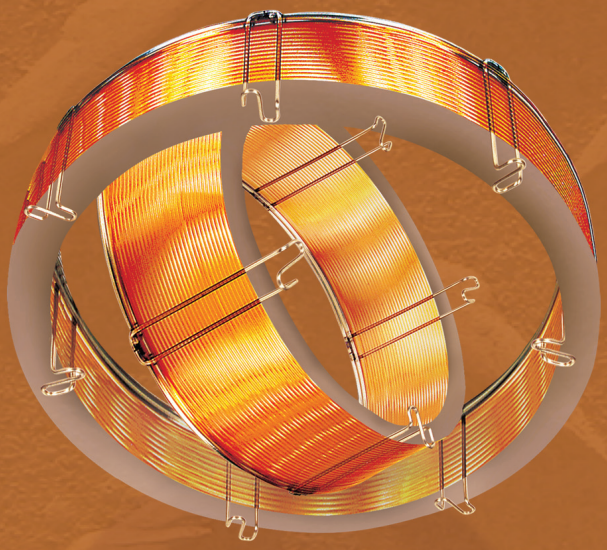
Zebron™

5 PHASE GC COLUMNS



DISCOVER NEW OPTIONS

phenomenex®

...breaking with tradition℠

Choosing the Correct 5 Phase Column

- Equivalent to USP Phase G27
- Low bleed (MS Certified) especially suited to high sensitivity work using GC/MS (Individually Tested)
- Intense QC specifications ensure column-to-column performance

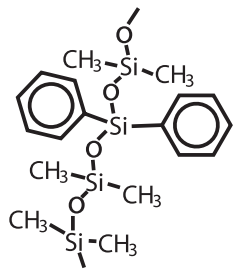
There are many different 5 phase GC column variations on the market. All utilize one of two main types of bonded phases: 5 %-Phenyl or 5 %-Phenyl-Arylene. The differences between the two phases can be slight but significant to the chromatographic result.

In Phenyl-Arylene phases, the phenyl ring is incorporated into the polymer backbone creating a web-like network in which compounds must negotiate in order to interact with the phenyl in the stationary phase. Since the access to the phenyl rings is more limited, compounds with a geometry that "fits" into the polymer network will tend to interact more strongly.

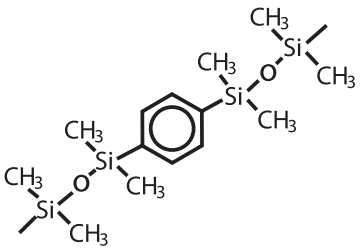
Due to their rigid structure, resolution differences are most commonly observed when analyzing multi-ring aromatics, such as PAHs and PCBs. However, resolution difference can also be observed for other aromatic compounds.

There are two main types of bonding: Pendant and Arylene.

Pendent



Arylene



There are 4 options: ZB-5, ZB-5HT, ZB-5MSi & ZB-5ms

START HERE

What best describes your application and/or needs for a GC column?

General use with both MS & non-MS detectors and non-active compounds.

Recommended Phenomenex column

ZB-5

Phase/Temperature Limits:
5 % – Phenyl – 95% – Dimethylpolysiloxane
Temp Limits:
-60 to 360/370 °C*

Features:
High stability. Low bleed phase (MS Certified).

Benefits:
Versatile, low cost column for general applications with various detectors.

Equivalent to:
DB-5, HP-5, Rtx-5, HP-PAS-5, MDN-5, Equity-5, SPB-5, OV-5, 007-5, AT-5, BPX5, SE-54, BP5, Ultra 2, EC-5, HP-5 Trace Analysis, CP-SIL 8 CB

*Thicker films (≥1.0 um df) are rated to 340/360 ˚C (Isothermal / TPGC).

High-temperature applications, dirty samples, long-chain hydrocarbons, high boilers, waxes, fuels.

Recommended Phenomenex column

ZB-5HT

Phase/Temperature Limits:
5 % – Phenyl – 95% – Dimethylpolysiloxane
Temp Limits:
-60 to 400/430 °C*

Features:
Award winning 430 °C stable phase. Improved polyimide coating = flexible tubing after prolonged use above 400 °C. Low bleed phase (MS Certified).

Benefits:
Increased temperature stability leads to improved column lifetime – saving time & money. Remove contaminants using high temperature bake outs. Replaces problematic metal columns.

Equivalent to:
DB-5ht, VF-5ht, HT-5, Stx-5HT, XTI-5HT

*0.53 mm ID columns are rated to 400 ˚C max operational temperature.

The analysis of active compounds that exhibit poor peak shape such as drugs, amines or acids. MS sensitive analysis.

Recommended Phenomenex column

ZB-5MSi

Phase/Temperature Limits:
5 % – Phenyl – 95 % – Dimethylpolysiloxane
Temp Limits:
-60 to 360/370 °C

Features:
New proprietary deactivation process decreases column activity. Aggressive phase crosslinking results in very low bleed levels (MS Certified).

Benefits:
Improved peak shape for acids, bases, and drug compounds. Extend performance for active compounds. Higher temperature limits allow for removal of column contamination.

Equivalent to:
DB-5, MDN-5S, HP-5ms, HP-5msi, Rxi-5ms, Rtx-5ms, Rtx-5Amine

Semi-volatile mixtures containing acids, bases, and neutrals. Aromatics, PAHs, or PCBs.
General MS applications.

Recommended Phenomenex column

ZB-5ms

Phase/Temperature Limits:
5 % – Phenyl-Arylene – 95 % – Dimethylpolysiloxane
Temp Limits:
-60 to 325/350 °C

Features:
Arylene Matrix Technology™ (AMT) provides highly stable crosslinked phenyl-arylene phase.
Slightly different selectivity to non-arylene 5-type phases. Highly deactivated (MS Certified).

Benefits:
Phase chemistry reduces "back-biting" and lowers column bleed.
Phenyl-Arylene bonded phase improves resolution of aromatic compounds. Reduced activity for acidic and basic compounds leads to better quantitation.

Equivalent to:
DB-5ms, VF-5ms, CP-SIL 8 CB MS, DB-5.625, DB-5ms EVDX, Rtx-5SilMS

ZB-5 GC Columns

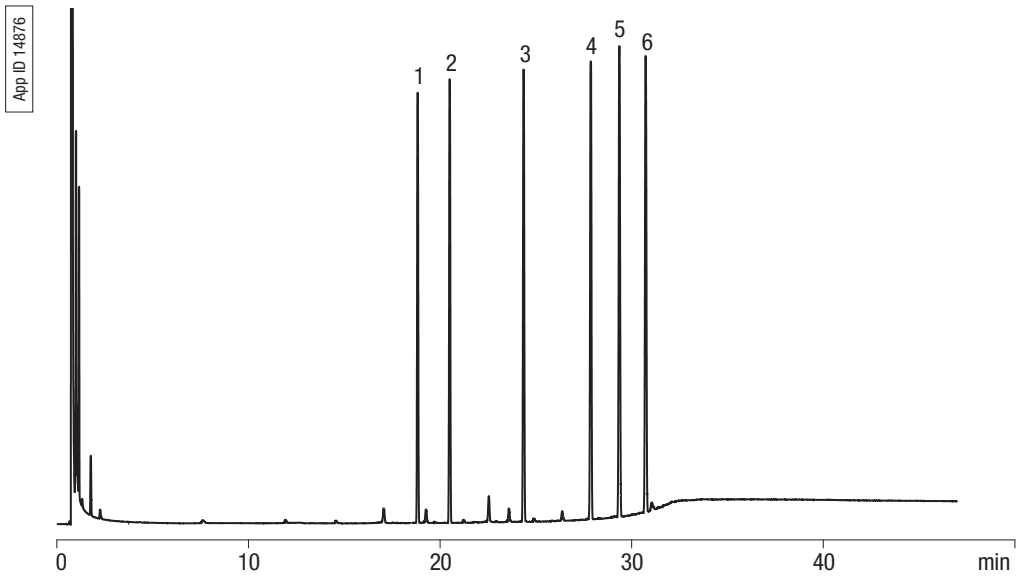
A fantastic general purpose column for both MS & non-MS detectors.

- **Temperature Limits: -60 to 360/370 ˚C (Isothermal/TPGC)***
- **Versatile low polarity column**
- **Resilient to dirty samples - long column life**
- **Great column for unknown samples**

Column Profile

Applications		
Alkaloids	FAMEs	Phenols
Dioxins	Halo-hydrocarbons	Residual Solvents
Drugs	PCBs/Aroclors	Semi-volatiles
Essential Oils/Flavors	Pesticides/Herbicides	

Alternative to Any 5 %-Phenyl- 95 %-Dimethylpolysiloxane Phase:						
DB-5	HP-PAS-5	SPB-5	007-5	SE-54	EC-5	Ultra 2
HP-5	MDN-5	OV-5	AT-5	BP5	CP-SIL 8 CB	
Rtx-5	Equity-5		BPX5	HP-5 Trace Analysis		



Phthalate Esters: EPA Method 606

Column: Zebron ZB-5
Dimensions: 30 meter x 0.53 mm x 1.50 µm
Part No.: 7HK-G002-28
Injection: Split 20:1 @ 300 ˚C, 1 µL
Carrier Gas: Helium @ 12.9 mL/min (Constant Flow)
Oven Program: 40 ˚C for 6 min to 300 ˚C @ 10 ˚C/min for 15 min
Detector: FID @ 300 ˚C
Sample:
1. Dimethyl Phthalate
2. Diethyl Phthalate
3. Di-n-butyl Phthalate
4. Butyl Benzyl Phthalate
5. Bis(2-ethylhexyl) Phthalate
6. Di-n-octyl Phthalate

*Thicker films (≥ 1.0 µm df) are rated to 340/360 °C (Isothermal/TPGC).

ZB-5MSi GC Columns

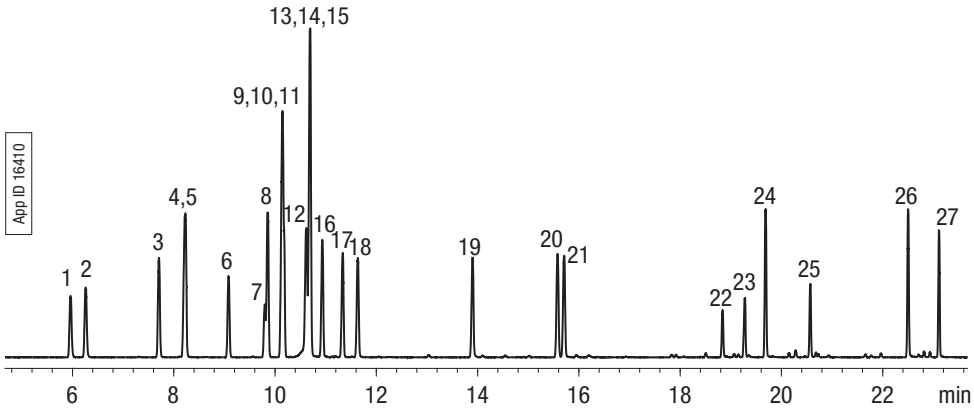
A deactivated, inert column specially designed to provide enhanced peak shapes for active acidic/basic compounds, whilst maintaining MS certified bleed levels.

- **Temperature Limits: -60 to 360/370 ˚C (Isothermal/TPGC)**
- **Highly inert - improved peak shape for acidic/basic compounds**
- **ESC bonding results in phase stability and high temperature limits**
- **Traditional bonding chemistry provides the same selectivity as the ZB-5 columns**

Column Profile

Applications		
Drugs of Abuse	FAMEs	Pesticides
Nitrosamines	Phenols	EPA Methods

Alternative to Any 5 %-Phenyl- 95 %-Dimethylpolysiloxane Phase:						
DB-5	Rtx-5ms	MDN-5S	HP-5ms	Rtx-5Amine	HP-5msi	Rxi-5ms



Phenols

Column: Zebron ZB-5MSi

Dimensions: 30 meter x 0.25 mm x 0.25 µm

Part No.: 7HG-G018-11

Injection: Split 5:1 @ 240 ˚C, 1 µL

Carrier Gas: Helium @ 1.2 mL/min (Constant Flow)

Oven Program: 60 ˚C to 140 ˚C @ 5 ˚C/min to 280 ˚C @ 10 ˚C/min

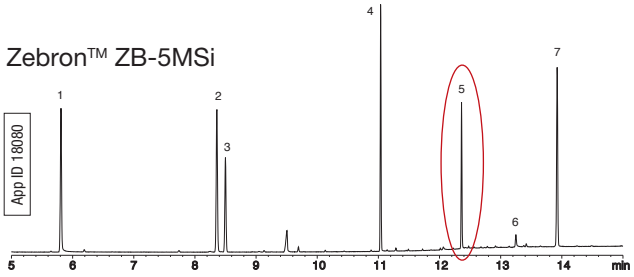
Detector: MSD @ 230 ˚C; 45-450 amu

Sample:

1. Phenol
2. 2-Chlorophenol
3. 2-Methylphenol
4. 4-Methylphenol
5. 3-Methylphenol
6. 2,6-Dimethylphenol
7. 2-Nitrophenol
8. 2-Ethylphenol
9. 2,4-Dimethylphenol
10. 3,5-Dimethylphenol
11. 2,5-Dimethylphenol
12. 4-Ethylphenol
13. 3-Ethylphenol
14. 2,4-Dichlorophenol
15. Benzoic Acid
16. 2,3-Dimethylphenol
17. 3,4-Dimethylphenol
18. 2.6-Dichlorophenol
19. 4-Chloro-3-methylphenol
20. 2,4,6-Trichlorophenol
21. 2,4,5-Trichlorophenol
22. 2,4-Dinitrophenol
23. 4-Nitrophenol
24. 2,3,4,6-Tetrachlorophenol
25. 4,6-Dinitro-2-methylphenol
26. Pentachlorophenol
27. Dinoseb

ZB-5MSi GC Columns *(continued)*

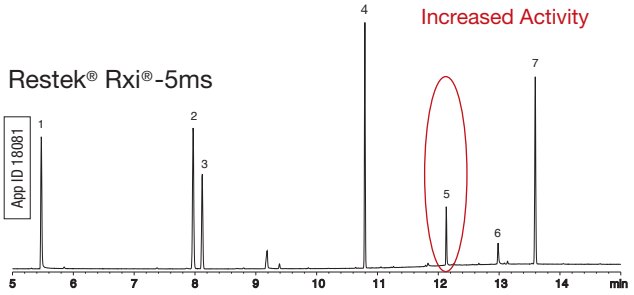
ZB-5MSi Comparative Application Data

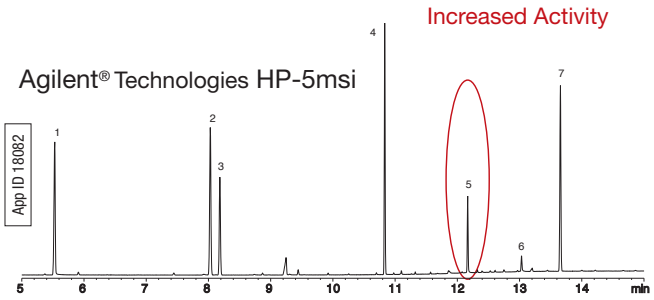


Zebron™ZB-5MSi vs. Restek® Rxi®-5ms & Agilent® HP-5msi Column Performance Evaluation

Conditions for all columns:

Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 83:1 @ 250 ˚C, 2.0 µL
Carrier Gas: Hydrogen @ 40 cm/sec (Constant Flow)
Oven Program: 135 ˚C to 220 ˚C @ 10 ˚C to 320 ˚C @ 8 ˚C/min
Detector: FID @ 325 ˚C
Sample:
1. Ibuprofen
2. Glutethamide
3. Dimenhydrinate
4. Desipramine
5. Oxymorphone
6. Quinidine
7. Alprazolam



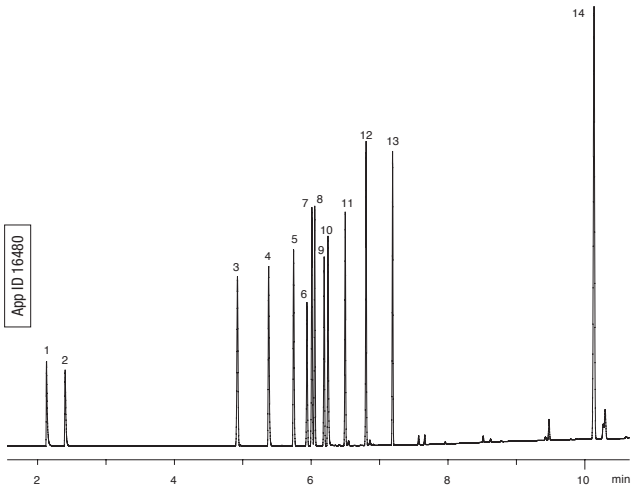


ZB-5MSi for Basic Compounds

Aromatic Amines

Column: Zebron ZB-5MSi
Dimensions: 30 meter x 0.25 mm x 0.50 µm
Part No.: 7HG-G018-17
Injection: Split 15:1 @ 220 ˚C, 1 µL
Carrier Gas: Hydrogen @ 1.7 mL/min (Constant Flow)
Oven Program: 90 ˚C for 4 min to 220 ˚C @ 30 ˚C for 4 min
Detector: FID @ 300 ˚C
Sample: 100 ppm in ethanol

1. Piperidine
2. 2-Methylpiperidine
3. Aniline
4. Benzylamine
5. α-Phenylethylamine
6. N-Methylaniline
7. o-Toluidine
8. m-Toluidine
9. N,N-Dimethylaniline
10. ß-Phenylethylamine
11. N-Ethylaniline
12. 2,4-Dimethylaniline
13. N,N-Diethylaniline
14. Dibenzylamine



ZB-5HT Inferno™ GC Columns

A high temperature column allowing reproducible analysis of higher boiling compounds with very low bleed.

- **Temperature Limits: -60 to 400/430 ˚C (Isothermal/TPGC)***
- **First non-metal columns stable to 430 ˚C**
- **Rugged high temperature, polyimide coated, fused silica tubing**
- **Provides robust column performance for high temperature bake outs**

Column Profile

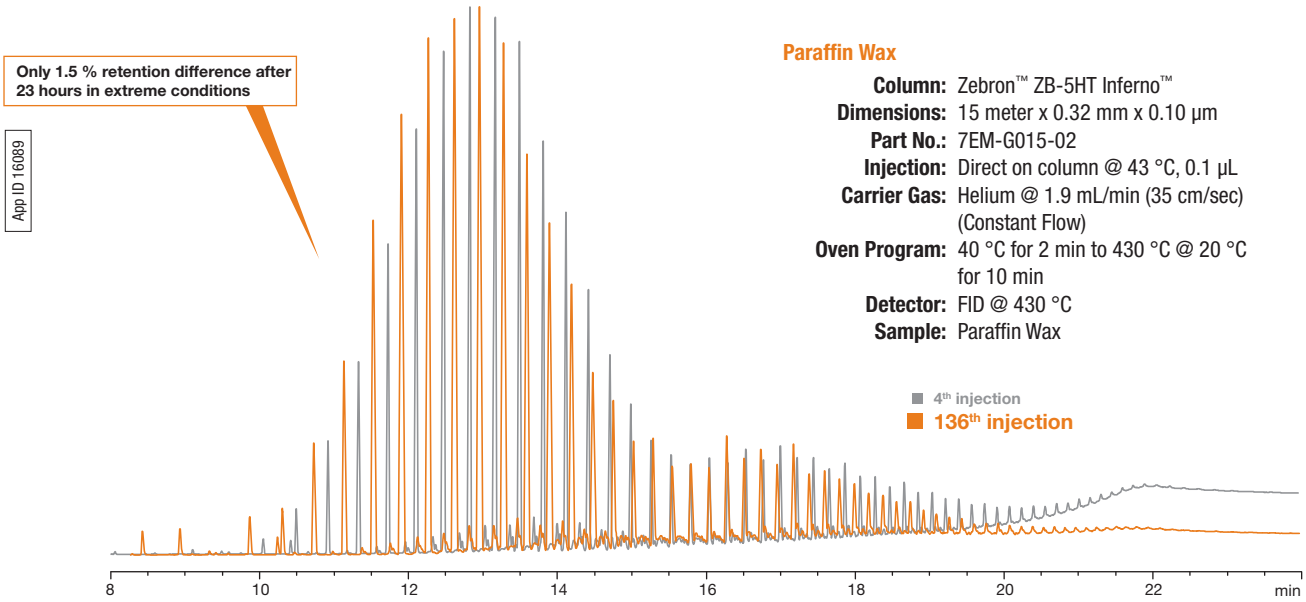
Applications		
High Boiling Petroleum Products	Polymers/Plastics	
Simulated Distillation Methods	Triglycerides	Diesel Fuel
Long-chained Hydrocarbons	Motor Oils	Surfactants
High Molecular Weight Waxes		

Alternative to Any 5 %-Phenyl-95 %-Dimethylpolysiloxane High-temperature Phase:				
DB-5ht	VF-5ht	HT-5	Stx-5HT	XTI-5HT

*0.53 mm ID columns are rated to 400 ˚C maximum operational temperature.

Stable and Durable Even When Pushed to 430 °C

To demonstrate the ultra-high temperature performance of the Zebron™ Inferno™ columns, we tested the Zebron ZB-5HT under extreme conditions (23 hours at 430 °C) and compared the difference in retention time. Under these harsh conditions, the difference in retention of pentacontane between the 1st and 125th chromatograms was only 1.5 %! With the Zebron Inferno column's improved endurance and extended temperature range, expect to get precise, dependable results for extended periods.



Paraffin Wax

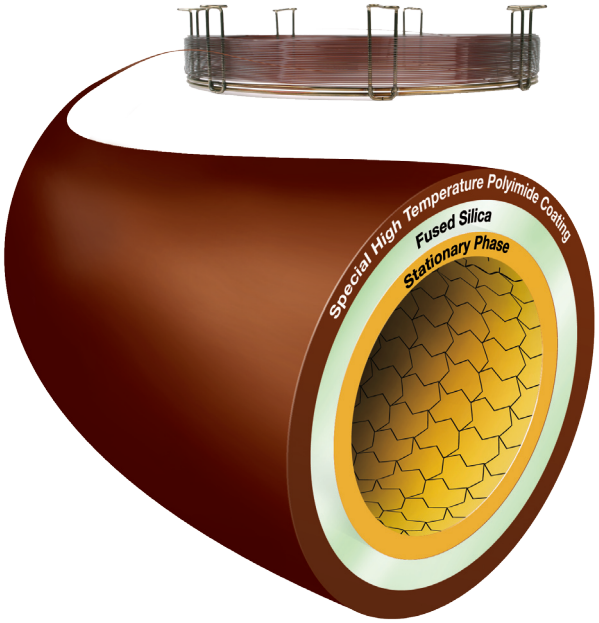
Column: Zebron™ ZB-5HT Inferno™
Dimensions: 15 meter x 0.32 mm x 0.10 µm
Part No.: 7EM-G015-02
Injection: Direct on column @ 43 °C, 0.1 µL
Carrier Gas: Helium @ 1.9 mL/min (35 cm/sec) (Constant Flow)
Oven Program: 40 °C for 2 min to 430 °C @ 20 °C for 10 min
Detector: FID @ 430 °C
Sample: Paraffin Wax

ZB-Inferno™ GC Columns

2007 R&D 100 Award Recipient

Special High Temperature Polyimide Coating

Capillary GC columns are externally coated with a thermoplastic polymer known as polyimide resin. It stabilises the internal glass capillary tubing and allows the columns to be flexible even at elevated temperatures. Standard polyimide resin pyrolyzes at temperatures above 380 ˚C making the tubing unstable. The Zebron ZB-1HT and -5HT Inferno columns utilize a polyimide resin material that shows minimal thermal degradation even at programmed temperatures up to 430 ˚C. The new resin material is also the reason for the graphite black appearance of the capillary tubing. However, unlike traditional tubing that darkens due to oxidation, this tubing will provide long lifetime even at 430 ˚C.

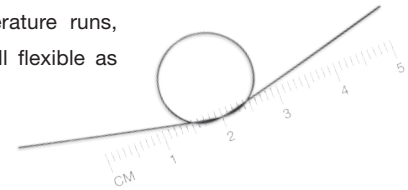


Still Flexible After 23 Hours at 430 ˚C*

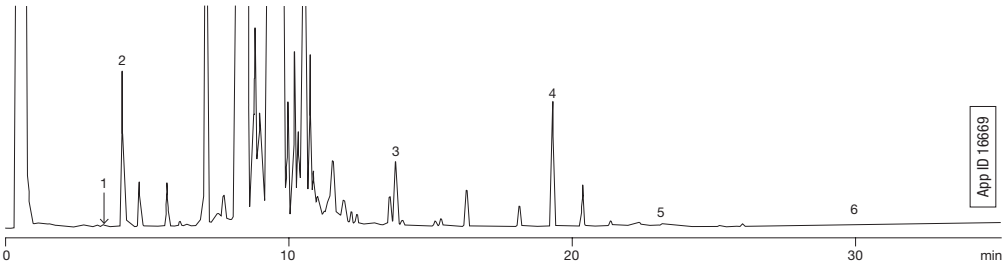
At temperatures above 380 ˚C, conventional fused silica tubing will become brittle and randomly break. Our special new tubing is manufactured using a novel High Temperature Polyimide Resin material that shows minimal thermal degradation even at programmed temperatures up to 430 ˚C.

*430 ˚C TPGC Stability Test

Evaluated by performing 185 programmed temperature runs, total 23 hours at 430 ˚C. Polyimide tubing was still flexible as shown here.



EN 141 05: Free and Total Glycerin Analysis in Biodiesel



Column: Zebron ZB-5HT Inferno
Dimension: 15 meter x 0.32 mm x 0.10 µm
Part No.: 7EM-G015-02
Injection: On-Column @ 50 ºC, 1 µL
Carrier Gas: Helium @ 5.79 cm/sec (Constant Flow)
Oven Program: 50 °C for 1 min to 180 °C @ 15 °C/min to 230 °C @ 7 °C/min to 370 °C @ 10 °C/min (hold 5 min)
Detector: FID @ 380 ºC
Note: A 5 m x 0.53 mm guard column was connected to the analytical column.

Sample:
1. Glycerol
2. Butanetriol
3. Monoolein
4. Tricarpin
5. Diolein
6. Triolein

ZB-Inferno™ GC Columns *(continued)*

Alternatives

Traditional GC Capillary Columns Fall Short in High Temperature Analysis

Various GC analyses require a capillary GC column capable of withstanding high oven temperatures. However, finding such a column has been difficult. Gas chromatographers using traditional polyimide columns for high temperature analysis face many challenges:

- **Traditional Polyimide Columns Break**
  After prolonged exposure to temperatures above 360 °C, traditional polyimide columns become brittle, inflexible, and are prone to breakage.
- **Costly to Replace**
  Constantly replacing broken or brittle columns is inconvenient and expensive.
- **Inhibit Productivity**
  Analysts spend too much time performing system maintenance and column changes due to column brittleness and breakage.
- **Problems Separating High Molecular Weight Compounds**
  Analyzing high molecular weight compounds, such as long-chained hydrocarbons, heavy PAHs, and triglycerides, requires capillary GC columns that perform well at high GC oven temperatures. Traditional polyimide columns aren't tough enough to withstand such conditions.

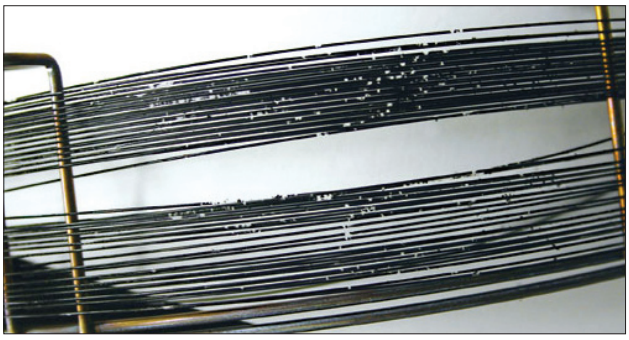


Figure 1. Traditional capillary columns break easily with prolonged exposure to GC oven temperatures above 360 °C

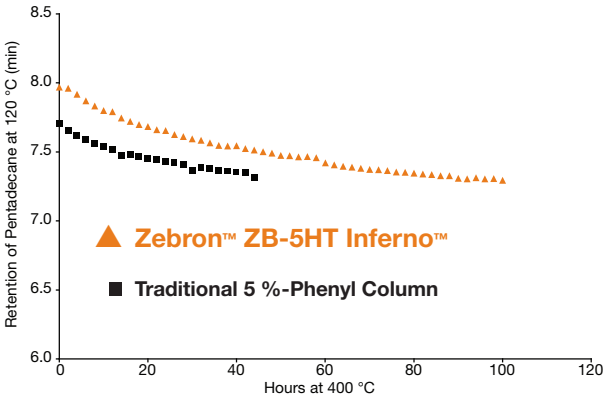


Figure 2. Comparison of retention of Pentadecane between the Zebron ZB-5HT Inferno column versus a traditional 5 % - Phenyl - 95 % - dimethylpolysiloxane column. Note that the 5 % - Phenyl column died around 40 hours at 400 °C whereas the Zebron ZB-5HT Inferno column maintained great retention of Pentadecane over 100 hours.

Metal GC Columns Present Tough Challenges

When working at high temperatures, the only other alternative to using traditional capillary columns is using a metal column. Metal columns, however, have several major drawbacks:

- **Hard to Use**
  Metal columns are inflexible and require special tubing cutters for installation.
- **Develop Leaks**
  Metal columns develop leaks due to expansion and contraction when heating.
- **High Column Activity for Acids and Bases**
  It's difficult to get good peak shape with acids and bases using metal columns due to their high activity for these compounds.
- **Incompatible with MS Detectors**
  Metal columns are incompatible with Mass Spectrometer (MS) detectors.

ZB-5ms GC Columns

Utilizes Arylene Matrix Technology™ to provide enhanced resolution of polyaromatic hydrocarbons (PAHs) and other multi-ring aromatic compounds.

- **Temperature Limits: -60 to 325/350 ˚C (Isothermal/TPGC)**
- **Arylene Matrix Technology (AMT)**
- **Fully conditioned within 35 minutes**
- **The perfect choice for EPA Methods 525, 610, 625, 8100, and 8270**

Column Profile

Applications		
Acids	EPA Methods	Pesticides/Herbicides
Alkaloids	Essential Oils/Flavors	Phenols
Amines	FAMEs	Residual Solvents
Dioxines	Halo-hydrocarbons	Semi-volatiles
Drugs	PCBs/Aroclors	Solvent Impurities

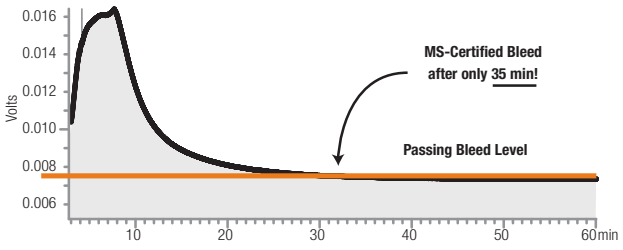
Alternative to Any MS-Certified 5 %-Phenyl-Arylene-95 %-Dimethylpolysiloxane Phase:				
DB-5ms	DB-5ms EVDX	VF-5ms	CP-Sil 8 CB MS	DB-5.625

Arylene Matrix Technology™

The Zebron ZB-5ms is the accumulation of more than 15 years of GC column manufacturing experience! We have applied our proprietary Engineered Self Cross-linking™ (ESC) bonding to an Arylene polymer chemistry and created the new Arylene Matrix Technology. The resulting columns have long lifetime, enhanced selectivity and lower bleed than traditional Arylene products.

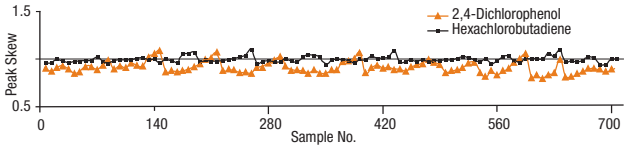
Low Bleed / Fast Conditioning

Achieves MS-Certified bleed level after only 35 minutes! Little to no change in bleed after an additional 30 minutes of conditioning!

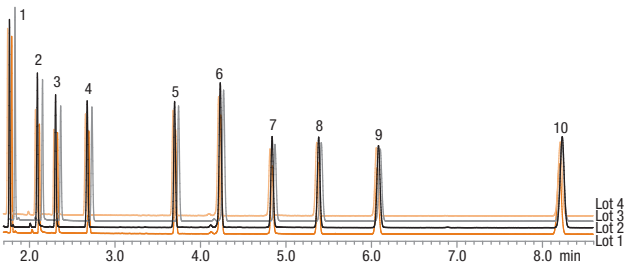


Long Lifetime

Consistent response after more than 700 samples at pH 2!



Reproducible Results



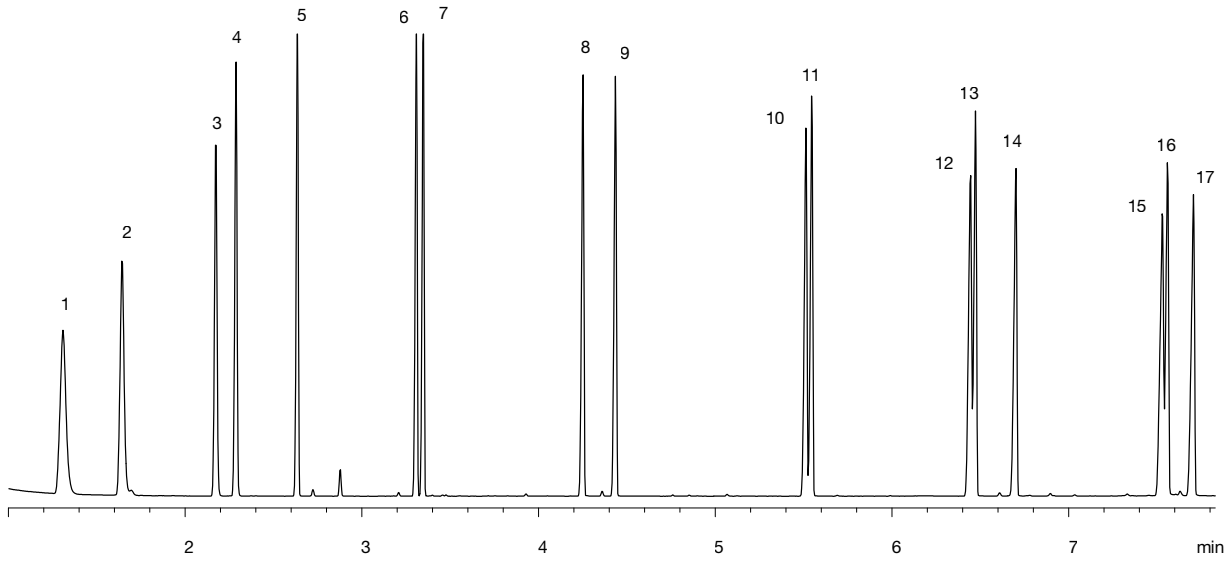
Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G010-11
Injection: Split 1:100 @ 250 ˚C, 1.4 µL
Carrier Gas: Hydrogen @ 140 ˚C, 40 cm/sec
Oven Program: 140 ˚C (Isothermal)
Detector: FID @ 325 ˚C

Sample:
1. Decane
2. 2-Ethylhexanoic Acid
3. 1,6-Hexanediol
4. 4-Chlorophenol
5. Tridecane
6. 1-Methylnaphthalene
7. 1-Undecanol
8. Tetradecane
9. Dicyclohexylamine
10. Pentadecane

ZB-5ms GC Columns *(continued)*

EPA Method 8100:
Polynuclear Aromatic Hydrocarbons

App ID 15806



Column: Zebron ZB-5ms

Dimensions: 10 meter x 0.10 mm x 0.10 µm

Part No: 7CB-G010-02

Oven Program: 100 °C to 200 °C @ 33 °C/min to 320 °C @ 25 °C/min

Carrier Gas: Helium @ 0.6 mL/min (Constant Flow)

Injection: Split 20:1 @ 320 °C, 1 µL

Detector: FID @ 330 °C

Note: Analytes were 50 ppm

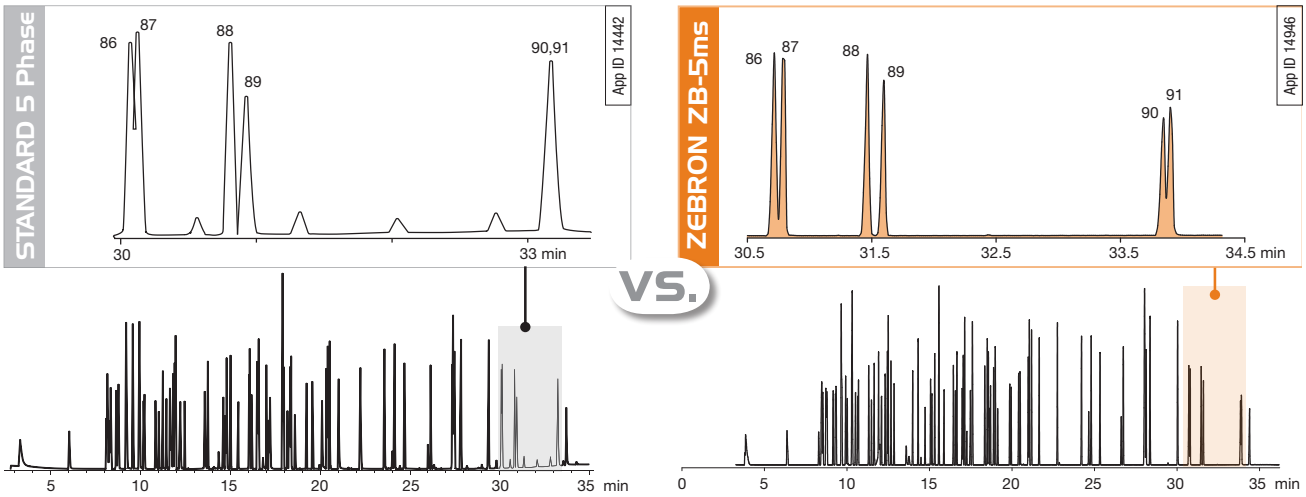
Sample:

1. Naphthalene
2. 2-Methylnaphthalene
3. Acenaphthalene
4. Acenaphthene
5. Fluorene
6. Phenanthrene
7. Anthracene
8. Fluoranthene
9. Pyrene
10. Benz[a]anthracene
11. Chrysene
12. Benzo[b]fluoranthene
13. Benzo[k]fluoranthene
14. Benzo[a]pyrene
15. Indeno[1,2,3-cd]pyrene
16. Dibenz[a,h]anthracene
17. Benzo[g,h,i]perylene

ZB-5ms GC Columns *(continued)*

Optimized Run Times

The added resolution offered by the Arylene Matrix Technology™ allows run times to be shortened by at least 20-30 %.

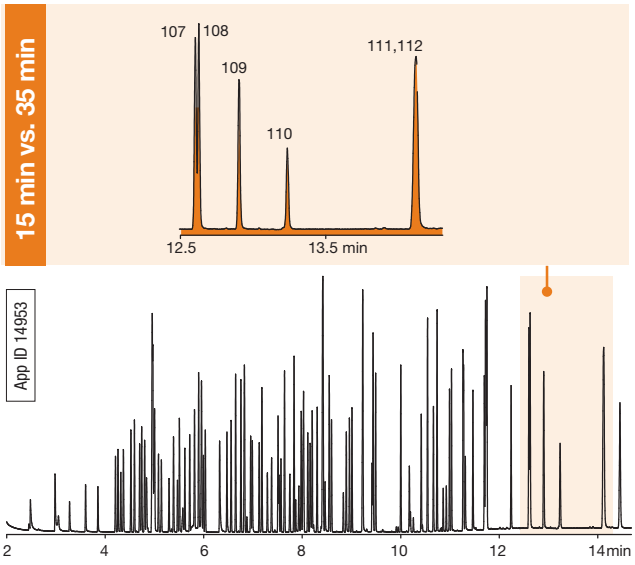


EPA Method 8270C: Semivolatile Organic Analysis

Conditions for both columns:

Dimensions: 30 meter x 0.25 mm x 0.50 µm
Injection: Splitless @ 250 ˚C, 1 µL
Carrier Gas: Helium @ 50 ˚C, 64 cm/sec
Oven Program: 50 ˚C (hold 3 min) 50-325 ˚C @ 9 ˚C/min, (hold 2 min)
Detector: MSD @ 300 ˚C
Sample: Semivolatile Organics

Results Done in 15 mins!



EPA Method 8270C: Done in 15 Minutes vs. 35 Minutes!

Column: Zebron ZB-5ms
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G010-11
Injection: Split 10:1 @ 250 ˚C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (Constant Flow)
Oven Program: 40 ˚C for 0.5 min to 220 ˚C @ 22 ˚C/min to 325 ˚C @ 35 ˚C/min for 3 min
Detector: MSD; 40-450 amu
Sample: 107. Benzo[b]fluoranthene
108. Benzo[k]fluoranthene
109. Benzo[a]pyrene
110. 3-Methylcholanthrene
111. Indeno[1,2,3-cd]pyrene
112. Dibenz[a,h]anthracene

ZB-5ms GC Columns *(continued)*

Improved Resolution

The ZB-5ms Arylene Matrix Technology™ provides improved resolution of the critical isomeric pair.

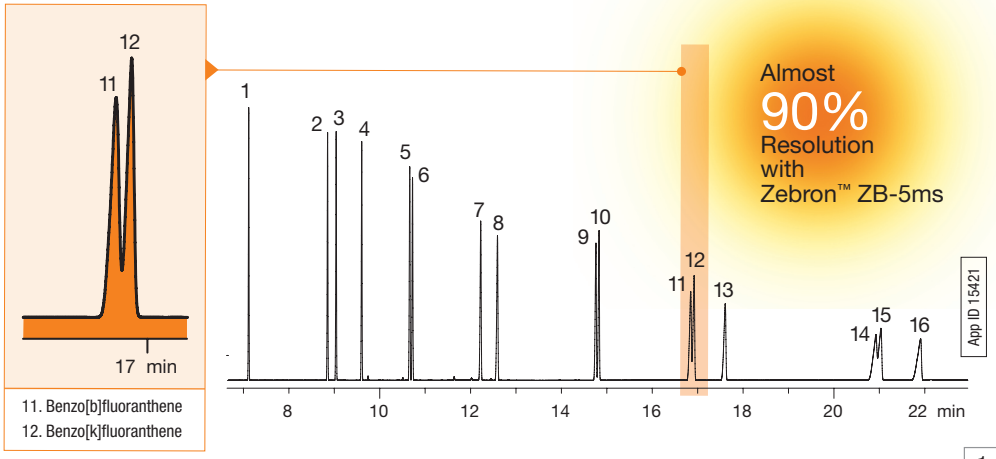
Zebron™ ZB-5ms vs. J&W® DB-5ms
EPA Method 610: Polyaromatic Hydrocarbons (PAHs)

Conditions for both columns:

Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 100:1 @ 250°C, 0.5 µL
Carrier Gas: Constant Pressure Hydrogen @ 1.2 mL/min (measured @ 140 °C)
Oven Program: 40 °C (hold 2min) to 250 °C @ 25 °C/min, to 265 °C @ 5 °C/min, to 300 °C @ 25 °C/min (hold until last peak elutes)
Detector: FID @ 325 °C
Sample: EPA 610 mix @ 2,000 ppm

VS.

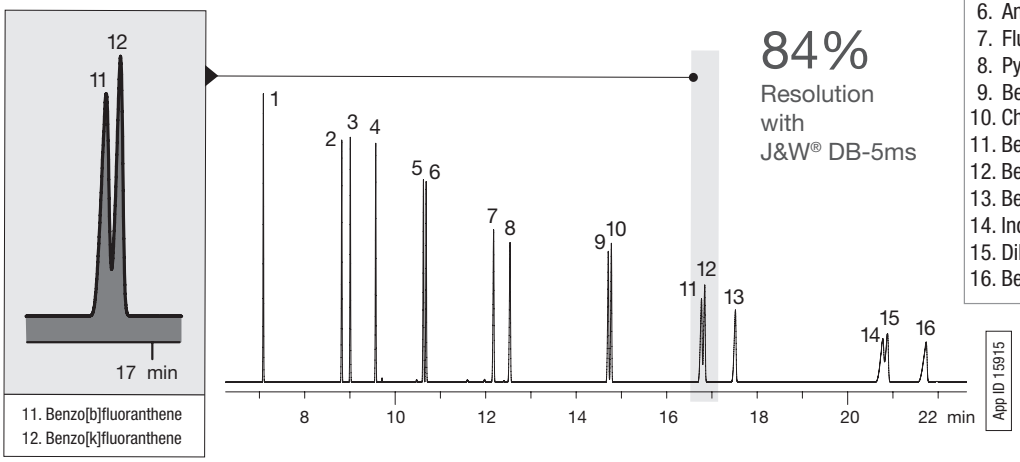
Zebron™ ZB-5ms



11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene

Almost **90%** Resolution with Zebron™ ZB-5ms

J&W® DB-5ms



11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene

84% Resolution with J&W® DB-5ms

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Indeno[1,2,3-cd]anthracene
15. Dibenz[a,h]anthracene
16. Benzo[g,h,i]perylene

ZB-5 GC Columns

Ordering Information

ID (mm)	df (µm)	Temp Limits °C	Part No.	Price
15 Meter				
0.25	0.10	-60 to 360 / 370	7EG-G002-02	
0.25	0.25	-60 to 360 / 370	7EG-G002-11	
0.25	0.50	-60 to 360 / 370	7EG-G002-17	
0.25	1.00	-60 to 340 / 360	7EG-G002-22	
0.32	0.10	-60 to 360 / 370	7EM-G002-02	
0.32	0.25	-60 to 360 / 370	7EM-G002-11	
0.32	1.00	-60 to 340 / 360	7EM-G002-22	
0.53	0.50	-60 to 360 / 370	7EK-G002-17	
0.53	1.50	-60 to 340 / 360	7EK-G002-28	
0.53	3.00	-60 to 340 / 360	7EK-G002-36	
20 Meter				
0.18	0.18	-60 to 360 / 370	7FD-G002-08	
30 Meter				
0.25	0.10	-60 to 360 / 370	7HG-G002-02	
0.25	0.25	-60 to 360 / 370	7HG-G002-11	
0.25	0.50	-60 to 360 / 370	7HG-G002-17	
0.25	1.00	-60 to 340 / 360	7HG-G002-22	
0.32	0.10	-60 to 360 / 370	7HM-G002-02	
0.32	0.25	-60 to 360 / 370	7HM-G002-11	
0.32	0.50	-60 to 360 / 370	7HM-G002-17	
0.32	1.00	-60 to 340 / 360	7HM-G002-22	
0.53	0.50	-60 to 360 / 370	7HK-G002-17	
0.53	1.50	-60 to 340 / 360	7HK-G002-28	
0.53	3.00	-60 to 340 / 360	7HK-G002-36	
0.53	5.00	-60 to 340 / 360	7HK-G002-39	
60 Meter				
0.25	0.10	-60 to 360 / 370	7KG-G002-02	
0.25	0.25	-60 to 360 / 370	7KG-G002-11	
0.25	0.50	-60 to 360 / 370	7KG-G002-17	
0.25	1.00	-60 to 340 / 360	7KG-G002-22	
0.32	0.25	-60 to 360 / 370	7KM-G002-11	
0.32	1.00	-60 to 340 / 360	7KM-G002-22	
0.53	1.50	-60 to 340 / 360	7KK-G002-28	
Test Mix				
Zebron	ZB-5		AG0-5155	

If you need a 5 in. cage, simply add a (-B) after the part number,e.g., 7HG-G002-11-B. Some exceptions may apply.
Thicker films (≥1.0 µm df) are rated to 340/360 ˚C (Isothermal/TPGC).

guarantee

If Zebron does not provide you with equivalent separations as compared to any other GC column of the same phase and comparable dimensions, send in your comparative data within 45 days and receive a FULL REFUND.

ZB-5MSi GC Columns

Ordering Information

ID (mm)	df (µm)	Temp Limits °C	Part No.	Price
10 Meter				
0.18	0.18	-60 to 360 / 370	7CD-G018-08	
15 Meter				
0.25	0.25	-60 to 360 / 370	7EG-G018-11	
30 Meter				
0.25	0.25	-60 to 360 / 370	7HG-G018-11	
0.25	0.50	-60 to 360 / 370	7HG-G018-17	
0.25	1.00	-60 to 360 / 370	7HG-G018-22	
0.32	0.25	-60 to 360 / 370	7HM-G018-11	
0.32	0.50	-60 to 360 / 370	7HM-G018-17	
60 Meter				
0.25	0.25	-60 to 360 / 370	7KG-G018-11	
Test Mix				
Zebron	ZB-5MSi		AG0-8362	

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., 7HG-G018-11-B. Some exceptions may apply.

EXTEND COLUMN LIFETIME. ADD A Z-GUARD TO YOUR NEXT ZEBRON GC ORDER

ZB-5HT Inferno GC Columns

Ordering Information

ID (mm)	df (µm)	Temp Limits °C	Part No.	Price
15 Meter				
0.25	0.10	-60 to 400/430	7EG-G015-02	
0.32	0.10	-60 to 400/430	7EM-G015-02	
0.32	0.25	-60 to 400/430	7EM-G015-11	
0.53	0.15	-60 to 400	7EK-G015-05	
20 Meter				
0.18	0.18	-60 to 400/430	7FD-G015-08	
30 Meter				
0.25	0.10	-60 to 400/430	7HG-G015-02	
0.25	0.25	-60 to 400/430	7HG-G015-11	
0.32	0.10	-60 to 400/430	7HM-G015-02	
0.32	0.25	-60 to 400/430	7HM-G015-11	
0.53	0.15	-60 to 400	7HK-G015-05	
Test Mix				
Zebron	ZB-5HT		AG0-5155	

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., 7HG-G015-11-B. Some exceptions may apply.
0.53 mm ID columns are rated to 400 ˚C max operational temperature.

ZB-5ms GC Columns

Ordering Information

ID (mm)	df (µm)	Temp Limits °C	Part No.	Price
10 Meter				
0.10	0.10	-60 to 325 / 350	7CB-G010-02	
0.18	0.18	-60 to 325 / 350	7CD-G010-08	
15 Meter				
0.25	0.25	-60 to 325 / 350	7EG-G010-11	
20 Meter				
0.18	0.18	-60 to 325 / 350	7FD-G010-08	
0.18	0.32	-60 to 325 / 350	7FD-G010-51	
0.18	0.36	-60 to 325 / 350	7FD-G010-53	
30 Meter				
0.25	0.25	-60 to 325 / 350	7HG-G010-11	
0.25	0.50	-60 to 325 / 350	7HG-G010-17	
0.25	1.00	-60 to 325 / 350	7HG-G010-22	
0.32	0.25	-60 to 325 / 350	7HM-G010-11	
0.32	0.50	-60 to 325 / 350	7HM-G010-17	
0.32	1.00	-60 to 325 / 350	7HM-G010-22	
60 Meter				
0.25	0.25	-60 to 325 / 350	7KG-G010-11	
0.32	0.25	-60 to 325 / 350	7KM-G010-11	
Test Mix				
Zebron	ZB-5ms		AG0-7578	

If you need a 5 in. cage, simply add a (-B) after the part number, e.g., 7HG-G010-11-B. Some exceptions may apply.

PROTECT YOUR GC COLUMN. TRY Z-GUARD WITH YOUR NEXT ZEBRON ORDER.

Cool-Lock™ Nut* ~exclusive~

- **Never burn your fingers again – cools with the oven**
- **Achieve the proper installation depth each and every time**
- **Hand-tightened connections means you will never search for a wrench again**
- **Low thermal mass ensure tracking with oven temperature – no cold/hot spots**
- **Patent-pending design**

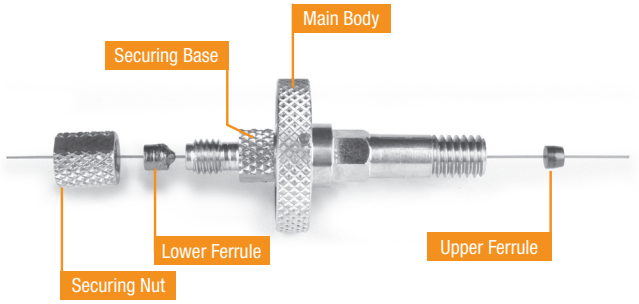
Ordering Information

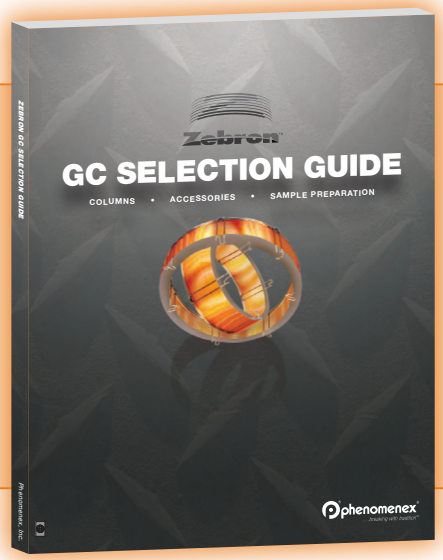
Cool-Lock GC Capillary Nut For Agilent GC Systems

Part No.	Description	Unit	Price
AG0-8319	Cool-Lock GC Capillary Nut For Use With Short-Style Ferrules	ea	
AG0-8320	Cool-Lock GC Capillary Nut For Use With Long-Style Ferrules	ea	
AG0-8349	Cool-Lock GC Installation Gauge	ea	
Replacement Ferrules			
AG0-4701	GC Capillary Ferrules Graphite 1/16 in. to 0.5 mm ID	10/pk	
AG0-4704	GC Capillary Ferrules Graphite 1/16 in. to 0.8 mm ID	10/pk	

Cool-Lock GC Capillary Nut for Shimadzu Systems

Part No.	Description	Unit	Price
AG0-8419	Cool-Lock GC Capillary Nut For Use With Short-Style Ferrules	ea	
AG0-8420	Cool-Lock Nut Installation Gauge	ea	





For the complete range of Zebron GC Columns and Accessories contact Phenomenex for your FREE GC Selection Guide (5335)

Australia
t: 02-9428-6444
f: 02-9428-6445
auinfo@phenomenex.com

Austria
t: 01-319-1301
f: 01-319-1300
anfrage@phenomenex.com

Belgium
t: +31 (0)30-2418700
f: +31 (0)30-2383749
beinfo@phenomenex.com

Canada
t: (800) 543-3681
f: (310) 328-7768
info@phenomenex.com

Denmark
t: 4824 8048
f: 4810 6265
dkinfo@phenomenex.com

France
t: 01 30 09 21 10
f: 01 30 09 21 11
franceinfo@phenomenex.com

Germany
t: 06021-58830-0
f: 06021-58830-11
anfrage@phenomenex.com

Ireland
t: 01 247 5405
f: +44 1625-501796
eireinfo@phenomenex.com

Italy
t: 051 6327511
f: 051 6327555
italiainfo@phenomenex.com

Luxembourg
t: +31 (0)30-2418700
f: +31 (0)30-2383749
nlinfo@phenomenex.com

Netherlands
t: 030-2418700
f: 030-2383749
nlinfo@phenomenex.com

New Zealand
t: 09-4780951
f: 09-4780952
nzinfo@phenomenex.com

Puerto Rico
t: (800) 541-HPLC
f: (310) 328-7768
info@phenomenex.com

United Kingdom
t: 01625-501367
f: 01625-501796
ukinfo@phenomenex.com

All other countries:
Corporate Office USA
t: (310) 212-0555
f: (310) 328-7768
info@phenomenex.com

phenomenex®
...breaking with tradition℠

www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country, contact Phenomenex USA, International Department at international@phenomenex.com

BR65361108_I