the surfaces of the ignitor coil, jet, combustion chamber, and chamber window. The residue increases detector offset and reduces the signal-to-noise ratio. The sample or column bleed usually cause the residue. After a period of time, you may need to rebuild the detector and replace the transfer line. Do not clean the transfer line, jet, or other parts with brushes or solvents.

To increase the time between servicing, remove the column, cap off the detector, and run it at 250 °C with the flame to bake off some of the residue. Replacing the ignitor may reduce baseline output. If these tactics are not effective, rebuild the detector.

If your solvent or sample is corrosive, it can erode the aluminum vent tube. Agilent recommends using alternative stainless steel vent tubes for these applications.

Air Leaks

The original FPD design has three more internal seals than the new design. Temperature cycling of the detector causes the ferrules to shrink and leaks to occur. The most common leaks are around the fused silica transfer line. To eliminate these leaks, remove the detector from the GC and tighten the transfer line fittings.

For both the original and new FPD, leaks can develop at the column nut or capillary column adapter, the gang fitting at the EPC module, around the vent tube, or around the ignitor glow plug. If you are replacing fittings or O-rings, always use conditioned, graphitized-polyimide ferrules and Agilent's low sulfur O-rings. Make sure ferrules are the correct size for your column.



Glow plug, 0854-0141

Flame Ignition Problems

You can tell if your FPD is lit by checking the detector "Output" and "Flame" on the display. The detector senses that the flame is on by comparing the output with the offset. An optimized FPD normally runs with an output in the range of 30 to 80 with the offset point at 2.0. If the flame is out and the electrometer is on, the output usually displays less than 1.

Most FPD ignition problems are caused by incorrect gas flows, incorrect column installation, or a dirty or defective ignitor. To troubleshoot:

1. Make sure the FPD is at operating temperature before trying to light.
2. Remove the rubber drip tube while lighting the FPD.
3. Increase air supply pressure by 10-20 psi.
4. Check the detector gas flows to see if they match the Recommended Gas Flows table.
5. Check the detector output when you turn the flame on. The photomultiplier will see the glow of the ignitor and jump to about 68000 pA.
6. Remove the column and check the tip for residue or burnt polyimide coating. If it appears damaged, cut off the damaged portion and reinstall to the proper height.
7. Remove the ignitor glow plug. If dirty or damaged, replace it.

Less common problems include leaks, quenching, and condensation:

- Large air leaks at the inlet or detector can reduce the percentage of the hydrogen-air mixture at the detector and cause ignition problems.
- Large injections of certain samples can cause flameouts or quenching that cause the detector to attempt to relight, interrupting your analysis.
- Condensation is a by-product of the burning of your sample. For many analyses, the liquid is collected from the vent tube. If the liquid drips back into the detector, it will extinguish the flame. Agilent recommends that you wait to light the flame until the detector is at temperature and equilibrated.
- Light leaks at the vent tube can cause a higher baseline offset. Make sure the vent tube ferrule seals tightly against the emission block. Keep the lid closed over the detector.

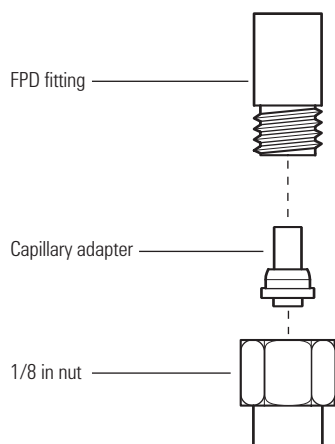
TIPS & TOOLS



Helium is not a good makeup gas for the FPD. You will not be able to light or keep the detector lit in the sulfur mode with helium.

Installing a Capillary Column Adapter to the FPD

1. Gather the required supplies and tools.
2. Load the GC maintenance method and wait for the GC to become ready.
3. Insert the capillary adapter into the 1/8 in nut as shown, then thread the nut onto the detector fitting.
4. Finger tighten the nut, then tighten an additional 1/8 turn with a wrench.



WHAT YOU NEED:

- FPD capillary column adapter
- Column cutter
- 1/4 in and 9/16 in wrenches
- Metric ruler
- 1/8 in nut
- Lint-free gloves



WARNINGS & CAUTION

- The oven and/or inlet may be hot enough to cause burns. If either is hot, wear heat-resistant gloves to protect your hands.
- Wear safety glasses to protect your eyes from flying particles while handling, cutting or installing glass or fused silica capillary columns. Use care in handling these columns to prevent puncture wounds.
- Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.



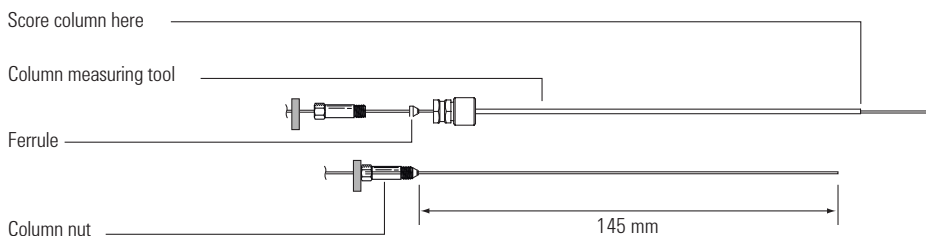
WHAT YOU NEED:

- Column measuring tool, p/n 19256-80640
- Column cutter
- 1/4 in and 7/16 in wrenches
- Column nut
- Ferrule
- Capillary column
- Lint-free gloves

Attaching a Capillary Column to the FPD

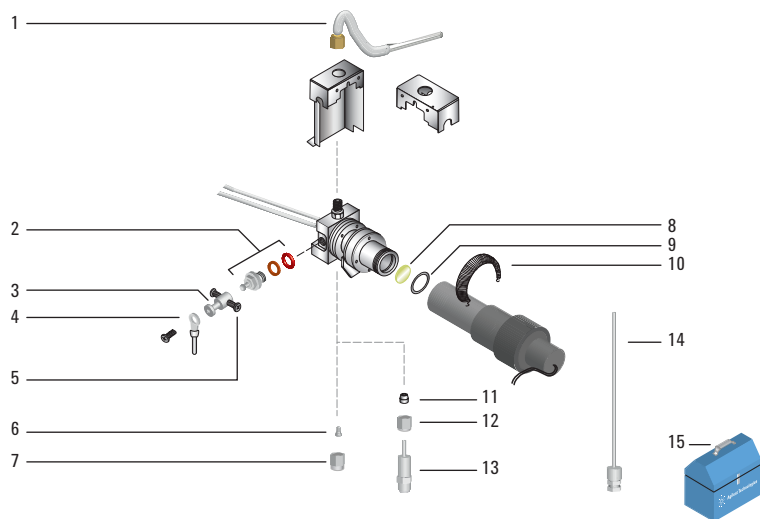
1. Gather the required supplies and tools.
2. Load the GC maintenance method and wait for the GC to become ready.
3. Assemble a septum, column nut, and ferrule on the end of the column.
4. Insert the end of the column through the column measuring tool so that the end protrudes beyond the tool.
5. Tighten the column nut until it grips the column. Tighten the nut an additional 1/8 to 1/4 turn with a pair of wrenches. Snug the septum against the base of the column nut.
6. Use a wafer cutter at 45° to score the column.
7. Snap off the column end. The column may protrude about 1 mm beyond the end of the tool. Inspect the end with a magnifying loupe to make certain that there are no burrs or jagged edges.
8. Remove the column, nut, and swaged ferrule from the tool.
9. Wipe the column walls with a tissue dampened with isopropanol to remove fingerprints and dust.
10. Verify that a capillary adapter is installed in the detector fitting.
11. Carefully thread the swaged column up into the adapter. Finger tighten the column nut, then use a wrench to tighten an additional 1/8 turn.

If you are using a capillary column, the tip of the column must be at least 1 mm below the surface of the jet. When you install the column, measure the distance from the sealing surface of the ferrule to the tip of the column. This measurement is 153 mm for the original FPD and 145 mm for the new FPD. For the new design, Agilent recommends using the column measuring tool, p/n 19256-80640.



7890/6890/6850 FPD Ignitor and Heat Shield Assembly

| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | FPD exit tube assembly, aluminum | | 19256-60700 |
| | FPD exit tube assembly, stainless steel | | 19256-20705 |
| 2 | FPD ignitor replacement kit | | 19256-60800 |
| 3 | Collet for glow plug | | 19256-20690 |
| 4 | Ignitor cable assembly | | G1535-60600 |
| 5 | Screw, M3 x 66 mm, T10 | | 0515-0680 |
| 6 | Capillary adapter seat, FPD | | 19256-21140 |
| 7 | Capillary adapter nut | | 19256-21150 |
| 8 | Sulfur filter | | 1000-1437 |
| | Phosphorus filter | | 19256-80010 |
| 9 | Filter spacer, use only with sulfur filter for flame photometric detector (p/n 1000-1437) | | 19256-20910 |
| 10 | Spring, compression, for flame photometric detector | | 1460-1160 |
| 11 | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 12 | Nut, 1/8 in, stainless steel | | 0100-0057 |
| 13 | 1/4 in packed column adapter | | G1532-20710 |
| 15 | FPD check out sample | | 5188-5953 |
| | FPD sample | | 5188-5245 |
| | PM kit for single FPD | | G2647-60501 |
| | PM kit for dual FPD | | G2648-60501 |



FPD ignitor and heat shield assembly

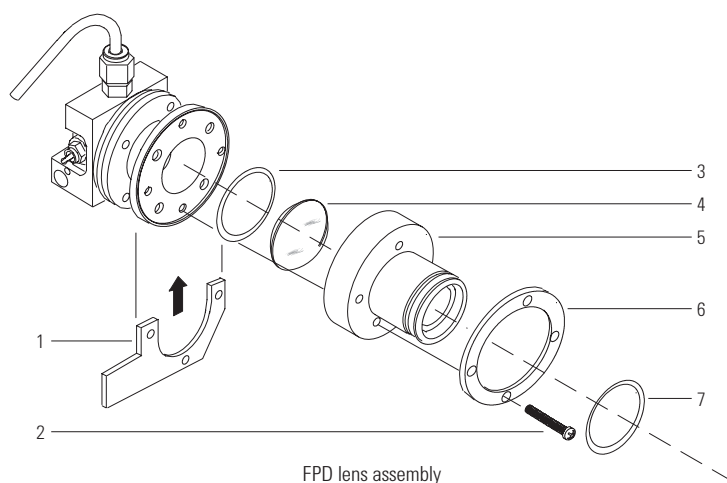
FPD Lens Assembly

| Item | Description | Part No. |
|------|---|-------------|
| 1 | Clamp | 19256-00090 |
| 2 | Screw, M3 x 25 mm (4 required) | 0515-0683 |
| 3 | Window O-ring, inner, 0.926 in id, orange | 5061-5886 |
| 4 | Convex lens | 1000-1438 |
| 5 | Lens housing | 19256-20900 |
| 6 | Flange ring | 19256-00200 |
| 7 | Fluorocarbon Elastomer O-ring, brown, 1.239 in id | 5061-5890 |

TIPS & TOOLS



Track detector output – when it increases by 50%, remove the column, bake it out, replace the ignitor, or rebuild the detector.



FPD Photomultiplier Tube (PMT) and Bracket Assemblies

| Description | Part No. |
|---|-------------|
| Chimney back cover | G1535-80520 |
| Heator/sensor assembly | G1535-60610 |
| Transfer line support bracket | 19256-00320 |
| Bracket/support | G1535-00010 |
| Sulfur filter, 7890 and late model 6890* | 1000-1437 |
| Sulfur filter, blue, early model 6890* | 19256-80000 |
| Phosphorus filter | 19256-80010 |
| Filter spacer, use only with sulfur filter for flame photometric detector (p/n 1000-1437) | 19256-20910 |
| PMT housing assembly | 19256-60510 |
| Dual FPD chimney front | G1535-00030 |

*Please contact Agilent technical support for assistance in selecting the correct sulfur filter for your 6890 FPD detector.

FPD+ Supplies for 7890B

| Description | Part No. |
|---|-------------|
| Single FPD+ heat shield | G3435-81330 |
| Dual FPD+ heat shield | G3435-81360 |
| Ignitor for FPD, cleaned | 19256-60750 |
| Collet for glow plug | 19256-20690 |
| Screw, M3 x 66 mm, T10 | 0515-0680 |
| Ignitor cable assembly | G1535-60600 |
| Sulfur filter | 1000-1437 |
| Phosphorus filter | 19256-80010 |
| Filter spacer, use only with sulfur filter for flame photometric detector (p/n 1000-1437) | 19256-20910 |
| Spring, compression, for flame photometric detector | 1460-1160 |
| Packed-capillary adapter assembly | G3435-60350 |
| Polyimide ferrule | 5062-3538 |
| Column tool brazement | 19256-80640 |
| FPD check out sample | 5188-5953 |
| FPD sample | 5188-5245 |



FPD+



Nitrogen Phosphorus Detector (NPD)

NPD Beads

The NPD for the 7890/6890 GC features a ceramic bead selective for nitrogen and phosphorus compounds. Agilent offers three beads:

- Blos bead
- White ceramic bead
- Black ceramic bead

Compared to the white ceramic bead, the Blos bead provides:

- Superior bead lifetime
- Faster attainment of stable operation at initial start-up, as well as more stable operation throughout bead's lifetime
- Superior sensitivity and selectivity for phosphorus-containing compounds
- Similar sensitivity and selectivity for nitrogen-containing compounds
- Superior immunity to moisture

The white ceramic bead exhibits some tailing for phosphorus compounds. The black ceramic bead does not exhibit peak tailing and typically has a longer lifetime than the white bead; however, it is less sensitive.

All Agilent NPD beads are preconditioned, self-aligning for installation and include a proof-of-performance chromatogram.



Blos NPD bead assembly, G3434-60806

NPD Beads

| Description | Part No. |
|---------------------------------|-------------|
| Blos NPD bead assembly | G3434-60806 |
| NPD white bead assembly | G1534-60570 |
| NPD black ceramic bead assembly | 5183-2007 |

NPD Gas Flow

The hydrogen, air and makeup gas flows should be measured frequently. They can drift over time or be changed unintentionally without knowledge of it occurring. Each gas flow should be measured independently to obtain the most accurate values. NPDs are very sensitive to changes in the gas flows and consistent flows are necessary to maintain performance levels.

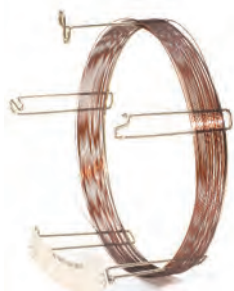
Measuring NPD Flows

1. Set the bead voltage to 0.0 V.
2. Cool the NPD to 100 °C.
3. Remove the bead and store it carefully until re-installation.
4. Insert the NPD flow meter adapter tool into the NPD collector.
5. Attach the flow-measuring insert to the NPD flow meter adapter tool.
6. Place the flow meter tubing over the flow-measuring insert to begin measuring flows.



NPD Gas Purity

Because of its high sensitivity, the NPD requires very pure gases (99.999% or better). We strongly recommend that moisture and hydrocarbon traps be used on the carrier gas and all detector gases, including the detector hydrogen, air, and makeup gases. Dirty gases will not only give poor chromatographic performance, but will shorten the bead life as well.



TIPS & TOOLS

Agilent J&W GC Columns offer the lowest bleed levels, the best inertness for acids/bases/mixed functional compounds, and the tightest column-to-column reproducibility. Learn more at www.agilent.com/chem/mygccolumns



Cleaning and Replacement

The NPD requires periodic cleaning. In most cases, this only involves the collector and the jet. Agilent provides brushes and wires that simplify the cleaning of all detector parts. The brushes are used to dislodge particulates clinging to the metal surfaces. A fine wire is used to clean the jet opening of particulates. Do not force too large a wire or probe into the jet opening or the opening will become distorted. A loss of sensitivity or poor peak shape may result if the opening is deformed. The various parts can be ultrasonicated after cleaning with a brush. Eventually the jet needs to be replaced, so it is strongly recommended to have spare jets on hand.

Over time, residue from the bead or sample can build up in the collector and cause baseline problems. You should clean the collector after you have damaged the bead two or three times.

The metal C-rings wear slightly with each assembly and disassembly. After several assemblies and disassemblies (five or more), the rings may not seal effectively, causing an erratic baseline. A ceramic insulator and seal kit is available (p/n 5182-9722). Always cool the detector to near-ambient when changing seals and insulators.

Because there is no flame in the NPD, the jet does not collect silica and soot as does the FID jet. Although you can clean the jet, it is more practical to simply replace dirty jets with new ones. If you do clean the jet, use the cleaning wire, taking care not to damage the inside of the jet. You can also use a sonicator bath to clean the jet.

Contaminants

Some chemical problems can also arise when using the NPD. Because it is a trace detector, be careful not to contaminate the analytical system.

Glassware

Glassware must be very clean. Phosphate detergents should be avoided, so acid washing of glassware followed by distilled water and solvent rinsing is recommended.

Solvents

Solvents should be checked for purity. Chlorinated solvents and silanizing reagents can decrease the useful lifetime of the alkali source; excess reagent should be removed prior to injection, if possible.

Other Contamination Sources

Phosphate-containing leak detectors, phosphoric acid-treated columns or glass wool, polyimide-coated columns, or nitrogen-containing liquid phases can add noise to the system and should be avoided.

NPD Jet Identification and Selection

Before ordering parts for NPD maintenance, determine which type of NPD is installed on your GC.

The NPD is available in two versions:

- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

Hint: Adaptable jets are longer than dedicated capillary jets.

NPD Jets

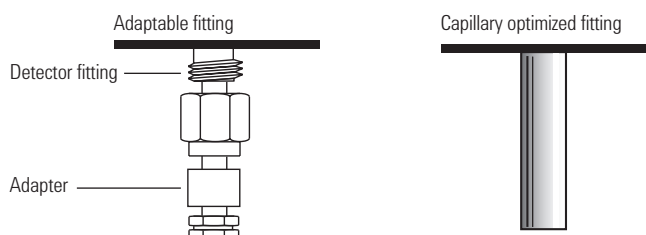
| Description | Jet Tip ID | Length (mm) | Part No. |
|--|--------------------|-------------|-------------|
| Jets for capillary optimized fittings | | | |
| Capillary with extended jet (recommended) | 0.29 mm (0.011 in) | 51.5 | G1534-80580 |
| Capillary | 0.29 mm (0.011 in) | 42.8 | G1531-80560 |
| Capillary | 0.47 mm (0.018 in) | 42.8 | G1531-80620 |
| Jets for adaptable fittings | | | |
| Capillary with extended jet (recommended) | 0.29 mm (0.011 in) | 70.5 | G1534-80590 |
| Capillary | 0.29 mm (0.011 in) | 61.5 | 19244-80560 |
| Capillary | 0.47 mm (0.018 in) | 61.5 | 19244-80620 |
| Packed | 0.46 mm (0.018 in) | 63.5 | 18710-20119 |



Capillary with extended jet,
for capillary-optimized fittings, G1534-80580

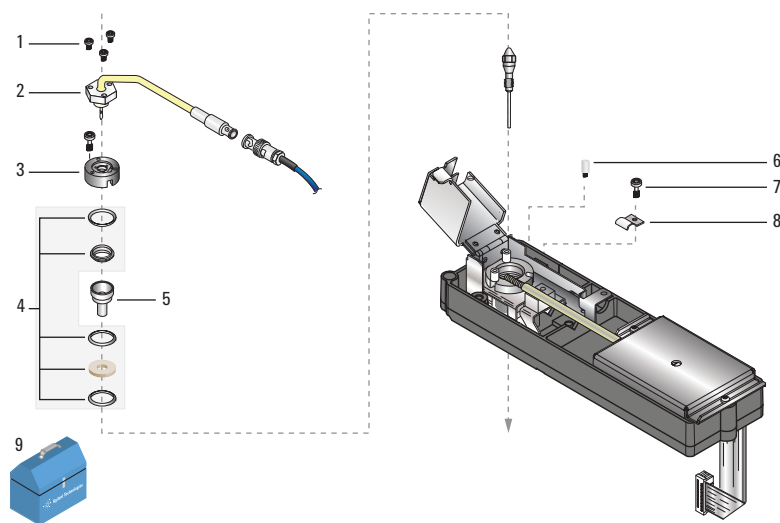


Capillary with extended jet,
for adaptable fittings, G1534-80590



7890/6890 Nitrogen Phosphorus Detector (NPD) Supplies (Top)

| Item | Description | Part No. |
|------|--|---|
| 1 | Screw, T-10, M3 x 8 mm | 0515-2726 |
| 2 | NPD white bead assembly | G1534-60570 |
| | Bios NPD bead assembly | G3434-60806 |
| | NPD black ceramic bead assembly | 5183-2007 |
| 3 | NPD lid weldment | G1534-80510 |
| 4 | NPD ceramic insulator kit Includes 2 metal C-rings (top and bottom), 2 alumina insulators (upper and lower) | 5182-9722 |
| 5 | NPD collector funnel | G1534-20530 |
| 6 | NPD lid standoff | G1534-20590 |
| 7 | Screw, M4 x 0.7, 10 mm | 0515-2495 |
| 8 | J-Clamp | 1400-0015 |
| 9 | Nitrogen phosphorus detector sample 1/4 in nut driver for FID jet, drilled shaft NPD flow adapter | 18789-60060 8710-1561 G1534-60640 |

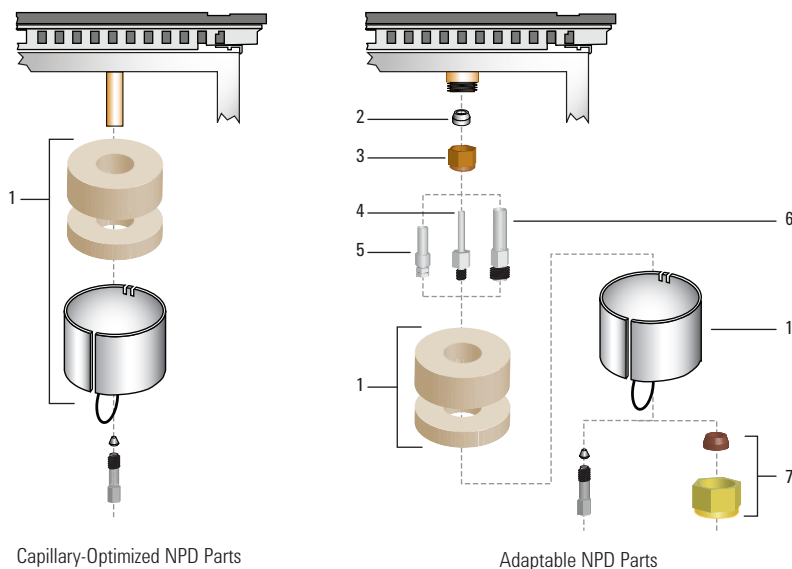


Nitrogen Phosphorus Detector (NPD) assembly (top)

7890/6890 Nitrogen Phosphorus Detector (NPD) Supplies (Bottom)

| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 1 | Nut warmer cup with insulation | | 19234-60720 |
| 2 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 3 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 4 | FID/NPD 1/8 in packed column | | 19231-80520 |
| 5 | FID/NPD adapter for capillary column | | 19244-80610 |
| 6 | FID/NPD 1/4 in packed column | | 19231-80530 |
| | 1/4 in packed column adapter | | G1532-20710 |
| 7 | 1/4 in stainless steel nut and ferrule set | 20/pk | 5080-8753 |
| | 1/4 in brass nut and ferrule set | 20/pk | 5080-8752 |
| | 1/4 in nut, brass | 10/pk | 5180-4105 |
| | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| | Universal column nut | 2/pk | 5181-8830 |

For complete offering of column ferrules, **see page 37**.



Nitrogen Phosphorus Detector (NPD) assembly (bottom)



Nitrogen Chemiluminescence Detector (NCD)

Nitrogen and Sulfur Chemiluminescence Detectors

The Agilent 355 Sulfur Chemiluminescence Detector (SCD) is the most sensitive and selective chromatographic sulfur detector available for the analysis of sulfur compounds.

The Agilent 255 Nitrogen Chemiluminescence Detector (NCD) is a nitrogen-specific detector that produces a linear and equimolar response to nitrogen compounds based on a chemiluminescent reaction of NO with ozone. Even complex sample matrices can be analyzed with little or no interference.

Nitrogen Chemiluminescence Detector (NCD) Supplies



Quartz tube kit for NCD DP burner, G6600-60038



Replacement oil coalescing filter, G6600-80042



Replacement oil coalescing filter for oil mist filter, G6600-80044



Replacement odor filtration element, G6600-80045

| Description | Part No. |
|--|-------------|
| Quartz tube kit for NCD DP burner Includes ferrules, fittings and quartz tube | G6600-60038 |
| PM Kit, DP RV5 oil pump Includes 4 chemical traps for ozone destruction, 4 oil coalescer elements and 4 (1 qt) bottles of synthetic oil | G6600-67007 |
| PM Kit, dry piston pump Includes 4 chemical traps for ozone destruction and 2 repair kits for pump | G6600-67008 |
| Replacement oil coalescing filter | G6600-80042 |
| Oil mist filter for RV5 pump | G6600-80043 |
| Replacement oil coalescing filter for oil mist filter | G6600-80044 |
| Replacement odor filtration element | G6600-80045 |
| O-ring, 1.3614 in id | G6600-80050 |
| O-ring, 1.301 in id | G6600-80051 |
| Dual plasma quartz tube | G6600-80063 |
| Mobil 1 synthetic oil | G6600-85001 |
| Oil, Edwards Ultragrade for RV3 and RV5 pumps | G6600-85002 |
| Spare column nut and ferrule kit | G6600-80018 |
| Column nut, 1/32 in | G6600-80072 |
| Ferrule, column, 1/32 in x 0.5 mm fused silica, Valco | 0100-2138 |
| Ferrule, column, 1/32 in x 9 mm, polyimide/graphite | 0100-2430 |

Sulfur Chemiluminescence Detector (SCD) Supplies

| Description | Part No. |
|--|-------------|
| PM Kit, DP RV5 oil pump Includes 4 chemical traps for ozone destruction, 4 oil coalescer elements and 4 (1 qt) bottles of synthetic oil | G6600-67007 |
| PM Kit, dry piston pump Includes 4 chemical traps for ozone destruction and 2 repair kits for pump | G6600-67008 |
| Ceramic tube kit for SCD DP burner Includes ferrules, 3 upper ceramic tubes, and 1 lower ceramic tube | G6600-60037 |
| Mobil 1 synthetic oil | G6600-85001 |
| Oil mist filter for RV5 pump | G6600-80043 |
| Oil, Edwards Ultragrade for RV3 and RV5 pumps | G6600-85002 |
| O-ring, 1.301 in id | G6600-80051 |
| Ozone destruction chemical trap | G6600-85000 |
| Replacement oil coalescing filter for oil mist filter | G6600-80044 |
| Sulfur chemiluminescence test sample | G2933-85001 |
| Sulfur trap For carrier H ₂ and air gases; one required for each cylinder of gas (3 total) | G2933-85003 |
| Spare column nut and ferrule kit | G6600-80018 |
| Column nut, 1/32 in | G6600-80072 |
| Ferrule, column, 1/32 in x 0.5 mm fused silica, Valco | 0100-2138 |
| Ferrule, column, 1/32 in x 9 mm, polyimide/graphite | 0100-2430 |



Sulfur Chemiluminescence Detector (SCD)



PM kit, G6600-67008

Miscellaneous Instrument Parts and Supplies

| Description | Part No. |
|--------------------------------------|-------------|
| Oven exhaust deflector for 6890/7890 | G1530-80650 |
| Oven exhaust deflector for 6850 | G2630-60710 |
| GC oven insert for 6890/7890 | G2646-60500 |



Ceramic tube kit for SCD DP burner, G6600-60037



Oil mist filter, G6600-80043

GC Standards

GC Qualitative Standards

| Description | Part No. |
|---|-------------|
| Qualitative Simulated Distillation Standards | |
| Boiling Point Calibration Sample No. 1 | 5080-8716 |
| Low Boiling Point Calibration Sample No. 220 | 5080-8768 |
| Boiling Point Calibration Sample No. 320 | 5080-8769 |
| PolyWax 500, 1 g, neat | 5188-5316 |
| PolyWax 655, 1 g, neat | 5188-5317 |
| Qualitative Petrochemical Standards | |
| Alcohol in Gasoline Sample | 18900-60640 |
| Natural Gas Sample | 5080-8756 |
| Transformer Gas Sample | 5080-8759 |
| Refinery Gas Sample | 5080-8755 |
| Reference Gas Oil No. 1, Batch 2 | 5060-9086 |
| Miscellaneous Qualitative Standards | |
| Nickel Catalyst Test Sample | 19354-60510 |
| Nickel Catalyst refill | 5080-8761 |
| MIDI System Calibration Standard | 19298-60500 |

7820A GC System

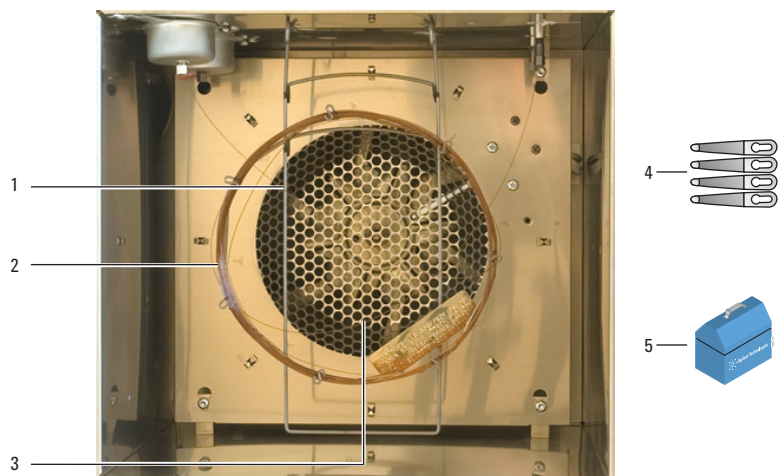
Reliability and value

The Agilent 7820A GC is an affordable, high-quality solution for small- to medium-sized labs that are mainly concerned with routine analyses using standard GC methods – including those that must comply with regulatory requirements. The 7820A GC was designed to maximize uptime, minimize maintenance and complexity, and provide a high return on your investment. The system uses Agilent's proven electronic pneumatics control and digital electronics so you will get the unsurpassed performance you expect from an industry leader, and results you can count on.

- With an intuitive user interface and 'minimalist' five-button keypad, the 7820A GC is very easy to operate, even for inexperienced or infrequent users. Because there are no gauges or manual gas knobs, errors are minimized. And with convenient, real-world design features and built-in self-diagnostics, the 7820A GC is also easy to maintain.
- The simplified front panel keys and display provide sequence information, instrument conditions, and run status, while minimizing operating errors. The complementary software keyboard and display lets you control the system when it connects with an integrator or third-party software.
- You'll find a wide choice of inlets, including split/splitless for megabore and all capillary columns, packed for wide-bore capillary and packed columns.
- There's a wide choice of detectors, too, from flame ionization to thermal conductivity, micro-electron capture to nitrogen-phosphorus, not forgetting single wavelength flame photometric.
- With an Agilent 7650A or 7693A Injection Tower, you can eliminate the variables of manual injection, and increase your lab's throughput, too. With a capacity of up to sixteen 2 mL samples, this optional accessory offers unprecedented sample handling flexibility, and allows fully unattended operation – from injection all the way through final reporting.

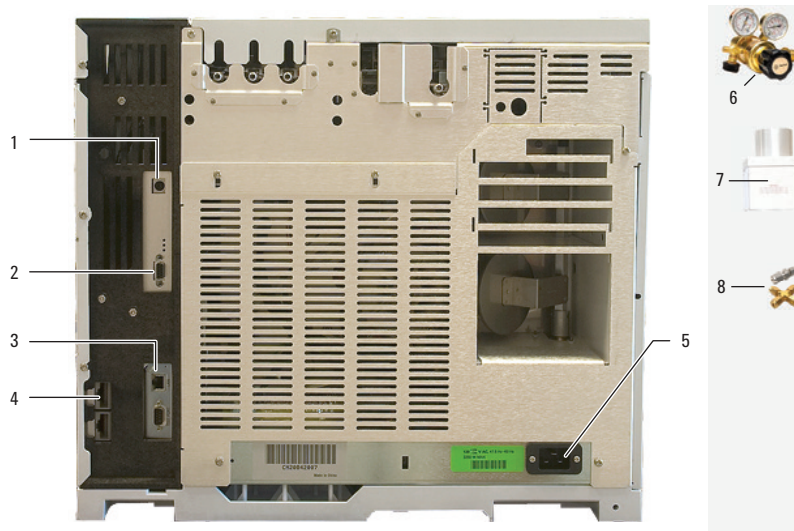


7820A GC System



7820A Column Oven Parts

| Item | Description | Unit | Part No. |
|------|--|------|-------------|
| 1 | Column hanger for 6890, 5890, 5880A | | 1460-1914 |
| 2 | HP-88, 30 m, 0.25 mm, 0.20 µm, 7 in cage | | 112-8837 |
| | DB-5ms, 20 m, 0.18 mm, 0.18 µm, 7 in cage | | 121-5522 |
| | DB-1ms, 30 m, 0.25 mm, 0.25 µm, 7 in cage | | 122-0132 |
| | DB-1701, 30 m, 0.25 mm, 0.25 µm, 7 in cage | | 122-0732 |
| 3 | Oven shroud, 120 V, US | | G1530-61610 |
| | Oven shroud, 220 V/10 A, China | | G1530-61230 |
| | Oven shroud, 240 V, Australia | | G1530-61640 |
| 4 | Column hanger clip kit for 7 in basket | | G1530-61580 |
| 5 | Ceramic wafer column cutter | 4/pk | 5181-8836 |
| | Magnifier, 20x | | 430-1020 |
| | MS interface column installation tool | | G1099-20030 |
| | Column ferrule installation tool | | 19251-80680 |

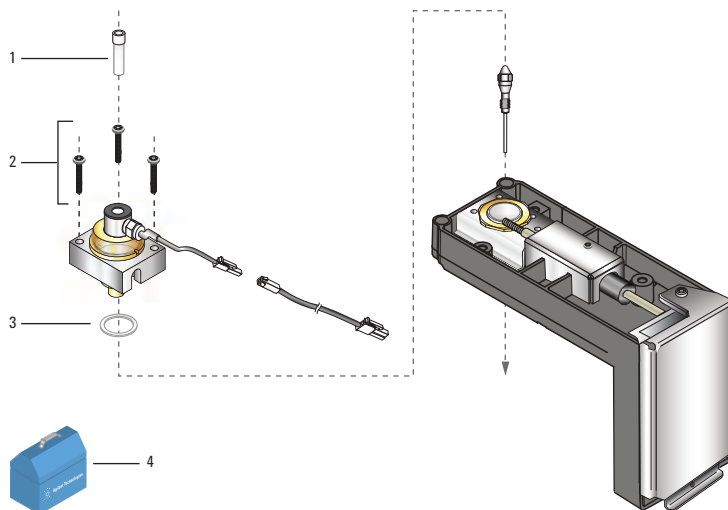


7820A Back View

| Item | Description | Unit | Part No. |
|------|---|------|-------------|
| 1 | Signal cable, general purpose analog output cable assembly, spade lugs/6 pins | | G1530-60560 |
| 2 | Remote start cable for general use with lug | | 35900-60670 |
| | Cable assembly, 6890A to 3396 | | G1530-60570 |
| | Remote Start/Stop Cable 3590B/C/D/E | | 35900-60920 |
| | Remote cable to 6890 | | 03396-61010 |
| | Remote cable APG 9M/9M to 6890 | | G1530-60930 |
| | Remote control APG h-cable | | 35900-60800 |
| 3 | Cable, w/conn, 80-1000V, telecom | | 8121-0940 |
| 4 | ALS main cable assembly | | G4514-60610 |
| 5 | Power cord, Korea, C19, 16 amp | | 8121-1222 |
| | Power cord, India/S.Africa, C19, 15 amp | | 8121-0710 |
| | Power cord, GB/HK/SG/MY, C19, 13 amp | | 8120-8620 |
| | Power cord, Europe, 16 amp | | 8120-8621 |
| | Power cord, Japan, C15, 15 amp | | 8120-5342 |
| | Power cord, US 120V, C19, 20 amp | | 8120-6894 |
| | Power cord, Japan, C19, 20 amp | | 8120-6903 |
| | Power cord, Australia, 16 amp | | 8120-8619 |
| | Power cord, China, C19, 15 amp, Fast | | 8121-0070 |
| | Power cord, Israel, C19, 16 amp | | 8121-0161 |
| | Power cord, Argentina, C19, 20 amp | | 8121-0675 |
| | Power cord, Thai 220V, 15 amp, 1.8M, C19 | | 8121-1301 |
| | Power cord, Swiss/DK, C19, 16 amp | | 8120-8622 |
| | Power cord, China, C13, 10 amp | | 8121-0723 |
| | Power cord, Brazil, C19, 250V max | | 8121-1787 |
| | Power cord, Taiwan/S America, C19, 20 amp | | 8120-6360 |

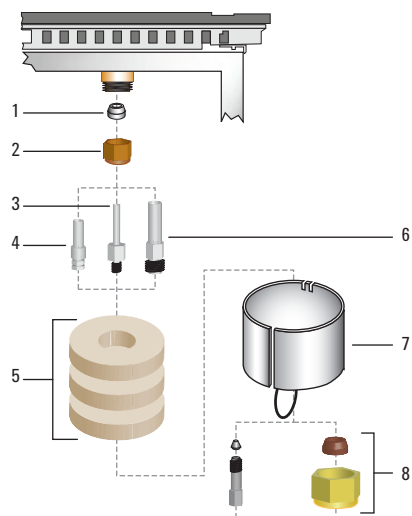
| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 6 | Regulator, 2-stage, brass body, stainless steel diaphragms, 125 psi max, CGA590, industrial air, with 1/8 in fitting, for 1/4 in tubing purchase a 1/4 in adapter | | 5183-4645* |
| | Regulator, 2-stage, brass body, stainless steel diaphragms, 125 psi max, CGA350, hydrogen, argon/methane, with 1/8 in fitting, for 1/4 in tubing purchase a 1/4 in adapter | | 5183-4642* |
| | Regulator, 2-stage, brass body, stainless steel diaphragms, 125 psi max, CGA346, air, with 1/8 in fitting, for 1/4 in tubing purchase a 1/4 in adapter | | 5183-4641* |
| | Regulator, 2-stage, brass body, stainless steel diaphragms, 125 psi max, CGA580, helium, argon, nitrogen, 1/8 in fitting, for 1/4 in tubing purchase a 1/4 in adapter | | 5183-4644* |
| 7 | Oven exhaust deflector for 6890/7890 | | G1530-80650 |
| 8 | 1/8 in brass nut and ferrule set | 20/pk | 5080-8750 |
| | Copper tubing, 1/8 in | 12 ft | 5021-7107 |
| | Copper tubing, 1/8 in | 50 ft | 5180-4196 |
| | 1/8 in cross, brass | | 0100-0161 |

*Designed for US thread type CGA.



7820A FID Parts Top

| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | Chimney insert, PTFE | | 19231-21050 |
| 2 | Screw, M4 x 25 mm, Torx T-20 | | 0515-2712 |
| 3 | Silicone gaskets, 0.890 in od/0.709 in id | 12/pk | 5180-4165 |
| 4 | Cleaning wires for 0.016 in id jet | 5/pk | 5180-4150 |
| | Cleaning wire for 0.018 in id/530 µm jet | 5/pk | 5180-4152 |
| | GC flame ionization detector MDL standard Agilent 7890 GC | | 5188-5372 |
| | FID flow measuring insert | | 19301-60660 |



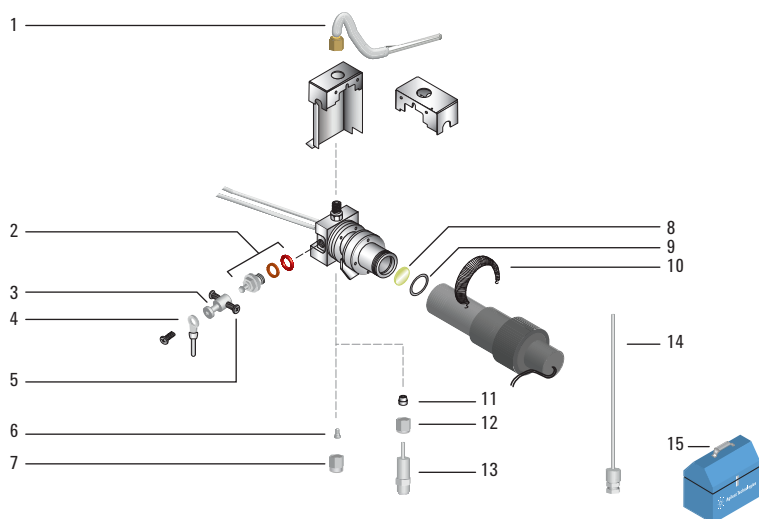
7820A FID Parts Bottom

| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 2 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 3 | FID/NPD 1/8 in packed column | | 19231-80520 |
| 4 | FID/NPD adapter for capillary column | | 19244-80610 |
| 5 | Nut warmer insulation | | 19234-60715 |
| 6 | FID/NPD 1/4 in packed column | | 19231-80530 |
| 7 | Nut warmer cup assembly | | 19234-60700 |
| 8 | 1/8 in stainless steel nut and ferrule set | 20/pk | 5080-8751 |
| | 1/8 in brass nut and ferrule set | 20/pk | 5080-8750 |
| | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| | 1/8 in nut, brass | 10/pk | 5180-4103 |
| | Universal column nut | 2/pk | 5181-8830 |
| | For complete offering of column ferrules, see page 37. | | |



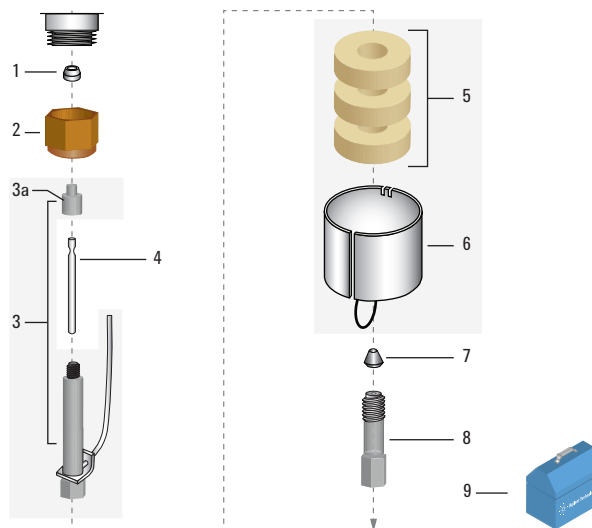
7820A FID Jets

| Item | Description | Part No. |
|------|--|-------------|
| 1 | Jet, capillary adaptable, 0.011 in id tip | 19244-80560 |
| 2 | Jet, packed, high temperature, 0.018 in id tip | 19244-80620 |
| 3 | Jet, packed standard, 0.018 in id tip | 18710-20119 |
| 4 | Jet, packed wide-bore, 0.030 in id tip (for high-bleed applications) | 18789-80070 |



7820A FPD Parts

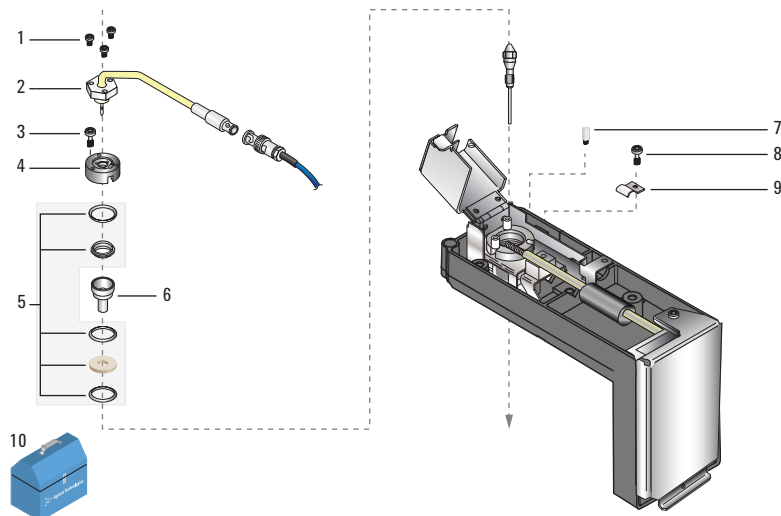
| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | FPD exit tube assembly | | 19256-60700 |
| | FPD vent tube assembly | | 19256-20705 |
| 2 | FPD ignitor replacement kit | | 19256-60800 |
| 3 | Collet for glow plug | | 19256-20690 |
| 4 | Ignitor cable assembly | | G1535-60600 |
| 5 | Screw, M3 x 66 mm, T10 | | 0515-0680 |
| 6 | Capillary adapter seat, FPD | | 19256-21140 |
| 7 | Capillary adapter nut | | 19256-21150 |
| 8 | Sulfur filter | | 1000-1437 |
| | Phosphorus filter | | 19256-80010 |
| 9 | Filter spacer, use only with sulfur filter for flame photometric detector (p/n 1000-1437) | | 19256-20910 |
| 10 | Spring, compression, for flame photometric detector | | 1460-1160 |
| 11 | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 12 | Nut, 1/8 in, stainless steel | | 0100-0057 |
| 13 | 1/4 in packed column adapter | | G1532-20710 |
| 14 | Column tool brazement | | 19256-80640 |
| | FPD check out sample | | 5188-5953 |
| | FPD sample | | 5188-5245 |
| | PM kit for single FPD | | G2647-60501 |
| | PM kit for dual FPD | | G2648-60501 |



7820A Micro ECD Parts

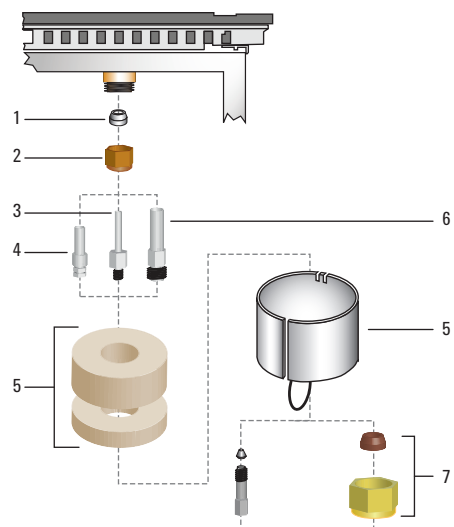
| Item | Description | Unit | Part No. |
|------|--|---------------------|--------------|
| 1 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 2 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 3 | Micro ECD makeup gas adapter, 7890 Micro ECD makeup gas adapter weldment assembly for new version detector, connected to EPC with tubing blocks | | G3433-63000 |
| | Old Micro ECD mug adapter Micro ECD makeup gas adapter weldment assembly for old version detector, connected to EPC with thumb nuts | | G4333-63000 |
| 3a | Stainless steel cap for ECD makeup gas adapter, ECD adapter end cap | | 19233-20755* |
| 4 | Fused silica liner for micro ECD makeup gas adapter | | G2397-20540* |
| 5 | Nut warmer insulation | | 19234-60715 |
| 6 | Nut warmer cup assembly | | 19234-60700 |
| 7 | For complete offering of column ferrules, see page 37. | | |
| 8 | Universal column nut | 2/pk | 5181-8830 |
| 9 | GC electron capture detector standard in isoctane | 3 x 0.5 mL ampoules | 18713-60040 |
| | Micro ECD wipe test kit | | 18713-60050 |

*Items 3a and 4 are supplied with item 3



7820A NPD Parts – Top

| Item | Description | Unit | Part No. |
|------|--|---------------------|-------------|
| 1 | Screw, T-10, M3 x 8 mm | | 0515-2726 |
| 2 | NPD white bead assembly | | G1534-60570 |
| | NPD black ceramic bead assembly | | 5183-2007 |
| 3 | Screw, M4 x 0.7, 10 mm | | 0515-2495 |
| 4 | NPD lid weldment | | G1534-80510 |
| 5 | NPD ceramic insulator kit | | 5182-9722 |
| 6 | NPD collector funnel | | G1534-20530 |
| 7 | NPD lid standoff | | G1534-20590 |
| 8 | Screw, M4 x 0.7, 10 mm | | 0515-2495 |
| 9 | J-Clamp | | 1400-0015 |
| 10 | Nitrogen phosphorus detector sample | 3 x 0.5 mL ampoules | 18789-60060 |
| | 1/4 in nut driver for FID jet, drilled shaft | | 8710-1561 |
| | NPD flow adapter | | G1534-60640 |



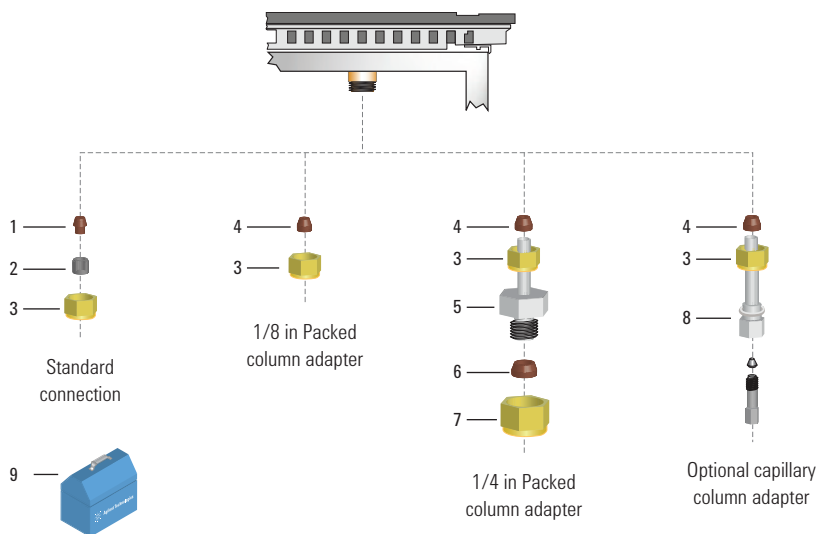
7820A NPD Parts – Bottom

| Item | Description | Unit | Part No. |
|---|--|-------|-------------|
| 1 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 2 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 3 | FID/NPD 1/8 in packed column | | 19231-80520 |
| 4 | FID/NPD adapter for capillary column | | 19244-80610 |
| 5 | Nut warmer cup with insulation | | 19234-60720 |
| 6 | FID/NPD 1/4 in packed column | | 19231-80530 |
| | 1/4 in packed column adapter | | G1532-20710 |
| 7 | 1/4 in nut, brass | | 5180-4105 |
| | 1/8 in stainless steel nut and ferrule set | 20/pk | 5080-8751 |
| | 1/4 in stainless steel nut and ferrule set | 20/pk | 5080-8753 |
| | 1/4 in brass nut and ferrule set | 20/pk | 5080-8752 |
| | Universal column nut | 2/pk | 5181-8830 |
| For complete offering of column ferrules, see page 37. | | | |



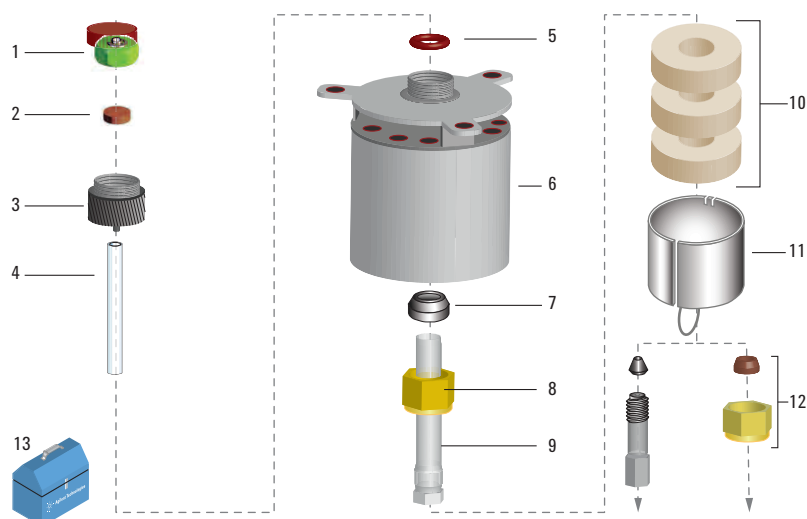
7820A NPD Jets

| Item | Description | Part No. |
|------|--|-------------|
| 1 | Capillary with extended jet, 0.011 in/ 0.29 mm id tip, 70.5 mm length for adaptable fittings | G1534-80590 |
| 2 | Jet, capillary adaptable, 0.011 in id tip | 19244-80560 |
| 3 | Jet, packed, high temperature, 0.018 in id tip | 19244-80620 |
| 4 | Jet, packed standard, 0.018 in id tip | 18710-20119 |



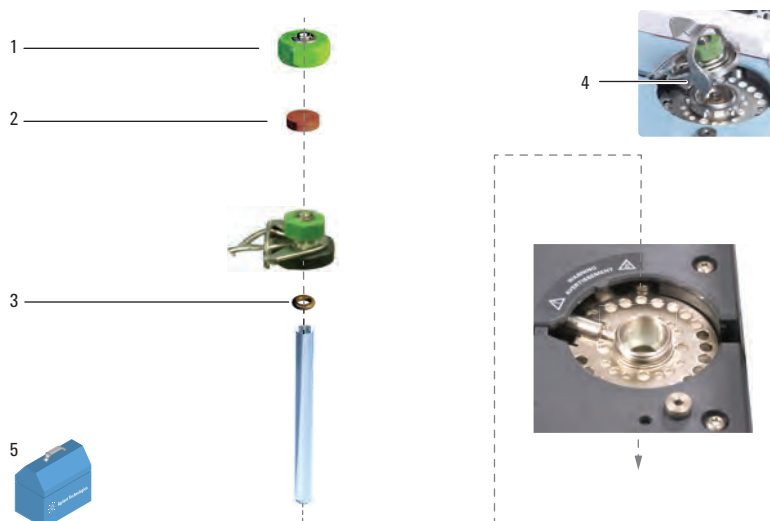
7820A TCD Parts

| Item | Description | Unit | Part No. |
|------|--|---------------------|-------------|
| 1 | TCD Front ferrule for 0.8 mm od columns | 10/pk | 5182-9673 |
| | TCD Front ferrule for 0.53 mm od columns | 10/pk | 5182-9676 |
| | TCD Front ferrule for 0.45 mm od columns | 10/pk | 5182-9677 |
| | TCD Front ferrule, no hole | 10/pk | 5182-9679 |
| 2 | TCD Back ferrule for 1/8 in detector fitting | 10/pk | 5182-3477 |
| 3 | 1/8 in nut, brass | 10/pk | 5180-4103 |
| | 1/8 in plug, brass | 6/pk | 5180-4124 |
| 4 | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| 5 | 1/4 in packed column adapter | | G1532-20710 |
| 6 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 7 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 8 | TCD capillary column adapter | | G1532-80540 |
| 9 | FID and TCD sample | 3 x 0.5 mL ampoules | 18710-60170 |
| | TCD sample | 3 x 0.5 mL ampoules | 18711-60060 |



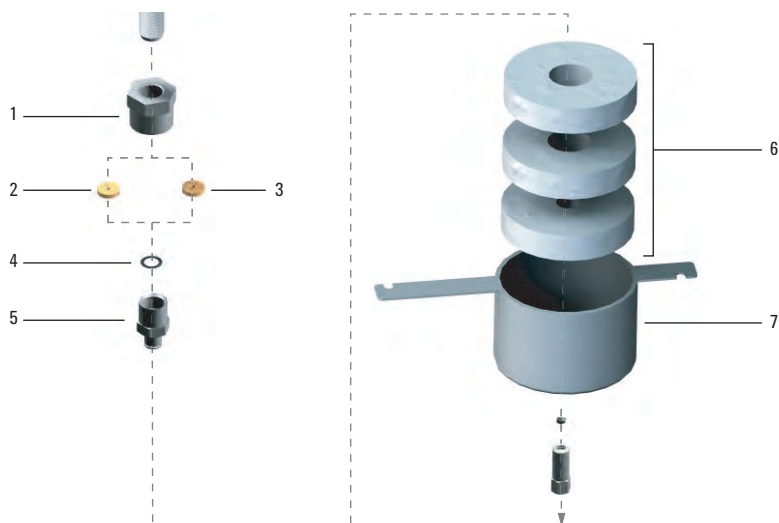
7820A Purged Packed Inlet Parts

| Item | Description | Unit | Part No. |
|------|---|--------|-------------|
| 1 | Septum nut, purged inlets | | 18740-60835 |
| 2 | 11 mm septa | 50/pk | 5183-4759 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| 3 | Packed port insert weldment | | 19243-80570 |
| 4 | Disposable glass insert, deactivated, 170 μ L internal volume | 5/pk | 5181-3382 |
| | Disposable glass liner, 170 μ L internal volume | 25/pk | 5080-8732 |
| 5 | O-ring, Viton | 12/pk | 5080-8898 |
| 6 | Inlet weldment | | G3451-80501 |
| 7 | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| 8 | 1/4 in nut, brass | 10/pk | 5180-4105 |
| 9 | 1/4 in column adapter | | 19243-80540 |
| | 1/8 in column adapter | | 19243-80530 |
| | 530 μ m column adapter for use with glass liners | | 19244-80540 |
| 10 | Nut warmer insulation | | 19234-60715 |
| 11 | Nut warmer cup assembly | | 19234-60700 |
| 12 | 1/8 in nut, brass | 10/pk | 5180-4103 |
| | Polyimide/graphite ferrule, 1/8 in | 10/pk | 0100-1332 |
| | 1/8 in brass nut and ferrule set | 20/pk | 5080-8750 |
| | Polyimide ferrule, 1/4 in | 10/pk | 5080-8774 |
| | Universal column nut | 2/pk | 5181-8830 |
| | For complete offering of column ferrules, see page 37. | | |
| 13 | QuickPick purged packed inlet PM kit | | 5188-6498 |
| | Swabs for cleaning GC/MS | 100/pk | 5080-5400 |
| | Injection port cleaning kit | | 480-0003 |
| | Septum tool, knurled handle | | 450-1000 |



7820A Split/Splitless Inlet Parts (Top)

| Item | Description | Unit | Part No. |
|------|--|--------|---------------|
| 1 | Headspace septum retainer nut | | 18740-60830 |
| | Septum nut, purged inlets | | 18740-60835 |
| 2 | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 50/pk | 5183-4757 |
| | Non-stick bleed and temperature optimized (BTO) septa, 11 mm | 100/pk | 5183-4757-100 |
| | Non-stick long-life septa, 11 mm | 50/pk | 5183-4761 |
| | Non-stick long-life septa, 11 mm | 100/pk | 5183-4761-100 |
| 3 | Graphite O-ring for splitless liner | 10/pk | 5180-4173 |
| | Graphite O-ring for split liner | 10/pk | 5180-4168 |
| | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 4 | Non-stick fluorocarbon O-ring for Flip Top | 100/pk | 5190-2268 |
| | Non-stick fluorocarbon liner O-ring for Flip Top | 10/pk | 5188-5366 |
| | Flip Top inlet sealing system | | 5188-2717 |
| 5 | QuickPick split inlet PM kit | | 5188-6493 |
| | QuickPick splitless vent and inlet PM kit | | 5188-6497 |
| | FID collector cleaning brush | 2/pk | 8710-1346 |
| | QuickPick split vent and inlet PM kit | | 5188-6496 |



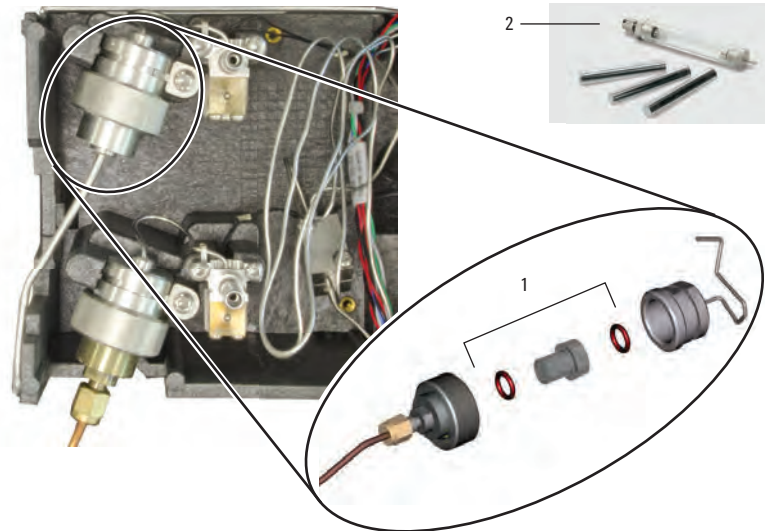
7820A Split/Splitless Inlet Parts (Bottom)

| Item | Description | Unit | Part No. |
|------|---|-------|-------------|
| 1 | Inlet heater weldment retaining nut | | G1544-20590 |
| 2 | Gold plated inlet seal kit with washer | | 5188-5367 |
| | Certified gold plated seal kit, includes washer | 10/pk | 5190-2209 |
| | Inlet seal, stainless steel | | 18740-20880 |
| 3 | Gold plated seal with cross, split only | | 5182-9652 |
| 4 | Washers, 0.375 od | 12/pk | 5061-5869 |
| 5 | Reducing nut for split/splitless inlet | | 18740-20800 |
| 6 | S/SL insulation kit, 3 pieces | | 5188-5241 |
| 7 | Cover, lower insulation | | 19243-00070 |

TIPS & TOOLS

Download the Agilent Parts Finder Tool for simplified parts ordering and troubleshooting, www.agilent.com/chem/go2partsfinder





7820A Split Vent Traps

| Item | Description | Unit | Part No. |
|------|--|------|-----------|
| 1 | Split vent trap preventive maintenance kit, single cartridge | | 5188-6495 |
| 2 | Split vent trap with 3 cartridges | | RDT-1020 |
| | Cartridges, split vent trap | 3/pk | RDT-1023 |

GC/MS Parts and Supplies

Your mass spectrometer is a sensitive, specialized device that delivers a higher level of functionality than other GC detectors. To continue achieving optimal results, it is critical to maintain your system properly by performing the essential tasks within this section. Some of the benefits of maintaining your GC/MSD include:

- Less downtime for repairs
- Longer lifetime for your MSD system
- Reduction in overall operating costs

It is advisable to keep a log book of system performance, Autotune, and maintenance operations performed. This makes it easier to identify variations from normal performance and to take corrective action.



Maintenance Schedule

| Task | Every week | Every 6 months | Every year | As needed |
|---------------------------------------|------------|----------------|------------|-----------|
| Tune the MSD | | | | ✓ |
| Change injection port liners | ✓ | | | |
| Check the foreline pump oil level | ✓ | | | |
| Gas ballast the foreline pump | | | | ✓ |
| Check the calibration vial | | ✓ | | |
| Replace the foreline pump oil | | ✓ | | |
| Check the diffusion pump fluid | ✓ | | | |
| Replace the diffusion pump fluid | | | ✓ | |
| Replace the dry pump tip seals (IDP3) | | | ✓ | |
| Replace the traps and filters | | | ✓ | |
| Clean the ion source | | | | ✓ |
| Replace worn out parts | | | | ✓ |
| Lubricate seals (where appropriate) | | | | ✓ |
| Replace column | | | | ✓ |

MSD Contamination

Contamination is usually identified by excessive background in the mass spectra, which can come from the GC or MSD. The source of contamination can sometimes be determined by identifying the contaminants. Some contaminants are much more likely to originate in the GC, while others are likely to originate in the MSD.

Contamination Sources in the GC

- Column or septum bleed
- Dirty injection port
- Injection port liner
- Contaminated syringe
- Poor quality carrier gas
- Dirty carrier gas tubing
- Fingerprints
- Air leaks
- Cleaning solvents and materials

Contamination Sources in the MSD

- Air leaks
- Cleaning solvents and materials
- Fingerprints inside the manifold
- Diffusion pump fluid
- Foreline pump oil

The action required to remove contamination depends on the type and level of contamination. Minor contamination by water or solvents can usually be removed by allowing the system to pump (with a flow of clean carrier gas) overnight. Serious contamination by rough pump oil, diffusion pump fluid or fingerprints is much more difficult to remove and may require extensive cleaning.

Air Leaks

Air leaks are a problem for any instrument that requires a vacuum to operate. Leaks are generally caused by vacuum seals that are damaged or not fastened correctly.

Symptoms of leaks

- Higher than normal vacuum manifold pressure or foreline pressure
- Higher than normal background
- Peaks characteristic of air (m/z 18, 28, 32, and 44 or m/z 14 and 16)
- Poor sensitivity
- Low relative abundance of m/z 502 (this varies with the tune program and MSD used)

Remedy

- Check interface nut for tightness. Replace if necessary.
- Check and leak test the GC injection port.

Leaks can occur in other places in the MSD, including the following:

- GC/MSD interface column nut
- Side/top plate O-ring (all the way around)
- Vent valve O-ring
- Calibration valve
- High vacuum gauge tube/controller fitting
- Cracked ion gauge tube
- Front and rear end plate O-rings
- GC/MSD interface O-ring (where the interface attaches to the vacuum manifold)
- Diffusion pump co-seal
- Baffle adapter O-ring
- Turbomolecular pump O-ring
- Polyimide/graphite ferrules, when heated



Cleaning Solvents

It is common to see cleaning solvent peaks in the mass spectra shortly after the ion source is cleaned.

Remedy

- Dry all cleaned metal parts in the GC oven before reassembling and reinstalling them. Refer to specific cleaning procedures in your MSD Hardware Manual or MSD Maintenance and Troubleshooting Manual.
- Use a temperature above the boiling point of the solvent but below the limit of the column.

Fingerprints

Fingerprints contain hydrocarbons that can appear in mass spectra. Hydrocarbon contamination is characterized by a series of mass peaks 14 m/z apart. The abundance of these peaks decrease as peak mass increases. Fingerprint contamination is usually caused by the failure to wear clean, nylon gloves during ion source handling or cleaning, GC inlet maintenance, or from installing the column. Use special care to avoid recontamination of parts after you clean them. This typically occurs after some maintenance or part replacement.

Remedy

Reclean using clean, nylon gloves and proper cleaning techniques.

MSD Contamination Identification

The following table lists some of the more common contaminants, the ion characteristics of those contaminants, and the likely sources of those contaminants.

| Common Contaminants | | |
|---|---|---|
| Ions (m/z) | Compound | Possible Source |
| 13, 14, 15, 16 | Methane | Cl gas |
| 18, 28, 32, 44 or 14, 16 | H ₂ O, N ₂ , O ₂ , CO ₂ , CO ₂ or N, O | Residual air and water, air leaks, outgassing from Polyimide ferrules |
| 31, 51, 69, 100, 119, 131, 169, 181, 214, 219, 264, 376, 414, 426, 464, 502, 576, 614 | PFTBA and related ions | PFTBA (tuning compound) |
| 31 | Methanol | Cleaning solvent |
| 43, 58 | Acetone | Cleaning solvent |
| 78 | Benzene | Cleaning solvent |
| 91, 92 | Toluene or xylene | Cleaning solvent |
| 105, 106 | Xylene | Cleaning solvent |
| 151, 153 | Trichloroethane | Cleaning solvent |
| 69 | Foreline pump fluid or PFTBA | Foreline pump oil vapor or calibration valve leak |
| 73, 147, 207, 221, 281, 295, 355, 429 | Dimethylpolysiloxane | Septum bleed or methyl silicone column coating |
| 77, 94, 115, 141, 168, 170, 262, 354, 446 | Diffusion pump fluid | Diffusion pump fluid and related ions |
| 149 | Plasticizer (phthalates) | Vacuum seals (O-rings) damaged by high temperatures, use of vinyl or plastic gloves |
| Peaks spaced 14 amu apart | Hydrocarbons | Fingerprints, foreline pump oil |

The easiest way to insure that you minimize background contamination and remove damaging oxygen from your carrier gas system is to use a carrier gas purifying trap right before the gas enters your GC system.

Column bleed generally appears as a continuous and increased rise in the baseline at higher column temperatures, especially at or near the upper temperature limit of the GC column. Septum bleed usually appears as discrete peaks, and can occur at any temperature.

A crude sign of a "leak-free" MS system is when the ion ratio of m/z 28 (nitrogen) over m/z 32 (oxygen) is approximately two or greater.

Even preconditioned ferrules can shrink slightly at very high temperatures. If leak problems persist upon a new column installation, check this fitting first.



5977A Series GC/MSD system



Cloths, lint-free, 05980-60051



Cotton swabs, 5080-5400

Cleaning and Maintenance Supplies

| Description | Part No. |
|--|-------------|
| Nylon gloves, lint-free, large, 1 pair | 8650-0030 |
| Nylon gloves, lint-free, small, 1 pair | 8650-0029 |
| Lint-free industrial wipes, 100% cotton, 9 x 9 in, 300/pk | 9310-4828 |
| Ion source cleaning kit Includes lint-free cloths (15/pk), abrasive sheets (5/pk), cotton swabs (100/pk), lint-free nylon gloves, abrasive Alumina powder | 5181-8863 |
| Cloths, lint-free, 15/pk | 05980-60051 |
| Swabs for cleaning GC/MS, 100/pk | 5080-5400 |
| Abrasive sheets, aluminum oxide green lapping paper, 600 mesh, 5/pk | 5061-5896 |
| Alumina powder, abrasive, 100 g | 393706201 |
| PFTBA sample, certified, 10 g | 8500-0656 |
| Replacement glass bulb for PFTBA and PFDTD test sample | G3170-80002 |
| Replacement glass vial for PFTBA and PFDTD test sample | 05980-20018 |
| Activated alumina, absorbent pellets for Edwards rough pump traps, non-LC/MS, 1 lb can | 8500-1233 |
| MSD Tool Kit Includes source hold tool, lint-free cloth, cotton swabs, lint-free nylon gloves, abrasive sheets, wrenches and driving tools | G1099-60566 |

(Continued)



TIPS & TOOLS

Self Tightening column nuts at the transfer line and inlet fitting, using short graphite/polyimide-blend ferrules, provide a leak-free seal at both column connections, without the need to retighten the fitting after hundreds of heat cycles.



Cleaning and Maintenance Supplies

| Description | Part No. |
|--|-------------|
| MS Interface Supplies | |
| MS interface column installation tool for the 5973 series, 5975 A/B/C/C TAD/E, 5977 series, and 7000 series Not for the 5975T | G1099-20030 |
| Column installation tool for 5975T | G3880-20030 |
| Column insertion tool for the 7200 series | G3850-60014 |
| Tools | |
| Screwdriver, 3 in Pozidriv shaft No. 1 pt, fits no. 2-4 screws | 8710-0899 |
| Screwdriver, 4 in Pozidriv shaft No. 2 pt, fits no. 5-10 screws | 8710-0900 |
| Open end wrench, 1/4 and 5/16 in | 8710-0510 |
| Hex nut driver, 5.5 mm | 8710-1220 |
| Screwdriver, Torx T20 | 8710-1615 |
| Screwdriver, Torx T15 | 8710-1622 |
| Screwdriver, Torx T10 | 5182-3466 |
| Gas Filters | |
| Replacement Agilent Gas Clean carrier gas filter | CP17973 |
| Gas Clean carrier gas starter kit for 7890 Includes carrier gas filter, 1/8 in single connecting unit with bracket that installs directly on the 7890 | CP17988 |
| GC/MS filter kit Includes 1 connecting unit 1/4 in and 2 carrier gas filters | CP17977 |
| Chemical ionization gas purifier | G1999-80410 |



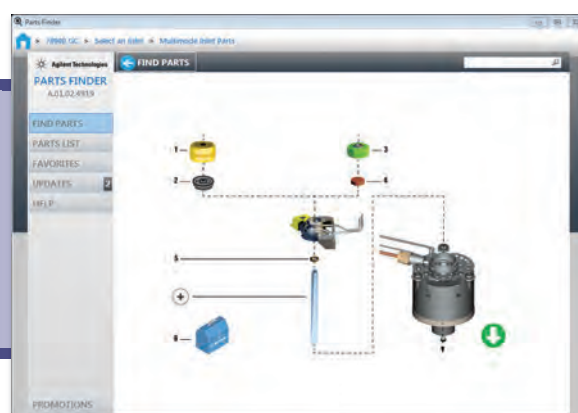
Column installation tool, G1099-20030



Replacement Agilent Gas Clean carrier gas filter, CP17973

TIPS & TOOLS

Download the Agilent Parts Finder Tool for simplified parts ordering and troubleshooting, www.agilent.com/chem/go2partsfinder



By using tools, supplies and best practices that provide a leak-free GC or GC/MS, analysts can improve performance and productivity of their system. The Agilent innovative Self Tightening column nuts using standard short polyimide/graphite ferrules eliminate the need to retighten GC column fitting at the mass spec transfer line, even after repeated heat cycling. Agilent UltiMetal Plus Flexible Metal ferrules provide robust leak-free column connections, along with an inert surface for fittings in the sample flow path.



Self Tightening column nut, for MS interface, 5190-5233



MS interface column nut, 05988-20066



UltiMetal Plus Flexible Metal ferrules, G3188-27501

Recommended MS Interface Connections

| Description | Part No. |
|---|-------------|
| Recommended | |
| Nut | |
| Self Tightening column nut, for MS interface | 5190-5233 |
| Ferrule | |
| 250 µm Polyimide/graphite ferrule, 10/pk | 5181-3323 |
| 320 µm Polyimide/graphite ferrule, 10/pk | 5062-3514 |
| Tools | |
| MS interface column installation tool | G1099-20030 |
| Column installation tool for 5975T | G3880-20030 |
| Traditional | |
| Nut | |
| MS interface column nut, female | 05988-20066 |
| Ferrule | |
| 0.4 mm Polyimide/graphite ferrule, 10/pk | 5062-3508 |
| 0.5 mm Polyimide/graphite ferrule, 10/pk | 5062-3506 |
| Tools | |
| MS interface column installation tool | G1099-20030 |
| Column installation tool for 5975T | G3880-20030 |
| Alternative | |
| Nut | |
| Swaging nut, for MS interface with Flexible Metal ferrules | G2855-20555 |
| Ferrule | |
| UltiMetal Plus Flexible Metal ferrule with 0.4 mm id, 10/pk | G3188-27501 |
| UltiMetal Plus Flexible Metal ferrule with 0.5 mm id, 10/pk | G3188-27502 |
| Tools | |
| Ferrule pre-swaging tool | G2855-60200 |

Ion Source

The ion source operates by electron ionization (EI) or chemical ionization (CI). The sample enters the ion source from the GC/MSD interface. Electrons emitted by a filament enter the ionization chamber, guided by a magnetic field. The high-energy electrons interact with the sample molecules, ionizing and fragmenting them. The positive voltage on the repeller pushes the positive ions into the lens stack, where they pass through several electrostatic lenses. These lenses concentrate the ions into a tight beam, which is directed into the mass filter.



Electron Impact (EI) Ion Source

Maintaining the Ion Source

Cleaning procedures for MSDs vary. Refer to your Troubleshooting and Maintenance Manual for specific ion source cleaning procedures.

Common Measures of Instrument Performance

- Abundance of certain ions
- Shape of lens ramps and the chosen voltages
- Sensitivity obtainable for a given analysis
- Ability to tune to a given reference compound (e.g., DFTPP)

Preparing to Clean

Prior to cleaning, the mass spectrometer must be vented and the ion source must be removed. Before venting the system, the following conditions must be met:

- Heated zones are less than 100 °C
- The diffusion pump is off and cool (if applicable)
- The turbo pump is off and not spinning (if applicable)
- The rough pump is off

Always allow the automatic venting routine to run its full course. Improper venting may cause diffusion pump fluid to be deposited into the analyzer (backstreaming). It can also reduce the life of the multiplier or other sensitive MS parts.

MSD Flow Rates (mL/min)

| | Min | Max Diff Pump | Max Turbo Pump | Tuning Max |
|------|-----|---------------|----------------|------------|
| 5977 | 0.1 | 2.0 | 4.0 | 2.0 |
| 5975 | 0.1 | 2.0 | 4.0 | 2.0 |
| 5973 | 0.1 | 2.0 | 4.0 | 2.0 |



WARNINGS & CAUTION

Important: Do not abrasively or ultrasonically clean the insulators.

Abrasively clean the surfaces that contact the sample or ion beam. Use an abrasive slurry of alumina powder and reagent-grade methanol on a cotton swab. Use enough force to remove all discoloration. Polishing the parts is not necessary; small scratches will not harm performance. Abrasively clean discoloration where electrons from filaments enter the source body.

Take care to avoid contaminating cleaned and dried parts. Put on new, clean gloves before handling the parts. Do not put the cleaned parts on a dirty surface. Place them only on clean, lint-free cloths.

TIPS & TOOLS



It is good practice to replace scratched lenses and other ion source parts regularly. Scratched source parts lead to poor performance.

El Source Selection Guide

Inert Ion Source

To ensure accurate quantification and high sensitivity, the entire GC/MSD flow path must be highly inert, including the detector surfaces. The inert ion source is made of the same inert material used in the Extractor EI Source and is programmable to 350 °C, enabling trace level detection and SVOC and VOC analyses (see Source Selection for Various Applications).

Aperture Diameters Available for the Agilent 5977A Series Ion Sources

| Aperture Diameter | 3 mm | 6 mm | 9 mm |
|------------------------|-------------|-------------|-------------|
| Stainless Steel Source | 05971-20134 | G3136-20530 | -- |
| Inert Source | G2589-20100 | G2589-20045 | -- |
| Extractor EI Source | G3870-20444 | G3870-20448 | G3870-20449 |

Having trouble selecting the appropriate aperture diameters for the Agilent 5977A Series Ion Sources? Download publication number 5991-2106EN at www.agilent.com/chem/library

Source and Tune Selection Guidance

Choosing the most appropriate source configuration and tune can have a significant effect on the success of an application (see, Source Configurations and Supported Tunes). The guidelines outlined here are meant to be general suggestions as starting points. Application-specific method development should be performed to ensure the best operating conditions. EI Tune Options gives a description of the various tune modes and their use.

TIPS & TOOLS

Read and understand "A Quick-Start Guide to Optimizing Detector Gain for GC/MSD", publication number 5991-2105EN, before attempting to optimize any method or configuration, www.agilent.com/chem/library



Stainless Steel Ion Source

The most cost-effective source for picogram to high nanogram sensitivity and for obtaining spectra most similar to legacy instruments is the stainless steel ion source, which is programmable up to 350 °C.

Source Selection for Various Applications

| Application | Source(s) | Drawout/ Extractor Lens (mm) | Tune |
|---|-----------------------------------|------------------------------------|--------------|
| Ultra-trace level (low fg-low ng) | Extractor EI | 3 | Etune |
| Trace level (fg-ng) | Extractor EI, Inert | 3 | Etune, Atune |
| Mid to high-level (pg-high ng) | Extractor, Inert, Stainless Steel | 6, 9 | Atune |
| Obtain spectra closest to older instruments | Stainless Steel | 3 | Stune |
| VOC P&T - (BFB) | Extractor EI, Inert | 6 | BFB Autotune |
| SVOC (DFTPP) | Extractor EI, Inert | 6 | DFTPP |

Source Configurations and Supported Tunes

| Source | Etune | Atune | BFB Autotune | Ion Mass | Stune | DFTPP | BFB |
|-----------------|-------|-------|--------------|----------|-------|-------|------|
| Stainless Steel | --* | ✓ | -- | ✓ | ✓ | ✓ | ✓*** |
| Inert | --* | ✓ | ✓** | ✓ | ✓ | ✓ | ✓*** |
| Extractor EI | ✓ | ✓ | ✓** | ✓ | ✓ | ✓ | ✓*** |

*Etune can be executed from the tune menu with a non-extractor source but will produce only an atune

**BFB Autotune requires the use of the 6 mm drawout plate/extraction lens

***BFB Autotune is the preferred tune. Download Application Note 5991-0029EN at www.agilent.com/chem/library

El Tune Options

In the Tune menu, and in the Tune and Vacuum Control view there are several options for tune selection. The top two options are mechanisms to run part or the entire active tune. The remaining menu options are tunes for specific purposes and are described below.

Description of the Tune Options for the Agilent 5977A Series Ion Source

Tune menu items

(default tune filenames as *.U)

Description

| | |
|----------------------------------|---|
| Tune MSD | Performs the type of tune that is embedded in the active tune. |
| QuickTune | Provides a fine tuning to ensure acceptable response, resolution and accurate mass assignment. |
| Autotun (Atune.U) | The standard repeller-based tune of the Agilent 5973 inert MSD and Agilent 5975 Series. |
| Extraction source tune (Etune.U) | Used with the Extractor EI Source to provide the highest sensitivity. Equivalent to Atune when used with inert or stainless sources. |
| BFB Autotune (BFB_Atune.U) | Used in conjunction with Atune to meet US EPA BFB tuning criteria. Requires the use of 6 mm drawout/extraction lens and operates in standard repeller-based tuning mode. |
| Low Mass Autotune (Lomass.U) | Identical to Autotune, except it tunes on masses 69, 131, and 219 instead of 69, 219, and 502. Intended for low molecular weight applications and natural gases under 250 daltons. |
| Standard Spectra Tune (Stune.U) | Ensures standard response over the full mass range. Specifically, PFTBA mass 69 is the base peak, mass 219 is between 35 and 99%, and mass 502 is >1%. This is a lower sensitivity tune used to better match legacy libraries created using the Agilent 5971 or 5972 MSDs. |
| DFTPP | A specific target tune used for US EPA semivolatile analysis (8270 methods). |
| BFB | A specific legacy target tune used for VOC analysis. It does not provide the same sensitivity and stability as BFB Autotune. Provides continuity for established SOPs and for users with a preference for target tuning. See Application Note 5991-0029EN for a description of the recommended procedure for VOC analysis at www.agilent.com/chem/library |

Available EI Sources for the Agilent 5977A Series GC/MS

| Source | Benefit | Part No. (spare parts) |
|---------------------|---|------------------------|
| Stainless | Inexpensive | G2591D |
| Inert | Reduced activity | G2591B |
| Extractor EI Source | Reduced activity Highest sensitivity | G2591C |



Electron Impact (EI) Ion Source

Electron Impact (EI) Ion Source

The recommended cleaning material for the EI ion source is abrasive, aluminum oxide powder.

Do not immerse filaments or lens insulators in solvent. If insulators are dirty, clean them with a cotton swab dampened with reagent-grade methanol. If that does not clean the insulators, replace them.

! WARNINGS & CAUTION

Important: Do not abrasively or ultrasonically clean the insulators.

Abrasively clean the surfaces that contact the sample or ion beam. Use an abrasive slurry of alumina powder and reagent-grade methanol on a cotton swab. Use enough force to remove all discoloration. Polishing the parts is not necessary; small scratches will not harm performance. Abrasively clean discoloration where electrons from filaments enter the source body.

Take care to avoid contaminating cleaned and dried parts. Put on new, clean gloves before handling the parts. Do not put the cleaned parts on a dirty surface. Place them only on clean, lint-free cloths.

5977/5975/5973 MSD Electron Impact Ion Source Parts (EI)

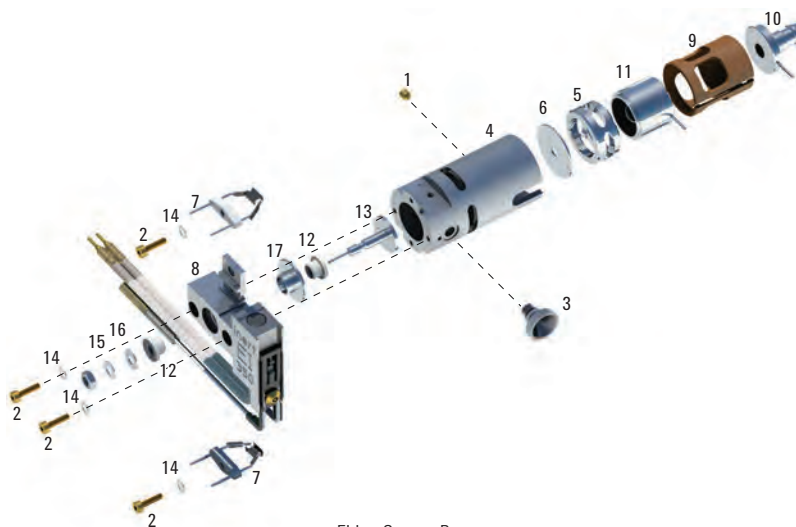
| Item | Description | Part No. |
|------|--|-------------|
| 1 | Set screw for lens stack | G1999-20022 |
| 2 | Cap screw, gold plated | G1999-20021 |
| 3 | Transfer line socket | G1099-20136 |
| 4 | Ion source body | G1099-20130 |
| 5 | Drawout cylinder | G1072-20008 |
| 6 | Drawout plate, 3 mm | 05971-20134 |
| | Drawout plate, 6 mm | G3163-20530 |
| 7 | Filament assembly, high temperature (EI) | G7005-60061 |
| 8 | Repeller assembly, Agilent 5977 MSD, stainless steel EI 350 ion source | G3870-60172 |
| 9 | Lens insulator | G3170-20530 |
| 10 | Entrance lens assembly | G3170-20126 |
| 11 | Ion focus lens | 05971-20143 |
| 12 | Repeller insulator | G1099-20133 |
| 13 | Repeller | G1099-20132 |
| 14 | Washer, SPR CRVD, 1.6 to 1.8 mm id, 4 mm od, SS | 3050-1375 |
| 15 | Washer, SPR BLVL 4 .125 in id .25 in od | 3050-1301 |
| 16 | Washer, for Repeller M3 | 3050-0891 |
| 17 | Repeller block insert | G3870-20135 |



Lens insulator, G3170-20530



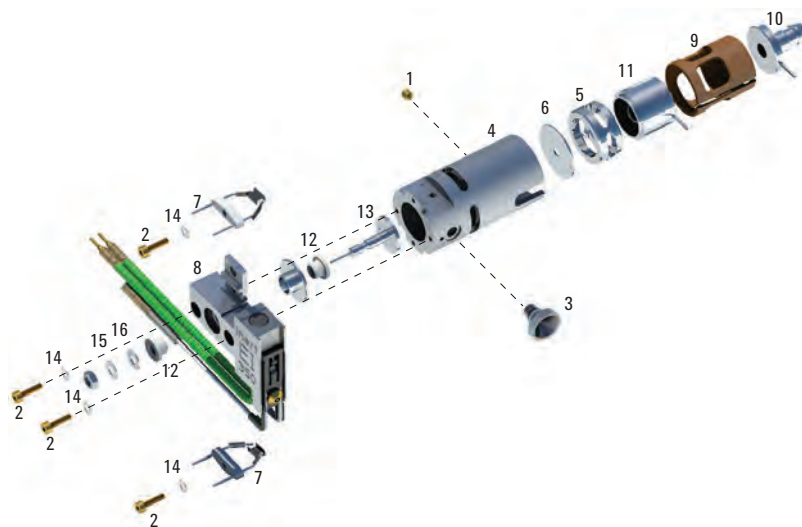
Repeller insulator, G1099-20133



EI Ion Source Parts

5977/5975/5973 MSD Electron Impact Inert Ion Source Parts (EI)

| Item | Description | Part No. |
|------|---|-------------|
| 1 | Set screw for lens stack | G1999-20022 |
| 2 | Cap screw, gold plated | G1999-20021 |
| 3 | Transfer line socket | G1099-20136 |
| 4 | Inert ion source body | G2589-20043 |
| 5 | Drawout cylinder | G1072-20008 |
| 6 | Drawout plate, 3 mm | G2589-20100 |
| | Drawout plate, 6 mm | G2589-20045 |
| 7 | Filament assembly, high temperature (EI) | G7005-60061 |
| 8 | 5977 Inert EI 350 repeller block | G3870-60179 |
| 9 | Lens insulator | G3170-20530 |
| 10 | Entrance lens assembly | G3170-20126 |
| 11 | Ion focus lens | 05971-20143 |
| 12 | Repeller insulator | G1099-20133 |
| 13 | Inert repeller | G2589-20044 |
| 14 | Washer, SPR CRVD, 1.6 to 1.8 mm id, 4 mm od, SS | 3050-1375 |
| 15 | Washer, SPR BLVL 4 .125 in id .25 in od | 3050-1301 |
| 16 | Washer, for Repeller M3 | 3050-0891 |



5977/5975/5973 Inert Ion source parts (EI)



Extractor EI Source

Extractor EI Source

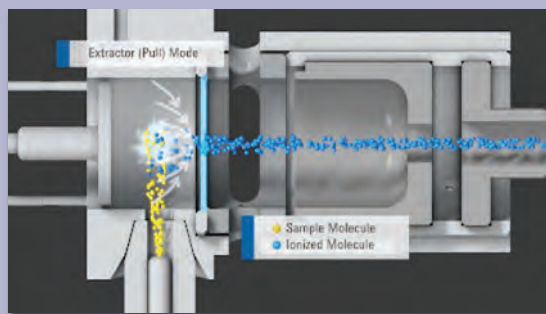
This innovative ion source has an extractor lens in place of the drawout plate used in the other EI sources and it is made of an inert material. It is programmable up to 350 °C to deliver enhanced response for active compounds and late eluters. These unique features provide maximum, ultratrace level sensitivity for a wide variety of compounds. The extractor lens provides additional focus to the ion beam into the mass analyzer. A potential is applied to the extractor lens which pulls the ions out of the ionization chamber, adding to the push provided by the repeller voltage. The result is a significant increase in the number of ions analyzed, improving the true sensitivity of the instrument. There are three available aperture sizes for the Extractor EI Source, as well as the two other sources: 3, 6, and 9 mm. Generally, the 3 mm aperture provides the best sensitivity. Selecting one of the larger aperture sizes enables analysis of higher concentrations of target compounds. Increasing aperture diameters also reduces the residence or interaction time and provides higher effective inertness for fragile compounds.

The Extractor EI Source can be operated in the higher sensitivity mode of extraction tuning or in standard mode in which it behaves in the same way as the standard stainless and inert sources. The ability to change between extractor and repeller-only mode is controlled by the software and does not require any physical changes.



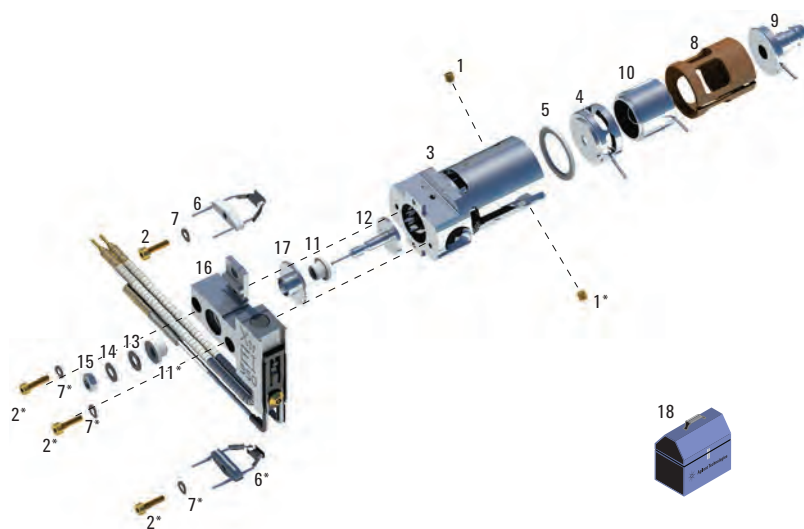
TIPS & TOOLS

A video description of the Extractor EI Source is available at www.chem.agilent.com/chem/resolve

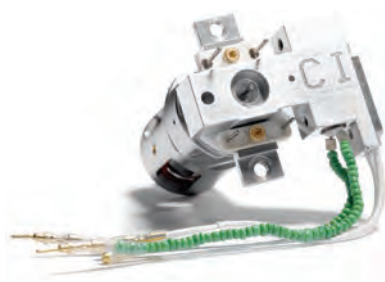


5977/7000C Extractor Ion Source Parts

| Item | Description | Part No. |
|------|---|-------------|
| 1 | Set screws | G3870-20446 |
| 2 | Screws | G3870-20021 |
| 3 | Extraction source body | G3870-20440 |
| 4 | Extractor lens | G3870-20444 |
| 5 | Extractor lens insulator | G3870-20445 |
| 6 | Filaments, 4-turn | G3170-60053 |
| 7 | Spring washer | 3050-1374 |
| 8 | Lens insulator | G3870-20530 |
| 9 | Entrance lens assembly | G3170-20126 |
| 10 | Ion focus lens | 05971-20143 |
| 11 | Repeller insulator | G1099-20133 |
| 12 | Inert repeller | G2589-20044 |
| 13 | Washer, for Repeller M3 | 3050-0891 |
| 14 | Washer, SPR BLVL 4 .125 in id .25 in od | 3050-1301 |
| 15 | Nut, 5.5 mm | 0535-0071 |
| 16 | 5977 Extraction 350 repeller block assembly | G3870-60171 |
| 17 | Repeller block insert | G3870-20135 |



Extractor Ion Source Parts



5977/5975/5973/7000 Ion Source

Chemical Ionization (CI) Ion Source

Because the CI ion source operates at much higher pressures than the EI ion source, it will probably require more frequent cleaning than the EI ion source.

The source should be cleaned whenever there are performance anomalies that are associated with a dirty ion source. Let analytical performance be your guide.

When cleaning the CI ion source, concentrate on the CI repeller, ion source body, and drawout plate. Be sure to clean the 0.5 mm diameter holes in the ion source body and drawout plate.

Cleaning the ion source is very similar to cleaning the EI ion source. Use the same EI cleaning procedure with the following exceptions:

- The CI ion source may not look dirty, but deposits left by chemical ionization are very difficult to remove. Clean the CI ion source thoroughly.
- Use a round wooden toothpick to gently clean out the electron entrance hole in the source body and the ion exit hole in the drawout plate.
- Do not use halogenated solvents. Use hexane for the final rinse.

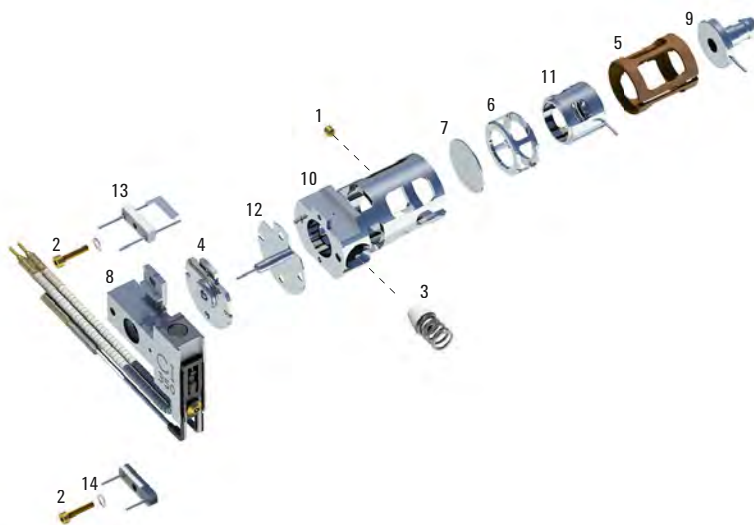
TIPS & TOOLS



Visual appearance is not an accurate guide to cleanliness of the CI ion source. The CI ion source can show little or no discoloration, yet still need cleaning.

5977/5975/5973/7000 MSD Chemical Ionization Ion Source Parts (CI)

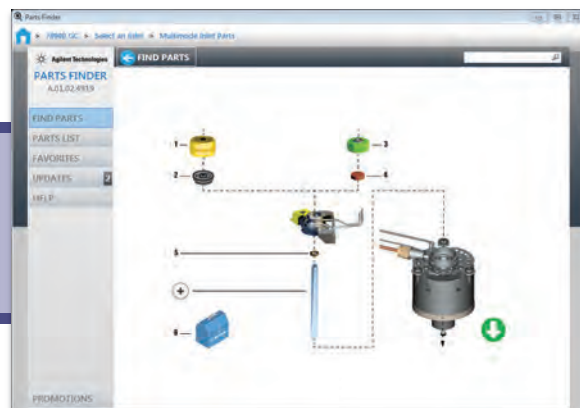
| Item | Description | Part No. |
|------|---|-------------|
| 1 | Set screw for lens stack | G1999-20022 |
| 2 | Cap screw, gold plated | G1999-20021 |
| 3 | Interface tip seal/spring | G1999-60412 |
| 4 | Repeller insulator | G1999-20433 |
| 5 | Lens insulator | G3170-20540 |
| 6 | Drawout cylinder | G1999-20444 |
| 7 | Drawout plate | G1999-20446 |
| 8 | 5977 CI 350 repeller assembly | G3170-60416 |
| 9 | Entrance lens assembly | G3170-20126 |
| 10 | Source body | G1999-20430 |
| 11 | Ion focus lens | G1999-20443 |
| 12 | Repeller | G1999-20432 |
| 13 | Filament assembly (CI), 2/pk | G7005-60072 |
| 14 | Washer, SPR CRVD, 1.6 to 1.8 mm id, 4 mm od, SS | 3050-1375 |



5977/5975/5973/7000 MSD Chemical Ionization (CI) Ion Source Assembly

TIPS & TOOLS

Download the Agilent Parts Finder Tool for simplified parts ordering and troubleshooting, www.agilent.com/chem/go2partsfinder



Installing a Capillary Column in the GC/MSD Interface

1. Condition the column.
2. Vent the MSD and open the analyzer chamber. Be sure you can see the end of the GC/MSD interface.
3. If the CI interface is installed, remove the spring-loaded tip seal from the MSD end of the interface.
4. Slide an interface nut and conditioned ferrule onto the free end of the GC column. The tapered end of the ferrule must point towards the nut.
5. Slide the column into the GC/MSD interface until you can pull it out through the analyzer chamber.
6. Score the column using a glass scribing tool. The score must be square to ensure a clean break.
7. Trim 1 cm off the end of the column. Do not let any column fragments fall into the analyzer chamber. They could damage the turbo pump.
8. Clean the outside of the free end of the column with a lint-free cloth moistened with methanol.
9. Adjust the column.
 - 5977/5975 – Push the column through, and then let it pass the end of the transferline by 1-2 mm. With the analyzer door partially open, view through the glass plate to see the column protrude.
 - 5973 – Push the column through, and then let it pass the end of the transferline by 1-2 mm as seen with the analyzer door open from that side.
 - 5972 – Push the column in all the way and then pull it back about 1-2 mm.Use the flashlight and magnifying glass if necessary to see the end of the column inside the analyzer changer. Do not use your finger to feel for the column end.
10. Hand-tighten the nut. Make sure the position of the column does not change as you tighten the nut. Reinstall the spring-loaded tip seal if it was removed earlier.
11. Check the GC oven to be sure that the column does not touch the oven walls.
12. Tighten the nut 1/4 to 1/2 turn. Check the tightness after one or two heat cycles.

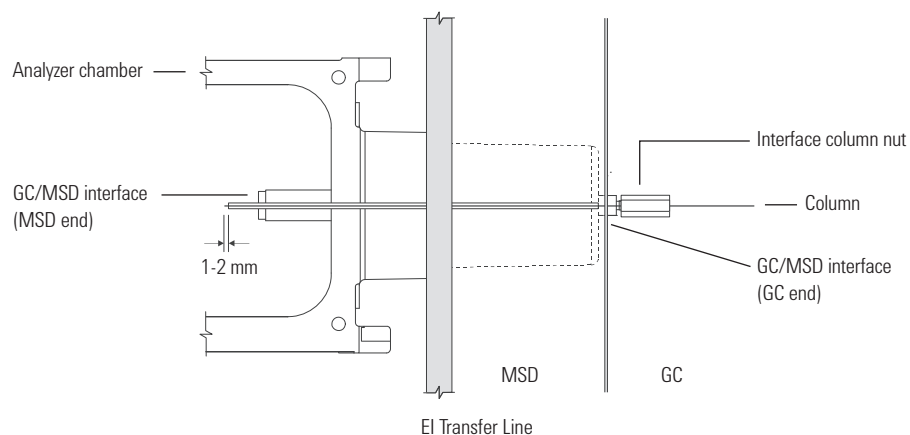
TIPS & TOOLS



View recommended MS interface connections.

Turn to page 38.

Installing a capillary column in the GC/MSD interface



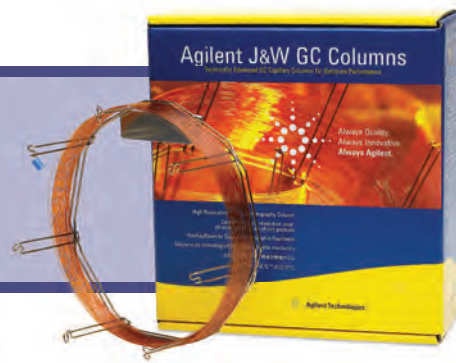
TIPS & TOOLS

The column installation procedure for 5977 MSDs is different from that for most previous MSDs. Using the procedure from another instrument may result in poor sensitivity and possible damage to the MSD.



TIPS & TOOLS

Agilent J&W GC Columns offer the lowest bleed levels, the best inertness for acids/bases/mixed functional compounds, and the tightest column-to-column reproducibility. Learn more at www.agilent.com/chem/mygccolumns



MSD Filaments

Like the filaments in an incandescent light bulb, the ion source filaments will eventually burn out. Certain practices will reduce the chance of early failure.

- When setting up data acquisition parameters, set the solvent delay so that the analyzer will not turn on while the solvent peak is eluting
- When the software prompts 'Override solvent delay at the beginning of a run' always select 'No'
- Higher emission current will reduce filament life
- If you control your MSD from the Edit Parameters screen, always select 'MS Off' before changing any of the filament parameters

MSD Filaments

| Description | 7200 Series | 7000 Series | 5977 Series | 5975 Series | 5975T Series | 5973 Series |
|--|-------------|-------------|-------------|-------------|--------------|-------------|
| Filament assembly, high temperature (EI) | G7005-60061 | G7005-60061 | G7005-60061 | G7005-60061 | G7005-60061 | G7005-60061 |
| Filament assembly (CI), 2/pk | G7005-60072 | G7005-60072 | G7005-60072 | G7005-60072 | | G7005-60072 |
| Micro ion vacuum gauge | G3170-80001 | G3170-80001 | G3170-80001 | G3170-80001 | | |
| Triode gauge tube for measuring vacuum | | | | | | 0960-0897 |
| Ion gauge controller | | | G3397B | G3397A | G3880-80010 | |
| Ion gauge tube | | | | | G3880-80011 | |



Filament assembly, high temperature (EI), G7005-60061



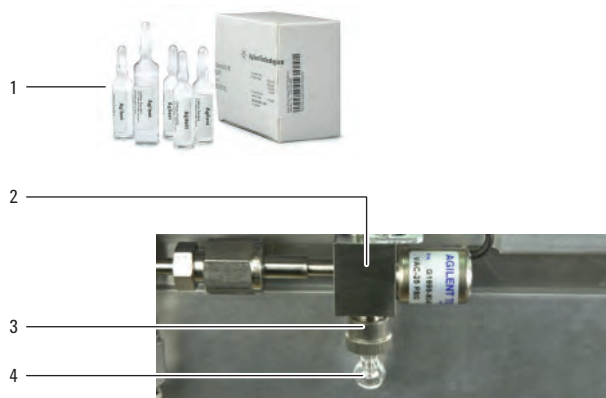
Filament assembly (CI), G7005-60072

TIPS & TOOLS



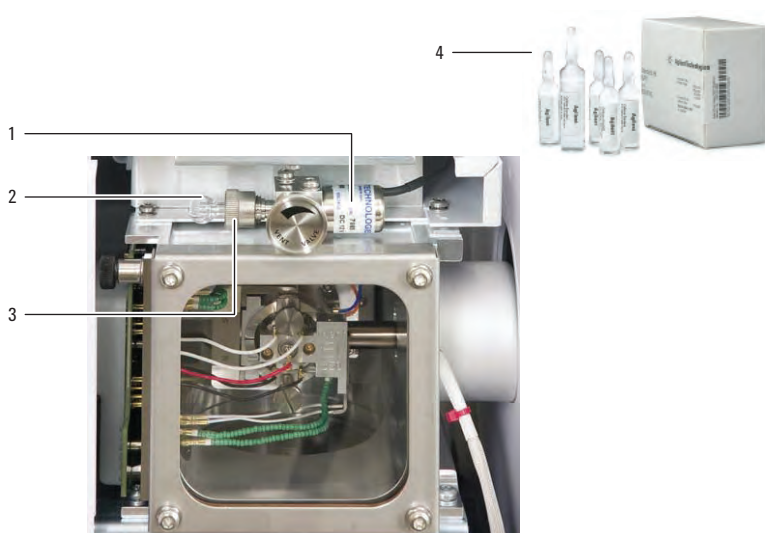
It is very useful to switch from one filament to the other every three months so that when a filament fails, you know the other will fail soon. This will allow you to change both filaments at the same time. Since the GC/MS system is already vented, it's a good idea to replace other supplies in the flowpath at the same time as the filaments.

Vent Valve Supplies



CI Valve Supplies

| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 1 | PFDTD calibrant, for GC/MS, perfluoro-5,8-dimethyl-3, 6,9-trioxidodecane | 1 mL | 8500-8510 |
| 2 | CI Cal valve assembly | | G1999-60452 |
| 3 | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 4 | 5975 Calibrant bulb | | G3170-80002 |



Vent Valve Supplies

| Item | Description | Unit | Part No. |
|------|---|--------|-------------|
| 1 | 5975 EI CalVal turbo | | G3170-60204 |
| 2 | 5975 Calibrant bulb | | G3170-80002 |
| 3 | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 4 | PFTBA MS sample kit | 0.5 mL | 05971-60571 |



Replacement Agilent Gas Clean carrier gas filter, CP17973

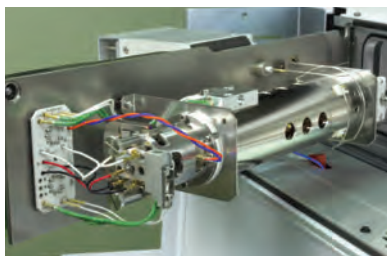
Gas Clean Filters

The Agilent Gas Clean Filter System delivers clean gases, reducing the risk of column damage, sensitivity loss and instrument downtime. Inserting a Gas Clean Filter System in the gas line immediately before the instrument inlet greatly reduces the level of impurities, thus improving trace analysis. Contaminants entering your GC column will also be reduced, which is critical for high temperature analysis and essential for longer column lifetime.

- Deliver clean gases for accurate analyses
- Fast, leak-free filter replacement reduces downtime
- Economical, with immediate payback
- Highly sensitive filter indicators provide maximum instrument protection

Gas Filters

| Description | Part No. |
|---|-------------|
| Chemical ionization gas purifier | G1999-80410 |
| Gas Clean carrier gas starter kit for 7890 | CP17988 |
| Replacement Agilent Gas Clean carrier gas filter | CP17973 |
| Big universal trap, 1/8 in fittings, nitrogen, for 7000 and 7200 Series | RMSN-2 |



Quadrupole Mass Filter

The mass filter does not require periodic maintenance. It should not be removed from the radiator or disturbed in any way.

- Never put the quadrupole in an ultrasonic cleaner.
- Never change the physical orientation of the quadrupole mass filter.
- The fused-quartz quadrupole is fragile and will break if dropped or handled roughly.
- The material in the cusps of the quadrupole is very hygroscopic. If exposed to water, the quadrupole must be dried very slowly to prevent damage.
- Cleaning techniques that are appropriate for other manufacturers' instruments are not suitable for Agilent MSDs – and may actually harm the mass filter.
- To save time and effort, use only Agilent MSD mass filters, which do not require periodic cleaning or maintenance.
- In case of extreme contamination, contact a trained Agilent service representative to perform the mass filter cleaning.

MSD Electron Multipliers and Replacement Horn

The lifetime of an electron multiplier is directly related to the current that flows through it and the extent of contamination or condensation that it experiences. Replace the electron multiplier or replacement horn when voltage is over 2500 V. To maximize electron multiplier life:

- Maintain the best possible vacuum, especially in the analyzer manifold
- Use extreme caution and be conservative with venting, pumpdown, and all vacuum system procedures to keep pump fluid background to a minimum
- After venting, allow four hours for pumpdown and thermal equilibration before scanning
- Actively look for background contamination and leaks and repair them immediately
- Don't tune excessively – PFTBA can result in higher background over an extended period of time
- Replace the electron multiplier if vacuum is poor or voltage is over 2600 V



Triple axis electron multiplier, G3170-80103

MSD Electron Multipliers and Replacement Horn

| Description | 7000A Series | 7000B/C Series | 5975 Series | 5973 Series | 5977 Series |
|---|--------------|----------------|-------------|-------------|-------------|
| Electron multiplier replacement horn Use with electron multipliers with "straight" horns | | | 05971-80103 | 05971-80103 | |
| Triple axis detector assembly* | G3170-80100 | | G3170-80100 | | G3170-80100 |
| Triple axis electron multiplier | G3170-80103 | G3170-80103 | G3170-80103 | | G3170-80103 |
| EM signal wire, low noise detector | | | G3170-80008 | | G3170-80008 |

*Included on 5975 triple axis detector systems

TIPS & TOOLS

The Agilent multipliers and horns listed are recommended for your MSD. Other manufacturers' products may be incompatible with Agilent instruments and can result in reduced sensitivity, lifetime, and noise problems.





Vacuum Systems and Pumps

The vacuum system creates the high vacuum (low pressure) required for the MSD to operate. Without this vacuum, the molecular mean free path is too short.

Ions cannot travel from the ion source through the mass filter to the electron multiplier (detector) without colliding with other molecules.

The main components of the vacuum system are:

- Vacuum manifold
- Foreline gauge
- Calibration valve
- Gauge controller (optional)
- Vacuum seals
- Foreline pump and/or trap
- Diffusion/turbo pump and fan
- High vacuum gauge tube

Pressure Symptoms

This section describes unusual pressure readings and their possible causes. The symptoms in this section are based on typical pressures. At typical column flow rates (0.5-2.0 mL/min), the foreline pressure will be approximately 20 to 100 mTorr. The vacuum manifold pressure will be approximately 1×10^{-6} to 1.4×10^{-4} Torr.

These pressures can vary widely from instrument to instrument, so it is important that you are familiar with the pressures that are typical for your instrument at a given carrier gas flow and oven temperature.

The foreline pressures listed can only be measured on diffusion pump-equipped systems. Turbomolecular pumps are controlled according to their speed and do not have foreline pressure gauges.

The vacuum manifold pressures can only be measured if your system is equipped with the optional gauge controller.

TIPS & TOOLS



Keeping a pan under the vacuum pump helps to detect and identify the origin of oil leaks.

Pressure Symptoms

Symptoms

Possible Causes

Foreline pressure is too high

- | | |
|--|---|
| <ul style="list-style-type: none"> • Pressure is above 100 mTorr. • Pressure for a given column flow has increased over time | <ul style="list-style-type: none"> • Column (carrier gas) flow is too high • Wrong carrier gas • Air leak (normally at transferline interface) • Foreline pump oil level is low or oil is contaminated • Foreline hose is constricted • Foreline gauge is not working correctly • Foreline pump is not working correctly |
|--|---|

Foreline pressure is too low

- | | |
|---|---|
| <ul style="list-style-type: none"> • Pressure is below 20 mTorr. | <ul style="list-style-type: none"> • Column (carrier gas) flow is too low • Wrong carrier gas • Column plugged or crushed by an overtightened nut • Empty or insufficient carrier gas supply • Bent or pinched carrier gas tubing • Foreline gauge is not working correctly |
|---|---|

Vacuum manifold pressure is too high

- | | |
|---|---|
| <ul style="list-style-type: none"> • Pressure is above 1.4×10^{-4} Torr. • Pressure for a given column flow has increased over time | <ul style="list-style-type: none"> • Column (carrier gas) flow is too high • Wrong carrier gas • Air leak • Foreline pump is not working correctly • Diffusion pump fluid level is low or fluid is contaminated • Defective gauge controller • Faulty ion gauge tube |
|---|---|

Vacuum manifold pressure is too low

- | | |
|---|---|
| <ul style="list-style-type: none"> • Pressure is below 1.4×10^{-4} Torr. | <ul style="list-style-type: none"> • Column (carrier gas) flow is too low • Wrong carrier gas • Column plugged or crushed by an overtightened nut • Empty or insufficient carrier gas supply • Bent or pinched carrier gas tubing • Defective gauge controller • Faulty ion gauge tube |
|---|---|

Diffusion Pump

It is not necessary to change the diffusion pump fluid more than once a year, unless you observe symptoms that suggest a problem with the fluid. The MSD must be vented in order to check the diffusion pump fluid (except for the 5977/5975/5973). Therefore, the best time to check the fluid is when the instrument is already vented for other maintenance.

How to Check the Fluid Level

5977/5975/5973 Series

- Use the sight glass to determine the depth of the fluid. The recommended total fluid charge is approximately 37 mL. Two charges are used for the 5977/5975/5973.



5977A Series GC/MSD system

Quiet Cover

Agilent has a solution to the annoying, frequent maintenance of GC/MS rough pumps (visual check of oil levels, oil changes, oil additions, cleanup of oil leaks, etc.), as well as the inherent noise produced by the pumps.

The Quiet Cover GC/MS was designed for easy movement, maintenance, and better living with rough pumps used with Agilent and other GC/MS systems.

The Quiet Cover GC/MS is compatible with rough pump models used in many laboratories, including the Agilent DS42, Agilent DS42i, Pfeiffer Duo 2.5, and Edwards E2M1.5. This quiet cover model is compatible with Agilent 5977 GC/MS, 5975 GC/MS and 5973 GC/MS systems.

For more Information Visit: www.agilent.com/chem/quietcover

Quiet Cover

| | |
|-------------------|--------|
| Quiet Cover GC/MS | G6014A |
|-------------------|--------|

The G6012A Quiet Cover DS is used with the 7200 GC-QTOF and requires an extra filter extension and seal.

Quiet Cover DS

| | |
|---|-----------|
| Quiet Cover DS | G6012A |
| Filter extender tube, NW 25 x 100 mm* | 5188-1181 |
| Clamping ring, NW 20/25, stainless steel* | 0100-0549 |
| Co-seal, NW 20/25, filter extender tube* | 0100-1597 |

*Parts required for use with Quiet Cover DS and a 7200 GC-QTOF



Quiet Cover GC/MS



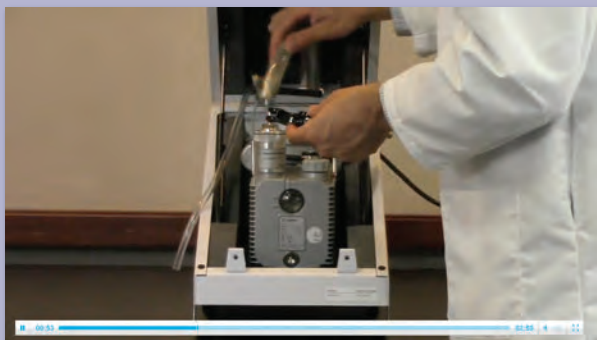
Quiet Cover GC/MS, with open-access cover



Quiet Cover DS, G6012A

TIPS & TOOLS

Find out how to quiet your rough pump once and for all at www.agilent.com/chem/quietcovervideo





Foreline Pump

Foreline Pump

The oil in the foreline or rough pump should be replaced on average once every six months, but can vary depending upon applications. If a foreline trap is present, the molecular sieves should also be replaced after an oil change.

Avoid contact with the pump oil. The residue from some samples may be toxic. Dispense of used oil properly.

Pump Oils

| Description | Part No. |
|---|-------------|
| Foreline pump (rotary pump) oil, Inland 45, 1 L | 6040-0834 |
| Diffusion pump fluid, 18.5 mL | 6040-0809* |
| Oil mist exhaust filter | G1099-80039 |
| Inland 45 pump oil, 1 gallon | 6040-0798 |
| Foreline (roughing) pump oil, 1 L | 8829951700 |
| Oil for vacuum pumps, 1 L, petroleum-based, used on 7000 Series | 6040-1361 |
| Oil, Edwards Ultragrade for RV3 and RV5 pumps | G6600-85002 |

*2 required for 5977, 5975 and 5973 Series



General Instructions on How to Replace the Pump Oil

1. Vent and shut down the MSD.
2. Place a container under the drain plug on the foreline pump.
3. Remove the fill cap from the top of the pump to expose the fill hole.
4. Remove the drain plug from the pump.
5. Reinstall the drain plug and pour pump oil into the fill hole.
6. Reinstall the fill cap.
7. Reconnect the MSD power cord.
8. Start up and pump down the MSD according to the Instrument Manual procedure.

7000 Triple Quadrupole GC/MS

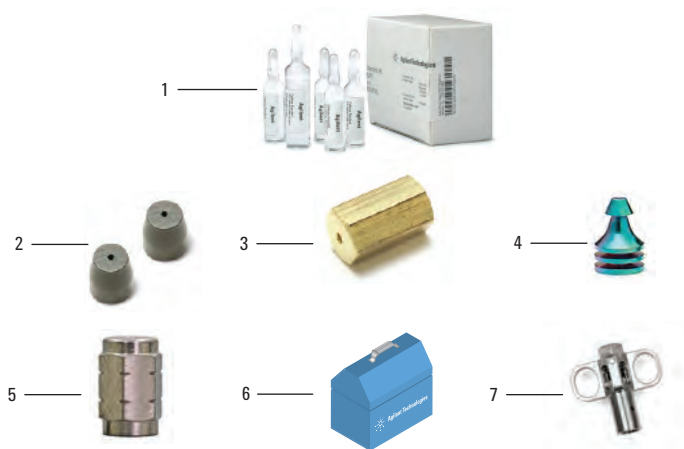
Precision, reliability and the lowest detection limits

The 7000C Triple Quadrupole GC/MS was designed to deliver the most accurate quantitative results and confident identification even in the most complex matrixes. Coupled with the 7890B GC, the 7000C MS works in perfect harmony to enhance productivity, save resources and alert you when maintenance is pending. Agilent MassHunter software has enhanced MRM optimization tools, giving you complete control from tune to report generation while streamlining your workflow.

- Second-generation extractor ion source: the high sensitivity EI extractor ion source with improved thermal characteristics delivers confident trace analysis even in complex matrixes. We demonstrate the instruments' detection limit of ≤ 4 fg octafluoronaphthalene at installation.
- Hyperbolic quadrupoles enhance performance up to 1050 u. The unique stability of the proprietary Gold Quadrupole allows the analyzer to be heated to 200 °C, to eliminate contamination commonly seen with metal quadrupoles operated at lower temperatures.
- The triple-axis HED-EM detector reduces neutral noise by the doubly off-axis position of the HED-EM.
- The MRM optimization tool allows for automated, efficient method development, yet is easily customizable.
- Capillary Flow Technology (CFT) adds functionality to the GC with backflush, Dean switching, or splitters for multiple detectors. CFT also enables reliable, leak-free in-oven connections.
- The programmable helium conservation module reduces helium consumption for GC and GC/MS systems by changing an alternate carrier during system stand-by. You program carrier gas changeover and flows during sleep and wake states. Programmable helium conservation eliminates the revalidation of methods required when converting to other carrier gases.
- The Pesticides and Environmental Pollutants Database provides comprehensive information to help you with simple yet flexible MS/MS method development.
- Retention Time Locking software reproduces retention times from one Agilent GC to another to help transfer methods anywhere, worldwide.
- Early maintenance feedback (EMF) monitors GC and MS resources, with injection counter, operation times, and electronic logs to help you plan maintenance more efficiently.



7000C Triple Quadrupole GC/MS



7000 Triple Quad GC/MS Interface Parts and Standards

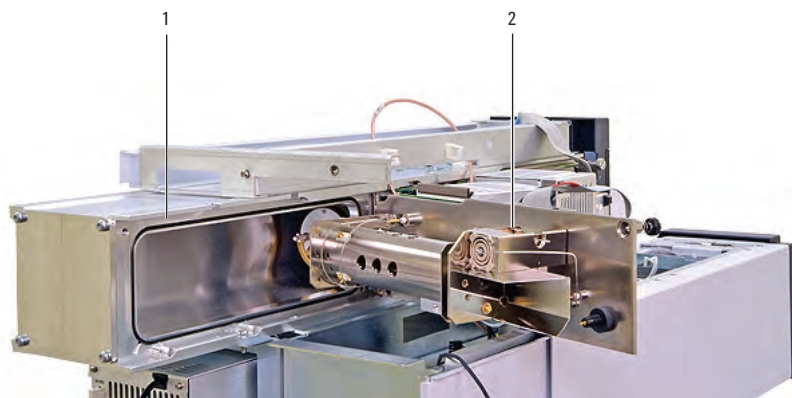
| Item | Description | Unit | Part No. |
|------|--|-------------------|-------------|
| 1 | OFN, 100 fg/μL | 3 x 1 mL ampoules | 5188-5347 |
| | OFN, 10 fg/μL | 3 x 1 mL ampoules | 5190-0585 |
| | OFN, 1 pg/μL | 3 x 1 mL ampoules | 5188-5348 |
| | Benzophenone, 100 pg/μL | 5 ampoules | 8500-5440 |
| | PFHT-high mass checkout sample, 10 μg/mL PFHT (Tris(perfluoro- heptyl)-s-triazine) in Hexane | 3 x 1 mL ampoules | 5188-5357 |
| 2 | Capillary column long ferrule | 10/pk | 5181-3308 |
| | 250 μm Polyimide/graphite ferrule | 10/pk | 5181-3323 |
| | 0.5 mm Polyimide/graphite ferrule | 10/pk | 5062-3506 |
| | 0.3 mm, 100 μm Polyimide ferrule | 10/pk | 5062-3507 |
| 3 | MS interface column nut, female | | 05988-20066 |
| 4 | UltiMetal Plus Flexible Metal ferrule with 0.4 mm id | 10/pk | G3188-27501 |
| | UltiMetal Plus Flexible Metal ferrule with 0.5 mm id | 10/pk | G3188-27502 |
| | UltiMetal Plus Flexible Metal ferrule with 0.8 mm id | 10/pk | G3188-27503 |
| | UltiMetal Plus Flexible Metal ferrule with no hole | 10/pk | G3188-27504 |
| 5 | Swaging nut, for MS interface with Flexible Metal ferrules | | G2855-20555 |
| 6 | MS interface column installation tool | | G1099-20030 |
| | Ferrule pre-swaging tool | | G2855-60200 |
| | Open end wrench, 1/4 and 5/16 in | | 8710-0510 |
| | Nylon gloves, lint-free, large | 1 pair | 8650-0030 |
| 7 | Self Tightening column nut, for MS interface | | 5190-5233 |

TIPS & TOOLS



View MS interface connection options including the recommended Self Tightening column nut.

Turn to page 38.



7000 Triple Quad Rear Analyzer Chamber

| Item | Description | Unit | Part No. |
|------|--------------------------|------|-------------|
| 1 | High vacuum grease | 25 g | 6040-0289 |
| 2 | Electron multiplier horn | | G7000-80103 |
| | Low noise EM horn | | G3170-80103 |

TIPS & TOOLS

To learn more about the Agilent 7000C Triple Quadrupole GC/MS, visit www.agilent.com/chem/7000C





7000A Triple Quadrupole GC/MS

7000 Triple Quadrupole GC/MS Parts and Supplies

Engineered from the ground up for ease-of-use and routine high performance operation, the 7000 Triple Quadrupole GC/MS delivers advanced high-speed GC/MS/MS quantitation for ultra-trace analysis of even the most complex samples. Combined with the Agilent 7890 GC, the result is an optimally robust GC/MS/MS system.



Low noise EM horn, G3170-80103



Cotton swabs, 5080-5400

Maintenance Supplies

| Description | Part No. |
|--|-------------|
| Abrasive sheets | 5061-5896 |
| Alumina powder, abrasive, 100 g | 393706201 |
| Cloths, lint-free | 05980-60051 |
| Lint-free industrial wipes, 100% cotton | 9310-4828 |
| Swabs for cleaning GC/MS | 5080-5400 |
| Nylon gloves, lint-free, large | 8650-0030 |
| Nylon gloves, lint-free, small | 8650-0029 |
| High vacuum grease, 25 g | 6040-0289 |
| Low noise EM horn | G3170-80103 |
| Filament assembly, high temperature (EI) | G7005-60061 |
| Filament assembly (CI), 2/pk | G7005-60072 |
| Manifold vacuum gauge | G1960-80303 |
| Replacement glass bulb for PFTBA and PFDTD test sample | G3170-80002 |

7200 Q-TOF for GC/MS

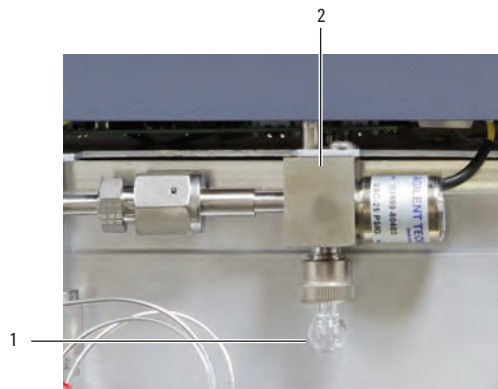
Detection and selectivity of targets and unknowns with complete confidence

Complex matrix analyses demand your best qualitative GC data. That's why we designed the Agilent 7200 Q-TOF for GC/MS, the world's first Q-TOF purpose built specifically for gas chromatography. The 7200 Q-TOF redraws the boundaries of GC/MS technology by combining the separation power of Agilent's 7890 Series GC with application-tested MS components from our 7000 Triple Quadrupole GC/MS and 6500 LC/Q-TOF systems. You get robust GC/MS operation, outstanding selectivity, full-spectrum acquisition with high sensitivity, fast data rates, and accurate mass information to simplify molecular characterization and structural confirmation.



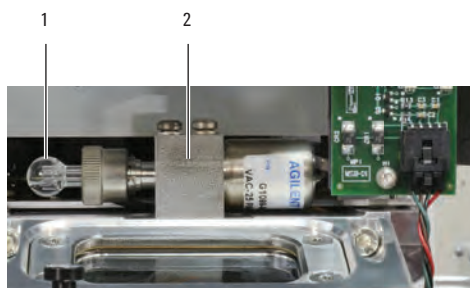
7200 Q-TOF for GC/MS

- Highly accurate mass assignments: low-ppm mass accuracy – combined with 15x to 50x greater resolution than a single quadrupole MS – gives you the power to analyze target, non-target, and unknown compounds with much greater reliability. In addition, the 7200 GC/Q-TOF uses dual gain amplifiers with dual analog-to-digital (ADC) detection to record multiple events over a wide mass range and concentration range.
- High sampling rate (32 Gbit/s): the 4 GHz ADC electronics improve resolution, mass accuracy, and sensitivity for low-abundance samples.
- 24/7 mass accuracy: our proprietary invar flight tube, sealed in a vacuum-insulated shell, stabilizes mass calibration against thermal change.
- Fast, high-quality MS/MS spectra: ions are accelerated in Agilent's unique hexapole collision cell.
- Fast routine maintenance: the removable ion source permits rapid changing of the entire ion source, lens, and filaments, without venting the high vacuum mass analyzer.
- Low detection limits and excellent linearity: a full spectrum with sensitivity better than quadrupole MS lets you capture accurate mass spectra at low pg on-column for most compounds. The dual-gain mode expands this range to 105.
- Unparalleled MS/MS selectivity: the detection selectivity of high-resolution MS/MS dramatically surpasses other MS/MS analyzers. Moreover, accurate mass product-ion spectra help confirm targets and non-targets, as well as elucidate unknown compounds.
- Agilent MassHunter software provides valuable tools for identification, quantitation, and confirmation: you can find compounds in complex samples by applying deconvolution optimized for EI or CI data, simplify compound identification by combining library search results and calculated formulas for molecular and fragment ions, and perform multivariate statistical analysis on several data files using Mass Profiler Professional – a mass spectrometry-centric program.



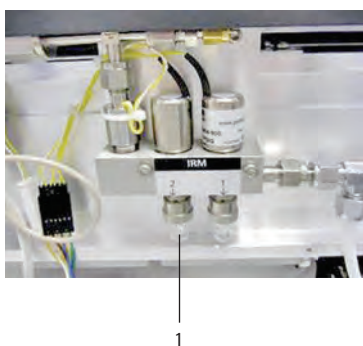
7200A Q-TOF CI Calibration Valves

| Item | Description | Unit | Part No. |
|------|--|-------|-------------|
| 1 | Replacement glass vial for PFTBA and PFDTD test sample | | 05980-20018 |
| | PFDTD calibrant, for GC/MS, perfluoro-5,8-dimethyl-3, 6,9-trioxidodecane | 1 mL | 8500-8510 |
| | 5975 Calibrant bulb | | G3170-80002 |
| 2 | CI Cal valve assembly | | G1999-60452 |
| | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 3 | PFDTD calibrant, for GC/MS, perfluoro-5,8-dimethyl-3, 6,9-trioxidodecane | 1 mL | 8500-8510 |



7200A Q-TOF EI Calibration Vials

| Item | Description | Unit | Part No. |
|------|---|--------|-------------|
| 1 | 5975 Calibrant bulb | | G3170-80002 |
| 2 | Certified non-stick fluorocarbon O-ring | 10/pk | 5188-5365 |
| 3 | PFTBA MS Sample Kit | 0.5 mL | 05971-60571 |



7200A Q-TOF IRM Vials

| Item | Description | Unit | Part No. |
|------|--|------------|-------------|
| 1 | Replacement glass vial for PFTBA and PFDTD test sample | | 05980-20018 |
| | 5975 Calibrant bulb | | G3170-80002 |
| | IRM calibrant for GC/TOF | 1 x 0.5 mL | 5190-0531 |
| 2 | PFTBA sample, certified | 10 g | 8500-0656 |

TIPS & TOOLS

To learn more about the capabilities of the Agilent 7200 Q-TOF for GC/MS, visit www.agilent.com/chem/GCMS_QTOF



240-MS Ion Trap Parts and Supplies

The Agilent 240-MS Ion Trap delivers unparalleled capabilities for both research and routine applications. Advanced ionization, including positive and negative chemical ionization, improves selectivity and limits of detection. Enhanced scanning techniques ensure compound confirmation. The MS/MS and MSⁿ reduce matrix influences and provide more detailed structural information. The software comes with a full complement of productivity, reporting, and regulatory compliance tools.

- Accurate identification and quantification of trace analytes
- Unsurpassed sensitivity (200 femtogram OFN full scan)
- Choice of internal or external ionization configurations
- Powerful MS/MS and CI options
- Low maintenance and high reliability
- Intuitive software for increased productivity



TIPS & TOOLS



Need GC supplies for your non-Agilent instruments? Check out the Agilent CrossLab supplies for Bruker/Varian GC Systems.

Turn to page 206.

240-MS Ion Trap Parts and Supplies

| Description | Part No. |
|--|-----------------|
| Manifold O-ring | 393010924 |
| Transfer line inner O-ring | 393010920 |
| Transfer line outer O-ring | 393010918 |
| Internal filaments (2 filaments on one disk) | 392017401 |
| Internal transfer line tip | 393171201 |
| External filament (single filament) | 393161001 |
| Electrode, end cap, SilChrom | 393164493 |
| Electrode set kit, SilChrom, DFC (inert) tested Includes 2 end cap electrodes, 1 RF electrode, cleaning instructions | 9300003590 |
| Electrode, RF, SilChrom | 393167593 |
| Spacer, RF, silco-quartz | 393053502 |
| Electron multiplier | 393175101 |
| Transfer line assembly upgrade field kit Contains a complete transfer line and side-mounted block for vacuum manifold | 393101291 |
| EPA volatile kit for EPA methods 524.2 & 8260B | 393082491 |
| ChromatoProbe microvials, 100/pk | 392567111 |
| GC/MS Standards | |
| Evaluation standard (Internal EI & CI) 2 pg/μL OFN, 5 pg/μL benzophenone | 393112601 |
| Test standard for external EI (5 pg/μL OFN) | 393112702 |
| Benzophenone CI sensitivity standard 50 pg/μL | 392030500 |
| Test standard for external NCI (1 pg/μL DFB) | 393113001 |
| Tuning calibration compound PFTBA (FC-43) | 392035300 |
| GC/MS column test mix | 392027300 |
| Vacuum Supplies | |
| Oil mist exhaust filter, DS42 | 393847701 |
| Oil mist eliminator | 2735000500 |
| Quiet Cover GC/MS | G6014A |
| Replacement cartridge for oil exhaust filter, 2/pk | 2710100200 |
| Foreline (roughing) pump oil, 1 L | 8829951700 |
| Premium foreline (roughing) pump oil, 1 L | 8829953800 |
| IDP-3 dry scroll pump tip seal maintenance kit | 2710100400 |
| IDP-3 dry scroll replacement module | 2710100500 |

220-MS Parts and Supplies

The 220-MS is a high sensitivity, flexible gas chromatograph/mass spectrometer that delivers outstanding qualitative and quantitative data in a range of applications. This simple and robust system is easy to operate and maintain.

- Accurately identify and quantify trace analytes
- Take advantage of powerful CI and MS/MS upgrades for advanced applications
- Spend less time on maintenance and more time on analysis

220-MS Parts and Supplies

| Description | Part No. |
|--|------------|
| Electron multiplier assembly | 393031501 |
| Exit end cap electrode, chrome | 393050292 |
| Exit end cap electrode, SilChrom | 393050293 |
| Filament end cap electrode, chrome | 393050392 |
| Filament end cap electrode, SilChrom | 393050393 |
| RF ring electrode, chrome | 393050492 |
| RF ring electrode, SilChrom | 393050493 |
| Complete set of SilChrom electrodes and silco-quartz spacers | 393001991 |
| Spacer, RF, quartz | 393053501 |
| Spacer, RF, silco-quartz | 393053502 |
| Filament disk assembly with wire connectors | 393060191 |
| Filament disk assembly User must solder on 3 wire connectors | 392043700 |
| Thermocouple vacuum gauge | 2722990700 |
| Mass spectrometer expendable supplies kit for 2x0MS Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil | 393011391 |
| GC/MS Standards | |
| Benzophenone CI sensitivity standard 50 pg/μL | 392030500 |
| Tuning calibration compound PFTBA (FC-43) | 392035300 |
| Hexachlorobenzene EI sensitivity standard 2 pg/mL | 392047100 |
| GC/MS column test mix | 392027300 |



GC/MS Standards

GC/MS Analyzer Kit Standards

| Description | Part No. |
|--|-------------|
| GC/MS semivolatiles analyzer checkout mixture | 5190-0473 |
| Solvents plus checkout mix for 3 in 1 environmental analyzer | G3440-05012 |
| GC/MS pesticide analyzer internal standard, phenanthrene-d10 at 1000 µg/mL in methylene chloride, 4 x 1 mL | 5190-0472 |
| Pesticide analyzer checkout solution, 20 pesticides at 10 µg/mL each in acetone, 5 x 1 mL | 5190-0468 |
| Pesticide checkout standard, 100 µg/L, 3 x 1 mL | 5190-0494 |
| GC/MS toxicology checkout mixture | 5190-0471 |
| Residual solvent revised method 467, class 2A, 1 x 1 mL | 5190-0492 |
| Residual solvent revised method 467, class 2B low | 5190-0513 |
| Residual solvent revised method 467, class 2B, 1 x 1 mL | 5190-0491 |
| Residual solvent revised method 467, class 2C, 1 x 1 mL | 5190-0493 |
| Residual solvent revised method 467, class 1 | 5190-0490 |
| Butanetriol internal standard #1 for biodiesel | 5982-0024 |
| Tricaprin internal standard #2 for biodiesel | 5982-0025 |
| Pesticide retention locking standard, 3 pesticides at 10 µg/mL each in n-hexane, 3 x 1 mL | 5190-1441 |
| Glycerol calibration standards kit, 5 x 1 mL | G3440-85028 |
| Standard glycerides stock solution in THF, 1 x 2 mL | G3440-85018 |
| FAME retention time standard in toluene, 5 x 2 mL | G3440-85027 |
| Methyl nonadecanoate in toluene, 5 x 10 mL | G3440-85026 |
| Solvents-plus checkout mix, 3 x 2 mL | G3440-85012 |
| Transformer Oil Gas Analyzer checkout mix, 17 L SCOTTY cylinder | G3440-85007 |
| PAH Analyzer checkout standard, 5 x 2 mL | G3440-85009 |
| C6 to C12 normal hydrocarbon mix, 3 x 2 mL | G3440-85013 |
| Natural gas analyzer checkout mix, 14 L SCOTTY cylinder | G3440-85017 |
| Methylheptadecanoate-d33 in dodecane, 3 x 2 mL | G3440-85029 |
| Ethanol calibration kit for blood alcohol analyzer | G3440-85035 |
| Multicomponent alcohol kit for blood alcohol analyzer | G3440-85036 |



MS standards

MS Test and Performance Samples

| | Description | Part No. | 5977/ 5975 Series | 5973 Series | 5972 Series | GCD | 7000 Series | 7200 Series |
|---|---|-------------|-------------------------|----------------|----------------|-----|----------------|----------------|
| Tuning Samples | | | | | | | | |
| El Tune | PFTBA sample, certified, 10 g, 5.32 mL | 8500-0656 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CI Tune | PFDTD calibrant | 8500-8510 | ✓ | ✓ | | | ✓ | ✓ |
| Performance Verification Samples | | | | | | | | |
| EI | OFN, 1 pg/μL | 5188-5348 | ✓ | ✓ | | | | |
| | Hexachlorobenzene 10 pg/μL, 1 ng/μL | 8500-5808 | | | ✓ | | | |
| | MSD Sampler | 05970-60045 | | | | ✓ | ✓ | |
| Negative Mode CI | OFN, 100 fg/μL | 5188-5347 | ✓ | | | | | |
| Positive Mode CI | Benzophenone, 100 pg/μL | 8500-5440 | ✓ | ✓ | ✓ | | | |
| | 1 pg/μL OFN, 5 pg/μL BZ | 393065201 | | | | | ✓ | |
| Checkout Samples | | | | | | | | |
| HighMass | PHFT, 100 pg/μL | 5188-5357 | ✓ | | | | | |
| Semivolatiles | GC/MS tuning standard, DFTPP | 8500-5995 | ✓ | ✓ | ✓ | ✓ | | |
| Volatile | p-Bromofluorobenzene (BFB), 25 μg/mL | 8500-5851 | ✓ | ✓ | ✓ | ✓ | | |
| MSD sampler | Solution of dodecane, biphenyl, p-chlorodiphenyl, and methyl palmitate in isooctane. Six 1.0 mL ampoules: 4 at 10 ng/μL, 1 at 100 ng/μL, 1 at 100 pg/μL. | 05970-60045 | ✓ | ✓ | ✓ | ✓ | ✓ | |



TIPS & TOOLS

Each GC/MS has a specific test and performance sample. Refer to the chart above for the exact sample. All volumes are approximately 0.5-1 mL unless otherwise specified.

Agilent Syringes

With a broad selection of syringes for manual and auto injectors, Agilent has what you need for accurate and effective sampling.

Whether you need an autosampler or manual syringe, there are two keys to choosing the right syringe – identifying your sample type and establishing the smallest volume to be dispensed or injected. Agilent offers two varieties of syringes.

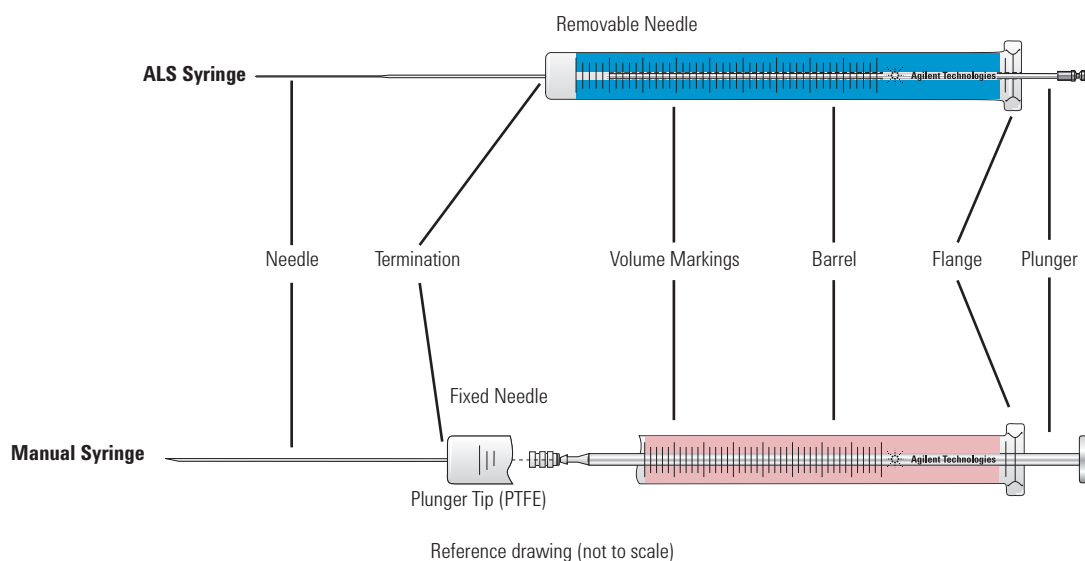
PTFE-Tipped Syringes for Gases and Liquids

PTFE-tipped syringes have a precision-machined plunger tip that forms a tight seal and enables the tip to wipe the barrel's interior free of sample during operation. This feature is particularly useful for viscous or heterogeneous samples, because it reduces deposits that can cause the plunger to freeze. Replacement plunger assemblies are available for most PTFE-tipped syringes.

Fitted Plunger Syringes for Liquids

Fitted plunger syringes feature a stainless steel plunger that is meticulously hand-fitted to its matching glass barrel, creating a liquid-tight seal. These syringes are ideal for homogenous samples that are not prone to precipitation or bonding with glass. **Note:** plungers cannot be interchanged or replaced if damaged.

Syringe Features



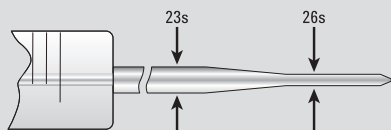


Needle Gauge

Needle gauge is the thickness of the needle. The gauge depends on the injector. When selecting a needle gauge, it is important to keep in mind the volume of the syringe and the dead volume of the needle. Refer to the chart below to choose a needle gauge with an appropriate dimension before selecting a needle.

Typical Needle Gauge Dimensions

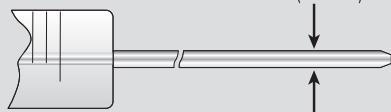
| Gauge | OD | | ID | |
|-------|-------|--------|------|--------|
| | mm | in | mm | in |
| 22 | 0.71 | 0.028 | 0.41 | 0.016 |
| 23s | 0.635 | 0.025 | 0.11 | 0.0045 |
| 25 | 0.50 | 0.020 | 0.20 | 0.008 |
| 26s | 0.47 | 0.0184 | 0.11 | 0.0045 |



Tapered Dual Gauge 23-26 or 23s-26s (0.64-0.47 mm)

Durability of a 23-gauge

Versatility of a 26-gauge for split/splitless and on-column injection

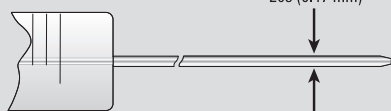


Single Gauge 23 or 23s (0.64 mm)

Merlin Microseal septa

Packed column injector ports

Split/splitless injector ports



Single Gauge 26 or 26s (0.47 mm)

Packed column injector ports

Split/splitless injector ports

Note: Needles with an 'S' following the gauge are more durable, with a thicker needle wall and smaller id bore.

Needle Termination

Needle terminations are available in fixed or removable, with various tip styles:

- **Fixed (cemented)** – Economical, reproducible injections for autosamplers
- **Removable needle** – One syringe fixed – many methods, simplicity of fixed needle, but needle can be replaced if damaged or clogged
- **Luer tip** – Easy, fast needle replacement, syringe filter or pump priming, Luer tip is ground glass suitable for mounting chromatographic or PTFE needles, syringes can be autoclaved (without plunger or needle)
- **Luer Lok** – Security of a locked needle, syringe filter or pump priming, PTFE, male Luer taper with nickel-plated brass locking hub for use with KEL-F or metal hub needles and universal connectors

Needle Tip Design



HP Tip
(also referred to as
Cone or Point Style AS)

Proprietary design required for Agilent autosamplers for optimal performance and reliability by reducing septum coring.



Bevel Tip
(Point Style 2, BV)

General purpose; excellent choice for transferring liquids from ampoules or vials. For manual GC injections, a beveled tip is preferred for optimum septum penetration and to prevent septum coring.



Side Hole
(Point Style 5)

Recommended for thin gauged septa or large volume injections.



Blue line autosampler syringe shown in 7693A ALS, G4513-80204

Autosampler Syringes

Premium autosampler syringes optimize system productivity and ensure precise sample handling

Agilent Blue Line Autosampler Syringes for 7693A ALS

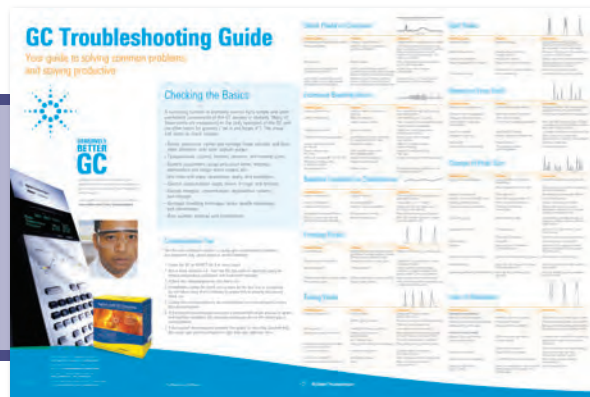
Agilent blue line autosampler syringes are specifically designed to support the higher productivity features of the 7693A ALS, while increasing plunger life and reducing costly downtime. Backed by over 40 years of chromatography experience, these meticulously crafted syringes offer:

- Wider range of volumes including exclusive 250 and 500 μ L syringes for sample enhancement with the new 7693A
- Precise match with your autosampler's stroking mechanism, resulting in more accurate volume delivered
- Smooth needle that reduces septum coring and keeps your system working at its full potential
- Choice of PTFE-tipped or metal fitted plunger to meet application needs
- Easy-open, environmentally friendly packaging
- Certified compliance with strict Agilent specifications



TIPS & TOOLS

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



Blue Line Autosampler Syringes with Fitted Plungers

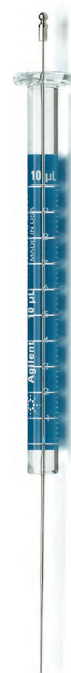
Fitted plunger syringes are recommended for homogeneous liquid samples. Each fitted syringe is individually matched with the plunger for precision injection. Plungers are not interchangeable or replaceable.

Blue Line Autosampler Syringes with Fitted Plungers

| Volume (µL) | Description | Unit | Needle Gauge/ Length (mm)/Tip | Part No. |
|-------------|----------------------------|------|----------------------------------|-------------|
| 0.5 | Plunger in needle, fixed | | 23/42/cone tipped | G4513-80229 |
| | Replacement needle/plunger | | | G4513-80240 |
| 1 | Plunger in needle, fixed | | 23/42/cone tipped | G4513-80215 |
| | Replacement needle/plunger | | | G4513-80239 |
| 5 | Straight, fixed | | 23/42/HP | G4513-80213 |
| | Straight, fixed | 6/pk | 23/42/HP | G4513-80205 |
| | Straight, fixed | | 26s/42/HP | G4513-80226 |
| | Straight, fixed | 6/pk | 26s/42/HP | G4513-80212 |
| | Tapered, fixed | | 23-26s/42/HP | G4513-80206 |
| | Tapered, fixed | 6/pk | 23-26s/42/HP | G4513-80201 |
| | Straight, removable | | 23/42/HP | G4513-80234 |
| | Replacement needle | 3/pk | 23/42/HP | G4513-80236 |
| | Tapered, removable | | 23-26s/42/HP | G4513-80224 |
| | Replacement needle | 3/pk | 23-26/42/HP | G4513-80225 |
| 10 | Straight, fixed | | 23/42/HP | G4513-80209 |
| | Straight, fixed | 6/pk | 23/42/HP | G4513-80202 |
| | Straight, fixed | | 26s/42/HP | G4513-80216 |
| | Straight, fixed | 6/pk | 26s/42/HP | G4513-80211 |
| | Tapered, fixed | 1/ea | 23-26s/42/HP | G4513-80204 |
| | Tapered, fixed | 6/pk | 23-26s/42/HP | G4513-80200 |
| | Straight, removable | | 23/42/HP | G4513-80235 |
| | Replacement needle | 3/pk | 23/42/HP | G4513-80236 |
| | Removable | | 23-26s/42/HP | G4513-80218 |
| | Replacement needle | 3/pk | 23-26/42/HP | G4513-80225 |
| 25 | Tapered, fixed | | 23-26/42/HP | G4513-80242 |
| 50 | Tapered, fixed | 1/ea | 23-26/42/HP | G4513-80244 |
| 100 | Tapered, fixed | 1/ea | 23-26/42/HP | G4513-80243 |



Blue line autosampler syringe, G4513-80205



Blue line autosampler syringe, G4513-80204

Blue Line Autosampler Syringes with PTFE-Tipped Plungers

Suitable for gas and liquid samples, the PTFE tip of the plunger creates a tight seal between the plunger and glass, helping to reduce carry-over and increase syringe lifetime. Replacement plungers are available.

Blue Line Autosampler Syringes with PTFE-Tipped Plungers

| Volume (µL) | Description | Unit | Needle Gauge/ Length (mm)/Tip | Part No. |
|-------------|--------------------------------------|------|----------------------------------|--------------|
| 10 | Straight, fixed | | 23/42/HP | G4513-80220 |
| | Straight, fixed | 6/pk | 23/42/HP | G4513-80210 |
| | Tapered, fixed | | 23-26/42/HP | G4513-80203* |
| | Replacement plunger for fixed needle | | | G4513-80227 |
| | Tapered, fixed | 6/pk | 23-26s/42/HP | G4513-80208 |
| | Straight, removable | | 23/42/HP | G4513-80219 |
| | Replacement needle | 3/pk | 23/42/HP | G4513-80236 |
| | Tapered, removable | | 23-26/42/HP | G4513-80233 |
| 25 | Straight, fixed | | 23/42/HP | G4513-80228 |
| | Tapered, fixed | | 23-26/42/HP | G4513-80241 |
| 50 | Straight, fixed | | 23/42/HP | G4513-80221 |
| | Tapered, fixed | | 23-26/42/HP | G4513-80223 |
| 100 | Tapered, fixed | | 23-26s/42/HP | G4513-80222 |

*Included in 7693A shipments



Needles, replacement, G4513-80236



Blue line autosampler syringe, G4513-60560

Advanced Sample Enhancement Autosampler Syringes with PTFE-Tipped Plungers

Used with the 7693A optional Enhanced Sample Handling Syringe Carriage, these syringes can eliminate analyst-to-analyst variability and reduce re-work in sample preparation, such as dilution and internal standard addition.

Advanced Sample Enhancement Autosampler Syringes with PTFE-Tipped Plungers

| Volume (µL) | Description | Needle Gauge/ Length (mm)/Tip | Part No. |
|-------------|------------------------------------|----------------------------------|-------------|
| 250 | Fixed, advanced sample enhancement | 23/42/HP | G4513-60560 |
| 500 | Fixed, advanced sample enhancement | 23/42/HP | G4513-60561 |

Gold Standard Autosampler Syringes

Use one needle and get the benefits of two. The upper portion of the tapered needle offers the strength of a 23-gauge needle, while the lower portion at 26s-gauge allows use with split/splitless or on-column injections with 0.53 mm id columns. All standard plungers are stainless steel.

Tapered Needle, 23-26s Gauge Autosampler Syringes

| Volume (μ L) | Description | Unit | Needle Gauge/ Length (mm)/ Tip | | Part No. |
|----------------------|--|------|--------------------------------------|--|-----------|
| | | | | | |
| 5 | Tapered, fixed | | 23-26s/42/HP | | 5181-1273 |
| | Tapered, fixed | 6/pk | 23-26s/42/HP | | 5181-8810 |
| | Tapered, removable | | 23-26s/42/HP | | 5182-0835 |
| | Replacement needle for 5 μ L syringe | 3/pk | | | 5182-0832 |
| 10 | Tapered, fixed | | 23-26s/42/HP | | 5181-1267 |
| | Tapered, fixed | 6/pk | 23-26s/42/HP | | 5181-3360 |
| | Tapered, removable | | 23-26s/42/HP | | 5181-3321 |
| | Replacement needle for 10 μ L syringe | 3/pk | | | 5181-3319 |
| | Tapered, fixed, PTFE-tipped plunger | | 23-26s/42/HP | | 5181-3354 |
| | Tapered, fixed, PTFE-tipped plunger | 6/pk | 23-26s/42/HP | | 5181-3361 |
| | Replacement plunger with PTFE tip for fixed needle 10 μ L syringe | | | | 5181-3365 |
| | Tapered, removable | | 23-26s/42/HP | | 5181-3356 |
| | Replacement plunger with PTFE tip for removable needle 10 μ L syringe | | | | 5181-3358 |
| 50 | Tapered, fixed, PTFE-tipped plunger | | 23-26s/42/HP | | 5183-0314 |
| 100 | Tapered, fixed, PTFE-tipped plunger | | 23-26s/42/HP | | 5183-2042 |





Autosampler Syringes

Straight Needle, 23 and 26s Gauge Autosampler Syringes

| Volume (μL) | Description | Unit | Needle Gauge/Length (mm)/Tip | Part No. |
|-------------|--|------|------------------------------|-----------|
| 1 | Cone-tipped | | 23/42/HP | 5188-5246 |
| 1 | Replacement needle/plunger for 1.0 μL syringe | | 23/42/HP | 5188-5370 |
| 0.5 | Replacement needle/plunger for 0.5 μL syringe | 1/ea | 23-26/42/HP | 5190-3193 |
| 2 | Cone-tipped | | 23/42/HP | 5188-5247 |
| | Replacement needle/plunger for 2.0 μL syringe | | 23/42/HP | 5188-5371 |
| 5 | Straight, fixed | | 26s/42/HP | 9301-0891 |
| | Straight, fixed | 6/pk | 26s/42/HP | 5183-4728 |
| | Straight, fixed | | 23/42/HP | 9301-0892 |
| | Straight, fixed | 6/pk | 23/42/HP | 5182-0875 |
| | Straight, removable | | 23/42/HP | 5182-0834 |
| | Replacement needle for 5 μL syringe | 3/pk | | 5182-0830 |
| 10 | Straight, fixed | | 26s/42/HP | 9301-0714 |
| | Straight, fixed | 6/pk | 26s/42/HP | 5183-4729 |
| | Straight, fixed | | 23/42/HP | 9301-0713 |
| | Straight, fixed | 6/pk | 23/42/HP | 9301-0725 |
| | Straight, fixed, PTFE-tipped plunger | | 23/42/HP | 5181-8809 |
| | Straight, fixed, PTFE-tipped plunger | 6/pk | 23/42/HP | 5183-4730 |
| | Replacement plunger for 10 μL fixed needle syringe | | | 5181-8808 |
| | Straight, removable | | 23/42/HP | 5181-8806 |
| | Straight, removable, PTFE-tipped plunger | | 23/42/HP | 5181-8813 |
| | Replacement needle for 10 μL syringe | 3/pk | | 5181-8811 |
| | Replacement plunger with PTFE tip for removable needle 10 μL syringe | | | 5181-3358 |
| 25 | Straight, fixed, PTFE-tipped plunger | | 23/42/HP | 5183-0316 |
| 50 | Straight, fixed, PTFE-tipped plunger | | 23/42/HP | 5183-0318 |
| 100 | Straight, fixed, PTFE-tipped plunger | | 23/42/HP | 5183-2058 |

7673/7683 On-Column Autosampler Syringes

Agilent 7673/7683 on-column syringes with needle diameter for columns ranging from 0.25 mm to 0.53 mm are specifically designed for the 7673/7683 Autosampler.

7673/7683 On-Column Autosampler Syringes

| Volume (μL) | Description | Unit | Part No. |
|-------------|---|-------|-----------|
| 5 | Removable needle, syringe only | | 5182-0836 |
| | Stainless steel needle for 0.53 mm column | 3/pk | 5182-0832 |
| | Stainless steel needle for 0.32 mm column | 3/pk | 5182-0831 |
| | Stainless steel needle for 0.25 mm column | 3/pk | 5182-0833 |
| | Plunger button | 10/pk | 5181-8866 |



HP 7670/71/72 Autosampler Syringes

This syringe has a long needle and regular plunger button for compatibility with HP 7670/71/72 autosamplers. Available with a fixed or removable needle.

HP 7670/71/72 Autosampler Syringes

| Volume (μL) | Description | Needle | Part No. |
|-------------|--------------------------------------|----------|-----------|
| 1 | Straight, removable | 23/56/2 | 5182-9622 |
| 10 | Straight, fixed | 23/50/HP | 5182-9734 |
| | Straight, removable | 23/50/HP | 5182-9626 |
| | Straight, fixed, PTFE-tipped plunger | 23/50/HP | 5182-9799 |



Autosampler syringe, 10 μL, straight, RN, 5182-9626



TIPS & TOOLS

Agilent color-coded manual syringes allow you to determine syringe volume with one quick glance, so you can more efficiently perform manual dilution, extraction, and sample prep. For your manual syringe selection, see pages 69-76 of the General Chromatography Supplies Catalog, publication number 5991-1056EN.



Agilent CrossLab

Supplies for major brand GC Systems

Agilent CrossLab is a growing portfolio of supplies critical to instrument performance and productivity. CrossLab GC supplies are designed and manufactured to perform seamlessly with a variety of other major brands of GCs in your lab.

We currently support:

- Bruker/Varian
- CTC
- PerkinElmer
- Shimadzu
- Thermo Scientific

Our growing GC Supplies portfolio includes the following products, featuring easy-to-use packaging for improved productivity:

- Premium non-stick inlet septa
- Ultra Inert inlet liners
- Liner O-rings
- Column ferrules and nuts
- Autosampler syringes
- Vials and closures
(See the complete CrossLab Vials and Closures section of our General Chromatography catalog, publication number 5991-1056EN)



Agilent CrossLab is more than supplies:

- Over 40 years of chromatography expertise and ongoing innovation
- Technical and application support
- Optimal performance for both routine and challenging applications
- Dependable worldwide product availability and delivery
- Convenience of consolidated purchasing
- 90-day risk-free money-back guarantee

Agilent CrossLab works with BRUKER/VARIAN | CTC | PERKINELMER | SHIMADZU | THERMO | AND MORE

Agilent CrossLab Inlet Liners

Liners are the centerpiece of the inlet system where sample is vaporized and mixed with the carrier gas. CrossLab GC inlet liners have the perfect mix of liner configurations and chemistries to solve your application challenges.

Choose from split, splitless, PTV, and other inlet liner designs in either the new, innovative Ultra Inert deactivation or Agilent's popular proprietary deactivation, now referred to as Agilent Original deactivation. With part number and lot number silk screened on CrossLab liners, identification and re-ordering have never been easier.



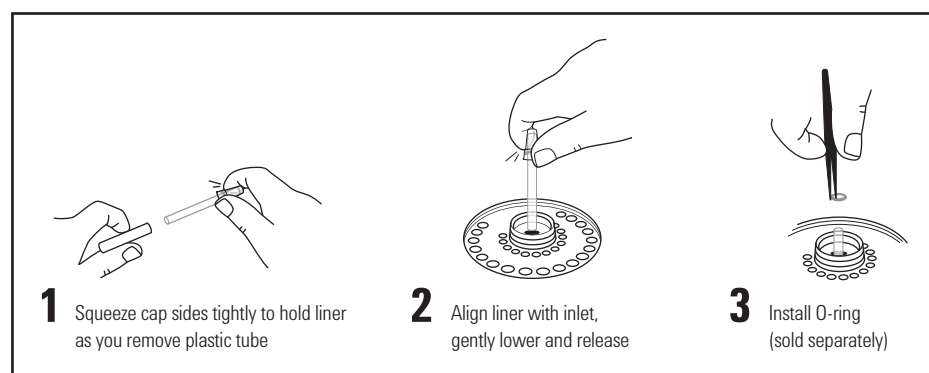
Agilent CrossLab Liners with Ultra Inert Deactivation

Developed for high sensitivity analysis, Agilent's Ultra Inert deactivation provides extreme surface inertness – even for liners containing glass wool. Ultra Inert chemistry was developed using a suite of tests specifically designed to stress then evaluate liner activity, resulting in liners featuring:

- **Reproducibility** – highest level and consistent inertness for active compounds such as acids and bases
- **Robustness** – tested with a sequence of 100 injections of Endrin/DDT with <20% degradation, allowing use of glass wool even with highly active compounds at trace (0.5 ng on-column) levels
- **Reliability** – lot-tested for inertness to ensure consistent and efficient deactivation using both acidic and basic probes at trace level (2 ng) on-column, with low to no bleed or background contamination

Ultra Inert liners are delivered in Agilent's exclusive Touchless packaging. Touchless packaging aids in easy installation of the new, clean, preconditioned liner – without risk of contamination from touching.

To view a demonstration of the Touchless Packaging for CrossLab Ultra Inert Liners please visit www.agilent.com/chem/CLTouchless



Agilent CrossLab Ultra Inert Touchless liner packaging includes visual installation guide.

Consider the following to determine how often to change your liners:

- Previous use pattern
- Sample cleanliness
- Chromatographic abnormalities, such as
 - ✓ Peak shape changes
 - ✓ Peak discrimination
 - ✓ Poor reproducibility
 - ✓ Sample pyrolysis
 - ✓ Active analyte response loss or decomposition

Get a robust, reproducible, and reliable inert flow path with Agilent CrossLab Ultra Inert Inlet Liners – even when containing glass wool

Forensic basic drugs test conditions

Column: DB-5ms Ultra Inert
122-5512UI
15 m x 0.25 mm, 0.25 µm

Sample: 5 mg/L Checkout mixture for GC/MS forensic/toxicology analyzer (p/n 5190-0471)

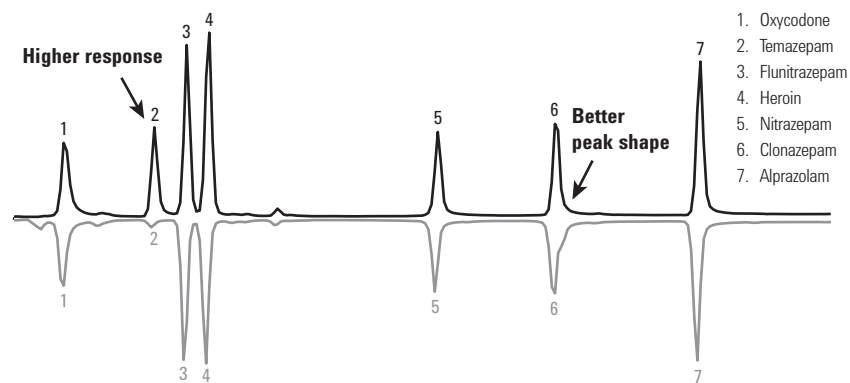
Injection: 1 µL splitless at 280 °C (hold 0.75 min)

Oven: 100 °C (0.5 min) to 325 °C at 20 °C/min and hold 2.5 min

Carrier: He, 18.74 psi (adj to RT lock), constant pressure

Detector: MSD; Source temp at 300 °C, Quad temp at 150 °C, Transfer line at 300 °C; Acquisition mode, SIM/scan

Agilent CrossLab Ultra Inert single taper liner with wool



Restek Siltek deactivated gooseneck liner with deactivated wool (cat. no. 22406.213.5)

Agilent CrossLab Ultra Inert deactivated liners with wool contribute to higher response and better peak shape for very active forensic basic drug compounds than similar Restek Siltek liners.

Agilent CrossLab Liners with Agilent Original Deactivation

Developed to complement fused silica capillary column technology, Agilent's proprietary deactivation, now referred to as Agilent Original deactivation, has been successfully used for years. Proven to deliver a long-lasting surface deactivation, this proprietary chemistry and manufacturing process was previously available for Agilent gas chromatographs only, but is now available for other GC systems. Agilent Original deactivation is recommended for everyday analysis.

Agilent CrossLab Liner O-rings

- Liners are sealed in the inlet with fluoroelastomer or graphite O-rings
- Graphite O-rings are used when inlet temperatures exceed 350 °C
- Fluoroelastomer O-rings are easier to replace than graphite O-rings, which deform and flake apart more easily

Ready for chromatographic use, CrossLab fluoroelastomer O-rings feature:

- Proprietary two-step cleaning and conditioning process eliminates out-gassing of contaminants, which is especially important for trace, ECD, and MSD analyses
- Plasma-treatment for a non-stick, contaminant-free surface that won't stick to the inlet metal surface
- Novel translucent dial package that conveniently delivers one clean O-ring at a time and makes it easy to know when to reorder



Agilent CrossLab Column Ferrules

A variety of column ferrules are available to meet your application requirements, including 100% graphite, 100% polyimide, and polyimide/graphite ferrules.

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks, which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance.

The ideal ferrule provides a leak-free seal, accommodates various column outer diameters, seals with minimum torque, withstands temperature cycling, and does not stick to the column or fittings.

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

To minimize problems, follow these general techniques for ferrule installation:

- Don't overtighten – finger tighten the column nut, then use wrench to tighten
- Maintain cleanliness
- Bake out ferrules prior to use (polyimide and polyimide/graphite only)
- Avoid contamination, such as fingerprint oils
- Inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them
- Change ferrules when new columns or injector/detector parts are installed

TIPS & TOOLS

Look for the following signals that indicate ferrule damage:

- Background noise from oxygen diffusing into the system
- Column bleed catalyzed by oxygen
- Sample degradation
- Sample loss
- Increase in detector signal/noise
- Poor retention time reproducibility



Ferrule Selection Recommendations

| Ferrule Type | Upper Temp. Limit | Usages | Advantages | Limitations |
|---|-------------------|---|--|---|
| Graphite (100%) | 450 °C | <ul style="list-style-type: none"> • General purpose for capillary columns • Suitable for FID and NPD • Recommended for high temperature and cool on-column applications | <ul style="list-style-type: none"> • Easy-to-use stable seal • Higher temperature limit • Can be removed easily | <ul style="list-style-type: none"> • Not for MS or oxygen-sensitive detectors • Soft, easily deformed or destroyed • Possible system contamination |
| Polyimide/graphite (85%/15% or 60%/40%) | 350 °C | <ul style="list-style-type: none"> • General purpose for capillary columns • Recommended for MS and oxygen-sensitive detectors • Most reliable leak-free connection | <ul style="list-style-type: none"> • Mechanically robust • Long lifetime | <ul style="list-style-type: none"> • Not reusable • Flows at elevated temperature • Must re-tighten frequently |
| Polyimide (100%) | 280 °C | <ul style="list-style-type: none"> • Isothermal operation • Can be reused or removed easily • Excellent sealing material when making metal or glass connections | <ul style="list-style-type: none"> • Mechanically robust • Long lifetime • Can be reused or removed easily | <ul style="list-style-type: none"> • Leaks after temperature cycle • Flows at elevated temperature • Must re-tighten frequently |



TIPS & TOOLS

100% Polyimide ferrules should only be used for isothermal applications.



Agilent CrossLab Autosampler Syringes

With a broad selection of syringes for auto injection, CrossLab autosampler syringes provide what you need for accurate and effective sampling. CrossLab syringes meet all fit, form, and function criteria for specific autosampler models. Agilent delivers more value in every autosampler syringe:

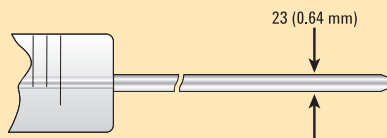
- Lot number printed directly on the barrel with a corresponding Certificate of Conformance
- Illuminating backing strip, for effortless viewing of the volume scale
- Environmentally friendly packaging and improved design that reduces waste
- Individually packaged for contaminant-free use right out of the box

Typical Needle Gauge Dimensions

| Gauge | OD | | ID | |
|-------|------|--------|------|--------|
| | mm | in | mm | in |
| 23 | 0.64 | 0.0248 | 0.11 | 0.0043 |
| 25 | 0.50 | 0.0197 | 0.20 | 0.0079 |
| 26 | 0.47 | 0.0184 | 0.11 | 0.0043 |

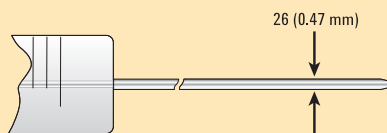


Needle Gauge



Single Gauge 23 (0.64 mm)

Packed column injector ports
Split/splitless injector ports



Single Gauge 26 (0.47 mm)

Packed column injector ports
Split/splitless injector ports

Needle Termination

Needle terminations are available in fixed or removable, with various tip styles.

Fixed (cemented)

- Economical, reproducible injections for autosamplers
- Preferred for applications requiring trace level samples
- Recommended for use where probability of needle bending is minimal
- Can be heated up to 70 °C

Removable needle

- Versatile option for injections
- Needle can be replaced if damaged or clogged
- Allows needle to be changed for different applications
- Can be heated up to 120 °C



Agilent CrossLab Inlet Septa

Inlet septa are a key component of sample introduction. Septa maintain the leak-free seal and exclude air from the inlet. They come in many different sizes and are made from different types of materials specific to inlet type and analysis needs.

Replace septa regularly to avoid:

- Leaks
- Decomposition
- Sample loss
- Reduced column or split vent flow
- Ghost peaks
- Column degradation

Septa are available for a variety of different applications and have different upper temperature limits. Lower temperature septa are usually softer, seal better, and can withstand more punctures (injections) than their high-temperature counterparts. If septa are used above their recommended temperatures, they can leak or decompose, causing sample loss, lower column flow, decreased column life, and ghosting. To minimize problems:

- Use within the recommended temperature range
- Change regularly
- Use septum purge when available
- Use autoinjectors
- Regularly inspect needle tips for wear

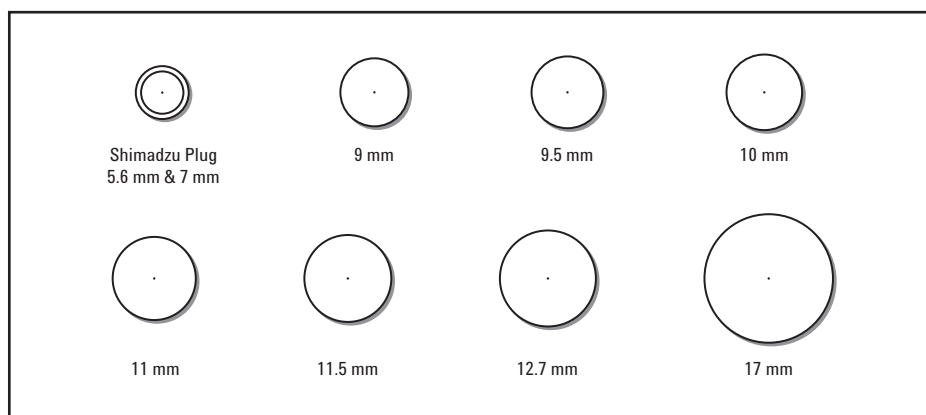


Agilent CrossLab Inlet Septa Selection Guide

| GC Manufacturer | Instrument Model | Diameter (mm) | Diameter (in) |
|---|--|---------------|---------------|
| Bruker, Varian* | 1177 Split/Splitless Injector | 9 | |
| | 1078/1079 Programmable Temperature Vaporizing Injector | 11.5 | |
| | 1093 Cold On-Column Injector | 11 | 7/16 |
| | 1075/1077 Split/Splitless Injector | 11 | 7/16 |
| | 1061 Packed/0.53 mm Capillary Column Flash Vaporization Injector | 9.5 | 3/8 |
| | 1041 Packed/Wide Bore On-Column Injector | 9.5 | 3/8 |
| PerkinElmer | Clarus System | 11 | 7/16 |
| | AutoSystem | 11 | 7/16 |
| | AutoSystem XL | 11 | 7/16 |
| | 8000 Series | 11 | 7/16 |
| | Sigma Series | 11 | 7/16 |
| Thermo Scientific Trace GC Ultra and Focus GC | Split/Splitless Injector | 17 | |
| | Large Volume Splitless Injector | 9 | |
| | Programmable Temperature Vaporizing Injector | 12.7 | 1/2 |
| | Purged Packed Column Injector | 11 | |
| | Packed Column Injector | 11 | |
| Thermo Scientific | Trace 2000 Series | 9.5 | |
| Finnigan | 9001 GC | 9.5 | |
| Shimadzu | All Models | Shimadzu Plug | |

*Formerly Varian systems, now Bruker products

Septa Diameters



Premium Non-Stick Septa

Agilent CrossLab premium non-stick inlet septa are designed and manufactured to provide a reliable noncontaminating seal. Our tri-fold blister pack ensures that each septum remains clean and ready to use.

- Proprietary plasma treatment prevents sticking and unnecessary inlet cleaning
- Innovative blister packaging keeps each septum clean and ready for use
- Center point guides the needle for easy penetration, less coring, and longer life
- Precision molding assures accurate fit in the inlet
- Each batch is tested for bleed
- Premium formulations selected for sealing and chromatographic cleanliness
- No need to bake septa before using



Summary of Premium Inlet Septum Characteristics

| Septum Type | Bleed | Lifetime | Temperature Limits |
|--|-------|----------|-------------------------------|
| Non-Stick BTO (Bleed and Temperature Optimized) | ✓✓✓ | ✓ | to 400 °C injection port temp |
| Non-Stick Advanced Green | ✓✓ | ✓✓ | to 350 °C |
| Non-Stick Long-Life | ✓ | ✓✓✓ | to 350 °C |

✓✓✓ = best ✓✓ = very good ✓ = good



Agilent CrossLab Non-Stick Bleed Temperature Optimized (BTO) Inlet Septa

- Extended temperature range, lowest bleed
- Maximum injection port temperature 400 °C
- Plasma treatment eliminates sticking in the injection port
- Pre-conditioned; ready to use
- Blister packaging maintains cleanliness and convenience
- Ideal for use with low-bleed, "Mass Spec" capillary columns



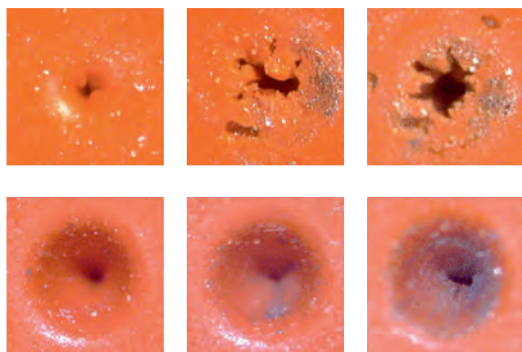
BTO septa, 8010-0223, 8010-0224

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0217 | 8010-0218 |
| 9.5 mm | 8010-0219 | 8010-0220 |
| 10 mm | 8010-0221 | 8010-0222 |
| 11 mm, CenterGuide | 8010-0223 | 8010-0224 |
| 11.5 mm, CenterGuide | 8010-0225 | 8010-0226 |
| Shimadzu plug | 8010-0231 | 8010-0232 |

| Description | 24/pk | 48/pk |
|----------------------|-----------|-----------|
| 12.7 mm, CenterGuide | 8010-0227 | 8010-0228 |
| 17 mm, CenterGuide | 8010-0229 | 8010-0230 |

Comparison of septum purity: TIC profile of isooctane extractions



Competitor's High-Temperature Septa without CenterGuide

Major coring before 100 autoinjections

Agilent CrossLab BTO Septa with CenterGuide

Very little coring, even after 700 autoinjections

Agilent CrossLab Non-Stick Advanced Green Inlet Septa

- True long-life, high-temperature green septa
- More injections per septum
- Plasma treatment eliminates sticking in the injection port
- Maximum injection port temperature 350 °C
- High-performance alternative to competitors' "green" septa
- Blister packaging for cleanliness and convenience



Advanced green septa, 8010-0207, 8010-0208

Non-Stick Advanced Green Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|----------------------|------------------------------------|-------------------------------------|
| 9 mm, CenterGuide | 8010-0201 | 8010-0202 |
| 9.5 mm | 8010-0203 | 8010-0204 |
| 10 mm | 8010-0205 | 8010-0206 |
| 11 mm, CenterGuide | 8010-0207 | 8010-0208 |
| 11.5 mm, CenterGuide | 8010-0209 | 8010-0210 |
| Shimadzu plug | 8010-0215 | 8010-0216 |
| Description | 24/pk | 48/pk |
| 12.7 mm, CenterGuide | 8010-0211 | 8010-0212 |
| 17 mm, CenterGuide | 8010-0213 | 8010-0214 |

Agilent CrossLab Non-Stick Long-Life Inlet Septa

- Preferred septa for autosamplers
- Pre-pierced for extended life and reduced coring
- Ideal for overnight runs
- Up to 400 injections per septum
- Plasma treatment eliminates sticking
- Maximum injection port temperature 350 °C
- Soft, 45 durometer, easy on autosampler needles
- Blister packaging for cleanliness and convenience



Long-life septa, 8010-0239, 8010-0240

Non-Stick Long-Life Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0233 | 8010-0234 |
| 11 mm, CenterGuide | 8010-0239 | 8010-0240 |
| 11.5 mm, CenterGuide | 8010-0241 | 8010-0242 |
| Description | 24/pk | 48/pk |
| 12.7 mm, CenterGuide | 8010-0243 | 8010-0244 |
| 17 mm, CenterGuide | 8010-0245 | 8010-0246 |



Agilent CrossLab Gray General Purpose Inlet Septa

Agilent CrossLab general purpose septa are made from an enhanced injection-molded silicone rubber and are good for routine use. The septa material, gray in color, is specified to withstand over 200 automatic injections at an injection port temperature of 350 °C.

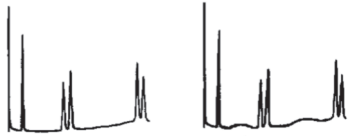


General Purpose Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|---------------|---------------------------------|----------------------------------|
| 9 mm | 8010-0249 | 8010-0250 |
| 9.5 mm | 8010-0251 | 8010-0252 |
| 10 mm | 8010-0253 | 8010-0254 |
| 11 mm | 8010-0255 | 8010-0256 |
| 11.5 mm | 8010-0257 | 8010-0258 |
| 12.7 mm | 8010-0259 | 8010-0260 |
| 17 mm | 8010-0261 | 8010-0262 |
| Shimadzu plug | 8010-0263 | 8010-0264 |





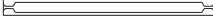









CrossLab general purpose inlet septa, 8010-0257

Septa Troubleshooting

| Symptom | Possible Causes | Remedy |
|--|--|--|
| Extra Peaks/Humps  | Septum bleed | Turn off injector heater. If extra peaks disappear, use septum specified for higher temperature or analyze at lower inlet temperature. |
| Baseline Change After Large Peak  | Large leak at septum during injection and for a short time thereafter (common with large diameter needles) | Replace septum and use smaller diameter needles. |
| Retention Times Prolonged  | Carrier gas leaks at septum or column connection | Check for leaks. Replace septum or tighten connections if necessary. |

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Liners for 1177 Split/Splitless Injector Ports

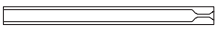






| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation | |
|---|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|--|
| Split/Splitless Liners | | | | | | | | | | |
|  Single taper | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | RT207992145 SG092017 | 8004-0151 | SG092017 | 8004-0101 | |
|  Single taper, with wool | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | SG092019 | 8004-0152 | SG092019 | 8004-0102 | |
|  Double taper | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | SG092018 | 8004-0155 | SG092018 | 8004-0105 | |
|  Gooseneck, with wool | 4.0 | 6.5 | 78.5 | 1000 | 5/pk | 392611936 | 8004-0170 | 392611936 | 8004-0114 | |
|  Recessed gooseneck, with wool | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | SG092010 | 8004-0153 | SG092010 | 8004-0103 | |
|  Gooseneck | 2.0 | 6.5 | 78.5 | 250 | 5/pk | 392611926 | 8004-0178 | 392611926 | 8004-0119 | |
| Splitless Liners | | | | | | | | | | |
|  Straight, with wool | 4.0 | 6.5 | 78.5 | 1000 | 5/pk | 392611937 | 8004-0173 | 392611937 | 8004-0116 | |
|  Gooseneck | 4.0 | 6.5 | 78.5 | 1000 | 5/pk | 392611927 | 8004-0165 | 392611927 | 8004-0113 | |
| Split Liners | | | | | | | | | | |
|  Straight-through | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | RT207732145 SG092007 | 8004-0156 | SG092007 | 8004-0106 | |
|  Straight, with wool | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | SG092001 392611934 | 8004-0154 | SG092001 392611934 | 8004-0104 | |
|  With frit, gooseneck | 4.0 | 6.3 | 78.5 | 1000 | 5/pk | RT210462145 | 8004-0158 | | | |
| Direct Liners | | | | | | | | | | |
|  Straight-through | 1.2 | 6.3 | 78.5 | 90 | 5/pk | SG092016 | 8004-0157 | SG092016 | 8004-0107 | |

***Formerly Varian systems, now Bruker products**



The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Liners for 1078/1079 Injector Ports

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Split/Splitless Liners | | | | | | | | | |
|  Single taper | 3.4 | 5.0 | 54 | 500 | 5/pk | RT209012145 SG092038 | 8004-0160 | SG092038 | 8004-0108 |
|  Gooseneck, with wool | 2.0 | 5.0 | 54 | 250 | 5/pk | | | 392611953 | 8004-0118 |
| Splitless Liners | | | | | | | | | |
|  Single taper | 2.0 | 5.0 | 54 | 170 | 5/pk | RT207122145 SG092039 | 8004-0161 | SG092039 | 8004-0109 |
| Split Liners | | | | | | | | | |
|  Gooseneck | 3.4 | 5.0 | 54 | 500 | 5/pk | 392611945 | 8004-0164 | 392611945 | 8004-0112 |
|  With frit, gooseneck | 3.4 | 5.0 | 54 | 500 | 5/pk | RT217092145 | 8004-0159 | | |
|  With frit, gooseneck | 3.4 | 5.0 | 54 | 500 | 5/pk | 392611946 | 8004-0171 | | |
| Other Liners | | | | | | | | | |
|  SPME, straight | 0.8 | 5.0 | 54 | 30 | 5/pk | 392611948 | 8004-0176 | | |

Liners for 1093/1094 Injector Ports

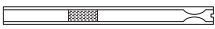
| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Direct Liners | | | | | | | | | |
|  SPL for 0.25/0.32 mm id columns | 0.5 | 4.6 | 54 | 10 | 5/pk | 190010906 | 8004-0167 | | |
|  SPL with 0.5 mm restriction for 0.53 mm id on-column | 0.8 | 4.6 | 54 | 30 | 5/pk | SG092034 190010907 | 8004-0162 | SG092034 190010907 | 8004-0110 |

*Formerly Varian systems, now Bruker products


The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Liners for 1075/1077 Injector Ports

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|---|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
|  With wool | 4.0 | 6.3 | 72 | 1000 | 5/pk | SG092021 190010901 | 8004-0163 | SG092021 190010901 | 8004-0111 |

Liners for 1060/1061 Injector Ports

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
|  Double gooseneck | 0.9 | 6.3 | 72 | 1000 | 5/pk | 392611943 | 8004-0168 | | |

Liner O-rings

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|-------|-------------------------|---------------------------|
| Non-stick fluoroelastomer O-ring, 1177 split/splitless, 6.3/6.5 mm od | 10/pk | 8850103100 | 8004-0201 |
| Graphite O-ring, 1177 split/splitless, 6.5 mm od | 10/pk | 392611930 | 8004-0202 |
| Graphite O-ring, 1177 split/splitless, 6.3 mm od | 10/pk | 392611935 | 8004-0203 |
| Graphite liner seal, 1078/1079 injector, 5 mm id | 10/pk | 392534201 | 8004-0204 |



Graphite liner O-ring, 8004-0202

*Formerly Varian systems, now Bruker products

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Column Ferrules

Capillary Column Ferrules

| Injector | Fitting Size (in) | Ferrule ID (mm) | Column ID (mm) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|-------------------|-----------------|-----------------|------|-------|-------------------------|---------------------------|
| 60% Polyimide/40% Graphite Capillary Column Ferrules | | | | | | | |
| 1177, 1079 | 1/16 | 0.3 | 0.18 or smaller | 1 | 10/pk | CR213103 | 8004-0211 |
| | 1/16 | 0.425 | 0.25 | 2 | 10/pk | CR213124 | 8004-0213 |
| | 1/16 | 0.425 | 0.25 | 1 | 10/pk | CR213104 | 8004-0212 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | CR213105 | 8004-0214 |
| | 1/16 | 0.5 | 0.32 | 2 | 10/pk | CR213125 | 8004-0215 |
| 1177, 1079, 1061, 1041 | 1/16 | 0.8 | 0.53 | 1 | 10/pk | CR213108 | 8004-0216 |
| Polyimide Capillary Column Ferrules | | | | | | | |
| 1177, 1079 | 1/16 | 0.3 | 0.18 | 1 | 10/pk | CR212103 | 8010-0306 |
| | 1/16 | 0.4 | 0.25 | 1 | 10/pk | | 8010-0307 |
| | 1/16 | 0.425 | 0.25 | 1 | 10/pk | CR212104 | 8004-0219 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | CR212105 | 8010-0308 |
| | 1/16 | 0.5 | 0.32 | 2 | 10/pk | CR212125 | 8004-0218* |
| 1177, 1079, 1061, 1041 | 1/16 | 0.8 | 0.53 | 1 | 10/pk | CR212108 | 8010-0309 |
| Graphite Capillary Column Ferrules | | | | | | | |
| 1177, 1079 | 1/16 | 0.4 | 0.25 | 1 | 10/pk | CR211104 | 8010-0301 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | CR211105 | 8010-0302 |
| | 1/16 | 0.5 | 0.32 | 2 | 10/pk | CR211125 | 8010-0303 |
| 1177, 1079, 1061, 1041 | 1/16 | 0.8 | 0.53 | 1 | 10/pk | CR211108 | 8010-0304 |

*1177 Injector only

***Formerly Varian systems, now Bruker products**

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Packed Column Ferrules

| Injector | Fitting Size (in) | Ferrule ID (in) | Column OD (in) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|--|-------------------|-----------------|----------------|------|-------|-------------------------|---------------------------|
| 60% Polyimide/40% graphite Packed Column Ferrules | | | | | | | |
| 1093, 1061, 1041 | 1/4 | 1/4 | 1/4 | 1 | 10/pk | CR213400 | 8004-0217* |
| Graphite Packed Column Ferrules | | | | | | | |
| 1093, 1061, 1041 | 1/4 | 1/4 | 1/4 | 1 | 10/pk | CR211400 | 8010-0305* |

*Straight body

Column Nuts

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|------|-------------------------|---------------------------|
| Column nut, brass, 1177, 1079, 1061, or 1041 injector | 2/pk | 394955100 | 8004-0311 |
| Column nut, stainless steel, 1093 injector | 2/pk | CP743117 | 8004-0312 |

Autosampler Syringes for Bruker/Varian GC Systems

| Model | Volume (µL) | Description | Needle Gauge/Length (mm)/Tip | Similar to OEM Syringe Part No. | Agilent CrossLab Syringe Part No. | Agilent CrossLab Replacement Needle Part No. | Agilent CrossLab Replacement Plunger Part No. |
|---------------------------------------|-------------|-----------------------------|------------------------------|---------------------------------|-----------------------------------|--|---|
| Varian CP8400, CP8410, CP9010, CP9050 | 10 | Fixed needle | 26/50/bevel tip | | 8004-0001 | | |
| | | Removable needle | 26/50/cone tip | SG002982 | 8004-0003 | 8004-0004, 2/pk | |
| Varian 8035, 8100, 8200 | | Fixed needle, gas tight | 26/53/side hole tip | | 8004-0002 | | 8004-0007 |
| | | Removable needle, gas tight | 25/53/side hole tip | | 8004-0005 | 8004-0006 | 8004-0007 |

*Formerly Varian systems, now Bruker products

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Inlet Septa

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|-------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0217 | CR298713 | 8010-0218 |
| 9.5 mm | 8010-0219 | CR298705 | 8010-0220 |
| 10 mm | 8010-0221 | CR298745 | 8010-0222 |
| 11 mm, CenterGuide | 8010-0223 | CR298717 | 8010-0224 |
| 11.5 mm, CenterGuide | 8010-0225 | CR298777 | 8010-0226 |



Non-stick bleed and temperature optimized septa, 10 mm, 50/pk, 8010-0221

Non-Stick Advanced Green Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|-------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0201 | CR246713 | 8010-0202 |
| 9.5 mm | 8010-0203 | CR246124 | 8010-0204 |
| 10 mm | 8010-0205 | | 8010-0206 |
| 11 mm, CenterGuide | 8010-0207 | CR246225 | 8010-0208 |
| 11.5 mm, CenterGuide | 8010-0209 | CR246725 | 8010-0210 |

*Formerly Varian systems, now Bruker products

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Bruker, Varian* GC Systems



Long-life septa, 8010-0239, 8010-0240

Non-Stick Long-Life Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|-------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0233 | CR239778 | 8010-0234 |
| 11 mm, CenterGuide | 8010-0239 | CR239287 | 8010-0240 |
| 11.5 mm, CenterGuide | 8010-0241 | CR239287 | 8010-0242 |

General Purpose Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|------------------------------|---------------------------------|----------------------------------|
| General Purpose Septa | | |
| 9 mm | 8010-0249 | 8010-0250 |
| 9.5 mm | 8010-0251 | 8010-0252 |
| 10 mm | 8010-0253 | 8010-0254 |
| 11 mm | 8010-0255 | 8010-0256 |
| 11.5 mm | 8010-0257 | 8010-0258 |

*Formerly Varian systems, now Bruker products

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.



TIPS & TOOLS

For a comprehensive vial compatibility chart, identification guide, septum recommendations, visit www.agilent.com/chem/vialsposter

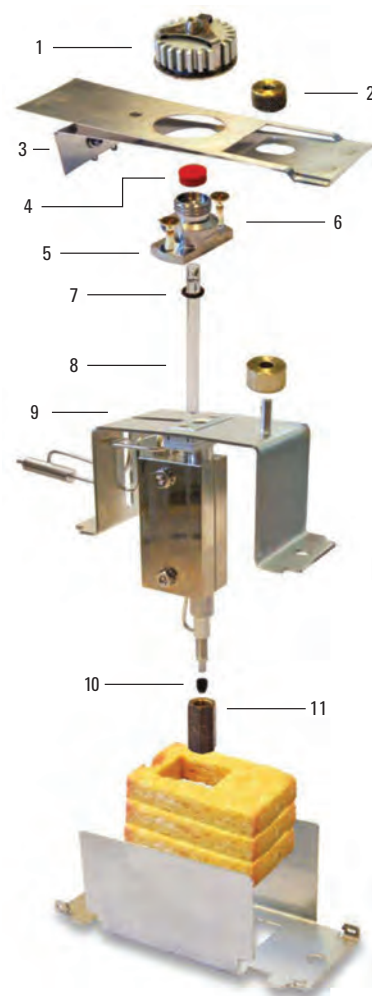
Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Injector Replacement Parts and Supplies

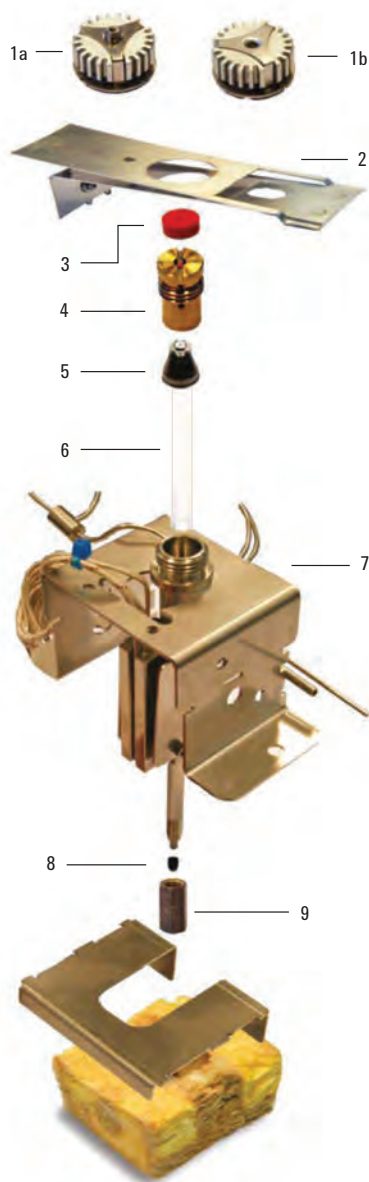
1177 Split/Splitless Injector

| Item | Description | Agilent CrossLab and Agilent Part No. |
|------|--|---------------------------------------|
| 1 | Injector nut | 392597501 |
| | Injector nut wrench | 390842300 |
| 2 | Knob | 392597101 |
| 3 | Automatic start switch | 390820601 |
| 4 | Septum, 9 mm | |
| | BTO | 8010-0217 |
| | Long-Life | 8010-0233 |
| | Advanced Green | 8010-0201 |
| | Septum pick | 7200008400 |
| 5 | Septum purge head | |
| | EFC21 (stainless steel) | 392597301 |
| | EFC21 (UltiMetal) | 392597303 |
| | EFC25 or Manual Pneumatics | 392597302 |
| 6 | Purge head screw | 391866308 |
| 7 | Graphite liner O-ring, splitless, 6.5 mm | 8004-0202 |
| | Non-stick fluoroelastomer liner O-ring, 6.3 mm | 8004-0201 |
| 8 | Glass liner | 8004-0165 |
| 9 | Injector body | |
| | Stainless steel | 392599401 |
| | UltiMetal | 392599411 |
| | Manual | 392599501 |
| 10 | For replacement ferrules, see complete CrossLab column ferrules ordering information, see page 209. | |
| 11 | Bottom nut | 8004-0311 |

*Formerly Varian systems, now Bruker products



Agilent CrossLab Supplies for Bruker, Varian* GC Systems



1079 Large Volume Injector (LVI)

| Item | Description | Agilent CrossLab and Agilent Part No. |
|------|--|---------------------------------------|
| 1a | Injector nut | 394966601 |
| 1b | Injector nut | 394966601 |
| | Injector nut wrench | 390842300 |
| 2 | Automatic start switch | 390820601 |
| 3 | Septum, 11.5 mm | |
| | BTO | 8010-0225 |
| | Long-Life | 8010-0241 |
| | Advanced Green | 8010-0209 |
| | Septum pick | 7200008400 |
| 4 | Septum support | 391867600 |
| 5 | Graphite liner seal | 8004-0204 |
| 6 | Glass liner | 8004-0164 |
| 7 | Injector body, EFC type | |
| | Stainless steel | 392544001 |
| | UltiMetal | 392544011 |
| 8 | For replacement ferrules, see complete CrossLab column ferrules ordering information, see page 209. | |
| 9 | Bottom nut | 8004-0311 |

***Formerly Varian systems, now Bruker products**

The poster is titled "CHROMATOGRAPHY VIALS THAT PROVIDE MORE OPTIONS, PRODUCTIVITY AND CONFIDENCE". It features a grid of various vial types, including Agilent Vials and Agilent Chromatography Vials. Below the grid are two tables: "Options for High-Volume" and "Cost-Per-Vial for 10 Year Needs". At the bottom, there is a QR code and the text: "Let the experts in chromatography help you select the right vial for your application. Get expert advice to ensure your vial is the best fit for your needs." The Agilent logo is also present.



TIPS & TOOLS

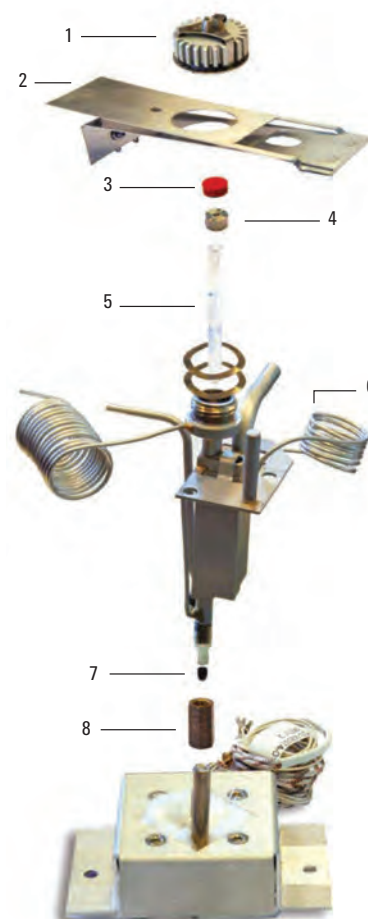
For a comprehensive vial compatibility chart, identification guide, septum recommendations, visit www.agilent.com/chem/vialsposter

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

1093 Cool On-Column (COC) Injector

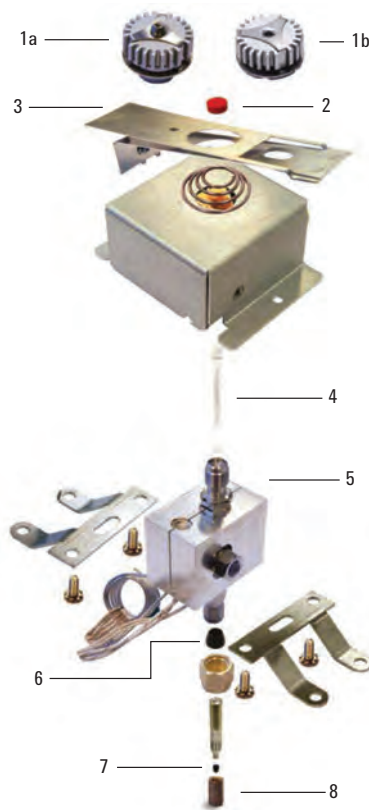
| Item | Description | Agilent CrossLab and Agilent Part No. |
|------|----------------------------|---------------------------------------|
| 1 | Injector nut | 394966601 |
| | Injector nut wrench | 390842300 |
| 2 | Automatic start switch | 390820601 |
| 3 | Septum, 11.5 mm | |
| | BTO | 8010-0225 |
| | Long-Life | 8010-0241 |
| | Advanced Green | 8010-0209 |
| | Septum pick | 7200008400 |
| 4 | Septum support | 391821100 |
| 5 | Glass liner | |
| | Default | 8004-0162 |
| | High performance | 8004-0167 |
| 6 | Screw | 391866306 |
| 7 | Graphite/polyimide ferrule | 8004-0217 |
| | Graphite ferrule | 8010-0305 |
| 8 | Bottom nut | |
| | Brass | 8004-0311 |
| | Stainless steel | 8004-0312 |

***Formerly Varian systems, now Bruker products**



Agilent CrossLab Supplies for Bruker, Varian* GC Systems

1061 Packed/530 µm Capillary Column Injector



| Item | Description | Agilent CrossLab and Agilent Part No. |
|------|--|---------------------------------------|
| 1a | Injector nut | 390812700 |
| 1b | Injector nut | 392595501 |
| | Injector nut wrench | 390842300 |
| 2 | Septum, 9.5 mm | |
| | BTO | 8010-0219 |
| | Advanced Green | 8010-0203 |
| | Septum pick | 7200008400 |
| 3 | Automatic start switch | 390820601 |
| 4 | Glass liner | 8004-0168 |
| 5 | Injector body, EFC23 | 392548301 |
| 6 | Graphite/polyimide ferrule | 8004-0217 |
| | Graphite ferrule | 8010-0305 |
| 7 | For replacement ferrules, see complete CrossLab column ferrules ordering information, see page 209. | |
| 8 | Bottom nut | 8004-0311 |

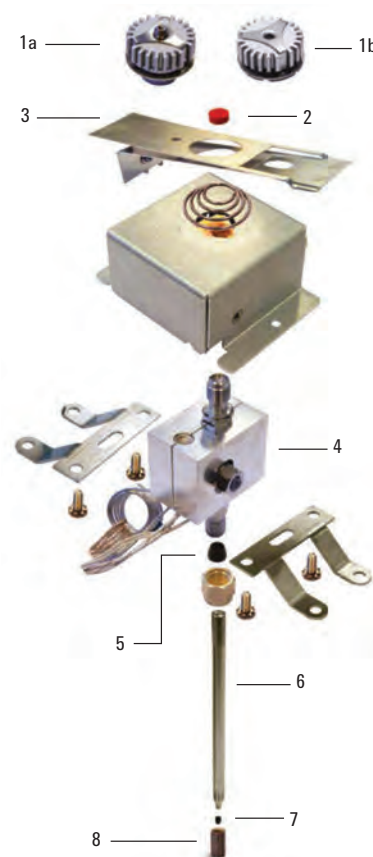
***Formerly Varian systems, now Bruker products**

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

1041 Packed/Wide Bore On-Column (PWOC) Injector

| Item | Description | Agilent CrossLab and Agilent Part No. |
|------|--|---------------------------------------|
| 1a | Injector nut | 390812700 |
| 1b | Injector nut | 392595501 |
| | Injector nut wrench | 390842300 |
| 2 | Septum, 9.5 mm | |
| | BTO | 8010-0219 |
| | Advanced Green | 8010-0203 |
| | Septum pick | 7200008400 |
| 3 | Automatic start switch | 390820601 |
| 4 | Injector body, EFC type | 392548201 |
| 5 | Graphite/polyimide ferrule | 8004-0217 |
| | Graphite ferrule | 8010-0305 |
| 6 | Injector insert, stainless steel | 392543101 |
| 7 | For replacement ferrules, see complete CrossLab column ferrules ordering information, see page 209. | |
| 8 | Bottom nut | 8004-0311 |

***Formerly Varian systems, now Bruker products**



Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Detector Replacement Parts and Supplies**Thermal Conductivity Detector (TCD)**

| Description | Agilent Part No. |
|---|-------------------------|
| Adapter TCD/DEFC capillary makeup gas | 392585291 |
| Adapter TCD/DEFC reference gas kit | 392585292 |
| Adapter TCD capillary makeup gas, MPC, 3800 | 392560591 |
| TCD DEFC 14 (Non-H ₂), 2 channels | 392561290 |

Flame Ionization Detector (FID)

| Description | Agilent Part No. |
|--------------------------------------|-------------------------|
| Tube collector | 394958700 |
| Lower FID insulator #17311 | 2100003200 |
| FID flame tip jet, 0.010 in | 200187500 |
| FID flame tip jet with nut, 0.020 in | 200193800 |
| Crunch washer, 25/pk | 1500334701 |

***Formerly Varian systems, now Bruker products**

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

Pulsed Flame Photometric Detector (PFPD)

| Description | Agilent Part No. |
|--------------------------------------|------------------|
| Photomultiplier tube (PFPD) #R647-08 | 392517100 |
| O-Ring, silicone, 0.53 in id, PFPD | 2740292400 |
| PFPD light pipe | 392515500 |
| Sapphire window assembly | 392514500 |
| Sapphire window washer | 392514300 |
| Wrench, PFPD combustor support | 392519200 |
| Seal, combustor support | 392513800 |
| Combustor holder, 2 mm | 392517800 |
| Combustor Sulfur, 2 mm, cleaned | 392517600 |
| Holder, combustor, 3 mm, cleaned | 392517901 |
| Combustor Phosphorus, 3 mm, cleaned | 392517700 |

PFPD Filter Assemblies

| Description | Agilent Part No. |
|---------------------------------|------------------|
| Arsenic (As) | 392515105 |
| Manganese (Mn) | 392544391 |
| Nitrogen (N) | 392511901 |
| Sulfur and Phosphorus (S and P) | 392515104 |
| Phosphorus (P) | 392515102 |
| Sulfur (S) | 392515101 |
| Tin (Sn) | 392515103 |

***Formerly Varian systems, now Bruker products**

Agilent CrossLab Supplies for Bruker, Varian* GC Systems

PFPD Nitrogen Mode Maintenance

| Description | Agilent Part No. |
|--|------------------|
| Photomultiplier tube, Nitrogen R-5070A | 392512800 |
| O-Ring, 0.987 in id | 2740236100 |
| PFPD filter assembly, Nitrogen | 392511901 |
| PFPD light pipe | 392515500 |
| Sapphire window assembly | 392514500 |
| Sapphire window washer | 392514300 |

Thermionic Specific Detector (TSD)

| Description | Agilent Part No. |
|--|------------------|
| TSD bead probe, unconditioned and untested | 390607400 |
| TSD bead probe, conditioned and tested | 390607401 |
| Upper TSD insulator #17310 TSD | 2100003100 |
| O-Ring, 30/pk | 2740928200 |
| TSD collector assembly | 390607900 |
| Lower FID insulator #17311 | 2100003200 |
| Crunch washer, 25/pk | 1500334701 |
| FID flame tip jet with nut, 0.020 in | 200193800 |
| Flow tube assembly | 200187600 |

***Formerly Varian systems, now Bruker products**




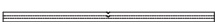

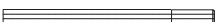
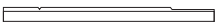




TIPS & TOOLS

For a comprehensive vial compatibility chart, identification guide, septum recommendations, visit www.agilent.com/chem/vialsposter

Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Liners for AutoSystem, AutoSystem XL, Clarus Systems

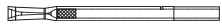

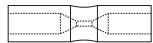

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (μL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Split/Splitless Liners | | | | | | | | | |
|  PSS straight | 2.0 | 4.0 | 86.2 | | 5/pk | N6502002 | 8003-0153 | | 8003-0103 |
|  PSS straight with bottom restriction | 2.0 | 4.0 | 86.2 | 260 | 5/pk | N6121004 | 8003-0158 | | |
|  PSS on-column | 2.0 | 4.0 | 86.2 | 250 | 5/pk | N6101539 | 8003-0165 | N6101539 | 8003-0110 |
|  PSS straight | 1.0 | 4.0 | 86.2 | 65 | 5/pk | N6121006 | 8003-0157 | | |
| Split/Large Volume Splitless Liners | | | | | | | | | |
|  Straight with bottom restriction | 4.0 | 6.2 | 92.1 | 1150 | 5/pk | N6121001 | 8003-0159 | N6121001 | 8003-0105 |
| Splitless Liners | | | | | | | | | |
|  Straight | 2.0 | 6.2 | 92.1 | 300 | 5/pk | N6101372 | 8003-0162 | N6101372 | 8003-0107 |
| Split Liners | | | | | | | | | |
|  Straight-through | 4.0 | 6.2 | 92.1 | 1150 | 5/pk | | 8003-0151 | | 8003-0101 |
|  Straight, wool | 4.0 | 6.2 | 92.1 | 1100 | 5/pk | N6121020 | 8003-0160 | N6121020 | 8003-0106 |
|  Straight with bottom restriction | 4.0 | 6.2 | 92.1 | 1100 | 5/pk | N6101052 | 8003-0166 | N6101052 | 8003-0111 |

(Continued)

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Liners for AutoSystem, AutoSystem XL, Clarus Systems

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|---|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Direct Liners | | | | | | | | | |
|  Gooseneck, drilled hole on top, wool | 4.0 | 6.2 | 92.1 | | 5/pk | N6121022 | 8003-0155 | | |
| Other Liners | | | | | | | | | |
|  Packed column, straight | 3.0 | 6.2 | 112 | 800 | 5/pk | N6121000 | 8003-0163 | N6121000 | 8003-0108 |
|  Programmable on-column, hour glass | 2.2 | 4.0 | 16 | | 5/pk | | | N6101703 | 8003-0109* |
|  PTV, 0.25 mm id restriction, recessed gooseneck | 1.0 | 2.0 | 88 | 70 | 5/pk | | 8003-0154 | | 8003-0104 |

*p/n 8003-0109 is not deactivated

Liner O-rings

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|--|-------|-------------------------|---------------------------|
| Non-stick fluoroelastomer O-ring | 10/pk | N9302783 | 8010-0401 |
| Non-stick fluoroelastomer O-ring, PSS Injector | 10/pk | N6101747 | 8003-0202 |
| Silicone O-ring | 10/pk | N6101374 | 8003-0203 |
| Graphite O-ring, PSS Injector | 10/pk | N6101751 | 8003-0204 |
| Graphite O-ring | 10/pk | N6101378 | 8003-0205 |



Graphite O-rings, 8003-0205

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Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Column Ferrules

Capillary Column Ferrules

| Model | Fitting Size (in) | Ferrule ID (mm) | Column ID (mm) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|-------------------|-----------------|-----------------|------|-------|-------------------------|---------------------------|
| 85% Polyimide/15% Graphite Capillary Column Ferrules | | | | | | | |
| AutoSystem, AutoSystem | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 09920104 | 8010-0310 |
| XL, Clarus | 1/16 | 0.4 | 0.25 | 2 | 10/pk | 04972392 | 8010-0312 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 09920105 | 8010-0311 |
| | 1/16 | 0.5 | 0.32 | 2 | 10/pk | N9306000 | 8003-0216 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 09920107 | 8010-0313 |
| Graphite Capillary Column Ferrules | | | | | | | |
| AutoSystem, AutoSystem | 1/16 | 0.4 | 0.25 | 1 | 10/pk | | 8010-0301 |
| XL, Clarus | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 09903700 | 8010-0302 |
| | 1/16 | 0.5 | 0.32 | 2 | 10/pk | N9306001 | 8010-0303 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 09920141 | 8010-0304 |
| Polyimide Capillary Column Ferrules | | | | | | | |
| AutoSystem, AutoSystem | 1/16 | 0.3 | 0.18 or smaller | 1 | 10/pk | | 8010-0306 |
| XL, Clarus | 1/16 | 0.4 | 0.25 | 1 | 10/pk | | 8010-0307 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | | 8010-0308 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | | 8010-0309 |

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Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Packed Column Ferrules

| Model | Fitting Size (in) | Ferrule ID (in) | Column OD (in) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|--|-------------------|-----------------|----------------|------|-------|-------------------------|---------------------------|
| 85% Polyimide/15% Graphite Packed Column Ferrules | | | | | | | |
| AutoSystem, | 1/4 | 1/4 | 1/4 | 1 | 10/pk | 09903739 | 8010-0314 |
| AutoSystem XL, Clarus | 1/8 | 1/8 | 1/8 | 1 | 10/pk | N9302081 | 8003-0219 |
| | 1/16 | 1/16 | 1/16 | 1 | 10/pk | 09920127 | 8010-0315 |
| Graphite Packed Column Ferrules | | | | | | | |
| AutoSystem, | 1/4 | 1/4 | 1/4 | 1 | 10/pk | 09920140 | 8010-0305 |
| AutoSystem XL, Clarus | 1/8 | 1/8 | 1/8 | 1 | 10/pk | 09903915 | 8003-0212 |
| | 1/16 | 1/16 | 1/16 | 1 | 10/pk | 02450972 | 8003-0211 |
| Polyimide Packed Column Ferrules | | | | | | | |
| AutoSystem, | 1/4 | 1/4 | 1/4 | 1 | 10/pk | N9301361 | 8003-0223 |
| AutoSystem XL, Clarus | 1/8 | 1/8 | 1/8 | 1 | 10/pk | N9301360 | 8003-0222 |
| | 1/16 | 1/16 | 1/16 | 1 | 10/pk | | 8003-0221 |

Column Nuts

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---------------------|------|-------------------------|---------------------------|
| Column nut, 1/16 in | 2/pk | 09903392 | 8003-0311 |

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Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Autosampler Syringes for PerkinElmer GC Systems

| Model | Volume (µL) | Description | Needle Gauge/Length (mm)/Tip | Similar to OEM Syringe Part No. | Agilent CrossLab Syringe Part No. | Similar to OEM Replacement Needle and Plunger Repair Kit Part No. | Agilent CrossLab Replacement Needle and Plunger Repair Kit Part No. |
|-----------------------------------|--------------------|-------------------------|-------------------------------------|--|--|--|--|
| AutoSystem, AutoSystem XL, Clarus | 0.5 | Removable needle | 23/70/cone tip | N6101252 | 8003-0005 | N6101469 | 8003-0006 |
| AutoSystem, AutoSystem XL, Clarus | | Removable needle | 26/70/bevelled cone tip | | 8003-0007 | | 8003-0008 |
| AutoSystem, AutoSystem XL, Clarus | 5 | Fixed needle | 23/70/cone tip | N6101251 | 8003-0001 | | |
| AutoSystem, AutoSystem XL, Clarus | | Fixed needle, gas tight | 23/70/cone tip | N6101390 | 8003-0002 | | |
| AutoSystem, AutoSystem XL, Clarus | | Fixed needle | 26/70/cone tip | N6101380 | 8003-0003 | | |
| AutoSystem, AutoSystem XL, Clarus | 50 | Fixed needle | 23/70/cone tip | N6101760 | 8003-0004 | | |

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Agilent CrossLab Parts and Supplies for PerkinElmer GC Systems

Inlet Septa

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|--------------------|---------------------------------|-------------------------|----------------------------------|
| 11 mm, CenterGuide | 8010-0223 | N9302972 | 8010-0224 |

Non-Stick Advanced Green Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|--------------------|---------------------------------|-------------------------|----------------------------------|
| 11 mm, CenterGuide | 8010-0207 | N6621028 N9306219 | 8010-0208 |



Long-life septa, 8010-0239, 8010-0240

Non-Stick Long-Life Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|--------------------|---------------------------------|----------------------------------|
| 11 mm, CenterGuide | 8010-0239 | 8010-0240 |




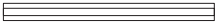




General Purpose Septa

| Description | Agilent CrossLab Part No. 50/pk | Similar to OEM Part No. | Agilent CrossLab Part No. 100/pk |
|-------------|---------------------------------|-------------------------|----------------------------------|
| 11 mm | 8010-0255 | 54019985 | 8010-0256 |

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Agilent CrossLab Supplies for Shimadzu GC Systems






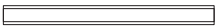




Liners for 2014 Systems

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (μL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Splitless Liners | | | | | | | | | |
|  Single taper, wool | 3.5 | 5.0 | 95 | | 5/pk | 221-48876-02 | 8001-0160 | | |
|  Double taper, drilled hole near top | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-01 | 8001-0158 | | |
|  Double taper, drilled hole near bottom | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-02 | 8001-0159 | | |
|  Straight-through | 2.6 | 5.0 | 95 | 500 | 5/pk | 220-94767-00 | 8001-0151 | 220-94767-00 | 8001-0101 |
| Split Liners | | | | | | | | | |
|  Straight with middle restriction | 3.5 | 5.0 | 95 | 800 | 5/pk | 221-41444-01 | 8001-0156 | 221-41444-01 | 8001-0106 |
|  Straight with middle restriction, wool | 3.5 | 5.0 | 95 | 800 | 5/pk | 220-90784-00 | 8001-0157 | | |
|  Straight-through | 3.4 | 5.0 | 95 | 860 | 5/pk | | 8001-0153 | | 8001-0103 |
| Direct Liners | | | | | | | | | |
|  For 0.53 mm id column | 2.6 | 5.0 | 95 | 450 | 5/pk | 220-94768-00 | 8001-0152 | 220-94768-00 | 8001-0102 |

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Shimadzu GC Systems








Liners for 2010 and 2010 Plus Systems

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|------------------------------|----------------------------------|-------------------------|-------------------------------|
| Split/Splitless Liners | | | | | | | | | |
|  Single taper | 3.4 | 5.0 | 95 | | 5/pk | 961-01480-07 | 8001-0154 | | 8001-0104 |
| Splitless Liners | | | | | | | | | |
|  Single taper, wool | 3.5 | 5.0 | 95 | | 5/pk | 221-48335-01 221-48876-02 | 8001-0160 | | |
|  Double taper, drilled hole near top | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-01 | 8001-0158 | | |
|  Double taper, drilled hole near bottom | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-02 | 8001-0159 | | |
|  Straight-through | 2.6 | 5.0 | 95 | 500 | 5/pk | 220-94767-00 | 8001-0151 | 220-94767-00 | 8001-0101 |
| Split Liners | | | | | | | | | |
|  Straight-through | 3.4 | 5.0 | 95 | 860 | 5/pk | | 8001-0153 | | 8001-0103 |
|  Straight with middle restriction | 3.5 | 5.0 | 95 | 800 | 5/pk | 221-41444-01 | 8001-0156 | 221-41444-01 | 8001-0106 |
|  Straight with middle restriction, wool | 3.5 | 5.0 | 95 | 800 | 5/pk | 220-90784-00 | 8001-0157 | | |
| Other Liners | | | | | | | | | |
|  PTV | 1.25 | 3.5 | 95 | 100 | 5/pk | 221-49300-00 | 8001-0163 | | |
|  SPME or Purge and Trap, straight | 0.75 | 5.0 | 95 | 50 | 5/pk | 220-94769-00 | 8001-0162 | | |

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Agilent CrossLab Supplies for Shimadzu GC Systems

Liners for 17A Systems


| Description | ID (mm) | OD (mm) | Length (mm) | Volume (μL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|------------------------------|----------------------------------|-------------------------|-------------------------------|
| Splitless Liners | | | | | | | | | |
|  Single taper, wool | 3.5 | 5.0 | 95 | | 5/pk | 221-48335-01 221-48876-02 | 8001-0160 | | |
|  Double taper, drilled hole near top | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-01 | 8001-0158 | | |
|  Double taper, drilled hole near bottom | 3.5 | 5.0 | 95 | | 5/pk | 220-94734-02 | 8001-0159 | | |
|  Straight-through | 2.6 | 5.0 | 95 | 500 | 5/pk | 220-94767-00 | 8001-0151 | 220-94767-00 | 8001-0101 |
| Split Liners | | | | | | | | | |
|  Straight with middle restriction, wool | 3.5 | 5.0 | 95 | 800 | 5/pk | 220-90784-00 | 8001-0157 | | |
|  Straight-through | 3.4 | 5.0 | 95 | 860 | 5/pk | | 8001-0153 | | 8001-0103 |
| Direct Liners | | | | | | | | | |
|  For 0.53 mm id column | 2.6 | 5.0 | 95 | 450 | 5/pk | 220-94768-00 | 8001-0152 | 220-94768-00 | 8001-0102 |

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.



Agilent CrossLab Supplies for Shimadzu GC Systems

Liners for 14 Systems

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (µL) | Unit | Agilent Ultra Inert Deactivation | Agilent Original Deactivation |
|---|---------|---------|-------------|-------------|------|----------------------------------|-------------------------------|
| Split/Splitless Liners | | | | | | | |
|  2.0 mm middle gooseneck | 3.4 | 5.0 | 99 | 850 | 5/pk | 8001-0155 | 8001-0105 |

Liner O-rings



Graphite liner O-rings, 8001-0202

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|----------------------------------|-------|-------------------------|---------------------------|
| Non-stick fluoroelastomer O-ring | 10/pk | 036-11203-84 | 8001-0201 |
| Graphite O-ring, split | 10/pk | 221-48393-91 | 8001-0202 |
| Graphite O-ring, splitless | 10/pk | 221-47222-91 | 8001-0203 |

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Agilent CrossLab Supplies for Shimadzu GC Systems

Column Ferrules

Capillary Column Ferrules

| Model | Fitting Size (in) | Ferrule ID (mm) | Column ID (mm) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|-------------------|-----------------|-----------------|------|-------|-------------------------|---------------------------|
| 85% Polyimide/15% Graphite Capillary Column Ferrules | | | | | | | |
| QP5000/5050 Standard MS | 1/16 | 0.3 | 0.18 or smaller | 1 | 10/pk | 220-90700-01 | 8001-0224 |
| | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 220-90700-02 | 8001-0221 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 220-90700-03 | 8001-0222 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 220-90700-04 | 8001-0223 |
| QP2010 | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 220-90418-14 | 8010-0310 |
| | 1/16 | 0.4 | 0.25 | 2 | 10/pk | 225-19056-00 | 8010-0312 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 220-90418-15 | 8010-0311 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 220-90418-18 | 8010-0313 |
| Graphite Capillary Column Ferrules | | | | | | | |
| 2010, 2010 Plus, 2014, 17A, 14A | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 220-90765-00 | 8001-0211 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 221-32126-05 | 8001-0212 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 221-32126-08 | 8001-0213 |

Packed Column Ferrules

| Model | Fitting Size (in) | Ferrule ID (in) | Column OD (in) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|--|-------------------|-----------------|----------------|------|-------|-------------------------|---------------------------|
| 85% Polyimide/15% Graphite Packed Column Ferrules | | | | | | | |
| QP5000/5050 Standard MS | 1/4 | 1/4 | 1/4 | 1 | 10/pk | 225-09028-00 | 8010-0314 |
| QP5000/5050 Wide Bore MS | 1/16 | 1/16 | 1/16 | 1 | 10/pk | 220-90418-28 | 8010-0315 |
| QP2010 | 1/16 | 1/16 | 1/16 | 1 | 10/pk | | 8010-0315 |
| 17A | 5 mm | 5 mm | 5 mm | 1 | 10/pk | 221-46403-92 | 8001-0214 |

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Graphite capillary column ferrules, 8001-0213

Agilent CrossLab Supplies for Shimadzu GC Systems

Column Nuts

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|------------------------------|------|-------------------------|---------------------------|
| Column nut, slotted, 6-sided | 2/pk | 221-32705-00 | 8001-0311 |
| Column nut, no slot, 6-sided | 2/pk | 221-41533-00 | 8001-0312 |

Autosampler Syringes for Shimadzu GC Systems

| Model | Volume (µL) | Description | Needle Gauge/Length (mm)/Tip | Similar to OEM Syringe Part No. | Agilent CrossLab Syringe Part No. | Similar to OEM Replacement Needle and Plunger Repair Kit Part No. | Agilent CrossLab Replacement Needle Part No. |
|------------------------|-------------|-----------------------------|------------------------------|---------------------------------|-----------------------------------|---|--|
| AOC-14, AOC-17, AOC-20 | 5 | Removable needle | 23/42/cone tip | | 8001-0010 | | 8001-0011 |
| AOC-14, AOC-17, AOC-20 | 10 | Removable needle | 23/42/cone tip | 220-90282-20 | 8001-0004 | 220-90281-20 | 8001-0005, 2/pk |
| AOC-14, AOC-17, AOC-20 | 10 | Removable needle | 26/42/cone tip | 220-90282-21 | 8001-0006 | 220-90281-21 | 8001-0007, 2/pk |
| AOC-14, AOC-17, AOC-20 | 50 | Removable needle | 23/42/cone tip | 221-45243-00 | 8001-0012 | | 8001-0014 |
| AOC-14, AOC-17, AOC-20 | 250 | Removable needle, gas tight | 23/42/cone tip | 221-45244-00 | 8001-0013 | | 8001-0014 |

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.



TIPS & TOOLS

For a comprehensive vial compatibility chart, identification guide, septum recommendations, visit www.agilent.com/chem/vialsposter



Agilent CrossLab Supplies for Shimadzu GC Systems

Inlet Septa

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|---------------|---------------------------------|----------------------------------|
| Shimadzu plug | 8010-0231 | 8010-0232 |

Non-Stick Advanced Green Septa

| Description | Similar to OEM Part No. | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|---------------|------------------------------|---------------------------------|----------------------------------|
| Shimadzu plug | 220-90547-00 220-94781-00 | 8010-0215 | 8010-0216 |

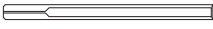









General Purpose Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|---------------|---------------------------------|----------------------------------|
| Shimadzu plug | 8010-0263 | 8010-0264 |

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Agilent CrossLab Supplies for Thermo Scientific GC Systems

Liners for Trace, Focus Systems

| Description | ID (mm) | OD (mm) | Length (mm) | Volume (μL) | Unit | Similar to OEM Part No. | Agilent Ultra Inert Deactivation | Similar to OEM Part No. | Agilent Original Deactivation |
|--|---------|---------|-------------|-------------|------|-------------------------|----------------------------------|-------------------------|-------------------------------|
| Splitless Liners | | | | | | | | | |
|  Single taper | 5.0 | 8.0 | 105 | 1750 | 5/pk | 45350033 | 8002-0153 | 45350033 | 8002-0103 |
|  Single taper | 3.0 | 8.0 | 105 | | 5/pk | 45350032 | 8002-0154 | 45350032 | 8002-0104 |
| Split Liners | | | | | | | | | |
|  Straight | 5.0 | 8.0 | 105 | 2000 | 5/pk | 45350030 | 8002-0151 | 45350030 | 8002-0101 |
|  Straight | 3.0 | 8.0 | 105 | 750 | 5/pk | 45350031 | 8002-0152 | 45350031 | 8002-0102 |
| PTV Liners | | | | | | | | | |
|  Straight | 2.0 | 2.75 | 120 | 375 | 5/pk | 45322045 | 8002-0156* | 45322045 | 8002-0106* |
|  Straight with bottom restriction | 2.0 | 2.75 | 120 | 375 | 5/pk | 45352057 | 8002-0157 | 45352057 | 8002-0107 |
|  6 baffles | 2.0 | 2.75 | 120 | | 5/pk | 453T2120 | 8002-0160* | | |
|  Straight | 1.75 | 2.75 | 120 | 300 | 5/pk | | 8002-0155 | | 8002-0105 |
|  Straight | 1.0 | 2.75 | 120 | 90 | 5/pk | 45352054 | 8002-0161 | | |
|  3 baffles | 1.0 | 2.75 | 120 | | 5/pk | 45352062 | 8002-0159* | | |

*Use in Trace systems only

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Thermo Scientific GC Systems

Liner O-rings

| Description | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|--|-------|-------------------------------|------------------------------|
| Non-stick fluoroelastomer O-ring, sintered liner | 10/pk | 29031305 | 8002-0201 |
| Non-stick fluoroelastomer O-ring | 10/pk | 29030306 | 8010-0401 |
| Graphite O-ring, 8 mm id | 2/pk | 29033406 | 8002-0203 |
| Graphite O-ring, PTV | 2/pk | 29013417 | 8002-0204 |

Column Ferrules

Capillary Column Ferrules

| Model | Fitting Size (in) | Ferrule ID (mm) | Column ID (mm) | Hole | Unit | Similar to OEM Part No. | Agilent CrossLab Part No. |
|---|-------------------|-----------------|----------------|------|-------|-------------------------------|---------------------------------|
| 85% Polyimide/15% Graphite Capillary Column Ferrules | | | | | | | |
| Injectors/Detectors | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 290VT186 | 8002-0220 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 290VT187 | 8002-0221 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | 290VT188 | 8002-0222 |
| Any GC/MS Interface | 1/16 | 0.4 | 0.25 | 1 | 10/pk | 29033496 | 8010-0310 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | 29033497 | 8010-0311 |
| Graphite Capillary Column Ferrules | | | | | | | |
| Trace/Focus | M4 | 0.3 | 0.18 | 1 | 10/pk | | 8002-0211 |
| Injectors/Detectors (not for GC/MS Interface) | M4 | 0.4 | 0.25 | 1 | 10/pk | 29053488 | 8002-0212 |
| | M4 | 0.5 | 0.32 | 1 | 10/pk | 29053487 | 8002-0213 |
| | M4 | 0.8 | 0.53 | 1 | 10/pk | 29053486 | 8002-0214 |
| Injectors/Detectors | 1/16 | 0.4 | 0.25 | 1 | 10/pk | | 8002-0215 |
| | 1/16 | 0.5 | 0.32 | 1 | 10/pk | | 8002-0216 |
| | 1/16 | 0.8 | 0.53 | 1 | 10/pk | | 8002-0217 |

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Thermo Scientific GC Systems

Column Nuts

| Description | Unit | Similar to | Agilent CrossLab |
|---|------|--------------|------------------|
| | | OEM Part No. | Part No. |
| Column nut, stainless steel, split/splitless injector | 2/pk | 35032423 | 8002-0311 |
| Column nut, brass | 2/pk | 290BT239 | 8002-0312 |

Autosampler Syringes for Thermo GC Systems

| Model | Volume (µL) | Description | Needle Gauge/ Length (mm)/Tip | Similar to OEM Syringe Part No. | Agilent CrossLab Syringe Part No. | Similar to OEM Replacement Needle or Plunger Part No. | Agilent CrossLab Replacement Needle or Plunger Part No. |
|---|-------------|--------------------------------|----------------------------------|---------------------------------------|--|--|--|
| TriPlus, AS3000 | 0.5 | Plunger-in-needle | 23/50/cone tip | 36504045 | 8010-0355 | | 8010-0367* |
| TriPlus | 5 | Fixed needle | 26/50/cone tip | 36504047 | 8010-0353 | | |
| TriPlus, AS3000, AS2000, AS200, AS800 | 10 | Fixed needle | 25/50/cone tip | 36500525 | 8002-0003 | | |
| TriPlus, AS2000 | 10 | Fixed needle | 23/80/cone tip | 36520061 | 8002-0002 | | |
| TriPlus, AS2000 | 10 | Fixed needle | 26/80/cone tip | 36502019 | 8002-0001 | | |
| TriPlus, AS2000, AS200, AS800 | 100 | Fixed needle, gas tight | 23/50/cone tip | | 8010-0354 | | 8010-0368** |
| TriPlus, AS2000 | 100 | Removable needle, gas tight | 23/50/side hole tip | 36520050 | 8002-0004 | 36540040 | 8002-0005*** |

*Needle and plunger repair kit

**Replacement plunger

***Replacement needle

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Thermo Scientific GC Systems

Inlet Septa

Non-Stick Bleed and Temperature Optimized (BTO) Septa

| Description | Similar to | Agilent CrossLab Part No. 50/pk | Similar to | Agilent CrossLab Part No. 100/pk |
|----------------------|-----------------|------------------------------------|-----------------|-------------------------------------|
| | OEM Part No. | | OEM Part No. | |
| 9 mm, CenterGuide | 31303240 | 8010-0217 | | 8010-0218 |
| 9.5 mm | | 8010-0219 | | 8010-0220 |
| 10 mm | | 8010-0221 | | 8010-0222 |
| 11 mm, CenterGuide | | 8010-0223 | | 8010-0224 |
| 11.5 mm, CenterGuide | 31303230 | 8010-0225 | | 8010-0226 |
| Description | | 24/pk | | 48/pk |
| 12.7 mm, CenterGuide | | 8010-0227 | 31303228 | 8010-0228 |
| 17 mm, CenterGuide | | 8010-0229 | 31303211 | 8010-0230 |

Non-Stick Advanced Green Septa

| Description | Similar to | Agilent CrossLab Part No. 50/pk | Similar to | Agilent CrossLab Part No. 100/pk |
|----------------------|-----------------|------------------------------------|-----------------|-------------------------------------|
| | OEM Part No. | | OEM Part No. | |
| 9 mm, CenterGuide | 313G3240 | 8010-0201 | | 8010-0202 |
| 9.5 mm | | 8010-0203 | | 8010-0204 |
| 10 mm | | 8010-0205 | | 8010-0206 |
| 11 mm, CenterGuide | 313G3230 | 8010-0207 | | 8010-0208 |
| 11.5 mm, CenterGuide | | 8010-0209 | | 8010-0210 |
| Description | | 24/pk | | 48/pk |
| 12.7 mm, CenterGuide | | 8010-0211 | 313G3228 | 8010-0212 |
| 17 mm, CenterGuide | | 8010-0213 | 313G3211 | 8010-0214 |



Non-stick advanced green septum, 11 mm, CenterGuide, 8010-0207

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for Thermo Scientific GC Systems



Long-life septa, 8010-0239, 8010-0240

Non-Stick Long-Life Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|----------------------|---------------------------------|----------------------------------|
| 9 mm, CenterGuide | 8010-0233 | 8010-0234 |
| 11 mm, CenterGuide | 8010-0239 | 8010-0240 |
| 11.5 mm, CenterGuide | 8010-0241 | 8010-0242 |
| Description | 24/pk | 48/pk |
| 12.7 mm, CenterGuide | 8010-0243 | 8010-0244 |
| 17 mm, CenterGuide | 8010-0245 | 8010-0246 |

General Purpose Septa

| Description | Agilent CrossLab Part No. 50/pk | Agilent CrossLab Part No. 100/pk |
|-------------|---------------------------------|----------------------------------|
| 9 mm | 8010-0249 | 8010-0250 |
| 9.5 mm | 8010-0251 | 8010-0252 |
| 10 mm | 8010-0253 | 8010-0254 |
| 11 mm | 8010-0255 | 8010-0256 |
| 11.5 mm | 8010-0257 | 8010-0258 |
| 12.7 mm | 8010-0259 | 8010-0260 |
| 17 mm | 8010-0261 | 8010-0262 |

The cross references to the original equipment manufacturer (OEM) part numbers listed here serve as a recommendation that the Agilent CrossLab products are viable alternatives to OEM products. CrossLab products are compatible with the corresponding OEM instruments, although in some cases, the CrossLab products may have slightly different designs as compared to the OEM counterparts. All Agilent CrossLab supplies are backed by Agilent's 90-day money-back warranty.

Agilent CrossLab Supplies for CTC GC Autosamplers

Autosampler Syringes for CTC CombiPAL and GC PAL

| Volume (µL) | Description | Needle Gauge/ Length (mm)/Tip | Agilent CrossLab Syringe Part No. | Agilent CrossLab Replacement Needle or Plunger Part No. |
|-------------|-----------------------------|----------------------------------|--|--|
| 0.5 | Plunger-in-needle | 23/50/cone tip | 8010-0355 | 8010-0367* |
| 5 | Fixed needle | 23/50/cone tip | 8010-0356 | |
| 10 | Fixed needle | 23/50/cone tip | 8010-0351 | |
| | Fixed needle, gas tight | 23/50/cone tip | 8010-0371 | 8010-0359** |
| | Fixed needle | 26/50/cone tip | 8010-0352 | |
| | Fixed needle, gas tight | 26/50/cone tip | 8010-0357 | 8010-0359** |
| | Fixed needle | 26/50/bevel tip | 8010-0358 | |
| 25 | Fixed needle | 26/50/cone tip | 8010-0360 | |
| 100 | Removable needle, gas tight | 23/50/side hole tip | 8002-0004 | 8002-0005*** |
| | Fixed needle | 26/50/cone tip | 8010-0361 | |
| 250 | Fixed needle, gas tight | 26/50/cone tip | 8010-0362 | |

| Volume (mL) | Description | Needle Gauge/ Length (mm)/Tip | Agilent CrossLab Syringe Part No. | Agilent CrossLab Replacement Needle or Plunger Part No. |
|-------------|---------------------------------------|----------------------------------|--|--|
| 1 | Fixed needle, gas tight, headspace | 23/56/side hole tip | 8010-0363 | 8010-0365 |
| 2.5 | Fixed needle, gas tight, headspace | 23/56/side hole tip | 8010-0364 | 8010-0366 |

*Needle and plunger repair kit

**Replacement plunger

***Replacement needle



Agilent PAL Sampler

Part Number Index

| | | | | | | | |
|------------------|--|------------------|------------------|------------------|-------------------------|--------------------|--------------------|
| 0100-0057..... | 113, 131 | 05971-20143..... | 154-155, 157 | 115-3352E..... | 429 | 121-5522..... | 126, 300 |
| 0100-0161..... | 127 | 05971-60571..... | 163, 176 | 115-3352PT..... | 429 | 121-5522E..... | 300 |
| 0100-0549..... | 169 | 05971-80103..... | 165 | 115-3412..... | 426 | 121-5522LTM..... | 300, 456 |
| 0100-1324..... | 41 | 05980-20018..... | 146, 176-177 | 115-3422..... | 426 | 121-5522UI..... | 266, 290 |
| 0100-1325..... | 41 | 05980-60051..... | 146, 174 | 115-3432..... | 426 | 121-5522UILTM..... | 290, 457 |
| 0100-1326..... | 41 | 05988-20066..... | 38, 40, 148, 172 | 115-3432E..... | 426 | 121-5523..... | 300 |
| 0100-1331..... | 41 | 07673-20570..... | 51 | 115-3432PT..... | 421, 426 | 121-5523LTM..... | 300, 456 |
| 0100-1332..... | 41, 91, 99, 105, 113, 129, 131, 136-137 | 07673-40180..... | 50 | 115-34H2..... | 426 | 121-5523UI..... | 290 |
| 0100-1342..... | 41 | 07673-60840..... | 51 | 115-3532..... | 433 | 121-5523UILTM..... | 290, 457 |
| 0100-1344..... | 41 | 0960-0897..... | 162 | 115-3532PT..... | 278-279, 421, 433 | 121-5542..... | 300 |
| 0100-1365..... | 41 | 1000-1437..... | 113-115, 131 | 115-3552..... | 433 | 121-5621..... | 394 |
| 0100-1375..... | 41, 85, 87 | 1000-1438..... | 114 | 115-3552PT..... | 279, 285, 421, 433 | 121-5622..... | 394 |
| 0100-1378..... | 41 | 112-2032..... | 361 | 115-4912..... | 366 | 121-7012..... | 352 |
| 0100-1379..... | 41 | 112-2032LTM..... | 361, 453 | 115-4912E..... | 366 | 121-7012LTM..... | 352, 458 |
| 0100-1381..... | 41 | 112-2112..... | 442 | 121-0122..... | 295 | 121-7013LTM..... | 458 |
| 0100-1389..... | 80 | 112-2132..... | 442 | 121-0122LTM..... | 295, 455 | 121-7022..... | 352 |
| 0100-1597..... | 169 | 112-2133..... | 442 | 121-0122UI..... | 289 | 121-7022LTM..... | 352, 458 |
| 0100-2138..... | 122-123 | 112-2133LTM..... | 442, 453 | 121-0713..... | 349 | 121-7023..... | 352 |
| 0100-2430..... | 122-123 | 112-2162..... | 442 | 121-0722..... | 266, 349 | 121-7023LTM..... | 352, 458 |
| 0100-2594..... | 53 | 112-2532..... | 411 | 121-0722LTM..... | 349, 454 | 121-7042..... | 352 |
| 0100-2595..... | 53 | 112-2532E..... | 411 | 121-1012..... | 319 | 121-7042E..... | 352 |
| 0101-0282..... | 48 | 112-2532LTM..... | 411, 453 | 121-1012E..... | 319 | 121-7043..... | 352 |
| 0101-0299..... | 48 | 112-2562..... | 411 | 121-1012LTM..... | 319, 453 | 121-9627..... | 390 |
| 0101-0300..... | 48 | 112-5432..... | 444 | 121-1013..... | 319 | 121-9723..... | 264, 276, 292, 392 |
| 0101-0301..... | 48 | 112-5462..... | 444 | 121-1013LTM..... | 319, 453 | 122-0112..... | 295 |
| 0101-0302..... | 48 | 112-6632..... | 410 | 121-101A..... | 319 | 122-0112E..... | 295 |
| 0101-0303..... | 48 | 112-6632LTM..... | 410, 453 | 121-101ALTM..... | 319, 453 | 122-0112LTM..... | 295, 455 |
| 0101-0304..... | 48 | 112-8837..... | 126, 405 | 121-1022..... | 319 | 122-0112UI..... | 289 |
| 0101-0355..... | 48 | 112-8837E..... | 405 | 121-1022E..... | 319 | 122-0131..... | 295 |
| 0101-0403..... | 48 | 112-8837LTM..... | 405, 460 | 121-1022LTM..... | 319, 453 | 122-0132..... | 126, 273, 295 |
| 0101-0532..... | 48 | 112-8867..... | 405 | 121-1023..... | 319 | 122-0132E..... | 295 |
| 0101-0584..... | 47 | 112-8867E..... | 405 | 121-1023LTM..... | 319, 453 | 122-0132LTM..... | 455 |
| 0101-0585..... | 47 | 112-88A7..... | 405 | 121-1043..... | 319 | 122-0132UI..... | 289 |
| 0101-0633..... | 48 | 112-88A7E..... | 405 | 121-1222..... | 304 | 122-0132UIE..... | 289 |
| 0101-0636..... | 47 | 113-2032..... | 361 | 121-1232..... | 304 | 122-0162..... | 295 |
| 0101-0637..... | 47 | 113-2132..... | 442 | 121-1324..... | 267, 271, 275, 284, 398 | 122-0162UI..... | 289 |
| 0101-0638..... | 47 | 113-2132LTM..... | 442, 453 | 121-1324E..... | 398 | 122-0212..... | 344 |
| 0101-0639..... | 47 | 113-2133..... | 442 | 121-1324LTM..... | 398, 457 | 122-0232..... | 344 |
| 0101-0666..... | 48 | 113-2532..... | 411 | 121-1324UI..... | 275, 291, 397 | 122-0232E..... | 344 |
| 0101-0667..... | 48 | 113-2532E..... | 411 | 121-1524..... | 267, 271, 275, 284, 400 | 122-0233..... | 267, 344 |
| 0101-0946..... | 47 | 113-3032..... | 444 | 121-1524LTM..... | 400, 457 | 122-0334UI..... | 292, 416 |
| 0101-0947..... | 47 | 113-3112..... | 437 | 121-1544..... | 400 | 122-0364UI..... | 292, 416 |
| 0101-0948..... | 48 | 113-3132..... | 437 | 121-1544E..... | 400 | 122-0712..... | 349 |
| 0101-0954..... | 48 | 113-3133..... | 437 | 121-1722..... | 339 | 122-0713..... | 349 |
| 0101-0955..... | 48 | 113-3133LTM..... | 437, 458 | 121-1722LTM..... | 339, 454 | 122-0713LTM..... | 349, 454 |
| 0101-0956..... | 48 | 113-3162..... | 437 | 121-1723..... | 339 | 122-0731..... | 349 |
| 0101-0957..... | 48 | 113-3432..... | 426 | 121-2223..... | 345 | 122-0732..... | 126, 266, 268, 349 |
| 0101-1001..... | 48 | 113-3432E..... | 426 | 121-2323..... | 342 | 122-0732E..... | 349 |
| 0101-1472..... | 47 | 113-3432LTM..... | 426, 458 | 121-3822..... | 306 | 122-0732LTM..... | 349, 454 |
| 0101-1473..... | 47 | 113-4302..... | 434 | 121-3822UI..... | 291 | 122-0733..... | 274, 349 |
| 03396-61010..... | 127 | 113-4312..... | 434 | 121-4722..... | 308 | 122-0733E..... | 349 |
| 0515-0680..... | 113, 115, 131 | 113-4332..... | 283, 434 | 121-4722LTM..... | 308, 454 | 122-0733LTM..... | 349, 454 |
| 0515-0683..... | 114 | 113-4362..... | 278, 434 | 121-5012..... | 329 | 122-0761..... | 349 |
| 0515-2495..... | 120, 133 | 113-5432..... | 444 | 121-5012E..... | 329 | 122-0762..... | 349 |
| 0515-2712..... | 128 | 113-6632..... | 410 | 121-5012LTM..... | 329, 455 | 122-0763..... | 349 |
| 0515-2726..... | 120, 133 | 113-6632LTM..... | 410, 453 | 121-5013..... | 329 | 122-0763E..... | 349 |
| 0535-0071..... | 157 | 115-2132..... | 282, 442 | 121-5013LTM..... | 329, 455 | 122-0766..... | 349 |
| 05890-61525..... | 50 | 115-2132LTM..... | 442, 453 | 121-5022..... | 329 | 122-1011..... | 319 |
| 05890-80660..... | 49 | 115-3113..... | 437 | 121-5022E..... | 329 | 122-1012..... | 319 |
| 05921-21170..... | 39-40 | 115-3133..... | 437 | 121-5022LTM..... | 329, 455 | 122-1012LTM..... | 319, 453 |
| 05970-60045..... | 182 | 115-3133LTM..... | 437, 458 | 121-5023..... | 329 | 122-1013..... | 319 |
| 05971-20134..... | 151, 154 | 115-3332..... | 429 | 121-5023LTM..... | 329, 455 | 122-1022..... | 319 |
| | | 115-3352..... | 429 | 121-5042..... | 329 | 122-1022LTM..... | 319, 453 |

| | | | | | | | |
|-------------|--|-------------|--------------------------------|---------------|-------------------------------|-------------|---------------|
| 122-1022LTM | 319, 453 | 122-1811 | 364 | 122-5032E | 330 | 122-6832 | 269-270, 388 |
| 122-1031 | 319 | 122-1831 | 364 | 122-5032LTM | 330, 456 | 122-7012 | 353 |
| 122-1032 | 319 | 122-1831LTM | 364, 454 | 122-5033 | 272, 330 | 122-7012E | 353 |
| 122-1032E | 319 | 122-1932 | 337 | 122-5033E | 330 | 122-7012LTM | 353, 458 |
| 122-1032G | 445 | 122-1962 | 337 | 122-5033LTM | 330, 456 | 122-7013 | 272, 353 |
| 122-1032LTM | 319, 453 | 122-2032 | 343 | 122-503E | 330 | 122-7013LTM | 353, 458 |
| 122-1033 | 267, 319 | 122-2032LTM | 343, 455 | 122-503ELTM | 330, 456 | 122-7031 | 353 |
| 122-1033E | 319 | 122-2033 | 343 | 122-5052 | 330 | 122-7032 | 278, 353 |
| 122-1033LTM | 319, 453 | 122-2033LTM | 343, 455 | 122-5061 | 330 | 122-7032E | 353 |
| 122-103E | 319 | 122-2212 | 345 | 122-5062 | 330 | 122-7032LTM | 353, 458 |
| 122-103ELTM | 319, 453 | 122-2212LTM | 345, 455 | 122-5063 | 330 | 122-7033 | 272, 276, 353 |
| 122-1052 | 319 | 122-2231 | 345 | 122-506E | 330 | 122-7033E | 353 |
| 122-1061 | 319 | 122-2232 | 345 | 122-5511 | 300 | 122-7033LTM | 353, 458 |
| 122-1062 | 319 | 122-2232LTM | 345, 455 | 122-5511LTM | 300, 456 | 122-7061 | 353 |
| 122-1063 | 319 | 122-2312 | 342 | 122-5512 | 300 | 122-7062 | 353 |
| 122-106E | 278, 319 | 122-2331 | 342 | 122-5512LTM | 300, 456 | 122-7062E | 353 |
| 122-10A6 | 369 | 122-2332 | 342 | 122-5512UI | 267, 290 | 122-7063 | 353 |
| 122-10A6E | 283, 369 | 122-2332E | 342 | 122-5512UILTM | 290, 457 | 122-7063E | 353 |
| 122-10AE | 319 | 122-2332LTM | 342, 455 | 122-5513 | 300 | 122-7332 | 354 |
| 122-10G3 | 319 | 122-2361 | 342 | 122-5513UI | 290 | 122-7332E | 354 |
| 122-1111 | 362 | 122-2361E | 342 | 122-5516 | 300 | 122-7332LTM | 354, 458 |
| 122-1111E | 362 | 122-2362 | 285, 342 | 122-5522 | 300 | 122-7333 | 354 |
| 122-1131 | 362 | 122-2362E | 342 | 122-5522LTM | 300, 456 | 122-7362 | 354 |
| 122-1131LTM | 455 | 122-2461 | 396 | 122-5522UI | 290 | 122-7363 | 354 |
| 122-1211 | 304 | 122-2462 | 396 | 122-5522UILTM | 290, 457 | 122-7732 | 283-284, 386 |
| 122-1211LTM | 304, 458 | 122-2912 | 312 | 122-5531 | 300 | 122-7732LTM | 386, 454 |
| 122-1212 | 304 | 122-2912LTM | 312, 455 | 122-5532 | 265, 267-268, 272-274, 300 | 122-96L2 | 390 |
| 122-1231 | 304 | 122-2932 | 283, 312 | 122-5532E | 300 | 122-9732 | 276, 292, 392 |
| 122-1232 | 267, 269, 272, 282-285, 304 | 122-2932E | 312 | 122-5532G | 445 | 122-9736 | 292, 392 |
| 122-1232G | 445 | 122-2932LTM | 312, 455 | 122-5532LTM | 300, 456 | 123-0112 | 295 |
| 122-1232LTM | 304, 458 | 122-2962 | 312 | 122-5533 | 266, 268-271, 290 | 123-0112UI | 289 |
| 122-1233 | 304 | 122-3212 | 358 | 122-5533UI | 290 | 123-0131 | 295 |
| 122-1236 | 265, 304 | 122-3232 | 358 | 122-5533UIE | 290 | 123-0132 | 295 |
| 122-1262 | 304 | 122-3232E | 358 | 122-5533UILTM | 290, 457 | 123-0132UI | 289 |
| 122-1332 | 347 | 122-3232LTM | 358, 457 | 122-5533 | 267, 273-274, 276, 300 | 123-0162 | 295 |
| 122-1332E | 347 | 122-3233 | 358 | 122-5533E | 300 | 123-0213 | 344 |
| 122-1333 | 267, 347 | 122-3262 | 358 | 122-5533G | 445 | 123-0232 | 344 |
| 122-1334 | 265, 269, 272, 398 | 122-3262E | 358 | 122-5533LTM | 300, 456 | 123-0233 | 344 |
| 122-1334E | 398 | 122-3263 | 358 | 122-5533UI | 266, 274, 290 | 123-0334UI | 292, 416 |
| 122-1334LTM | 398, 457 | 122-3812 | 306 | 122-5533UILTM | 290, 457 | 123-0364UI | 292, 416 |
| 122-1334UI | 265, 272, 291, 397 | 122-3812UI | 291 | 122-5536 | 270, 300 | 123-0712 | 349 |
| 122-1362 | 347 | 122-3831 | 306 | 122-5536E | 300 | 123-0712LTM | 349, 454 |
| 122-1363 | 347 | 122-3832 | 265, 270, 274, 283-284, 306 | 122-5536G | 445 | 123-0713 | 349 |
| 122-1363E | 347 | 122-3832E | 306 | 122-5536UI | 290 | 123-0731 | 349 |
| 122-1364 | 265, 267, 269, 271, 284, 398 | 122-3832LTM | 306, 455 | 122-5536UILTM | 290, 457 | 123-0732 | 349 |
| 122-1364E | 398 | 122-3832UI | 271, 291 | 122-5552 | 300 | 123-0732E | 349 |
| 122-1364UI | 265, 267, 275, 291, 397 | 122-3862 | 306 | 122-5552UI | 290 | 123-0733 | 349 |
| 122-1534 | 265, 269, 272, 400 | 122-4711 | 308 | 122-5561 | 300 | 123-0733E | 349 |
| 122-1534LTM | 400, 457 | 122-4711LTM | 308, 454 | 122-5562 | 300 | 123-0753 | 349 |
| 122-1564 | 265, 267, 269, 271-272, 275, 284, 400 | 122-4712 | 308 | 122-5562E | 300 | 123-0762 | 349 |
| 122-1564E | 400 | 122-4712LTM | 308, 454 | 122-5562G | 445 | 123-0763 | 349 |
| 122-1712 | 339 | 122-4731 | 308 | 122-5562UI | 270-271, 276, 290 | 123-0763E | 349 |
| 122-1713 | 339 | 122-4732 | 270, 273, 308 | 122-5563 | 300 | 123-100ALTM | 453 |
| 122-1713E | 339 | 122-4732E | 308 | 122-5563UI | 290 | 123-1011 | 320 |
| 122-1731 | 339 | 122-4732LTM | 308, 454 | 122-5631 | 394 | 123-1011LTM | 320, 453 |
| 122-1731E | 339 | 122-4762 | 308 | 122-5631G5 | 445 | 123-1012 | 320 |
| 122-1732 | 339 | 122-5002LTM | 456 | 122-5632 | 394 | 123-1012LTM | 320, 453 |
| 122-1732E | 339 | 122-5011 | 330 | 122-5633 | 394 | 123-1013 | 320 |
| 122-1732LTM | 339, 454 | 122-5012 | 283, 330 | 122-5661 | 394 | 123-1014 | 320 |
| 122-1733 | 339 | 122-5012LTM | 330, 456 | 122-5711 | 363 | 123-1015 | 320 |
| 122-1762 | 339 | 122-5013 | 330 | 122-5711E | 363 | 123-1015LTM | 320, 453 |
| 122-1801 | 364 | 122-501E | 330 | 122-5711LTM | 363, 456 | 123-1022 | 283, 320 |
| 122-1801LTM | 364, 454 | 122-5022 | 330 | 122-5731 | 363 | 123-1026 | 320 |
| | | 122-5031 | 330 | 122-5731LTM | 363, 456 | 123-1027 | 320 |
| | | 122-5032 | 284, 330 | 122-6432 | 443 | 123-102F | 320 |
| | | | | 122-6462 | 443 | 123-1031 | 320 |

PART NUMBER INDEX

| | | | | | | | |
|------------------|-------------------------|------------------|-------------------------|------------------|-----------------------------|------------------|-------------------|
| 123-1032..... | 320 | 123-1861..... | 364 | 123-5512LTM..... | 300, 456 | 123-BD01..... | 378 |
| 123-1032LTM..... | 320, 453 | 123-1932..... | 337 | 123-5513..... | 300 | 123-BD11..... | 378 |
| 123-1033..... | 282, 320 | 123-1933..... | 337 | 123-5513LTM..... | 300, 456 | 123-BD34..... | 378 |
| 123-1033E..... | 320 | 123-1933E..... | 337 | 123-5526..... | 300 | 124-0034..... | 402 |
| 123-1033LTM..... | 320, 453 | 123-1933LTM..... | 337, 455 | 123-5531..... | 300 | 124-1032..... | 320 |
| 123-1034..... | 320 | 123-2032..... | 343 | 123-5532..... | 270, 273, 300 | 124-1034..... | 320 |
| 123-1035..... | 320 | 123-2033..... | 343 | 123-5532E..... | 300 | 124-1334..... | 280, 283, 398 |
| 123-1035LTM..... | 320, 453 | 123-2232..... | 345 | 123-5532UI..... | 275, 290 | 124-1334LTM..... | 398, 457 |
| 123-103B..... | 320 | 123-2232E..... | 345 | 123-5532UIE..... | 290 | 124-1374..... | 269, 398 |
| 123-103BLTM..... | 320, 453 | 123-2332..... | 342 | 123-5533..... | 276, 300 | 124-1534..... | 281, 400 |
| 123-103E..... | 270, 274, 320 | 123-2332E..... | 342 | 123-5533LTM..... | 300, 456 | 124-1574..... | 281, 400 |
| 123-103ELTM..... | 320, 453 | 123-2362..... | 342 | 123-5533UI..... | 290 | 124-3232..... | 282, 358 |
| 123-1052..... | 320 | 123-2932..... | 312 | 123-5536..... | 270, 274, 300 | 124-5032..... | 331 |
| 123-1055..... | 320 | 123-3212..... | 358 | 123-5536LTM..... | 300, 456 | 124-5037..... | 331 |
| 123-1056..... | 320 | 123-3223..... | 358 | 123-5536UI..... | 290 | 124-7032..... | 280, 282, 353 |
| 123-105C..... | 320 | 123-3232..... | 281, 358 | 123-5561..... | 300 | 125-0212..... | 279, 344 |
| 123-105F..... | 320 | 123-3232E..... | 358 | 123-5562..... | 300 | 125-0232..... | 344 |
| 123-1061..... | 320 | 123-3232LTM..... | 358, 457 | 123-5563..... | 300 | 125-0232LTM..... | 344, 455 |
| 123-1062..... | 320 | 123-3233..... | 358 | 123-5563UI..... | 290 | 125-0334UI..... | 292, 416 |
| 123-1062E..... | 320 | 123-3233LTM..... | 358, 457 | 123-5566..... | 300 | 125-0712..... | 349 |
| 123-1063..... | 320 | 123-3234..... | 358 | 123-5631..... | 394 | 125-0712E..... | 349 |
| 123-1063E..... | 320 | 123-3234LTM..... | 358, 457 | 123-5632..... | 394 | 125-0712LTM..... | 349, 454 |
| 123-1064..... | 320 | 123-3253..... | 358 | 123-5701..... | 363 | 125-0731..... | 349 |
| 123-1064E..... | 320 | 123-3262..... | 358 | 123-5701LTM..... | 363, 456 | 125-0732..... | 349 |
| 123-1065..... | 320 | 123-3263..... | 358 | 123-5711..... | 363 | 125-0732E..... | 349 |
| 123-1065E..... | 320 | 123-3264..... | 358 | 123-5711E..... | 363 | 125-0732G..... | 445 |
| 123-106B..... | 320 | 123-3812..... | 306 | 123-5731..... | 363 | 125-0733..... | 349 |
| 123-106BE..... | 320 | 123-3832..... | 273-274, 306 | 123-5731E..... | 363 | 125-0737..... | 349 |
| 123-106E..... | 279, 320 | 123-3832E..... | 306 | 123-6133..... | 443 | 125-0762..... | 349 |
| 123-106G..... | 320 | 123-3832UI..... | 266, 268, 270, 275, 291 | 123-6412..... | 443 | 125-0762E..... | 349 |
| 123-1102LTM..... | 455 | 123-4712..... | 308 | 123-6432..... | 443 | 125-1002..... | 321 |
| 123-1111..... | 362 | 123-4732..... | 270, 308 | 123-7012..... | 353 | 125-1005..... | 321 |
| 123-1111LTM..... | 362, 455 | 123-4732LTM..... | 308, 454 | 123-7012LTM..... | 353, 458 | 125-1005LTM..... | 321, 454 |
| 123-1131..... | 362 | 123-5003LTM..... | 456 | 123-7013..... | 353 | 125-100B..... | 321 |
| 123-1131E..... | 362 | 123-500E..... | 330 | 123-7013LTM..... | 353, 458 | 125-1011..... | 321 |
| 123-1232..... | 304 | 123-500ELTM..... | 330, 456 | 123-7031..... | 353 | 125-1011E..... | 321 |
| 123-1236..... | 266, 268, 270, 273, 304 | 123-5011..... | 330 | 123-7032..... | 353 | 125-1011LTM..... | 321, 454 |
| 123-1262..... | 304 | 123-5011LTM..... | 330, 456 | 123-7032E..... | 353 | 125-1012..... | 321 |
| 123-1332..... | 347 | 123-5012..... | 330 | 123-7032LTM..... | 353, 458 | 125-1012E..... | 321 |
| 123-1333..... | 347 | 123-5012E..... | 330 | 123-7033..... | 353 | 125-1012LTM..... | 321, 454 |
| 123-1334..... | 398 | 123-5012LTM..... | 330, 456 | 123-7033E..... | 353 | 125-1014..... | 321 |
| 123-1334E..... | 398 | 123-5013..... | 330 | 123-7033LTM..... | 353, 458 | 125-1015..... | 321 |
| 123-1334LTM..... | 398, 457 | 123-5013E..... | 330 | 123-7062..... | 281, 353 | 125-1015LTM..... | 321, 454 |
| 123-1334UI..... | 291, 397 | 123-5013LTM..... | 330, 456 | 123-7063..... | 353 | 125-1017..... | 321 |
| 123-1363..... | 347 | 123-5022..... | 330 | 123-7063E..... | 353 | 125-101J..... | 321 |
| 123-1364..... | 398 | 123-5022LTM..... | 330, 456 | 123-7312..... | 354 | 125-101K..... | 321 |
| 123-1364E..... | 398 | 123-5026..... | 330 | 123-7314..... | 354 | 125-1025..... | 321 |
| 123-1364UI..... | 275, 291, 397 | 123-502D..... | 330 | 123-7332..... | 354 | 125-1025LTM..... | 321, 454 |
| 123-1464..... | 402 | 123-502F..... | 330 | 123-7333..... | 354 | 125-102J..... | 321 |
| 123-1534..... | 283, 400 | 123-5031..... | 330 | 123-7334..... | 354 | 125-1032..... | 321 |
| 123-1564..... | 400 | 123-5032..... | 330 | 123-7334LTM..... | 354, 458 | 125-1032LTM..... | 321, 454 |
| 123-1632..... | 284, 403 | 123-5032E..... | 330 | 123-7354..... | 354 | 125-1034..... | 283, 321 |
| 123-1711..... | 339 | 123-5032LTM..... | 330, 456 | 123-7354E..... | 354 | 125-1034E..... | 321 |
| 123-1712..... | 339 | 123-5033..... | 282, 330 | 123-7362..... | 354 | 125-1034LTM..... | 321, 454 |
| 123-1713..... | 339 | 123-5033E..... | 330 | 123-7363..... | 354 | 125-1035..... | 278, 284-285, 321 |
| 123-1730..... | 266, 282, 388 | 123-503B..... | 330 | 123-7364..... | 285, 354 | 125-1035E..... | 321 |
| 123-1730LTM..... | 388, 457 | 123-503BLTM..... | 330, 456 | 123-7722..... | 386 | 125-1035LTM..... | 321, 454 |
| 123-1731..... | 339 | 123-503E..... | 330 | 123-7732..... | 386 | 125-1037..... | 321 |
| 123-1732..... | 339 | 123-503ELTM..... | 330, 456 | 123-8232..... | 265-266, 268, 273, 275, 384 | 125-1039..... | 321 |
| 123-1732E..... | 339 | 123-5052..... | 330 | 123-8336..... | 265-266, 268, 273, 275, 384 | 125-103B..... | 321 |
| 123-1732LTM..... | 339, 454 | 123-5053..... | 330 | 123-9134..... | 414 | 125-103J..... | 321 |
| 123-1733..... | 339 | 123-5056..... | 330 | 123-9134LTM..... | 414, 457 | 125-103JLTM..... | 321, 454 |
| 123-1733E..... | 339 | 123-5062..... | 330 | 123-9234..... | 414 | 125-103K..... | 321 |
| 123-1762..... | 339 | 123-5063..... | 330 | 123-9234E..... | 414 | 125-103KE..... | 321 |
| 123-1811..... | 364 | 123-5511..... | 300 | | | 125-103KLTM..... | 321, 454 |
| 123-1831..... | 364 | 123-5512..... | 300 | | | 125-1055..... | 321 |

| | | | | | | | |
|------------------|-------------------|------------------|-------------------|------------------|----------|------------------|-------------------|
| 125-1062..... | 321 | 125-3237..... | 358 | 127-0113..... | 295 | 128-3812..... | 306 |
| 125-1062E..... | 321 | 125-3262..... | 358 | 127-0122..... | 295 | 128-3822..... | 306 |
| 125-1064..... | 321 | 125-32H2..... | 358 | 127-0123..... | 295 | 128-5012..... | 330 |
| 125-1065..... | 321 | 125-3832..... | 306 | 127-0123LTM..... | 295, 455 | 128-5022..... | 330 |
| 125-1065E..... | 321 | 125-3837..... | 306 | 127-0722..... | 349 | 128-5022LTM..... | 330, 455 |
| 125-106J..... | 321 | 125-5012..... | 273, 331 | 127-0723..... | 349 | 128-5052..... | 330 |
| 125-106JE..... | 321 | 125-5012E..... | 331 | 127-100A..... | 318 | 128-50H7..... | 330 |
| 125-10B5..... | 321 | 125-5012LTM..... | 331, 456 | 127-100ALTM..... | 318, 453 | 128-5512..... | 300 |
| 125-10H5..... | 321 | 125-5017..... | 331 | 127-1012..... | 318 | 128-5522..... | 300 |
| 125-10HB..... | 321 | 125-501J..... | 331 | 127-1012E..... | 318 | 128-5522LTM..... | 300, 456 |
| 125-10HBE..... | 321 | 125-501K..... | 331 | 127-1013..... | 318 | 128-5552..... | 300 |
| 125-10HBLTM..... | 321, 454 | 125-5025..... | 331 | 127-1013E..... | 318 | 128-7022..... | 352 |
| 125-1131..... | 362 | 125-5032..... | 282, 331 | 127-1013LTM..... | 318, 453 | 128-7032..... | 352 |
| 125-1212..... | 304 | 125-5032E..... | 331 | 127-1022..... | 318 | 128-7032LTM..... | 352, 458 |
| 125-1232..... | 304 | 125-5032LTM..... | 331, 456 | 127-1022E..... | 318 | 128-7052..... | 352 |
| 125-1312..... | 347 | 125-5034..... | 331 | 127-1023..... | 318 | 128-7323..... | 354 |
| 125-1314..... | 398 | 125-5035..... | 331 | 127-1023LTM..... | 318, 453 | 128-8522..... | 415 |
| 125-1332..... | 347 | 125-5035E..... | 331 | 127-1043..... | 318 | 12A-1015..... | 319 |
| 125-1333..... | 347 | 125-5035LTM..... | 331, 456 | 127-1046..... | 318 | 12A-1015LTM..... | 319, 453 |
| 125-1333LTM..... | 347, 454 | 125-5037..... | 331 | 127-1046E..... | 318 | 12A-5015..... | 329 |
| 125-1334..... | 279-280, 285, 398 | 125-503B..... | 331 | 127-1712..... | 339 | 12A-5015LTM..... | 329, 455 |
| 125-1334E..... | 398 | 125-503D..... | 331 | 127-1712LTM..... | 339, 454 | 1300502506..... | 54 |
| 125-1334G5..... | 445 | 125-503J..... | 331 | 127-1713..... | 339 | 14-3823-000..... | 62 |
| 125-1334LTM..... | 398, 457 | 125-503K..... | 331 | 127-1722..... | 339 | 14-6855-000..... | 62 |
| 125-1334UI..... | 291, 397 | 125-5062..... | 331 | 127-2222..... | 345 | 14-8911-003..... | 63 |
| 125-1364..... | 398 | 125-5065..... | 331 | 127-3212..... | 358 | 1400-0015..... | 120, 133 |
| 125-1364E..... | 398 | 125-5065E..... | 331 | 127-3212LTM..... | 358, 457 | 145-1001..... | 285, 370, 417-418 |
| 125-1374..... | 269, 398 | 125-50HB..... | 331 | 127-32H2..... | 358 | 145-1009..... | 370, 417-418 |
| 125-1374E..... | 398 | 125-5512..... | 300 | 127-32H2LTM..... | 358, 457 | 145-1011..... | 283, 418 |
| 125-1374UI..... | 291, 397 | 125-5532..... | 300 | 127-5012..... | 329 | 145-1032..... | 418 |
| 125-14A4..... | 402 | 125-5532LTM..... | 300, 456 | 127-5012E..... | 329 | 145-1334..... | 419 |
| 125-1704..... | 339 | 125-5537..... | 300 | 127-5012LTM..... | 329, 455 | 145-2814..... | 417-418 |
| 125-1711..... | 339 | 125-5537G..... | 445 | 127-5013..... | 329 | 145-7032..... | 419 |
| 125-1712..... | 339 | 125-553J..... | 300 | 127-5013LTM..... | 329, 455 | 1460-1160..... | 113, 115, 131 |
| 125-1712LTM..... | 339, 454 | 125-553JLTM..... | 300, 456 | 127-501E..... | 329 | 1460-1914..... | 126 |
| 125-1713..... | 339 | 125-6837..... | 272-273, 275, 388 | 127-501ELTM..... | 329, 455 | 1500334701..... | 218, 220 |
| 125-1713LTM..... | 339, 454 | 125-7012..... | 353 | 127-501N..... | 329 | 1535-4952..... | 47, 52 |
| 125-1717..... | 339 | 125-7012E..... | 353 | 127-5022..... | 329 | 1535-4954..... | 47 |
| 125-1730..... | 282, 388 | 125-7017..... | 353 | 127-5023..... | 329 | 160-1010-1..... | 464 |
| 125-1731..... | 339 | 125-7031..... | 353 | 127-7012..... | 352 | 160-1010-10..... | 464 |
| 125-1732..... | 339 | 125-7031LTM..... | 353, 458 | 127-7012E..... | 352 | 160-1010-5..... | 464 |
| 125-1732E..... | 339 | 125-7032..... | 279-280, 353 | 127-7012LTM..... | 352, 458 | 160-2200-10..... | 468 |
| 125-1732LTM..... | 339, 454 | 125-7032E..... | 353 | 127-7013..... | 352 | 160-2200-5..... | 468 |
| 125-1733..... | 339 | 125-7032LTM..... | 353, 458 | 127-7013LTM..... | 352, 458 | 160-2205-1..... | 464 |
| 125-1737..... | 339 | 125-7037..... | 353 | 127-7022..... | 352 | 160-2205-10..... | 464 |
| 125-1762..... | 339 | 125-7062..... | 353 | 127-7022LTM..... | 352, 458 | 160-2205-5..... | 464 |
| 125-1912..... | 337 | 125-7062E..... | 353 | 127-7023..... | 352 | 160-2250-10..... | 468 |
| 125-1932..... | 337 | 125-7312..... | 354 | 127-7023E..... | 352 | 160-2250-5..... | 468 |
| 125-1932LTM..... | 337, 455 | 125-7314..... | 354 | 127-7023FF..... | 353 | 160-2255-1..... | 465 |
| 125-1937..... | 337 | 125-7332..... | 354 | 127-7023LTM..... | 352, 458 | 160-2255-10..... | 465 |
| 125-2032..... | 343 | 125-7332E..... | 354 | 128-0112..... | 295 | 160-2255-30..... | 465 |
| 125-2212..... | 273, 345 | 125-7333..... | 354 | 128-0122..... | 295 | 160-2255-5..... | 43, 53, 465 |
| 125-2232..... | 345 | 125-7333LTM..... | 354, 458 | 128-0122E..... | 295 | 160-2320-10..... | 468 |
| 125-2237..... | 345 | 125-7334..... | 354 | 128-0122LTM..... | 295, 455 | 160-2320-5..... | 468 |
| 125-2312..... | 342 | 125-7334E..... | 354 | 128-1012..... | 319 | 160-2325-1..... | 465 |
| 125-2332..... | 342 | 125-7362..... | 354 | 128-1012LTM..... | 319, 453 | 160-2325-10..... | 465 |
| 125-2814..... | 279-280, 283, 370 | 125-7732..... | 386 | 128-1022..... | 319 | 160-2325-30..... | 465 |
| 125-2814E..... | 370 | 125-9134..... | 414 | 128-1022LTM..... | 319, 453 | 160-2325-5..... | 43, 53, 465 |
| 125-2814LTM..... | 370, 455 | 125-9134E..... | 414 | 128-1034..... | 319 | 160-2455-1..... | 465 |
| 125-3212..... | 358 | 125-9234..... | 414 | 128-1052..... | 319 | 160-2455-10..... | 465 |
| 125-3217..... | 358 | 126-1012..... | 318 | 128-1056..... | 284, 369 | 160-2455-5..... | 53, 465 |
| 125-3217LTM..... | 358, 457 | 126-1013..... | 318 | 128-1222..... | 304 | 160-2530-10..... | 468 |
| 125-3231..... | 358 | 126-7012..... | 352 | 128-1314LTM..... | 457 | 160-2530-5..... | 468 |
| 125-3232..... | 358 | 126-7013..... | 352 | 128-1324..... | 398 | 160-2535-1..... | 465 |
| 125-3232E..... | 358 | 127-0112..... | 295 | 128-1324E..... | 398 | 160-2535-10..... | 465 |
| 125-3233..... | 358 | 127-0112LTM..... | 295, 455 | 128-1324LTM..... | 398, 457 | 160-2535-30..... | 465 |

PART NUMBER INDEX

| | | | | | | | |
|-------------------|-----------------------------------|--------------------|----------|--------------------|---------------|----------------------|--------------------------------|
| 160-2535-5..... | 43, 53, 465 | 19091A-115..... | 327 | 19091J-216E..... | 333 | 19091N-216E..... | 355 |
| 160-2610-10..... | 468 | 19091B-002..... | 328 | 19091J-231..... | 333 | 19091N-231..... | 272, 355 |
| 160-2610-5..... | 468 | 19091B-005..... | 328 | 19091J-233..... | 272, 333 | 19091N-233..... | 276, 355 |
| 160-2615-1..... | 464 | 19091B-012..... | 328 | 19091J-233LTM..... | 333, 459 | 19091N-233E..... | 355 |
| 160-2615-10..... | 464 | 19091B-012E..... | 328 | 19091J-236..... | 333 | 19091N-236..... | 355 |
| 160-2615-5..... | 464 | 19091B-015..... | 328 | 19091J-313..... | 333 | 19091N-331..... | 355 |
| 160-2625-1..... | 43, 464 | 19091B-101..... | 328 | 19091J-330..... | 333 | 19091N-577..... | 355 |
| 160-2625-10..... | 43, 464 | 19091B-101LTM..... | 328, 461 | 19091J-330LTM..... | 333, 459 | 19091N-577E..... | 355 |
| 160-2625-5..... | 43, 464 | 19091B-102..... | 328 | 19091J-333..... | 333 | 19091N-577LTM..... | 355, 460 |
| 160-2634-10..... | 468 | 19091B-102E..... | 328 | 19091J-411..... | 333 | 19091P-K15..... | 428 |
| 160-2634-5..... | 468 | 19091B-102LTM..... | 328, 461 | 19091J-411LTM..... | 333, 459 | 19091P-K15E..... | 428 |
| 160-2635-1..... | 464 | 19091B-105..... | 328 | 19091J-413..... | 333 | 19091P-K15PT..... | 421, 428 |
| 160-2635-10..... | 464 | 19091B-105E..... | 328 | 19091J-413E..... | 333 | 19091P-K33..... | 428 |
| 160-2635-5..... | 464 | 19091B-112..... | 328 | 19091J-413LTM..... | 333, 459 | 19091P-K33LTM..... | 428, 461 |
| 160-2644-10..... | 468 | 19091B-112LTM..... | 328, 461 | 19091J-416..... | 333 | 19091P-M15..... | 434 |
| 160-2644-5..... | 468 | 19091B-115..... | 328 | 19091J-431..... | 333 | 19091P-M15E..... | 434 |
| 160-2650-10..... | 468 | 19091B-115E..... | 328 | 19091J-431E..... | 333 | 19091P-MS4..... | 438 |
| 160-2650-5..... | 468 | 19091F-102..... | 359 | 19091J-433..... | 333 | 19091P-MS4E..... | 438 |
| 160-2655-1..... | 464 | 19091F-102E..... | 359 | 19091J-433E..... | 333 | 19091P-MS7..... | 438 |
| 160-2655-10..... | 464 | 19091F-102LTM..... | 359, 460 | 19091J-433LTM..... | 333, 459 | 19091P-MS7LTM..... | 438, 461 |
| 160-2655-5..... | 464 | 19091F-105..... | 359 | 19091J-436..... | 333 | 19091P-MS8..... | 438 |
| 160-2660-5..... | 468 | 19091F-105E..... | 359 | 19091J-436E..... | 333 | 19091P-MS8LTM..... | 438, 461 |
| 160-2815-5..... | 465 | 19091F-112..... | 359 | 19091J-577..... | 332 | 19091P-Q03..... | 425 |
| 160-2825-5..... | 465 | 19091F-112E..... | 359 | 19091J-577E..... | 332 | 19091P-Q03LTM..... | 425, 461 |
| 160-2845-10..... | 465 | 19091F-112LTM..... | 359, 460 | 19091J-577LTM..... | 332, 459 | 19091P-Q03PT..... | 421, 425 |
| 160-2845-5..... | 465 | 19091F-115..... | 359 | 19091L-101..... | 340 | 19091P-Q04..... | 425 |
| 160-2855-10..... | 465 | 19091F-115E..... | 359 | 19091L-113..... | 340 | 19091P-Q04E..... | 425 |
| 160-2855-5..... | 465 | 19091F-413..... | 359 | 19091L-113E..... | 340 | 19091P-Q04LTM..... | 425, 461 |
| 160-2865-10..... | 465 | 19091F-433..... | 359 | 19091L-133..... | 340 | 19091P-Q04PT..... | 421, 425 |
| 160-2865-5..... | 465 | 19091F-433E..... | 359 | 19091L-330..... | 340 | 19091P-S12..... | 432 |
| 160-4535-5..... | 53, 469 | 19091F-433LTM..... | 359, 460 | 19091L-330LTM..... | 340, 459 | 19091P-S12LTM..... | 432, 461 |
| 169-0013-HSP..... | 55 | 19091G-113..... | 338 | 19091L-333..... | 340 | 19091P-S12PT..... | 421, 432 |
| 18596-40015..... | 51 | 19091G-131..... | 338 | 19091L-413..... | 340 | 19091P-S15..... | 432 |
| 18710-20119..... | 96, 119, 130, 135 | 19091G-131E..... | 338 | 19091L-413E..... | 340 | 19091P-S15E..... | 432 |
| 18710-60170..... | 105, 136 | 19091G-131LTM..... | 338, 459 | 19091L-416..... | 340 | 19091P-S15PT..... | 421, 432 |
| 18711-60060..... | 105, 136 | 19091G-133..... | 338 | 19091L-431..... | 340 | 19091P-S33..... | 432 |
| 18713-60040..... | 102, 132 | 19091G-213..... | 338 | 19091L-431LTM..... | 340, 459 | 19091P-U04..... | 428 |
| 18713-60050..... | 102, 132 | 19091G-B133..... | 411 | 19091L-433..... | 340 | 19091P-U04E..... | 428 |
| 18740-20800..... | 75, 139 | 19091G-B213..... | 411 | 19091L-433LTM..... | 340, 459 | 19091P-U04LTM..... | 428, 461 |
| 18740-20880..... | 67, 139 | 19091G-B233..... | 411 | 19091N-013..... | 355 | 19091R-303..... | 401 |
| 18740-60830..... | 74, 76, 138 | 19091G-B233E..... | 411 | 19091N-013LTM..... | 355, 460 | 19091R-306..... | 267, 271, 275, 401 |
| 18740-60835..... | 74, 76, 83, 85, 90-91, 137-138 | 19091J-002..... | 332 | 19091N-030..... | 355 | 19091R-316..... | 401 |
| 18740-60840..... | 31 | 19091J-005..... | 332 | 19091N-030LTM..... | 355, 460 | 19091R-319..... | 401 |
| 18740-80190..... | 31 | 19091J-012..... | 333 | 19091N-033..... | 355 | 19091S-001..... | 282-283, 367 |
| 18740-80200..... | 30 | 19091J-015..... | 333 | 19091N-036..... | 355 | 19091S-001E..... | 367 |
| 18740-80220..... | 30 | 19091J-101..... | 332 | 19091N-102..... | 355 | 19091S-010..... | 388 |
| 18789-60060..... | 120, 133 | 19091J-102..... | 332 | 19091N-102LTM..... | 355, 460 | 19091S-101..... | 301 |
| 18789-80070..... | 96, 130 | 19091J-102E..... | 332 | 19091N-105..... | 355 | 19091S-101LTM..... | 301, 460 |
| 18900-21000..... | 48 | 19091J-105..... | 332 | 19091N-105E..... | 355 | 19091S-102..... | 301 |
| 18900-60640..... | 124 | 19091J-105E..... | 332 | 19091N-111..... | 355 | 19091S-102E..... | 301 |
| 19091-21050..... | 468 | 19091J-108..... | 332 | 19091N-113..... | 282, 355 | 19091S-102LTM..... | 301, 460 |
| 19091-60312..... | 322 | 19091J-112..... | 333 | 19091N-113E..... | 355 | 19091S-105..... | 301 |
| 19091-60620E..... | 464 | 19091J-112E..... | 333 | 19091N-116..... | 278, 285, 355 | 19091S-111LTM..... | 460 |
| 19091-63000..... | 80 | 19091J-113..... | 333 | 19091N-131..... | 355 | 19091S-112..... | 301 |
| 19091A-002..... | 327 | 19091J-113E..... | 333 | 19091N-131E..... | 355 | 19091S-112E..... | 301 |
| 19091A-005..... | 327 | 19091J-113LTM..... | 333, 459 | 19091N-133..... | 355 | 19091S-113..... | 270, 274, 301 |
| 19091A-008..... | 327 | 19091J-115..... | 333 | 19091N-133E..... | 355 | 19091S-133..... | 267, 270, 273-274, 276, 301 |
| 19091A-012..... | 327 | 19091J-115E..... | 333 | 19091N-136..... | 278, 355 | 19091S-133UI..... | 271, 274, 290 |
| 19091A-015..... | 327 | 19091J-202..... | 332 | 19091N-136E..... | 355 | 19091S-133UILTM..... | 290, 460 |
| 19091A-101..... | 327 | 19091J-205..... | 332 | 19091N-202..... | 355 | 19091S-139..... | 395 |
| 19091A-102..... | 327 | 19091J-212..... | 333 | 19091N-205..... | 355 | 19091S-213..... | 276, 282, 301 |
| 19091A-102E..... | 327 | 19091J-213..... | 333 | 19091N-205E..... | 355 | 19091S-213UI..... | 290 |
| 19091A-105..... | 327 | 19091J-213E..... | 333 | 19091N-213..... | 355 | 19091S-213UILTM..... | 290, 460 |
| 19091A-108..... | 327 | 19091J-215..... | 333 | 19091N-213E..... | 355 | 19091S-231..... | 301 |
| 19091A-112..... | 327 | 19091J-215E..... | 333 | 19091N-216..... | 281-282, 355 | 19091S-233..... | 301 |
| | | 19091J-216..... | 333 | | | | |

| | | | | | | | |
|----------------------|--------------------|--------------------|---------------|--------------------|-------------------------|--------------------|----------------------------|
| 19091S-233E..... | 301 | 19091W-012LTM..... | 361, 459 | 19095F-121LTM..... | 359, 460 | 19095S-100..... | 323 |
| 19091S-233UI..... | 266, 290 | 19091W-015..... | 361 | 19095F-123..... | 359 | 19095S-100E..... | 323 |
| 19091S-233UILTM..... | 290, 460 | 19091W-015E..... | 361 | 19095F-123E..... | 359 | 19095S-200..... | 369 |
| 19091S-313..... | 301 | 19091W-102..... | 361 | 19095F-123LTM..... | 359, 460 | 19095S-205..... | 369 |
| 19091S-331..... | 301 | 19091W-105..... | 361 | 19095J-023..... | 333 | 19095V-420..... | 416 |
| 19091S-331LTM..... | 301, 460 | 19091Y-012..... | 441 | 19095J-023E..... | 333 | 19095V-420E..... | 416 |
| 19091S-333..... | 301 | 19091Y-012E..... | 441 | 19095J-121..... | 333 | 19095V-420LTM..... | 416, 460 |
| 19091S-336..... | 301 | 19091Y-015..... | 441 | 19095J-121E..... | 333 | 19095W-121..... | 361 |
| 19091S-413..... | 285, 301 | 19091Y-102..... | 441 | 19095J-121LTM..... | 333, 459 | 19095W-123..... | 361 |
| 19091S-413E..... | 301 | 19091Z-002..... | 322 | 19095J-123..... | 333 | 19095Z-020..... | 279, 323 |
| 19091S-413LTM..... | 301, 460 | 19091Z-002LTM..... | 322, 459 | 19095J-123E..... | 333 | 19095Z-021..... | 279, 323 |
| 19091S-413UI..... | 275, 290 | 19091Z-005..... | 322 | 19095J-321..... | 273, 333 | 19095Z-021E..... | 323 |
| 19091S-413UILTM..... | 290, 460 | 19091Z-008..... | 322 | 19095J-323..... | 333 | 19095Z-021LTM..... | 323, 459 |
| 19091S-416..... | 301 | 19091Z-012..... | 323 | 19095J-323E..... | 333 | 19095Z-023..... | 323 |
| 19091S-431..... | 301 | 19091Z-012LTM..... | 323, 459 | 19095J-621..... | 333 | 19095Z-023E..... | 323 |
| 19091S-431LTM..... | 301, 460 | 19091Z-015..... | 323 | 19095J-623..... | 285, 333 | 19095Z-023LTM..... | 323, 459 |
| 19091S-431UI..... | 267, 290 | 19091Z-102..... | 322 | 19095J-623E..... | 333 | 19095Z-121..... | 323 |
| 19091S-431UILTM..... | 290, 460 | 19091Z-102E..... | 322 | 19095L-021..... | 340 | 19095Z-121E..... | 323 |
| 19091S-433..... | 267, 283-284, 301 | 19091Z-105..... | 322 | 19095L-021LTM..... | 340, 459 | 19095Z-121LTM..... | 323, 459 |
| 19091S-433E..... | 301 | 19091Z-112..... | 323 | 19095L-023..... | 340 | 19095Z-123..... | 323 |
| 19091S-433LTM..... | 301, 460 | 19091Z-112E..... | 323 | 19095L-023E..... | 340 | 19095Z-123E..... | 323 |
| 19091S-433UI..... | 266, 268, 271, 290 | 19091Z-115..... | 281, 285, 323 | 19095L-121..... | 441 | 19095Z-123LTM..... | 323, 459 |
| 19091S-433UIE..... | 290 | 19091Z-115E..... | 323 | 19095L-523..... | 340 | 19095Z-220..... | 323 |
| 19091S-433UILTM..... | 290, 460 | 19091Z-202..... | 322 | 19095N-121..... | 355 | 19095Z-221..... | 323 |
| 19091S-436..... | 301 | 19091Z-202LTM..... | 322, 459 | 19095N-123..... | 355 | 19095Z-221E..... | 323 |
| 19091S-436E..... | 301 | 19091Z-205..... | 322, 367 | 19095N-123E..... | 355 | 19095Z-321..... | 323 |
| 19091S-436UI..... | 290 | 19091Z-205E..... | 367 | 19095N-123LTM..... | 355, 460 | 19095Z-323..... | 323 |
| 19091S-577..... | 301 | 19091Z-211..... | 323 | 19095N-126..... | 355 | 19095Z-323E..... | 323 |
| 19091S-577LTM..... | 301, 460 | 19091Z-212..... | 323 | 19095P-K23..... | 428 | 19095Z-421..... | 323 |
| 19091S-577UI..... | 266, 290 | 19091Z-213..... | 323 | 19095P-K23LTM..... | 428, 461 | 19095Z-423..... | 323 |
| 19091S-577UILTM..... | 290, 460 | 19091Z-213E..... | 323 | 19095P-K23PT..... | 278, 421, 428 | 19095Z-423E..... | 323 |
| 19091S-602..... | 296 | 19091Z-215..... | 323 | 19095P-K25..... | 428 | 19095Z-621..... | 282, 323 |
| 19091S-602E..... | 296 | 19091Z-216..... | 323 | 19095P-K25E..... | 428 | 19095Z-623..... | 323 |
| 19091S-612..... | 296 | 19091Z-216E..... | 323 | 19095P-K25PT..... | 285, 421, 428 | 19095Z-623E..... | 323 |
| 19091S-612UI..... | 289 | 19091Z-231..... | 322 | 19095P-M23..... | 434 | 19095Z-623LTM..... | 323, 459 |
| 19091S-633..... | 296 | 19091Z-233..... | 322 | 19095P-M25..... | 434 | 19095Z-626..... | 285, 323 |
| 19091S-633LTM..... | 296, 459 | 19091Z-233E..... | 322 | 19095P-M25PT..... | 421, 434 | 19095Z-627..... | 283, 323 |
| 19091S-633UI..... | 289 | 19091Z-236..... | 284-285, 322 | 19095P-MS0..... | 278, 438 | 1909BD-113..... | 378 |
| 19091S-677..... | 296 | 19091Z-236E..... | 322 | 19095P-MS0E..... | 438 | 19231-20910..... | 98 |
| 19091S-677LTM..... | 296, 459 | 19091Z-313..... | 323 | 19095P-MS0LTM..... | 438, 461 | 19231-20940..... | 98 |
| 19091S-677UI..... | 289 | 19091Z-313LTM..... | 323, 459 | 19095P-MS5..... | 438 | 19231-20980..... | 98 |
| 19091S-713..... | 280, 283, 296 | 19091Z-331..... | 322 | 19095P-MS6..... | 438 | 19231-21050..... | 128 |
| 19091S-713LTM..... | 296, 459 | 19091Z-333..... | 322 | 19095P-MS6E..... | 438 | 19231-21060..... | 98 |
| 19091S-713UI..... | 289 | 19091Z-411..... | 323 | 19095P-MS9..... | 278, 438 | 19231-60680..... | 98 |
| 19091S-733..... | 296 | 19091Z-413..... | 323 | 19095P-Q03..... | 425 | 19231-80520..... | 99, 121, 129, 134 |
| 19091S-733E..... | 296 | 19091Z-413E..... | 323 | 19095P-Q03E..... | 425 | 19231-80530..... | 99, 121, 129, 134 |
| 19091S-733LTM..... | 296, 459 | 19091Z-416..... | 323 | 19095P-Q03LTM..... | 425, 461 | 19233-20755..... | 102, 132 |
| 19091S-733UI..... | 289 | 19091Z-431..... | 322 | 19095P-Q03PT..... | 278, 282, 284, 421, 425 | 19234-60700..... | 90, 99, 102, 129, 132, 137 |
| 19091S-833..... | 296 | 19091Z-433..... | 322 | 19095P-Q04..... | 425 | 19234-60715..... | 90, 99, 102, 129, 132, 137 |
| 19091S-833LTM..... | 296, 459 | 19091Z-433E..... | 322 | 19095P-Q04E..... | 425 | 19234-60720..... | 91, 121, 134 |
| 19091S-911..... | 296 | 19091Z-436..... | 322 | 19095P-Q04LTM..... | 425, 461 | 19243-00070..... | 75, 139 |
| 19091S-911UI..... | 289 | 19091Z-513..... | 323 | 19095P-Q04PT..... | 283-284, 421, 425 | 19243-80530..... | 90-91, 137 |
| 19091S-913..... | 296 | 19091Z-513E..... | 323 | 19095P-S21..... | 432 | 19243-80540..... | 90-91, 137 |
| 19091S-913E..... | 296 | 19091Z-530..... | 283, 322, 367 | 19095P-S23..... | 432 | 19243-80570..... | 90-91, 137 |
| 19091S-913UI..... | 289 | 19091Z-530E..... | 322, 367 | 19095P-S23PT..... | 278, 421, 432 | 19244-80540..... | 90-91, 137 |
| 19091S-916..... | 296 | 19091Z-577..... | 322 | 19095P-S25..... | 432 | 19244-80560..... | 96, 119, 130, 135 |
| 19091S-931..... | 296 | 19091Z-577E..... | 322 | 19095P-S25E..... | 432 | 19244-80610..... | 99, 121, 129, 134 |
| 19091S-931UI..... | 289 | 19091Z-613..... | 284, 323 | 19095P-S25PT..... | 281, 421, 432 | 19244-80620..... | 96, 119, 130, 135 |
| 19091S-933..... | 296 | 19091Z-613LTM..... | 323, 459 | 19095P-U03..... | 428 | 19245-20510..... | 80 |
| 19091S-933E..... | 296 | 19091Z-713..... | 323 | 19095P-U03LTM..... | 428 | 19245-20515..... | 80 |
| 19091S-933LTM..... | 296, 459 | 19091Z-713E..... | 323 | 19095P-U04..... | 428 | 19245-20525..... | 80 |
| 19091S-933UI..... | 289 | 19091Z-713LTM..... | 323, 459 | 19095P-U04LTM..... | 428, 461 | 19245-20580..... | 80 |
| 19091S-936..... | 296 | 19091Z-716..... | 323 | 19095P-U04PT..... | 284, 421, 428 | 19245-20780..... | 80 |
| 19091S-936E..... | 296 | 19095F-120..... | 359 | 19095R-420..... | 401 | 19245-40050..... | 80 |
| 19091W-012..... | 361 | 19095F-120E..... | 359 | 19095R-429..... | 401 | | |
| 19091W-012E..... | 361 | 19095F-121..... | 359 | | | | |

PART NUMBER INDEX

| | | | | | | | |
|--------------------|---------------|----------------------|--------------|----------------|---------|----------------|-----------------|
| 19245-60760..... | 80 | 222-4712LTM..... | 463 | 390607400..... | 220 | 393050492..... | 180 |
| 19245-80521..... | 80 | 222-4732LTM..... | 463 | 390607401..... | 220 | 393050493..... | 180 |
| 19251-60540..... | 29 | 222-5512LTM..... | 462 | 390607900..... | 220 | 393053501..... | 180 |
| 19251-80680..... | 126 | 222-5512UILTM..... | 462 | 390812700..... | 216-217 | 393053502..... | 179-180 |
| 19256-00090..... | 114 | 222-5532LTM..... | 462 | 390820601..... | 213-217 | 393060191..... | 180 |
| 19256-00200..... | 114 | 222-5532UILTM..... | 462 | 390842300..... | 213-217 | 393065201..... | 182 |
| 19256-00320..... | 114 | 222-5711LTM..... | 462 | 391821100..... | 215 | 393082491..... | 179 |
| 19256-20690..... | 113, 115, 131 | 222-5731LTM..... | 462 | 391866306..... | 215 | 393101291..... | 179 |
| 19256-20705..... | 113, 131 | 222-7013LTM..... | 463 | 391866308..... | 213 | 393112601..... | 179 |
| 19256-20900..... | 114 | 222-7033LTM..... | 463 | 391867600..... | 214 | 393112702..... | 179 |
| 19256-20910..... | 113-115, 131 | 2302533140..... | 54 | 392017401..... | 179 | 393113001..... | 179 |
| 19256-21140..... | 113, 131 | 2307230001..... | 54 | 392027300..... | 179-180 | 393161001..... | 179 |
| 19256-21150..... | 113, 131 | 2307232901..... | 54 | 392030500..... | 179-180 | 393164493..... | 179 |
| 19256-60510..... | 114 | 232-2790010-EHS..... | 55 | 392035300..... | 179-180 | 393167593..... | 179 |
| 19256-60700..... | 113, 131 | 232-2790012-EHS..... | 55 | 392043700..... | 180 | 393171201..... | 179 |
| 19256-60750..... | 115 | 2321700003..... | 54-55 | 392047100..... | 180 | 393175101..... | 179 |
| 19256-60800..... | 113, 131 | 2321700004..... | 54-55 | 392511901..... | 219-220 | 393706201..... | 146, 174 |
| 19256-80000..... | 114 | 2322590004..... | 54-55 | 392512800..... | 220 | 393847701..... | 179 |
| 19256-80010..... | 113-115, 131 | 2322590005..... | 54-55 | 392513800..... | 219 | 394958700..... | 218 |
| 19256-80640..... | 113, 115, 131 | 2322700011..... | 54 | 392514300..... | 219-220 | 394966601..... | 214-215 |
| 19258-20830..... | 55 | 2710100200..... | 179 | 392514500..... | 219-220 | 410105017..... | 54 |
| 19258-20870..... | 55 | 2710100400..... | 179 | 392515101..... | 219 | 4177-0607..... | 53 |
| 19298-60500..... | 124 | 2710100500..... | 179 | 392515102..... | 219 | 430-1020..... | 126 |
| 19301-60660..... | 128 | 2722990700..... | 180 | 392515103..... | 219 | 450-1000..... | 86, 90, 137 |
| 19320-80625..... | 80 | 2735000500..... | 179 | 392515104..... | 219 | 480-0003..... | 86, 90, 137 |
| 19325-60660..... | 48 | 2740236100..... | 220 | 392515105..... | 219 | 500-2114..... | 37 |
| 19354-60510..... | 124 | 2740292400..... | 219 | 392515500..... | 219-220 | 500-2118..... | 37 |
| 200-0010..... | 482 | 2740928202..... | 220 | 392517100..... | 219 | 5020-8292..... | 40 |
| 200-0032..... | 482 | 29091N-133LTM..... | 463 | 392517600..... | 219 | 5020-8293..... | 40 |
| 200-0070..... | 482 | 29091N-577LTM..... | 463 | 392517700..... | 219 | 5020-8294..... | 40 |
| 200-0110..... | 482 | 29091R-303LTM..... | 463 | 392517800..... | 219 | 5021-7107..... | 127 |
| 200-0113..... | 482 | 29091S-431UILTM..... | 462 | 392517901..... | 219 | 5021-7133..... | 45 |
| 200-0185..... | 482 | 29091S-433LTM..... | 463 | 392519200..... | 219 | 5021-7134..... | 45 |
| 200-0310..... | 482 | 29091S-433UILTM..... | 462 | 392543101..... | 217 | 5021-7136..... | 45 |
| 200-0370..... | 482 | 29091S-577UILTM..... | 462 | 392544001..... | 214 | 5021-7137..... | 45 |
| 200187500..... | 218 | 29091S-677LTM..... | 462 | 392544011..... | 214 | 5021-7146..... | 45 |
| 200187600..... | 220 | 29091S-833LTM..... | 462 | 392544391..... | 219 | 5021-7148..... | 45 |
| 200193800..... | 218, 220 | 29091S-931LTM..... | 462 | 392548201..... | 217 | 5021-7164..... | 45 |
| 210-3003..... | 30 | 301-011-HSP..... | 55 | 392548301..... | 216 | 5021-7166..... | 45 |
| 210-3003-5..... | 30 | 301-015-HSP..... | 55 | 392560591..... | 218 | 5021-7168..... | 45 |
| 210-4004-5..... | 29 | 301-016-HSP..... | 55 | 392561290..... | 218 | 5021-7169..... | 45 |
| 210-4022-5..... | 29 | 301-017-HSP..... | 55 | 392567111..... | 179 | 5021-7170..... | 45 |
| 2100003100..... | 220 | 301-152-HSP..... | 55 | 392585291..... | 218 | 5040-4667..... | 61 |
| 2100003200..... | 218, 220 | 301-169-HSP..... | 55 | 392585292..... | 218 | 5040-4668..... | 61 |
| 221-0122LTM..... | 462 | 301-170-HSP..... | 55 | 392595501..... | 216-217 | 5040-4669..... | 61 |
| 221-1324LTM..... | 463 | 301-205-HSP..... | 55 | 392597101..... | 213 | 5040-4671..... | 61 |
| 221-1524LTM..... | 463 | 301-211-HSP..... | 55 | 392597301..... | 213 | 5060-9086..... | 124 |
| 221-3822LTM..... | 463 | 301-212-HSP..... | 55 | 392597302..... | 213 | 5061-5869..... | 75, 139 |
| 221-4722LTM..... | 463 | 3050-0891..... | 154-155, 157 | 392597303..... | 213 | 5061-5886..... | 114 |
| 221-5522LTM..... | 462 | 3050-1246..... | 98 | 392597501..... | 213 | 5061-5890..... | 114 |
| 221-5522UILTM..... | 462 | 3050-1301..... | 154-155, 157 | 392599401..... | 213 | 5061-5896..... | 146, 174 |
| 221-6822LTM..... | 463 | 3050-1374..... | 157 | 392599411..... | 213 | 5062-3506..... | 37-38, 148, 172 |
| 222-0112LTM..... | 462 | 3050-1375..... | 154-155, 159 | 392599501..... | 213 | 5062-3507..... | 37, 172 |
| 222-0132LTM..... | 462 | 3150-0602..... | 84 | 392609901..... | 23 | 5062-3508..... | 37-38, 148 |
| 222-0732LTM..... | 463 | 321-002-HSP..... | 55 | 392609902..... | 22 | 5062-3511..... | 37 |
| 222-1032LTM..... | 462 | 321-055-HSP..... | 55 | 392609903..... | 23 | 5062-3512..... | 37 |
| 222-1111LTM..... | 462 | 321-056-HSP..... | 55 | 393001991..... | 180 | 5062-3513..... | 37 |
| 222-1131LTM..... | 462 | 321-057-HSP..... | 55 | 393010918..... | 179 | 5062-3514..... | 37-39, 148 |
| 222-1334LTM..... | 463 | 325-062-HSP..... | 55 | 393010920..... | 179 | 5062-3515..... | 37 |
| 222-1534LTM..... | 463 | 325-132-HSP..... | 55 | 393010924..... | 179 | 5062-3516..... | 37 |
| 222-2912LTM..... | 463 | 325-185-HSP..... | 55 | 393011391..... | 180 | 5062-3519..... | 47 |
| 222-2932LTM..... | 463 | 35900-60670..... | 127 | 393031501..... | 180 | 5062-3525..... | 45, 84, 86 |
| 222-3212LTM..... | 463 | 35900-60800..... | 127 | 393050292..... | 180 | 5062-3538..... | 37, 115 |
| 222-3232LTM..... | 463 | 35900-60920..... | 127 | 393050293..... | 180 | 5062-3580..... | 40 |
| 222-3812LTM..... | 463 | 3600500001..... | 55 | 393050392..... | 180 | 5062-3581..... | 40 |
| 222-3832LTM..... | 463 | 3600500002..... | 55 | 393050393..... | 180 | 5062-3587..... | 30 |

| | | | | | | | |
|------------------------|---------------------------|-------------------------|---------------------------|----------------|---------------|--------------------|---------------------------|
| 5062-9508..... | 47 | 5181-7460..... | 47 | 5182-9747..... | 84-86 | 5183-4757..... | 18, 74, 76, |
| 5062-9509..... | 47 | 5181-8806..... | 190 | 5182-9748..... | 84-85, 87 | 90-91, 137-138 | |
| 5062-9510..... | 47 | 5181-8808..... | 190 | 5182-9749..... | 84-85 | 5183-4757-100..... | 18, 74, 76, 138 |
| 5062-9511..... | 47 | 5181-8809..... | 190 | 5182-9754..... | 83, 86 | 5183-4758..... | 18, 80 |
| 5067-0226..... | 56 | 5181-8810..... | 189 | 5182-9756..... | 83, 86 | 5183-4759..... | 19, 85, 90, 137 |
| 5067-0227..... | 56 | 5181-8811..... | 190 | 5182-9757..... | 84, 87 | 5183-4759-100..... | 19, 85 |
| 5067-0234..... | 58 | 5181-8813..... | 190 | 5182-9758..... | 84, 87 | 5183-4760..... | 19, 80 |
| 5080-5400..... | 86, 90, 137, 146, 174 | 5181-8815..... | 22, 74, 76, 90 | 5182-9759..... | 84, 87 | 5183-4761..... | 19, 74, 76, 85, |
| 5080-8716..... | 124 | 5181-8816..... | 22, 74, 76 | 5182-9760..... | 84-85, 87 | 90, 137-138 | |
| 5080-8728-100..... | 21 | 5181-8818..... | 30 | 5182-9761..... | 83, 86 | 5183-4761-100..... | 19, 74, 76, 85, 138 |
| 5080-8728-50..... | 21 | 5181-8830..... | 39-40, 91, 99, 105, | 5182-9762..... | 83, 86 | 5183-4762..... | 19, 80 |
| 5080-8732..... | 90-91, 137 | 121, 129, 132, 134, 137 | | 5182-9763..... | 83, 86 | 5188-1181..... | 169 |
| 5080-8750..... | 91, 99, 127, 129, 137 | 5181-8833..... | 22 | 5182-9768..... | 83, 86 | 5188-1447..... | 63 |
| 5080-8751..... | 91, 99, 129, 134 | 5181-8836..... | 53, 126 | 5182-9769..... | 83, 86 | 5188-1448..... | 63 |
| 5080-8752..... | 121, 134 | 5181-8839..... | 22 | 5182-9770..... | 83, 86 | 5188-2717..... | 68, 138 |
| 5080-8753..... | 121, 134 | 5181-8863..... | 146 | 5182-9775..... | 84, 87 | 5188-2753..... | 59 |
| 5080-8755..... | 124 | 5181-8866..... | 191 | 5182-9799..... | 191 | 5188-2759..... | 59 |
| 5080-8756..... | 124 | 5182-0551..... | 50 | 5183-0314..... | 189 | 5188-5241..... | 75, 139 |
| 5080-8759..... | 124 | 5182-0773..... | 63 | 5183-0316..... | 190 | 5188-5245..... | 113, 115, 131 |
| 5080-8761..... | 124 | 5182-0774..... | 63 | 5183-0318..... | 87, 190 | 5188-5246..... | 190 |
| 5080-8768..... | 124 | 5182-0775..... | 63 | 5183-2007..... | 116, 120, 133 | 5188-5247..... | 190 |
| 5080-8769..... | 124 | 5182-0781..... | 63 | 5183-2036..... | 32, 85, 87 | 5188-5311..... | 33 |
| 5080-8773..... | 105 | 5182-0783..... | 63 | 5183-2037..... | 32, 87 | 5188-5312..... | 40 |
| 5080-8774..... | 90-91, 99, 102, 105, 121, | 5182-0794..... | 62 | 5183-2038..... | 32, 87 | 5188-5313..... | 32, 85, 87 |
| 129, 132, 134, 136-137 | | 5182-0795..... | 62 | 5183-2042..... | 189 | 5188-5314..... | 40 |
| 5080-8853..... | 37, 105 | 5182-0796..... | 62 | 5183-2058..... | 87, 190 | 5188-5315..... | 40-41 |
| 5080-8858..... | 482 | 5182-0830..... | 190 | 5183-4474..... | 56 | 5188-5316..... | 124 |
| 5080-8894-100..... | 21 | 5182-0831..... | 80, 191 | 5183-4475..... | 56 | 5188-5317..... | 124 |
| 5080-8896-50..... | 21, 90 | 5182-0832..... | 189, 191 | 5183-4477..... | 58 | 5188-5347..... | 172, 182 |
| 5080-8898..... | 90-91, 137 | 5182-0833..... | 80, 191 | 5183-4478..... | 58 | 5188-5348..... | 172, 182 |
| 5180-4103..... | 99, 105-106, | 5182-0834..... | 190 | 5183-4479..... | 58 | 5188-5356..... | 32, 85, 87 |
| 129, 136-137 | | 5182-0835..... | 189 | 5183-4480..... | 58 | 5188-5357..... | 172, 182 |
| 5180-4105..... | 90-91, 99, 102, 105, 121, | 5182-0836..... | 80, 191 | 5183-4641..... | 127 | 5188-5365..... | 33, 74, 76, 138, 163, 176 |
| 129, 132, 134, 136-137 | | 5182-0837..... | 56 | 5183-4642..... | 127 | 5188-5366..... | 33, 68, 138 |
| 5180-4124..... | 136 | 5182-0838..... | 56 | 5183-4644..... | 127 | 5188-5367..... | 67, 75, 139 |
| 5180-4150..... | 128 | 5182-0839..... | 58 | 5183-4645..... | 127 | 5188-5370..... | 190 |
| 5180-4152..... | 128 | 5182-0840..... | 58 | 5183-4647..... | 28-30 | 5188-5371..... | 190 |
| 5180-4165..... | 98, 128 | 5182-0844..... | 62 | 5183-4691..... | 29 | 5188-5372..... | 128 |
| 5180-4168..... | 33, 74, 76, 138 | 5182-0845..... | 62 | 5183-4692..... | 29 | 5188-5379..... | 482 |
| 5180-4173..... | 33, 74, 76, 138 | 5182-0846..... | 62 | 5183-4693..... | 30 | 5188-5392..... | 59 |
| 5180-4196..... | 127 | 5182-0847..... | 62 | 5183-4694..... | 30 | 5188-5953..... | 113, 115, 131 |
| 5181-1260..... | 21, 80 | 5182-0848..... | 62 | 5183-4695..... | 30 | 5188-6471..... | 31 |
| 5181-1261..... | 21 | 5182-0849..... | 62 | 5183-4696..... | 30 | 5188-6493..... | 74, 138 |
| 5181-1267..... | 189 | 5182-0850..... | 62 | 5183-4697..... | 31 | 5188-6495..... | 140 |
| 5181-1273..... | 189 | 5182-0851..... | 62 | 5183-4698..... | 31 | 5188-6496..... | 74, 138 |
| 5181-1291..... | 48-49 | 5182-0852..... | 62 | 5183-4699..... | 31 | 5188-6497..... | 74, 138 |
| 5181-1292..... | 48-49 | 5182-0853..... | 22 | 5183-4700..... | 31 | 5188-6498..... | 90-91, 137 |
| 5181-3308..... | 37, 40, 172 | 5182-0875..... | 190 | 5183-4701..... | 28-31 | 5188-6537..... | 59 |
| 5181-3315..... | 30 | 5182-3442..... | 22, 74, 76 | 5183-4702..... | 28-31 | 5188-6538..... | 59 |
| 5181-3316..... | 30 | 5182-3444..... | 22, 74, 76, 83, 85, 90-91 | 5183-4703..... | 30 | 5188-8813..... | 63 |
| 5181-3316i..... | 30 | 5182-3445..... | 22, 74, 76, 83, 85, 90-91 | 5183-4704..... | 30 | 5188-8814..... | 63 |
| 5181-3319..... | 189 | 5182-3466..... | 147 | 5183-4705..... | 30 | 5188-8815..... | 63 |
| 5181-3321..... | 189 | 5182-3477..... | 106, 136 | 5183-4706..... | 30 | 5188-8816..... | 63 |
| 5181-3322..... | 37 | 5182-9622..... | 191 | 5183-4707..... | 30 | 5188-8817..... | 63 |
| 5181-3323..... | 37-39, 148, 172 | 5182-9626..... | 191 | 5183-4708..... | 30 | 5188-8818..... | 63 |
| 5181-3351..... | 440 | 5182-9633..... | 80 | 5183-4709..... | 30 | 5188-8819..... | 63 |
| 5181-3352..... | 440 | 5182-9645..... | 80 | 5183-4710..... | 30 | 5188-8820..... | 63 |
| 5181-3354..... | 189 | 5182-9651..... | 87 | 5183-4711..... | 29 | 5188-8821..... | 63 |
| 5181-3356..... | 189 | 5182-9652..... | 67, 75, 139 | 5183-4712..... | 29 | 5188-8822..... | 63 |
| 5181-3358..... | 189-190 | 5182-9673..... | 106, 136 | 5183-4713..... | 29 | 5190-0468..... | 181 |
| 5181-3360..... | 189 | 5182-9676..... | 106, 136 | 5183-4728..... | 190 | 5190-0471..... | 181 |
| 5181-3361..... | 189 | 5182-9677..... | 106, 136 | 5183-4729..... | 190 | 5190-0472..... | 181 |
| 5181-3365..... | 189 | 5182-9679..... | 106, 136 | 5183-4730..... | 190 | 5190-0473..... | 181 |
| 5181-3382..... | 90-91, 137 | 5182-9722..... | 120, 133 | 5183-4731..... | 190 | 5190-0490..... | 181 |
| 5181-3388..... | 40 | 5182-9733..... | 52, 54-55 | 5183-4732..... | 40, 105 | 5190-0491..... | 181 |
| 5181-7459..... | 47 | 5182-9734..... | 191 | 5183-4741..... | 64 | 5190-0492..... | 181 |

PART NUMBER INDEX

| | | | | | | | |
|----------------|-----------------|-----------------|------------------|----------------|----------|----------------|----------|
| 5190-0493..... | 181 | 5190-3193..... | 190 | 8001-0159..... | 227-229 | 8003-0106..... | 221 |
| 5190-0494..... | 181 | 5190-3976..... | 64 | 8001-0160..... | 227-229 | 8003-0107..... | 221 |
| 5190-0513..... | 181 | 5190-3978..... | 64 | 8001-0162..... | 228 | 8003-0108..... | 222 |
| 5190-0531..... | 177 | 5190-3983..... | 28 | 8001-0163..... | 228 | 8003-0109..... | 222 |
| 5190-0585..... | 172 | 5190-4006..... | 28, 31 | 8001-0201..... | 230 | 8003-0110..... | 221 |
| 5190-1407..... | 378 | 5190-4007..... | 28 | 8001-0202..... | 230 | 8003-0111..... | 221 |
| 5190-1408..... | 378 | 5190-4047..... | 28, 31 | 8001-0203..... | 230 | 8003-0151..... | 221 |
| 5190-1409..... | 378 | 5190-4048..... | 28, 31 | 8001-0211..... | 231 | 8003-0153..... | 221 |
| 5190-1410..... | 378 | 5190-4054..... | 37, 40 | 8001-0212..... | 231 | 8003-0154..... | 222 |
| 5190-1426..... | 32, 85, 87 | 5190-4061..... | 60 | 8001-0213..... | 231 | 8003-0155..... | 222 |
| 5190-1437..... | 53 | 5190-4062..... | 60 | 8001-0214..... | 231 | 8003-0157..... | 221 |
| 5190-1438..... | 53 | 5190-4063..... | 60 | 8001-0221..... | 231 | 8003-0158..... | 221 |
| 5190-1441..... | 181 | 5190-4064..... | 60 | 8001-0222..... | 231 | 8003-0159..... | 221 |
| 5190-1445..... | 63 | 5190-4065..... | 60 | 8001-0223..... | 231 | 8003-0160..... | 221 |
| 5190-1446..... | 63 | 5190-4066..... | 60 | 8001-0224..... | 231 | 8003-0162..... | 221 |
| 5190-2209..... | 16, 67, 75, 139 | 5190-4067..... | 60 | 8001-0311..... | 232 | 8003-0163..... | 222 |
| 5190-2231..... | 63 | 5190-5233..... | 38, 40, 148, 172 | 8001-0312..... | 232 | 8003-0165..... | 221 |
| 5190-2232..... | 63 | 5190-6144..... | 67, 75 | 8002-0001..... | 236 | 8003-0166..... | 221 |
| 5190-2233..... | 63 | 5190-6145..... | 67, 75 | 8002-0002..... | 236 | 8003-0202..... | 222 |
| 5190-2234..... | 63 | 5190-6149..... | 16, 67 | 8002-0003..... | 236 | 8003-0203..... | 222 |
| 5190-2235..... | 63 | 5190-6168..... | 28, 53 | 8002-0004..... | 236, 239 | 8003-0204..... | 222 |
| 5190-2238..... | 56 | 5190-6194..... | 39-40, 91 | 8002-0005..... | 236, 239 | 8003-0205..... | 222 |
| 5190-2239..... | 56 | 5190-6979..... | 44 | 8002-0101..... | 234 | 8003-0211..... | 224 |
| 5190-2257..... | 58 | 5190-6980..... | 44 | 8002-0102..... | 234 | 8003-0212..... | 224 |
| 5190-2258..... | 58 | 5190-6981..... | 47 | 8002-0103..... | 234 | 8003-0216..... | 223 |
| 5190-2265..... | 54 | 5190-6982..... | 47 | 8002-0104..... | 234 | 8003-0219..... | 224 |
| 5190-2266..... | 54 | 5958-9441..... | 51 | 8002-0105..... | 234 | 8003-0221..... | 224 |
| 5190-2268..... | 16, 33, 68, 138 | 5958-9442..... | 51 | 8002-0106..... | 234 | 8003-0222..... | 224 |
| 5190-2269..... | 16, 33 | 5958-9443..... | 51 | 8002-0107..... | 234 | 8003-0223..... | 224 |
| 5190-2270..... | 16, 30 | 5958-9444..... | 51 | 8002-0151..... | 234 | 8003-0311..... | 224 |
| 5190-2271..... | 16, 30 | 5958-9445..... | 51 | 8002-0152..... | 234 | 8004-0001..... | 210 |
| 5190-2272..... | 16, 30 | 5958-9450..... | 51 | 8002-0153..... | 234 | 8004-0002..... | 210 |
| 5190-2275..... | 16, 29 | 5982-0024..... | 181 | 8002-0154..... | 234 | 8004-0003..... | 210 |
| 5190-2285..... | 56 | 5982-0025..... | 181 | 8002-0155..... | 234 | 8004-0004..... | 210 |
| 5190-2286..... | 56 | 6040-0289..... | 173-174 | 8002-0156..... | 234 | 8004-0005..... | 210 |
| 5190-2287..... | 56 | 6040-0798..... | 170 | 8002-0157..... | 234 | 8004-0006..... | 210 |
| 5190-2288..... | 56 | 6040-0809..... | 170 | 8002-0159..... | 234 | 8004-0007..... | 210 |
| 5190-2292..... | 28 | 6040-0834..... | 170 | 8002-0160..... | 234 | 8004-0101..... | 206 |
| 5190-2293..... | 28 | 6040-1361..... | 170 | 8002-0161..... | 234 | 8004-0102..... | 206 |
| 5190-2294..... | 28 | 621-9723..... | 292, 392 | 8002-0201..... | 235 | 8004-0103..... | 206 |
| 5190-2295..... | 28 | 622-9732..... | 292, 392 | 8002-0203..... | 235 | 8004-0104..... | 206 |
| 5190-2296..... | 31 | 6410090050..... | 54 | 8002-0204..... | 235 | 8004-0105..... | 206 |
| 5190-2297..... | 28, 31 | 7200008400..... | 213-217 | 8002-0211..... | 235 | 8004-0106..... | 206 |
| 5190-3151..... | 62 | 8001-0004..... | 232 | 8002-0212..... | 235 | 8004-0107..... | 206 |
| 5190-3152..... | 62 | 8001-0005..... | 232 | 8002-0213..... | 235 | 8004-0108..... | 207 |
| 5190-3153..... | 62 | 8001-0006..... | 232 | 8002-0214..... | 235 | 8004-0109..... | 207 |
| 5190-3154..... | 62 | 8001-0007..... | 232 | 8002-0215..... | 235 | 8004-0110..... | 207 |
| 5190-3157..... | 16, 18 | 8001-0010..... | 232 | 8002-0216..... | 235 | 8004-0111..... | 208 |
| 5190-3158..... | 16, 19 | 8001-0011..... | 232 | 8002-0217..... | 235 | 8004-0112..... | 207 |
| 5190-3162..... | 28 | 8001-0012..... | 232 | 8002-0220..... | 235 | 8004-0113..... | 206 |
| 5190-3163..... | 28 | 8001-0013..... | 232 | 8002-0221..... | 235 | 8004-0114..... | 206 |
| 5190-3164..... | 28 | 8001-0014..... | 232 | 8002-0222..... | 235 | 8004-0116..... | 206 |
| 5190-3165..... | 28 | 8001-0101..... | 227-229 | 8002-0311..... | 236 | 8004-0118..... | 207 |
| 5190-3166..... | 28 | 8001-0102..... | 227, 229 | 8002-0312..... | 236 | 8004-0119..... | 206 |
| 5190-3167..... | 28 | 8001-0103..... | 227-229 | 8003-0001..... | 225 | 8004-0151..... | 206 |
| 5190-3168..... | 28 | 8001-0104..... | 228 | 8003-0002..... | 225 | 8004-0152..... | 206 |
| 5190-3169..... | 28 | 8001-0105..... | 230 | 8003-0003..... | 225 | 8004-0153..... | 206 |
| 5190-3170..... | 16, 28 | 8001-0106..... | 227-228 | 8003-0004..... | 225 | 8004-0154..... | 206 |
| 5190-3171..... | 16, 28 | 8001-0151..... | 227-229 | 8003-0005..... | 225 | 8004-0155..... | 206 |
| 5190-3172..... | 16, 28 | 8001-0152..... | 227, 229 | 8003-0006..... | 225 | 8004-0156..... | 206 |
| 5190-3173..... | 16, 28 | 8001-0153..... | 227-229 | 8003-0007..... | 225 | 8004-0157..... | 206 |
| 5190-3188..... | 60 | 8001-0154..... | 228 | 8003-0008..... | 225 | 8004-0158..... | 206 |
| 5190-3189..... | 60 | 8001-0155..... | 230 | 8003-0101..... | 221 | 8004-0159..... | 207 |
| 5190-3190..... | 60 | 8001-0156..... | 227-228 | 8003-0103..... | 221 | 8004-0160..... | 207 |
| 5190-3191..... | 60 | 8001-0157..... | 227-229 | 8003-0104..... | 222 | 8004-0161..... | 207 |
| 5190-3192..... | 60 | 8001-0158..... | 227-229 | 8003-0105..... | 221 | 8004-0162..... | 207, 215 |

| | | | | | | | |
|----------------|------------------------------------|----------------|--------------------|----------------------|---------------|---------------|--------------|
| 8004-0163..... | 208 | 8010-0244..... | 204, 238 | 8121-0723..... | 127 | CP1308..... | 474 |
| 8004-0164..... | 207, 214 | 8010-0245..... | 204, 238 | 8121-0940..... | 127 | CP1309..... | 476 |
| 8004-0165..... | 206, 213 | 8010-0246..... | 204, 238 | 8121-1222..... | 127 | CP1483..... | 475 |
| 8004-0167..... | 207, 215 | 8010-0249..... | 205, 212, 238 | 8121-1301..... | 127 | CP17973..... | 147, 164 |
| 8004-0168..... | 208, 216 | 8010-0250..... | 205, 212, 238 | 8121-1787..... | 127 | CP17977..... | 147 |
| 8004-0170..... | 206 | 8010-0251..... | 205, 212, 238 | 8500-0656..... | 146, 177, 182 | CP17988..... | 147, 164 |
| 8004-0171..... | 207 | 8010-0252..... | 205, 212, 238 | 8500-1233..... | 146 | CP2045..... | 475 |
| 8004-0173..... | 206 | 8010-0253..... | 205, 212, 238 | 8500-5440..... | 172, 182 | CP2046..... | 475 |
| 8004-0176..... | 207 | 8010-0254..... | 205, 212, 238 | 8500-5808..... | 182 | CP2050..... | 479 |
| 8004-0178..... | 206 | 8010-0255..... | 205, 212, 226, 238 | 8500-5851..... | 182 | CP2055..... | 474 |
| 8004-0201..... | 208, 211, 213, 226, 233, 237 | 8010-0256..... | 205, 212, 226, 238 | 8500-5995..... | 182 | CP2058..... | 472 |
| 8004-0202..... | 208, 213 | 8010-0257..... | 205, 212, 238 | 8500-6812..... | 482 | CP2059..... | 476 |
| 8004-0203..... | 208 | 8010-0258..... | 205, 212, 238 | 8500-6813..... | 482 | CP2062..... | 473 |
| 8004-0204..... | 208, 214 | 8010-0259..... | 205, 238 | 8500-8510..... | 163, 176 | CP2065..... | 475 |
| 8004-0211..... | 209 | 8010-0260..... | 205, 238 | 8500-8510..... | 182 | CP2068..... | 473 |
| 8004-0212..... | 209 | 8010-0261..... | 205, 238 | 8650-0029..... | 146, 174 | CP2073..... | 478 |
| 8004-0213..... | 209 | 8010-0262..... | 205, 238 | 8650-0030..... | 146, 172, 174 | CP4016..... | 440 |
| 8004-0214..... | 209 | 8010-0263..... | 205, 233 | 8710-0510..... | 40, 147, 172 | CP4017..... | 440 |
| 8004-0215..... | 209 | 8010-0264..... | 205, 233 | 8710-0899..... | 147 | CP4018..... | 440 |
| 8004-0216..... | 209 | 8010-0301..... | 209, 223 | 8710-0900..... | 147 | CP4788..... | 440 |
| 8004-0217..... | 210, 215-217 | 8010-0302..... | 209, 223 | 8710-1220..... | 147 | CP4789..... | 440 |
| 8004-0218..... | 209 | 8010-0303..... | 209, 223 | 8710-1346..... | 74, 138 | CP4795..... | 440 |
| 8004-0219..... | 209 | 8010-0304..... | 209, 223 | 8710-1561..... | 120, 133 | CP4796..... | 440 |
| 8004-0311..... | 210, 213-217 | 8010-0305..... | 210, 215-217, 224 | 8710-1615..... | 147 | CP5881..... | 297 |
| 8004-0312..... | 210, 215 | 8010-0306..... | 209, 223 | 8710-1622..... | 147 | CP5882..... | 309 |
| 8010-0201..... | 203, 211, 213, 237 | 8010-0307..... | 209, 223 | 8829951700..... | 170, 179 | CP5883..... | 309 |
| 8010-0202..... | 203, 211, 237 | 8010-0308..... | 209, 223 | 8829953800..... | 179 | CP5884..... | 309 |
| 8010-0203..... | 203, 211, 216-217, 237 | 8010-0309..... | 209, 223 | 9300003590..... | 179 | CP5887..... | 307 |
| 8010-0204..... | 203, 211, 237 | 8010-0310..... | 223, 231, 235 | 9301-0658..... | 80 | CP5889..... | 307 |
| 8010-0205..... | 203, 211, 237 | 8010-0311..... | 223, 231, 235 | 9301-0713..... | 23, 87, 190 | CP5891..... | 311 |
| 8010-0206..... | 203, 211, 237 | 8010-0312..... | 223, 231 | 9301-0714..... | 190 | CP5892..... | 311 |
| 8010-0207..... | 203, 211, 226, 237 | 8010-0313..... | 223, 231 | 9301-0718..... | 58 | CP6172..... | 406 |
| 8010-0208..... | 203, 211, 226, 237 | 8010-0314..... | 224, 231 | 9301-0719..... | 58 | CP6173..... | 406 |
| 8010-0209..... | 203, 211, 214-215, 237 | 8010-0315..... | 224, 231 | 9301-0721..... | 58 | CP6174..... | 406 |
| 8010-0210..... | 203, 211, 237 | 8010-0351..... | 239 | 9301-0723..... | 50 | CP6175..... | 406 |
| 8010-0211..... | 203, 237-238 | 8010-0352..... | 239 | 9301-0725..... | 190 | CP6530..... | 379 |
| 8010-0212..... | 203, 237-238 | 8010-0353..... | 236 | 9301-0891..... | 190 | CP6540..... | 372, 417-418 |
| 8010-0213..... | 203, 237 | 8010-0354..... | 236 | 9301-0892..... | 23, 87, 190 | CP6550..... | 372, 417-418 |
| 8010-0214..... | 203, 237 | 8010-0355..... | 236, 239 | 9301-0976..... | 58 | CP6571..... | 469 |
| 8010-0215..... | 203, 233 | 8010-0356..... | 239 | 9301-1031..... | 50 | CP6572..... | 469 |
| 8010-0216..... | 203, 233 | 8010-0357..... | 239 | 9310-4828..... | 146, 174 | CP6573..... | 469 |
| 8010-0217..... | 202, 211-213, 237 | 8010-0358..... | 239 | 998-0000053-EHS..... | 55 | CP6574..... | 469 |
| 8010-0218..... | 202-205, 211, 226, 233, 237-238 | 8010-0359..... | 239 | C-102SSC..... | 66 | CP6575..... | 469 |
| 8010-0219..... | 202, 211, 216-217, 237 | 8010-0360..... | 239 | C-AT010C..... | 66 | CP6576..... | 469 |
| 8010-0220..... | 202, 211, 237 | 8010-0361..... | 239 | C-B010M..... | 66 | CP6577..... | 469 |
| 8010-0221..... | 202, 211, 237 | 8010-0362..... | 239 | C-BIO10..... | 66 | CP6578..... | 469 |
| 8010-0222..... | 202, 211, 237 | 8010-0363..... | 239 | C-BTX1UG..... | 66 | CP6579..... | 469 |
| 8010-0223..... | 202, 211, 226, 237 | 8010-0364..... | 239 | C-CF020..... | 66 | CP6580..... | 469 |
| 8010-0224..... | 202, 211, 226, 237 | 8010-0365..... | 239 | C-CPLOK..... | 66 | CP6581..... | 469 |
| 8010-0225..... | 202, 211, 214-215, 237 | 8010-0366..... | 239 | C-DF010..... | 66 | CP6666..... | 326, 418 |
| 8010-0226..... | 202, 211, 237 | 8010-0367..... | 236, 239 | C-G1CM10..... | 66 | CP6670..... | 326, 418 |
| 8010-0227..... | 202, 237 | 8010-0368..... | 236 | C-GAT010C..... | 66 | CP6671..... | 326, 418 |
| 8010-0228..... | 202, 237 | 8010-0371..... | 239 | C-GT010..... | 66 | CP6680..... | 335, 419 |
| 8010-0229..... | 202, 237 | 8010-0401..... | 222, 235 | C-HY010C..... | 66 | CP6681..... | 419 |
| 8010-0230..... | 202, 237 | 8120-5342..... | 127 | C-PL010..... | 66 | CP67569..... | 418 |
| 8010-0231..... | 202, 233 | 8120-6360..... | 127 | C-TBE10..... | 66 | CP68186..... | 467 |
| 8010-0232..... | 202, 233 | 8120-6894..... | 127 | C-TBP1C1C..... | 66 | CP68187..... | 467 |
| 8010-0233..... | 204, 212-213, 238 | 8120-6903..... | 127 | C-TBP1CXC..... | 66 | CP6918..... | 419, 431 |
| 8010-0234..... | 204, 212, 238 | 8120-8619..... | 127 | C-TBP1TC..... | 66 | CP6937..... | 419, 439 |
| 8010-0239..... | 204, 212, 226, 238 | 8120-8620..... | 127 | C-TNXTA..... | 66 | CP6938..... | 419, 439 |
| 8010-0240..... | 204, 212, 226, 238 | 8120-8621..... | 127 | C-UN010C..... | 66 | CP6938I5..... | 419, 439 |
| 8010-0241..... | 204, 212, 214-215, 238 | 8120-8622..... | 127 | CP0031..... | 483 | CP6953..... | 419, 424 |
| 8010-0242..... | 204, 212, 238 | 8121-0070..... | 127 | CP108194..... | 467 | CP6954..... | 419, 424 |
| 8010-0243..... | 204, 238 | 8121-0161..... | 127 | CP1305..... | 474 | CP6968..... | 419, 431 |
| | | 8121-0675..... | 127 | CP1306..... | 475 | CP7128..... | 357 |
| | | 8121-0710..... | 127 | CP1307..... | 473 | CP7130..... | 418 |

PART NUMBER INDEX

| | | | | | | | |
|----------|------------------|----------|-------------------|----------|-------------------|----------|-------------------|
| CP7135 | 326, 418 | CP7440 | 391, 419 | CP7529 | 283, 375 | CP7584PT | 421, 427 |
| CP7140 | 326, 418 | CP7441 | 324 | CP7530 | 368 | CP7586 | 431 |
| CP7141 | 357, 419 | CP7442 | 325 | CP7531 | 282, 368 | CP7587 | 431 |
| CP7148 | 357, 419 | CP7443 | 324 | CP7531I5 | 368 | CP7588 | 270-271, 276, 396 |
| CP7150 | 326, 418 | CP7443I5 | 324 | CP7532 | 279, 372, 417-418 | CP7591 | 383 |
| CP7160 | 326, 418 | CP7444 | 325 | CP7532I5 | 372, 417 | CP7592 | 280, 372, 417-418 |
| CP7168 | 357, 419 | CP7446 | 381 | CP7533 | 278, 439 | CP7593 | 372, 417-418 |
| CP7170 | 326, 418 | CP7447 | 381 | CP7534 | 439 | CP7594 | 383 |
| CP7178 | 357, 419 | CP7447I5 | 381 | CP7534I5 | 439 | CP7595 | 382 |
| CP7179 | 357, 419 | CP7448 | 381 | CP7534PT | 421, 439 | CP7595I5 | 382 |
| CP7196 | 335, 419 | CP7448I5 | 381 | CP7535 | 439 | CP7596 | 269, 382 |
| CP7310 | 324 | CP7451 | 334 | CP7535I5 | 439 | CP7596I5 | 382 |
| CP7311 | 324 | CP7452 | 335 | CP7536 | 439 | CP7597 | 273, 382 |
| CP7334 | 356 | CP7453 | 334 | CP7536PT | 421, 439 | CP7598 | 274, 382 |
| CP7335 | 356 | CP7453I5 | 334 | CP7537 | 278, 439 | CP7598I5 | 382 |
| CP7340 | 350 | CP7454 | 335 | CP7538 | 439 | CP7599 | 382 |
| CP7347 | 422 | CP7461 | 390 | CP7538I5 | 439 | CP7608 | 326 |
| CP7348 | 422 | CP7462 | 390 | CP7538PT | 421, 439 | CP7614 | 282, 360 |
| CP7348PT | 421-422 | CP7463 | 409, 419 | CP7539 | 439 | CP7615 | 285, 409 |
| CP7350 | 280, 422 | CP7475 | 367 | CP7539PT | 421, 439 | CP7617 | 409 |
| CP7350I5 | 422 | CP7476 | 395 | CP7540 | 439 | CP7619 | 336 |
| CP7351 | 422 | CP7477 | 395 | CP7540I5 | 439 | CP7620 | 326 |
| CP7351I5 | 422 | CP7481 | 387 | CP7541 | 371 | CP7621 | 335 |
| CP7351PT | 281-282, 421-422 | CP7482 | 281, 393 | CP7542 | 372, 417-418 | CP7622 | 324 |
| CP7352 | 422 | CP7483 | 409 | CP7543 | 439 | CP7624 | 360 |
| CP7352I5 | 422 | CP7485 | 410 | CP7544 | 439 | CP7625 | 326 |
| CP7352PT | 421-422 | CP7485I5 | 410 | CP7548 | 424 | CP7628 | 357 |
| CP7353 | 422 | CP7486 | 279, 410 | CP7549 | 424 | CP7629 | 336 |
| CP7353I5 | 422 | CP7487 | 407 | CP7550 | 424 | CP7630 | 326 |
| CP7353PT | 280, 421-422 | CP7488 | 278-279, 407 | CP7550I5 | 424 | CP7631 | 335 |
| CP7354 | 272, 422 | CP7489 | 407 | CP7550PT | 421, 424 | CP7635 | 326 |
| CP7354I5 | 422 | CP7491 | 404 | CP7551 | 424 | CP7636 | 335 |
| CP7354PT | 281-282, 421-422 | CP749103 | 404 | CP7551I5 | 424 | CP7637 | 350 |
| CP7355 | 422 | CP749106 | 404 | CP7551PT | 421, 424 | CP7638 | 357 |
| CP7371 | 436 | CP7491I5 | 404 | CP7552 | 424 | CP7640 | 326 |
| CP7372 | 436 | CP7494 | 412 | CP7553 | 424 | CP7641 | 335 |
| CP7374 | 278, 436 | CP7495 | 412 | CP7554 | 279, 424 | CP7645 | 326 |
| CP7375 | 436 | CP7495I5 | 412 | CP7554I5 | 424 | CP7646 | 335 |
| CP7381 | 423 | CP7498 | 396 | CP7554PT | 421, 424 | CP7647 | 350 |
| CP7406 | 387 | CP7500 | 413 | CP7555 | 424 | CP7648 | 357 |
| CP7407 | 387 | CP7500I5 | 413 | CP7556 | 424 | CP7649 | 336 |
| CP7409 | 387 | CP7501 | 413 | CP7557 | 424 | CP7654 | 272, 360 |
| CP7411 | 399 | CP7502 | 412 | CP7557PT | 421, 424 | CP7656 | 335 |
| CP7412 | 399 | CP7502I5 | 412 | CP7558 | 278, 424 | CP7657 | 350 |
| CP7413 | 399 | CP7503 | 412 | CP7559 | 424 | CP7658 | 357 |
| CP7414 | 279, 399 | CP7504 | 387 | CP7562 | 372, 417-418 | CP7658I5 | 357 |
| CP7415 | 399 | CP7511 | 430 | CP7565 | 431 | CP7659 | 336 |
| CP7416 | 399 | CP7512 | 372, 417-418 | CP7565I5 | 431 | CP7664 | 360 |
| CP7416I5 | 399 | CP7512I5 | 372 | CP7565PT | 421, 431 | CP7665 | 360 |
| CP7417 | 279, 399 | CP7513 | 436 | CP7567 | 281, 431 | CP7666 | 335 |
| CP7418 | 399 | CP7514 | 436 | CP7568 | 431 | CP7667 | 350 |
| CP7419 | 407 | CP7515 | 430 | CP7568PT | 421, 431 | CP7668 | 357 |
| CP7419I5 | 407 | CP7515I5 | 430 | CP7569 | 372, 417-418 | CP7670 | 324 |
| CP7420 | 407 | CP7515PT | 279, 421, 430 | CP7569I5 | 372, 417 | CP7670I5 | 324 |
| CP7421 | 407 | CP7517 | 430 | CP7570 | 279, 372, 417-418 | CP7671 | 334 |
| CP7422 | 382 | CP7517PT | 421, 430 | CP7571 | 372, 417-418 | CP7672 | 350 |
| CP7424 | 382 | CP7518 | 430 | CP7572 | 372, 417-418 | CP7673 | 356 |
| CP7428 | 281 | CP7518PT | 278-279, 421, 430 | CP7574 | 427 | CP7673I5 | 356 |
| CP7429 | 376 | CP7519 | 430 | CP7576 | 430 | CP7675 | 326 |
| CP7430 | 376 | CP7521 | 371 | CP7577 | 430 | CP7676 | 335 |
| CP7431 | 376 | CP7522 | 371 | CP7579 | 427 | CP7678 | 357 |
| CP7432 | 376 | CP7522I5 | 371 | CP7580 | 427 | CP7680 | 325 |
| CP7433 | 376 | CP7525 | 280-282, 284, 373 | CP7581 | 427 | CP7680I5 | 325 |
| CP7434 | 380 | CP7525I5 | 373 | CP7582 | 279, 372, 417-418 | CP7681 | 335 |
| CP7435 | 380 | CP7527 | 408 | CP7583 | 427 | CP7682 | 324 |
| CP7437 | 380 | CP7528 | 403 | CP7584 | 427 | CP7684 | 324 |

| | | | | | | | |
|---------------|----------|---------------|----------|---------------|--------------|---------------|-------------------|
| CP7685..... | 285, 326 | CP7770..... | 325 | CP81073..... | 474 | CP8718..... | 357 |
| CP7685I5..... | 326 | CP7770I5..... | 325 | CP8120..... | 408 | CP8722..... | 350 |
| CP7686..... | 410 | CP7771..... | 335 | CP8121..... | 389, 467 | CP8723..... | 356 |
| CP7688..... | 326 | CP7772..... | 350 | CP8128..... | 466 | CP8730..... | 326 |
| CP7690..... | 325 | CP7773..... | 357 | CP8129..... | 466 | CP8735..... | 278-281, 326 |
| CP7690I5..... | 325 | CP7773I5..... | 357 | CP8131..... | 389 | CP8735I5..... | 326 |
| CP7691..... | 335 | CP7775..... | 356 | CP8132..... | 389 | CP8736..... | 272, 335 |
| CP7691I5..... | 335 | CP7777..... | 360 | CP8133..... | 389 | CP8736I5..... | 335 |
| CP7692..... | 324 | CP7778..... | 360 | CP8134..... | 389, 466 | CP8737..... | 350 |
| CP7693..... | 324 | CP7779..... | 335 | CP8135..... | 466 | CP8738..... | 279-280, 285, 357 |
| CP7694..... | 324 | CP7785..... | 356 | CP8186..... | 467 | CP8738I5..... | 357 |
| CP7695..... | 326 | CP7787..... | 360 | CP8187..... | 467 | CP8741..... | 324 |
| CP7696..... | 335 | CP7789..... | 335 | CP8430..... | 280, 325 | CP8741I5..... | 324 |
| CP7697..... | 350 | CP7791..... | 356 | CP8431..... | 335 | CP8742..... | 325 |
| CP7698..... | 357 | CP7792..... | 356 | CP8510..... | 324 | CP8743..... | 324 |
| CP7698I5..... | 357 | CP7797..... | 360 | CP8511..... | 334 | CP8744..... | 325 |
| CP7700..... | 324 | CP7809..... | 350 | CP8513..... | 356 | CP8745..... | 356 |
| CP7702..... | 350 | CP7813..... | 336 | CP8521..... | 334 | CP8746..... | 356 |
| CP7703..... | 356 | CP7820..... | 341 | CP8529..... | 325 | CP8748..... | 356 |
| CP7709..... | 324 | CP7821..... | 341 | CP8530..... | 325 | CP8750..... | 334 |
| CP7710..... | 324 | CP7822..... | 341 | CP8531..... | 335 | CP8751..... | 276, 334 |
| CP7711..... | 334 | CP7822I5..... | 341 | CP8533..... | 357 | CP8752..... | 335 |
| CP7712..... | 350 | CP7824..... | 341 | CP8540..... | 325 | CP8753..... | 334 |
| CP7713..... | 356 | CP7829..... | 350 | CP8541..... | 335 | CP8754..... | 335 |
| CP7713I5..... | 356 | CP7830..... | 341 | CP8542..... | 350 | CP8756..... | 335 |
| CP7714..... | 373 | CP7831..... | 341 | CP8543..... | 357 | CP8760..... | 279, 281, 325 |
| CP7715..... | 346 | CP7832..... | 341 | CP8550..... | 325 | CP8761..... | 335 |
| CP7717..... | 360 | CP7834..... | 341 | CP8553..... | 357 | CP8762..... | 350 |
| CP7717I5..... | 360 | CP7839..... | 350 | CP8560..... | 325 | CP8763..... | 279-280, 285, 357 |
| CP7719..... | 324 | CP7871..... | 341 | CP8562..... | 350 | CP8770..... | 324 |
| CP7720..... | 324 | CP7871I5..... | 341 | CP8564..... | 435 | CP8771..... | 334 |
| CP7721..... | 334 | CP7879..... | 357 | CP8566..... | 435 | CP8772..... | 350 |
| CP7722..... | 350 | CP7884..... | 334 | CP8567..... | 435 | CP8773..... | 282, 357 |
| CP7723..... | 356 | CP7889..... | 357 | CP8568..... | 435 | CP8774..... | 326 |
| CP7723I5..... | 356 | CP7906..... | 336 | CP8570..... | 435 | CP8775..... | 284, 326 |
| CP7725..... | 346 | CP7907..... | 336 | CP8570I5..... | 435 | CP8780..... | 324 |
| CP7727..... | 360 | CP7917..... | 336 | CP8571..... | 435 | CP8781..... | 334 |
| CP7730..... | 325 | CP7926..... | 336 | CP8575..... | 375 | CP8791..... | 335 |
| CP7731..... | 335 | CP7926I5..... | 336 | CP8587..... | 366 | CP8796..... | 335 |
| CP7732..... | 350 | CP7936..... | 336 | CP8587I5..... | 366 | CP8798..... | 280, 357 |
| CP7739..... | 325 | CP7937..... | 336 | CP8605..... | 348 | CP8799..... | 326 |
| CP7740..... | 325 | CP7945..... | 368 | CP8607..... | 348 | CP8801..... | 305 |
| CP7741..... | 335 | CP7946..... | 336 | CP8610..... | 348 | CP8805..... | 305 |
| CP7741I5..... | 335 | CP7947..... | 336 | CP8613..... | 348 | CP8806..... | 305 |
| CP7742..... | 350 | CP7977..... | 336 | CP8662..... | 350 | CP8807..... | 305 |
| CP7743..... | 357 | CP8003..... | 465 | CP8667..... | 474 | CP8809..... | 305 |
| CP7745..... | 346 | CP8007..... | 466 | CP8667I5..... | 474 | CP8813..... | 305 |
| CP7747..... | 360 | CP8008..... | 466 | CP8673..... | 326 | CP8816..... | 305 |
| CP7749..... | 325 | CP8009..... | 466 | CP8674..... | 326 | CP8821..... | 310 |
| CP7749I5..... | 325 | CP8014..... | 335 | CP8675..... | 326 | CP8822..... | 310 |
| CP7750..... | 325 | CP8015..... | 404, 466 | CP8676..... | 326 | CP8822I5..... | 310 |
| CP7750I5..... | 325 | CP8016..... | 466 | CP8677..... | 280-281, 326 | CP8824..... | 310 |
| CP7751..... | 335 | CP8017..... | 466 | CP8678..... | 335 | CP8824I5..... | 310 |
| CP7751I5..... | 335 | CP8018..... | 466 | CP8685..... | 326 | CP8827..... | 310 |
| CP7752..... | 350 | CP8019..... | 466 | CP8687..... | 280-281, 325 | CP8828..... | 310 |
| CP7753..... | 357 | CP8070..... | 467 | CP8687I5..... | 325 | CP8829..... | 310 |
| CP7754..... | 373 | CP8073..... | 357 | CP8688..... | 325 | CP8831..... | 310 |
| CP7757..... | 360 | CP8073I5..... | 357 | CP8688I5..... | 325 | CP8842..... | 350 |
| CP7758..... | 325 | CP8080..... | 467 | CP8689..... | 325 | CP8843..... | 357 |
| CP7760..... | 325 | CP8087..... | 466 | CP8690..... | 325 | CP8853..... | 357 |
| CP7761..... | 335 | CP8088..... | 466 | CP8690I5..... | 325 | CP8855..... | 311 |
| CP7762..... | 350 | CP8089..... | 466 | CP8710..... | 324 | CP8857..... | 311 |
| CP7763..... | 357 | CP8090..... | 467 | CP8712..... | 350 | CP8858..... | 271, 311 |
| CP7764..... | 373 | CP81025..... | 475 | CP8713..... | 356 | CP8859..... | 311 |
| CP7767..... | 360 | CP81069..... | 474 | CP8713I5..... | 356 | CP8859I5..... | 311 |
| CP7769..... | 334 | CP81071..... | 476 | CP8716..... | 335 | CP8860..... | 270, 311 |

PART NUMBER INDEX

| | | | | | | | |
|---------------|----------------------------|---------------|-------------------|---------------|----------------------------|------------------|-----------------------|
| CP8861..... | 311 | CP8951..... | 303 | CP9053..... | 316 | CP9205..... | 313 |
| CP8864..... | 311 | CP8953..... | 303 | CP9054..... | 267, 316 | CP9205I5..... | 313 |
| CP8865..... | 311 | CP8955..... | 265, 276, 303 | CP9055..... | 316 | CP9206..... | 269, 313 |
| CP8867..... | 311 | CP8956..... | 303 | CP9056..... | 316 | CP9207..... | 313 |
| CP8868..... | 274, 311 | CP8957..... | 267, 275, 303 | CP9057..... | 316 | CP9210..... | 314 |
| CP8870..... | 325 | CP8958..... | 303 | CP9058..... | 316 | CP9211..... | 314 |
| CP8871..... | 335 | CP8959..... | 303 | CP9062..... | 316 | CP9212..... | 314 |
| CP8872..... | 307 | CP8960..... | 271, 303 | CP9063..... | 316 | CP9213..... | 314 |
| CP8873..... | 307 | CP8961..... | 303 | CP9064..... | 316 | CP9214..... | 314 |
| CP8874..... | 307 | CP8962..... | 303 | CP9066..... | 316 | CP9215..... | 272, 274, 276, 314 |
| CP8875..... | 307 | CP8963..... | 303 | CP9070..... | 265-266, 270-271, 275, 386 | CP9216..... | 314 |
| CP8877..... | 270, 275, 307 | CP8964..... | 415 | CP9071..... | 386 | CP9217..... | 314 |
| CP8878..... | 307 | CP8965..... | 298 | CP9072..... | 386 | CP9218..... | 313 |
| CP8879..... | 273, 307 | CP8967..... | 273, 298 | CP9073..... | 385 | CP9219..... | 313 |
| CP8880..... | 307 | CP8968..... | 298 | CP9074..... | 265-267, 270-271, 275, 385 | CP9220..... | 313 |
| CP8882..... | 307 | CP8969..... | 274, 298 | CP9075..... | 385 | CP9221..... | 313 |
| CP8883..... | 307 | CP8970..... | 298 | CP9076..... | 379, 419 | CP9222..... | 313 |
| CP8884..... | 307 | CP8971..... | 303 | CP9077..... | 379, 419 | CP9223..... | 313 |
| CP8888..... | 274, 307 | CP8974..... | 303 | CP9078..... | 285, 379, 419 | CP9225..... | 314 |
| CP8900..... | 297 | CP8975..... | 274, 303 | CP9079..... | 379, 419 | CP9226..... | 272, 314 |
| CP8901..... | 297 | CP8976..... | 270, 272-274, 303 | CP9080..... | 379 | CP9228..... | 314 |
| CP8902..... | 297 | CP8977..... | 309 | CP9083..... | 379 | CP9229..... | 313 |
| CP8903..... | 297 | CP8979..... | 309 | CP9090..... | 365, 417 | CP97638..... | 408 |
| CP8904..... | 297 | CP8980..... | 309 | CP9091..... | 365, 418 | CP97658..... | 408 |
| CP8905..... | 297 | CP8981..... | 309 | CP9092..... | 365, 417 | CP97713..... | 408 |
| CP8906..... | 280-281, 284, 298 | CP8982..... | 270, 309 | CP9093..... | 365, 418 | CP97721..... | 408 |
| CP8907..... | 298 | CP8982I5..... | 309 | CP9094..... | 365, 417 | CP97723..... | 408 |
| CP8908..... | 298 | CP8983..... | 271, 309 | CP9094I5..... | 365, 417 | CP97723I5..... | 408 |
| CP8908I5..... | 298 | CP8984..... | 309 | CP9095..... | 365, 418 | CP97743..... | 408 |
| CP8909..... | 298 | CP8986..... | 309 | CP9096..... | 365, 417 | CP97753..... | 408 |
| CP8910..... | 298 | CP8990..... | 309 | CP9097..... | 365, 418 | CP97753I5..... | 408 |
| CP8911..... | 298 | CP8991..... | 265, 309 | CP9100..... | 315 | CP97763..... | 408 |
| CP8912..... | 298 | CP8996..... | 309 | CP9101..... | 315 | CP97773..... | 408 |
| CP8912I5..... | 298 | CP8998..... | 309 | CP9102..... | 265, 267, 269, 315 | CR213105..... | 209 |
| CP8913..... | 267, 298 | CP9001..... | 272, 309 | CP9102I5..... | 315 | DY50295500..... | 64 |
| CP8914..... | 298 | CP9002..... | 273, 309 | CP9103..... | 265, 267, 272, 275, 315 | DY50296800..... | 64 |
| CP8915..... | 298 | CP9010..... | 446 | CP9103I5..... | 315 | DY50390600..... | 64 |
| CP8916..... | 298 | CP9011..... | 446 | CP9104..... | 315 | DY50402400..... | 64 |
| CP8917..... | 298 | CP9012..... | 446 | CP9104I5..... | 315 | DY50540700..... | 64 |
| CP8919..... | 298 | CP9013..... | 446 | CP9105..... | 269, 271, 275, 315 | DY50546100..... | 64 |
| CP8921..... | 298 | CP9014..... | 446 | CP9106..... | 315 | DY50546390..... | 64 |
| CP8922..... | 298 | CP9015..... | 446 | CP9106I5..... | 315 | DY50548400..... | 64 |
| CP8923..... | 298 | CP9016..... | 446 | CP9107..... | 272, 315 | DY50549100..... | 64 |
| CP8924..... | 265, 272, 298 | CP9019..... | 446 | CP9108..... | 269, 271, 315 | DY50549290..... | 64 |
| CP8925..... | 298 | CP9021..... | 446 | CP9109..... | 315 | DY50549500..... | 64 |
| CP8926..... | 265, 298 | CP9022..... | 446 | CP9110..... | 315 | DY50551400..... | 64 |
| CP8928..... | 298 | CP9023..... | 446 | CP9145..... | 317 | DY50559800..... | 64 |
| CP8929..... | 298 | CP9024..... | 446 | CP9150..... | 317 | DY50559900..... | 64 |
| CP8930..... | 298 | CP9025..... | 446 | CP9151..... | 266, 268, 317 | DY50572600..... | 64 |
| CP8934..... | 302 | CP9026..... | 446 | CP9151I5..... | 317 | DY50573990..... | 64 |
| CP8935..... | 302 | CP9027..... | 446 | CP9152..... | 317 | DY50574190..... | 64 |
| CP8936..... | 302 | CP9030..... | 297 | CP9152I5..... | 317 | DY50574390..... | 64 |
| CP8937..... | 302 | CP9031..... | 297 | CP9154..... | 317 | DY50574500..... | 64 |
| CP8938..... | 303 | CP9032..... | 297 | CP9156..... | 317 | DY70001990..... | 64 |
| CP8939..... | 267, 303 | CP9034..... | 302 | CP9162..... | 317 | DY70007691..... | 64 |
| CP8940..... | 303 | CP9035..... | 302 | CP9163..... | 265, 317 | DY70007701..... | 64 |
| CP8941..... | 303 | CP9036..... | 302 | CP9165..... | 317 | DY70007791..... | 64 |
| CP8943..... | 270, 303 | CP9037..... | 302 | CP9166..... | 317 | DY70008101..... | 64 |
| CP8944..... | 266-271, 273-274, 276, 303 | CP9038..... | 302 | CP9170..... | 317 | DY70008590..... | 64 |
| CP8944I5..... | 303 | CP9039..... | 302 | CP9171..... | 272-274, 317 | G1072-20008..... | 154-155 |
| CP8945..... | 270, 276, 303 | CP9041..... | 305 | CP9176..... | 446 | G1099-20030..... | 38, 126, 147-148, 172 |
| CP8946..... | 266, 273, 275-276, 303 | CP9044..... | 365 | CP9177..... | 446 | G1099-20130..... | 154 |
| CP8947..... | 303 | CP9045..... | 365 | CP9201..... | 313 | G1099-20132..... | 154 |
| CP8948..... | 270, 303 | CP9046..... | 365 | CP9202..... | 313 | G1099-20133..... | 154-155, 157 |
| CP8949..... | 303 | CP9047..... | 365 | CP9203..... | 313 | G1099-20136..... | 154-155 |
| CP8950..... | 303 | CP9048..... | 365 | CP9204..... | 313 | G1099-60566..... | 146 |

| | | | | | | | |
|------------------|---------------------------------|------------------|--------------------------------|------------------|---------------|------------------|-----|
| G1099-80039..... | 170 | G2589-20044..... | 155, 157 | G3440-20003..... | 48 | G3591-70013..... | 475 |
| G1530-60560..... | 127 | G2589-20045..... | 151, 155 | G3440-20004..... | 48 | G3591-70014..... | 478 |
| G1530-60570..... | 127 | G2589-20100..... | 151, 155 | G3440-20005..... | 48 | G3591-70015..... | 476 |
| G1530-60930..... | 127 | G2591B..... | 153 | G3440-20007..... | 48 | G3591-70016..... | 471 |
| G1530-61230..... | 126 | G2591C..... | 153 | G3440-20008..... | 48 | G3591-70017..... | 476 |
| G1530-61580..... | 126 | G2591D..... | 153 | G3440-20033..... | 49 | G3591-70018..... | 478 |
| G1530-61610..... | 126 | G2617-20510..... | 84 | G3440-20035..... | 49 | G3591-74001..... | 474 |
| G1530-61640..... | 126 | G2617-60506..... | 83 | G3440-20037..... | 49 | G3591-80000..... | 480 |
| G1530-80650..... | 123, 127 | G2617-60507..... | 83, 85, 87 | G3440-60033..... | 49 | G3591-80001..... | 472 |
| G1531-20690..... | 98 | G2617-60508..... | 83 | G3440-60035..... | 49 | G3591-80002..... | 474 |
| G1531-20700..... | 98 | G2617-60510..... | 84 | G3440-60136..... | 49 | G3591-80003..... | 476 |
| G1531-20740..... | 98 | G2617-80540..... | 84 | G3440-60233..... | 49 | G3591-80004..... | 474 |
| G1531-21090..... | 98 | G2617-80550..... | 85, 87 | G3440-60234..... | 49 | G3591-80006..... | 480 |
| G1531-60690..... | 98 | G2618-80500..... | 83, 85 | G3440-60236..... | 49 | G3591-80007..... | 479 |
| G1531-80560..... | 96, 119 | G2619-60501..... | 83 | G3440-60300..... | 49 | G3591-80008..... | 479 |
| G1531-80620..... | 96, 119 | G2630-60710..... | 123 | G3440-60310..... | 49 | G3591-80011..... | 473 |
| G1532-20710..... | 105, 113, 121, 131, 134, 136 | G2630-61230..... | 107 | G3440-60333..... | 49 | G3591-80012..... | 476 |
| G1532-60675..... | 107 | G2646-60500..... | 123 | G3440-60334..... | 49 | G3591-80013..... | 478 |
| G1532-60685..... | 107 | G2647-60501..... | 113, 131 | G3440-60336..... | 49 | G3591-80014..... | 479 |
| G1532-60690..... | 107 | G2648-60501..... | 113, 131 | G3440-60600..... | 49 | G3591-80015..... | 479 |
| G1532-60695..... | 107 | G2855-20530..... | 43, 49 | G3440-60610..... | 49 | G3591-80016..... | 478 |
| G1532-60695..... | 107 | G2855-20532..... | 49 | G3440-60620..... | 49 | G3591-80017..... | 475 |
| G1532-80540..... | 105, 136 | G2855-20555..... | 38, 40, 43, 49, 148, 172 | G3440-80217..... | 39-40, 74, 76 | G3591-80019..... | 474 |
| G1534-20530..... | 120, 133 | G2855-20590..... | 43, 53 | G3440-80218..... | 39-40, 74, 76 | G3591-80020..... | 474 |
| G1534-20590..... | 120, 133 | G2855-40001..... | 53 | G3440-81664..... | 49 | G3591-80021..... | 471 |
| G1534-60570..... | 116, 120, 133 | G2855-60200..... | 38, 43, 53, 148, 172 | G3440-81665..... | 49 | G3591-80022..... | 475 |
| G1534-60640..... | 120, 133 | G2855-60570..... | 53 | G3440-85007..... | 181 | G3591-80023..... | 474 |
| G1534-80510..... | 120, 133 | G2933-85001..... | 123 | G3440-85009..... | 181 | G3591-80025..... | 476 |
| G1534-80580..... | 119 | G2933-85003..... | 123 | G3440-85012..... | 181 | G3591-80026..... | 479 |
| G1534-80590..... | 119, 135 | G3163-20530..... | 154 | G3440-85013..... | 181 | G3591-80027..... | 472 |
| G1535-00010..... | 114 | G3170-20126..... | 154-155, 157, 159 | G3440-85017..... | 181 | G3591-80028..... | 476 |
| G1535-00030..... | 114 | G3170-20530..... | 154-155 | G3440-85018..... | 181 | G3591-80029..... | 479 |
| G1535-60600..... | 113, 115, 131 | G3170-20540..... | 159 | G3440-85026..... | 181 | G3591-80030..... | 472 |
| G1535-60610..... | 114 | G3170-60053..... | 157 | G3440-85027..... | 181 | G3591-80031..... | 476 |
| G1535-80520..... | 114 | G3170-60204..... | 163 | G3440-85028..... | 181 | G3591-80032..... | 472 |
| G1540-30025..... | 48 | G3170-60416..... | 159 | G3440-85029..... | 181 | G3591-80033..... | 474 |
| G1540-30026..... | 48 | G3170-80001..... | 162 | G3440-85035..... | 181 | G3591-80034..... | 480 |
| G1540-30027..... | 48 | G3170-80002..... | 163, 176-177 | G3440-85036..... | 181 | G3591-80035..... | 476 |
| G1540-30028..... | 48 | G3170-80002..... | 146, 174 | G3451-80501..... | 90, 137 | G3591-80036..... | 477 |
| G1540-80013..... | 90 | G3170-80008..... | 165 | G3452-20512..... | 76 | G3591-80037..... | 473 |
| G1544-20590..... | 75, 139 | G3170-80100..... | 165 | G3452-60570..... | 74 | G3591-80039..... | 472 |
| G1544-60585..... | 74 | G3170-80103..... | 165, 173-174 | G3452-60586..... | 74 | G3591-80040..... | 480 |
| G1544-80700..... | 32 | G3182-61580..... | 42 | G3452-60730..... | 74 | G3591-80043..... | 476 |
| G1544-80730..... | 32 | G3182-61581..... | 42 | G3452-60835..... | 53 | G3591-80044..... | 477 |
| G1544-80731..... | 32 | G3184-60065..... | 43 | G3452-80570..... | 74 | G3591-80045..... | 473 |
| G1545-80520..... | 80 | G3188-20509..... | 49 | G3480-20002..... | 48 | G3591-80046..... | 475 |
| G1888-60701..... | 55 | G3188-27501..... | 37-39, 41, 43, 49, 148, 172 | G3480-60663..... | 48 | G3591-80047..... | 474 |
| G1888-60702..... | 54 | G3188-27502..... | 37-39, 41, 43, 49, 148, 172 | G3480-67585..... | 74 | G3591-80048..... | 476 |
| G1888-60703..... | 54 | G3188-27503..... | 37, 41, 43, 49, 172 | G3500-80000..... | 87 | G3591-80049..... | 480 |
| G1888-60704..... | 54 | G3188-27504..... | 49, 172 | G3504-20504..... | 40 | G3591-80051..... | 478 |
| G1890-60000..... | 54 | G3188-27505..... | 49 | G3504-60620..... | 53 | G3591-80052..... | 478 |
| G1960-80303..... | 174 | G3188-27506..... | 49 | G3507-60660..... | 48 | G3591-80053..... | 478 |
| G1999-20021..... | 154-155, 159 | G3397A..... | 162 | G3510-20018..... | 76 | G3591-80054..... | 476 |
| G1999-20022..... | 154-155, 159 | G3397B..... | 162 | G3520-20210..... | 53 | G3591-80055..... | 471 |
| G1999-20430..... | 159 | G3430-60011..... | 74 | G3591-70001..... | 478 | G3591-80056..... | 475 |
| G1999-20432..... | 159 | G3431-60680..... | 98 | G3591-70002..... | 475 | G3591-80058..... | 476 |
| G1999-20433..... | 159 | G3432-60220..... | 107 | G3591-70003..... | 475 | G3591-80059..... | 477 |
| G1999-20443..... | 159 | G3432-60221..... | 107 | G3591-70004..... | 475 | G3591-80060..... | 473 |
| G1999-20444..... | 159 | G3433-63000..... | 102, 132 | G3591-70005..... | 474 | G3591-80061..... | 475 |
| G1999-20446..... | 159 | G3434-60806..... | 116, 120 | G3591-70006..... | 474 | G3591-80062..... | 475 |
| G1999-60412..... | 159 | G3435-60350..... | 115 | G3591-70007..... | 474 | G3591-80063..... | 479 |
| G1999-60452..... | 163, 176 | G3435-81330..... | 115 | G3591-70008..... | 475 | G3591-80064..... | 475 |
| G1999-80410..... | 147, 164 | G3435-81360..... | 115 | G3591-70009..... | 478 | G3591-80065..... | 475 |
| G2397-20540..... | 102, 132 | G3440-05012..... | 181 | G3591-70010..... | 478 | G3591-80066..... | 478 |
| G2397-80520..... | 102 | | | G3591-70011..... | 474 | G3591-80067..... | 472 |
| G2589-20043..... | 155 | | | G3591-70012..... | 471 | G3591-80068..... | 479 |

PART NUMBER INDEX

| | | | | | | | |
|------------------|-----|------------------|-----|------------------|-----|------------------|-------------|
| G3591-80071..... | 479 | G3591-81016..... | 478 | G3591-81098..... | 476 | G3591-82048..... | 476 |
| G3591-80072..... | 477 | G3591-81017..... | 475 | G3591-81099..... | 471 | G3591-82049..... | 480 |
| G3591-80074..... | 475 | G3591-81019..... | 474 | G3591-81100..... | 474 | G3591-82050..... | 471 |
| G3591-80075..... | 475 | G3591-81020..... | 474 | G3591-81101..... | 476 | G3591-82051..... | 478 |
| G3591-80077..... | 475 | G3591-81021..... | 471 | G3591-81102..... | 474 | G3591-82053..... | 478 |
| G3591-80082..... | 472 | G3591-81022..... | 475 | G3591-81103..... | 475 | G3591-82063..... | 479 |
| G3591-80083..... | 478 | G3591-81023..... | 474 | G3591-81104..... | 475 | G3591-82064..... | 475 |
| G3591-80084..... | 470 | G3591-81025..... | 476 | G3591-81105..... | 470 | G3591-82067..... | 472 |
| G3591-80085..... | 476 | G3591-81026..... | 479 | G3591-81106..... | 478 | G3591-82072..... | 477 |
| G3591-80086..... | 477 | G3591-81027..... | 472 | G3591-81119..... | 477 | G3591-82082..... | 472 |
| G3591-80087..... | 477 | G3591-81028..... | 476 | G3591-81120..... | 478 | G3591-82084..... | 470 |
| G3591-80088..... | 473 | G3591-81029..... | 479 | G3591-81121..... | 474 | G3591-82087..... | 477 |
| G3591-80090..... | 475 | G3591-81030..... | 472 | G3591-81122..... | 477 | G3591-82088..... | 473 |
| G3591-80091..... | 473 | G3591-81031..... | 476 | G3591-81123..... | 477 | G3591-82093..... | 476 |
| G3591-80093..... | 476 | G3591-81032..... | 472 | G3591-81135..... | 478 | G3591-82095..... | 470 |
| G3591-80094..... | 480 | G3591-81033..... | 474 | G3591-81136..... | 478 | G3591-82099..... | 471 |
| G3591-80095..... | 470 | G3591-81034..... | 480 | G3591-81137..... | 478 | G3591-82101..... | 476 |
| G3591-80096..... | 478 | G3591-81035..... | 476 | G3591-81138..... | 478 | G3591-82102..... | 474 |
| G3591-80097..... | 476 | G3591-81036..... | 477 | G3591-81139..... | 471 | G3591-82104..... | 475 |
| G3591-80098..... | 476 | G3591-81037..... | 473 | G3591-81140..... | 472 | G3591-82106..... | 478 |
| G3591-80099..... | 471 | G3591-81039..... | 472 | G3591-81141..... | 479 | G3591-82119..... | 477 |
| G3591-80100..... | 474 | G3591-81040..... | 480 | G3591-81142..... | 479 | G3591-82121..... | 474 |
| G3591-80101..... | 476 | G3591-81043..... | 476 | G3591-81143..... | 474 | G3591-82122..... | 477 |
| G3591-80103..... | 475 | G3591-81044..... | 477 | G3591-81146..... | 474 | G3591-82123..... | 477 |
| G3591-80104..... | 475 | G3591-81045..... | 473 | G3591-81147..... | 475 | G3591-82135..... | 478 |
| G3591-80105..... | 470 | G3591-81046..... | 475 | G3591-81149..... | 475 | G3591-82136..... | 478 |
| G3591-80106..... | 478 | G3591-81047..... | 474 | G3591-81156..... | 473 | G3591-82137..... | 478 |
| G3591-80107..... | 475 | G3591-81048..... | 476 | G3591-81157..... | 478 | G3591-82139..... | 471 |
| G3591-80108..... | 479 | G3591-81049..... | 480 | G3591-81160..... | 472 | G3591-82140..... | 472 |
| G3591-80110..... | 477 | G3591-81050..... | 471 | G3591-81161..... | 472 | G3591-82159..... | 474 |
| G3591-80119..... | 477 | G3591-81051..... | 478 | G3591-81162..... | 476 | G3591-82176..... | 479 |
| G3591-80120..... | 478 | G3591-81052..... | 478 | G3591-81176..... | 479 | G3850-60014..... | 147 |
| G3591-80121..... | 474 | G3591-81053..... | 478 | G3591-81209..... | 475 | G3870-20021..... | 157 |
| G3591-80122..... | 477 | G3591-81054..... | 476 | G3591-81210..... | 473 | G3870-20135..... | 154, 157 |
| G3591-80123..... | 477 | G3591-81055..... | 471 | G3591-81211..... | 473 | G3870-20440..... | 157 |
| G3591-80124..... | 474 | G3591-81056..... | 475 | G3591-81212..... | 473 | G3870-20444..... | 151, 157 |
| G3591-80135..... | 478 | G3591-81058..... | 476 | G3591-81213..... | 473 | G3870-20445..... | 157 |
| G3591-80136..... | 478 | G3591-81059..... | 477 | G3591-81214..... | 476 | G3870-20446..... | 157 |
| G3591-80137..... | 478 | G3591-81060..... | 473 | G3591-81215..... | 480 | G3870-20448..... | 151 |
| G3591-80138..... | 478 | G3591-81061..... | 475 | G3591-82000..... | 480 | G3870-20449..... | 151 |
| G3591-80139..... | 471 | G3591-81062..... | 475 | G3591-82001..... | 472 | G3870-20530..... | 157 |
| G3591-80140..... | 472 | G3591-81063..... | 479 | G3591-82002..... | 474 | G3870-60171..... | 157 |
| G3591-80141..... | 479 | G3591-81064..... | 475 | G3591-82003..... | 476 | G3870-60172..... | 154 |
| G3591-80142..... | 479 | G3591-81065..... | 475 | G3591-82004..... | 474 | G3870-60179..... | 155 |
| G3591-80156..... | 473 | G3591-81066..... | 478 | G3591-82011..... | 473 | G3880-20030..... | 38, 147-148 |
| G3591-80157..... | 478 | G3591-81067..... | 472 | G3591-82012..... | 476 | G3880-80010..... | 162 |
| G3591-80158..... | 473 | G3591-81068..... | 479 | G3591-82013..... | 478 | G3880-80011..... | 162 |
| G3591-80160..... | 472 | G3591-81071..... | 479 | G3591-82014..... | 479 | G3900-63001..... | 462 |
| G3591-80161..... | 472 | G3591-81072..... | 477 | G3591-82015..... | 479 | G3900-63002..... | 462 |
| G3591-80162..... | 476 | G3591-81074..... | 475 | G3591-82016..... | 478 | G3900-63003..... | 463 |
| G3591-80170..... | 479 | G3591-81075..... | 475 | G3591-82017..... | 475 | G3900-63004..... | 462 |
| G3591-80171..... | 479 | G3591-81077..... | 475 | G3591-82020..... | 474 | G3900-63005..... | 462 |
| G3591-80176..... | 479 | G3591-81082..... | 472 | G3591-82022..... | 475 | G3900-63006..... | 463 |
| G3591-81000..... | 480 | G3591-81083..... | 478 | G3591-82023..... | 474 | G3900-63007..... | 463 |
| G3591-81001..... | 472 | G3591-81084..... | 470 | G3591-82025..... | 476 | G3900-63008..... | 463 |
| G3591-81002..... | 474 | G3591-81085..... | 476 | G3591-82026..... | 479 | G3900-63009..... | 462 |
| G3591-81003..... | 476 | G3591-81086..... | 477 | G3591-82029..... | 479 | G3900-63010..... | 463 |
| G3591-81004..... | 474 | G3591-81087..... | 477 | G3591-82032..... | 472 | G3900-63011..... | 463 |
| G3591-81006..... | 480 | G3591-81088..... | 473 | G3591-82033..... | 474 | G3900-63012..... | 463 |
| G3591-81007..... | 479 | G3591-81090..... | 475 | G3591-82035..... | 476 | G3900-63013..... | 462 |
| G3591-81008..... | 479 | G3591-81091..... | 473 | G3591-82036..... | 477 | G3900-63014..... | 462 |
| G3591-81011..... | 473 | G3591-81093..... | 476 | G3591-82037..... | 473 | G3900-63015..... | 463 |
| G3591-81012..... | 476 | G3591-81094..... | 480 | G3591-82039..... | 472 | G3900-63016..... | 462 |
| G3591-81013..... | 478 | G3591-81095..... | 470 | G3591-82040..... | 480 | G3900-63017..... | 462 |
| G3591-81014..... | 479 | G3591-81096..... | 478 | G3591-82043..... | 476 | G3900-63018..... | 462 |
| G3591-81015..... | 479 | G3591-81097..... | 476 | G3591-82044..... | 477 | G3900-63019..... | 462 |

| | | | | | |
|------------------|----------|----------------------|-------------------|-------------------|---------|
| G3900-63020..... | 463 | G4513-80233..... | 188 | MKI-UTD-5064..... | 66 |
| G3900-63021..... | 463 | G4513-80234..... | 187 | MKI-Z-0285..... | 65 |
| G3900-63022..... | 463 | G4513-80235..... | 187 | MKI-Z-0351..... | 65 |
| G3900-63023..... | 463 | G4513-80236..... | 187-188 | RDT-1020..... | 52, 140 |
| G3900-63024..... | 463 | G4513-80239..... | 187 | RDT-1023..... | 140 |
| G3900-63025..... | 463 | G4513-80240..... | 187 | RMSN-2..... | 164 |
| G3900-63026..... | 463 | G4513-80241..... | 188 | | |
| G3900-63027..... | 463 | G4513-80242..... | 187 | | |
| G3900-63028..... | 463 | G4513-80243..... | 187 | | |
| G3900-63029..... | 463 | G4513-80244..... | 187 | | |
| G3900-63030..... | 462 | G4514-60610..... | 127 | | |
| G3900-63031..... | 462 | G4514-60710..... | 50 | | |
| G3900-63032..... | 462 | G4514-67505..... | 50 | | |
| G3900-63033..... | 462 | G4525-60701..... | 50 | | |
| G3900-63034..... | 463 | G4525-60702..... | 50 | | |
| G3900-63035..... | 463 | G4525-60703..... | 50 | | |
| G3900-63036..... | 463 | G4525-60704..... | 50 | | |
| G3900-63037..... | 463 | G4556-60019..... | 52 | | |
| G3900-63038..... | 462 | G4556-60125..... | 52 | | |
| G3900-63039..... | 462 | G4556-67010..... | 52 | | |
| G3900-63040..... | 462 | G4556-90500..... | 52 | | |
| G3900-63041..... | 462 | G6012A..... | 169 | | |
| G3900-63042..... | 462 | G6014A..... | 169, 179 | | |
| G3900-64016..... | 450 | G6600-60037..... | 123 | | |
| G3900-65001..... | 448 | G6600-60038..... | 122 | | |
| G3900-65003..... | 449 | G6600-67007..... | 122-123 | | |
| G3900-65004..... | 449 | G6600-67008..... | 122-123 | | |
| G3903-61004..... | 448 | G6600-80018..... | 41, 122-123 | | |
| G3903-63001..... | 284, 374 | G6600-80042..... | 122 | | |
| G3903-63002..... | 374 | G6600-80043..... | 122-123 | | |
| G3903-63003..... | 283, 374 | G6600-80044..... | 122-123 | | |
| G3903-63004..... | 374 | G6600-80045..... | 122 | | |
| G3903-65002..... | 448 | G6600-80050..... | 122 | | |
| G4333-63000..... | 132 | G6600-80051..... | 122-123 | | |
| G4513-20561..... | 50 | G6600-80063..... | 122 | | |
| G4513-40525..... | 50 | G6600-80072..... | 122-123 | | |
| G4513-40529..... | 50 | G6600-85000..... | 123 | | |
| G4513-60560..... | 188 | G6600-85001..... | 122-123 | | |
| G4513-60561..... | 188 | G6600-85002..... | 122-123, 170 | | |
| G4513-80200..... | 187 | G7005-60061..... | 154-155, 162, 174 | | |
| G4513-80201..... | 187 | G7005-60072..... | 159, 162, 174 | | |
| G4513-80202..... | 187 | MKI-C-QSC10..... | 65 | | |
| G4513-80203..... | 188 | MKI-MTD-1169..... | 65 | | |
| G4513-80204..... | 187 | MKI-MTD-1204..... | 65 | | |
| G4513-80205..... | 187 | MKI-SERUTD-5065..... | 66 | | |
| G4513-80206..... | 187 | MKI-U-COV06..... | 65 | | |
| G4513-80208..... | 188 | MKI-U-COV07..... | 65 | | |
| G4513-80209..... | 23, 187 | MKI-U-COV10..... | 65 | | |
| G4513-80210..... | 188 | MKI-U-DISK1..... | 65 | | |
| G4513-80211..... | 187 | MKI-U-DISK3..... | 65 | | |
| G4513-80212..... | 187 | MKI-U-T10CW-2S..... | 65 | | |
| G4513-80213..... | 23, 187 | MKI-U-T11GPC..... | 65 | | |
| G4513-80215..... | 187 | MKI-U-T11GPC-2S..... | 65 | | |
| G4513-80216..... | 187 | MKI-U-T12ME..... | 65 | | |
| G4513-80218..... | 187 | MKI-U-T12ME-2S..... | 65 | | |
| G4513-80219..... | 188 | MKI-U-T13DHS..... | 65 | | |
| G4513-80220..... | 188 | MKI-U-T13DHS-2S..... | 65 | | |
| G4513-80221..... | 188 | MKI-U-T15ATA-2S..... | 65 | | |
| G4513-80222..... | 188 | MKI-U-T16GHG-2S..... | 65 | | |
| G4513-80223..... | 188 | MKI-U-T1703P-2S..... | 65 | | |
| G4513-80224..... | 187 | MKI-U-T1HBL-2S..... | 65 | | |
| G4513-80225..... | 187-188 | MKI-U-T3ATX..... | 65 | | |
| G4513-80226..... | 187 | MKI-U-T3ATX-2S..... | 65 | | |
| G4513-80227..... | 188 | MKI-U-T6SUL-2S..... | 65 | | |
| G4513-80228..... | 188 | MKI-U-T9TNX..... | 65 | | |
| G4513-80229..... | 187 | MKI-U-T9TNX-2S..... | 65 | | |

Product Index

Agilent J&W GC Columns

Application and Method Guides

| | |
|-----------------------------------|---------|
| ASTM Methods | 278-285 |
| Application Cross Reference Guide | 262-264 |
| EPA Methods | |
| Drinking Water | 265-268 |
| Solid Waste | 272-276 |
| Waste Water | 269-271 |
| United States Pharmacopoeia (USP) | |
| GC Phases | 277 |

Capillary Columns

By Group

| | |
|-------------------------------|---------|
| Foods, Flavors and Fragrances | 405 |
| High Temperature | 362 |
| Life Sciences | 414 |
| Low-bleed GC/MS | 294 |
| Non-Bonded | 441 |
| PAH | 390 |
| PLOT | 420 |
| Pesticides | 384 |
| Petroleum | 366 |
| Polyethylene Glycol (PEG) | 351-413 |
| Premium Polysiloxane | 318 |
| Semivolatiles | 392 |
| Ultra Inert | 286 |
| Volatiles | 397 |

By Stationary Phase

| | |
|--|---------|
| Biodiesel | 377-378 |
| CAM | 442 |
| CarboBOND | 436 |
| CarboPLOT P7 | 436 |
| Carbowax 20M and HP-20M | 361 |
| CP-1301 | 348 |
| CP-Al2O3/KCl | 430-431 |
| CP-Al2O3/Na2SO4 | 430-431 |
| CP-Carbowax 400 for Volatiles in Alcohol | 408 |
| CP-Chirasil Val | 412 |
| CP-Chirasil-Dex CB | 412 |
| CP-Cyclodextrin- β -2,3,6-M-19 | 413 |
| CP-FFAP CB for Free Fatty Acids | |
| in Dairy Products | 410 |
| CP-Molsieve 5A | 439 |
| CP-Select 624 CB | 399 |
| CP-Select CB for MTBE | 403 |
| CP-Sil 13 CB | 336 |
| CP-Sil 19 CB | 350 |
| CP-Sil 19 CB for Pesticides | 387 |
| CP-Sil 2 CB | 373 |
| CP-Sil 24 CB | 341 |
| CP-Sil 43 CB | 346 |
| CP-Sil 5 CB | 324-326 |
| CP-Sil 5 CB for Formaldehyde | 367 |
| CP-Sil 5 CB for Sulfur | 375 |
| CP-Sil 5/C18 CB for PCB | 395 |
| CP-Sil 8 CB | 334-335 |
| CP-Sil 8 CB for Amines | 382 |
| CP-Sil 8 CB for PCB | 393 |
| CP-Sil 8 CB for Pesticides | 387 |
| CP-Sil 88 | 406 |
| CP-Sil 88 for Dioxins | 396 |
| CP-Sil 88 for FAME | 407 |
| CP-Sil PAH CB UltiMetal | 391 |

| | |
|---|----------|
| CP-Sil PONA CB | 368 |
| CP-Sil PONA for ASTM D5134 | 368 |
| CP-SilicaPLOT | 435 |
| CP-SimDist | 371-372 |
| CP-TAP CB for Triglycerides | 409 |
| CP-TCEP for Alcohols in Gasoline | 373 |
| CP-Volamine | 381 |
| CP-Wax 52 CB | 356-357 |
| CP-Wax 57 CB | 408 |
| CP-Wax 57 CB for Glycols and Alcohols | 409 |
| CP-Wax 58 FFAP CB | 360 |
| CP-Wax for Volatile Amines and Diamines | 382 |
| CycloSil-B | 410 |
| Cyclodex-B | 411 |
| DB-1 | 318-321 |
| DB-1301 | 347 |
| DB-17 | 339 |
| DB-1701 | 349 |
| DB-1701P | 386 |
| DB-17ht | 364 |
| DB-17ms | 308 |
| DB-1ht | 362 |
| DB-1ms | 295 |
| DB-1ms Ultra Inert | 289 |
| DB-200 | 343 |
| DB-210 | 344 |
| DB-225 | 345 |
| DB-225ms | 312 |
| DB-23 | 342 |
| DB-2887 | 370 |
| DB-35 | 337 |
| DB-35ms | 306 |
| DB-35ms Ultra Inert | 291 |
| DB-5 | 329-331 |
| DB-5.625 | 394 |
| DB-502.2 | 402 |
| DB-5ht | 363 |
| DB-5ms | 299-300 |
| DB-5ms EVDX | 415 |
| DB-5ms Ultra Inert | 290 |
| DB-608 | 388 |
| DB-624 | 398 |
| DB-624 Ultra Inert | 291, 397 |
| DB-ALC1 | 414 |
| DB-ALC2 | 414 |
| DB-CLP1 | 384 |
| DB-CLP2 | 384 |
| DB-Dioxin | 396 |
| DB-EUPAH | 390 |
| DB-FFAP | 358 |
| DB-HT SimDis | 370 |
| DB-MTBE | 402 |
| DB-Petro | 369 |
| DB-Select 624 UI for <467> | 292, 416 |
| DB-Sulfur SCD | 374 |
| DB-TPH | 403 |
| DB-UI 8270D Ultra Inert | 292 |
| DB-UI 8270D for Semivolatiles | 392 |
| DB-VRX | 400 |
| DB-WAX | 351-353 |
| DB-WAX FF | 351-353 |
| DB-WAXetr | 354 |
| DB-XLB | 304 |

| | |
|----------------------------|---------|
| DX-1 | 443 |
| DX-4 | 443 |
| GS-Alumina | 433 |
| GS-Alumina KCl | 429 |
| GS-CarbonPLOT | 437 |
| GS-GasPro | 434 |
| GS-OxyPLOT | 366 |
| GS-Q | 426 |
| HP-1 | 322-323 |
| HP-1 Aluminum Clad | 369 |
| HP-101 | 441 |
| HP-17 | 441 |
| HP-1ms | 296 |
| HP-1ms Ultra Inert | 289 |
| HP-20M | 361 |
| HP-35 | 338 |
| HP-5 | 332-333 |
| HP-50+ | 340 |
| HP-5ms | 301 |
| HP-5ms Semivolatile | 395 |
| HP-5ms Ultra Inert | 290 |
| HP-88 | 405 |
| HP-Chiral β | 411 |
| HP-FFAP | 359 |
| HP-Fast Residual Solvent | 416 |
| HP-INNOWax | 355 |
| HP-PAS5 | 388 |
| HP-PLOT Al2O3 KCl | 428 |
| HP-PLOT Al2O3 M | 434 |
| HP-PLOT Al2O3 S | 432 |
| HP-PLOT Molesieve | 438 |
| HP-PLOT Q | 425 |
| HP-PLOT U | 428 |
| HP-PONA | 367 |
| HP-VOC | 401 |
| Lowox | 366 |
| PoraBOND Q | 422 |
| PoraBOND U | 423 |
| PoraPLOT Amines | 383 |
| PoraPLOT Q | 424 |
| PoraPLOT Q-HT | 424 |
| PoraPLOT S | 427 |
| PoraPLOT U | 427 |
| Rapid-MS | 389 |
| SE-30 | 444 |
| SE-54 | 444 |
| Select Al2O3 MAPD | 376 |
| Select Biodiesel | 379 |
| Select FAME | 407 |
| Select Low Sulfur | 375 |
| Select Mineral Oil | 404 |
| Select PAH | 390 |
| Select Silanes | 380 |
| Select for Permanent Gases | 376 |
| Ultra 1 | 327 |
| Ultra 2 | 328 |
| VF-1301ms | 315-316 |
| VF-1701 Pesticides | 386 |
| VF-1701ms | 317 |
| VF-17ms | 309 |
| VF-1ms | 297-298 |
| VF-200ms | 311 |
| VF-23ms | 310 |

| | | | | | |
|--|---------|---------------------------------|---------|---|-----------|
| VF-35ms..... | 307 | Carboxen-1000 | 471 | MSD Contamination | 142-145 |
| VF-5 Pesticides | 385 | Chromosorb 101 | 471 | MSD Electron Multipliers and Replacement | |
| VF-5ht..... | 365 | Chromosorb 102 | 471 | Horn | 165 |
| VF-5ms..... | 302-303 | HayeSep A | 473 | MSD Filaments | 162 |
| VF-624ms | 315 | HayeSep D | 473 | Maintenance Schedule | 141 |
| VF-DA..... | 415 | HayeSep DB..... | 473 | Quadrupole Mass Filter | 164 |
| VF-WAXms | 313-314 | HayeSep N | 473 | Recommended MS Interface Connections..... | 148 |
| VF-Xms..... | 305 | HayeSep N + HayeSep R 1:1..... | 473 | Standards | |
| Metal Columns..... | 417 | HayeSep P | 473 | Analyzer Kit Standards | 181 |
| Column Selection | | HayeSep Q | 474 | Test and Performance Samples..... | 182 |
| Column Diameter | 256-257 | HayeSep R..... | 474 | Vacuum Systems and Pumps | 166 |
| Column Film Thickness..... | 260-261 | HayeSep T | 474 | Diffusion Pump | 168 |
| Column Length..... | 258-259 | MolSieve 13X | 476 | Foreline Pump..... | 170 |
| Gas-Solid or PLOT Columns | 254 | MolSieve 5Å | 475 | Pressure Symptoms | 166-167 |
| Polarity..... | 252-253 | Porapak N | 477 | Quiet Cover | 169 |
| Selecting Stationary Phases..... | 248-251 | Porapak N + Porapak R 1:1 | 477 | Vent Valve Supplies | 163 |
| Stationary Phase Selection Summary..... | 255 | Porapak Q..... | 478 | Inlet Liners..... | 24-25 |
| Custom Ordering..... | 481 | Porapak OS | 478 | Specialty Injection | |
| Fused Silica Tubing | | Porapak R..... | 478 | Direct Connect | 32 |
| Deactivated | 464-467 | Porapak T | 478 | MultiMode Inlet Heavy Matrix..... | 31 |
| Undeactivated | 468 | Silica Gel..... | 479 | PTV | 32 |
| Guard Columns | | Test Standards..... | 482-483 | Split, Original Deactivation..... | 29 |
| DuraGuard | 445 | | | Splitless, Original Deactivation | 30 |
| EZ-Guard..... | 446 | | | Ultra Inert | 28 |
| Installation and Troubleshooting | | | | Inlet Septa | 17 |
| Causes of Column Performance | | | | Advanced Green | 19 |
| Degradation | 488-493 | | | Bleed and Temperature Optimized (BTO)..... | 18 |
| Evaluating the Problem..... | 494-495 | | | General Purpose | 21 |
| Quick Reference Guide..... | 485-487 | | | Long-Life | 19 |
| Troubleshooting Guides | | | | Inlet Systems | |
| Baseline Instability or Disturbances | 496 | | | Cool On-Column | 78-80 |
| Change in Peak Size..... | 498 | | | Flip Top Inlet Sealing System | 68 |
| Excessive Baseline Noise..... | 496 | | | Multimode | 76-77 |
| Loss of Resolution | 499 | | | Programmable Temperature Vaporizer (PTV)..... | 81-87 |
| Retention Time Shift | 498 | | | Purged Packed | 88-91 |
| Split Peaks..... | 497 | | | Split/Splitless Inlet Seals | 67, 69-75 |
| Tailing Peaks | 497 | | | Large Valve Oven | 46 |
| LTM Column Modules | 447-463 | | | Liner O-rings..... | 33 |
| Packed Columns | | | | Maintenance Schedule..... | 14-15 |
| 0.1% SP-1000..... | 479 | | | Markes Thermal Desorption | 65-66 |
| 1.5% OV-101 | 476 | | | Merlin Microseal..... | 22-23 |
| 10% Carbowax 20M (G16, GS1)..... | 471 | | | Oven Exhaust Deflector | 123 |
| 10% Carbowax 20M (G16, GS1) + 2% KOH..... | 471 | | | Purge and Trap Systems | |
| 10% OV-101 | 476 | | | Archon..... | 64 |
| 10% PEG-20M | 477 | | | Teledyne Tekmar | 62-63 |
| 10% SE-30 | 478 | | | Sample Introduction Systems | |
| 10% UC W982 | 480 | | | 7693A Automatic Liquid Sampler..... | 50 |
| 12% UC W982 | 480 | | | 7697A Headspace Sampler | 52-53 |
| 15% Carbowax 1540 | 470 | | | Automatic Liquid Sampler..... | 51 |
| 15% Hallcomid M-18 | 472 | | | G1883A Network Headspace Sampler..... | 55 |
| 15% SP-2100..... | 479 | | | G1888A Network Headspace Sampler..... | 54 |
| 20% Carbowax 20M (G16, GS1)..... | 471 | | | G3520A XLSI Accessory | 53 |
| 20% OV-101..... | 476 | | | Syringes | 183 |
| 20% PEG-20M | 477 | | | 7673/7683 On-Column Autosampler Syringes..... | 191 |
| 20% Sebaconitrile..... | 479 | | | Blue Line Autosampler Syringes for 7693A ALS | |
| 20% Sebaconitrile/2% H3PO4 | 479 | | | Advanced Sample Enhancement..... | 188 |
| 20% TCEP | 480 | | | Fitted Plungers..... | 187 |
| 25% DC-200 (500 cSt)..... | 472 | | | PTFE-Tipped Plungers | 188 |
| 25% SP-2100..... | 479 | | | Gold Standard Autosampler Syringes | |
| 30% DC 200/500 | 472 | | | Straight Needle, 23 and 26s Gauge | 190 |
| 30% DC-200 (500 cSt)..... | 472 | | | Tapered Needle, 23-26s Gauge..... | 189 |
| 35% DC-200 (500 cSt)..... | 472 | | | HP 7670/71/72 Autosampler Syringes | 191 |
| 5% Carbowax 20M (G16, GS1)..... | 470 | | | Needle Gauge | 184 |
| 7% Carbowax M + 3% Polyphenolether | | | | Needle Termination..... | 185 |
| 6 ring + 2% KOH..... | 471 | | | Needle Tip Design..... | 185 |
| Carbosieve S-II..... | 470 | | | Valves and Loops..... | 47-49 |

Agilent Supplies

| | |
|--|---------|
| 7820A GC System..... | 125 |
| Bulk GC Supplies | 16 |
| Capillary Column Ferrules and Nuts | |
| Column Nuts | 38-40 |
| Ferrule Selection Recommendations..... | 38-39 |
| For LTM Rapid Heating/Cooling System..... | 41 |
| For NCD and SCD | 41 |
| Reducing | 41 |
| Short and Long Ferrules | 36 |
| Specialty..... | 37-40 |
| Straight..... | 41 |
| Capillary Flow Technology | |
| Column/Retention Gap Installation..... | 43 |
| Ferrules | 43 |
| Fittings..... | 43 |
| Ultimate Union | 42 |
| Column Connectors and Splitters | |
| Graphpak..... | 45 |
| Press-fit..... | 44 |
| Column Nuts | 38-40 |
| Detector Systems | |
| Electron Capture Detector (ECD)..... | 100-102 |
| Flame Ionization Detector (FID) | 92-99 |
| Flame Photometric Detector (FPD)..... | 108-115 |
| Nitrogen Chemiluminescence | |
| Detector (NCD) | 122-123 |
| Nitrogen Phosphorus Detector (NPD) | 116-121 |
| Sulfur Chemiluminescence Detector (SCD)..... | 122-123 |
| Thermal Conductivity Detector (TCD) | 103-107 |
| GC Standards..... | 124 |
| GC/MS | |
| 220-MS..... | 180 |
| 240-MS Ion Trap | 178-179 |
| 7000 Triple Quadrupole GC/MS..... | 171-174 |
| 7200 Q-TOF for GC/MS..... | 175-177 |
| Cleaning and Maintenance | 146-147 |
| Gas Clean Filters | 164 |
| GC/MSD Interface..... | 160-161 |
| Ion Source..... | 149-159 |
| Chemical Ionization (CI) Ion Source..... | 158-159 |
| Electron Impact (EI) Ion Source..... | 154-157 |

Vials and Closures
 Headspace
 20 mm Caps and Septa.....58
 CombiPAL 18 mm Screw Top Caps with Septa...59
 CombiPAL Screw Top Vials.....59
 Convenience Packs.....58
 Crimp Top Vials.....56
 High Performance Septa.....57-58
 Electronic Crimpers and Decappers.....60
 Manual Crimpers and Decappers.....61

Applications

Energy and Fuels576
 Environmental
 Air Analysis.....549
 Hydrocarbons.....501
 Pesticides and Herbicides.....506
 Semivolatiles532
 Volatiles544
 Food, Flavor and Fragrance.....554
 Industrial Chemical602
 Forensic Toxicology and Pharma635

CrossLab Supplies

Bruker, Varian GC Systems
 Autosampler Syringes.....210
 Capillary Column Ferrules209
 Column Nuts210
 Detector Replacement
 Flame Ionization Detector (FID).....218
 Pulsed Flame Photometric Detector (PFPD).....219-220
 Thermal Conductivity Detector (TCD).....218
 Thermionic Specific Detector (TSD).....220
 Injector Replacement
 1041 Packed/Wide Bore
 On-Column (PWOC) injector.....217
 1061 Packed/530 µm
 Capillary Column Injector.....216
 1079 Large Volume Injector (LVI).....214
 1093 Cool On-Column (COC) Injector215
 1177 Split/Splitless Injector.....213
 Inlet Liners
 1060/1061 Injector208
 1075/1077 Injector208
 1078/1079 Injector207-208
 1093/1094 Injector207-208
 1177 Injector206-220
 Inlet Septa.....211-212
 Liner O-rings208
 Packed Column Ferrules.....210
 CTC GC Autosamplers
 Autosampler Syringes.....239
 Column Ferrules.....195-196
 Inlet Liners193-194
 Inlet Septa199-201
 Advanced Green203
 Bleed and Temperature Optimized (BTO)202
 General Purpose205
 Long-Life.....204
 Liner O-rings195

Perkin Elmer GC Systems
 Autosampler Syringes.....225
 Capillary Column Ferrules223
 Column Nuts224
 Inlet Liners
 AutoSystem.....221-222
 AutoSystem XL.....221-222
 Clarus.....221-222
 Inlet Septa.....226
 Liner O-rings222
 Packed Column Ferrules.....224
 Shimadzu GC Systems
 Autosampler Syringes.....232
 Capillary Column Ferrules231
 Column Nuts232
 Inlet Liners
 14 Systems230
 17A Systems229
 2010 and 2010 Plus Systems228
 2014 Systems.....227
 Inlet Septa.....233
 Liner O-rings230
 Packed Column Ferrules.....231
 Syringes197-198
 Thermo Scientific GC Systems
 Autosampler Syringes.....236
 Capillary Column Ferrules235
 Column Nuts236
 Inlet Liners
 Focus Systems.....234
 Trace Systems.....234
 Inlet Septa.....237-238
 Liner O-rings235

Application Title Index

| | |
|--|-----|
| 1,3-Butadiene | 586 |
| 1,3-Butadiene Purity | 587 |
| 10 ng/μL Semivolatile Checkout Standard on a 20 m x 0.18 mm, 0.36 μm Agilent J&W DB-UI 8270D Capillary GC Column using an Ultra Inert Liner with Wool | 542 |
| 15+1 EU Priority PAHs | 505 |
| 69 Component FAME Mix | 572 |
| 78 Semi-volatile Components on an Agilent J&W DB-UI 8270D | 504 |

A

| | |
|--|-----|
| Acids | 570 |
| Acrylate Impurities I | 627 |
| Acrylate Impurities II | 628 |
| Acrylates | 628 |
| Agilent's Ultra Inert Test Probe Mixture | 532 |
| Alcohol Beverage Standard | 568 |
| Alcohols I | 602 |
| Alcohols II | 605 |
| Alcohols III | 606 |
| Aldehydes and Acids | 611 |
| Aldehydes and Ketones | 612 |
| Alditol Acetates | 568 |
| Amines and Alcohols | 606 |
| Amines and Nitriles | 610 |
| Amines in Water | 611 |
| Amphetamines and Precursors – TMS Derivatives | 636 |
| Anabolic Steroids | 648 |
| Analysis of Acetylenes' Mixture | 634 |
| Analysis of Amino Alcohols in Water | 606 |
| Analysis of Drugs of Abuse in Urine via GC/MS | 642 |
| Analysis of Ethanolamines | 607 |
| Analysis of Fragrance and Allergens | 561 |
| Analysis of Oxygenates in Mixed C4 Streams | 595 |
| Analysis of Oxygenates in a C1 to C5 Hydrocarbon Mix | 600 |
| Analysis of Polycyclic Aromatic Hydrocarbons | 503 |
| Analysis of Process Gas | 601 |
| Analysis of Semivolatiles | 510 |
| Analysis of Solvents | 626 |
| Analysis of Volatile Organic Compounds in Environmental Waters Using the Agilent 7697A Headspace and 7890B/5977A GC/MS | 546 |
| Anesthetics | 643 |
| Anilines | 629 |
| Anticonvulsants | 643 |
| Antiepileptic Drugs | 644 |
| Antihistamines | 644 |
| Aroclors 1016-1268 (without 1221) | 514 |
| Aromatic Solvents | 604 |
| Aromatics Analysis – ASTM D16 Analytes | 593 |
| Aromatics Analysis – Ethylbenzene Impurities | 593 |
| Aromatics I | 614 |
| Aromatics II | 615 |
| Aromatics in Finished Gasoline – ASTM Method D5769 | 597 |
| Aspirin and Ibuprofen in Methanol | 647 |
| Automated Cleanup of PCB extracts from Waste Oil Using 7696A Sample Prep Workbench | 535 |

B

| | |
|---|-----|
| Bacterial Fatty Acid Methyl Esters | 571 |
| Barbiturates | 637 |
| Baseline Resolution of Air/CO, CO ₂ , and Methane in a Natural Gas Sample | 583 |
| Benzodiazepines I | 636 |
| Benzodiazepines II | 640 |
| Blood Alcohols I (Static Headspace/Split) | 638 |
| Blood Alcohols II (Static Headspace/Split) | 638 |
| Blood Pollutants I | 649 |
| Blood Pollutants II | 650 |
| Bourbon | 568 |
| Butter Triglycerides I | 574 |
| Butter Triglycerides II | 574 |

C

| | |
|--|-----|
| C ₁ to C ₄ Hydrocarbon Mix | 580 |
| C ₁ and C ₂ Halocarbons (Freons) | 527 |
| CLP Pesticides | 514 |
| Canola Oil Margarine Partially Hydrogenated FAMES AOCS Method 1c-89 | 574 |
| Chiral Compounds in Essential Oils and Fragrances | 560 |
| Chlorinated Isooctane | 623 |
| Chlorinated Pesticides, EPA Method 508 | 521 |
| Citrus Flavored Carbonated Beverage (Soda) | 567 |
| CLP Pesticides | 514 |
| Cold-pressed Orange Oil | 564 |
| Column Performance for USP <467> Standards | 651 |
| Common Drug Screen | 641 |
| Congeners in DIN Method PCBs | 533 |

D

| | |
|---|-----|
| DB-624UI 1 μL/L Fermented Beverage Standard Mix | 554 |
| DB-624UI Organic Acid Performance | 509 |
| DB-Select 624 UI for <467> Megabore Early Eluting Peaks | 635 |
| Denatured Fuel Ethanol – ASTM D5501 | 596 |
| Detailed Hydrocarbon Analysis of Petroleum Naphthas Through N-nonane Using ASTM D5134 | 601 |
| Determination of Chlorophenols in Water and Soil | 502 |
| Diesel Analysis | 600 |
| Diesel Fuel | 503 |
| Dioxins and Dibenzofurans | 504 |
| Direct Comparison for Rapid CLP (Contract Laboratory Program) Pesticide Analysis | 513 |
| Drug Screen | 640 |

E

| | |
|---|-----|
| EPA 625 Halogenated Pesticides on "1701" Type Phases | 528 |
| EPA Air Analysis Compendium Method TO-14 Standard | 549 |

| | |
|---|----------|
| EPA Air Analysis Method TO-15 (1 ppbv standard) | 553 |
| EPA Method 504.1 – 1,2 dibromoethane (EDB), 1,2-dibromo-3-chloropropane (DBCP), and 1,2,3-trichloropropane (123TCP) | 507 |
| EPA Method 508.1 – Chlorinated Pesticides and Herbicides | 520 |
| EPA Method 525.2 | 518 |
| EPA Method 551 | 547 |
| EPA Method 551 – Chlorinated Solvents, Trihalomethanes (THMs), and Disinfection Byproducts (DBPs) | 509 |
| EPA Method 552.2 | 543 |
| EPA Volatiles by GC/MS (Split Injector) | 517, 548 |
| Essential Oils | 557 |
| Esters I | 617 |
| Esters II | 618 |
| Esters III | 618 |
| Ethers | 619 |
| Ethoxyethanol | 607 |
| Ethylene | 584 |
| Ethylene Glycol Mixture | 621 |
| Ethylene Oxide | 631 |
| Ethylene Oxide Synthetic Standard | 594 |
| European Red List Volatiles | 547 |
| Extended Analyte List for EPA Method 8021 (ELCD) | 544 |
| Extended Hydrocarbon Analysis I | 588 |
| Extended Hydrocarbon Analysis II | 589 |
| Extended Temperature Program Resolving Congeners 52 and 138 | 534 |

F

| | |
|---|----------|
| FAME Standard | 572, 573 |
| FAMES | 561 |
| Fast Analysis of Aromatic Solvent | 576 |
| Fast Analysis of Permanent Gases and CO ₂ using Tandem PLOT columns | 552 |
| Fast CLP Pesticides | 506 |
| Fast Screening of FAME Isomers in Butter | 575 |
| Fast Separation of Silanes | 633 |
| Fast VOC Analysis | 545 |
| Fentanyl | 645 |
| Flavor Mixture | 563 |
| Formaldehyde Underivatized | 613 |
| Formaldehyde, 50 ppb | 550 |
| Formaldehyde-DNPH Derivative | 613 |
| Fragrance Allergens | 563 |
| Fragrance Reference Standard | 558, 559 |
| Free Organic Acids/C ₄ -C ₅ Isomers | 608 |
| Free Phenols | 528 |
| Free Steroids | 648 |

G

| | |
|------------------------------------|-----|
| Gasoline Unleaded ASTM D5769 | 599 |
| Glycols I | 619 |
| Glycols II | 620 |
| Glycols III | 620 |
| Glycols/Diols | 622 |

| | | | |
|--|----------|--|----------|
| H | | | |
| Hallucinogens..... | 646 | Organochlorine Pesticides, EPA Method 8081B..... | 508 |
| Halocarbons..... | 631 | Organophosphorous Pesticides in Apple Matrix..... | 531 |
| Halogenated Hydrocarbons I..... | 603 | Organophosphorus Pesticide Residues | |
| Halogenated Hydrocarbons II..... | 622 | in Olive Oil Extract..... | 562 |
| Halothane..... | 632 | Organotin Compounds I..... | 537 |
| Herbicides I..... | 526 | Organotin Compounds II..... | 537 |
| Herbicides II..... | 526 | Over-the-Counter Pain Killers – TMS Derivatives .. | 647 |
| High Resolution Phenol Analysis by GC/MS..... | 542 | Oxygenates in Gasoline ASTM D5599 (GC-OFID) .. | 595 |
| High Resolution Separation of Xylene Isomers..... | 632 | | |
| High Speed VOC, EPA Method 8260..... | 515 | | |
| | | P | |
| I | | PAHs..... | 540 |
| Impurities in Ethylbenzene..... | 616 | PBDEs..... | 516 |
| Impurities in Ethylene..... | 584 | PBDEs by ECD..... | 502 |
| Impurities in Mixed Xylenes..... | 632 | PCBs by EPA Method 8082..... | 534 |
| Impurities in Propylene..... | 585 | PFBHA Derivative..... | 614 |
| Impurities in Styrene..... | 616 | PONA Mix as Specified by | |
| Impurities in p-Xylene – ASTM D3798..... | 594 | AFNOR Method #2..... | 596 |
| Inorganic Gases..... | 605 | Peppermint Oil..... | 565 |
| Inorganic Hydride Gases..... | 633 | Perfume..... | 560 |
| | | Permanent Gases..... | 582 |
| L | | Permanent Gases on a Thick Film | |
| Lavender Oil Characterization..... | 556 | Molsieve Column..... | 552 |
| Lemon Oil..... | 564 | Pesticides and Fire Retardants (US EPA 527)..... | 519 |
| | | Pesticides in Sunflower Oil..... | 575 |
| M | | Pesticides, EPA 508.1..... | 511 |
| Marijuana ($\Delta 9$ -THC) and Major Metabolites – TMS | | Phenols..... | 541 |
| Derivatives..... | 649 | Phenols According to EPA Method 8040..... | 543 |
| Menthol..... | 560 | Phenols I..... | 604 |
| Mercaptans..... | 592 | Phenols II..... | 630 |
| | | Phenols III..... | 630 |
| N | | Phenoxy Acid Herbicides – Methyl Derivatives, | |
| N_2O I..... | 551 | EPA 8151A..... | 512 |
| N_2O II..... | 551 | Polybrominated Diphenyl Ethers (PBDEs)..... | 505 |
| N_2O III..... | 551 | Polyethylene..... | 599 |
| Narcotics..... | 637 | Polyethyleneamines..... | 609 |
| Narcotics and Adulterants..... | 647 | Polymer Additives..... | 633 |
| Natural Gas..... | 583 | Primary Amines..... | 609 |
| Nitrogen Containing Herbicides | | Propylene..... | 585 |
| (EPA Method 507)..... | 527 | Pyrethrins..... | 536 |
| Nitrogen-based Solvents I..... | 626 | Pyrolysates of Polystyrene..... | 617 |
| Nitrogen-based Solvents II..... | 627 | | |
| Nitrogen/Phosphorus Containing | | R | |
| Pesticides, EPA Method 507..... | 525 | Reference Gas Oil..... | 598 |
| Noble Gases..... | 582 | Refinery Gas..... | 590 |
| n-Paraffin Standard..... | 578 | Refinery Gas I..... | 577 |
| | | Regular Unleaded Gasoline | |
| O | | (California Phase 1) – "Normal" GC Run I..... | 598 |
| Organic Acids..... | 570, 607 | Regular Unleaded Gasoline | |
| Organochlorine Pesticides..... | 521, 525 | (California Phase 1) – "Normal" GC Run II..... | 598 |
| Organochlorine Pesticides I | | Residual Solvents, DMI Diluent..... | 639 |
| EPA Method 8081A..... | 529 | Residual Solvents, USP 467..... | 650 |
| Organochlorine Pesticides II | | Rosemary Oil..... | 567 |
| EPA Method 8081A..... | 530 | | |
| Organochlorine Pesticides III..... | 522 | S | |
| Organochlorine Pesticides IV..... | 523 | Sedative Hypnotics..... | 646 |
| Organochlorine Pesticides | | Selected Oxygenates..... | 582 |
| to EPA 625 via GC/MS..... | 529 | Semivolatiles Compounds, US EPA Method 8270..... | 538 |
| Organochlorine Pesticides, DB-5/DB-1701P..... | 524 | Separation of TMS-derivatized Sugars | |
| | | using VF-1ms..... | 569 |
| | | Separation of cis-trans FAME Isomers..... | 571 |
| | | Simulated Distillation..... | 597 |
| | | Solvents..... | 625 |
| | | Solvents I..... | 623 |
| | | Solvents II..... | 624 |
| | | Solvents III..... | 624 |
| | | Solvents IV..... | 625 |
| | | Spearmint Oil..... | 555 |
| | | Spearmint Oil (Western)..... | 565 |
| | | Strawberry Syrup..... | 569 |
| | | Substituted Anilines..... | 629 |
| | | Sulfur Compounds in Naphtha..... | 593 |
| | | Sulfur Compounds in Natural Gas – | |
| | | Synthetic Mixture..... | 592 |
| | | Sulfur Compounds in Propylene (1 ppm)..... | 579, 591 |
| | | Sulfur Gas Analysis in Light | |
| | | Hydrocarbon Streams I..... | 590 |
| | | Sulfur Gas Analysis in Light | |
| | | Hydrocarbon Streams II..... | 591 |
| | | Sulfur Gases..... | 634 |
| | | Sulfur Impurities in Propylene..... | 579 |
| | | Sulfur Standards in Toluene..... | 578 |
| | | Sulfur in Air..... | 550 |
| | | | |
| | | T | |
| | | Tetrachlorodibenzo-p-furans..... | 533 |
| | | Tocopherols..... | 645 |
| | | Trace Active Amines, 10 ng on-column..... | 608 |
| | | Trace Level Polycyclic Aromatic | |
| | | Hydrocarbon (PAH) Analyses..... | 532 |
| | | Trace Oxygenates in Light | |
| | | Hydrocarbon Matrices..... | 581 |
| | | Trace Sulfur Compounds in Methane (50 ppbv)..... | 581 |
| | | Tricyclic Antipsychotics..... | 644 |
| | | Triethylene Glycol and Impurities..... | 621 |
| | | | |
| | | U | |
| | | US EPA Method 8061 (Phthalate Esters)..... | 539 |
| | | Underivatized Drugs of Abuse – | |
| | | Agilent Fast Toxicology Analyzer..... | 639 |
| | | Unleaded Gasoline..... | 501, 577 |
| | | Urine Drug Screen..... | 642 |
| | | | |
| | | V | |
| | | Volatile Amines..... | 608 |
| | | | |
| | | Y | |
| | | Ylang Ylang Oil..... | 566 |

1,2-Butadiene586-587, 634
 1,3-Butadiene553, 584-591, 634
 Butalbitol637
 Butanal611
 1,3-Butandiol619, 622
 1,4-Butandiol619
 2,3-Butandiol619
 Butane599, 601
 iso-Butane583, 590-591
 n-Butane577, 580, 583-590, 596, 634
 n-Butane/cis-2-butene591
 1,3-Butanediol620
 1,4-Butanediol620
 2,3-Butanediol620
 2,3-Butanedione (VDK)554
 2,3-Butanedione (diacetyl)558-559
 1-Butanethiol578-579, 581, 591
 Butanol626-628
 1-Butanol515, 554, 595, 600, 602, 605-606, 625, 649-650
 2-Butanol554, 635, 639
 iso-Butanol606
 n-Butanol568, 624, 650
 sec-Butanol568, 595, 602, 605, 624, 650
 tert-Butanol595, 602, 605, 624, 650
 2-Butanone (MEK)515, 517, 548, 550, 553, 600, 612, 626, 639
 2-Butanthiol581
 Butene617
 Butene-1584, 586-587
 1-Butene584-585, 588-591, 617, 634
 cis-2-Butene584-590
 trans-2-Butene584-591
 1-Butene/methyl acetylene590
 3-Buten-1-ol602, 605
 2-Buten-1-ol (crotyl alcohol)602, 605
 Butethal637
 Butylpentylin537
 2-Butoxyethanol602, 605
 bis(2-n-Butoxyethyl) phthalate539
 Butyl acetate617-618, 627-628
 n-Butyl acetate625
 sec-Butyl acetate617-618
 n-Butylbenzene517, 544, 546, 548, 576, 593, 597, 604, 632
 tert-Butyl acetate617-618
 Butyl acrylate627-628
 n-Butyl acrylate628
 n-Butyl alcohol581, 625
 s-Butyl alcohol581
 sec-Butyl alcohol624-625, 649-650
 tert-Butyl alcohol515, 581, 625, 649-650
 Butyl aldehyde554, 581
 Butylate518, 525
 Butylbenzene515, 577, 608, 614-615
 s-Butylbenzene576, 593
 sec-Butylbenzene515, 517, 544-546, 548, 577, 593, 604, 614-615
 tert-Butylbenzene515, 517, 544-546, 548, 576, 593, 601, 604, 614-615
 Butyl benzyl phthalate538, 539
 Butyl caproate618
 Butyl cellosolve625
 Butyl cellosolve acetate625
 Butylene601
 Butyl ether619

Butyl ethyl ether619
 Butyl heptanoate618
 1-Butyl mercaptan592
 n-Butyl mercaptan592
 tert-Butyl mercaptan581, 592
 sec-Butyl methacrylate628
 Butyl methyl ether619
 tert-Butyl methyl ether (MTBE)553
 Butyl propionate618, 627-628
 4-tert-Butyltoluene614-615
 Butyl valerate618
 2-Butyne (dimethylacetylene)586-587
 1-Butyne (ethylacetylene)586-587
 2-sec-Butyl-4,6-dinitrophenol (dionseb)542, 543
 Butyraldehyde600, 612
 Butyric acid570, 607-608, 611
 iso-Butyric acid611
 n-Butyric acid509
 Butyric acid methyl ester572, 573

C

Cadinene564
 δ-Cadinene557-559, 566
 γ-Cadinene556-557
 Caffeine636, 640-641, 647
 Camphene556, 558-559, 560, 564, 567
 Camphor556, 558-559, 597
 Capric acid methyl ester561, 572, 573
 Caproic acid methyl ester561, 572, 573, 607
 Caprylic acid methyl ester561, 572, 573
 Captafol508, 529-530
 Captan524, 529-530
 d-Carane557
 Carbamazepine640, 643
 Carbazole538, 540
 Carbepoxide 10/11644
 Carbinoxamine644
 Carbon dioxide549, 552, 577, 583, 601, 605
 CO/air552, 601
 Carbon disulfide517, 546, 548, 550, 553, 578, 579, 591
 Carbon monoxide582
 Carbon tetrachloride507, 509, 515, 517, 544-549, 553, 603, 622, 635, 649-651
 Carbonyl sulfide (COS)550, 577-579, 581, 591, 605, 634
 Carbophenothion524, 562
 Carboxin518, 525-526
 tau-Cardinol556
 3-Carene556
 Carfentanyl645
 Carvacrol560
 cis-Carveol563, 565
 trans-Carveol555, 563, 565
 Carvone565
 l-Carvone555
 Carvone phenylethyl acetate558
 cis-Caryyl acetate555, 565
 Caryophyllene556
 α-Caryophyllene566
 β-Caryophyllene555, 557-559, 564-566
 Caryophyllene oxide556
 Celestolide558
 Cellosolve acetate625
 Cetearyl decanoate558-559

Cetearyl octanoate558-559
 Chloral hydrate509, 547
 Chloramben512
 Chlorcyclizine641, 644
 α-Chlordane506, 508, 511, 513-514, 518, 520-524, 529-530
 γ-Chlordane506, 508, 511, 513-514, 518, 520-524, 529-530
 Chlordiazepoxide636
 Chloroacetic acid543
 Chloroacetonitrile515, 517, 548
 2-Chloroaniline610, 629
 3-Chloroaniline610, 629
 4-Chloroaniline538, 610, 629
 Chlorobenzene515, 517, 544-546, 548-549, 553, 604, 614-615, 623, 625, 651
 Chlorobenzene-d5550, 553, 549
 Chlorobenzilate508, 511, 518, 520-521, 524, 529-530
 4-Chlorobenzonitrile610
 2-Chlorobiphenyl518
 1-Chlorobutane515, 517, 548, 603, 622, 649-650
 2-Chlorobutane649-650
 Chlorodibromoacetic acid543
 1-Chloro-1,1-difluoroethane527
 Chlorodifluoromethane527
 2-Chloro-4,6-dinitroaniline629
 Chloroethane515, 517, 527, 544-546, 548-549, 553
 2-Chloroethanol515, 631
 bis(2-Chloroethoxy) methane538
 bis(2-Chloroethyl) ether538
 2-Chloroethyl vinyl ether544
 1-Chloro-3-fluorobenzene517, 544, 548
 Chloroform507, 509, 515, 517, 544-549, 553, 603, 622, 624, 635, 649-650
 1-Chlorohexane515, 603, 622
 1-Chloro isooctane623
 3-Chloro isooctane623
 4-Chloro isooctane623
 bis(2-Chloroisopropyl) ether538, 544
 Chloromethane515, 517, 527, 544-546, 548-549, 553
 4-Chloro-2-methylaniline629
 4-Chloromethyl 2,2'-dimethyl pentane623
 2-Chloro-5-methylphenol541
 4-Chloro-2-methylphenol541
 4-Chloro-3-methylphenol528, 538, 541-543, 604
 2-Chloronaphthalene538
 Chloroneb508, 511, 518, 520-521, 524, 529-530
 2-Chloro-4-nitroaniline629
 4-Chloro-2-nitroaniline629
 1-Chloro-4-nitrobenzene614-615
 4-Chloro-3-nitrobenzotrifluoride529-530
 Chloropentafluoroethane527
 2-Chlorophenol502, 528, 538, 541-543, 604, 630
 3-Chlorophenol502
 4-Chlorophenol502, 541
 4-Chlorophenyl-phenyl ether538
 Chloropicrin509, 547
 Chloroprene544
 2-Chloropropane544
 2-Chloropropene594
 3-Chloropropene (allyl chloride)553, 603, 622
 3-Chloropropionitrile515
 Chloropropylate508, 529-530

| | | | | | | |
|---|--|---|---|--|---|-----|
| Chloropyrifos..... | 575 | Cyclizine..... | 644 | Diacetylmorphone (heroin)..... | 194, 637, 639-641, 647 | |
| 4-Chlorostyrene..... | 614-615 | Cycloate..... | 518, 525 | Di-allate A..... | 529-530 | |
| 2-Chloro-1,1,1,2-tetrafluoroethane..... | 527 | Cyclohexane..... | 553, 576-577, 588-589, 593, 623-624, 626, 635, 639, 650-651 | Di-allate B..... | 529-530 | |
| Chlorothalonil..... | 508, 511, 518, 520-521, 529-530, 542 | Cyclohexanol..... | 602, 605-606 | 2,4-Diaminoanisole..... | 629 | |
| 2-Chlorotoluene..... | 515, 517, 544-546, 548, 604, 614-615 | Cyclohexanone..... | 612 | 2,4-Diaminotoluene..... | 629 | |
| 3-Chlorotoluene..... | 546, 604, 614-615 | 2-Cyclohexyl-4,6-dinitrophenol..... | 541 | 3,4-Diaminotoluene..... | 610 | |
| 4-Chlorotoluene..... | 515, 517, 544, 546, 548, 604, 614-615, 623 | Cyclohexyl methacrylate..... | 628 | Diamyl phthalate..... | 539 | |
| Chlorotrifluoromethane..... | 527 | Cyclopenta[c,d]pyrene..... | 505 | Diazepam..... | 636, 639-642 | |
| Chlorpheniramine..... | 641, 644 | Cyclopentane..... | 588-589, 596, 601 | Diazinon..... | 518, 525, 531, 562 | |
| Chlorpropham..... | 518, 525 | Cyclopentanol..... | 602, 605 | Dibenz[a,h]anthracene..... | 503, 505, 518, 532, 538 | |
| Chlorprothixene..... | 644 | Cyclopentanone..... | 612 | 1,2,3,4-Dibenzanthracene..... | 540 | |
| Chlorpyrifos..... | 524, 526, 531, 562 | Cyclopentene..... | 588-589 | 1,2,5,6-Dibenzanthracene..... | 540 | |
| 4-Chlortestosterone-17-acetate (clostebol)..... | 648 | 1-Cyclopentene..... | 596 | Dibenzo[a,e]pyrene..... | 505 | |
| 5- α -Cholestane..... | 648 | Cyclopentylbarbital..... | 637 | Dibenzo[a,h]pyrene..... | 505 | |
| Cholesterol..... | 648 | Cyclopropane..... | 584-587 | Dibenzo[a,l]pyrene..... | 505 | |
| Chrysene..... | 503, 505, 518, 532, 538, 540 | Cyheptamide..... | 642 | Dibenzofuran..... | 538, 540 | |
| Chrysene-d12..... | 518-519, 538, 542 | o-Cymene..... | 556 | Dibenzo-p-dioxin..... | 540 | |
| 1,8-Cineol..... | 555, 558-559, 565 | p-Cymene..... | 558, 559, 567 | Dibenzothiophene..... | 540 | |
| Cineole..... | 560 | r-Cymene..... | 555, 564-565 | Dibenzyl ether..... | 558-559 | |
| Cinerin I..... | 536 | D | | | Dibenzyl phthalate..... | 539 |
| Cinerin II..... | 536 | 2,4-D..... | 512 | Diborane..... | 633 | |
| Cinnamaldehyde..... | 561, 563 | Dalapon..... | 512, 543 | Dibromoacetic acid..... | 543 | |
| trans-Cinnamaldehyde..... | 560 | 2,4-DB..... | 512 | Dibromoacetone..... | 509, 547 | |
| Cinnamic alcohol..... | 563 | 4,4'-DDD..... | 506, 508, 511, 513, 514, 520-521, 525, 529 | 1,2-Dibromobenzene..... | 549 | |
| Cinnamyl acetate..... | 563, 566 | o,p'-DDD..... | 524, 575 | 4,4'-Dibromobiphenyl..... | 511 | |
| trans-Cinnamyl acetate..... | 566 | p,p'-DDD..... | 518, 521-524, 529-530, 575 | Dibromochloromethane..... | 507, 509, 515, 517, 544-548, 553 | |
| Cinnamyl alcohol..... | 561 | 4,4'-DDE..... | 506, 508, 511, 513, 514, 520-521, 525, 529 | 1,2-Dibromo-3-chloropropane (DBCP)..... | 507-509, 515, 517, 529-530, 544-548, 603, 622 | |
| Cinnamyl cinnamate..... | 558-559 | p,p'-DDE..... | 518, 521-524, 529-530, 575 | 1,2-Dibromoethane (EDB)..... | 507, 509, 515, 517, 544, 546-549, 553, 603, 622 | |
| Cinnamyl phenyl acetate..... | 558-559 | o,p'-DDE..... | 524, 575 | Dibromofluoromethane..... | 515 | |
| Cinnanzine..... | 644 | 4,4'-DDT..... | 506, 508, 511, 513, 514, 520-521, 525, 528, 529, 542 | Dibromomethane..... | 515, 517, 544-546, 548, 622 | |
| Citral..... | 563 | o,p'-DDT..... | 524 | 1,2-Dibromomethane..... | 545 | |
| Citronellal..... | 558, 564 | p,p'-DDT..... | 518, 521-524, 529-530, 575 | α , α -Dibromo-m-xylene..... | 529-530 | |
| Citronellic acid..... | 509 | Decabromobiphenyl ether (decaBDE)..... | 502 | 2,6-Dibromo-4-nitroaniline..... | 629 | |
| Citronellol..... | 557-561, 563, 569 | Decachlorobiphenyl..... | 506, 508, 513-514, 520-524, 534 | 4,4'-Dibromooctafluorobiphenyl..... | 512 | |
| Citronellyl acetate..... | 558-559 | Decanal..... | 564, 611 | 2,4-Dibromophenol..... | 541 | |
| Citronellyl formate..... | 557-558 | 1,10-Decandiol..... | 619 | 1,2-Dibromopropane..... | 547 | |
| Citronellyl propionate..... | 558 | Decane..... | 249, 251-252, 503, 576, 593, 599, 623 | 2,3-Dibromopropionic acid..... | 543 | |
| Citronellyl tiglate..... | 558-559 | n-Decane..... | 249, 260, 532, 577, 596-597 | 1,2-Dibromo-1,1,2,2-tetrafluoroethane..... | 527 | |
| cis-Citronellyl tiglate..... | 563 | 1,10-Decanediol..... | 619, 620, 622 | Dibucaine..... | 643 | |
| trans-Citronellyl tiglate..... | 563 | Decanoic acid..... | 570, 611 | Dibutyl chlorendate..... | 529-530 | |
| Clemizole..... | 644 | Decanol..... | 567 | tert-Dibutyl disulfide..... | 592 | |
| Clobazam..... | 640 | 1-Decanol..... | 602, 605 | Dibutyl ether..... | 627-628 | |
| Clonazam..... | 636 | n-Decylamine..... | 609-610 | Dibutylpentyltin..... | 537 | |
| Clonazepam..... | 194, 636, 639-640 | DEF..... | 518 | Dicamba..... | 512 | |
| Cocaine..... | 639-642, 647 | 1-Dehydro-17-a-methyltestosterone (methandrostenolone)..... | 648 | Dichlobenil..... | 526 | |
| Codeine..... | 637, 639, 641-642, 647 | Dehydroisoandrosterone (prasterone)..... | 648 | Dichlone..... | 508 | |
| Commamyl acetate..... | 560 | 1-Dehydrotestosterone acetate..... | 648 | Dichloroacetic acid..... | 543 | |
| α -Copaene..... | 555, 558-559, 566 | 1-Dehydrotestosterone benzoate..... | 648 | Dichloroacetone..... | 509, 547 | |
| Coprostane (5- β -cholestane)..... | 648 | 1-Dehydrotestosterone (boldenone)..... | 648 | 3,4-Dichloroaniline..... | 610, 629 | |
| Cotinine..... | 642 | 1-Dehydrotestosterone undecylenate..... | 648 | 1,2-Dichlorobenzene..... | 515, 517, 538, 544-546, 548-549, 553, 604, 614-615, 623 | |
| Coumarin..... | 560-561, 563 | Delorazepam..... | 640 | 1,3-Dichlorobenzene..... | 256, 258, 515, 517, 538, 544-546, 548-549, 553, 604, 614-615, 623 | |
| 2-Cresol..... | 630 | Demoxepam..... | 636, 640 | 1,4-Dichlorobenzene..... | 256, 258, 515, 517, 538, 544-546, 548-549, 553, 604, 614-615, 623 | |
| 3-Cresol..... | 630 | n-Des..... | 644 | 1,4-Dichlorobenzene-d4..... | 515, 538, 542 | |
| 4-Cresol..... | 630 | Desalkyl aurazepam..... | 636 | 3,3'-Dichlorobenzidine..... | 538, 542, 629 | |
| m-Cresol..... | 542-543, 630 | Desipramine..... | 640 | 3,5-Dichlorobenzoic acid..... | 512 | |
| o-Cresol..... | 542-543, 630 | Desmethyldiazepam..... | 640 | 2,3-Dichlorobiphenyl..... | 518 | |
| p-Cresol..... | 542-543, 630 | n-Desmethyl methsuximide..... | 643 | | | |
| Crotonaldehyde..... | 515, 612 | Dextromethorphan..... | 637 | | | |
| Cumene..... | 576, 593, 616, 623, 632 | Diacetone alcohol..... | 625 | | | |
| Cumic aldehyde..... | 556 | Diacetyl..... | 568 | | | |
| Cyanazine..... | 511, 518, 520, 526 | | | | | |
| 2-Cyanopyridine..... | 610 | | | | | |
| 3-Cyanopyridine..... | 610 | | | | | |

| | | | | | |
|--|--|--------------------------------------|--|---|--|
| p,p'-Dichlorobiphenyl | 524 | Diethylbenzene isomer | 593 | Dimethyl phthalate | 518, 538, 539 |
| cis-Dichlorobutene | 515 | Diethyl disulfide | 578 | Dimethyl sulfide | 550, 578-579, 581, 591-592, 626 |
| cis-1,4-Dichlorobutene | 544 | Diethylene glycol | 620-621 | Dimethyl sulfoxide (DMSO) | 626-627, 639, 649-650 |
| trans-Dichlorobutene | 515 | Diethylene glycol monobutyl ether | 619, 620 | Dimethyl tetrachloroterephthalate (DCPA) | 508, 511-512, 518, 520-521, 524, 526, 529-530 |
| trans-1,4-Dichloro-2-butene | 517, 548, 603, 622 | Diethylene glycol monoethyl ether | 619, 620 | Dimethyltryptamine | 646 |
| Dichlorodifluoromethane | 515, 517, 527, 544, 546, 548, 549, 553 | Diethylene glycol monomethyl ether | 619, 620 | Di-n-butyl phthalate | 518, 538, 539 |
| Dichlorodimethyl silane | 633 | Diethylenetriamine | 611 | 2,4-Dinitroaniline | 629 |
| Dichloroethane-d4 | 515 | Diethyl ether | 517, 548, 581, 600, 626, 632, 635, 649-650 | 2,2'-Dinitrobiphenyl | 540 |
| 1,1-Dichloroethane | 515, 517, 544-549, 553, 603, 622 | 1,2-Diethyl-4-ethylbenzene | 596 | 2,7-Dinitrofluorene | 540 |
| 1,2-Dichloroethane | 515, 517, 544, 546-549, 553, 603, 622, 635, 651 | 1,3-Diethyl-5-ethylbenzene | 596 | 4,6,-Dinitro-2-methyl phenol | 538, 542 |
| cis-1,2-Dichloroethane | 651 | Diethyl formamide (DEF) | 518 | 1,3-Dinitronaphthalene | 540 |
| trans-1,2-Dichloroethane | 651 | Diethyl phthalate | 518, 538-539, 560 | 1,5-Dinitronaphthalene | 540 |
| 1,1-Dichloroethene | 515, 517, 544-546, 548-549, 553, 603, 622, 651 | Diethyl sulfide | 578, 581 | 2,4-Dinitrophenol | 528, 538, 541-543, 604, 630 |
| cis-1,2-Dichloroethene | 515, 517, 544, 546, 548-549, 553 | Diethyltryptamine | 646 | 2,5-Dinitrophenol | 541 |
| trans-1,2-Dichloroethene | 515, 517, 544-546, 548, 553, 622 | 1,4-Difluorobenzene | 550, 517, 548-549, 553 | 2,4-Dinitrotoluene | 518, 538, 542 |
| 1,1-Dichloroethylene | 547, 635 | 1,1-Difluoroethane | 527 | 2,6-Dinitrotoluene | 518, 538 |
| cis-1,2-Dichloroethylene | 635 | Difolatan | 526 | Di-n-octyl phthalate | 538, 539 |
| trans-1,2-Dichloroethylene | 635 | Diglyme | 619, 620 | Dinonyl phthalate | 539 |
| 1,1-Dichloro-1-fluoroethane | 527 | Dihexyl phthalate | 539 | Dinoseb | 512, 541 |
| Dichlorofluoromethane | 527, 545 | 9,10-Dihydroanthracene | 540 | 1,3-Dioxalane | 619 |
| Dichloromethane | 527, 546, 626, 633, 635, 651 | trans-Dihydro carveol acetate | 555 | 1,4-Dioxane | 515, 553, 576, 593, 619, 624-626, 635, 650-651 |
| Dichloromethyl silane | 633 | Dihydro carveone | 555, 565 | Diphenamid | 518, 525-526 |
| 2,6-Dichloro-4-nitroaniline | 629 | trans-Dihydro carvyl | 565 | Diphenhydramine | 644 |
| 2,3-Dichlorophenol | 502, 541 | Dihydrocodeine | 637 | Diphenylamine | 610 |
| 2,4-Dichlorophenol | 502, 528, 538, 541-543, 604, 630 | Dihydropentaborane | 633 | 9,10-Diphenylanthracene | 540 |
| 2,5-Dichlorophenol | 502, 541 | Diisobutyl phthalate | 539 | Diphenyl isophthalate | 539 |
| 2,6-Dichlorophenol | 502, 541-543 | Diisopropylamine | 610 | Diphenyl oxide | 558-559 |
| 3,4-Dichlorophenol | 502, 541 | 1,3-Diisopropylbenzene | 604, 614-615 | Diphenyl phthalate | 539 |
| 3,5-Dichlorophenol | 502, 541 | 1,4-Diisopropylbenzene | 604, 614-615 | Diphenyl pyraline | 644 |
| Dichloroprop | 512 | Diisopropyl ether (DIPE) | 515, 581, 595, 600 | Diphenyl sulfide | 578 |
| 1,1-Dichloropropane | 622 | Dimenhydrinate | 641, 644 | Dipropylene glycol | 619-620 |
| 1,2-Dichloropropane | 515, 517, 544-546, 548-549, 553, 603, 622 | Dimethoate | 519, 531, 562 | Dipropyl ether | 600 |
| 1,3-Dichloropropane | 515, 517, 544, 546, 548, 622 | 3,3'-Dimethoxybenzidine | 629 | Disulfoton | 518, 525 |
| 2,2-Dichloropropane | 515, 517, 544-546, 548, 622 | 1,2-Dimethoxyethane | 595, 639 | Diuron | 526 |
| 1,3-Dichloro-2-propanol | 515 | Dimethoxyethane (DME) | 595 | cis-13,16-Docosadienoic acid methyl ester | 572, 573 |
| 1,1-Dichloro-2-propanone | 509, 517, 547-548 | n,n-Dimethylacetamide | 625, 639 | cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester | 572, 573 |
| 1,1-Dichloropropene | 515, 517, 544, 548 | Dimethylamine | 608 | Docusane | 503 |
| 1,1-Dichloro-1-propene | 546 | Dimethylamphetamine | 636 | Dodecahydrotriphenylene | 540 |
| cis-1,2-Dichloropropene | 603 | 2,4-Dimethylaniline | 610 | γ-Dodecalactone | 558-559 |
| cis-1,3-Dichloropropene | 515, 517, 544-546, 548-549, 553, 622 | 2,6-Dimethylaniline | 610, 629 | Dodecane | 249, 251-252, 503, 576-577, 593, 623 |
| trans-1,2-Dichloropropene | 603 | 7,12-Dimethylbenz[a]anthracene | 540 | n-Dodecane | 249, 260, 582, 596-597 |
| trans-1,3-Dichloropropene | 515, 517, 544-546, 548-549, 553, 622 | 1,2-Dimethylbenzene | 560 | Dodecanoic acid | 570 |
| Dichlorotetrafluoroethane | 553 | n,n-Dimethylbenzylamine | 610 | Dodecanol | 558-559 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 527, 549 | 2,2-Dimethylbutane | 588-589, 596, 599 | Dodecenal | 564 |
| 2,2-Dichloro-1,1,1-trifluoroethane | 527 | 2,3-Dimethylbutane | 588-589, 596, 599 | n-Dotriacontane | 597 |
| Dichlorvos | 518, 525 | Dimethyl disulfide | 578 | Doxylamine | 641, 644 |
| Dicyclohexylamine | 609-610 | Dimethyl ether (DME) | 581, 601 | Droperidol | 646 |
| Dicyclohexyl phthalate | 539 | Dimethylformamide (DMF) | 624, 626-627, 650 | Dursban (chlorpyrifos) | 518, 519 |
| Dieldrin | 506, 508, 511, 513-514, 518, 520-525, 529-530, 575 | n,n-Dimethylformamide | 625-626, 639 | | |
| Diethanolamine (DEA) | 606, 607 | 2,6-Dimethylhept-5-enal (melonal) | 558, 559 | E | |
| Diethylamine | 610 | 2,2-Dimethylhexane | 517, 548, 599 | cis-11,14-Eicosadienoic acid methyl ester | 572, 573 |
| n,n-Diethylaniline | 610 | 1,3-Dimethyl-2-imidazolidinone (DMI) | 639 | Eicosane | 503, 558 |
| 2,6-Diethylaniline | 610 | 2,6-Dimethylnaphthalene | 540 | n-Eicosane | 597 |
| Diethylbenzene | 593 | 1,2-Dimethyl-2-nitrobenzene | 519 | cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester | 572, 573 |
| 1,2-Diethylbenzene | 576, 597 | 1,3-Dimethyl-2-nitrobenzene | 518, 542 | cis-11,14,17-Eicosatrienoic acid methyl ester | 572, 573 |
| 1,3-Diethylbenzene | 576, 596 | 2,2-Dimethylpentane | 596, 599 | cis-8,11,14-Eicosatrienoic acid methyl ester | 572, 573 |
| 1,4-Diethylbenzene | 597 | 2,3-Dimethylpentane | 588-589, 596, 599 | cis-11-Eicosenoic acid methyl ester | 572, 573 |
| | | 2,4-Dimethylpentane | 588-589, 596, 599 | Elaidic acid methyl ester | 572, 573 |
| | | Dimethylpentyltin | 537 | | |
| | | 3,6-Dimethylphenanthrene | 540 | | |
| | | 2,3-Dimethylphenol | 541 | | |
| | | 2,4-Dimethylphenol | 528, 538, 541-543, 604 | | |
| | | 2,5-Dimethylphenol | 541 | | |
| | | 2,6-Dimethylphenol | 541 | | |
| | | 3,4-Dimethylphenol | 541 | | |

| | | | | | |
|---|---|--|--------------------------------------|--|---|
| Endosulfan I..... | 506, 508, 511, 513-514, 518, 520-525, 529-530 | Ethyl cellosolve..... | 625 | Farnesyl acetate..... | 566 |
| Endosulfan II..... | 506, 508, 511, 513-514, 518, 520-525, 529-530 | Ethyl decanoate..... | 558-559 | Fenamiphos..... | 518-519, 525 |
| α -Endosulfan..... | 575 | Ethyl dodecanoate..... | 558-559 | Fenarimol..... | 518, 525 |
| β -Endosulfan..... | 575 | Ethylene..... | 577, 580, 584-585, 588-590, 601, 634 | Fenchone..... | 563 |
| Endosulfan sulfate..... | 506, 508, 511, 513-514, 518, 520-525, 529-530, 575 | Ethylene/acetylene..... | 591 | Fenchyl acetate..... | 558 |
| Endrin..... | 506, 508, 511, 513-514, 518, 520-525, 529-530, 542 | Ethylenediamine..... | 611 | Fenitrothion..... | 562, 575 |
| Endrin aldehyde..... | 506, 508, 511, 513-514, 518, 520-525, 528-530 | Ethylene..... | 595 | Fentanyl..... | 640, 645-646 |
| Endrin ketone..... | 506, 508, 513-514, 518, 521-524, 529-530 | Ethylene glycol..... | 602, 605, 619-622, 649-650 | Fenthion..... | 562 |
| Ephedrine..... | 636 | Ethylene glycol monoacetate..... | 607 | Fenvalerate..... | 519 |
| Epiandrosterone (trans-androsterone)..... | 648 | Ethylene glycol monobutyl ether..... | 619-620 | Florazone..... | 558-559 |
| Epichlorohydrin..... | 515, 619 | Ethylene glycol monoethyl ether..... | 619-620 | Flunitrazepam..... | 194, 636, 639-640 |
| EPTC..... | 518, 525-526 | Ethylene glycol monoformate..... | 607 | Fluoranthene..... | 503, 532, 538, 540 |
| Eptam..... | 527 | Ethylene glycol monomethyl ether..... | 619-620 | Fluorene..... | 503, 518, 532, 538, 540, 542 |
| Erucic acid methyl ester..... | 572, 573 | Ethylene glycol phenyl ether..... | 622 | Fluorobenzene..... | 515, 517, 544, 545, 548, 614-615 |
| Erythritol..... | 569 | Ethylene oxide..... | 594, 605, 607, 631 | 2-Fluorobiphenyl..... | 538 |
| Esfenvalerate..... | 519 | Ethyl ether..... | 515, 619, 624-625, 650 | 2-Fluorophenol..... | 538 |
| Estazolam..... | 636 | Ethyl formate..... | 568, 607, 617-618, 624-625, 649-650 | Flurazepam..... | 640, 642 |
| 17- α -Estradiol..... | 648 | Ethyl heptanoate..... | 558-559 | Fluridone..... | 518, 525-526 |
| β -Estradiol..... | 648 | Ethyl hexadecanoate..... | 558-559 | Fonofos..... | 526 |
| Estriol..... | 648 | Ethyl hexanoate..... | 558-559 | Formaldehyde..... | 550, 553, 613 |
| Estrone..... | 648 | 2-Ethyl hexanoic acid..... | 509 | Formaldehyde-DNPH..... | 613 |
| Ethane..... | 580, 583-585, 588-591, 596, 601, 634 | 2-Ethyl-1-hexanol..... | 602, 605 | Formaldehyde-PFBHA..... | 614 |
| Ethane/ethylene..... | 580 | Ethyl isoheptanoate..... | 558-559 | Formic acid..... | 509, 570, 607 |
| Ethanethiol..... | 578 | Ethyl mercaptan..... | 579, 581, 591-592 | Frambinone (raspberry ketone)..... | 558-559 |
| Ethanol..... | 515, 554, 568, 581, 595-596, 600, 602, 605, 623-628, 635, 638-639, 649-650 | Ethyl methacrylate..... | 515, 517, 548, 628 | Fucitol..... | 568 |
| Ethanolamine..... | 608 | Ethyl methyl sulfide..... | 578 | Furan..... | 619 |
| Ethchlorvynol..... | 646 | Ethyl morphine..... | 637 | Furfural..... | 558-559, 612 |
| Ethinamate..... | 646 | Ethyl nonanoate..... | 558-559 | Furfuryl alcohol..... | 602, 605 |
| Ethoprop..... | 518, 525-526 | Ethyl octadecanoate..... | 558-559 | | |
| Ethosuximide..... | 643 | Ethyl octanoate..... | 558-559 | G | |
| Ethotoin..... | 644 | Ethyl parathion..... | 575 | Galactitol..... | 568-569 |
| 2-Ethoxyethanol..... | 602, 605, 607, 635, 639 | Ethyl pentadecanoate..... | 559 | Geranial..... | 558-559, 564 |
| bis(2-Ethoxyethyl) phthalate..... | 539 | Ethyl pentadecanoate nonadecane..... | 558 | Geranial acetate..... | 566 |
| 2-Ethoxyethyl acetate..... | 607, 617-618 | Ethyl pentanoate..... | 558-559 | Geraniol..... | 558-559, 560, 561, 563, 566, 569 |
| 2-Ethyl-1-hexanol..... | 567 | α -Ethylphenethyl alcohol..... | 602, 605 | cis-Geraniol..... | 556 |
| bis(2-Ethylhexyl) adipate..... | 518 | β -Ethylphenethyl alcohol..... | 602, 605 | trans-Geraniol..... | 563 |
| bis(2-Ethylhexyl) phthalate..... | 518, 538-539 | 2-Ethylphenol..... | 630 | Geranyl acetate..... | 556, 558-559, 564, 566 |
| Ethyl acetate..... | 515, 553-554, 558-559, 568-569, 617-618, 624-628, 635, 639, 649-650 | 4-Ethylphenol..... | 630 | Geranyl butyrate..... | 559 |
| Ethyl acetylene..... | 634 | Ethyl-3-phenyl oxiran carboxylate..... | 569 | Geranyl formate..... | 558-559 |
| Ethyl acrylate..... | 617-618, 626-628 | Ethyl propanoate..... | 554 | Geranyl-2-methyl valerate..... | 558 |
| Ethyl alcohol..... | 607 | Ethyl propionate..... | 558-559, 617-618, 627-628 | Geranyl tiglate..... | 558-559 |
| 2-(Ethylamino)-ethanol..... | 606 | Ethyl tetradecanoate..... | 558-559 | Germacrene-d..... | 555, 556, 565, 566 |
| Ethyl and dimethyl thiophenes..... | 593 | 4-Ethyltoluene..... | 553 | Gesatamine (atraton)..... | 518 |
| Ethylbenzene..... | 501, 515, 517, 544-546, 548-549, 553, 576-577, 588-589, 593-594, 596-597, 599, 601, 604, 614-616, 623, 625, 632, 639, 649-651 | m-Ethyltoluene..... | 576, 593 | Glucitol..... | 568 |
| Ethylbenzene-d10..... | 597 | p-Ethyltoluene..... | 576, 593 | Glucuronic acid..... | 569 |
| Ethyl benzoate..... | 569, 617-618 | Ethyl undecanoate..... | 558-559 | Glucuronic acid-1,5-lactone..... | 569 |
| Ethyl butanoate..... | 554 | Ethyl valerate..... | 618 | Glutethimide..... | 640, 646 |
| 2-Ethyl-1-butanol..... | 606 | Ethyl vinyl ether..... | 619 | Glycidol..... | 602, 605 |
| Ethyl t-butyl ether (ETBE)..... | 515, 546, 581, 595, 600, 625, | Etridiazole..... | 508, 511, 520-521, 524 | Glyme..... | 620 |
| Ethyl butyrate..... | 558-559, 569, 618 | Eucalyptol..... | 556-557 | Glyme (propylene glycol dimethyl ether)..... | 619, 620 |
| Ethyl caprate..... | 554 | Eugenol..... | 561, 563 | GOAL..... | 527 |
| Ethyl caproate..... | 618 | iso-Eugenol..... | 561, 563 | 3,7-Guaiadiene..... | 558 |
| Ethyl caprylate..... | 554 | Evernyl..... | 558 | α -Gurjunene..... | 566 |
| | | Eugenyl acetate..... | 558-559 | | |
| | | Eugenyl methyl ether..... | 559 | | |
| | | | | H | |
| | | F | | Halazepam..... | 636, 640 |
| | | Farnesene..... | 566 | Haloperidol..... | 646 |
| | | β -Farnesene..... | 556 | Halothane..... | 632 |
| | | t- β -Farnesene..... | 557 | Helium..... | 552 |
| | | trans- β -Farnesene..... | 555, 565 | Heneicosane..... | 558 |
| | | Farnesol..... | 563 | Heneicosanoic acid methyl ester..... | 572, 573 |
| | | Farnesol 1..... | 563 | 1,7-Hepatanediol..... | 620 |
| | | Farnesol acetate..... | 566 | Heptachlor..... | 506, 508, 511, 513-514, 518, 520-525, 529-530 |
| | | Farnesol isomer..... | 561 | | |

- Heptachlor epoxide506, 508, 511, 513-514,
518, 520-525, 529-530, 542
2,2',3,3',4,4',6-Heptachlorobiphenyl518
Heptadec-1-ene558
Heptadecane536
n-Heptadecane597
Heptadecanoic acid methyl ester572, 573
cis-10-Heptadecenoic acid methyl ester572, 573
Heptanal554, 611-612
1,7-Heptandiol619, 620
Heptane576, 593, 601, 616, 623,
625, 639, 649-650
n-Heptane553, 577, 588-589,
596-597, 624, 635, 650
Heptanoic acid570, 607, 611
n-Heptanoic acid509
1-Heptanol532, 602, 605-606
2-Heptanol602, 605
3-Heptanol602, 605
2-Heptanone612
3-Heptanone612
4-Heptanone612
cis-4-Hepten-1-ol602, 605
trans-2-Hepten-1-ol602, 605
Hercolyn D
(tetrahydro & dihydro methyl abietate)558
Heroin194, 637, 639-641, 647
Hexabromobenzene (HBB)524
Hexabromobiphenyl519
Hexacosane503
Hexachlorobenzene508, 518, 520, 524, 529-530, 538
Hexachlorobezene511, 521
2,2',4,4',5,6'-Hexachlorobiphenyl518
Hexachlorobutadiene515, 517, 538, 544-546,
548, 553, 603, 622
Hexachloro-1,3-butadiene549
 β -Hexachlorocyclohexane575
 δ -Hexachlorocyclohexane575
 γ -Hexachlorocyclohexane575
Hexachlorocyclopentadiene508, 511, 518, 538,
542, 603, 622
Hexachloroethane515, 517, 538, 548, 603, 622
Hexachloropentadiene529-530
Hexadecane503
n-Hexadecane249, 597
Hexadecanoic acid570
2,4-Hexadienal557
Hexanal554, 611-612
1,6-Hexandiol619
Hexane517, 548, 599, 601, 623-626, 639, 649-650
n-Hexane553, 577, 583-585, 588-589,
596-597, 624, 635, 650
1,6-Hexanediol620
Hexanoic acid611
Hexanol249, 251-252, 558-559
1-Hexanol554, 602, 606
2-Hexanol602, 605
3-Hexanol602, 605
2-Hexanone517, 548, 553, 612
3-Hexanone612
n-Hexatriacontane597
Hexazinone518-519, 525-527
Hexchlorocyclopentadiene520
cis-2-Hexen-1-ol602, 605
cis-3-Hexen-1-ol602, 605
cis-2-Hexene588-589
trans-2-Hexene588-589
Hexobarbital637, 641
Hexyl acetate558-559
Hexyl butyrate556
Hexyl cinnamaldehyde563
Hexyl cinnamic aldehyde561
Hexylene glycol558-559
Hexyl 2-ethylhexyl phthalate539
1-Hexyl mercaptan592
n-Hexyl mercaptan592
Hexyl methacrylate628
 α -Humulene564
Hydrocarbon616
Hydrocodone639, 641
Hydrogen oxide577
Hydrogen sulfide550, 577-579, 581, 583,
591, 592, 601, 605, 634
Hydroxy acetate607
Hydroxy citronellal558-559, 561, 563
4-Hydroxy-4-methyl-2-pentanone602, 605
Hydroxyphenamate641
Hydroxypropionitrile515
Hydroxypropyl acrylate628
Hydroxyzine644
- I**
- Ibogaine640, 646
Ibuprofen641, 647
Imipramine642
Indan596-597
Indeno[1,2,3-c,d]pyrene503, 505, 518, 532, 538
Inositol568
Iodobenzene614-615
Iodoform603, 622
Iodomethane517, 544, 548, 603, 622
Irgafos633
Irganox633
Isoamyl acetate554, 569, 617-618
Isoamyl alcohol554, 568, 649-650
Isoamyl butyrate569
Isoamyl mercaptan592
Isoamyl salicylate558, 560
Isoborneol558-560, 567
Isobutane584-589, 599
Isobutanol515, 568, 581, 595, 602, 605, 626-628
Iso-butene634
Isobutyl acetate554, 558-559, 617-618, 624, 627-628
Isobutyl acrylate627-628
Isobutyl alcohol554
Isobutyl aldehyde554, 581
Isobutylbenzene577, 604, 614-615
Isobutylene584-587
Isobutyl mercaptan592
Isobutyl propionate627-628
Isobutyraldehyde582, 600, 612, 625
Isobutyric acid509, 570, 607-608
Isocaproic acid570, 607
Isodrin508, 524, 529-530
Isoeugenol563
trans-Isoeugenol563
Isomenthol557
Isomenthone555, 557-559
d-Isomethone565
Isonox633
Isooctane577, 588-589, 596-597, 623-624, 635
Isopentane577, 584-589, 596
Isopentanoic acid509
Isophorone518, 538, 542
Isoprene586-589
Isopropanol554, 581, 602, 605,
624-625, 638, 650
Isopropyl acetate617-618, 624, 639
Isopropyl acrylate627-628
Isopropyl alcohol515, 553, 624-625, 649-650
Isopropyl amine649-650
Isopropyl benzene515, 517, 544-546, 548,
577, 588, 589, 593, 604, 614-616
Isopropyl ether619
Isopropyl mercaptan592
Isopropyl myristate558-559
2-Isopropylphenol630
Isopropyltoluene515
4-Isopropyltoluene545-546
p-Isopropyltoluene517, 544, 548
Isovaleraldehyde581, 600
Isovaleric acid570, 607
- J**
- Jasmolin I536
Jasmolin II536
cis-Jasmone555, 565
- K**
- Kelthane508, 529-530
Kepone519
Ketamine646, 647
Krypton582
- L**
- L-9-Carboxy-11-nor- δ 9-THC649
L-11-Hydroxy- δ 9-THC649
Lactose569
Lactulose569
Lauric acid methyl ester572, 573
Lavandulol556
Lavandulyl acetate556
Levulinic acid509
Lidocaine640, 643, 647
Lignoceric acid methyl ester572, 573
Lilial561, 563
Limonene555, 558-560, 563-564, 565, 567
 δ -Limonene556-557, 564
S-(-)-Limonene567
Linalool555, 558-561, 563-567
 β -Linalool556
Linalool acetate556
cis-Linalool oxide558-559
trans-Linalool oxide558-559
Linalyl acetate558-560
Linoleic acid methyl ester572, 573
Linoleic acid methyl ester572, 573
Linolenic acid methyl ester572, 573
 γ -Linolenic acid methyl ester572, 573
Lofentanyll645
Lorazepam636, 639-640
Lormetazepam636
Lyrall561
Lyrall 1563
Lyrall 2563
Lysergic acid diethylamide (LSD)640, 646

M

| | | | | | |
|------------------------------------|--|---|---|---|--|
| β-Maaliene..... | 557 | 3-Methyl-2-buten-1-ol..... | 602, 605 | Methyl 3-hydroxydodecanoate..... | 571 |
| Malathion..... | 519, 531, 562, 575 | 2-Methyl-1-butene..... | 596 | Methyl 2-hydroxyhexadecanoate..... | 571 |
| Manitol..... | 569 | 2-Methyl-2-butene..... | 584, 588-589, 596 | Methyl 2-hydroxytetradecanoate..... | 571 |
| Mannitol..... | 568 | 3-Methyl-1-butene..... | 586-589 | Methyl 3-hydroxytetradecanoate..... | 571 |
| Meclizine..... | 644 | trans-2-Methyl-2-butenoic acid..... | 608 | Methyl isobutyl ketone..... | 624-625 |
| Medazepam..... | 636, 640 | 2-Methylbutyl acetate..... | 617-618 | Methyl laurate..... | 571 |
| Menthofuran..... | 557 | 2-Methylbutyl alcohol..... | 558-559 | Methyl mercaptan..... | 550, 579, 581, 591-592 |
| Menthol (MeOH)..... | 557, 560, 565, 577, 595 | 3-Methylbutyl alcohol..... | 558-559 | Methyl methacrylate..... | 515, 517, 548, 627-628 |
| Menthone..... | 557-559 | Methyl t-butyl ether (MTBE)..... | 515, 595, 639, 649-650 | Methyl 14-methylhexadecanoate..... | 571 |
| Menthyl acetate..... | 565 | Methyl butyrate..... | 558-559 | Methyl 12-methyltetradecanoate..... | 571 |
| Meperidine..... | 639, 642 | 2-Methyl butyric acid..... | 608 | Methyl monoethanolamine (MMEA)..... | 606 |
| Mephobarbital..... | 637 | Methyl chavicol..... | 561 | Methyl myristate..... | 571 |
| Mepivacaine..... | 643 | 3-Methylcholanthrene..... | 540 | 1-Methylnaphthalene..... | 540, 597 |
| Meprobamate..... | 641, 646 | 2-Methyl-4-chlorophenoxyacetic acid (MCPA)..... | 512 | 2-Methylnaphthalene..... | 538, 540, 596-597 |
| Merphos..... | 518, 525 | Methyl chlorophenoxypropionic acid (MCPP)..... | 512 | 2-Methyl-5-nitroaniline..... | 629 |
| Mescaline..... | 646 | 5-Methylchrysene..... | 505 | Methyl nonadecanoate..... | 571 |
| Mesitylene..... | 623 | Methyl-cresol..... | 558 | Methyl octadecanoate..... | 618 |
| Mesterolone..... | 648 | Methyl-p-cresol..... | 559 | Methyl octine carbonate..... | 561, 563 |
| Methacrolein..... | 612, 626-627 | Methyl-r-cresol..... | 566 | Methyl oleate..... | 571 |
| Methacrylic acid..... | 509 | Methylcyclohexane..... | 588-589, 599, 635, 639, 651 | Methyl palmitate..... | 571 |
| Methacrylonitrile..... | 515, 517, 548, 626-627 | Methylcyclopentane..... | 577, 588-589, 596, 599 | Methyl palmitoleate..... | 571 |
| Methadone..... | 639-640, 642 | 1-Methyl-1-cyclopentene..... | 596 | Methyl paraoxon..... | 518 |
| Methamidophos..... | 531, 562 | Methyl decanoate..... | 618 | Methyl parathion..... | 575 |
| Methamphetamine..... | 636, 639, 642 | Methyl-2,4-dichlorophenylacetate..... | 512 | Methyl pentadecanoate..... | 571 |
| Methane..... | 552, 577, 580, 582-585, 588-591, 601, 626, 634-635 | Methyl diethanolamine (MDEA)..... | 606 | 2-Methylpentane..... | 588-589, 596, 599 |
| Methanethiol..... | 578 | 4-Methyl-2,5-dimethoxyamphetamine (STP)..... | 636 | 3-Methylpentane..... | 501, 588-589, 596, 599, 623 |
| Methanol..... | 554, 568, 581-582, 595-596, 600-602, 605-606, 613, 623-624, 626-628, 635, 638-639, 649-651 | 2-Methyl-4,6-dinitrophenol..... | 528, 541-543, 604 | 2-Methyl-2 pentanol..... | 581 |
| Methapyrilene..... | 641, 644 | Methyl dodecanoate..... | 618 | 3-Methyl-3-pentanol..... | 606 |
| Methaqualone..... | 640, 646 | Methyl eicosenoate..... | 618 | 4-Methyl-2-pentanol..... | 602, 605-606 |
| Methidathion..... | 531, 562 | Methyl elaidate..... | 571 | 2-Methyl-3-pentanone..... | 612 |
| Methofuran..... | 565 | 4,4'-Methylenedianiline..... | 629 | 4-Methyl-2-pentanone (MIBK)..... | 517, 548, 553, 612 |
| Methohexital..... | 637 | 3,4-Methyl enedioxyamphetamine..... | 642 | 2-Methyl-1-pentene..... | 588-589, 596 |
| Methone..... | 565 | 3,4-Methyl enedioxyethylamphetamine..... | 642 | 4-Methyl-1-pentene..... | 588-589 |
| Methoprene..... | 536 | 3,4-Methyl enedioxyethamphetamine..... | 642 | bis(4-Methyl-2-pentyl) phthalate..... | 539 |
| Methoxychlor..... | 506, 508, 511, 513-514, 518, 520-524, 529-530 | Methyl ethyl ketone (2-butanone)..... | 649, 650 | α-Methylphenyl alcohol..... | 602 |
| 2-Methoxyethanol..... | 602, 605, 626 | Methyl isobutyl ketone (MIBK)..... | 639 | 2-Methylphenol..... | 538, 541 |
| bis(4-methoxyethyl) phthalate..... | 539 | α-Methyl ionone..... | 560 | 3-Methylphenol..... | 541 |
| 2-Methoxy-5-methylaniline..... | 629 | Methyl cis-9,10-methylene octadecanoate..... | 571 | 4-Methylphenol..... | 538, 541 |
| 1-Methoxy-2-propanol..... | 639 | Methyl cis-9,10-methyl hexadecanoate..... | 571 | 5-Methyl-5-phenylhydantoin..... | 643 |
| Methsuximide..... | 643 | Methylene chloride..... | 515, 517, 544-545, 548-549, 553, 603, 622, 624-625, 639, 649-650 | 2-Methyl-1-propanethiol..... | 578-579, 581, 591 |
| Methyl acetate..... | 617-618, 627-628, 635 | Methylenedioxyamphetamine (MDA)..... | 636, 639 | 2-Methyl-2-propanethiol..... | 578-579, 591 |
| Methyl acetylene..... | 591 | Methylenedioxyethylamphetamine (MDE)..... | 636, 639 | 2-Methyl-1-propanol (isobutanol)..... | 600 |
| Methyl acrylate..... | 515, 517, 548, 627-628 | Methylenedioxyethamphetamine (MDMA)..... | 636, 639 | 2-Methyl-2-propanol (tert-butanol)..... | 600, 639 |
| Methyl alcohol..... | 625 | Methyl ephedrine..... | 636 | Methyl propionate..... | 617-618, 627-628 |
| Methylamine..... | 608 | 1-Methyl-2-ethylbenzene..... | 597 | 1-Methyl-1-propnaethiol..... | 579, 591 |
| 4-Methylaminorex..... | 646 | 1-Methyl-3-ethylbenzene..... | 597 | 1-Methyl-3-propylbenzene..... | 596 |
| r-Methylansiole..... | 566 | 1-Methyl-4-ethylbenzene..... | 597 | 1-Methyl-1-propyl mercaptan..... | 592 |
| 2-Methylanthracene..... | 540 | Methyl ethyl ketone (MEK)..... | 581, 624-625, 650 | 2-Methyl-1-propyl mercaptan..... | 592 |
| 9-Methylanthracene..... | 540 | Methyl ethyl sulfide..... | 581 | 1-Methyl-2-pyrrolidine..... | 610 |
| Methyl arachidate..... | 571 | Methyl eugenol..... | 561 | 1-Methyl-2-pyrrolidinone..... | 626-627 |
| Methyl benzoate..... | 558-559, 566, 617-618 | 2-Methylfluoranthene..... | 540 | n-Methylpyrrolidone..... | 639 |
| 5-Methylbenzo[b]thiophene..... | 578 | Methyl formate..... | 617-618 | Methyl stearate..... | 571 |
| 3-Methylbenzothiophene..... | 578 | Methyl γ ionone..... | 561 | α-Methylstyrene..... | 576, 593, 614-616 |
| 2-Methyl butanal..... | 611 | 3-0-Methylglucose 1..... | 569 | 4-Methylstyrene..... | 614-615 |
| 2-Methylbutane..... | 599 | 3-0-Methylglucose 2..... | 569 | Methyl sulfide..... | 634 |
| 2-Methyl-1-butanol..... | 568, 602, 605, 611 | Methyl heptadecanoate..... | 571 | Methyl tert-butyl ether (MTBE)..... | 517, 546, 548, 581-582, 597, 600, 619, 623 |
| 2-Methyl-2-butanol..... | 602, 605 | 2-Methylheptane..... | 577, 588-589, 596 | 17α-Methyltestosterone..... | 648 |
| 3-Methyl-1-butanol..... | 568, 602, 605, 625, 635 | 3-Methylheptane..... | 588-589, 596 | Methyl tetradecanoate..... | 618 |
| 3-Methyl-2-butanone..... | 612, 635 | 4-Methylheptane..... | 577 | 2-Methylthiophene..... | 578 |
| 2-Methyl-3-buten-2-ol..... | 602, 605 | Methyl heptine carbonate..... | 561, 563 | 3-Methylthiophene..... | 578 |
| | | Methyl hexadecanoate..... | 618 | Methyl thiophenes..... | 593 |
| | | 2-Methylhexane..... | 588-589, 599 | Methyl tridecanoate..... | 571 |
| | | 3-Methylhexane..... | 588-589, 599 | Methyltripentyltin..... | 537 |
| | | Methyl 2-hydroxydecanoate..... | 571 | | |
| | | Methyl 2-hydroxydodecanoate..... | 571 | | |

Methyl undecanoate.....571
 Metolachlor.....511, 518, 520, 525-526
 Metribuzin.....511, 518, 520, 525-526
 Mevinphos.....518, 525, 531, 542
 MGK-264.....518, 525
 Endo-MGK.....264, 536
 Exo-MGK.....264, 536
 Mirex.....508, 519, 524, 529-530
 Molinate.....518, 525-526
 6-Monoacetylmorphine.....637
 Mono ethylene glycol.....606
 Mono-ethanolamine (MEA).....607
 Monuron.....526
 Morphine.....637, 641, 647
 Musk T (ethylene brassylate).....558-559
 Musk ketone.....560
 Musk xylene.....560
 Myrcene.....555, 558-560, 564-565
 β-Myrcene.....556-557
 Myristic acid methyl ester.....572, 573
 Myristoleic acid methyl ester.....572, 573

N

Naled.....531
 Naphthalene.....249, 251-252, 501, 503, 515,
 517, 532, 538, 540, 542,
 544-546, 548, 577, 596-597, 623
 Naphthalene-d8.....538, 597
 1-Naphthol.....630
 Napropamide.....518, 525-526
 Nefopam.....643
 Neomenthol.....560, 565
 Neon.....552, 582
 Neral.....558-559, 563-564
 Nerol.....557
 Nerol acetate.....556
 cis-Nerolidol.....558
 trans-Nerolidol.....558
 Nervonic acid methyl ester.....572, 573
 Neryl acetate.....558-559, 564
 Nicotinamine.....636
 Nicotine.....639-641, 647
 Nitrazepam.....194, 636, 639
 2-Nitroaniline.....538, 610, 629
 3-Nitroaniline.....538, 610, 629
 4-Nitroaniline.....538, 610, 629
 Nitrobenzene.....515, 517, 538, 548, 614-615
 Nitrobenzene-d5.....538
 2-Nitrobiphenyl.....540
 3-Nitrobiphenyl.....540
 4-Nitrobiphenyl.....540
 Nitrofen.....508
 Nitrogen.....552, 582, 605, 632
 Nitromethane.....635
 1-Nitronaphthalene.....540
 2-Nitronaphthalene.....540
 Nitrophen.....519
 2-Nitrophenol.....528, 538, 541-543, 604, 630
 3-Nitrophenol.....541
 4-Nitrophenol.....512, 528, 538, 541-543, 604
 2-Nitropropane.....515, 517, 548
 n-Nitrosodimethylamine.....538, 542
 n-Nitrosodiphenylamine.....538
 n-Nitroso-di-n-propylamine.....538
 2-Nitrotoluene.....604, 614-615

3-Nitrotoluene.....604, 614-615
 4-Nitrotoluene.....604, 614-615
 trans-Nonachlor.....508, 518, 529-530
 Nonadecane.....559
 Nonadec-1-ene.....558-559
 Nonanal.....564
 γ-Nonalactone.....558-559
 1,9-Nonanediol.....619
 Nonane.....576, 593, 599, 601, 623
 n-Nonane.....532, 577, 588-589, 596-597
 1,9-Nonanediol.....620, 622
 Nonanol.....567
 1-Nonanol.....602, 605
 Nonyl aldehyde.....612
 Nonylamine.....608
 n-Nonylamine.....609-610
 Nootkatone.....564
 Norcodeine.....637
 Nordazepam.....636
 Norethandrolone.....648
 Norflurazon.....518-519, 525-526
 Normorphine.....637
 19-Nortestosterone (nandrolone).....648
 19-Nortestosterone-17-decanoate.....648
 19-Nortestosterone-17-propionate.....648

O

cis-Ocimene.....555, 565
 trans-Ocimene.....555
 β-cis-Ocimene.....556
 β-trans-Ocimene.....556
 Octacosane.....503
 n-Octacosane.....597
 2,2',3,3',4,5',6,6'-Octachlorobiphenyl.....518
 1,2,3,4,6,7,8,9-Octachlorodibenzodioxin.....504
 1,2,3,4,6,7,8,9-Octachlorodibenzofurans.....504
 Octadecane.....503, 536
 n-Octadecane.....597
 Octadecanoic acid.....570
 Octanal.....554, 564, 611
 1,8-Octanediol.....619
 Octane.....576, 593, 599, 601, 623
 isooctane.....501
 n-Octane.....532, 577, 588-589, 596-597
 1,8-Octanediol.....620
 Octanoic acid.....570, 611
 Octanol.....558-559, 564, 567
 1-Octanol.....602, 605
 3-Octanol.....555, 565
 3-Octanone.....532, 556
 1-Octene.....532
 1-Octen-3-ol.....556, 565
 Octen-1-ol acetate.....556
 Octyl acetate.....558-559
 3-Octyl acetate.....555, 565
 Octyl aldehyde.....612
 n-Octylamine.....609-610
 n-Octyl mercaptan.....592
 Oleic acid methyl ester.....572, 573
 Omethoate.....562
 Ordram.....527
 Oxadiazon.....527
 Oxazepam.....636, 639-640
 Oxazopam.....636
 Oxychlordane.....519

Oxycodone.....194, 639
 Oxydemeton-methyl.....531
 4,4'-Oxydianiline.....629
 Oxygen.....552, 582
 Oxymetholone.....648
 Oxymorphone.....641

P

Paarlan.....527
 Palmitic acid methyl ester.....572, 573
 Palmitoleic acid methyl ester.....572, 573
 Paraldehyde.....515
 Parathion.....519, 562
 Parathion-methyl.....562
 Pebulate.....525-526
 Pentaborane.....633
 2,2',3,4,4'-Pentabromodiphenyl ether.....502
 2,2',4,4',5-Pentabromodiphenyl ether.....502
 2,2',4,4',6-Pentabromodiphenyl ether.....502
 Pentachlorobenzene.....614-615
 2,2',3',4,6-Pentachlorobiphenyl.....518
 1,2,3,7,8-Pentachlorodibenzofuran.....504
 2,3,4,7,8-Pentachlorodibenzofuran.....504
 Pentachloroethane.....515, 517, 548, 603, 622
 Pentachloronitrobenzene.....508, 511, 524, 529-530
 Pentachlorophenol.....512, 518, 528, 538, 541-543, 604
 n-Pentadecane.....249, 582, 597
 Pentadecanoic acid methyl ester.....572, 573
 cis-10-Pentadecenoic acid methyl ester.....572, 573
 cis-1,3-Pentadiene.....586-587
 trans-1,3-Pentadiene.....586-587
 Pentafluorobenzene.....515, 517, 548
 Pentafluoroethane.....527
 Pentamethylbenzene.....597
 Pentamethyl disiloxane.....633
 Pentanal.....611
 1,5-Pentanediol.....619
 Pentane.....599, 601, 603, 617, 625-626
 iso-Pentane.....583, 590-591, 601
 n-Pentane.....577, 583-591, 596-597
 1,2-Pentenediol.....532
 1,5-Pentenediol.....620
 2,3-Pentanedione (VDK).....554
 2,3-Pentanedione (acetyl propionyl).....558-559
 n-Pentanoic acid.....509
 1-Pentanol.....554, 602, 605-606, 625, 639
 2-Pentanol.....602, 605
 3-Pentanol.....554, 602, 605
 2-Pentanone.....515, 612, 624
 3-Pentanone.....612
 Pentene-1.....584, 586-587
 1-Pentene.....584-585, 588-589, 596, 625
 cis-2-Pentene.....584, 586-589
 trans-2-Pentene.....584, 586-589
 4-Pentenoic acid.....608
 trans-2-Pentenoic acid.....608
 trans-3-Pentenoic acid.....608
 1-Penten-3-ol.....602, 605
 2-Penten-1-ol.....602, 605
 Pentobarbital.....637, 641
 Pentyl ether.....619
 1-Pentyl mercaptan.....592
 cis-Permethrin.....508, 511, 518, 520-521,
 524, 529-530

| | | | |
|---|--|---|--|
| trans-Permethrin..... | 508, 511, 518, 520-521, 524, 529-530 | 1,2-Propanediol (propylene glycol)..... | 620 |
| Perthane..... | 508, 529-530 | 1,3-Propanediol..... | 620 |
| Perylene..... | 540 | 1-Propanethiol..... | 578-579, 591 |
| Perylene-d12..... | 518-519, 538, 542 | 2-Propanethiol..... | 578-579, 581, 591 |
| α-Phellandrene..... | 564 | Propanil..... | 526 |
| Phenacetin..... | 636, 641 | Propanoic acid..... | 611 |
| Phenanthrene..... | 503, 518, 532, 538, 540 | Propanol..... | 550 |
| Phenanthrene-d10..... | 518, 538, 542 | 1-Propanol..... | 515, 554, 595, 600, 602, 605-606, 625-626, 635, 638-639, 649-650 |
| Phencyclidine (PCP)..... | 639, 640, 642, 646 | 2-Propanol..... | 595, 626, 635, 639 |
| Phenethylalcohol..... | 567 | n-Propanol..... | 568, 581, 624, 650 |
| Pheniramine..... | 644 | Propargyl alcohol..... | 515 |
| Phenmetrazine..... | 641 | Propazine..... | 518-519, 525-527 |
| Phenobarbital..... | 637, 640-641, 643-644 | Propene..... | 553 |
| Phenol..... | 249, 251-252, 502, 528, 538, 541-543, 604, 630 | 2-Propen-1-ol (allyl alcohol)..... | 602, 605 |
| Phenol-d5..... | 538 | Propiolactone..... | 515 |
| 2-Phenoxyethanol..... | 602, 605 | Propiomazine..... | 646 |
| Phensuximide..... | 643 | Propionaldehyde..... | 581, 600, 612 |
| Phentermine..... | 636, 639 | Propionic acid..... | 509, 568, 570, 607 |
| Phenyl acetaldehyde..... | 561, 563 | 1-Propionic acid..... | 532 |
| Phenylacetone..... | 636 | Propionitrile..... | 515, 517, 548, 610, 626-627 |
| Phenylacetylene..... | 576, 593 | Proposyphene..... | 642 |
| 9-Phenylanthracene..... | 540 | Propyl acetate..... | 554, 617-618, 635 |
| Phenyl ephedrine..... | 636 | n-Propyl acetate..... | 625 |
| 1-Phenyl ethyl acetate..... | 554 | Propylbenzene..... | 515, 576-577, 593, 614-616, 623 |
| Phenylethylamine..... | 610 | n-Propylbenzene..... | 517, 532, 544-546, 548, 588-589, 593, 596-597, 604, 616 |
| Phenyl ethyl cinnamate..... | 558-559 | Propyl benzoate..... | 617-618 |
| Phenylethylmalonamide..... | 643 | Propyl butyrate..... | 618 |
| Phenyl ethyl tiglate..... | 558-559 | Propyl caproate..... | 618 |
| 2-Phenyl-naphthalene..... | 540 | Propylene..... | 577, 579-580, 584-591, 601, 617 |
| Phenyltoin..... | 644 | Propylene glycol..... | 602, 605 |
| Phenyltoloxamine..... | 644 | Propyl ether..... | 581, 619 |
| Phenytioin..... | 643 | n-Propyl ether..... | 625 |
| Phorate..... | 526 | Propyl formate..... | 617-618 |
| Phosmet..... | 531 | 1-Propyl mercaptan..... | 592 |
| Phosphine..... | 633 | 2-Propyl mercaptan..... | 592 |
| Phylethylmalonamide (PEMA)..... | 644 | n-Propyl mercaptan..... | 592 |
| Picloram..... | 512 | 2-Propyl pentanoic acid..... | 509 |
| 4-Picoline..... | 532 | Propyl propionate..... | 617-618 |
| α-Pinene..... | 555-559, 564-567 | Propyl valerate..... | 618 |
| β-Pinene..... | 555, 557-560, 564-565, 567 | Propyne..... | 580, 584-587, 588-589 |
| Piperazine..... | 611 | 2-Propyn-1-ol (propargyl alcohol)..... | 602, 605 |
| Piperitone..... | 565 | Prowl..... | 527 |
| Pirimiphos-methyl..... | 562 | Psilocin..... | 646 |
| Polyethylene glycol..... | 621 | Pulegone..... | 565 |
| Polymethoxyflavones..... | 564 | Pyrazole..... | 610 |
| Prazepam..... | 636, 640 | Pyrene..... | 503, 518, 532, 538, 540 |
| Prebane (terbutryn)..... | 518 | Pyrene-d10..... | 518 |
| Primidone..... | 643-644 | Pyrethrin I..... | 536 |
| Procaine..... | 641, 643, 647 | Pyrethrin II..... | 536 |
| Progesterone..... | 648 | Pyridazine..... | 610 |
| Promazine..... | 644 | Pyridine..... | 515, 538, 610, 624-627, 635, 650 |
| Promethazine..... | 644 | Pyrilamine..... | 644 |
| Prometon..... | 518, 525-526 | Pyrimidine..... | 610 |
| Prometryn..... | 518-519, 525-526 | Pyrimiphos ethyl..... | 575 |
| Promofos..... | 575 | Pyrimiphos methyl..... | 575 |
| Pronamide..... | 518, 525-526 | Pyrithyldione..... | 646 |
| Propachlor..... | 508, 511, 518, 520-521, 524, 526-527, 529-530 | Pyrrbutamine..... | 641 |
| Propadiene..... | 584-587, 634 | | |
| Propanal..... | 553 | | |
| 2-Propanamine..... | 625 | | |
| 1,3-Propanediol..... | 619 | | |
| 1,2-Propanediol (propylene glycol)..... | 619 | | |
| Propane..... | 580, 583-591, 596, 599, 601, 617 | | |

| | |
|--------------|-----|
| Q | |
| Quinine..... | 647 |

| | |
|--|---------|
| R | |
| Rhamnitol..... | 568-569 |
| Rhamnose 1..... | 569 |
| Rhamnose 2..... | 569 |
| Ribitol..... | 568-569 |
| Ribose 2..... | 569 |
| Ro-Neet..... | 527 |
| Rosatol (rosetone)..... | 559 |
| Rosatol (rosetone) geranyl butyrate..... | 558 |
| Rose oxide, cis-rose..... | 558-559 |
| Rose oxide, trans-rose..... | 558-559 |

| | |
|--------------------------------|---|
| S | |
| Sabinene..... | 555, 558, 564-565 |
| trans-Sabinene hydrate..... | 555, 565 |
| Salicylamide..... | 643 |
| α-Santolene..... | 556 |
| Secbumeton..... | 526 |
| Secobarbital..... | 637, 641 |
| Selenide..... | 633 |
| Sencor..... | 527 |
| Simazine..... | 511, 518, 520, 525-527, 542 |
| Simetryn..... | 518, 525-526 |
| α-Sinensal..... | 564 |
| β-Sinensal..... | 564 |
| Sorbitol..... | 569 |
| Stanozolol..... | 648 |
| Stearic acid methyl ester..... | 572, 573 |
| Stigmasterol..... | 648 |
| Stirifos..... | 525 |
| Strawberry aldehyde..... | 569 |
| Strychnine..... | 639, 647 |
| Styrene..... | 515, 517, 544, 546, 548-549, 553, 576, 588-589, 593, 604, 614-617, 623, 632 |
| Styrene dimer..... | 617 |
| Styrene oxide..... | 614, 615 |
| Styrene trimer..... | 617 |
| Sucrose..... | 569 |
| Sufentanyl..... | 645 |
| Sulfallate..... | 526 |
| Sulfur dioxide..... | 605, 634 |
| Sulpiride..... | 646 |
| Sutan..... | 527 |

| | |
|--------------------------|--------------------------------|
| T | |
| Talbutal..... | 637, 646 |
| Tebuthiuron..... | 518, 525 |
| Temazepam..... | 194, 636, 639-640 |
| Tenocyclidine (TCP)..... | 646 |
| Terbacil..... | 518, 525-527 |
| Terbufos..... | 518, 525-526, 542 |
| Terbufos sulfone..... | 519 |
| Terbuthylazine..... | 526 |
| Terbutryn..... | 525-526 |
| Terphenyl-d14..... | 538 |
| Terpinene..... | 565 |
| α-Terpinene..... | 555, 564-565 |
| γ-Terpinene..... | 555, 557-559, 564-565, 567 |
| Terpinen-4-ol..... | 555-556, 558-559, 564-565, 567 |
| α-Terpineol..... | 556, 558-560, 564-565, 567 |
| Terpinolene..... | 555, 559, 564-565 |
| γ-Terpinolene..... | 565 |
| Terrazole..... | 518, 529-530 |

| | | | | | |
|---|---|--|--|--|---|
| Testosterone | 648 | o-Tolualdehyde | 612 | Triflupromazine | 644 |
| 2,2',4,4'-Tetrabromodiphenyl ether | 502 | p-Tolualdehyde | 612 | Trifluralin | 508, 511, 518, 520-521, 524, 529-530, 542 |
| 2,3',4,4'-Tetrabromodiphenyl ether | 502 | Toluene | 249, 251-252, 501, 515, 517, 544-546, 548-549, 553, 576, 577, 586-589, 593-594, 596-597, 599, 601, 604, 614-617, 623-625, 632, 635, 639, 649-651 | Triglyme (triethylene glycol dimethyl ether) | 619, 620 |
| 2,3',4',6'-Tetrabromodiphenyl ether | 502 | Toluene-d8 | 515, 549 | Trimethylamine | 608 |
| Tetraborane | 633 | o-Toluidine | 629 | 2,4,5-Trimethylaniline | 629 |
| Tetrabutyltin | 537 | Tonalid | 558-560 | 1,2,3-Trimethylbenzene | |
| Tetracaine | 643 | Trazodone | 639 | (hemimellitene) | 546, 577, 596-597, 599, 601, 614-615 |
| 1,2,4,5-Tetrachlorobenzene | 614-615 | Treflan | 527 | 1,2,4-Trimethylbenzene | |
| 2,2',4,4'-Tetrachlorobiphenyl | 518 | 2,2',4-TriBDE (BDE-17) | 502 | (pseudocumene) | 501, 515, 517, 544-546, 548-549, 553, 577, 588-589, 596-597, 614-615, 623 |
| 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) | 504 | 2,4,4'-TriBDE (BDE-28) | 502 | 1,3,5-Trimethylbenzene | |
| 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | 504 | Triacetoneamine (TAA) | 595 | (mesitylene) | 515, 517, 544-546, 548-549, 553, 588-589, 596-597, 614-615 |
| Tetrachloroethane | 507, 509 | Triadimefon | 518, 525 | Trimethylchloro silane | 633 |
| 1,1,1,2-Tetrachloroethane | 515, 517, 544-546, 548, 603, 622 | Triazolam | 636, 640 | 3,5,5-Trimethylhexanol | 558-559 |
| 1,1,2,2-Tetrachloroethane | 515, 517, 544, 546, 548-549, 553, 603, 622 | Tribromoacetic acid | 543 | 2,2,4-Trimethylpentane (isooctane) | 553 |
| Tetrachloroethene | 515, 517, 544-549, 553, 622 | 2,4,6-Tribromophenol | 538 | 2,3,3-Trimethylpentane | 577, 596 |
| Tetrachloroethylene | 547 | Tributylpentyltin | 537 | 2,3,4-Trimethylpentane | 588-589 |
| Tetrachloro-m-xylene (TCMS) | 506, 508, 513-514, 520, 524, 529-530, 534 | Trichloroacetic acid | 543 | 2,3,5-Trimethylphenol | 630 |
| 2,4,5,6-Tetrachloro-m-xylene | 521-523 | Trichloroacetonitrile | 509, 547 | Trimethyl phosphate | 532 |
| 2,3,4,5-Tetrachlorophenol | 502, 541 | 2,4,5-Trichloroaniline | 629 | Trimipramine | 546 |
| 2,3,4,6-Tetrachlorophenol | 502, 541 | 1,2,3-Trichlorobenzene | 515, 517, 544-546, 548, 614-615 | 2,4,6-Trinitrophenol | 604 |
| 2,3,5,6-Tetrachlorophenol | 502, 541-543 | 1,2,4-Trichlorobenzene | 515, 517, 538, 544-546, 548-549, 553, 614-615 | 1,3,5-Trioxane impurity | 554 |
| Tetrachlorvinphos (stirifos) | 518 | 1,3,5-Trichlorobenzene | 546, 614-615 | Tripelennamine | 644 |
| n-Tetracontane | 597 | 2,4,5-Trichlorobiphenyl | 518 | Triphenyl phosphate | 518, 519, 562 |
| Tetracosane | 503 | Trichloroethane | 507, 509, 624 | Tripolidine | 644 |
| n-Tetracosane | 597 | 1,1-Trichloroethane | 649-650 | | |
| Tetradecane | 503, 596 | 1,1,1-Trichloroethane | 507, 509, 515, 517, 544-549, 553, 603, 622, 635, 651 | | |
| n-Tetradecane | 249, 582, 597 | 1,1,2-Trichloroethane | 507, 509, 515, 517, 544-546, 548-549, 553, 603, 622 | | |
| Tetradecanoic acid | 570 | Trichloroethene | 515, 517, 544-549, 553, 622 | | |
| Tetraethylene pentamine | 611 | Trichloroethylene | 547, 624, 626, 635, 650 | | |
| 1,1,1,2-Tetrafluoroethane | 527 | Trichlorofluoromethane | 515, 517, 527, 544-546, 548, 549, 553 | | |
| 1,1,2,2-Tetrafluoroethane | 527 | 1,1,2-trichloro-1,2,2-trifluoroethane) | 549 | | |
| Tetrahydrocannabinol | 639 | Trichloromethane | 625-626 | | |
| δ9-tetrahydrocannabinol (THC) | 649 | Trichloromethyl silane | 633 | | |
| 1,2,3,4-Tetrahydrofluranthene | 540 | 2,3,4-Trichlorophenol | 502, 541-543 | | |
| Tetrahydrofuran (THF) | 517, 548, 553, 619, 624, 626, 639, 650, 651 | 2,3,5-Trichlorophenol | 502, 541-543 | | |
| Tetrahydropyran | 619 | 2,3,6-Trichlorophenol | 502, 541-543 | | |
| 1,2,3,5-Tetramethylbenzene | 596-597 | 2,4,5-Trichlorophenol | 502, 538, 541-543 | | |
| 1,2,4,5-Tetramethylbenzene | 577, 596-597 | 2,4,6-Trichlorophenol | 502, 528, 538, 541-543, 630 | | |
| Tetrapentyltin | 537 | 3,4,5-Trichlorophenol | 502, 541 | | |
| Thenyldiamine | 641 | 2,4,5-Trichlorophenoxyacetic acid | 512 | | |
| Thiamine pyrophosphate (TPP) | 531 | 1,2,3-Trichloropropane | 507, 509, 515, 517, 543-544, 546, 548, 603, 622 | | |
| Thiamylal | 637 | 1,1,1-Trichloropropanone | 547 | | |
| Thiazopyr | 519 | 1,1,1-Trichloro-2-propanone | 509 | | |
| 4,4'-Thiodianiline | 629 | 1,1,2-Trichloro-1,2,2-trifluoroethane | 527, 553 | | |
| Thiopental | 637 | 1,1,2-Trichlorotrifluoroethane | 603, 622 | | |
| Thiophene | 578-579, 581, 591, 592, 593 | Tricosanoic acid methyl ester | 572, 573 | | |
| Thioridazine | 644 | Tricyclazole | 518, 525-526 | | |
| Thonzylamine | 644 | Tridecane | 576-577, 593 | | |
| Threhalose | 569 | n-Tridecane | 249, 582 | | |
| Threitol | 569 | Tridecanoic acid methyl ester | 572, 573 | | |
| Thujone | 563 | Triethanolamine (TEA) | 607, 608 | | |
| α-Thujone | 558, 564 | Triethylamine | 610, 626-627 | | |
| β-Thujone | 564 | Triethylene glycol | 621 | | |
| Tillam | 518, 527 | Triethylenetetramine | 611 | | |
| Tinuvin P | 633 | 1,1,1-Trifluoroethane | 527 | | |
| α-Tocopherol | 645 | Trifluoromethane | 527 | | |
| β-Tocopherol | 645 | Trifluorotoluene | 544 | | |
| δ-Tocopherol | 645 | | | | |
| γ-Tocopherol | 645 | | | | |
| Tolban | 527 | | | | |
| o-Tolidine | 629 | | | | |
| m-Tolualdehyde | 612 | | | | |

U

| | |
|------------------------------|------------------------|
| Undecane | 576, 593, 599, 623 |
| n-Undecane | 249, 260, 577, 596-597 |
| Undecanoic acid methyl ester | 572, 573 |

V

| | |
|-------------------------------|---------------------------------|
| Valencene | 564 |
| Valeraldehyde (pentanal) | 581, 600, 612 |
| Valeric acid (pentanoic acid) | 570, 607, 608, 611 |
| iso-Valeric acid | 611 |
| Valerolactone | 608 |
| Vanillin | 563 |
| Verapamil | 639 |
| Vernam | 527 |
| Vernolate | 518, 525-526 |
| Vertenex | 558-559 |
| Vinclozolin | 519, 575 |
| Vinyl acetate | 553, 617-618 |
| Vinyl chloride | 515, 517, 544-546, 548-549, 553 |
| Vinyl-trimethyl silane | 633 |
| Viridiflorol | 555, 565 |

W

| | |
|-------|---------------|
| Water | 583, 595, 607 |
|-------|---------------|

X

| | |
|------------|--|
| Xenon | 582 |
| m-Xylene | 515, 517, 544-546, 548-549, 553, 576-577, 588-589, 593-594, 596-597, 599, 601, 604, 614-616, 623, 625, 632 |
| m,p-Xylene | 501, 639, 649-651 |

| | |
|-------------------|--|
| o-Xylene | 501, 515, 517, 544-546, 548-549, 553, 576-577, 588-589, 593-594, 596-597, 599, 601, 604, 614-616, 623, 625, 632, 639, 649-651 |
| p-Xylene | 515, 517, 544-546, 548-549, 553, 576-577, 588-589, 593-594, 596-597, 599, 601, 604, 614-616, 623, 625, 632 |
| 2,3-Xylenol | 630 |
| 2,4-Xylenol | 630 |
| 2,5-Xylenol | 630 |
| 2,6-Xylenol | 630 |
| 3,4-Xylenol | 630 |
| 3,5-Xylenol | 630 |
| Xylose 1 | 569 |
| Xylose 2 | 569 |

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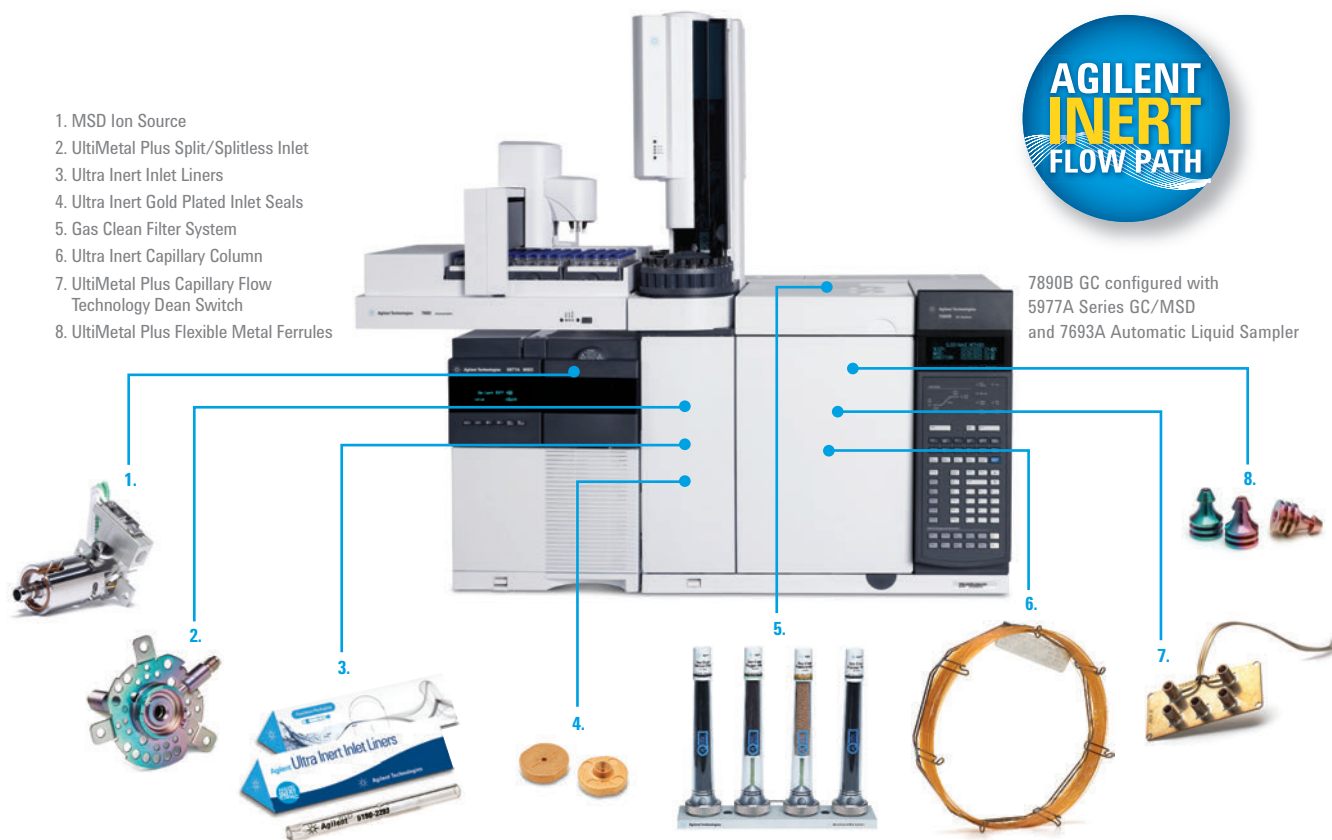
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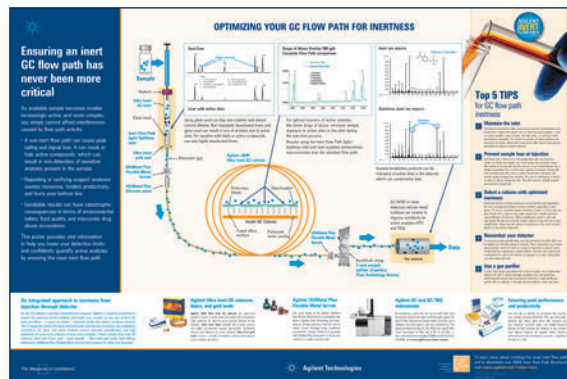
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