



Atomic Absorption

Atomic Absorption:

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• ISO •
9001:2008
REGISTERED
17025
ACCREDITED

UNITED STATES
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CHROMATOGRAPHIC SPECIALTIES INC.

1-800-267-8103 • www.chromspec.com • tech@chromspec.com



Graphite Furnace Tubes

Quality Raw Materials for Long Life and Performance

CPI graphite tubes are produced from one of the highest grades of spectrally pure graphite available today. Prior to use, the base material is tested for purity, constant density and electrical resistivity. This critical screening ensures that our tubes are free from trace metal contamination and provide maximum, consistent life and performance in your instrument.



PerkinElmer®

Part Number	Replaces	Description
PerkinElmer® Type Graphite Products		
4090-0506	B010-9322 / B010-9324	Pre-inserted Platform Tubes, Pyro Coated, 50/pk
4090-10	B300-1254 / B300-1256	Pre-inserted Platform Tubes, Pyro Coated, 20/pk
4090-0304	B012-1092 / B012-1091	Pre-inserted Platform Tubes, Pyro Coated, 10/pk
4090-26	B013-7111 / B013-7112	Pre-inserted Platform Tubes, Pyro Coated, 5/pk
4090-05	B010-9322	Platform Tubes, Pyro Coated, 50/pk
4090-03	B012-1092	Platform Tubes, Pyro Coated, 10/pk
4090-06	B010-9324	Platforms, Solid, Pyro, 50/pk
4090-04	B012-1091	Platforms, Solid, Pyro, 10/pk
4090-09	B050-5057	Forked Tubes and Platforms, Pyro Coated, 20/pk
4090-08	B009-1504	Standard Tubes, Pyro Coated, 50/pk
4090-010016	B300-0342	Standard Tubes, Pyro Coated 20/pk
4090-07	B013-5653	Standard Tubes, Pyro Coated, 10/pk
4090-010017	B010-5197	Standard Tubes, Pyro Coated, 5/pk
4090-12	B007-0699	Standard Tubes, Uncoated, 50/pk
4090-14	----	Standard Tubes, Uncoated, 10/pk
4090-15A	B011-6823	Zeeman Contact Sets, 1 set
4090-15	B018-0361	Zeeman Contact Sets, 5 sets
4090-16A	B012-8490	Regular Contact Sets, 1 set
4090-16	B018-0363	Regular Contact Sets, 5 sets

Performance of CPI Graphite Tubes

The following results were achieved in a study comparing the performance of L'vov tubes.

	<i>Less Expensive Aftermarket Brand</i>	<i>CPI Tubes</i>
Lifetime (till out of spec)	115	415
Lifetime (test)	269	431
Lifetime (till failure)	269	550
Absorption Signal (ave)	0.281	0.337
Absorption Signal Failure	0.250 @ 115 firing	0.250 @ 415 firing

Summary

Each tube was tested using chromium, and a combination of lifetime and absorption signal was observed. The element chromium was chosen because of its demanding temperature profile (2,650 degrees C). A lab fortified blank was used to eliminate bias. Actual number of firings may be lower given a "real world" sample matrix.

The less expensive aftermarket tubes did not meet CPI specifications for life, sensitivity or absorption signal. These parts, manufactured in China, exhibit greater variances in performance and life. CPI tubes demonstrated excellent performance of 550 firings.

Varian®

<i>Part Number</i>	<i>Replaces</i>	<i>Description</i>
Varian® Type Graphite Products		
4090-2324D	----	Pre-Inserted Forked Tubes & Platforms, Pyro Coated, 10/pk*
4090-20	63-100011-00	Plateau Tubes, Pyro Coated, 10/pk*
4090-21	63-100013-00	Platforms, Solid Pyro, 10/pk*
4090-25D	63-100012-00	Partitioned Tubes, Pyro Coated, 10/pk*
4090-30	63-100016-00	Standard Contacts, 1 set
4090-31	63-100017-00	Zeeman Contacts, 1 set
4090-33	63-100018-00	Standard Shroud, 1/pk
4090-32	63-100019-00	Zeeman Shroud, 1/pk

*Good sensitivity & accuracy, with longer life due to a harder pyrolytic coating.

GBC®

Part Number	Replaces	Description
GBC® Type Graphite Products		
4090-73	99-0059-00	Cuvette, Pyro Coated, 10/pk
4090-71	99-0059-01	Cuvette, Uncoated, 10/pk
4090-75	----	Pre-inserted Platform Cuvette, Pyro Coated, 10/pk (with pre-inserted pyro platforms)
4090-010008	45-0006-00	Contact Set, 1 set
4090-010009	45-0004-00	Shroud, 1/pk

ATI/Unicam®

Part Number	Replaces	Description
ATI/Unicam® Type Graphite Products		
4090-90	9423-393-95041	ELC™ Type Cuvette, Coated, 10/pk
4090-010018	9423-393-90191	ELC™ Type Cuvette, Ridged, Coated, 20/pk
4090-96	9423-393-95191	Pre-Inserted Platform Cuvette, Coated, 10/pk
4090-92	9423-393-95071	Ridged, Coated Cuvette, 10/pk
4090-94	9423-393-95031	Ridged, Uncoated Cuvette, 10/pk
4090-010013	9423-393-90031	Cuvettes, Uncoated, 10/pk
4090-010014	9423-393-95091	Cuvettes, Not Ridged, Coated, 10/pk
4090-010020	9423-393-90091	Cuvettes, Coated, 20/pk

Platform Tubes offer maximum sensitivity and are recommended for As, Pb, Se and Tl determinations.

Hitachi®

Part Number	Replaces	Description
Hitachi® Type Graphite Products		
4090-55	ANO-0028	Platform Tubes, Pyro Coated, 10/pk
4090-56	ANO-0027	Platform Tubes, Pyro Coated, 50/pk
4090-53	180-7444	Cuvettes, Pyro Coated, 10/pk
4090-58	190-6003	Cuvettes, Pyro Coated, Type A 100µl, 10/pk
4090-51	180-7400	Cuvettes, Uncoated, 10/pk
4090-57	190-7115	Contact Rings, 1 set

Hollow Cathode Lamps

CPI offers a comprehensive selection of high quality, price-competitive hollow cathode lamps for popular spectrometer models. Our 1.5" (37mm) diameter element lamps are designed for direct use in Varian®, TJA®, GBC®, ATI®, Unicam®, Hitachi® Buck® and Shimadzu® spectrometers. We also offer specially designed lamps compatible with Smith-Hieftje® background correction, found on certain TJA® instrumentation, replacing Visimax® type II lamps. Coded lamps for Varian® and Unicam® are also available as well as a selection of multielement lamps.



1.5" (37mm) Diameter Type AA Lamps

Element	Lamps for Zeeman® and D2 Background Replaces Varian®, TJA Visimax I, GBC®, Hitachi®, Shimadzu, ATI®, Unicam® (non-coded)	Lamps for Smith-Hieftje® Background Correction Only Replaces TJA Visimax II	"Varian® Type Coded Lamps"	Varian® Type "Super Lamps"	Unicam® Type Coded Lamps
Aluminum (Al)	4081-101	4081-401	4081-301	----	4081-901
Antimony (Sb)	4081-102	4081-402	4081-302	4081-602	4081-902
Arsenic (As)	4081-103	4081-403	4081-303	4081-603	4081-903
Barium (Ba)	4081-104	4081-404	4081-304	----	4081-904
Beryllium (Be)	4081-105	4081-105	4081-305	----	4081-905
Bismuth (Bi)	4081-106	4081-406	4081-306	----	4081-906
Boron (B)	4081-107	4081-107	4081-307	----	4081-907
Cadmium (Cd)	4081-108	4081-408	4081-308	----	4081-908
Calcium (Ca)	4081-109	4081-409	4081-309	----	4081-909
Chromium (Cr)	4081-111	4081-411	4081-311	----	4081-911
Cobalt (Co)	4081-112	4081-412	4081-312	----	4081-912
Copper (Cu)	4081-113	4081-413	4081-313	----	4081-913
Gold (Au)	4081-120	4081-420	4081-320	----	4081-920
Iron (Fe)	4081-125	4081-425	4081-325	4081-625	4081-925
Lead (Pb)	4081-127	4081-427	4081-327	4081-627	4081-927
Lithium (Li)	4081-128	4081-128	4081-328	----	4081-928
Magnesium (Mg)	4081-130	4081-430	4081-330	----	4081-930
Manganese (Mn)	4081-131	4081-431	4081-331	4081-631	4081-931

1.5" (37mm) Diameter Type AA Lamps (continued)

Element	Lamps for Zeeman® and D2 Background Replaces Varian®, TJA Visimax I, GBC®, Hitachi®, Shimadzu, ATI®, Unicam® (non-coded)	Lamps for Smith-Hieftje® Background Correction Only Replaces TJA Visimax II	"Varian® Type Coded Lamps"	Varian® Type "Super Lamps"	Unicam® Type Coded Lamps
Mercury (Hg)	4081-132	4081-132	4081-332	----	4081-932
Molybdenum (Mo)	4081-133	4081-133	4081-333	----	4081-933
Nickel (Ni)	4081-135	4081-435	4081-335	4081-635	4081-935
Platinum (Pt)	4081-139	4081-139	4081-339	----	4081-939
Potassium (K)	4081-140	4081-140	4081-340	----	4081-940
Selenium (Se)	4081-148	4081-448	4081-348	4081-648	4081-948
Silicon (Si)	4081-149	4081-449	4081-349	----	4081-949
Silver (Ag)	4081-150	4081-450	4081-350	----	4081-950
Sodium (Na)	4081-151	4081-151	4081-351	----	4081-951
Strontium (Sr)	4081-152	4081-452	4081-352	----	4081-952
Thallium (Tl)	4081-156	4081-156	4081-356	4081-656	4081-956
Tin (Sn)	4081-158	4081-458	4081-358	----	4081-958
Titanium (Ti)	4081-159	4081-459	4081-359	----	4081-959
Tungsten (W)	4081-160	4081-160	4081-360	----	4081-960
Vanadium (V)	4081-161	4081-461	4081-361	----	4081-961
Zinc (Zn)	4081-164	4081-464	4081-364	----	4081-964

1.5" Multielement AA Lamps

Element	Non-Coded CPI P/N	Replaces Varian® P/N	Coded CPI P/N	Replaces Varian® P/N
Ca/Mg	4081-010016	56-101291-00	----	----
Cu/Zn	4081-010034	56-101293-00	4081-010036	----
Na/K	4081-010015	56-101290-00	4081-010037	56-101070-00
Co/Cr/Cu/Fe/Mn/Ni	4081-010002	56-101292-00	4081-010017	56-101076-00

Our 2" (50mm) diameter element lamps are designed for direct use in PerkinElmer® spectrometers. We also offer coded lamps for 5100, 4100, 2100, 1100 and other models as well as non-coded lamps with special plugs compatible for use in newer PerkinElmer® AAnalyst instrumentation. Adapters are not needed to run CPI lamps, but are offered to improve compatibility of lamps across a range of instrument models.

2" (50mm) Diameter Type AA Lamps

Element	PerkinElmer® Type Non Coded Lamps CPI P/N	PerkinElmer® Type Coded Lamps CPI P/N	PerkinElmer® Type Non Coded Lamps for AAnalyst® Systems CPI P/N
Aluminum (Al)	4081-201	4081-501	4081-801
Antimony (Sb)	4081-202	4081-502	4081-802
Arsenic (As)	4081-203	4081-503	4081-803
Barium (Ba)	4081-204	4081-504	4081-804
Beryllium (Be)	4081-205	4081-505	4081-805
Bismuth (Bi)	4081-206	4081-506	4081-806
Boron (B)	4081-207	4081-507	4081-807
Cadmium (Cd)	4081-208	4081-508	4081-808
Calcium (Ca)	4081-209	4081-509	4081-809
Chromium (Cr)	4081-211	4081-511	4081-811
Cobalt (Co)	4081-212	4081-512	4081-812
Copper (Cu)	4081-213	4081-513	4081-813
Gold (Au)	4081-220	4081-520	4081-820
Iron (Fe)	4081-225	4081-525	4081-825
Lead (Pb)	4081-227	4081-527	4081-827
Lithium (Li)	4081-228	4081-528	4081-828
Magnesium (Mg)	4081-230	4081-530	4081-830
Manganese (Mn)	4081-231	4081-531	4081-831
Mercury (Hg)	4081-232	4081-532	4081-832
Molybdenum (Mo)	4081-233	4081-533	4081-833
Nickel (Ni)	4081-235	4081-535	4081-835
Platinum (Pt)	4081-239	4081-539	4081-839
Potassium (K)	4081-240	4081-540	4081-840
Selenium (Se)	4081-248	4081-548	4081-848
Silicon (Si)	4081-249	4081-549	4081-849
Silver (Ag)	4081-250	4081-550	4081-850
Sodium (Na)	4081-251	4081-551	4081-851
Strontium (Sr)	4081-252	4081-552	4081-852
Thallium (Tl)	4081-256	4081-556	4081-856
Tin (Sn)	4081-258	4081-558	4081-858
Titanium (Ti)	4081-259	4081-559	4081-859
Tungsten (W)	4081-260	4081-560	4081-860
Vanadium (V)	4081-261	4081-561	4081-861
Zinc (Zn)	4081-264	4081-564	4081-864

2" Multielement AA Lamps

Element	Non-Coded CPI P/N	Replaces PE® P/N	Coded CPI P/N	Replaces PE® P/N
Ca/Mg	4081-010024	0303-6092	4081-010022	N066-1285
Na/K	4081-010026	0303-6095	4081-010029	N066-1276
Al/Ca/Mg	4081-010028	0303-6099	4081-010030	N066-1228
Cu/Fe/Ni	4081-010027	0303-6101	4081-010031	N066-1266
Cu/Fe/Mn/Zn	4081-010025	0303-6105	4081-010032	N066-1219
Co/Cr/Cu/Fe/Mn/Ni	4081-010014	0303-6103	4081-010033	N066-1223

Lamp Plug Adapters

Non-Coded

Non-Coded Lamp Plug Adapter

Permits non-coded HCL's to run on PE® 5100 and 3300 instruments.

CPI P/N	Replaces PE®
4081-010021	N066-0122

Non-Coded Lamp Plug Adapter

Permits non-coded HCL's to run on PE® 4110 ZL, 4100ZL, 2100 and 1100B instruments.

CPI P/N	Replaces PE®
4081-010042	B015-6094

Non-Coded Lamp Plug Adapter

"Permits non-coded HCL's to run on PE AAnalyst® instruments."

CPI P/N	Replaces PE®
4081-010019	N305-0197

Coded

Coded Lamp Plug Adapter

Permits coded HCL's to run on PE® instruments that do not support coding.

CPI P/N	Replaces PE®
4081-010041	N066-0123

Universal Coded Lamp Plug Adapter

*Permits Coded (non-Lumina) HCL's to run on PE AAnalyst instruments.**

CPI P/N	Replaces PE®
4081-010040	N305-0196

*Adapter is for fit only; coding will not be read by AAnalyst® instrument.

Matrix Modifiers

Save time and improve analytical performance with CPI modifiers. Our pre-mixed matrix modifiers offer both convenience and consistency from analysis to analysis. To prevent analyte loss in the ashing process, use a matrix modifier to convert the analyte to a less volatile form.

Part Number	Volume	Description
Modifiers, Concentrated		
4095-10	100mL	1% Palladium
4095-12	100mL	1% Magnesium Nitrate
4095-14	100mL	1% Nickel
4095-16	100mL	1% $\text{NH}_4\text{H}_2\text{PO}_4$
4095-34	100mL	5% Nickel Nitrate
4095-35	100mL	2% Calcium Nitrate
4095-36	100mL	5% Lanthanum Nitrate
4095-37	100mL	2% Ammonium Nitrate
4095-38	250mL	3000 $\mu\text{g}/\text{mL}$ Pd & 2000 $\mu\text{g}/\text{mL}$ $\text{Mg}(\text{NO}_3)_2$
Modifiers, Pre-mixed (Per 20μL aliquots, for HGA[®] Furnaces)		
4095-29	250mL	0.03mg Pd & 0.02mg $\text{Mg}(\text{NO}_3)_2$
4095-20	250mL	0.015mg Pd & 0.01mg $\text{Mg}(\text{NO}_3)_2$
4095-21	250mL	0.05mg $\text{Mg}(\text{NO}_3)_2$
4095-25	250mL	0.006mg $\text{Mg}(\text{NO}_3)_2$
4095-26	250mL	0.02mg Ni
4095-28	250mL	0.2mg $\text{NH}_4\text{H}_2\text{PO}_4$ & 0.01mg $\text{Mg}(\text{NO}_3)_2$
Modifiers, Pre-mixed (Per 5μL aliquots)		
4095-40	100mL	0.015mg Pd & 0.02mg $\text{Mg}(\text{NO}_3)_2$
4095-41	100mL	0.2mg $\text{NH}_4\text{H}_2\text{PO}_4$ & 0.01mg $\text{Mg}(\text{NO}_3)_2$
Modifiers, Pre-mixed (Per 5μL aliquots, for THGA[®] Furnaces)		
4095-30	250mL	0.005mg Pd & 0.003mg $\text{Mg}(\text{NO}_3)_2$
4095-31	250mL	0.015mg $\text{Mg}(\text{NO}_3)_2$
4095-32	250mL	0.05mg $\text{NH}_4\text{H}_2\text{PO}_4$ & 0.003mg $\text{Mg}(\text{NO}_3)_2$

Single-Element Standards

CPI International AA Standards are provided in 1,000 µg/mL concentrations in 500 mL volumes. All our AA standards are produced in a controlled environment using high quality starting materials and the utmost care in handling. Each standard is verified instrumentally and gravimetrically and comes with a Certificate of Analysis and MSDS. All are guaranteed for 18-months from the date of shipping.



Part Number	Element	Source/Matrix	Part Number	Element	Source/Matrix
AA Standards					
4095-100012	Al	Al Metal/HCl	4095-1000321	Mn	Mn Metal/HNO ₃
4095-100022	Sb	SbCl ₃ /HCl	4095-1000331	Hg	Hg Metal/ HNO ₃
4095-100032	As	As ₂ O ₃ /HCl	4095-1000342	Mo	Mo Metal/HCl
4095-100042	Ba	BaCl ₂ ·2H ₂ O/HCl	4095-1000361	Ni	Ni(NO ₃) ₂ ·6H ₂ O/ HNO ₃
4095-100061	Bi	Bi Metal/HNO ₃	4095-1000412	K	KCl/HCl
4095-100074	B	H ₃ BO ₃ /H ₂ O	4095-1000491	Se	Se Metal/HNO ₃
4095-100081	Cd	Cd Metal/HNO ₃	4095-1000504F	Si	(NH ₄) ₂ SiF ₆ /H ₂ O
4095-100091	Ca	Ca ₂ CO ₃ /HNO ₃	4095-1000511	Ag	AgNO ₃ /HNO ₃
4095-1000111	Cs	Cs ₂ CO ₃ /HNO ₃	4095-1000522	Na	NaCl/HCl
4095-1000121	Cr	Cr Metal/HNO ₃	4095-1000531	Sr	SrCO ₃ /HNO ₃
4095-1000131	Co	Co Metal/HNO ₃	4095-1000581	Tl	TlNO ₃ /HNO ₃
4095-1000141	Cu	Cu Metal/HNO ₃	4095-1000612	Sn	Sn Metal/HCl
4095-1000262	Fe	FeCl ₃ /HCl	4095-1000622	Ti	Ti Metal/HCl
4095-1000271	La	La ₂ O ₃ / HNO ₃	4095-1000634	W	Na ₂ WO ₄ ·2H ₂ O/H ₂ O
4095-1000281	Pb	Pb(NO ₃) ₂ /HNO ₃	4095-1000652	V	V ₂ O ₅ /HCl
4095-1000291	Li	Li ₂ CO ₃ /HNO ₃	4095-1000681	Zn	Zn Metal/ HNO ₃
4095-1000311	Mg	Mg Metal/HNO ₃	4095-1000691	Zr	ZrO(NO ₃) ₂ ·2H ₂ O/HNO ₃

Ionization Buffers & Releasing Agents

Part Number	Source	Matrix	Volume	Description
Ionization Buffers				
4400-010132	KCl	1% HCl	500 mL	1% Potassium
4400-010133	KCl	1% HCl	500 mL	5% Potassium
4400-010134	KNO ₃	1% HNO ₃	500 mL	1% Potassium
4400-010135	KNO ₃	1% HNO ₃	500 mL	5% Potassium
4400-010136	CsCl	1% HCl	500 mL	1% Cesium
4400-010137	CsCl	1% HCl	500 mL	5% Cesium
4400-010138	Cs ₂ CO ₃	1% HNO ₃	500 mL	1% Cesium
4400-010139	Cs ₂ CO ₃	1% HNO ₃	500 mL	5% Cesium
4400-010140	NaCl	1% HCl	500 mL	1% Sodium
4400-010141	NaCl	1% HCl	500 mL	5% Sodium
4400-010142	NaNO ₃	1% HNO ₃	500 mL	1% Sodium
4400-010143	NaNO ₃	1% HNO ₃	500 mL	5% Sodium
4400-010144	LiCl	1% HCl	500 mL	1% Lithium
4400-010145	LiCl	1% HCl	500 mL	5% Lithium
4400-010146	Li ₂ CO ₃	1% HNO ₃	500 mL	1% Lithium
4400-010147	Li ₂ CO ₃	1% HNO ₃	500 mL	5% Lithium
Releasing Agents				
4400-010152	La ₂ O ₃	1% HCl	500 mL	1% Lanthanum
4400-010153	La ₂ O ₃	1% HNO ₃	500 mL	1% Lanthanum
4400-010154	SrCO ₃	2% HCl	500 mL	1% Strontium
4400-010155	SrCO ₃	2% HNO ₃	500 mL	1% Strontium

GFAA Standards

TCLP Standard			
CPI P/N		Volume	
4400-TCLP-100		100mL	
4400-TCLP-500		500mL	
µg/mL in 2% HNO ₃			
As	25	Pb	25
Ba	500	Se	5
Cd	5	Ag	25
Cr	25	Hg*	20
*Shipped Separately			

TCLP - 3 Analytes	
CPI P/N	Volume
4400-010091	100mL
µg/mL in 2% HNO₃	
As	25
Pb	25
Se	5

TCLP - 4 Analytes			
CPI P/N		Volume	
4400-010089		100mL	
4400-010090		500mL	
µg/mL in 2% HNO ₃			
Ba	500	Cr	25
Cd	5	Ag	25

Calibration Standard

CPI P/N		Volume	
4400-010107		100mL	
μg/mL in 2% HNO ₃ + tr HF			
As	20	Sb	50
Cd	15	Se	15
Pb	10	Tl	20

Initial Calibration Standard

CPI P/N		Volume	
4400-010109		100mL	
<i>μg/mL in 2% HNO₃ + tr HF</i>			
As	20	Sb	25
Cd	15	Se	15
Pb	10	Tl	20

Spike Standard

CPI P/N		Volume	
4400-010111		100mL	
µg/mL in 2% HNO ₃ + tr HF			
As	40	Sb	100
Cd	5	Se	10
Pb	20	Tl	50

Mercury Standard

CPI P/N	Volume
4400-010113	100mL
$\mu\text{g/mL}$ in 2% HNO_3	
Hg	100

IVC Standard

CPI P/N		Volume	
4400-010046		250mL	
μg/mL in 2% HNO ₃ + tr HF			
As	2	Pb	2
Cd	0.4	Se	2
Cr	0.4	Ag	0.4
Tl		2	

IVC Spike

CPI P/N		Volume	
4400-GFAA-SPIKE		250mL	
<i>μg/mL in 2% HNO₃ + tr HF</i>			
As	4	Pb	4
Cd	1	Se	5
Cr	2	Ag	1
Tl		4	

Sample Cups

Part Number	Replaces	Description
AA Sample Cups		
4092-300	PE® / B011-9079	1.5 - 2 ml Polystyrene Conical, 1,000/pk
4092-301	----	1.5 - 2 ml Polystyrene Conical, 10,000/pk
4092-304	PE® / B051-0397	1.1 ml Cup for PE AS-71/72 2,000/pk
4092-302	B008-7056 / 99-100282-00	1.5 - 2 ml Polyethylene Conical, 1,000/pk
4092-303	----	1.5 - 2 ml Polyethylene Conical, 10,000/pk
4092-315	PE® / B012-9303	3 - 4 ml Polystyrene Conical Bottom, 1,000/pk
4092-325	TJA® / 134703-00	Sample Vessel, Polystyrene, for DS-2000, 1,000/pk