

ZB-Dioxin

for Fast Dioxin and PCB Analysis

Zebron™
GC Columns

- Improve lab productivity by 50%
- Fast PCB analysis
- Enhanced resolution of TCDD & TCDF
- Improved column lifetime with integrated guard column option
- MS certified, low bleed GC column



www.phenomenex.com/GCDioxin

phenomenex®
...breaking with tradition™

Increase Throughput and Improve Resolution of Dioxins and PCBs by using Zebron ZB-Dioxin!

Zebron™ ZB-Dioxin has a unique phase that allows for improved resolution of critical dioxin and PCB congeners and its consistent film thickness allows for optimal dioxin analysis on a single column.

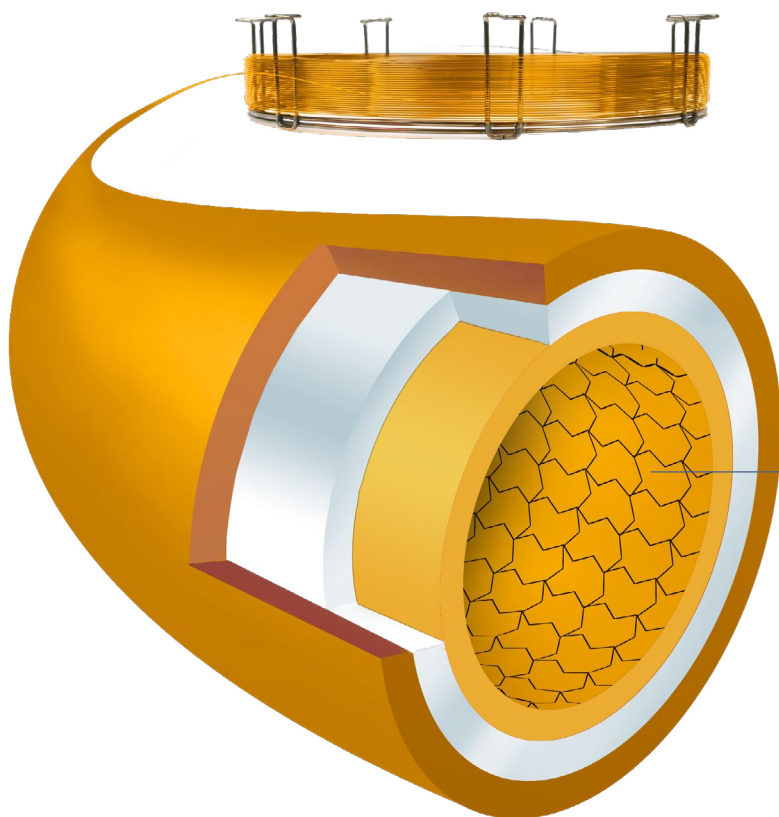
<p>Traditional</p>  <p>PCB and Dioxin required 2 different GC columns</p>	<p>ZB-Dioxin Upgrade</p>  <p>Zebron ZB-Dioxin is a single column solution for Dioxin and PCB</p>
<p>Traditional</p>  <p>~90 mins</p> <p>Long Run Time for Dioxin analysis</p> <p>First column (5% phenyl phase) ~60 minutes</p> <p>Second column (225 phase) ~30 minutes</p>	<p>ZB-Dioxin Upgrade</p>  <p>~40 mins</p> <p>Faster Run Time using one ZB-Dioxin ~40 minutes</p>
<p>Traditional</p>  <p>Lower throughput from customer perspective</p>	<p>ZB-Dioxin Upgrade</p>  <p>HIGH throughput from customer perspective (Take our customer's word for it on page 3)</p>
<p>Traditional</p>  <p>Higher analysis cost: 2 GC-HRMS + 2 GC columns</p>	<p>ZB-Dioxin Upgrade</p>  <p>Lower analysis cost: 1 GC-HRMS + 1 GC column</p>
<p>Traditional</p>  <p>Shorter column lifetime for difficult matrix like soil</p>	<p>ZB-Dioxin Upgrade</p>  <p>Longer column lifetime with New ZB-Dioxin Guardian™ option (Part No: 7KG-G045-10-GGA)</p>
<p>Traditional</p>  <p>~290°C</p> <p>Some GC Dioxin columns do not exceed 290°C Temperature Limits</p>	<p>ZB-Dioxin Upgrade</p>  <p>320/340°C</p> <p>Low Bleed GC column temp with 320/340°C Temperature Limits, this will provide higher sensitivity for later eluters and the ability to bake out major contaminants.</p>

Why ZB-Dioxin?

Zebron™ ZB-Dioxin columns are specifically tailored for the analysis of aromatic compounds like dioxins, furans and PCBs in Food and Environmental matrices. The current analysis of Tetra through Octa Dioxin and Furan is time consuming and requires two GC columns and two GC-HRMS instruments. By switching to the unique selectivity of ZB-Dioxin, you will gain enhanced resolution of 2,3,7,8-TCDD and 2,3,7,8-TCDF from its isomers

in one run, and only need a single ZB-Dioxin GC column. In addition, ZB-Dioxin serves as your single column solution for Dioxin and PCB analysis. Upgrade your existing GC column for Dioxin analysis to a Zebron ZB-Dioxin GC column and get all the analytical benefits and productivity gains of a single column solution.

Learn more at www.phenomenex.com/GCDioxin



- Unique selectivity for improved 2,3,7,8-TCDD and 2,3,7,8-TCDF resolution
- Ideal selectivity for Dioxins and PCBs
- Optimal phase volume ratio for shorter run time
- Extensive cross-linking through ESC™ (Engineered Self Cross-Linking™) for low bleed and high temperature stability to minimize GC-MS maintenance and system downtime

Our Customer Says YES!



“The ZB-Dioxin achieves superior resolution for both 2,3,7,8-TCDD and 2,3,7,8-TCDF while not only maintaining chromatography for the hexes but improving it. This is all performed while reducing the overall runtime over traditional 5ms dioxin columns by as much as 25%. The ZB-Dioxin increases throughput by not only eliminating the need for a second column confirmation, but also by allowing additional samples to be analyzed in each 12-hour analytical sequence”

Andrew Patterson, Technical Director, Eurofins Specialty Services, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Column-to-Column Reproducibility

Why compromise your Dioxin analysis quality with an average separation on a 5% Phenyl GC phase when you can upgrade to the Zebtron™ ZB-Dioxin which is specially tailored for reproducible Dioxin analysis.

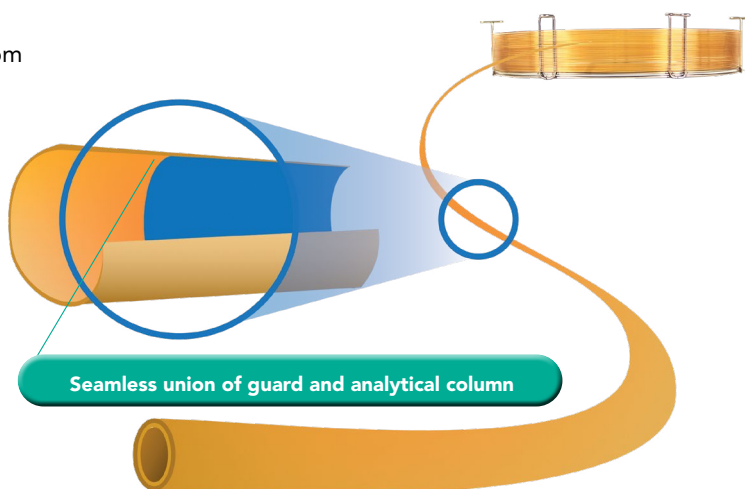
Compound	Relative Retention Time (RRT)			% RSD
	Column 1	Column 2	Column 3	
2,3,7,8-TCDF	1.000	1.000	1.000	-
1,2,3,7,8-PeCDF	1.098	1.097	1.097	0.05
2,3,4,7,8-PeCDF	1.127	1.127	1.128	0.05
1,2,3,4,7,8-HxCDF	1.220	1.223	1.223	0.14
1,2,3,6,7,8-HxCDF	1.225	1.227	1.228	0.12
2,3,4,6,7,8-HxCDF	1.248	1.249	1.248	0.05
1,2,3,7,8,9-HxCDF	1.280	1.277	1.277	0.14
1,2,3,4,6,7,8-HpCDF	1.321	1.319	1.319	0.09
1,2,3,4,7,8,9-HpCDF	1.382	1.381	1.381	0.04
OCDF	1.482	1.485	1.485	0.12



Low % RSD =
Reproducible results

NEW! Extend your ZB-Dioxin Lifetime with Integrated Zebtron Dioxin Guardian™ Column

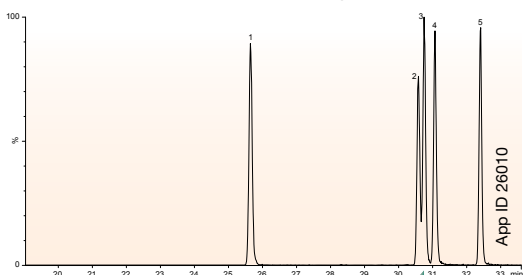
- Prevent non-volatile contaminants from entering the analytical column
- Prevent excessive trimming of analytical column
- Improve peak focusing of early eluters
- Seamless union of guard and analytical column that is leak-free
- Longer column lifetime with Zebtron Dioxin Guardian column
Part No. [7KG-G045-10-GGA](#)



TCDD on a Zebtron ZB-Dioxin and a Popular Brand A

Zebtron ZB-Dioxin GC Column
Part No. [7KG-G045-10](#)

60 meter x 0.25 mm x 0.20 μm



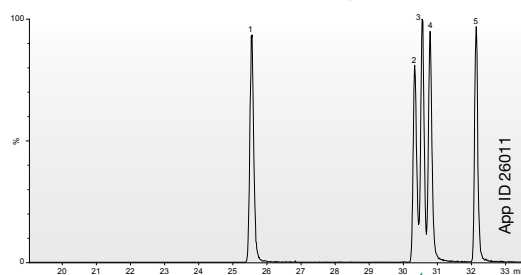
High Resolution of 2,3,7,8-TCDD by using ZB-Dioxin which exceeds 25% valley EPA-1613 method requirement and provided extended lifetime

Sample:

1.	1,3,6,8-TCDD
2.	1,2,3,7-TCDD
3.	1,2,3,8-TCDD
4.	2,3,7,8-TCDD
5.	1,2,8,9-TCDD

Runtime (min)	ZB-Dioxin	Brand A
	25.65	23.20
	30.58	30.33
	30.75	30.55
	31.07	30.78
	32.41	32.13

Brand A Premium 5MS Phase
60 meter x 0.25 mm x 0.25 μm



2,3,7,8-TCDD is not completely resolved which affects the column lifetime

Conditions for all separations:

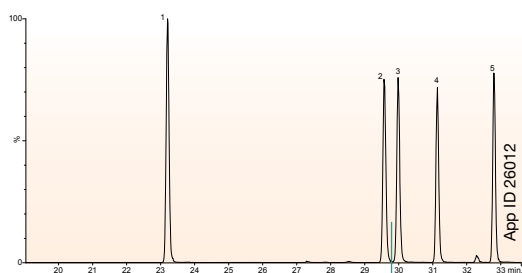
- Column 1: Zebtron ZB-Dioxin
- Column 1 Dimension: 60 meter x 0.25 mm x 0.20 μm
- Column Part No.: [7KG-G045-10](#)
- Column 2: Brand A Premium 5MS
- Column 2 Dimension: 60 meter x 0.25 mm x 0.25 μm
- Guard Column: 5 meter Z-Guard™ Kit
- Guard Kit Part No.: [7AG-G000-00-GZK](#)
- Injection: Pulse Splitless (2.0 min, 60 psi) @ 280 °C, 1 μL
- Liner: Zebtron PLUS 4 mm ID Single Taper Liner
- Liner Part No.: [AG2-0A10-05](#)

- Carrier Gas: Helium @ 1.25 mL/min (constant flow)
- Oven Program: 160 °C for 2.4 min to 200 °C @ 25 °C/min to 220 °C @ 5 °C/min for 19 min to 288 °C @ 4 °C/min to 300 °C @ 5 °C/min for 7.6 min
- Detector: HRMS
- Transfer Line Temperature: 300 °C

TCDF on a Zebtron ZB-Dioxin and a Popular Brand A

Zebtron ZB-Dioxin GC Column
Part No. [7KG-G045-10](#)

60 meter x 0.25 mm x 0.20 μm



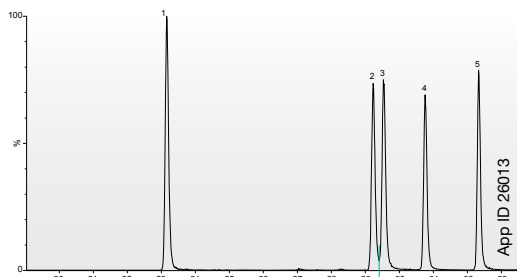
Complete resolution of 2,3,7,8-TCDF on a single column ZB-Dioxin—NO NEED FOR ADDITIONAL CONFIRMATION COLUMN

Sample:

1.	1,3,6,8-TCDF
2.	1,3,4,7-TCDF
3.	2,3,7,8-TCDF
4.	1,2,3,9-TCDF
5.	1,2,8,9-TCDF

Runtime (min)	ZB-Dioxin	Brand A
	23.20	23.16
	29.57	29.23
	29.98	29.53
	31.14	30.76
	32.79	32.33

Brand A Premium 5MS Phase
60 meter x 0.25 mm x 0.25 μm

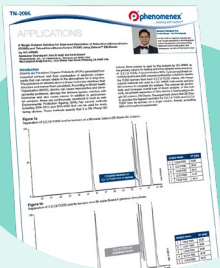


2,3,7,8-TCDF are not completely resolved and need an additional GC column to confirm isomers separation

Comparative separations may not be representative of all applications.

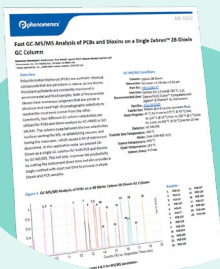
Dioxin and PCB Applications

Explore the following Dioxin and PCB Resources:



Single GC Column Solution for Dioxin Analysis

Learn how to improve the productivity of your lab by using the ZB-Dioxin, a Single Column Solution for Improved Resolution of Tetrachlorodibenzodioxins (TCDD) and Tetrachlorodibenzofurans (TCDF) by GC-HRMS



Fast PCB and Dioxin Analysis on a Single ZB-Dioxin GC Column by GC-MS/MS

Learn how ZB-Dioxin can provide fast PCB and Dioxin separation without compromising resolution by GC-MS/MS



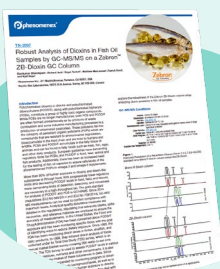
Analysis of Dioxins and PCBs on ZB-Dioxin GC Column by GC-HRMS

Learn how ZB-Dioxin can analyze Food PCB and Dioxin without compromising resolution by GC-HRMS



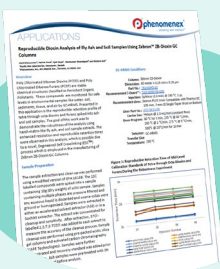
Fast PCB Analysis on ZB-Dioxin GC Column by GC-MS

Learn how to optimize fast PCB analysis using ZB-Dioxin GC column by GC-MS



Robust Dioxin Analysis of Fish Oil

Learn how ZB-Dioxin can achieve a robust analysis even with difficult matrix like Fish Oil samples by GC-MS/MS

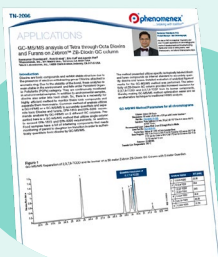


Reproducible Dioxin Analysis of Fly Ash and Soil Samples

Learn how to gain a reproducible Dioxin analysis of environmental samples like Fly Ash and Soil using Zebron ZB-Dioxin GC column

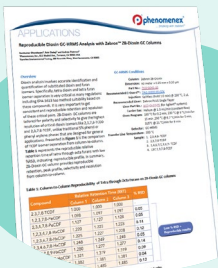
Dioxin and PCB Applications (cont'd)

Explore the following Dioxin and PCB Resources:



GC-MS/MS Analysis of Dioxins

Learn how to enhance the resolution of Tetra through Octa Dioxins and Furans on a Zebron ZB-Dioxin GC Column by GC-MS/MS



Column-to-Column Reproducibility

Learn how specially tailored ZB-Dioxin can provide reproducible Dioxin analysis



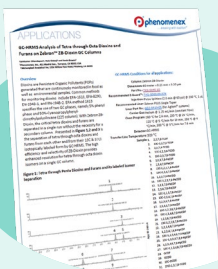
NEW Dioxin Integrated Guard Column

Learn how to extend your column lifetime by using Dioxin Integrated Guard column



Better and Faster Dioxin Analysis

Learn how to improve separation and run time for PCDD and PCDF with Zebron™ ZB-Dioxin GC Columns







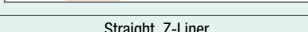











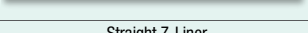

GC-HRMS Analysis of Tetra through Octa Dioxins

Learn how to separate Tetra through Octa Dioxins and Furans using ZB-Dioxin GC column

- Remarkably Inert
- Ridiculously Easy to Install



Zebron™ PLUS GC Liners Ordering Information

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For Agilent® and Thermo Scientific® GC Systems						
 Direct Connect	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	AG2-0A50-01 AG2-0A50-05 AG2-0A50-25	Ea 5/pk 25/pk
 Single Taper	Pesticides	S/SL	4 x 78.5	PLUS Inert	AG2-0A10-01 AG2-0A10-05 AG2-0A10-25	Ea 5/pk 25/pk
 Single Taper Z-Liner™	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	AG2-0A13-01 AG2-0A13-05 AG2-0A13-25	Ea 5/pk 25/pk
 Single Taper with Wool	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A11-01 AG2-0A11-05 AG2-0A11-25	Ea 5/pk 25/pk
 Straight	Volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A00-01 AG2-0A00-05 AG2-0A00-25	Ea 5/pk 25/pk
 Straight Z-Liner	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	AG2-0A03-01 AG2-0A03-05 AG2-0A03-25	Ea 5/pk 25/pk
 Straight Single Baffle	Semi-volatiles, Pesticides	S/SL	1.8 x 71	PLUS Inert	AG2-1F06-01 AG2-1F06-05 AG2-1F06-25	Ea 5/pk 25/pk
For Shimadzu® 17A, 2014 and 2025 Models						
 Single Taper Z-Liner™	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-3B13-01 AG2-3B13-05 AG2-3B13-25	Ea 5/pk 25/pk
 Straight Z-Liner	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-3B03-01 AG2-3B03-05 AG2-3B03-25	Ea 5/pk 25/pk
For Shimadzu 2010 Models						
 Single Taper	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B10-01 AG2-4B10-05 AG2-4B10-25	Ea 5/pk 25/pk
 Single Taper Z-Liner	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-4B13-01 AG2-4B13-05 AG2-4B13-25	Ea 5/pk 25/pk
 Straight	Volatiles	S/SL	3.4 x 95	PLUS Inert	AG2-4B00-01 AG2-4B00-05 AG2-4B00-25	Ea 5/pk 25/pk
 Straight Z-Liner	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B03-01 AG2-4B03-05 AG2-4B03-25	Ea 5/pk 25/pk
For PerkinElmer® GC Systems						
 Single Taper	Pesticides	S/SL	4 x 92	PLUS Inert	AG2-2A10-01 AG2-2A10-05 AG2-2A10-25	Ea 5/pk 25/pk
 Single Taper Z-Liner™	Semi-volatiles, Dirty samples	S/SL	4 x 92	PLUS Inert	AG2-2A13-01 AG2-2A13-05 AG2-2A13-25	Ea 5/pk 25/pk
 Straight	Volatiles	S/SL	4 x 92	PLUS Inert	AG2-2A00-01 AG2-2A00-05 AG2-2A00-25	Ea 5/pk 25/pk
 Straight Z-Liner	Volatiles, Dirty samples	PSS	2 x 86.2	PLUS Inert	AG2-2E03-01 AG2-2E03-05 AG2-2E03-25	Ea 5/pk 25/pk
 Straight Z-Liner	High initial oven temperatures	S/SL	4 x 92	PLUS Inert	AG2-2A03-01 AG2-2A03-05 AG2-2A03-25	Ea 5/pk 25/pk

Zebron Gas Management Ordering Information



Zebron Gas Management Filters

Part No.	Description	Unit
AG6-1040	Gas Filter Universal	ea
AG6-1070	Gas Filter Universal (Helium)	ea
AG6-1010	Gas Filter Oxygen	ea
AG6-1020	Gas Filter Moisture	ea
AG6-1030	Gas Filter Hydrocarbon	ea
AG6-1050	Gas Filter Hydrocarbon/Moisture for LC-MS	2/pk
AG6-1060	Ring Nut for Gas Filter	ea



Zebron Gas Management Traps

Part No.	Description	Unit
AG6-3140	Click-on Universal Trap	ea
AG6-3110	Click-on Oxygen Trap	ea
AG6-3120	Click-on Moisture Trap	ea
AG6-3130	Click-on Hydrocarbon Trap	ea
AG6-3150	Click-on Carbon Dioxide Trap	ea



Zebron Connecting Units

Part No.	Description	Unit
AG6-2101	1-position Connecting Unit 1/4 in. Brass	ea
AG6-2102	2-position Connecting Unit 1/4 in. Brass	ea
AG6-2103	4-position Connecting Unit 1/4 in. Brass	ea
AG6-2201	1-position Connecting Unit 1/8 in. Brass	ea
AG6-2202	2-position Connecting Unit 1/8 in. Brass	ea
AG6-2203	4-position Connecting Unit 1/8 in. Brass	ea
AG6-2204	High flow 2-position Connecting Unit for LC-MS	ea
AG6-2205	Particle Filter for LC-MS	ea
AG6-2206	O-ring Replacement for Gas Filter Baseplate	20/pk

Part No.	Description	Unit
AG6-2301	1-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2302	2-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2303	4-position Connecting Unit 1/4 in. Stainless Steel	ea
AG6-2304	1-position Connecting Unit 1/8 in. Stainless Steel	ea
AG6-2305	2-position Connecting Unit 1/8 in. Stainless Steel	ea
AG6-2306	4-position Connecting Unit 1/8 in. Stainless Steel	ea

Zebron Base Electronic Indicator and Other Accessories

Part No.	Description	Unit
AG6-3160	1/8 in. Brass Click-on Connector Set	2/pk
AG6-3170	1/4 in. Brass Click-on Connector Set	2/pk
AG6-3180	Wall-mounting Clamp Set for Gas Traps	2/pk
AG6-4150	1/8 in. Stainless Steel Click-on Connector Set	2/pk
AG6-4160	1/4 in. Stainless Steel Click-on Connector Set	2/pk
AG6-3190	O-ring Replacement Set for Gas Trap	20/pk
AG6-4110	Electronic Indicator for Gas Trap	ea
AG6-4120	Electronic Indicator for Gas Filter	ea
AG6-4130	Electronic Indicator for LC-MS Filter	ea



First time ordering Zebron Click-on Gas Traps?

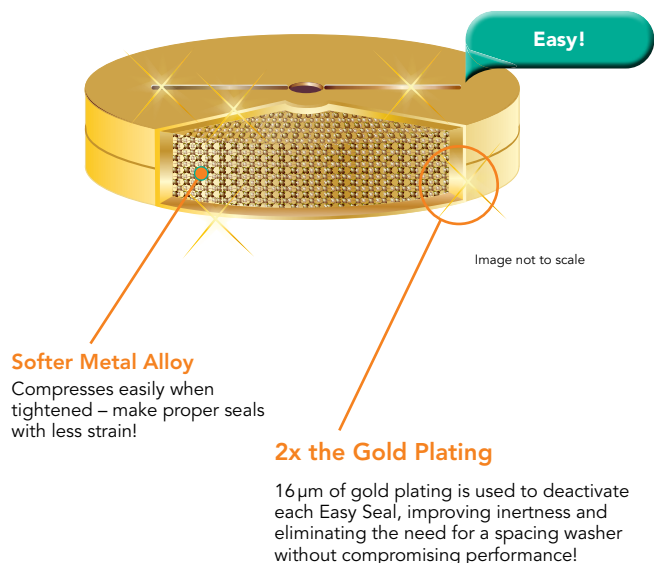
Be sure to order the **brass or stainless steel connector** with your first trap.



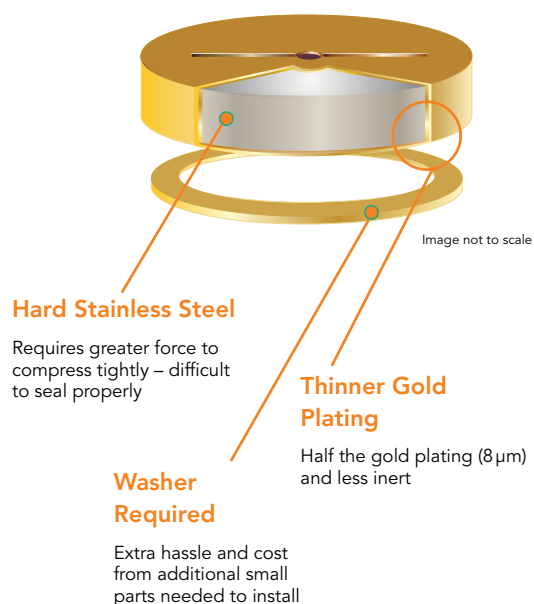
Improve Dioxin and PCB analysis by using Inlet Base Seals

Easy seals™ compatible with Agilent GC instruments

Phenomenex Easy Seals



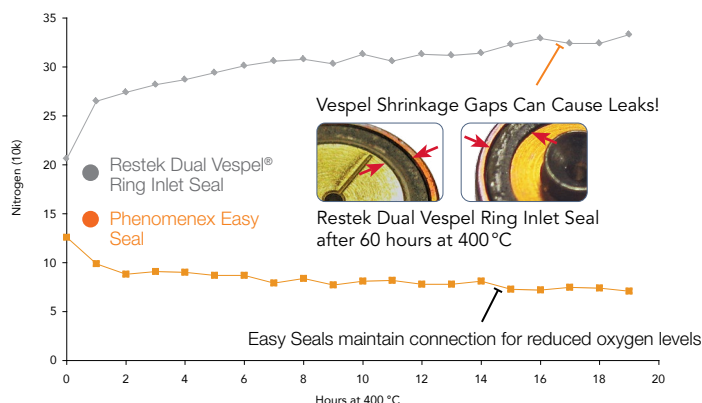
Traditional Gold Plated Seals



The Oxygen Test: 20 Hours at 400 °C

Easy Seals are designed to create leak-tight connections that reduce the amount of oxygen entering the GC system, even up to 400 °C! Our testing showed that the Easy Seal maintained a good connection while the Restek® Dual Vespel® Ring Inlet Seal showed increasing levels of oxygen in the system — increased potential for contamination!

Test Conditions: Both inlet base seals were new and unused prior to testing. Seals were installed in an Agilent 6890 Series instrument with a 5973 MS with a Zebron ZB-5ms GC column (15 meter x 0.25 mm x 0.25 μm). An initial air and water check was performed upon installation to ensure there was no error in installation. The inlet temperature was set to 400 °C and counts of oxygen were measured over time.



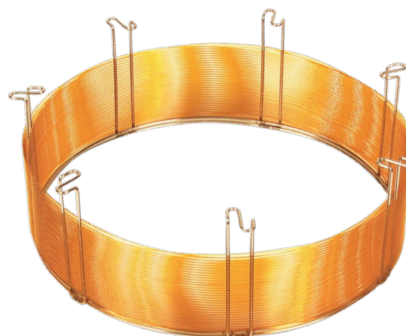
Phenomenex Easy Seals Ordering Information

Easy Seals Inlet Base Seals				2/pk	10/pk
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Part No.	Part No.
Easy Seals Gold Inlet Seal	Splitless	Single	0.8	AG0-8619	AG0-8620



Zebron ZB-Dioxin GC Column Ordering Information

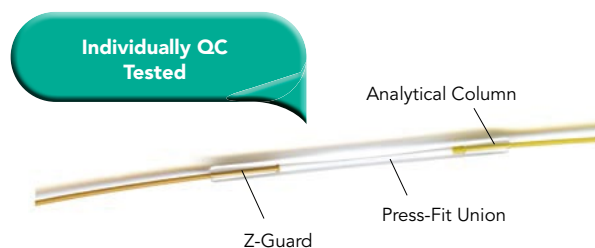
ID (mm)	df (µm)	Temp. Limits (°C)	Part No.
60 meter			
0.25	0.2	40 to 320/340	7KG-G045-10
60 meter with 5 meter Guardian™ Integrated Guard			
0.25	0.2	40 to 320/340	7KG-G045-10-GGA
40 meter			
0.18	0.14	40 to 320/340	7PD-G045-47



Z-Guard™ Columns

Protect and Extend Column Lifetime

- Individually QC tested to ensure the highest level of quality
- Extend column lifetime by preventing stationary phase damage
- Improve separation and peak shapes (especially early eluters)
- Improve sensitivity and accuracy of quantitative results
- Available as individual guard columns or as complete kits with connectors



Standard Z-Guard Columns and Kits Ordering Information

ID (mm)	Description	Part No.	
		5-Meter	10-Meter
0.25	Guard Column	7AG-G000-00-GZO	7CG-G000-00-GZO
	Guard Column Kit	7AG-G000-00-GZK	7CG-G000-00-GZK

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Fast Dioxin and PCB Analysis

on a Single ZB-Dioxin GC Column

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