ARMI

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When Ordering IARMs, please use the "**IARM**-xxx/" prefix followed by a slash plus the appropriate suffix: "/X" for XRF, "/G" for General Purpose OES, and "/C" for Chips.

Pre-Selected Calibration Sets

Pre-selected, matrix specific calibration sets are available. Please contact us for additional information, pricing and availability. Custom sets are also available. We can develop custom sets for your specific needs. Please contact us regarding specific alloy availability & pricing.

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Introduction

Analytical Reference Materials International (ARMI) was founded in 1984 for the purpose of providing Certified Reference Materials (CRMs) to the Metals Industry. Since that time, ARMI has expanded its metals inventory to include CRMs for the following matrices:

Carbon & Low Alloy Steels	Titanium Alloys	Nickel Alloys	Stainless Steels	Aluminum Alloys
High Temperature Steels	Tool Steels	Copper Alloys	Cobalt Alloys	

ARMI's CRMs are produced from commercially available material analyzed by participating laboratories that are members of ARMI's Inter-Laboratory Analysis Program (ILAP). The ILAP Laboratories utilize ASTM Standards to produce the analytical and statistical data used by ARMI to calculate the certified values and 95% confidence intervals of the CRMs . The result is a true CRM of the highest quality yielding consistent, reproducible results and reliability for Industry. Furthermore, ARMI's Certificates of Analysis contain all of the required and necessary informational disclosures and also evidence that the CRMs are traceable to NIST.

ARMI is the world-wide distributor for Alcan Aluminum CRMs. Please see our Aluminum producers catalog for additional information.

ARMI now offers Heavy Metals in Plastic RMs. We have Br, Hg, Cr, Pb, and Cd in PE and PVC. These RMs are available in sets only.

ARMI also carries Set-up Standards (SUSs) for Low Alloy, Cast Iron, and Aluminum. In addition to its internally produced SUSs, ARMI also carries the full line of Alcoa Aluminum SUSs and MBH's lines of SUSs.

ARMI has expanded its inventory to include Hydrocarbon CRMs for Industry. The new CRMs are produced following ASTM Standards and like ARMI's metal CRMs, they have full informational disclosures and are traceable to NIST. The Hydrocarbon CRMs include standards for Sulfur in Oil and Coal. The Oil CRMs cover various Sulfur levels in:

#2 Diesel Fuel CRMs & RMs	Residual Fuel Oil	White Mineral Oil	Green & Calcined Petroleum Coke

Coal CRMs are available to cover a wide range of values for:

Sulfur	BTU	Ash	Chlorine
Fixed Carbon	Volatile Matter	Mercury	Gases

In addition to these cataloged CRMs, ARMI has access to additional standards from its affiliates and associates throughout the world. We have an arrangement with MBH Analytical Limited of England and TechLab of France to distribute their products in the United States. Let ARMI's staff help fill your standards needs.

Thank you for considering ARMI's products and we look forward to supplying your Certified Reference Material needs. If you have any questions, need technical assistance, require additional information or need assistance in locating a special CRM, please contact us. We will be happy to assist you in what ever way we can.

Best Regards,

William D. Britt
President & General Manager

Carbon & Low-Alloy Steels | **Please call for availability and current pricing - (303) 216-2621 or (800) 421-9454**

IARM Status	Grade UNS#	Al Ni	As O	B P	C Pb	Co S	Cr Si	Cu Sn	Mn Ti	Mo V	N W	Nb Bi
27A	Pure Iron	(0.002)	(0.001)	(<0.0002)	(0.002)	0.003	(0.001)	(0.004)	(<0.001)	0.002	0.0005	(0.001)
OES ONLY	K00095	(0.004)	0.0439	0.002	---	0.002	(<0.001)	0.002	0.001	(0.001)	---	
27D	Pure Iron	[(0.001)]	[(0.001)]	[<0.001]	[(0.002)]	[(0.004)]	[(0.002)]	[(0.001)]	[(0.001)]	[(0.001)]	[(0.001)]	[(0.001)]
Provisional	K00095	[(0.003)]	[(0.01)]	[(0.001)]	[<0.0005]	[(0.001)]	[(0.003)]	[(0.001)]	[(0.001)]	[<0.0005]	[(0.002)]	
28A	AISI 1018	0.003	(0.006)	(0.0001)	0.20	0.010	0.15	0.247	0.69	0.031	0.0113	0.002
CHIPS ONLY	G10180	0.099	(0.0106)	0.011	(<0.005)	0.023	0.22	0.011	0.002	0.006	(0.012)	
28B	AISI 1018	0.003	0.008	0.0002	0.18	0.011	0.13	0.36	0.75	0.029	0.0094	0.002
Final	G10180	0.13	0.0070	0.010	(<0.01)	0.029	0.23	0.014	0.002	0.002	(<0.001)	
28C	AISI 1018	0.010	0.004	0.0002	0.16	0.008	0.073	0.23	0.76	0.042	0.0084	0.0014
Final	G10180	0.24	0.0074	0.011	---	0.011	0.25	0.016	0.001	0.024	(0.004)	
28D	AISI 1018	0.0110	0.0039	0.0002	0.1700	0.009	0.081	0.11	0.80	0.025	0.0079	0.002
Final	G10180	0.09	0.006	0.010	---	0.016	0.27	0.008	0.001	0.019	(0.003)	
28E	AISI 1018	0.011	0.007	0.0001	0.169	0.008	0.079	0.120	0.68	0.033	0.0088	0.001
Final	G10180	0.145	0.0052	0.009	<0.001	0.0026	0.171	0.010	0.001	0.019	0.002	
28F	AISI 1018	0.012	0.004	0.0002	0.150	0.007	0.077	0.254	0.76	0.042	0.0089	0.002
Final	G10180	0.25	0.0061	0.012	(0.0005)	0.011	0.27	0.015	0.0012	0.023	(0.004)	
28G	AISI 1018	0.002	0.0031	0.0001	0.189	0.003	0.049	0.178	0.79	0.009	0.0089	0.0013
Final	G10180	0.044	0.003	0.021	<0.001	0.023	0.252	0.016	0.0011	0.0014	0.003	
28H	AISI 1018	0.027	0.0071	0.0002	0.175	0.0051	0.129	0.120	0.82	0.034	0.0076	0.0015
Final	G10180	0.070	0.0015	0.015	<0.001	0.031	0.26	0.0059	0.0023	0.0015	0.003	
209A	AISI 1030	0.004	0.005	(<0.0005)	0.34	0.006	0.065	0.11	0.82	0.017	0.0062	0.001
CHIPS ONLY	G10300	0.076	(0.0034)	0.007	(<0.001)	0.028	0.20	0.007	0.0014	0.055	---	
209B	AISI 1030	0.003	0.0076	0.0002	0.321	0.007	0.08	0.17	0.66	0.011	0.0083	(0.002)
Final	G10300	0.064	0.0039	0.008	---	0.031	0.25	0.008	0.001	0.024	(0.002)	
210A	AISI 1040	0.003	0.007	(<0.005)	0.39	0.008	0.11	0.27	0.82	0.022	0.0124	(0.002)
CHIPS ONLY	G10400	0.11	(0.0033)	0.015	---	0.023	0.22	0.011	(0.002)	0.052	---	
210B	AISI 1040	0.029	0.0025	(0.0002)	0.40	0.003	0.058	0.020	0.67	0.016	0.0059	(0.001)
Final	G10400	0.028	0.0012	0.011	<0.002	0.005	0.20	0.0013	0.002	0.0014	(0.003)	
210C	AISI 1040	[0.01]	[0.01]	[(0.0002)]	[0.44]	[0.01]	[0.16]	[0.37]	[0.88]	[0.02]	[0.009]	[0.02]
Provisional	G10400	[0.10]	[0.009]	[0.03]	[0.003]	[0.22]	[0.22]	[0.02]	[0.001]	[0.01]	[0.003]	
200A	AISI 1045	0.003	---	<0.0005	0.45	0.006	0.092	0.090	0.76	0.018	0.0084	0.001
CHIPS ONLY	G10450	0.048	(0.0031)	0.006	---	0.014	0.27	0.007	0.002	0.057	(<0.01)	
200B	AISI 1045	0.003	0.005	0.0001	0.452	0.007	0.132	0.228	0.755	0.018	0.0097	0.001
Final	G10450	0.089	0.004	0.013	0.0004	0.026	0.219	0.009	0.002	0.024	0.002	

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Carbon & Low-Alloy Steels — **Please call for availability and current pricing - (303) 216-2621 or (800) 421-9454**

IARM	**Grade**	**Al**	**As**	**B**	**C**	**Co**	**Cr**	**Cu**	**Mn**	**Mo**	**N**	**Nb**
Status	**UNS#**	**Ni**	**O**	**P**	**Pb**	**S**	**Si**	**Sn**	**Ti**	**V**	**W**	**Bi**
254A	AISI 1050	0.025	0.005	0.0002	0.500	0.006	0.050	0.091	0.78	0.013	0.0096	0.001
Final	G10500	0.044	(0.003)	0.010	(0.0003)	0.024	0.211	0.005	0.001	0.002	(0.001)	
29B	AISI 1117	0.002	0.011	(0.0005)	0.20	0.008	0.072	0.24	1.20	0.014	0.0083	0.002
CHIPS ONLY	G11170	0.069	0.0028	0.018	(<0.01)	0.086	0.23	0.014	0.002	0.002	(<0.01)	
29C	AISI 1117	0.003	0.009	(0.003)	0.18	(0.01)	0.076	0.15	1.20	0.016	0.010	(0.003)
Final	G11170	0.075	0.005	0.011	<0.001	0.13	0.28	0.008	0.0015	0.003	(0.002)	
29D	AISI 1117	0.0033	0.0046	(0.0003)	0.17	(0.023)	0.076	0.085	1.07	0.016	0.0057	(0.0027)
Final	G11170	0.042	(0.0082)	0.018	---	0.1153	0.050	0.0072	0.0014	0.0018	(0.0030)	
199A	AISI 1144	(0.002)	---	---	0.44	0.007	0.10	0.11	1.47	0.031	0.0071	0.003
X-RAY & CHIPS ONLY	G11440	0.10	0.0021	0.008	---	0.27	0.16	0.007	0.001	0.003	---	
199B	AISI 1144	0.003	0.005	0.002	0.45	0.007	0.048	0.089	1.45	0.008	0.0059	(0.002)
Final	G11440	0.035	(0.0048)	0.009	(<0.01)	0.29	0.18	0.005	0.002	0.003	0.002	
233A	AISI 1215 Bi	[.0.002]	[0.004]	[(0.001)]	[0.081]	[0.005]	[0.045]	[0.093]	[0.86]	[0.010]	[0.0058]	[(0.001)]
Provisional	G12150	[0.037]	[0.013]	[0.071]	[0.003]	[0.30]	[0.009]	[0.010]	[0.001]	[0.002]	[0.002]	[0.16]
183B	AISI 12L14	[0.003]	[0.002]	[0.002]	[0.073]	[0.005]	[0.046]	[0.021]	[1.08]	[0.006]	[0.003]	[(0.001)]
Provisional	G12144	[0.024]	[0.014]	[0.060]	[0.28]	[0.33]	[0.004]	[0.002]	[0.001]	[0.003]	[<0.005}	
206A	AISI 1215	0.003	0.008	0.0006	0.068	0.009	0.041	0.098	0.90	0.012	0.0119	(0.002)
Final	G12150	0.044	(0.019)	0.069	---	0.26	(0.019)	0.005	0.0015	0.002	---	
143B	AISI 4130	0.018	---	0.0001	0.29	0.009	0.93	0.13	0.48	0.20	0.0080	(0.002)
Final	G41300	0.14	0.0023	0.009	---	0.009	0.28	0.012	(0.001)	0.004	---	
143C	AISI 4130	0.038	0.008	0.0002	0.297	0.011	0.95	0.22	0.56	0.22	0.0089	0.002
X-RAY & CHIPS ONLY	G41300	0.155	0.0014	0.006	(0.001)	0.011	0.21	0.020	0.002	0.003	0.002	---
30A	AISI 4140	0.019	(0.006)	(0.0001)	0.43	0.010	1.05	0.22	0.90	0.18	0.0105	0.001
X-RAY & CHIPS ONLY	G41400	0.19	(0.0031)	0.016	---	0.032	0.27	0.009	0.002	0.004	(<0.01)	
30B	AISI 4140	0.024	0.007	0.0001	0.42	0.009	0.95	0.31	0.87	0.17	0.0094	0.002
CHIPS ONLY	G41400	0.066	0.0008	0.014	<0.01	0.025	0.25	0.010	0.002	0.006	<0.01	
30C	AISI 4140	0.027	---	(0.0001)	0.39	0.009	0.94	0.16	0.84	0.16	0.0108	(0.002)
Final	G41400	0.18	0.0025	0.021	---	0.016	0.28	0.014	0.003	0.004	---	
30D	AISI 4140	0.035	0.008	0.0004	0.391	0.013	0.978	0.241	0.83	0.220	0.0097	0.002
Final	G41400	0.159	0.0014	0.013	0.0003	0.020	0.244	0.017	0.002	0.003	0.004	
30E	AISI 4140	0.014	0.015	0.0002	0.408	0.012	1.06	0.301	0.92	0.209	0.180	0.002
Final	G41400	0.180	0.0014	0.011	<0.001	0.0071	0.264	0.017	0.003	0.005	0.005	
31A	AISI 4340	0.036	(0.006)	(0.0002)	0.41	0.011	0.85	0.19	0.75	0.22	0.0114	0.003
CHIPS ONLY	G43400	1.66	(0.0015)	0.012	---	0.028	0.22	0.008	0.003	0.004	---	

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Carbon & Low-Alloy Steels												**Please call for availability and current pricing - (303) 216-2621 or (800) 421-9454**
IARM Status	**Grade UNS#**	**Al Ni**	**As O**	**B P**	**C Pb**	**Co S**	**Cr Si**	**Cu Sn**	**Mn Ti**	**Mo V**	**N W**	**Nb Bi**
31B	AISI 4340	0.027	0.006	0.0002	0.41	0.010	0.87	0.23	0.71	0.26	0.0081	0.002
CHIPS ONLY	G43400	1.81	0.0008	0.013	<0.01	0.022	0.25	0.01	0.003	0.006	(0.009)	
31C	AISI 4340	0.019	0.0056	(0.0003)	0.413	0.012	0.84	0.178	0.78	0.28	0.0076	0.0042
Final	G43400	1.75	0.0018	0.013	0.0003	0.0072	0.24	0.010	0.003	0.005	0.008	
31D	AISI 4340	0.023	0.006	(0.0002)	0.4120	0.012	0.830	0.171	0.79	0.238	0.0084	0.006
CHIPS ONLY	G43400	1.71	0.0013	0.009	<0.005	0.0053	0.264	0.010	0.003	0.005	0.009	
33A	AISI 4620	0.026	(0.007)	(0.0002)	0.20	0.01	0.15	0.10	0.58	0.24	0.0130	0.003
CHIPS ONLY	G46200	1.77	(0.0015)	0.008	---	0.015	0.26	0.005	0.002	0.003	(0.015)	
33B	AISI 4620	0.022	0.005	0.0002	0.19	0.010	0.17	0.15	0.54	0.22	0.0070	0.003
Final	G46200	1.68	0.0020	0.010	(<0.01)	0.014	0.22	0.010	0.002	0.002	(<0.01)	
33C	AISI 4620	0.025	(0.005)	(0.0002)	0.184	0.008	0.133	0.223	0.562	0.236	0.0078	0.002
Final	G46200	1.71	0.0021	0.009	<0.002	0.017	0.25	0.009	0.0014	0.0021	0.0026	
33D	AISI 4620	0.026	0.0035	0.0002	0.209	0.008	0.139	0.072	0.593	0.229	0.0053	0.002
Final	G46200	1.78	0.0013	0.009	<0.001	0.023	0.207	0.005	0.003	0.002	<0.005	
155A	AISI 4820	0.030	0.004	0.0003	0.20	0.010	0.13	0.12	0.54	0.25	0.0096	0.003
CHIPS ONLY	G48200	3.34	0.0016	0.009	(<0.01)	0.024	0.28	0.006	0.002	0.001	(<0.01)	
155B	AISI 4820	0.027	0.0038	0.0002	0.207	0.011	0.149	0.152	0.635	0.239	0.0080	0.0024
Final	G48200	3.57	0.0017	0.009	0.0005	0.028	0.313	0.008	0.003	0.003	(0.01)	
155C	AISI 4820	0.027	0.004	0.0002	0.204	0.011	0.099	0.130	0.550	0.265	0.0079	0.002
Final	G48200	3.36	0.0018	0.009	(0.001)	0.025	0.286	0.007	0.0019	0.002	<0.01	
49C	AISI E52100	0.016	0.004	(0.0001)	1.04	0.007	1.35	0.082	0.31	0.015	0.0078	0.001
Final	G52986	0.064	(0.0012)	0.009	(<0.001)	0.013	0.26	0.005	0.003	0.008	(<0.005)	
34A	AISI E6150	0.014	(0.006)	(0.0002)	0.51	0.009	0.99	0.18	0.78	0.044	0.0076	0.003
Final	G61506	0.14	(0.0014)	0.01	---	0.010	0.22	0.009	0.003	0.17	(0.02)	
34B	AISI E6150	0.024	0.006	0.0002	0.48	0.009	0.94	0.21	0.81	0.053	0.0089	0.002
Final	G61506	0.14	0.0018	0.021	(<0.01)	0.021	0.29	0.012	0.002	0.16	(<0.01)	
32A	AISI 8620	0.003	(0.005)	(0.0002)	0.20	0.007	0.45	0.12	0.80	0.18	0.0093	0.003
Final	G86200	0.49	(0.0037)	0.011	---	0.024	0.23	0.006	0.002	0.068	---	
32B	AISI 8620	0.038	0.005	0.0002	0.20	0.009	0.54	0.14	0.81	0.15	0.0078	0.003
X-RAY & CHIPS ONLY	G86200	0.44	0.0030	0.016	(<0.01)	0.024	0.25	0.011	0.001	0.004	(<0.01)	
32C	AISI 8620	0.038	0.005	0.0002	0.20	0.009	0.54	0.14	0.81	0.15	0.0078	0.003
Final	G86200	0.44	0.0030	0.016	(<0.01)	0.024	0.25	0.011	0.001	0.004	(<0.01)	
182A	AISI 86L20	0.020	---	0.0003	0.20	0.011	0.56	0.23	0.90	0.18	0.0067	0.003
Final	N/A	0.50	0.0014	0.028	0.14	0.023	0.25	0.012	0.005	0.005	(0.01)	

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Revised - 6/7/2007

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IARM	Grade	Al	As	B	C	Co	Cr	Cu	Mn	Mo	N	Nb
Status	**UNS#**	**Ni**	**O**	**P**	**Pb**	**S**	**Si**	**Sn**	**Ti**	**V**	**W**	**Bi**
252A	AISI 8740	0.017	0.005	0.0002	0.419	0.008	0.501	0.107	0.91	0.206	0.0085	0.002
X-RAY & CHIPS ONLY	G87400	0.507	(0.001)	0.024	0.0007	0.009	0.248	0.007	0.001	0.005	0.004	
252B	AISI 8740	0.028	0.005	0.0002	0.419	0.005	0.486	0.084	0.91	0.223	0.0081	0.002
Final	G87400	0.486	0.0016	0.007	0.0004	0.019	0.236	0.021	0.002	0.004	0.002	
252C	AISI 8740	0.017	0.004	(0.0001)	0.416	0.008	0.501	0.109	0.92	0.205	0.0083	0.002
Final	G87400	0.505	(0.002)	0.025	0.001	0.008	0.248	0.007	0.001	0.005	<0.005	
156A	AISI E9310	0.037	0.006	0.0003	0.11	0.031	1.30	0.17	0.52	0.12	0.0088	0.003
CHIPS ONLY	G93106	2.97	0.0016	0.017	(0.002)	0.016	0.26	0.009	0.002	0.006	0.076	
156B	AISI E9310	[0.07]	[0.004]	[0.001]	[0.11]	[0.01]	[1.31]	[0.12]	[0.59]	[0.11]	[0.002]	[0.005]
Provisional	G93106	[3.25]	[(0.001)]	[0.008]	[<0.001]	[0.001]	[0.32]	[0.006]	[0.005]	[0.006]	[0.01]	
213A	A36	0.0018	0.007	0.0003	0.16	0.008	0.15	0.41	0.66	0.048	0.0082	0.002
Final	K02600	0.15	0.011	0.015	0.0025	0.034	0.15	0.018	0.001	0.002	(0.007)	
35A	1-1/4Cr 1/2Mo	0.028	(0.003)	(0.0002)	0.12	0.008	1.23	0.078	0.52	0.49	0.0081	0.003
CHIPS ONLY	K11572	0.088	(0.0014)	0.005	(<0.005)	0.006	0.61	0.004	0.002	0.020	---	
35B	1-1/4Cr 1/2Mo	0.016	0.006	0.0005	0.13	0.008	1.12	0.11	0.45	0.46	0.0079	0.003
CHIPS ONLY	K11572	0.084	0.0016	0.006	(<0.01)	0.015	0.58	0.006	0.003	0.005	(<0.01)	
35C	1-1/4Cr-1/2Mo	0.029	0.003	0.0002	0.124	0.006	1.20	0.061	0.51	0.46	0.047	0.003
Final	K11572	0.047	(0.001)	0.008	<0.0005	0.017	0.57	0.005	0.002	0.004	0.004	
35F	1-1/4Cr-1/2Mo	[0.036]	[<0.005]	[0.0003]	[0.126]	[0.004]	[1.16]	[0.030]	[0.50]	[0.48]	[0.0060]	[0.003]
Provisional	K11572	[0.047]	[0.0016]	[0.009]	[0.0014]	[0.020]	[0.57]	[0.002]	[0.003]	[0.004]	[0.004]	
35H	1-1/4Cr-1/2Mo	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	K11572	---	---	---	---	---	---	---	---	---	---	
229A	C 1/2 Mo, F1	0.027	(0.002)	0.0002	0.218	0.011	0.015	0.014	0.86	0.493	0.0071	0.002
Final	K12822	0.029	0.0013	0.008	(0.001)	0.010	0.331	0.002	0.002	0.006	(0.003)	
36A	2-1/4Cr 1Mo	0.024	(0.005)	(0.0002)	0.099	0.012	2.08	0.17	0.55	0.93	0.0105	0.004
Final	K21590	0.16	(0.0027)	0.006	(<0.005)	0.013	0.22	0.009	0.003	0.008	---	
36B	2-1/4Cr 1Mo	0.030	0.009	(0.0002)	0.14	0.012	2.18	0.13	0.49	0.95	0.0102	0.004
Final	K21590	0.18	0.0018	0.010	(0.003)	0.038	0.21	0.008	0.003	0.006	(<0.01)	
37A	5Cr 1/2Mo	0.03	(0.007)	(0.0003)	0.13	0.015	4.27	0.13	0.46	0.46	0.0190	0.004
Final	K42544	0.10	(0.0034)	0.017	(<0.005)	0.018	0.25	0.008	0.004	0.012	---	
37B	5Cr 0.5Mo	0.025	0.006	0.0002	0.119	0.017	4.82	0.137	0.431	0.470	0.0155	0.005
Final	K42544	0.11	0.0024	0.011	(0.0003)	0.016	0.235	0.008	0.0021	0.012	0.013	
238A	F 91	[0.03]	[0.012]	[0.0003]	[0.11]	[0.027]	[8.24]	[0.17]	[0.40]	[0.94]	[0.047]	[0.086]
Provisional	N/A	[0.257]	[0.003]	[0.007]	[(0.0003)]	[0.010]	[0.32]	[0.013]	[0.003]	[0.22]	[<0.01]	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Carbon & Low-Alloy Steels

Please call for availability and current pricing - (303) 216-2621 or (800) 421-9454

IARM	**Grade**	**Al**	**As**	**B**	**C**	**Co**	**Cr**	**Cu**	**Mn**	**Mo**	**N**	**Nb**
Status	**UNS#**	**Ni**	**O**	**P**	**Pb**	**S**	**Si**	**Sn**	**Ti**	**V**	**W**	**Bi**
38A	9Cr 1Mo	0.009	(0.023)	(0.0003)	0.130	0.029	8.67	0.15	0.41	0.96	0.0190	0.008
CHIPS ONLY	K90941	0.24	(0.0050)	0.008	---	0.018	0.38	0.014	0.003	0.020	(0.023)	
38B	9Cr 1Mo	0.032	0.01	0.0004	0.130	0.017	8.84	0.119	0.427	0.94	0.0192	0.007
Final	K90941	0.15	0.0030	0.023	<0.001	0.013	0.78	0.010	0.004	0.014	(0.01)	

TechLab S.A., France - Low-Alloy Steel

Part Number	**Al**	**As**	**B**	**C**	**Co**	**Cr**	**Cu**	**Mn**	**Mo**	**N**	**Nb**
Size	**Ni**	**O**	**P**	**Pb**	**S**	**Si**	**Sn**	**Ti**	**V**	**W**	**Bi**
TL - 1668	0.0382	0.0016	0.0003	0.2134	0.0031	0.0173	0.0108	1.643	0.0014	0.0043	0.0002
25mm x 37mm	0.0164	---	0.0137	(0.0007)	0.0012	1.645	0.0046	0.0032	0.002		

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

CKD Low-Alloy Steel Spectrometrometric CRMs **(Low-Alloy Calibration - Set of Ten)**

CKD	C	Mn	Si	P	S	Cr	Ni	Mo	V	W	Cu	Se	Al t	Al s
Number	**Ti**	**Zr**	**Co**	**B**	**Nb**	**Ta**	**Sn**	**As**	**Sb**	**Pb**	**Bi**	**Te**	**N**	**Fe**
180B	(0.003)	0.047	0.001	0.004	0.0038	0.013	0.018	0.001	0.000	(0.0001)	0.006	(0.000)	(0.001)	
	0.000	0.000	0.003	0.0000	(0.0001)	(0.0000)	0.0011	0.001	0.0004	(0.0002)	(0.0000)	(0.000)	(0.0028)	(99.90)
181A	0.225	0.971	0.435	0.039	0.007	0.660	0.725	0.385	0.302	0.188	0.093		0.016	0.014
	0.149	0.001	0.050	0.0069	0.058	0.039	0.113	0.027	0.016	0.0005			(0.005)	(95.48)
181B	0.240	0.988	0.445	0.042	0.008	0.669	0.737	0.395	0.307	0.188	0.095		0.016	0.014
	0.155	0.001	0.050	0.0076	0.062	0.042	0.122	0.029	0.017	0.0005			(0.005)	(95.37)
182A	1.38	0.370	0.123	0.008	0.006	0.122	2.82	0.011	0.027	0.016	0.293		0.023	0.017
	0.004	0.001	0.171	0.0003	0.001	0.000	0.004	0.005	0.001	(0.000)			0.0049	(94.60)
182B	1.39	0.370	0.126	0.008	0.006	0.122	2.82	0.011	0.027	0.016	0.293		0.023	0.017
	0.004	0.001	0.171	0.0003	0.001	0.000	0.004	0.005	0.001	(0.000)			0.0049	(94.59)
183A	0.047	1.74	1.02	0.009	0.012	0.204	1.09	0.036	0.004	0.354	0.568		0.150	0.141
	0.003	0.078	0.119	0.0005	0.006	(0.000)	0.051	0.005	0.001	(0.000)	0.0000		0.0036	(94.49)
183B	0.050	1.76	1.03	0.010	0.012	0.204	1.10	0.036	0.004	0.347	0.575		0.150	0.141
	0.003	0.082	0.119	0.0005	0.006	(0.000)	0.0054	0.004	0.001	(0.000)	0.0000		0.0036	(94.44)
184A	1.013	2.23	0.348	0.028	(0.01)	2.33	0.250	0.016	0.017	(0.001)	0.089	(0.008)	0.022	0.016
	0.010	(0.002)	0.007	0.0005	0.013	0.000	0.008	0.006	0.002	(0.000)			0.0104	(93.58)
185A	0.566	0.715	0.230	0.024	(0.02)	0.032	3.84	0.123	0.178	(0.001)	0.179		0.060	0.054
	0.022	0.002	0.032	0.0116	0.20	0.085	0.003	0.022	0.011	0.002		(0.005)	0.0051	(93.63)
186B	0.382	1.299	1.41	0.012	0.007	1.50	1.57	0.251	0.020	0.054	0.227		0.042	0.038
	0.044	(0.002)	0.006	0.0009	0.004	0.009	0.018	0.007	0.002	(0.000)			(0.005)	(93.12)
187A	0.119	0.525	0.567	0.035	0.018	3.51	0.085	0.565	0.558	0.67	0.036	(0.004)	0.019	0.017
	0.087	0.013	0.071	0.0006	0.028	0.015	0.013	(0.007)	0.023	0.003	0.003		0.0122	(93.01)
187B	0.119	0.529	0.577	0.035	0.014	3.51	0.085	0.565	0.558	0.67	0.036	(0.004)	0.027	0.025
	0.099	0.013	0.071	0.0006	0.028	0.017	0.013	(0.007)	0.022	0.003	0.003		0.0122	(92.98)
188A	0.332	0.169	0.775	0.006	0.033	5.11	0.445	1.28	0.802	0.091	0.057		0.093	0.083
	0.034	0.052	0.006	0.0047	0.122	0.022	0.005	(0.005)	0.006	0.001		(0.001)	0.0076	(90.53)
189A	0.175	0.262	0.286	0.032	0.051	1.065	5.34	0.837	0.054	1.30	0.060		0.041	0.039
	0.326	0.005	0.007	0.0030	0.017	(0.005)	0.029	0.080	(0.003)	0.002			(0.004)	(90.01)

( ) Indicates non-certified value.

Revised - 6/7/2007

MBH Low-Alloy Steels

Residuals in Mild Steel

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Sn	Al	W	Ti	V	As	Size (mm) Ø H
Cast	**12 X 12746**	0.032	0.16	0.08	0.068	1.93	0.21	0.23	0.61	0.50	0.11	0.25	0.01	0.12	0.05	0.01(6)	0.075	40 x 15
	12 X 12747	0.06	0.35	0.025	0.045	1.67	0.38	0.43	0.52	0.41	0.21	0.17	0.025	. . .	0.15	. . .	<0.005	
	12 X 12749	0.21	0.53	0.054	0.041	1.40	0.32	0.49	0.22	0.20	0.46	0.03	0.14	. . .	<0.01	. . .	0.07	
	12 X 12750	0.202	0.57	0.058	0.022	0.54	0.70	0.70	0.11	0.11	0.61	0.22	0.27	. . .	0.11	. . .	0.12	
Wrought RM	**12 X 12748**	0.135	0.120	0.052	0.05	0.50	0.45	0.75	0.29	0.54	0.29	0.076	(0.01)	0.057	(0.004)	0.048	0.145	40 x 15
	12 X 12749	0.138	0.549	0.080	0.036	1.531	0.609	0.549	0.224	0.269	0.484	0.0240	0.026	0.035	0.0361	0.0419	0.074	42 x 15
	12 X 349	0.24	0.26	0.024	0.021	0.69	0.23	0.10	0.06	0.20	0.006	0.16	0.32	0.08	0.085	0.002	0.005	40 x 15
	12 X 350	0.18	0.45	0.032	0.029	0.70	0.18	0.31	0.10	0.15	0.005	0.03	0.35	0.29	0.052	0.002	0.07	
*	**12 X 352**	0.275	0.414	0.126	0.070	0.200	0.376	0.313	0.261	0.140	0.020	0.110	0.255	0.20	0.291	0.029	0.036	

Continuation from above

	Nb	Pb	Bi	Se	Sb	Zn	N	Size (mm) Ø H
12 X 352	0.104	0.006	0.008	0.006	0.023	0.005	(0.006)	42 x 17

Residuals in Mild Steel

		C	Si	S	P	Mn	Co	Al	Nb	V	B	Sb	Zr	Size (mm) Ø H
Wrought	**12 X 353**	0.194	0.142	0.025	0.0205	0.817	0.057	0.0070	0.096	0.0481	. . .	0.156	. . .	42 x 15
	12 X 354	0.27	0.19	0.015	0.066	0.86	0.03	0.01	0.07(5)	0.02	(0.0002)	0.05	0.03	
	12 X 355	0.20	0.48	0.024	0.028	0.62	0.05	<0.01	0.02	0.11	0.001	0.08	<0.01	
	12 X 356	0.36	0.37(5)	0.031	0.049	0.44	0.12	0.05	0.02	0.09	0.007	0.02	0.01	
	12 X 357	0.45	0.23	0.062	0.016	0.24	0.21	0.06	(<0.001)	0.19	0.014	<0.005	(<0.005)	

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

MBH Low-Alloy Steels

	Low Alloy	C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Sn	Al	V	N	others	Size (mm) Ø x H
Cast	**12 X 15217**	0.52	1.47	0.069	0.072	0.97	0.57	1.04	0.30	0.19	0.195	0.05	0.04	0.78	. . .		40 x 15
*	**12 X 15251**	0.80	2.18	0.028	0.044	1.12	1.21	0.68	0.24	0.17	0.28	0.01	0.06	0.47	. . .		
	12 X 15252	0.094	0.26	0.054	0.082	1.03	2.00	0.75	0.24(6)	0.17	0.15	0.05	0.03	0.35	. . .		
	12 X 15253	0.288	0.445	0.092	0.0644	1.28	0.544	1.61	0.509	0.411	0.079	0.221	(0.008)	0.261	0.014	W, Ti, Nb, As, Zn, Sb, Bi, Se, Pb, B	
CRM	**12 X 15254**	0.335	1.001	0.029	0.055	0.899	1.042	2.26	0.795	0.408	0.642	0.050	0.037	0.182	0.026	continued	43 x 20
*	**12 X 15255**	0.41	1.04	0.070	0.12	1.21	0.25	1.46	0.19	0.30	0.060	0.12	0.11	0.43	0.026	W, Ti, Nb, Zr, Ta, As, Sb, Bi, Pb, B	
	12 X 15256	0.09	0.16	0.042	0.046	0.51	3.51	0.32	0.07	0.06	0.28	0.15	0.03	0.64	. . .		
	12 X 15258	0.49	1.05	0.053	0.060	1.10	0.28	0.28	0.22	0.14	0.33	0.06	0.04	0.24	. . .		
	12 X 15259	0.67	1.83	0.11	0.043	0.31	3.97	0.47	0.42	0.54	0.11	0.089	0.26	0.40	0.005	W, Ti, Nb, Zr, Ta, As, Sb, Bi, Pb, B	
	12 X 15260	0.43	0.31	0.064	0.040	2.02	0.69	3.04	0.11	0.11	0.12(5)	0.03	0.60	0.53	. . .		
CRM	**12 X 15261**	0.522	1.72	0.079	0.117	1.013	0.147	0.959	1.43	0.364	0.245	0.0204	1.73	0.118	0.0040	continued	43 x 20
	12 X 15266	0.27	0.14	0.055	0.094	1.03	1.27	4.07	0.28	0.21	0.19	0.01	0.47	0.06	. . .		

Continuation from above	Ti	As	W	Nb	Pb	Bi	Sb	Se	Zn	B	Size (mm) Ø x H
12 X 15254	0.034	0.024	0.339	0.29	0.0055	0.009	0.030	. . .	. . .	. . .	43 x 20
12 X 15261	0.58	0.039	0.187	0.783	0.028	0.046	0.23	0.0251	0.037	0.0093	43 x 20

Wrought * information for last batch - currently out of stock

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Sn	Al	V	N	Size (mm) Ø x H
	12 X LA1	0.06	0.73	0.045	0.013	1.32	0.21	0.95	<0.01	0.034	. . .	. . .	<0.01	0.41	. . .	40 x 15
	12 X LA2	0.19	0.97	0.043	0.033	0.55	0.74	0.81	0.10	0.44	<0.01	. . .	1.45	0.09	0.006	44 x 15
	12 X LA3	0.48	0.13	0.040	0.032	1.50	0.31	0.37	0.30	0.20	. . .	. . .	0.06	0.19	. . .	40 x 15
*	**12 X LA4**	0.67	0.28	0.021	0.044	0.24	0.46	0.64	0.46	0.29	. . .	. . .	0.19	0.36	. . .	40 x 15
	12 X LA5	0.81	0.67	0.015	0.057	0.98	0.13	0.12	0.19	0.09	. . .	. . .	0.19	0.58	. . .	40 x 15

Special Carbon & Low-Alloy Steels

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IARM Status	Grade UNS#	Al Ni	As O	B P	C Pb	Co S	Cr Si	Cu Sn	Mn Ti	Mo V	N W	Nb
164A	CLA1	0.72	(0.002)	(0.0001)	0.004	0.006	0.032	0.88	1.57	0.009	0.0003	0.006
Final	N/A	1.29	0.0005	0.004	(0.004)	0.070	0.019	0.002	0.002	0.78	1.44	
165A	CLA2	0.80	(0.003)	(0.001)	0.003	0.006	0.036	1.40	1.65	0.009	0.0004	0.007
Final	N/A	1.43	0.0004	0.005	(<0.01)	0.086	0.021	0.002	0.002	1.13	1.57	
166A	CLA3	0.55	(0.004)	(0.0002)	0.003	0.004	0.014	0.64	1.29	1.08	0.0002	0.006
Final	N/A	0.77	0.0006	0.005	(<0.01)	0.073	0.91	(0.003)	0.002	0.40	1.02	
167A	CLA4	0.64	(0.004)	(0.0002)	0.003	0.003	0.016	0.95	1.36	1.25	0.0005	0.006
CHIPS ONLY	N/A	1.00	0.0007	0.019	(0.002)	0.087	1.08	0.003	0.003	0.59	1.19	
168A	CLA5	0.19	(0.003)	0.0004	0.003	0.003	0.004	0.009	0.12	0.69	0.0002	0.003
Final	N/A	2.32	0.0008	0.030	(<0.01)	0.064	0.46	0.003	0.004	0.004	0.52	
169A	CLA6	0.30	(0.009)	(0.001)	0.31	0.005	2.19	0.31	0.21	0.95	0.0004	0.005
Final	N/A	2.50	0.0006	0.033	(0.002)	0.065	0.79	0.003	0.005	0.006	0.65	
170A	CLA7	0.032	(0.005)	(0.0002)	0.56	0.004	2.55	0.005	0.019	1.57	0.0003	0.004
Final	N/A	1.51	0.0003	0.039	(<0.01)	0.025	0.010	0.002	0.006	0.006	(0.018)	
171A	CLA8	0.082	(<0.01)	(0.0006)	0.64	0.005	2.88	0.49	0.020	1.91	0.0003	0.005
X-Ray ONLY	N/A	1.95	(0.0004)	0.043	(<0.01)	0.059	0.25	0.002	0.005	0.006	0.13	
172A	CLA9	0.39	(0.005)	0.0003	0.78	0.006	3.52	0.40	0.010	0.014	0.0004	0.004
Final	N/A	0.025	0.0006	0.007	(<0.01)	0.004	1.29	0.003	0.003	0.003	0.038	
173A	CLA10	0.48	(<0.01)	0.0004	0.85	0.010	4.39	0.72	0.011	0.015	0.0006	0.006
Final	N/A	0.024	0.0007	0.015	(<0.01)	0.004	1.70	0.003	0.004	0.28	0.041	
180A	CLA11	0.76	(0.004)	0.0004	0.007	0.004	0.037	0.89	0.41	0.006	0.0096	(0.005)
Final	N/A	1.29	0.0006	0.004	(0.002)	0.046	0.023	0.002	0.002	0.76	1.48	
181A	CLA12	0.87	(0.013)	(0.0002)	0.007	(0.004)	0.044	1.45	1.76	0.009	0.0185	(0.007)
X-RAY & CHIPS ONLY	N/A	1.40	0.0006	0.004	(0.002)	0.095	0.026	0.002	0.003	1.12	1.65	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Revised - 6/7/2007

Tool Steels — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM Status	Grade UNS#	Al Ni	As O	B P	C Pb	Co S	Cr Si	Cu Sn	Mn Ti	Mo V	N W	Nb Zr
304A	AISI M-1	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	T11301	---	---	---	---	---	---	---	---	---	---	
44A	AISI M-2	0.027	(0.022)	(0.0022)	0.86	0.16	4.26	0.14	0.31	5.08	0.0247	(0.009)
CHIPS ONLY	T11302	0.20	(0.0018)	0.029	(<0.005)	0.003	0.39	0.011	0.005	1.86	6.25	
44B	AISI M-2	---	---	---	0.84	0.41	3.86	0.072	0.27	4.79	0.0251	0.016
Final	T11302	0.18	0.0028	0.014	(0.0001)	0.006	0.39	(0.008)	0.004	1.83	5.98	
44C	AISI M-2	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	T11302	---	---	---	---	---	---	---	---	---	---	
251A	AISI M-4	0.01	0.016	(0.002)	1.398	0.129	4.1	0.13	0.33	5.16	0.044	0.016
Final	T11304	0.131	(0.01)	0.014	(0.002)	0.058	0.58	0.011	0.003	3.9	5.5	(0.002)
48A	AISI T-1	(0.016)	(0.051)	(0.0018)	0.79	0.39	4.32	0.13	0.33	0.40	0.0221	(0.003)
CHIPS ONLY	T12001	0.23	(0.0107)	0.036	---	0.021	0.29	0.019	0.004	1.13	17.99	
48B	AISI T-1	(0.006)	---	---	0.74	(0.040)	4.14	0.07	0.28	0.093	0.0096	0.004
Final	T12001	0.080	(0.0125)	0.020	---	0.023	0.28	(0.009)	(0.004)	1.12	(17.26)	
255A	AISI H-11	0.01	(0.002)	0.0004	0.403	0.009	4.84	0.049	0.27	1.33	0.0067	0.004
Final	T20811	0.083	0.0011	0.013	<0.001	0.0012	0.93	0.006	0.002	0.43	0.007	<0.005
42A	AISI H-13	(0.024)	---	(0.0007)	0.39	0.015	(5.42)	0.070	0.35	1.29	0.0143	(0.001)
X-Ray & Chips Only	T20813	0.32	(0.0019)	0.011	<0.005	0.007	1.04	0.005	0.005	1.02	(0.014)	
42B	AISI H-13	0.013	---	(0.0005)	0.38	0.013	5.10	0.089	0.36	1.23	0.0105	0.004
Final	T20813	0.18	0.0026	0.014	(0.0003)	0.005	0.99	0.005	0.003	0.94	0.012	
39B	AISI A-2	0.006	---	---	0.99	0.014	4.79	0.10	0.54	1.01	0.0096	0.006
Final	T30102	0.14	---	0.017	---	0.003	0.35	0.004	0.003	0.22	(0.026)	
40A	AISI A-6	0.009	(0.007)	(0.0003)	0.68	0.011	1.04	0.092	2.15	1.05	0.0077	0.004
CHIPS ONLY	T30106	0.14	(0.0024)	0.024	---	0.010	0.25	0.006	0.003	0.007	(0.013)	
40B	AISI A-6	(0.006)	---	(0.0010)	0.68	0.015	1.04	0.050	1.98	1.22	0.0107	0.005
Final	T30106	0.096	(0.0014)	0.012	---	0.003	0.39	0.004	0.003	0.014	0.013	
41B	AISI D-2	0.014	---	---	1.49	0.025	(12.51)	0.035	0.36	0.80	0.0128	---
X-Ray ONLY	T30402	0.095	(0.0024)	0.021	---	0.005	0.30	0.004	0.005	0.76	(0.022)	
41C	AISI D-2	[0.012]	[<0.005]	[0.0002]	[1.55]	[0.019]	[11.6]	[0.034]	[0.28]	[0.81]	[0.0106]	[0.01]
Provisional	T30402	[0.102]	[0.0021]	[0.022]	---	[0.001]	[0.39]	[0.0041]	[0.0053]	[0.93]	[0.01]	[0.002]
45A	AISI O-6	0.011	(0.003)	(0.0001)	1.39	0.004	0.13	0.049	0.88	0.25	0.0079	0.002
Final	T31506	0.11	(0.0017)	0.014	(<0.005)	0.012	1.02	0.005	0.003	0.005	---	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Tool Steels **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM Status	Grade UNS#	Al Ni	As O	B P	C Pb	Co S	Cr Si	Cu Sn	Mn Ti	Mo V	N W	Nb Zr
45B	AISI O-6	0.01	0.002	(0.0001)	1.42	0.004	0.061	0.018	0.90	0.24	0.0080	0.002
Final	T31506	0.11	0.0005	0.010	---	0.008	0.92	0.008	0.002	0.003	(0.004)	
46A	AISI S-1	0.011	(0.009)	(0.0012)	0.49	0.015	1.31	0.083	0.48	0.16	0.0144	0.004
Final	T41901	0.30	(0.0027)	0.023	(<0.005)	0.012	0.94	0.024	0.004	0.16	1.84	
46B	AISI S-1	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	T41901	---	---	---	---	---	---	---	---	---	---	
47A	AISI S-5	0.017	(0.014)	(0.0003)	0.58	0.009	0.29	0.25	0.80	0.41	0.0084	(0.004)
X-Ray & Chips Only	T41905	0.23	(0.0021)	0.015	(<0.005)	0.010	1.92	0.031	0.008	0.22	(0.016)	
47B	AISI S-5	0.014	---	(<0.001)	0.59	0.007	0.23	0.17	0.79	0.20	0.0092	(0.002)
Final	T41905	0.090	(0.0014)	0.017	(0.0003)	0.006	1.96	0.008	0.010	0.17	(0.016)	
259A	AISI S-7	0.016	0.006	0.0003	0.479	0.011	3.27	0.081	0.399	1.43	0.0077	0.003
Final	T41907	0.194	0.0014	0.020	<0.0005	0.0007	0.44	0.004	0.0026	0.256	0.035	0.001
43A	AISI L-6	0.030	(0.006)	(0.0002)	0.68	0.016	0.66	0.15	0.61	0.20	0.0089	0.003
Final	T61206	1.34	(0.0026)	0.009	(<0.005)	0.034	0.24	0.008	0.003	0.008	(0.016)	
43B	AISI L-6	0.021	0.005	0.0002	0.711	0.012	0.651	0.180	0.56	0.206	0.0093	0.004
Final	T61206	1.39	0.0016	0.008	<0.0005	0.013	0.251	0.013	0.0047	0.0035	<0.005	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Revised - 6/7/2007

Statistical Process Control (SPC) Standards							**Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**					
IARM **Status**	**Grade** **UNS#**	**Al** **Ni**	**As** **P**	**B** **Pb**	**C** **S**	**Co** **Si**	**Cr** **Sn**	**Cu** **Ti**	**Mn** **V**	**Mo** **W**	**N** **Zr**	**Nb**
194A	SPC1	0.102	0.031	0.0058	0.517	0.052	0.70	0.26	1.04	0.40	0.0055	0.056
Final	N/A	0.79	0.039	0.0010	0.025	0.49	0.017	0.078	0.333	0.13	0.026	
195A	SPC2	0.013	0.021	0.0040	0.255	0.102	0.214	0.52	1.85	0.052	0.0078	0.007
Final	N/A	1.01	0.018	0.0014	0.007	1.16	0.084	0.002	0.083	0.38	0.002	
195B	SPC2	0.029	0.021	0.0039	0.255	0.101	0.216	0.52	1.84	0.052	0.0070	0.007
Final	N/A	1.00	0.018	0.002	0.005	1.16	0.084	0.002	0.082	0.38	0.002	
196A	SPC3	0.015	0.025	0.0017	1.08	0.013	2.35	0.25	2.40	0.129	0.0084	0.087
Final	N/A	0.61	0.040	0.001	0.014	0.35	0.033	0.014	0.157	0.189	0.006	

( ) and < Indicate non-certified Value.
[ ] Indiates provisional value, certification in progess

The CKD Low-Alloy Cast Iron CRMs for Solid Sample Spectrometry (CRMs 241-249 A-D)

Designed for the calibration and validation of spectrochemical analysis methods using Atomic Emission Spectrometry (AES) - OE (spark emission), glow discharge or laser excitation, this set is also excellent for X-Ray Fluorescence Spectrometry.

The CRMs can be used as a set of nine or as individual samples. Each individual CRM can be purchased separately.

Manufacture and Technical Parameters

The samples were white chill-cast on a massive copper block with controlled speed at a controlled temperature of the molten metal. The samples are truncated pyramids with a base analytical surface (38x38 mm), a minimum total height of 20 mm and a side ledge 11-13 mm high. The samples can be used until 1 mm of the ledge height remains. The certified portion of a sample extends 10-12 mm from the original analytical surface.

Shrinkage cavities and porosity, which may appear in the uncertified portions of the samples do not affect the analytical performance of the certified portions. The uncertified portions should not be used for calibration and/or validation.

Homogeneity was tested by Atomic Emission Spectrometry with an analytical area approximately 4 mm in diameter.

The CRMs were tested for random homogeneity and trend homogeneity along the height of the certified portion. Trend homogeneity of the casting sequence was also tested. The latter test was supported by Combustion - IR Molecular Absorption Spectrometry and Thermoevolution.

Quality Management System ISO 9001 is in force with the producer. Production, testing and certification were carried out in compliance with the ISO-REMCO Guide 34 (2000).

CKD Low-Alloy Cast Iron Spectrometremetric CRMs **(Cast Iron Calibration - Set of Nine)**

CKD	C	Mn	Si	P	S	Ni	Cr	Cu	Mo	V	Ti	Al	Mg	Ce	B	Sn
Number	**Sb**	**As**	**Pb**	**Bi**	**Zn**	**Se**	**Te**	**Co**	**W**	**Nb**	**Zr**	**La**	**N**	**Fe**		
241B	1.84	0.060	3.15	0.007	0.123	0.021	0.683	0.011	0.61	0.080	0.001	0.003	0.000	0.000	(0.001)	0.003
	0.139	0.002	0.001	0.000	0.000	---	---	0.004	0.001	0.003	0.000	0.000	0.0053	(93.2)		
242A	1.84	0.060	3.06	0.039	0.036	0.039	0.029	0.055	1.13	0.37	0.19	0.036	0.000	---	0.008	0.010
	0.007	0.015	(0.012)	(0.015)	---	---	(0.08)	0.002	(0.007)	0.013	---	---	---	(92.9)		
242B	2.06	0.189	2.81	0.044	0.028	0.022	0.031	0.040	1.21	0.46	0.28	0.042	0.000	---	0.005	0.010
	0.005	0.009	0.027	0.020	---	(0.002)	(0.031)	0.004	(0.002)	0.009	---	0.000	0.0092	(92.6)		
243B	2.29	0.466	2.44	0.173	0.081	0.098	0.394	0.191	0.252	0.227	0.003	0.013	0.000	0.000	0.010	0.110
	0.079	0.078	0.013	---	0.025	(0.016)	---	0.027	0.026	0.024	0.000	0.000	0.0050	(93.0)		
244C	2.57	0.715	2.15	0.027	0.012	0.344	0.248	0.301	0.059	0.002	0.034	0.071	0.031	0.017	0.086	0.175
	0.004	0.043	0.003	0.000	0.027	---	---	0.050	0.052	0.006	0.037	0.008	---	(92.9)		
245B	2.95	1.38	1.59	0.42	0.035	0.194	0.197	0.081	0.115	0.055	0.110	0.038	0.003	---	0.003	0.076
	0.052	0.006	0.020	0.009	---	(0.029)	(0.017)	0.007	0.020	0.029	0.004	---	---	(92.5)		
246B	2.73	0.354	0.76	0.66	0.020	0.065	1.16	1.39	0.009	0.013	0.014	0.101	0.016	0.007	0.000	0.002
	0.004	0.003	(0.002)	(0.001)	---	---	---	0.012	(0.011)	(0.001)	0.000	0.003	---	(92.6)		
247C	3.13	0.99	1.29	0.099	0.0033	0.503	0.029	0.84	0.024	0.010	0.067	0.041	0.053	0.058	0.000	0.040
	0.005	0.012	(0.002)	0.007	0.018	---	(0.007)	0.097	(0.002)	0.048	0.009	0.023	---	(92.6)		
248C	3.39	0.281	1.78	0.053	0.0035	0.688	0.052	0.132	0.001	0.162	0.133	0.028	0.048	0.036	0.038	0.016
	0.017	0.019	0.013	0.002	0.008	(0.007)	(0.003)	0.013	0.011	0.003	0.012	0.011	---	(93.0)		
248D	3.46	0.250	1.79	0.058	0.0042	0.714	0.057	0.122	0.001	0.193	0.111	0.015	0.039	0.030	0.038	0.018
	0.015	0.021	0.011	0.003	0.010	(0.009)	(0.005)	0.009	0.001	0.005	0.014	0.010	---	(93.0)		
249A	4.10	0.197	0.91	0.26	0.013	1.20	0.083	0.497	0.010	0.032	0.084	0.047	0.067	0.027	0.015	0.003
	0.002	0.014	0.015	0.007	0.004	(0.005)	---	0.020	(0.01)	0.021	0.028	0.007	---	(92.3)		

( ) Indicates non-certified value.

CKD Low-Alloy Cast Iron Spectrometrometric CRMs															(Cast Iron Calibration - Set of Nine)
CKD Number	**C / Sb**	**Mn / As**	**Si / Pb**	**P / Bi**	**S / Zn**	**Ni / Se**	**Cr / Te**	**Cu / Co**	**Mo / W**	**V / Nb**	**Ti / Zr**	**Al / La**	**Mg / N**	**Ce / Fe**	**B**	**Sn**
249B	4.06	0.121	0.47	0.26	0.0078	1.16	0.102	0.474	0.013	0.019	0.046	0.105	0.040	0.021	0.016	0.007
	0.005	0.017	0.013	0.006	0.006	(0.005)	---	0.013	(0.011)	0.013	0.048	0.006	---	(92.9)		
249C	4.06	0.099	0.49	0.27	0.0075	1.21	0.148	0.486	0.011	0.026	0.026	0.032	0.042	0.017	0.017	0.002
	0.005	0.016	0.009	0.004	0.006	(0.002)	---	0.014	0.009	0.011	0.027	0.004	---	(92.9)		
249D	3.76	0.127	0.34	0.25	0.008	1.42	0.093	0.479	0.013	0.023	0.095	0.056	0.051	(0.08)	0.018	0.004
	0.004	0.018	0.025	(0.006)	0.004	(0.003)	(0.002)	0.011	(0.01)	0.035	0.039	(0.023)	---	(93.0)		

( ) Indicates non-certified value.

MBH Cast Irons

High P

			C	Si	S	P	Mn	B	Size (mm) W D H
Chill Cast		**11 X HPC 1**	3.22	2.60	0.0311	0.75	0.499	. . .	40 x 15
	*	**11 X HPC 2**	3.16	1.54	0.055	1.78	0.884	(0.0012)	
		11 X HPC 3	3.77	1.58	0.0513	1.96	1.316	. . .	
	*	**11 X HPC 4**	3.59	1.00	0.115	1.63	0.943	(0.001)	

Low Alloy

			C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Sn	Al	Ti	V	Nb	Co	
Chill Cast		**11 X C1**	2.85	1.37	0.045	0.099	1.24	0.592	0.301	0.0213	0.291	0.0253	0.009	0.218	0.120	0.149	0.082	
		11 X C2	3.50	1.31	0.096	0.798	0.980	1.58	1.15	0.109	0.189	0.058	0.0098	0.054	0.289	0.148	0.106	
	*	**11 X C3**	3.46	0.87	0.108	0.41	0.60	3.22	2.14	0.20	0.032	0.18	(0.007)	0.025	0.65	0.13	0.28	
	CRM	**11 X C4**	1.89	3.02	0.138	0.111	0.651	2.41	1.50	0.114	0.342	0.0207	0.032	0.091	0.0233	0.072	0.0175	continued
	*	**11 X C5**	2.78	1.80	0.062	0.102	0.774	1.04	1.22	0.50	0.71	0.043	0.219	0.125	0.045	0.010	0.036	
		11 X C6	3.60	0.464	0.034	0.057	0.934	0.123	0.493	1.54	0.87	0.061	(0.014)	0.141	0.0622	0.008	0.086	
		11 X C7	2.38	0.87	0.022	0.023	1.94	0.23	0.46	0.05	0.056	0.009	0.009	0.014	0.016	(0.05)	0.02	
		11 X C8	3.06	1.42	0.205	0.117	0.371	0.613	0.310	0.201	0.443	0.111	0.010	0.082	0.0374	0.027	0.409	
	*	**11 X C9**	3.18	1.31	0.025	0.053	2.05	1.57	1.20	0.147	0.11	0.048	0.023	0.06	0.30	0.06	0.10	
Double CC		**11 X CC21**	3.12	2.19	0.083	0.0246	0.785	0.107	0.351	0.0357	0.153	0.0078	0.0024	0.0259	0.0083	. . .	. . .	continued

Continuation from above

	W	Pb	As	Zr	Sb	Bi	Se	Te	Zn	B	Ce	La	N	Cd	Size (mm) Ø H
11 X C1	0.014	0.011	0.0049	0.0105	0.058	0.018	0.022	0.0055	0.0101	0.039	. . .	. . .	(0.0046)	. . .	40 x 17
11 X C2	0.081	(0.0090)	0.053	0.0009	0.098	0.0248	0.0285	(0.0020)	0.0096	0.0097	. . .	. . .	. . .	. . .	40 x 17
11 X C3	(0.04)	. . .	0.084	(0.003)	0.21	(0.0007)	. . .	(0.0013)	0.021	. . .	. . .	. . .	0.006	. . .	40 x 18
11 X C4	0.122	0.0155	0.0103	0.006	0.011	0.0050	(0.0030)	0.0010	0.0112	0.018	. . .	. . .	. . .	0.0014	40 x 17
11 X C5	. . .	0.010	0.019	(0.016)	0.030	(0.011)	0.021	(0.002)	0.011	(0.010)	. . .	. . .	0.008	. . .	40 x 17
11 X C6	0.016	(0.0007)	0.052	0.0161	0.0024	0.022	0.0179	0.0165	0.029	0.0052	. . .	. . .	(0.0034)	. . .	40 x 17
11 X C7	0.05	(0.004)	0.01	<0.01	0.02	0.02	. . .	(0.013)	(0.003)	0.008	(0.016)	(<0.005)	0.01	. . .	40 x 15
11 X C8	0.041	0.025	0.078	0.0006	0.073	0.023	0.022	0.005	(0.0038)	0.046	. . .	. . .	(0.0046)	. . .	40 x 17
11 X C9	(0.035)	(0.002)	0.038	. . .	0.10	0.018	. . .	(0.019)	(0.002)	. . .	. . .	. . .	0.015	. . .	40 x 15
11 X CC21	. . .	. . .	0.0101	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	45 x 6

Abrasion Resistant

			C	Si	S	P	Mn	Ni	Cr	Typical Alloy Type	Size (mm) Ø H
Chill Cast		**11 X AR1**	2.76	1.79	0.062	0.044	1.24	4.1	7.7		40 x 15
	*	**11 X AR2**	3.69	0.92	0.173	0.314	0.76	7.17	9.63		
		11 X AR3	3.13	0.95	0.046	0.066	0.58	5.08	6.88	Ni Hard	
		11 X AR4	2.95	1.28	0.024	0.061	0.50	5.04	7.81		
		11 X AR5	3.10	1.70	0.0316	0.0299	0.57	5.16	9.73		

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

MBH Cast Irons

Corrosion Resistant

		C	Si	S	P	Mn	Ni	Cr	Cu	Mo	Sn	Al	Pb	Typical Alloy Type	Size (mm) Ø x H
Chill Cast	11 X S/1 Cr1	2.71	2.42	0.008	0.010	1.73	14	1.72	7.55	. . .	. . .	. . .	. . .	Ni Resist	40 x 15
	11 X S/1 Cr2	2.7	0.87	0.037	0.063	0.41	18	2.5	5.1	. . .	. . .	. . .	. . .	BS 3486 F1	
	* 11 X S/1 Cr3	2.92	1.20	0.035	0.093	0.86	14.91	0.96	6.09	. . .	. . .	. . .	. . .	ASTM A436/439	
	11 X S/1 Cr4	2.58	2.48	0.10	0.257	0.94	15.9	2.39	6.34	. . .	. . .	. . .	. . .	DIN 1694	
	* 11 X S/1 Cr5	2.54	1.27	0.035	0.107	0.75	16.3	3.36	6.31	. . .	. . .	. . .	. . .	NFA 32.301	
Chill Cast	11 X S/2 Cr1	2.83	2.85	0.011	0.31	1.68	16.5	2.48	0.02	. . .	. . .	. . .	. . .		
	11 X S/2 Cr2	3.03	1.23	0.046	0.14	0.53	18	2.35	0.23	. . .	. . .	. . .	. . .	Ni Resist	40 x 15
	11 X S/2 Cr3	2.64	2.44	0.012	0.044	0.90	20.9	2.47	0.48	. . .	. . .	. . .	. . .	BS 3486 F2/S2	
	11 X S/2 Cr4	2.82	2.59	0.010	0.049	0.97	20.7	1.10	0.24	. . .	. . .	. . .	. . .	ASTM A436/439	
	11 X S/2 Cr5	3.01	2.51	0.042	0.14	0.83	19.5	3.99	0.24	. . .	. . .	. . .	. . .	DIN 1694	
	11 X S/2 Cr6	2.65	3.59	0.009	0.254	0.81	18	4.39	0.27	. . .	. . .	. . .	. . .	NFA 32.301	
	* 11 X S/2 Cr7 *	3.2	3	0.05	0.075	0.78	18.5	5.05	0.25	. . .	. . .	. . .	. . .		
	* target values														
Chill Cast	11 X S/3 Cr1	2.61	2.52	0.011	0.046	0.7	31.7	0.15	0.19	. . .	. . .	. . .	. . .	Ni Resist	40 x 15
	11 X S/3 Cr2	2.30	2.59	0.010	0.045	0.85	31	2.62	0.21	. . .	. . .	. . .	. . .	BS 3486 F3/S5S	
	11 X S/3 Cr3	2.49	2.44	0.050	0.053	0.66	29.4	4.06	0.23	. . .	. . .	. . .	. . .	ASTM A436/439	
	11 X S/3 Cr4	2.51	2.37	0.056	0.081	0.65	29.5	5.30	0.23	. . .	. . .	. . .	. . .	DIN 1694	
	11 X S/3 Cr5	2.36	0.99	0.010	0.043	1.15	32.2	2.91	0.04	. . .	. . .	. . .	. . .	NFA 32.301	
	11 X S/3 Cr6	2.51	4.50	0.022	0.056	0.42	26.8	3.42	0.25	. . .	. . .	. . .	. . .		
Cast	11 X 20001	2.90	1.01	0.143	0.005	0.58	21.4	1.50	0.01	. . .	. . .	. . .	. . .		40 x 15
	11 X 20002	3.10	2.19	0.074	0.077	1.05	20	2.49	0.31	. . .	. . .	. . .	. . .	Ni Resist	
	11 X 20003	3.01	3.13	0.013	0.193	1.46	18	2.49	0.54	. . .	. . .	. . .	. . .		
Cast	11 X 0331.1	2.68	2.02	0.17	0.090	1.61	13.31	1.58	7.58	0.294	0.038	0.452	0.056		40 x 13
	11 X 0331.2	2.54	2.78	0.126	0.062	1.32	15.61	1.50	7.42	0.085	0.0220	0.049	0.029		
	11 X 0331.3	2.10	2.46	0.061	0.040	1.08	18.03	2.57	6.49	0.061	0.0091	0.055	0.0112		
	11 X 0331.4	2.09	1.40	0.010	0.015	0.41	19.0	2.1	3.9	0.01	<0.01	0.004	0.002		
	11 X 0331.5	2.82	1.20	0.27	0.09	0.72	12.8	0.45	7.46	0.096	0.08	(0.006)	0.02		
	11 X 0331.6	2.71	2.05	0.0197	0.0473	1.144	14.03	1.13	6.57	0.011	(0.0020)	. . .	(0.0006)		35 x 6

Note: items which are not chill cast may contain some primary carbon.

With Cr

		C	Si	S	P	Mn	Ni	Cr	Cu	Mo	W	Pb	Sn	Size (mm) Ø x H
Cast	* 11 X 15294 *	2.40	0.50	0.08	0.09	0.60	4.0	30	0.15	0.30	0.35	0.04	0.06	43 x 20
	11 X 15295	2.62	0.80	0.063	0.060	0.74	0.22	27.9	0.21	0.27	0.21	. . .	. . .	40 x 15
	11 X 15309	3.14	1.52	0.028	0.006	1.10	0.01	25.03	0.01	<0.01	<0.01	. . .	. . .	40 x 15

* approximate composition - currently being certified

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

Stainless & High Temperature Steel Alloys — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	Grade	Al	B	C	Co	Cr	Cu	Mn	Mo	N	Nb
Status	**UNS#**	**Ni**	**O**	**P**	**S**	**Se**	**Si**	**Sn**	**Ti**	**V**	**W**
21B	13-8 PH Mo	1.04	---	0.038	0.020	12.32	0.032	0.059	2.11	0.0039	0.008
CHIPS ONLY	S13800	8.17	0.0010	0.006	0.003	---	0.047	0.002	0.012	0.011	0.01
21C	13-8 PH Mo	[1.08]	[0.001]	[0.035]	[0.022]	[12.38]	[0.047]	[0.05]	[2.11]	[0.0044]	[0.008]
Provsional	S13800	[8.18]	[0.0005]	[0.006]	[0.0038]	---	[0.043]	[0.004]	[0.013]	[0.013]	[<0.01]
22A	15-5 PH	(0.003)	---	0.046	0.08	15.11	3.33	0.41	0.36	0.020	0.33
CHIPS ONLY	S15500	4.80	(0.024)	0.023	0.005	---	0.34	0.01	<0.01	0.075	(0.03)
22B	15-5 PH	0.004	(0.0007)	0.045	0.08	14.29	3.25	0.53	0.35	0.012	0.301
Final	S15500	4.81	0.001	0.022	0.001	---	0.41	0.01	0.003	0.054	0.028
23A	17-4 PH	(0.002)	---	0.049	0.05	15.51	3.18	0.52	0.10	0.044	0.28
CHIPS ONLY	S17400	4.40	(0.013)	0.024	0.006	---	0.51	0.007	<0.01	0.054	(0.03)
23B	17-4 PH	0.003	0.0007	0.034	0.038	15.21	3.67	0.81	0.19	0.0334	0.22
Final	S17400	4.10	0.0035	0.022	0.022	---	0.40	0.009	0.002	0.059	0.020
152A	17-7 PH	1.18	---	0.075	0.11	16.37	0.40	0.83	0.44	0.0277	0.18
X-Ray ONLY	S17700	7.21	(0.0021)	0.026	0.001	---	0.39	0.008	0.077	0.12	0.051
152B	17-7 PH	1.19	0.002	0.075	0.17	16.94	0.31	0.76	0.51	0.026	0.033
Final	S17700	7.22	0.0011	0.0230	0.0019	---	0.361	0.0081	0.115	0.091	0.05
17B	Nitronic 50	(0.003)	---	0.032	0.080	21.34	0.17	5.12	2.30	0.33	0.22
X-RAY & CHIPS ONLY	S20910	13.36	0.0042	0.033	0.003	---	0.38	0.005	(0.002)	0.20	0.093
17C	Nitronic 50	0.01	0.003	0.033	0.057	21.03	0.38	5.0	2.10	0.265	0.139
Final	S20910	11.99	0.0035	0.022	0.0042	---	0.47	0.006	<0.005	0.183	0.029
18A	Nitronic 60	<0.005	---	0.082	0.11	16.36	0.40	8.19	0.23	0.13	0.05
CHIPS ONLY	S21800	8.24	(0.017)	0.031	0.005	---	4.13	(0.003)	0.011	0.075	0.026
18B	Nitronic 60	0.006	(0.002)	0.085	0.124	16.37	0.362	8.58	0.31	0.157	0.004
Final	S21800	8.50	0.0016	0.032	0.0012	---	3.67	0.003	0.006	0.058	0.020
19B	Nitronic 40	0.01	(0.001)	0.021	0.098	19.98	0.174	9.31	0.275	0.25	0.057
Final	S21900	6.83	0.0061	0.021	0.0020	---	0.48	0.005	0.006	0.102	0.022
241A	AISI 302	0.004	0.0003	0.059	0.083	18.21	0.142	1.43	0.076	0.051	0.004
Final	S30200	8.08	0.0050	0.025	0.020	---	0.43	0.005	0.002	0.065	0.014
241B	AISI 302	0.005	0.0007	0.023	0.121	18.46	0.389	1.76	0.369	0.065	0.007
Final	S30200	8.12	0.008	0.025	0.022	---	0.53	0.022	0.042	0.057	0.037
241C	AISI 302	0.003	0.0005	0.069	0.058	17.80	0.52	1.50	0.117	0.0478	0.003
Final	S30200	8.05	0.007	0.043	0.030	---	0.630	0.0057	0.002	0.039	0.01

( ) and < > Indicates non-certified value.

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Revised - 6/7/2007

Stainless & High Temperature Steel Alloys **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	Grade	Al	B	C	Co	Cr	Cu	Mn	Mo	N	Nb
Status	**UNS#**	**Ni**	**O**	**P**	**S**	**Se**	**Si**	**Sn**	**Ti**	**V**	**W**
1C	AISI 303	0.002	(0.0004)	0.068	0.309	17.35	0.51	1.87	0.583	0.0344	0.056
Final	S30300	8.64	0.0049	0.032	0.378	---	0.634	0.010	0.002	0.107	0.057
253A	AISI 303Se	0.003	0.0003	0.041	0.088	17.90	0.223	1.50	0.348	0.0373	0.016
Final	S30323	9.17	0.009	0.140	0.0089	0.21	0.50	0.01	0.002	0.106	0.10
2C	AISI 304	0.005	0.0021	0.017	0.10	18.44	0.42	1.73	0.45	0.083	0.0100
CHIPS ONLY	S30400	8.49	0.008	0.028	0.023	---	0.60	0.008	0.002	0.043	0.018
2D	AISI 304	(0.002)	(0.0004)	0.047	0.098	18.22	0.43	1.48	0.48	0.0506	0.003
CHIPS ONLY	S30400	8.86	0.0080	0.031	0.020	---	0.49	0.014	(0.002)	0.047	0.022
2F	AISI 304	0.003	0.0004	0.041	0.070	18.37	0.40	1.48	0.20	0.057	0.003
Final	S30400	8.09	0.0087	0.043	0.028	---	0.27	0.008	0.001	0.036	0.021
162A	AISI 304L	0.003	---	0.015	0.084	18.31	0.34	1.69	0.27	0.077	0.012
CHIPS ONLY	S30403	8.56	0.0039	0.023	0.024	---	0.36	0.012	0.002	0.072	0.026
162B	AISI 304L	0.003	0.003	0.022	0.30	18.35	0.81	1.76	0.482	0.0241	0.032
Final	S30403	10.25	0.004	0.029	0.025	---	0.635	0.009	0.002	0.117	0.10
234A	AISI 302 HQ	0.36	0.0009	0.102	0.35	18.0	3.65	1.99	0.004	0.096	0.20
CHIPS & OES ONLY	S30430	8.06	0.0007	0.004	0.0026	---	1.02	0.003	0.002	0.003	0.02
234B	AISI 302 HQ	0.29	0.0005	0.103	0.20	17.99	3.01	1.35	0.004	0.067	0.094
Final	S30430	8.05	0.0005	0.004	0.0011	---	0.54	0.002	0.002	(0.003)	0.014
3A	AISI 309	(0.012)	(0.0002)	0.076	0.113	22.54	0.31	1.58	0.36	(0.089)	0.02
CHIPS ONLY	S30900	12.48	(0.020)	0.026	0.002	---	0.43	0.007	(0.002)	0.06	0.04
3B	AISI 309	0.009	(0.0004)	0.058	0.093	22.41	0.282	1.68	0.49	0.079	0.077
CHIPS ONLY	S30900	12.62	0.0044	0.027	0.0034	---	0.46	0.008	0.004	0.066	0.047
3C	AISI 309	0.004	0.0003	0.066	0.078	22.28	0.130	1.573	0.195	0.037	0.013
Final	S30900	14.88	0.015	0.023	0.027	---	0.27	0.003	0.004	0.116	0.032
3D	AISI 309	---	---	---	---	---	---	---	---	---	---
Coming 2007	S30900	---	---	---	---	---	---	---	---	---	---
4B	AISI 310	(0.012)	---	0.059	0.23	24.33	0.15	1.50	0.11	0.037	0.029
CHIPS ONLY	S31000	20.00	0.0044	0.025	0.003	---	0.97	0.004	0.005	0.075	0.02
4C	AISI 310	0.01	0.0003	0.064	0.098	23.95	0.230	1.69	0.224	0.039	0.013
Final	S31000	19.3	0.0054	0.029	0.0017	---	0.454	0.007	0.003	0.078	0.024
302A	Alloy 254SMO	---	---	---	---	---	---	---	---	---	---
Coming 2007	S31254	---	---	---	---	---	---	---	---	---	---

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Stainless & High Temperature Steel Alloys						**Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**					
IARM Status	**Grade UNS#**	**Al Ni**	**B O**	**C P**	**Co S**	**Cr Se**	**Cu Si**	**Mn Sn**	**Mo Ti**	**N V**	**Nb W**
5C CHIPS ONLY	AISI 316 S31600	0.004 10.15	--- 0.0039	0.049 0.025	0.082 0.029	16.32 ---	0.36 0.42	1.37 0.007	2.09 0.002	0.057 0.064	0.009 0.03
5D Final	AISI 316 S31600	0.005 10.38	(0.0005) 0.0097	0.021 0.040	0.143 0.020	16.56 ---	0.168 0.458	1.78 0.004	2.11 0.008	0.056 0.029	(0.004) 0.016
163A CHIPS ONLY	AISI 316L S31603	(0.005) 10.19	--- 0.0041	0.014 0.025	0.16 0.024	16.62 ---	0.36 0.49	1.37 0.006	2.05 0.003	0.067 0.067	0.018 0.052
163B Final	AISI 316L S31603	0.005 11.14	0.0026 0.0043	0.0138 0.027	0.128 0.025	16.78 ---	0.475 0.516	1.36 0.006	2.04 0.005	0.046 0.075	0.007 0.036
153A 1 OES Left	AISI 317L S31703	0.009 14.11	--- (0.0040)	0.024 0.03	0.16 0.002	18.13 ---	0.23 0.33	1.61 0.008	2.99 0.002	0.0496 0.065	0.022 0.027
153B Final	AISI 317L S31703	0.006 13.19	0.0022 0.0052	0.015 0.031	0.115 0.0082	18.13 ---	0.408 0.28	1.58 0.014	3.12 0.002	0.0158 0.031	0.008 0.020
212A Final	Duplex 2205 S31803	(0.002) 5.69	(0.001) 0.0057	0.015 0.025	0.13 0.002	22.27 ---	0.21 0.41	1.43 0.008	3.08 0.003	0.14 0.079	0.012 0.027
6B CHIPS ONLY	AISI 321 S32100	0.089 9.64	--- 0.0022	0.039 0.030	0.13 0.007	18.14 ---	0.38 0.70	1.35 0.011	0.32 0.23	0.0214 0.074	0.021 0.044
6C CHIPS ONLY	AISI 321 S32100	0.064 9.23	(0.0003) 0.0021	0.038 0.038	0.139 0.0087	17.61 ---	0.130 0.61	1.73 0.005	0.090 0.22	0.027 0.039	0.003 0.013
6D Final	AISI 321 S32100	0.110 9.42	0.0037 0.0010	0.048 0.024	0.182 0.0007	17.45 ---	0.302 0.27	1.52 0.013	0.358 0.63	0.0095 0.128	0.039 0.09
6E Final	AISI 321 S32100	0.139 10.49	0.0005 0.0011	0.046 0.023	0.148 0.022	17.25 ---	0.238 0.489	1.67 0.007	0.383 0.49	0.011 0.144	0.048 0.029
292A Coming 2007	Alloy 2101 S32101	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---
212B Provsional	Alloy 2205 S32205	[0.006] [5.61]	[0.0014] [0.004]	[0.023] [0.023]	[0.073] [0.0005]	[22.22] ---	[0.21] [0.34]	[1.29] [0.006]	[3.26] [0.0031]	[0.169] [0.066]	[0.005] [0.019]
239A Final	Ferralium 255 S32550	0.005 6.07	0.0030 0.017	0.028 0.023	0.037 0.0015	25.74 ---	1.63 0.40	1.01 <0.01	3.14 0.003	0.253 0.05	0.010 0.027
301A Coming 2007	Alloy 2507 S32750	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---
8B CHIPS ONLY	AISI 347 S34700	0.004 9.06	0.0030 0.0056	0.054 0.025	0.097 0.024	17.61 ---	0.26 0.48	1.43 0.010	0.50 0.003	0.0324 0.071	0.63 0.031

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Revised - 6/7/2007

Stainless & High Temperature Steel Alloys

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM	Grade	Al	B	C	Co	Cr	Cu	Mn	Mo	N	Nb
Status	**UNS#**	**Ni**	**O**	**P**	**S**	**Se**	**Si**	**Sn**	**Ti**	**V**	**W**
8C	AISI 347	0.003	(0.0008)	0.060	0.146	17.53	0.46	1.50	0.70	0.054	0.67
Final	S34700	9.15	0.0054	0.030	0.027	---	0.43	0.011	0.002	0.047	0.140
8D	AISI 347	0.004	0.0005	0.054	0.141	17.30	0.472	1.76	0.437	0.0151	0.72
Final	S34700	9.19	0.0043	0.029	0.027	---	0.36	0.007	0.003	0.062	0.079
9A	AISI 410	(0.002)	---	0.14	0.025	11.84	0.07	0.54	0.07	0.016	---
CHIPS ONLY	S41000	0.39	(0.028)	0.029	0.011	---	0.29	(0.007)	(0.004)	0.05	0.014
9B	AISI 410	0.024	---	0.13	0.016	11.97	0.054	0.54	0.064	0.0468	0.028
CHIPS ONLY	S41000	0.30	0.0019	0.019	0.006	---	0.29	0.004	0.005	0.048	0.01
9C	AISI 410	0.014	(0.0003)	0.122	0.038	12.04	0.063	0.38	0.192	0.019	0.005
Final	S41000	0.33	0.0039	0.021	0.029	---	0.35	0.002	0.002	0.080	0.073
10C	AISI 416	0.003	<0.0005	0.128	0.022	12.25	0.155	0.35	0.08	0.015	0.003
Final	S41600	0.24	0.008	0.026	0.29	---	0.37	0.009	0.002	0.024	0.011
20A	Greek Ascoloy	(0.04)	---	0.18	0.034	12.78	0.05	0.41	0.21	(0.04)	0.01
CHIPS ONLY	S41800	2.02	(0.029)	0.015	0.011	---	0.35	(0.003)	<0.01	0.10	2.84
20B	Greek Ascoloy	0.006	---	0.18	0.030	12.42	0.069	0.35	0.32	0.0434	0.010
Final	S41800	1.94	0.0056	0.019	0.004	---	0.40	0.005	0.004	0.17	3.52
20C	Greek Ascoloy	(0.004)	---	0.18	0.031	12.15	0.060	0.30	0.12	0.0222	0.010
Final	S41800	1.93	0.0068	0.018	0.007	---	0.35	0.004	(0.003)	0.086	2.59
154A	AISI 420	0.008	---	0.39	0.021	12.82	0.044	0.47	0.052	0.0294	0.004
CHIPS ONLY	S42000	0.19	(0.0068)	0.018	0.003	---	0.35	0.004	0.002	0.045	0.011
154B	AISI 420	0.002	(0.001)	0.35	0.020	12.20	0.087	0.405	0.079	0.020	0.003
Final	S42000	0.223	0.0016	0.017	0.0004	---	0.45	0.006	0.002	0.067	0.010
205A	AISI 422	0.005	0.003	0.23	0.018	11.48	0.033	0.73	0.98	0.046	0.006
Final	S42200	0.92	0.0019	0.014	0.003	---	0.28	0.003	0.002	0.24	1.01
205B	AISI 422	0.009	0.0003	0.220	0.025	11.72	0.149	0.68	0.97	0.049	0.018
Final	S42200	0.702	0.0016	0.014	0.001	---	0.37	0.006	0.003	0.262	1.1
11A	AISI 430	(<0.02)	---	0.042	0.02	16.8	0.13	0.40	0.02	(0.045)	(0.015)
CHIPS ONLY	S43000	0.22	(0.019)	0.021	0.003	---	0.51	(0.009)	(0.006)	0.04	0.01
11B	AISI 430	(0.003)	---	0.077	0.023	17.59	0.05	0.50	0.03	0.083	(0.007)
CHIPS ONLY	S43000	0.26	---	0.019	0.009	---	0.59	(0.010)	(<0.01)	0.055	---
11C	AISI 430	0.010	<0.0005	0.055	0.017	17.66	0.070	0.52	0.055	0.029	0.005
Final	S43000	0.219	0.004	0.018	0.0030	---	0.51	0.010	<0.003	0.031	<0.005

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Revised - 6/7/2007

Stainless & High Temperature Steel Alloys						Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454					
IARM Status	**Grade UNS#**	**Al Ni**	**B O**	**C P**	**Co S**	**Cr Se**	**Cu Si**	**Mn Sn**	**Mo Ti**	**N V**	**Nb W**
12A	AISI 431	(0.076)	---	0.14	0.03	16.03	0.10	0.61	0.07	(0.057)	0.04
CHIPS ONLY	S43100	2.27	(0.020)	0.024	0.006	---	0.37	(0.007)	0.004	0.07	0.024
12B	AISI 431	(0.003)	(0.0003)	0.174	0.018	16.02	0.143	0.6	0.057	0.061	0.011
Final	S43100	2.15	0.0101	0.016	0.003	---	0.56	0.006	0.003	0.037	0.014
13B	AISI 440C	0.004	---	1.02	0.016	16.78	0.030	0.39	0.48	0.0290	0.003
Final	S44004	0.14	0.0053	0.015	0.001	---	0.72	0.004	0.002	0.041	(0.003)
13C	AISI 440C	0.003	<0.0005	1.02	0.021	16.84	0.031	0.43	0.455	0.0188	0.004
Final	S44004	0.108	0.0029	0.017	0.001	---	0.69	(0.004)	0.005	0.10	<0.005
14A	AISI 446	(<0.01)	---	0.089	0.038	23.84	0.06	0.46	0.05	[0.17]	(<0.01)
CHIPS ONLY	S44600	0.31	[0.021]	0.023	0.004	---	0.37	[0.013]	(<0.01)	0.045	0.014
14B	AISI 446	0.004	(0.0004)	0.016	0.030	23.60	0.071	0.426	0.095	0.043	0.006
Final	S44600	0.29	0.0054	0.022	0.0015	---	0.51	0.005	0.0024	0.11	0.011
15A	Custom 450	0.029	---	0.033	0.11	14.9	1.59	0.38	0.77	(0.015)	0.62
CHIPS ONLY	S45000	6.54	(0.022)	0.021	0.003	---	0.41	0.005	(<0.01)	0.09	0.026
15B	Custom 450	0.006	---	0.047	0.24	14.53	1.53	0.39	0.82	0.0355	0.65
Final	S45000	6.94	0.0039	0.013	0.001	---	0.33	0.009	0.005	0.033	0.12
16B	Custom 455	0.062	(0.0018)	0.0067	0.027	11.44	2.23	0.026	0.016	0.0022	0.25
Final	S45500	8.28	0.0011	0.007	0.0025	---	0.039	0.004	1.11	0.067	0.011
291A	M-152	[0.01]	[0.001]	[0.11]	[0.021]	[11.3]	[0.061]	[0.71]	[1.61]	[0.035]	[0.020]
Provsional	S64152	[2.62]	[0.014]	[0.016]	[0.009]	---	[0.23]	[0.004]	[0.002]	[0.29]	[(0.01)]
26B	A286	0.25	---	0.050	0.24	14.76	0.038	0.19	1.24	0.0064	0.021
Final	S66286	25.06	0.0032	0.013	0.002	---	0.16	0.003	2.03	0.28	0.068
242A	Aermet 100	0.004	(0.0005)	0.24	13.5	3.00	0.007	0.018	1.21	0.0003	0.004
Final	K92580	11.1	0.0006	0.002	0.0004	---	0.02	(0.001)	0.009	0.01	<0.01
99B	Maraging 300	0.095	0.0026	0.005	9.24	0.081	0.094	0.036	4.88	0.0011	(0.005)
Final	K93120	18.46	0.0015	0.005	0.0005	---	0.022	(0.003)	0.74	0.012	0.016
24A	Invar-36	(0.002)	---	0.055	0.056	0.17	0.08	0.76	0.01	(0.0026)	(0.01)
Final	K93601	36.07	(0.009)	0.01	0.001	---	0.27	(0.002)	<0.005	0.024	(0.035)
214A	NMS-100	(0.002)	(0.001)	0.018	0.021	12.36	0.36	18.3	0.44	0.27	0.23
Final	N/A	2.33	0.0026	0.033	0.002	---	1.00	0.008	0.002	0.04	0.02
25A	20Cb3	0.01	---	0.024	0.27	19.63	3.23	0.48	2.10	(0.015)	0.51
CHIPS ONLY	N08020	33.57	(0.012)	0.020	0.003	---	0.32	0.028	0.004	0.10	0.05

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

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Stainless & High Temperature Steel Alloys — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	Grade	Al	B	C	Co	Cr	Cu	Mn	Mo	N	Nb
Status	**UNS#**	**Ni**	**O**	**P**	**S**	**Se**	**Si**	**Sn**	**Ti**	**V**	**W**
7A	Alloy 330	0.022	---	0.063	0.06	19.00	0.19	1.51	0.31	0.038	0.013
CHIPS ONLY	N08330	(35.53)	(0.014)	0.018	0.004	---	1.24	0.003	(0.004)	0.05	(0.045)
7B	Alloy 330	0.023	(0.002)	0.062	0.069	19.32	0.21	1.47	0.19	0.0130	0.023
Final	N08330	35.84	0.0026	0.018	(0.001)	---	1.38	0.004	(0.005)	0.048	(0.031)
157A	AL6XN	0.021	---	0.023	0.045	20.7	0.14	0.35	6.18	0.20	0.019
X-RAY & CHIPS ONLY	N08367	23.8	---	0.014	0.001	---	0.39	(<0.01)	(0.004)	0.044	0.023
157B	AL6XN	[0.014]	[0.001]	[0.015]	[0.21]	[20.4]	[0.21]	---	[0.40]	[6.3]	0.02
Provisional	N08367	[23.9]	[0.002]	[0.021]	[0.001]	---	[0.31]	[0.01]	[0.004]	[0.07]	0.023
100A	Haynes 556	(0.29)	(0.0015)	0.11	17.66	21.82	0.09	1.00	2.87	(0.16)	0.11
X-RAY & CHIPS ONLY	R30556	(20.17)	---	(0.012)	0.001	---	0.45	---	(0.023)	0.04	2.42
100B	Haynes 556	0.31	(0.003)	0.100	18.03	22.32	0.049	1.07	3.13	0.132	0.130
X-RAY & CHIPS ONLY	R30556	21.16	0.0016	0.010	0.0006	---	0.400	<0.005	0.005	0.043	2.48
100C	Haynes 556		---	---	---	---	---	---	---	---	---
Coming 2007	R30556		---	---	---	---	---	---	---		

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

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MBH Stainless & High-Alloy Steel Solids

	Austenitic	C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Al	Nb	Sn	B	N	Size (mm) Ø H
Cast	**13 X 17001**	0.114	0.34	0.016	0.080	1.73	6.05	14.89	0.12	0.037	0.15	0.01	0.76	0.030	0.008	0.040	40 x 15
	13 X 17002	0.08	0.51	0.029	0.047	0.98	8.24	17.79	0.22	0.06	0.08	. . .	0.43	. . .	. . .	. . .	
	13 X 17003	0.10	0.78	0.035	0.037	0.85	11.9	11.89	0.27	0.08	0.07	. . .	0.34	. . .	. . .	. . .	
	13 X 17004	0.06	1.32	0.048	0.024	0.62	16.06	21.78	0.31	0.11	0.05	. . .	0.23	. . .	. . .	. . .	
	13 X 17005	0.005	1.79	0.051	0.011	0.246	19.97	24.7	0.49	0.09	0.03	. . .	0.10	. . .	. . .	0.007	
Cast	**13 X 19001**	0.10	1.20	0.080	0.031	0.92	5.14	14.95	1.54	0.19	. . .	. . .	0.04	. . .	. . .	. . .	40 x 15
	13 X 19003	0.050	0.60	0.029	0.050	1.47	12.8	19.2	2.49	0.074	. . .	. . .	0.12	. . .	. . .	. . .	
	13 X 19004	0.066	0.36	0.014	0.069	1.96	17.9	22.8	3.62	0.022	. . .	. . .	0.18	. . .	. . .	. . .	
Cast	**13 X 18001**	0.22	0.32	0.057	0.022	1.40	6.41	15.92	0.80	0.16	0.04	. . .	0.57	. . .	. . .	. . .	40 x 15
*	**13 X 18002**	0.114	0.46	0.048	0.028	0.95	7.98	17.7	0.199	0.112	0.056	. . .	1.51	. . .	. . .	0.011	
CRM	**13 X 18003**	0.203	1.008	0.042	0.054	0.773	10.35	19.98	0.397	0.074	0.120	. . .	1.12	. . .	. . .	0.046	42 x 15
	13 X 18004	0.07	1.44	0.012	0.094	2.1	12.55	21.64	0.63	0.04	0.18	. . .	0.83	. . .	. . .	. . .	

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	W	Ti	Al	
Cast	**13 X 12533**	0.03	0.37	0.032	0.011	1.13	5.04	18.8	1.05	0.18	0.055	. . .	0.14	0.011	
	13 X 12534	0.07	0.81	0.043	0.014	0.54	8.10	17.56	2.02	0.10	0.05	. . .	0.21	0.02	
*	**13 X 12535 ***	0.20	1.20	0.05	0.075	0.20	15.0	17.0	4.0	0.06	0.06	. . .	1.00	0.04	continued
	13 X 12536	0.165	0.65	0.13	0.053	0.47	11.9	14.8	2.53	0.048	0.09	. . .	0.47	0.11	
	13 X 12537	0.054	1.09	0.028	0.11	0.91	10.05	19.9	3.03	0.03	0.12	. . .	0.49	0.056	
		* target values													
Cast	**13 X 12853**	0.050	0.99	0.016	0.016	1.17	11.92	17.2	2.74	0.114	0.06	0.12	0.027	. . .	
CRM	**13 X 12854**	0.055	1.10	0.0155	0.018	1.32	12.12	16.64	2.79	0.161	0.126	0.153	0.051	(0.058)	continued
	13 X 12855	0.109	1.00	0.016	0.014	1.04	12.1	17.2(5)	2.78	0.40	0.16	0.21	0.043	. . .	

Continuation from above	Ta	Sn	B	Sb	Zr	Bi	N	V	Zn	Se	Typical Alloy Type	Size (mm) Ø H
13 X 12533	(0.17)	(0.03)	(0.01)	. . .	. . .	. . .	(0.014)	. . .	. . .	. . .		40 x 15
13 X 12534	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .		
13 X 12535	. . .	0.017	. . .	. . .	. . .	. . .	0.056	. . .	. . .	. . .		43 x 20
13 X 12536	0.15	0.018	0.022	. . .	. . .	. . .	. . .	. . .	. . .	. . .		
13 X 12537	0.24	0.08	0.006	. . .	. . .	. . .	0.044	. . .	. . .	. . .		
13 X 12853	0.03	. . .	0.003	0.02	0.009	(0.007)	(0.011)	. . .	. . .	. . .		40 x 15
13 X 12854	0.065	0.020	0.0090	0.114	0.010	0.019	0.057	0.118	0.021	0.016	AISI 316	42 x 15
13 X 12855	0.07	. . .	0.021	0.19	<0.01	<0.005	. . .	. . .	. . .	. . .		

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MBH Stainless & High-Alloy Steel Solids

Maraging

		C	Si	S	P	Mn	Ni	Cr	Mo	Co	Al	Ti	Size (mm) Ø x H
Cast	13 X 14933	0.008	0.05	0.014	0.023	0.17	16.8	0.022	3.83	11.4	<0.005	0.029	40 x 15
	13 X 14934	0.009	0.13	0.014	0.028	0.30	17.8	0.16	4.7	8.5	0.022	0.67	
	13 X 14935	0.03	0.31	0.052	0.040	0.32	18.93	0.26	5.40	7.05	0.26	0.94	

Martensitic

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Nb	Sn	V	N	Typical Alloy Type	Size (mm) Ø x H
Cast	CRM 13 X 12547	0.335	0.246	0.110	0.062	1.16	0.58	16.43	0.741	0.544	0.313	0.349	0.0232	0.098	0.0511		42 x 15
	13 X 12548	0.18	0.32	0.224	0.027	0.75	1.12	12.91	1.30	0.26	0.37	0.56	. . .	. . .	. . .	AISI 414	
	13 X 12549	0.16	0.43	0.29	0.092	0.34	1.26	11.70	1.49	0.10	0.52	0.23	. . .	. . .	. . .		
Cast	13 X 14775	0.05	0.63	0.054	0.053	1.37	1.75	17.7	0.47	0.21	0.15	0.75	. . .	. . .	. . .		40 x 15
	13 X 15023	0.12	0.19	0.012	0.013	1.43	0.78	10.75	1.49	0.06	0.05	1.20	. . .	. . .	. . .		
	13 X 15024	0.12	0.77	0.028	0.030	0.57	2.84	14.94	0.24	0.36	0.10	0.10	. . .	. . .	. . .		
	13 X 15035	0.10	0.68	0.069	0.054	0.93	2.66	13.94	0.45	0.31	0.21	0.63	. . .	. . .	. . .		
	13 X 15059	0.057	0.48	0.020	0.015	1.22	1.30	15.97	0.63	0.14	0.26	0.8(1)	(0.02)	0.06	0.049		

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Sn	V	Al	As	Ti	Sb	B	N	Size (mm) Ø x H
Chill Cast	13 X 8110F	0.247	0.13	0.015	0.017	0.12	2.08	9.71	1.51	0.040	0.010	0.1	(0.002)	(0.008)	0.006	. . .	. . .	0.017	40 x 15
	13 X 8110G	0.26	0.33	0.026	0.027	0.18	2.84	11.08	1.84	0.06	<0.005	0.24	0.03	0.02	0.008	<0.01	. . .	. . .	
	13 X 8110I	0.07	0.15	0.010	0.011	0.05	1.24	10.24	0.97	0.024	<0.005	0.03	0.004	0.011	<0.005	0.004	. . .	. . .	
	13 X 8110J	0.14	0.27	0.010	0.012	0.04	2.81	11.46	1.75	0.030	0.009	0.25	0.017	<0.001	0.10	0.005	. . .	. . .	
	13 X 8110K	0.10	0.34	0.008	0.009	0.07	1.80	13.66	2.12	0.18	0.02	0.11	0.08	<0.001	0.28	0.02	. . .	. . .	
	13 X 8110L	0.792	0.96	0.110	0.059	0.772	4.11	12.33	2.71	0.286	. . .	0.207	0.009	0.085	0.055	. . .	1.09	0.024	40 x 17
Chill Cast	13 X 58191	0.46	0.50	0.011	0.018	1.21	0.29	14.4	0.17	0.02	0.033	0.42	0.02	0.012	<0.01	. . .	(0.001)	(0.040)	40 x 15
	13 X 58192	0.443	0.63	0.007	0.018	1.27	0.28	14.0	0.12	0.025	0.07	0.43	0.04	0.025	0.056	. . .	(0.0016)	(0.040)	
	13 X 58193	0.46	0.55	0.008	0.013	1.24	1.03	14.2	0.09	0.12	0.06	0.41	0.019	0.024	0.050	. . .	<0.002	0.038	
	13 X 58194	0.49	0.56	0.007	0.013	1.15	1.22	14.1	0.11	0.030	0.05	0.40	0.04	0.02	0.07(4)	. . .	(0.0008)	0.040	
	13 X 58195	0.40	0.57	0.005	0.013	1.31	2.03	14.0	0.15	0.021	0.03	0.41	0.05	0.007	0.15	. . .	<0.001	0.026	

Special Stainless

		C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Nb	W	Ti	V	Al	Cd	N	Size (mm) Ø x H
Cast	13 X 12538	0.04(5)	0.64	. . .	. . .	0.78	6.07	23.72	1.53	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	13 X 12539	0.15	0.85	. . .	. . .	0.80	5.45	25.55	1.10	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
	13 X 12540	0.15	1.05	. . .	. . .	0.44	5.17	27.88	0.54	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
Cast	13 X 14207	0.06	1.55	0.011	0.011	1.04	12.48	19.97	0.23	0.24	0.01	0.26	3.05	. . .	. . .	. . .	. . .	. . .	40 x 15
	13 X 14211	0.112	1.75	0.018	0.016	0.65	12.8	25.7	0.31	0.28	0.056	0.15	2.80	. . .	. . .	. . .	. . .	. . .	
	CRM 13 X 14212	0.069	2.50	0.041	0.058	0.66	10.33	20.90	0.540	5.56	0.241	0.612	3.32	(0.018)	0.152	(0.013)	0.0015	0.121	43 x 20
	* 13 X 14215	0.126	0.56	0.016	0.016	1.08	15.70	23.8	0.046	0.03	0.016	(0.016)	2.89	0.08	0.06	. . .	. . .	. . .	
	* 13 X 14216 *	0.09	1.50	0.029	0.028	0.94	12.55	22.48	0.23	0.22	0.22	0.36	2.2	. . .	. . .	. . .	. . .	. . .	
	13 X 14219	0.08	1.48	0.048	0.047	0.48	12.39	21.71	0.19	0.23	. . .	0.19	4.07	. . .	. . .	. . .	. . .	. . .	

* target composition

( ) Indicates non-certified value.
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MBH Stainless & High-Alloy Steel Solids

		Precipitation Hardening Steel	C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Nb	N	Co	V	B	Cd	Typical Alloy Type	Size (mm) Ø x H
Cast	*	**13 X PH 1 ***	0.115	0.25	0.030	0.060	1.45	5.20	16.0	0.20	3.10	0.08	0.082	. . .	. . .	. . .	. . .		43 x 20
		13 X PH 2	0.07	0.51	0.020	0.025	0.89	3.79	16.7	0.94	4.11	0.17	(0.013)	. . .	. . .	. . .	. . .		40 x 15
	CRM	**13 X PH 3**	0.167	1.70	0.039	0.023	0.399	6.03	7.47	0.996	7.06	0.65	0.0291	0.398	0.066	0.0046	(0.0006)		43 x 20
		13 X PH 4	0.052	0.78	0.070	0.040	0.805	4.12	15.46	0.296	5.73	0.393	0.131	. . .	. . .	. . .	. . .		43 x 20
		13 X PH 5	0.122	1.03	0.015	0.065	0.98	4.51	17.85	0.51	4.42	0.58	0.046	. . .	. . .	. . .	. . .	FV 520	40 x 15
		13 X PH 6	0.116	2.10	0.015	0.040	0.652	6.35	12.13	1.45	2.08	0.539	0.027	. . .	. . .	. . .	. . .		43 x 20
		13 X PH 7	0.10	1.40	0.021	0.031	1.49	5.58	13.15	2.53	0.79	0.29	0.060	. . .	. . .	. . .	. . .		40 x 15

* approximate composition - currently being certified

		High Nitrogen Stainless Steel	C	Si	S	Mn	Ni	Cr	Mo	Nb	Cu	N	Co	W	V	Al	Size (mm) Ø x H
Cast		**13 X NSA 1**	0.07	0.4	. . .	0.42	7.9(6)	20.3	2.47	. . .	. . .	0.040	. . .	. . .	. . .	. . .	40 x 15
	*	**13 X NSA 2**	0.142	0.805	0.0083	0.808	10.24	18.71	1.89	. . .	. . .	0.163	. . .	. . .	. . .	. . .	
		13 X NSA 3	0.16	0.57	. . .	1.07	12.0	16.1	2.8	. . .	. . .	0.20	. . .	. . .	. . .	. . .	
Chill Cast		**13 X NSA 4**	0.0262	0.44	0.0130	5.59	17.11	23.79	4.19	0.079	0.487	0.532	. . .	. . .	. . .	. . .	40 x 17
Wrought		**13 X NSB 1**	0.17	0.58	. . .	0.44	10.0	19.1	0.11	. . .	. . .	0.04	. . .	. . .	. . .	. . .	40 x 15
		13 X NSB 2	0.06	0.66	. . .	0.62	11.1	18.2	0.21	. . .	. . .	0.095	. . .	. . .	. . .	. . .	
		13 X NSB 3	0.101	0.73	. . .	1.07	9.05	17.10	0.49	. . .	. . .	0.29	. . .	. . .	. . .	. . .	
Chill Cast		**13 X NSC 1**	0.368	0.76	0.0103	7.28	5.08	17.89	0.254	1.430	0.348	0.063	. . .	. . .	. . .	. . .	40 x 17
	*	**13 X NSC 2 ***	0.50	1.0	. . .	9.0	4.0	21.0	. . .	2.0	. . .	0.25	. . .	. . .	. . .	. . .	
	*	**13 X NSC 3**	1.959	2.23	0.0127	11.69	2.48	27.44	0.13	2.42	0.13	0.549	. . .	. . .	. . .	. . .	40 x 17
		* target composition															
Cast	CRM	**13 X NSC 4**	0.559	1.65	0.0100	8.98	6.94	31.88	1.28	3.15	0.197	0.896	0.215	0.192	0.197	(0.029)	40 x 17
Wrought	*	**13 X NSD1**	0.046	0.41	0.009	23.53	0.114	24.51	1.12	0.030	0.042	0.88	. . .	. . .	. . .	. . .	40 x 15
	*	**13 X NSD2**	0.253	1.50	0.0027	17.01	0.104	23.94	1.06	. . .	0.054	0.801	. . .	. . .	. . .	. . .	

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

MBH Stainless & High-Alloy Steel Solids

High Speed Steel

			C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	W	V	N	Sn		Typical Alloy Type	Size (mm) Ø x H
Wrought	*	14 X HS 1	0.72	0.23	0.020	0.018	0.29	0.28	4.00	0.36	0.07	0.25	17.2	1.04	0.023	(0.035)		T-1	40 x 15
Wrought	*	14 X HS 2	0.78	0.21	0.014	0.02	0.24	0.20	4.15	0.44	0.105	5.10	18.1	1.20	0.021	(0.03)		T-4	
Chill cast	*	14 X HS 3	0.92	0.35	0.031	0.016	0.632	0.354	5.60	1.33	0.128	10.73	19.6	1.31	0.030	(0.014)	As 0.017	T-5/6	
Wrought		14 X HS 4	1.01	0.11	0.012	0.010	0.13	0.05	3.68	0.42	0.03	2.04	9.8	0.47	. . .	. . .			
Wrought		14 X HS 5	0.59	0.30	0.022	0.015	0.29	0.16	3.4	3.54	0.13	8.02	6.0	1.37	. . .	. . .		M-36	
Wrought		14 X HS 6	0.70	0.14	0.032	0.026	0.17	0.06	3.94	5.47	0.08	0.26	6.63	1.95	. . .	. . .		M-2	
Chill cast		14 X HS 7	1.33	0.38	0.028	0.032	0.32	0.07	4.19	5.00	0.10	0.77	14.28	1.83	. . .	. . .			
Wrought		14 X HS 8	0.97	0.14	0.022	0.020	0.28	0.16	3.55	9.47	0.09	9.04	1.81	1.20	. . .	. . .		M-33	
	CRM	14 X HS 9	2.14	0.406	0.0126	0.0222	0.259	0.239	12.40	1.11	0.039	0.037	0.011	4.06	0.032	. . .		D7	42 x 15
																. . .			
Cast		14 X 14944	0.62	0.17	0.011	0.016	0.23	0.19	2.87	0.14	0.10	0.15	15.5	1.00	. . .	. . .			40 x 15
		14 X 14945	0.67	0.26	0.041	0.033	0.72	0.33	3.97	0.23	0.12	0.22	16.84	0.55	. . .	. . .			
		14 X 14946	0.85	0.46	0.048	0.051	0.53	1.06	5.06	0.21	0.25	0.44	16.9(7)	1.03	. . .	. . .		T-1	
		14 X 14948	0.83	0.26	0.017	0.011	0.65	0.29	4.04	0.14	0.04	0.16	18.8	0.65	. . .	. . .			
		14 X 14952	0.90	0.32	0.054	0.054	0.64	0.34	4.93	0.32	0.02	0.02	18.0	1.24	. . .	. . .			
Cast		14 X 14890	0.81	0.69	0.028	(0.012)	0.58	0.08	3.60	5.59	0.09	0.32	5.30	1.99	. . .	. . .			40 x 15
		14 X 14891	0.67	0.43	0.043	0.014	0.23(5)	1.02	4.83	4.49	0.14	0.07	7.22	1.47	. . .	. . .		M-2	
		14 X 14892	0.83	0.23	0.047	0.054	0.23	0.23	3.99	4.99	0.20	0.16	6.30	1.76	. . .	. . .			

Continuation from above	Nb	Al
14 X HS 9	(0.011)	(0.022)

High Manganese Steel

			C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Al	V	Sn	N	Nb	Size (mm) Ø x H
Chill Cast	*	14 X MN1	0.500	0.610	0.0069	0.019	17.95	0.308	1.587	0.543	0.055	0.024	0.015	(0.0023)	0.076	0.168	40 x 17
	*	14 X MN2	0.70	1.00	0.014	0.013	8.84	0.49	0.29	1.45	0.034	(0.007)	0.07	0.08	0.018	. . .	
	*	14 X MN3	1.08	0.88	0.015	0.067	11.03	0.613	1.10	0.233	0.77	(0.004)	0.064	0.024	0.04	0.163	
	*	14 X MN4	1.303	0.77	0.019	0.046	15.35	1.16	2.14	0.805	0.320	0.055	0.034	0.028	0.038	0.054	40 x 17
	*	14 X MN5	1.58	1.55	0.040	0.042	7.70	1.60	3.64	2.00	0.55	0.105	0.018	0.009	0.026	. . .	
Cast		14 X 15195	1.64	1.45	0.018	0.062	12.06	0.09	0.11	0.30	0.12	0.08	0.33	0.05	. . .	. . .	40 x 15
		14 X 15196	1.08	1.64	0.012	0.037	10.16	0.25	0.26	0.22	0.22	0.13(5)	0.21	0.10(5)	. . .	. . .	
		14 X 15197	1.25	1.43	0.041	0.093	13.7(2)	0.42	0.25	0.12	0.32	0.39	0.11	0.18	. . .	. . .	

Free-machining and Resulfurised Steel

			C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Sn	Co	V	N	Ti	Al	Size (mm) Ø x H
Cast	CRM	14 X MSFM1	0.0098	0.351	0.364	0.0778	1.109	0.0205	0.017	0.249	0.0056	0.0041	0.0019	0.0026	0.0060	. . .	0.0024	40 x 15
		14 X MSFM2	0.269	0.503	0.191	0.060	1.83	0.041	0.060	0.291	0.0085	(0.003)	0.0033	(0.0008)	(0.003)	(0.002)	. . .	40 x 15
		14 X MSFM3	0.55	0.52	0.087	0.060	2.10	. . .	. . .	0.27	. . .	. . .	. . .	. . .	. . .	. . .	. . .	

Speciality Alloys

		C	Si	S	Mn	Ni	Cu	Co	Al	Ti	Zr	Typical Alloy Type	Size (mm) Ø x H
Cast	14 X ALNICO 1	0.08	0.31	0.007	0.26	17.1	6.1	15.1	9.03	0.50	0.2	AlNiCo	40 x 15

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

Nickel Based Alloys

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM Status	Grade UNS#	Al Nb	B Ni	C O	Co P	Cr S	Cu Si	Fe Ta	Mg Ti	Mn V	Mo W	N Zr
98A	Kovar	0.04	---	0.019	(17.50)	0.12	0.05	(52.77)	---	0.24	0.05	---
Final	K94610	(<0.01)	(29.09)	---	(0.002)	0.002	0.10	---	<0.01	<0.01	(0.03)	(<0.01)
50B	Alloy 200	0.031	(0.0002)	0.010	0.069	0.010	(0.001)	0.079	(0.001)	0.20	(0.003)	0.0001
Final	N02200	(0.002)	99.5	0.0061	0.002	0.0002	0.059	<0.005	0.002	0.016	0.010	(0.001)
51A	Alloy 400	0.05	(<0.001)	0.13	0.015	0.01	29.87	2.07	---	1.49	<0.01	---
CHIPS ONLY	N04400	<0.01	---	---	0.008	0.001	0.26	<0.01	0.05	(<0.01)	(<0.01)	<0.01
51B	Alloy 400	0.004	---	0.16	0.029	0.32	31.70	1.60	0.015	1.01	0.043	0.0004
Final	N04400	(<0.01)	64.9	0.0022	0.011	0.002	0.105	---	0.05	(<0.01)	(<0.01)	<0.01
202A	Alloy R-405	0.080	(<0.002)	0.13	0.020	0.008	32.3	1.31	0.024	1.03	(<0.01)	0.0004
Final	N04405	---	64.8	(0.0018)	0.011	0.032	0.046	(0.008)	0.005	(<0.01)	(<0.01)	0.010
52B	Alloy K-500	3.02	(0.0003)	0.154	0.004	0.047	30.22	0.77	0.012	0.77	0.011	0.0002
Final	N05500	(0.004)	64.3	(0.001)	0.009	0.0010	0.09	---	0.50	0.003	(0.005)	0.039
69B	Alloy X	0.20	(0.0007)	0.074	1.58	21.90	0.11	17.84	0.006	0.68	8.78	0.0155
Final	N06002	0.11	47.37	0.0011	0.013	0.0004	0.38	---	0.011	0.10	0.78	0.005
69C	Alloy X	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	N06002	---	---	---	---	---	---	---	---	---	---	---
65A	Alloy C-22	0.27	---	0.011	1.52	21.38	0.14	4.37	(0.003)	0.37	13.31	---
CHIPS ONLY	N06022	0.08	---	---	0.01	0.0013	0.05	---	0.01	0.16	2.92	(<0.01)
65B	Alloy C-22	0.283	(0.002)	0.0054	0.59	21.32	0.054	3.63	0.009	0.29	13.02	0.046
Final	N06022	0.029	57.3	0.0013	0.006	0.0005	0.030	(0.06)	0.005	0.155	2.87	<0.001
67A	Alloy G-30	0.20	(0.005)	0.019	3.61	(28.77)	1.88	14.88	---	1.11	5.02	---
CHIPS ONLY	N06030	0.70	---	---	0.016	0.0014	0.30	(0.024)	0.03	(0.04)	3.13	(<0.01)
67B	Alloy G-30	0.26	(0.001)	0.008	3.69	28.54	1.74	14.26	0.007	1.12	4.98	0.060
Final	N06030	0.73	41.1	0.0014	0.012	0.0010	0.24	(0.03)	0.005	0.054	3.10	(0.002)
258A	Hastelloy C-2000	0.30	0.001	0.005	0.08	22.8	1.54	0.85	0.009	0.21	15.5	0.032
Final	N06200	0.01	58.6	0.0009	0.005	0.0007	0.015	<0.01	0.003	0.014	0.14	<0.005
68B	Haynes 230	0.22	(0.002)	0.097	0.40	21.02	0.019	1.48	0.004	0.52	2.34	0.050
CHIPS ONLY	N06230	0.018	59.8	(0.0009)	(0.005)	(0.0004)	0.38	(0.021)	0.008	0.013	13.45	<0.01
68C	Haynes 230	0.35	0.0026	0.104	0.18	22.01	0.017	1.10	0.004	0.50	1.35	0.0610
Final	N06230	0.041	59.7	0.0009	0.006	0.0002	0.44	(0.01)	0.006	0.033	14.2	(0.002)
60A	RA 333	(0.08)	(0.003)	0.058	3.02	25.72	0.10	17.71	---	1.50	3.09	(0.044)
CHIPS ONLY	N06333	0.14	---	---	(0.017)	0.001	1.21	(0.02)	0.03	0.07	2.98	(<0.01)

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Nickel Based Alloys Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM	Grade	Al	B	C	Co	Cr	Cu	Fe	Mg	Mn	Mo	N
Status	**UNS#**	**Nb**	**Ni**	**O**	**P**	**S**	**Si**	**Ta**	**Ti**	**V**	**W**	**Zr**
60B	RA 333	0.05	0.002	0.062	2.9	25.3	0.05	17.9	(0.001)	1.53	2.87	0.029
Final	N06333	0.016	45.3	0.0035	0.015	0.0003	0.87	(0.01)	0.004	0.070	3.08	0.001
53B	Alloy 600	0.17	0.005	0.064	0.057	14.55	0.13	9.75	0.005	0.25	0.12	0.0095
X-RAY & CHIPS ONLY	N06600	0.073	74.2	---	0.008	0.0008	0.11	---	0.33	0.024	0.018	<0.01
53C	Alloy 600	0.21	0.004	0.070	0.035	14.95	0.045	7.16	0.008	0.21	0.047	0.0079
Final	N06600	0.024	76.5	(0.0016)	0.006	(<0.001)	0.33	---	0.34	0.029	(0.008)	<0.01
53D	Alloy 600	0.34	0.0035	0.045	0.052	15.20	0.015	6.86	0.007	0.49	0.02	0.0075
Final	N06600	0.006	76.2	0.0009	0.005	0.0005	0.35	<0.01	0.34	0.022	0.022	---
53E	Alloy 600	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	N06600	---	---	---	---	---	---	---	---	---	---	---
54C	Alloy 625	0.24	0.0021	0.021	0.069	21.3	0.09	2.71	0.0007	0.050	8.69	0.009
Final	N06625	3.50	62.8	0.0005	0.005	0.0009	0.1	(0.01)	0.31	0.014	0.040	0.005
201A	Alloy 690	0.37	(<0.002)	0.019	0.009	29.9	0.008	9.09	0.006	0.19	0.018	0.0053
Final	N06690	0.009	59.9	(0.0009)	0.005	(0.0004)	0.15	---	0.30	0.011	(<0.01)	<0.01
62B	Waspaloy	1.38	0.005	0.028	12.95	19.06	0.024	0.79	(0.001)	0.026	4.17	0.0022
CHIPS ONLY	N07001	0.050	58.33	0.0014	0.0028	0.0003	0.073	---	3.02	0.022	0.068	0.036
62C	Waspaloy	1.35	0.0073	0.057	12.40	19.44	0.008	0.09	0.0015	0.008	3.94	0.0049
Final	N07001	0.006	59.6	0.0008	0.002	0.0003	0.035	---	2.89	0.006	0.019	0.061
61A	Haynes 214	4.42	0.005	0.042	(<0.01)	16.12	(0.01)	3.57	(<0.002)	0.17	<0.01	---
X-RAY & CHIPS ONLY	N07214	(0.01)		---	0.003	0.001	0.02	(<0.01)	<0.01	(<0.01)	<0.01	0.02
56C	Alloy 718	0.521	0.0029	0.025	0.011	18.02	0.016	18.39	0.0007	0.064	2.94	0.0089
CHIPS ONLY	N07718	5.18	53.68	0.0004	0.009	0.0003	0.049	0.008	0.99	0.027	0.02	(0.004)
56D	Alloy 718	0.60	0.0044	0.041	0.298	18.37	0.063	18.10	0.0051	0.200	3.06	0.0084
CHIPS ONLY	N07718	5.22	52.8	0.0014	0.010	0.0003	0.119	0.007	0.98	0.033	0.064	(0.001)
56E	Alloy 718	[0.61]	[0.004]	[0.033]	[0.27]	[18.44]	[0.056]	[18.3]	[0.0024]	[0.097]	[3.07]	[0.0078]
Provisional	N07718	[5.34]	[52.6]	[0.001]	[0.008]	[0.0004]	[0.09]	[0.01]	[0.96]	[0.074]	[0.04]	[0.001]
57C	Alloy X750	0.74	0.0015	0.038	0.018	15.56	0.010	8.00	0.007	0.23	0.034	0.0049
Final	N07750	0.93	71.73	0.0027	0.009	0.0006	0.15	<0.01	2.47	0.019	0.006	0.016
25A	20Cb3	0.01	---	0.024	0.27	19.63	3.23	---	---	0.48	2.10	0.0227
CHIPS ONLY	N08020	0.51	33.57	(0.012)	0.020	0.003	0.32	(0.21)	0.004	0.10	0.05	---
25B	20Cb3	0.006	0.0026	0.022	0.14	19.42	3.25	---	2.06	1.51	0.31	(0.015)
Final	N08020	0.52	33.31	0.0056	0.015	0.001	0.37	---	(0.005)	0.098	(0.021)	---

( ) and < > Indicates non-certified value.

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Revised - 6/7/2007

Nickel Based Alloys

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IARM	Grade	Al	B	C	Co	Cr	Cu	Fe	Mg	Mn	Mo	N
Status	**UNS#**	**Nb**	**Ni**	**O**	**P**	**S**	**Si**	**Ta**	**Ti**	**V**	**W**	**Zr**
7A	Alloy 330	0.022	---	0.063	0.06	19.00	0.19	---	---	1.47	0.19	0.038
CHIPS ONLY	N08330	0.01	(35.53)	(0.014)	0.018	0.004	1.24	(0.19)	(0.004)	0.05	(0.045)	---
7B	Alloy 330	0.023	(0.002)	0.062	0.069	19.32	0.21	---	---	0.0130	0.023	0.0130
Final	N08330	0.023	35.84	0.0026	0.018	(0.001)	1.38	---	(0.005)	0.048	(0.031)	---
7C	Alloy 330	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	N08330	---	---	---	---	---	---	---	---	---	---	---
157A	AL6XN	0.021	---	0.023	0.045	20.7	0.14	---	---	0.35	6.18	0.20
X-RAY & CHIPS ONLY	N08367	0.019	23.8	---	0.014	0.001	0.39	---	(0.004)	0.044	0.023	---
157B	AL6XN	[0.014]	[0.001]	[0.015]	[0.21]	[20.4]	[0.21]	[48.0]	---	[0.40]	[6.3]	[0.22]
Provisional	N08367	[0.032]	[23.9]	[0.002]	[0.021]	[0.001]	[0.31]	---	[0.004]	[0.07]	[0.05]	[(0.003)]
58A	Alloy 800	0.53	(<0.001)	0.076	0.10	20.71	0.03	(44.90)	(<0.001)	0.65	0.17	---
CHIPS ONLY	N08800	(0.03)	32.01	---	0.011	(<0.001)	0.26	(<0.01)	0.49	0.03	(<0.01)	(<0.01)
58B	Alloy 800	[0.46]	[<0.0005]	[0.073]	[0.02]	[19.6]	[0.010]	[47.8]	[(0.001)]	[0.52]	[0.011]	[0.010]
Provisional	N08800	[0.007]	[30.7]	[0.0012]	[0.010]	[0.001]	[0.29]	[<0.005]	[0.51]	[0.032]	[0.007]	(<0.01)
59A	Alloy 825	0.05	(0.002)	0.02	0.25	22.12	1.71	30.82	(<0.001)	0.33	2.68	---
CHIPS ONLY	N08825	0.02	---	---	0.017	0.001	0.10	(<0.01)	0.83	0.03	0.13	<0.01
59B	Alloy 825	0.18	(0.0008)	0.032	0.049	21.20	2.48	31.25	(0.002)	0.45	3.05	0.0079
CHIPS ONLY	N08825	(0.005)	40.01	0.0030	0.010	0.0028	0.23	---	0.96	0.048	(0.012)	(0.005)
59C	Alloy 825	[0.17]	[0.003]	[0.012]	[0.27]	[22.11]	[1.80]	[29.7]	[0.0006]	[0.359]	[3.25]	[0.00851]
Provisional	N08825	[0.24]	[40.71]	[0.0038]	[0.019]	[0.0003]	[0.24]	---	[0.91]	[0.033]	[0.30]	---
59D	Alloy 825	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	N08825	---	---	---	---	---	---	---	---	---	---	---
55A	Haynes 242	0.24	(0.005)	0.03	0.04	7.90	(0.03)	1.09	---	0.33	(25.40)	---
CHIPS ONLY	N10242	(0.02)	---	---	0.003	(0.001)	0.11	(0.01)	0.01	(<0.01)	0.09	(<0.02)
55B	Haynes 242	0.09	0.002	0.004	0.036	8.25	0.013	1.12	0.011	0.323	24.62	0.016
Final	N10242	0.08	65.4	0.0009	0.005	0.0010	0.021	(0.08)	0.002	0.005	0.12	(0.005)
66C	Alloy C-276	[0.23]	[0.0023]	[0.003]	[0.23]	[15.7]	[0.15]	[5.25]	[0.02]	[0.41]	[15.7]	[0.026]
Provisional	N10276	[0.026]	[59.0]	[0.001]	[0.008]	[0.001]	[0.025]	[<0.01]	[0.007]	[0.011]	[3.25]	[<0.01]
63A	Alloy B-2	0.28	---	0.005	0.09	0.55	0.05	1.47	---	0.19	27.48	---
CHIPS ONLY	N10665	(<0.01)	(69.67)	---	0.004	0.001	0.02	(<0.01)	<0.01	(<0.01)	[0.18]	(0.02)
63B	Alloy B-2	0.31	(<0.002)	0.0025	0.019	0.47	0.012	1.68	0.005	0.61	27.3	0.0041
X-RAY & CHIPS ONLY	N10665	(0.001)	69.6	0.0010	0.004	(0.0004)	0.019	---	0.003	(0.010)	0.060	(0.002)

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Nickel Based Alloys **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM Status	Grade UNS#	Al Nb	B Ni	C O	Co P	Cr S	Cu Si	Fe Ta	Mg Ti	Mn V	Mo W	N Zr
63C	Alloy B-2	0.11	0.003	0.010	0.013	0.10	0.003	1.13	0.003	0.76	26.6	0.0006
Final	N10665	0.002	71.1	0.0005	0.005	0.0005	0.01	---	0.15	0.007	0.03	0.001
257A	Hastelloy B-3	0.34	<0.003	0.005	0.024	1.57	0.019	1.47	0.010	0.63	28.0	0.0039
Final	N10675	<0.03	67.9	0.0004	0.004	0.0005	0.024	<0.005	0.002	0.01	0.070	(0.008)
203A	Alloy 909	0.066	(0.002)	0.005	12.88	0.72	0.05	40.6	(<0.002)	0.023	0.090	---
Final	N19909	5.00	38.44	---	0.006	0.0009	0.41	---	1.58	(<0.01)	(0.02)	<0.01
100A	Haynes 556	(0.29)	(0.0015)	0.11	17.66	21.82	0.09	---	---	1.00	2.87	(0.16)
X-RAY & CHIPS ONLY	R30556	0.11	(20.17)	---	(0.012)	0.001	0.45	(0.59)	(0.023)	0.04	2.42	(0.02)
100B	Haynes 556	[0.31]	[0.0028]	[0.100]	[17.93]	[22.32]	[0.047]	[30.10]	[<0.01]	[1.07]	[3.13]	[0.135]
X-RAY & CHIPS ONLY	R30556	[0.132]	[21.23]	[0.0014]	[0.010]	[0.0007]	[0.40]	---	[0.003]	[0.041]	[2.48]	[0.011]

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Hi-Purity Nickel Materials **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	Grade	Ag	Al	As	B	Be	Bi	C	Ca	Cd	Co	Cr	Cu	Fe	Ga	Mg	Mn
Status	**UNS#**	**Mo**	**N**	**Ni**	**O**	**P**	**Pb**	**S**	**Sb**	**Se**	**Si**	**Sn**	**Te**	**Ti**	**Tl**	**V**	**Zn**
187A	HPNI	0.1	11	0.1	(<5)	(<1)	<0.1	13	<10	(<0.1)	1.0	(3)	2.2	19	<0.5	(2)	3.0
Final	N/A	(<1)	(1)	Bal.	(14)	<1.0	0.15	1.9	<0.5	<0.1	(18)	0.4	<0.1	(3)	<0.2	(0.8)	<0.5
188A	HPNI-LO	1.1	24	0.7	(<5)	(<1)	0.9	22	<10	0.2	1.7	(6)	1.8	19	<0.5	(4)	2.3
Final	N/A	<1	(1)	Bal.	(17)	1.4	1.0	1.8	1.1	0.7	18	1.1	0.8	(2)	-0.9	(<0.5)	2.3
189A	HPNI-MI	2.4	44	0.7	(<5)	(<1)	2.6	23	<10	0.8	3.1	(10)	9.0	38	<0.5	(8)	1.9
Final	N/A	(<1)	(1)	Bal.	(18)	3.7	2.9	1.8	3.9	2.1	19	2.2	1.7	(3)	2.3	(<0.5)	2.8
190A	HPNI-HI	10.9	50	28	<5	(<1)	11.1	22	<10	5	8	(1)	17	99	<0.5	(6)	1.8
Final	N/A	(<1)	(1)	Bal.	(19)	34	9.3	3.3	11	6.5	28	6.2	8.9	(6)	5.8	(<0.5)	8.1
191A	ELNI-HP	0.1	1.5	13	(<5)	(<1)	<0.1	14	<10	<0.1	545	2.1	4.2	7.9	<0.5	(2)	3.1
Final	N/A	(<1)	(2)	Bal.	(30)	<1.0	0.3	2.1	<0.5	1.9	(5)	0.4	<0.1	(<1)	<0.2	(<0.5)	1.9

All Values Reported in ppm.

( ) and < > Indicates non-certified value.
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MBH Nickel Based Alloys

	Residuals in Nickel	Si	Mn	Cu	Fe	Cr	Co	Ti	Al	Mg	C	S	Sn	Pb	B	N	Size (mm) Ø x H
Cast	**21 X 17518**	0.05	0.43	<0.001	0.52	0.05	1.05	0.032	0.15	0.034	0.007	-0.001	-0.002	-0.002	-0.002	<0.001	40 x 15
	21 X 17519	0.17	0.35	0.06	0.28	0.06	0.77	0.07	0.19	0.20	. . .	. . .	. . .	. . .	. . .	. . .	
	21 X 17520	0.20	0.18	0.09	0.25	0.10	0.48	0.08	0.04(5)	0.06	. . .	. . .	. . .	. . .	. . .	. . .	
	21 X 17521	0.28	0.11	0.16	0.24	0.16	0.26	0.12	0.03	0.03	. . .	. . .	. . .	. . .	. . .	. . .	
	21 X 17522	0.32	0.02	0.21	0.06	0.23	0.05	0.32	0.03	<0.005	. . .	. . .	. . .	. . .	. . .	. . .	

	`Nimonic' Type Alloy Ni/Cr	C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Mg	Typical Alloy Type	Size (mm) Ø x H
Cast	**22 X 751**	0.07	0.61	0.54	0.21	2.15	20.43	0.22	0.22	0.51	0.20	0.007		40 x 15
	22 X 753	0.04	1.05	0.23	0.02	3.07	19.52	0.06	0.51	0.20	0.02	0.002	'Nimonic 75'	
	22 X 754	0.07	0.66	0.53	0.21	2.22	19.65	0.21	0.23	0.49	0.18	0.002		
	22 X 755	0.05	0.27	1.07	0.50	1.15	19.69	0.49	0.07	0.83	0.36	0.003		
Cast	**22 X 801**	0.14	0.51	0.56	0.22	0.57	20.75	0.25	0.25	2.19	1.33	0.03		40 x 15
	22 X 802	0.20	0.50	0.49	0.19	0.55	18.90	0.23	0.28	2.13	1.26	0.02		
	22 X 803	0.06	1.05	0.22	0.007	0.33	19.85	0.50	0.50	1.93	1.60	0.0002	'Nimonic 80A'	
	22 X 804	0.07	0.56	0.54	0.21	0.66	19.72	0.09	0.20	2.34	1.33	0.004		
	22 X 805	0.20	0.22	1.01	0.54	1.06	19.82	0.10	0.22	2.71	1.06	. . .		

		C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Sn	Pb	W	B	
Cast	**22 X 806**	. . .	0.02	<0.01	<0.01	0.10	20.13	0.08	0.30	2.08	1.36	<0.0005	0.0019	0.015	0.006	
	22 X 808	. . .	0.10	0.05	<0.01	0.11	19.73	<0.01	0.03	2.14	1.41	0.030	0.007	0.11	0.014	continued

Continuation from above	Zr	V	Ag	Te	Bi	As	Sb	Size (mm) Ø x H
22 X 806	<0.005	<0.01	<0.0001	<0.0001	<0.0001	<0.001	<0.0002	40 x 15
22 X 808	0.035	0.05	0.007	0.008	0.002	0.013	0.017	

			C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Mg	S	P	B	Typical Alloy Type	Size (mm) Ø x H
Cast		**22 X 901**	0.11	0.51	0.50	0.10(5)	0.57	20.80	0.26	17.02	2.28	1.29	0.020	. . .	. . .	. . .		40 x 15
		22 X 902	0.15	0.50	0.51	0.13	0.61	18.80	0.22	17.08	2.26	1.31	0.02	. . .	. . .	. . .		
		22 X 903	0.08	1.09	0.25	0.01	0.83	19.84	0.07	17.60	1.86	1.67	0.002	. . .	. . .	. . .	'Nimonic 90'	
		22 X 904	0.08	0.52	0.50	0.10	0.25	19.9	0.21	16.9	2.26	1.29	0.005	. . .	. . .	. . .		
		22 X 905	0.19	0.22	1.08	0.23	1.15	19.89	0.53	16.45	2.92	1.03	. . .	. . .	. . .	. . .		
Cast	CRM	**22 X 1051**	0.166	0.58	0.206	0.115	0.575	15.95	4.50	18.98	1.078	4.35	0.0186	0.0015	0.0040	0.0009		40 x 15
		22 X 1052	0.19	0.51	0.26	0.13	0.65	15.7	4.48	18.6	1.09	4.08	0.002	. . .	. . .	. . .		
		22 X 1053	0.06	1.02	0.55	0.24	0.31	13.97	5.12	17.92	1.74	4.92	(0.0003)	. . .	. . .	. . .	'Nimonic 105'	
		22 X 1054	0.22	0.59	0.23	0.11	0.88	14.44	4.66	19.13	1.24	4.95	0.004	. . .	. . .	. . .		
	*	**22 X 1055**	0.274	0.24	0.03	0.02	1.26	14.9	3.87	19.9	0.52	3.97	(0.008)	0.009	. . .	. . .		

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MBH Nickel Based Alloys

		C	Si	S	P	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	B	Typical Alloy Type	Size (mm) Ø x H
Cast	22 X 9012	0.09	0.23	0.03	0.017	0.58(5)	0.19	(Rem)	11.90	4.95(5)	0.51(5)	2.02	0.18	42.0	0.008		40 x 15
	22 X 9013	0.103	1.23	0.103	0.025	0.67	0.23	(Rem)	10.00	7.1	1.26	2.9	0.36	42.2	0.017	'Nimonic 901'	
	22 X 9014	0.08	0.49	0.013	0.014	0.25	0.06	(Rem)	13.22	6.08	0.18	2.37	0.16	45.7	0.013		
	22 X 9015	0.08	0.38	0.021	0.023	0.25	0.11	(Rem)	13.0	5.85	0.21	2.18	0.29	43.3	0.015		

`Incoloy' Type Alloy Fe/Ni/Cr (continued)

		C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	23 X 8001	0.09	0.21	1.07	0.07	(Rem)	20.43	0.52	1.03	0.51	0.47	31.4		40 x 15
	23 X 8002	0.06	0.47	0.68	0.28	(Rem)	20.48	0.34	0.54	0.32	0.29	32.1		
	23 X 8003	0.01	0.79	0.28	0.51	(Rem)	20.17	0.12	0.12	0.11	0.08	32.7	'Incoloy 800'	
	23 X 8004	0.06	0.53	0.70	0.30	(Rem)	19.72	0.33	0.53	0.34	0.31	31.8		
	23 X 8005	0.07	0.46	0.73	0.28	(Rem)	20.81	0.34	0.50	0.35	0.22	32.2		
Cast	23 X DS 1	0.10	2.47	1.59	0.08	(Rem)	17.87	0.08	1.04	0.09	0.07	36.4		40 x 15
	23 X DS 2	0.06	2.07	1.00	0.30	(Rem)	17.81	0.30	0.48	0.17	0.04	37.4		
	23 X DS 3	0.05	1.61	0.58	0.63	(Rem)	17.95	0.63	0.13	0.35	(0.02)	38.1	'Incoloy 800DS'	
	23 X DS 4	0.08	1.99	1.06	0.41	(Rem)	16.88	0.32	0.56	0.20	0.035	37.15		
	23 X DS 5	0.080	1.98	1.04	0.30	(Rem)	18.64	0.30	0.50	0.17	0.08	36.6		

Ni/Cr/Co/Mo

		Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	24 X 10992	0.33	0.51	0.24	0.49	19.07	6.05	19.80	2.47	0.48	(Rem)		40 x 15
	24 X 14939	0.42	0.63	0.52	0.57	21.0	6.62	19.58	1.88	0.76	(Rem)		
	24 X 10999	0.15	0.47	0.15	0.52	20.38	5.84	19.53	2.50	0.46	(Rem)		
	24 X 11001	0.57	0.53	0.17	0.51	20.44	6.06	19.67	2.06	0.58	(Rem)	C263	
	24 X 11002	0.40	0.21	0.11	0.20	20.32	6.29	20.48	2.65	0.37	(Rem)		
	24 X 11005	0.39	0.65	0.72	0.81	20.21	5.93	18.74	2.45	0.41	(Rem)		

Waspalloys

		C	Si	S	P	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Nb	B	V	W	Zr	Size (mm) Ø x H
Cast	24 X WASP 1	0.01(3)	0.59	0.011	0.019	0.13	0.08	2.16	16.64	6.14	12.8	3.13	1.64	0.055	0.007	0.03	0.18	0	40 x 15
	24 X WASP 2	0.09	0.35	0.018	0.009	0.24	0.11	1.66	18.5	4.22	14.6	3.53	1.00	0.12	0.008	0.06	0.14	0.07	
*	24 X WASP 3 *	0.118	0.208	0.026	0.014	0.542	0.735	0.96	20.84	1.96	13.77	5.52	2.99	0.163	0.0087	0.123	0.064	0.0	43 x 20
*	24 X WASP 4	0.052	0.21	(0.01)	<0.005	0.53	(0.004)	1.48	19.7	7.51	11.01	2.25	2.16	0.25	0.014	0.145	0.25	0.0	45 x 20

* target values

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Revised - 6/7/2007

MBH Nickel Based Alloys

	Ni/Cr/Nb/Mo	Si	Mn	Cu	Fe	Cr	Mo	Co	W	Nb	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	**25 X 10221**	0.45	0.28	0.11	0.62	20.0	6.57	0.26	2.23	7.43	(Rem)		40 x 15
	25 X 10225	0.25	0.29	0.12	0.55	18.27	5.95	0.30	1.74	7.00	(Rem)		
	25 X 10230	0.34	0.35	0.12	0.76	21.9	6.06	0.59	3.83	7.04	(Rem)	PE 10	
	25 X 10231	0.14	0.13	0.06	0.55	20.58	6.00	0.11	2.67	6.76	(Rem)	MC 102	
	25 X 10235	0.56	0.53	0.26	1.26	19.87	5.85	0.53	3.14	7.25	(Rem)		
	25 X 10219	0.20	0.33	0.13	0.65	20.36	5.01	0.25	2.67	6.62	(Rem)		

	Ni/Cr/Mo	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	**26 X 11381**	0.30	0.43	0.008	0.70	19.76	9.47	(0.047)	2.48	0.41	(Rem)		40 x 15
	26 X 11383	0.29	0.19	0.08	0.49	22.50	9.37	0.05(5)	2.84	0.67	(Rem)		
	26 X 11384	0.15	0.13	0.12	0.98	20.5(3)	10.2	0.30	2.6(1)	0.50	(Rem)	C130	
	26 X 11385	0.43	0.58	0.07	0.25	21.20	9.25	0.07	3.40	0.93	(Rem)	ANC12	
	26 X 14182	(0.01)	(<0.005)	0.006	0.09	21.61	10.11	0.06	2.75	0.76	(Rem)		

	Ni/Cr/Mo/Co	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	**27 X 14184**	0.38	0.38	0.064	0.35	21.64	10.8	10.6	0.01	<0.01	(Rem)		40 x 15
	27 X 14188	0.33	0.30	(0.003)	0.44	21.17	10.3	10.4	0.03	<0.01	(Rem)	C242	
	27 X 14386	0.38	0.39	0.02	1.50	20.73	10.47	10.51	0.06	0.02	(Rem)	ANC11	
	27 X 14387	0.21	0.30	(0.005)	1.00	21.0	10.7	9.9	<0.01	<0.01	(Rem)		

	Ni/Cr/Fe Inconel types	C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Mg	Nb	Typical Alloy Type	Size (mm) Ø x H
Cast	**28 X 6001**	. . .	0.95	0.12	0.83	6.33	16.38	. . .	1.02	0.58	0.02	0.01	. . .		40 x 15
	28 X 6002	. . .	0.25	0.65	0.02	8.24	16.23	. . .	0.22	0.12	0.18	0.004	. . .		
	28 X 6003	. . .	0.74	0.47	0.42	7.1	15.56	. . .	0.62	0.22	0.025	0.01	. . .	'Inconel 600'	
	28 X 6004	. . .	0.65	0.38	0.42	7.17	16.21	. . .	0.77	0.27	0.05	0.008	. . .		
	28 X 6005	. . .	0.60	0.39	0.39	6.98	16.93	. . .	0.62	0.28	0.06	0.002	. . .		
Cast	**28 X X7501**	0.15	0.55	1.56	0.51	5.08	15.22	0.54	. . .	2.35	1.00	. . .	1.57		40 x 15
	28 X X7502	0.10	0.33	1.03	0.22	6.70	14.93	0.35	. . .	2.60	0.74	. . .	0.96		
	28 X X7503	0.08	0.14	0.56	0.06	9.24	15.02	0.11	. . .	2.90	0.56	. . .	0.63	Inconel X750'	
	28 X X7504	0.03	0.39	1.09	0.22	6.42	14.22	0.46	. . .	2.59	0.70	. . .	0.95		
	28 X X7505	0.11	0.34	1.04	0.22	6.25	16.08	0.33	. . .	2.33	0.80	. . .	1.07		

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MBH Nickel Based Alloys

Ni/Cr/Fe (Continued) Inconel types

			C	Si	S	P	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Nb	V	
Cast		**28 X 6251**	0.039	0.47	0.001	(0.0014)	0.17	0.051	3.12	20.5	9.88	0.022	(0.01)	0.16	2.70	. . .	
		28 X 6252	0.077	0.61	0.004	0.010	0.28	0.145	4.14	21.5	8.77	0.20	(0.025)	0.21	3.39	. . .	
		28 X 6253	0.124	1.26	0.013	0.02	0.54	0.30	5.41	21.90	7.86	0.39	0.044	0.32	4.25	. . .	continued
	*	**28 X 6254**	0.037	0.53	0.0046	0.004	0.093	0.027	6.46	21.1	5.89	0.22	0.30	0.05	3.53	. . .	
	*	**28 X 6255**	0.045	0.15	0.024	0.022	0.405	0.423	1.06	22.46	8.57	0.309	0.12	0.11	4.35	. . .	
Cast		**28 X 7181**	0.008	0.71	0.005	(0.003)	0.108	0.013	(19.5)	18.71	2.94	0.01	0.025	(0.007)	4.97	0.02	
	*	**28 X 7182**	0.035	0.47	0.0066	0.004	0.184	0.117	17.0	21.30	0.88	0.64	1.13	0.34	4.76	0.05	
	*	**28 X 7183**	0.296	0.52	0.0023	0.003	0.36	0.26	(19.6)	18.85	1.31	0.94	1.21	1.21	6.25	0.047	continued
	*	**28 X 7184**	0.149	0.36	0.023	0.012	0.192	0.11	18.2	16.65	3.41	0.211	(0.28)	0.34	5.67	0.101	
	*	**28 X 7185**	0.050	0.13	0.0109	0.008	0.34	0.30	16.95	21.80	2.54	0.320	(0.16)	0.32	4.88	0.05	
		28 X 7186	0.007	0.65	0.014	0.016	0.253	0.091	(16.5)	17.85	2.88	0.40	0.20	0.32	5.15	0.012	

Continuation from above	W	B	Ta	As	Sn	Sb	Pb	Bi	Ag	Zn	Ni	N	Typical Alloy Type	Size (mm) Ø x H
28 X 6251	. . .	0.0047	. . .	(0.003)	(0.004)	. . .	(0.003)	. . .	(0.0024)	(0.001)	(62.3)	0.211		45 x 20
28 X 6252	. . .	0.014	. . .	(0.009)	(0.009)	. . .	. . .	(0.010)	(0.009)	(0.008)	59.9	0.322		
28 X 6253	. . .	0.023	. . .	(0.019)	0.022	(0.028)	(0.022)	0.017	(0.020)	(0.019)	56.67	0.35	'Inconel 625'	
28 X 6254	. . .	0.0014	(0.012)	. . .	(0.003)	. . .	. . .	. . .	. . .	. . .	(61.3)	0.065		
28 X 6255	. . .	(0.009)	0.25	. . .	. . .	. . .	. . .	. . .	. . .	. . .	61.67	0.194		43 x 20
28 X 7181	. . .	0.0010	. . .	(0.005)	0.003	. . .	(0.005)	. . .	. . .	. . .	52.6	0.233		45 x 20
28 X 7182	0.10	(0.0010)	0.011	. . .	(0.005)	. . .	. . .	. . .	. . .	. . .	52.7	0.033		
28 X 7183	0.08	0.0016	0.02	. . .	(0.006)	. . .	. . .	. . .	. . .	. . .	48.96	0.04	'Inconel 718'	
28 X 7184	0.20	0.0062	0.08	(0.005)	0.011	(0.007)	(0.007)	. . .	(0.007)	. . .	54.00	. . .		43 x 20
28 X 7185	0.096	0.012	0.035	. . .	(0.004)	(0.002)	(0.005)	. . .	. . .	. . .	51.84	0.24		43 x 20
28 X 7186	. . .	0.0047	. . .	(0.008)	(0.014)	0.025	0.016	. . .	. . .	. . .	54.84	0.077		

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MBH Nickel Based Alloys

Ni/Co/Cr/Al/Ti

			C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Zr	V	Ni	N	Typical Alloy Type	Size (mm) Ø x H
Cast		**210 X 11774**	0.09	0.16	0.04	0.16	0.23	10.25	3.41	13.67	5.30	5.56	0.08	0.94	(Rem)	. . .		40 x 15
	*	**210 X 11775**	0.024	0.36	0.127	(0.008)	1.02	10.42	3.19	14.83	5.76	7.0	0.070	0.47	(56.6)	-0.003		45 x 20
		210 X 11979	0.025	0.30	0.13	0.07	0.56	8.07	3.28	14.32	5.22	3.76	0.04	0.82	(Rem)	. . .	IN100	40 x 15
		210 X 11980	0.013	0.38	0.18	0.015	0.67	9.47	3.02	14.98	4.07	3.97	0.02	0.83	(Rem)	. . .	AMS 5397	40 x 15
		210 X 11981	0.09	0.33	0.21	0.10	0.93	11.81	3.66	14.65	4.83	5.07	0.11	0.73	(Rem)	. . .		40 x 15

		C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Zr	V	Ni	B	
Cast	**210 X 11982**	0.15	0.30	0.19	0.07	0.84	9.54	3.09	14.50	5.7	5.07	0.04	1.20	(Rem)	0.027	continued
	210 X 11999	0.014	0.40	0.18	0.012	0.66	9.42	3.03	14.96	4.20	4.08	0.033	0.82	(Rem)	. . .	

Continuation from above	ppm Ag	ppm Mg	ppm Pb	ppm Sn	ppm Cd	ppm Zn	ppm As	ppm Se	ppm Bi	ppm Sb	ppm Te	Typical Alloy Type	Size (mm) Ø x H
210 X 11982	<1	60	5	6	<0.5	9	76	<2	<0.5	2	<1	IN 100	40 x 15
210 X 11999	1.3	5.5	3.7	6.2	0.1	7.8	<5	<1	<1	1	<1		

Ni/Cr/Al

		Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Nb	Ta	Zr	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	**211 X 11221**	0.08	0.27	0.09	0.22	13.83	3.80	1.27	1.22	6.26	2.76	0.08	0.08	(Rem)		40 x 15
	211 X 11222	0.23	0.32	0.11	0.17	14.18	4.03	0.12	1.05	5.47	2.89	0.08	0.12	(Rem)		
	211 X 11224	0.24	0.09	0.34	0.46	14.03	4.02	0.32	1.27	6.07	2.92	0.32	0.12	(Rem)	IN 713	
	211 X 11233	0.14	0.20	0.21	0.39	12.67	4.10	0.63	1.32	6.03	2.61	0.23	0.13	(Rem)	AMS 5377	
	211 X 11236	0.21	0.21	0.16	0.46	15.98	4.02	0.64	1.33	6.14	2.73	0.10	0.05	(Rem)		

Ni/Cu

			C	Si	S	Mn	Cu	Fe	Cr	Pb	Co	Ti	Al	Mg	Ni	Nb	P	Mo	Typical Alloy Type	Size (mm) Ø x H
Cast	CRM	**212 X 4001**	0.093	1.43	0.0202	3.08	26.99	2.00	0.267	0.072	0.125	0.315	0.43	0.214	65.0	(0.023)	0.0075	0.015		43 x 20
		212 X 4002	0.046	0.10	0.071	1.99	31.5	0.99	0.023	0.05	0.09	0.06	0.055	0.017	(64.8)	. . .	. . .	. . .	Monel 400'	
		212 X 4003	0.02	0.27	0.024	1.04	30.6	2.00	0.07	0.05	0.03	0.03	0.03	0.04	65.7	. . .	. . .	. . .	Monel 500'	
	CRM	**212 X 4004**	0.122	0.780	(0.0023)	0.715	30.52	3.75	0.174	0.034	0.088	0.867	0.793	0.0013	61.2	1.00	0.022	0.070		43 x 20
		212 X 4005	0.074	2.44	0.0255	1.45	21.31	3.36	0.350	0.020	0.107	0.613	1.85	(0.0002)	68.38	. . .	. . .	. . .	Monel 506'	43 x 20
	CRM	**212 X 4006**	0.031	3.97	0.019	0.794	23.89	1.79	0.097	0.023	0.0508	1.49	4.18	0.027	62.9	0.52	0.013	0.112		43 x 20

			C	Si	S	P	Mn	Cu	Fe	Mg	Pb	Cr	Mo	Co	Ti	Al	Ni	Nb	Typical Alloy Type	Size (mm) Ø x H
Cast		**212 X NA1**	0.21	0.96	0.009	0.030	1.56	31.5	1.72	0.076	0.01	. . .	. . .	. . .	. . .	. . .	. . .	. . .		40 x 15
		212 X NA2	0.07	2.50	0.023	0.019	1.06	29.6	1.53	0.008	0.02	. . .	. . .	. . .	. . .	. . .	. . .	. . .	'Monel H'	
		212 X NA3	0.37	3.66	0.008	0.022	0.52	29.2	1.42	0.74	0.05	. . .	. . .	. . .	. . .	. . .	. . .	. . .		
	CRM	**212 X NA4**	0.098	3.83	0.004	0.0053	1.082	29.34	2.26	0.0014	0.018	0.120	0.026	0.046	0.037	0.012	62.8	(0.51)	'Monel S'	40 x 13

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MBH Nickel Based Alloys

	'MAR M200'	C	Si	Mn	Fe	Cr	Co	Ti	Al	Nb	Zr	B	W	Ni	Typical Alloy Type	Size (mm) Ø x H
Cast	213 X 200 M3	0.19	0.14	0.17	0.53	8.86	10.74	1.44	6.50	1.12	0.04	0.008	11.1	(rem)		40 x 15
	213 X 200 M5	0.19	0.31	0.12	0.82	9.06	8.46	2.55	4.70	1.07	0.15	0.022	13.4	(rem)		
	213 X 200 M6	0.19	0.15	0.11	0.46	8.28	9.98	1.89	5.92	1.26	0.07	0.015	11.52	(rem)		

this series is being exhausted and will not be replaced

		Hastelloy	C	Si	S	P	Mn	Cu	Fe	Cr	Mo	Co	V	W	Ni	N	Others	Typical Alloy Type	Size (mm) Ø x H
Cast	*	215 X HB1	0.068	0.246	0.049	0.005	1.25	0.035	7.46	2.04	33.9	1.12	0.63	. . .	(Rem)	0.031	Al, Ti, Sn	BS 3146	45 x 20
	*	215 X HB2	0.045	0.48	0.039	0.011	0.925	-0.004	2.43	1.63	32.1	0.51	0.52	. . .	61.2	0.006		ANC 15	45 x 20
		215 X HB3	0.10	1.26	0.020	0.004	1.09	. . .	4.98	0.675	29.1	0.83	0.51	. . .	(Rem)			AMS 5396	40 x 15
		215 X HB4	0.13	1.37	0.008	0.030	0.86	. . .	6.22	0.70	27.9	1.80	0.32	. . .	(Rem)			ASTM A494	40 x 15
		215 X HB5	0.150	1.32	0.002	0.053	0.44	0.05	3.05	0.03	26.0	2.47	0.14	. . .	(Rem)	0.008	Al, Ti	Hastelloy B'	43 x 20
Cast	*	215 X HC1	0.031	0.58	0.006	0.003	1.18	0.057	4.31	15.2	19.5	2.44	0.144	3.22	53.2	0.121	Ti	BS 3146	45 x 20
		215 X HC2	0.066	1.02	0.003	0.012	0.97	0.023	3.62	15.7	18.9	1.7	0.38	3.91	(Rem)	0.18	Al, Ti	ANC 16	45 x 20
	*	215 X HC3	0.105	1.06	0.027	0.025	0.79	0.157	5.38	17.2	18	0.97	0.40	4.31	51.3	0.146	Al, B, Ti	AMS 5388	45 x 20
		215 X HC4	0.248	1.85	0.030	0.040	0.548	0.026	8.17	20.8	17.3	0.493	0.752	5.79	(43.6)	(0.066)	Al,Ti,B,Mg	Hastelloy C'	43 x 20
		215 X HC5	0.243	1.35	0.033	0.053	0.322	0.265	6.81	18.81	14.37	0.093	0.53	4.87	50.09	0.162	Al,Ti,B,Mg	Hastelloy C'	43 x 20

		Various Nickel Alloys	C	Si	Mn	Cu	Fe	Cr	Mo	Co	Ti	Al	Ni	Nb	Y	B	Ta	W	Zr	Size (mm) Ø x H
Cast		219 X NY1	. . .	1.10	. . .	. . .	. . .	29.2	. . .	. . .	1.12	9.9	(Rem)	. . .	0.24	. . .	. . .	. . .	. . .	40 x 15
		219 X NY2	. . .	1.64	. . .	. . .	. . .	20.8	. . .	. . .	0.6	13.1	(Rem)	. . .	0.69	. . .	. . .	. . .	. . .	
Cast		219 X 20500	0.025	1.35	0.239	(0.007)	1.24	51.09	0.006	(0.008)	. . .	. . .	45.68	. . .	. . .	. . .	. . .	. . .	. . .	43 x 20
Cast		219 X 1837	<0.01	<0.02	<0.02	. . .	0.09	9.95	3.02	10.05	5.22	5.35	(Rem)	<0.02	. . .	. . .	. . .	0.02	0.03	40 x 15
	CRM	219 X 1867	0.086	0.203	0.205	0.45	0.285	7.69	5.95	9.98	1.97	6.43	(61.92)	0.116	. . .	0.021	4.14	0.121	0.59	continued

Continuation from above	S	P	Size (mm) Ø x H
219 X 1867	0.0099	0.010	40 x 15

	Ni/B Hardfacing Alloys	C	Si	S	Mn	Cr	Mo	Cu	B	Fe	Ni	Size (mm) Ø x H
Cast	221 X HF1	0.144	4.61	0.006	0.130	13.1	0.018	0.029	2.12	0.33	(rem)	40 x 15
	221 X HF2	0.91	2.29	0.0095	0.32	9.5	0.16	0.70	2.83	0.33	(rem)	
	221 X HF3	1.24	3.34	0.004	0.036	10.6	0.06	0.095	1.80	1.21	(rem)	
	221 X HF4	0.54	5.97	0.014	0.109	14.7	0.09	0.044	1.26	6.58	(rem)	

( ) Indicates non-certified value.
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Cobalt Based Alloys

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM	Grade	Al	B	C	Co	Cr	Cu	Fe	La	Mg	Mn	Mo	N
Status	**UNS#**	**Nb**	**Ni**	**O**	**P**	**S**	**Si**	**Ta**	**Ti**	**V**	**W**	**Zr**	
95B	Alloy 6B	0.07	(0.002)	0.946	60.9	28.8	0.008	1.10	---	(0.0004)	0.99	0.83	0.0027
Final	R30016	(0.002)	2.25	(0.001)	0.010	0.0006	0.46	0.03	0.004	(0.002)	3.42	(0.002)	
95C	Alloy 6B	0.13	(0.002)	1.10	57.0	29.0	0.014	2.47	---	(0.0004)	1.55	1.37	0.033
Final	R30016	(0.008)	2.88	(0.004)	0.009	0.001	0.54	0.03	0.004	0.004	3.96	(0.005)	
207A	MP35N	0.040	0.011	0.007	33.46	19.98	0.017	0.64	---	(0.0005)	0.015	9.62	0.0031
Final	R30035	0.043	35.19	0.0011	0.002	0.0027	0.053	0.007	0.91	0.011	0.028	0.003	
208A	F 75	0.07	0.002	0.28	63.4	27.7	0.021	0.78	---	0.0003	0.68	5.3	0.063
Final	R30075	0.020	0.80	(0.003)	0.030	0.001	0.77	0.012	0.012	0.012	0.07	(0.001)	
208B	F 75	0.04	0.005	0.100	60.0	30.0	0.03	1.17	---	(0.0004)	0.75	6.63	0.003
Final	R30075	0.06	0.42	0.0015	0.004	0.0009	0.63	0.042	0.029	0.05	0.03	0.002	
208C	F 75	0.07	0.002	0.052	64.0	27.55	0.01	0.29	---	0.0002	0.53	6.12	0.169
Final	R30075	0.011	0.63	0.0010	0.008	0.0004	0.62	(0.02)	0.012	0.012	0.02	0.0014	
256A	MP159	0.17	0.013	0.020	35.6	19.1	0.008	9.0	---	<0.001	0.014	7.0	0.0032
Final	R30159	0.51	25.7	0.0011	0.006	0.002	0.07	<0.005	3.03	0.03	0.02	(0.005)	
97B	Alloy 188	0.08	(0.002)	0.096	42.5	21.2	0.07	1.92	0.005	<0.002	0.76	0.56	0.014
Final	R30188	0.022	19.4	0.003	0.009	(0.001)	0.34	0.019	0.006	0.012	12.9	(0.001)	
97C	Alloy 188	0.19	0.0028	0.130	35.8	22.2	0.027	2.37	---	0.0010	0.82	0.36	0.075
Final	R30188	0.023	22.8	0.0007	0.011	0.0004	0.47	0.04	0.011	0.010	14.6	(0.007)	
96A	Alloy 25	0.03	(0.003)	0.10	(49.48)	20.17	0.04	2.29	---	---	1.52	0.28	---
CHIPS ONLY	R30605	0.07	10.53	---	0.009	0.0011	0.017	(0.08)	0.01	0.01	15.2	(0.01)	
96B	Alloy 25	0.035	0.0021	0.132	49.4	20.54	0.047	2.27	---	(0.0005)	1.39	1.17	0.007
Final	R30605	0.046	10.04	0.002	0.0063	0.0005	0.16	0.028	0.007	0.012	14.52	0.007	
96C	Alloy 25	0.08	0.002	0.132	47.1	19.95	0.08	2.93	---	(0.0002)	1.91	1.88	0.031
Final	R30605	0.047	10.36	0.001	0.008	0.001	0.31	0.03	0.007	0.012	15.4	0.009	
96D	Alloy 25	0.23	0.003	0.079	49.8	19.97	0.038	2.17	---	(0.004)	1.40	0.35	0.0084
Final	R30605	0.08	10.66	0.0006	0.006	0.005	0.23	0.03	0.046	0.008	14.71	(0.007)	
64A	Ultimet 1233	[0.16]	---	0.057	(55.38)	[24.78]	[0.02]	2.98	---	---	0.81	4.72	[0.077]
X-RAY & CHIPS ONLY	R31233	(<0.01)	[8.92]	---	[0.006]	0.002	0.34	[0.03]	0.02	(<0.01)	1.83	(<0.01)	
64B	Ultimet 1233	0.12	(0.001)	0.062	54.2	25.26	0.020	3.02	---	0.005	0.78	4.77	0.12
Final	R31233	(0.018)	9.06	(0.0009)	0.005	(0.0004)	0.27	(0.028)	0.011	(0.014)	2.12	<0.01	
64C	Ultimet 1233	0.138	0.0010	0.064	53.4	25.4	0.019	2.99	---	0.0043	0.79	4.72	0.113
Final	R31233	0.016	9.47	0.0012	0.0064	0.0004	0.24	0.02	0.007	0.020	2.39	<0.01	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Revised - 6/7/2007

Cobalt Based Alloys **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	Grade	Al	B	C	Co	Cr	Cu	Fe	La	Mg	Mn	Mo	N
Status	**UNS#**	**Nb**	**Ni**	**O**	**P**	**S**	**Si**	**Ta**	**Ti**	**V**	**W**	**Zr**	
260A	FSX414	0.006	0.008	0.244	50.7	29.4	0.012	0.49	---	<0.005	0.46	0.015	0.0323
Final		0.015	10.72	0.006	0.005	0.0013	0.85	<0.02	0.01	0.010	7	<0.005	

MBH Cobalt Based Alloys

		Cobalt/Cr/W	Alloy Type WI 52																Size (mm)
			C	Si	Mn	Ni	Cr	W	Nb	Ta	Fe	Cu	Pb	Sn	Mo	Al	S	N	P	Ø H
Cast	CRM	111 X 12667	0.008	0.749	0.52	(0.70)	21.79	8.22	1.50	0.145	1.36	0.047	. . .	. . .	0.161	0.005	0.0068	0.085	(0.003)	43 x 20
		111 X 12669	. . .	0.71	0.57	0.62	22.04	10.65	2.06	. . .	1.41	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
		111 X 12670	0.01	0.60	0.46	1.13	19.6	10.7	2.36	0.07	1.32	0.06	(0.005)	0.042	0.08	(0.003)	(0.027)	0.008	(0.012)	
		111 X 12671	. . .	0.51	0.61	0.88	20.5	11.8	1.95	. . .	1.45	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
		111 X 12672	0.126	0.78	0.72	0.71	21.8	9.3	1.87	0.09	1.87	0.14	0.01	0.034	0.29	0.27	0.014	. . .	. . .	
	*	111 X 12673	(0.005)	0.82	0.52	1.69	19.0	9.75	2.35	0.06	1.70	0.104	(0.003)	0.074	0.086	<0.005	0.022	0.031	0.010	

		Cobalt/Cr/Mo	Alloy Type Stellite 8, BS 3531, etc																Size (mm)
			C	Si	Mn	Ni	Cr	W	Mo	Fe	Al	Cu	Nb	Zr	P	S	B	N	Ti	Ø H
Cast		112 X 14936	0.45	0.23	0.77	1.67	23.00	1.12	4.65	0.39	0.48	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	CRM	112 X 14937	0.308	0.767	0.408	2.65	24.56	3.37	6.96	2.04	1.38	0.080	0.098	. . .	0.010	0.0158	0.0104	0.061	0.409	43 x 20
		112 X 14941	0.38	0.45	0.14	1.17	26.85	0.54	4.16	0.76	0.03	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
		112 X 14942	0.090	1.02	0.46	0.29	28.47	1.67	6.22	1.09	0.18	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	*	112 X 14943	0.233	0.53	1.18	0.12	32.5	(0.09)	7.53	0.85	<0.01	0.116	(0.063)	. . .	0.006	0.0137	(0.0034)	0.115	. . .	43 x 20
Wrough	*	112 X 14944	0.225	0.71	0.744	0.128	29.24	<0.02	6.29	0.14	<0.01	0.006	<0.01	. . .	0.0017	0.0040	(0.0004)	0.148	. . .	38 x 16

		Cobalt/Cr/Ni/W	Alloy Type Stellite 31									Size (mm)
			C	Si	Mn	Ni	Cr	W	Fe	B	S	P	Ø H
Cast		113 X X401	0.56	1.22	0.20	11.74	25.24	7.09	0.73	0.008	. . .	. . .	40 x 15
		113 X X402	0.38	0.32	1.26	9.41	24.86	7.96	2.15	. . .	0.036	0.045	
		113 X X403	0.52	0.85	0.69	10.40	25.03	7.82	1.06	0.006	0.022	0.021	
		113 X X404	0.51	0.75	0.69	10.76	23.7	7.71	1.28	0.001	0.006	0.002	
		113 X X405	0.48	0.76	0.68	10.79	26.7	7.65	1.30	0.001	0.005	0.002	

		Various Cobalt alloy	Alloy Type 6B, L605, CCM, Stellite3, Stellite 188, etc														Size (mm)
			C	Si	Mn	Ni	Cr	W	Mo	Nb	Cu	Fe	Mg	S	P	N	Al	B	Ø H
Cast	CRM	119 X COB 1	0.055	0.624	0.64	21.98	23.92	10.48	0.195	0.308	0.069	19.06	. . .	0.0163	0.040	0.124	0.054	. . .	43 x 20
		119 X COB 2	. . .	. . .	0.50	22.3	24.7	11.5	. . .	. . .	. . .	9.6	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
		119 X 81601	0.29	1.17	1.55	19.6	14.2	3.75	3.85	3.9	. . .	12.6	0.042	0.03	. . .	. . .	. . .	. . .	40 x 15
	CRM	119 X ST3	2.43	0.95	1.01	3.02	28.70	10.89	0.298	. . .	0.0315	3.06	. . .	0.0198	. . .	0.059	. . .	0.101	43 x 20

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

Revised - 6/7/2007

Copper, Brass & Bronze Alloys

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM	CDA Grade	Ag	Al	As	Be	Bi	C	Co	Cr	Cu	Fe	Mn
Status	**UNS#**	**Ni**	**P**	**Pb**	**S**	**Sb**	**Se**	**Si**	**Sn**	**Zn**	**Zr**	**Nb**
70A	CDA 110	(<0.005)	<0.01	(<0.01)	---	---	0.012	<0.01	<0.01	---	<0.01	<0.01
CHIPS ONLY	C11000	0.003	0.002	(<0.01)	0.002	<0.01	---	<0.01	(0.005)	<0.01	---	
70B	CDA 110	0.0011	---	(0.0001)	---	<0.0002	(0.007)	<0.003	---	>99.9	<0.001	<0.0003
Final	C11000	<0.0002	0.002	(0.0003)	(0.0005)	(0.0002)	<0.0002	<0.0005	(0.0002)	<0.001	---	
278A	CDA 145	[<0.003]	[(0.001)]	[<0.002]	---	[(0.001)]	[(0.003)]	[(0.001)]	[(0.001)]	[99.5]	[(0.004)]	[<0.0005]
Final	C14500	[(0.001)]	[0.011]	[0.003]	[0.002]	[(0.001)]	---	[0.002]	[(0.001)]	[0.002]	---	
71B	CDA 172	(0.002)	0.040	---	1.84	---	0.003	0.21	0.0030	97.7	0.042	0.0010
Final	C17200	0.021	0.004	0.006	(0.0004)	(0.002)	---	0.060	0.005	0.005	---	
72A	CDA 314	(<0.005)	<0.01	---	(<0.001)	---	(0.014)	(<0.01)	---		0.011	<0.01
CHIPS ONLY	C31400	(<0.01)	(0.007)	1.78	0.0014	<0.01	---	<0.01	<0.01	8.48	---	
72B	CDA 314	(0.002)	---	(0.003)	---	---	0.002	---	---	90.08	0.007	---
Final	C31400	0.004	0.005	1.99	0.0015	0.006	---	(0.002)	0.029	7.81	---	
73B	CDA 360	0.005	0.001	(0.005)	---	(0.005)	(0.004)	(0.003)	---	61.5	0.17	(0.001)
Final	C36000	0.059	0.003	2.71	(0.004)	0.007	---	(0.002)	0.15	35.3	---	
74A	CDA 464	(0.002)	<0.01	(<0.01)	---	---	(0.012)	---	---	---	0.01	<0.01
Final	C46400	0.01	0.006	0.02	0.001	<0.01	---	(<0.01)	0.50	38.14	---	
74B	CDA 464	(0.005)	0.003	<0.01	---	(<0.005)	---	---	---	60.4	0.011	<0.01
Final	C46400	0.006	(0.008)	0.017	(0.003)	0.003	---	0.003	0.70	38.9	---	
75A	CDA 482	---	<0.01	<0.01	---	---	(0.010)	---	---	---	0.052	<0.01
CHIPS ONLY	C48200	0.025	0.005	0.83	0.002	<0.01	---	<0.01	0.89	38.39	---	
75B	CDA 482	(0.005)	(0.005)	(0.004)	---	(0.001)	(0.004)	(0.003)	---	60.63	0.06	(0.003)
Final	C48200	0.02	0.003	0.63	(0.001)	(0.004)	---	(0.003)	0.59	38.0	---	
76A	CDA 485	(0.002)	<0.01	<0.01	---	---	(0.031)	---	---		0.08	<0.01
CHIPS ONLY	C48500	0.03	0.005	1.80	0.002	(<0.02)	---	<0.01	0.99	36.14	---	
76B	CDA 485	0.005	(0.005)	(0.003)	---	---	(0.004)	0.0007	---	60.5	0.060	(0.003)
Final	C48500	0.015	0.005	1.94	0.003	0.006	---	---	0.69	36.71	---	
76C	CDA 485	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C48500	---	---	---	---	---	---	---	---	---	---	
77A	CDA 510	(0.010)	(<0.01)	(<0.01)	---	---	(0.012)	<0.01	---	---	0.01	0.01
CHIPS ONLY	C51000	<0.01	0.12	(0.011)	0.003	(<0.01)	---	<0.01	4.60	0.03	---	
77B	CDA 510	(0.002)	(0.001)	(0.001)	---	(0.004)	0.003	---	---	95.2	0.002	(0.002)
Final	C51000	0.002	0.148	0.016	0.002	0.005	---	(0.003)	4.66	0.007	---	

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Copper, Brass & Bronze Alloys

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IARM	CDA Grade	Ag	Al	As	Be	Bi	C	Co	Cr	Cu	Fe	Mn
Status	**UNS#**	**Ni**	**P**	**Pb**	**S**	**Sb**	**Se**	**Si**	**Sn**	**Zn**	**Zr**	**Nb**
78B	CDA 544	0.008	(0.002)	<0.003	---	(0.001)	<0.002	<0.0005	---	87.7	0.02	(0.002)
Final	C54400	0.077	0.19	3.87	0.010	0.01	---	<0.002	4.73	3.55	---	
79B	CDA 623	0.002	9.19	---	---	(0.003)	0.002	(0.002)	(0.003)	88.4	2.13	0.16
Final	C62300	0.075	0.005	(0.003)	(0.001)	---	---	0.019	0.017	0.013	---	
79C	CDA 623	<0.005	9.20	0.003	---	---	0.003	<0.003	(0.002)	87.6	2.28	0.20
Final	C62300	0.55	0.006	<0.005	<0.001	<0.005	---	0.033	0.010	0.013	---	
80A	CDA 630	(<0.005)	9.89	(<0.01)	---	---	(0.013)	<0.01	---	---	4.01	0.23
CHIPS ONLY	C63000	4.85	(0.009)	(0.007)	0.003	(<0.01)	---	0.022	0.02	0.18	---	
80B	CDA 630	0.006	10.19	(0.004)	---	<0.005	(0.01)	0.014	0.012	81.2	3.31	0.54
Final	C63000	4.69	0.009	0.009	(0.001)	(0.004)	---	0.030	0.018	0.078	---	
80C	CDA 630	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C63000	---	---	---	---	---	---	---	---	---	---	
81A	CDA 642	(<0.005)	6.97	(<0.01)	---	---	(0.010)	(<0.01)	---	---	0.10	0.01
CHIPS ONLY	C64200	0.015	(0.014)	0.014	(0.002)	(0.01)	---	1.97	0.05	0.20	---	
81B	CDA 642	(0.004)	6.70	0.058	---	<0.001	0.002	---	0.002	91.2	0.047	0.012
Final	C64200	0.003	0.004	0.006	<0.001	0.003	---	1.84	0.008	0.176	---	
82A	CDA 655	(<0.005)	(0.012)	(<0.01)	---	---	(0.014)	(<0.01)	---	---	0.04	1.02
CHIPS ONLY	C65500	<0.01	(0.004)	(0.02)	0.002	<0.01	---	3.07	0.015	(0.01)	---	
82B	CDA 655	---	0.002	<0.002	---	---	(0.003)	---	0.004	95.3	0.080	1.04
Final	C65500	0.011	0.004	0.011	0.003	<0.01	---	3.22	0.017	0.38	---	
83A	CDA 675	(<0.005)	<0.01	(<0.01)	---	---	(0.007)	(<0.01)	---	---	0.99	0.22
CHIPS ONLY	C67500	0.01	0.005	0.058	0.002	0.008	---	<0.01	0.57	39.81	---	
83B	CDA 675	(0.002)	0.002	---	---	---	0.003	(0.003)	(0.003)	58.7	0.97	0.13
Final	C67500	0.010	0.004	0.017	(0.001)	(0.004)	---	(0.003)	0.85	39.3	---	
84A	CDA 706	0.005	<0.01	<0.01	---	---	0.013	0.01	(<0.01)	---	1.33	0.68
CHIPS ONLY	C70600	9.89	0.010	0.007	0.011	<0.01	---	<0.01	0.01	0.013	---	
84B	CDA 706	0.005	(0.002)	(0.002)	---	---	(0.01)	0.013	(0.003)	87.9	1.30	0.62
Final	C70600	10.03	0.004	0.008	0.008	(0.002)	---	0.01	0.014	0.082	---	
85A	CDA 715	(<0.005)	<0.005	---	---	---	0.043	0.01	(<0.01)	---	0.58	0.8
CHIPS ONLY	C71500	(29.79)	0.005	0.005	0.005	<0.01	---	<0.01	0.02	0.01	---	
85B	CDA 715	---	(<0.01)	---	---	---	0.011	0.034	---	---	0.53	0.53
Final	C71500	29.60	0.007	0.005	0.010	(<0.01)	---	(<0.01)	0.014	0.12	---	

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Copper, Brass & Bronze Alloys — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM	CDA Grade	Ag	Al	As	Be	Bi	C	Co	Cr	Cu	Fe	Mn
Status	**UNS#**	**Ni**	**P**	**Pb**	**S**	**Sb**	**Se**	**Si**	**Sn**	**Zn**	**Zr**	**Nb**
85C	CDA 715	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C71500	---	---	---	---	---	---	---	---	---	---	
158B	CDA 815	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C81500	---	---	---	---	---	---	---	---	---	---	
86B	CDA 836	(0.027)	(<0.01)	---	---	---	(0.01)	(<0.01)	---	---	0.029	(<0.01)
CHIPS ONLY	C83600	0.78	0.071	5.49	0.03	0.092	---	(<0.01)	4.58	4.18	---	
86C	CDA 836	(0.02)	0.002	<0.005	---	(0.01)	0.003	<0.005	---	84.6	0.24	0.002
Final	C83600	0.27	0.003	5.03	0.035	0.143	---	0.003	4.37	5.38	---	
250A	CDA 844	(0.02)	(0.002)	---	---	0.02	<0.005	(0.002)	<0.003	80.2	0.17	<0.002
Final	C84400	0.33	0.003	7.2	0.046	0.052	---	0.003	2.46	9.7	---	
87B	CDA 857	(0.01)	0.20	0.007	---	0.003	0.003	0.007	(0.002)	60.9	0.29	0.006
Final	C85700	0.095	0.008	1.58	(0.001)	0.014	---	0.004	0.78	36.1	---	
88A	CDA 863	---	6.03	(<0.01)	---	---	(0.022)	(<0.01)	---	---	2.27	3.72
CHIPS ONLY	C86300	0.02	(0.004)	0.03	(0.002)	<0.01	---	0.02	0.04	23.25	---	
88B	CDA 863	---	5.66	(0.01)	---	---	0.003	---	---	63.9	2.12	2.93
Final	C86300	0.065	0.011	0.066	<0.001	<0.005	---	0.09	0.020	25.1	---	
88C	CDA 863	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C86300	---	---	---	---	---	---	---	---	---	---	
150A	CDA 872	(<0.01)	(<0.01)	---	---	---	(<0.01)	---	---	---	0.045	1.05
X-RAY & CHIPS ONLY	C87200	0.013	0.005	0.011	(0.001)	(<0.03)	---	3.93	0.016	0.03	---	
151A	CDA 875	(<0.01)	(<0.01)	---	---	---	(<0.01)	---	---	---	0.076	0.002
X-RAY & CHIPS ONLY	C87500	0.009	0.006	---	---	---	---	3.95	(0.006)	14.02	---	
151B	CDA 875	(0.01)	0.002	(0.002)	---	---	0.005	---	(0.003)	84.0	0.025	0.002
Final	C87500	0.011	0.003	0.013	<0.001	(0.001)	---	3.11	0.009	12.94	---	
211A	Magnolia B	0.005	0.002	(0.01)	---	5.0	---	(0.001)	(0.002)	88.4	0.004	(0.003)
Final	C89320	0.003	0.19	0.014	0.002	0.057	---	0.003	6.23	0.006	---	
226A	EnviroBrass 2-1	[(0.005)]	[0.002]	[0.005]	[<0.001]	[1.71]	---	---	---	[86.8]	[0.055]	[0.003]
Provisional	C89520 Modified	[0.54]	[0.005]	[0.043]	[0.005]	[0.006]	[0.94]	[0.002]	[5.14]	[4.76]	---	
227A	EnviroBrass 2-2	[(0.004)]	[0.002]	[0.005]	---	[2.29]	[0.003]	[(0.001)]	[0.002]	[86.0]	[0.06]	[(0.003)]
Provisional	C89520 Modified	[0.53]	[0.004]	[0.04]	[0.005]	[0.01]	[1.21]	[0.002]	[5.12]	[4.71]	---	
228A	CDA 903	[0.004]	[0.002]	[0.005]	---	[1.52]	[(0.003)]	[(0.002)]	[(0.002)]	[89.1]	[0.05]	[0.002]
Provisional	C89520 Modified	[0.46]	[0.03]	[0.02]	[0.004]	[0.02]	[0.68]	[0.002]	[4.10]	[4.06]	---	

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Copper, Brass & Bronze Alloys — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

IARM Status	CDA Grade UNS#	Ag Ni	Al P	As Pb	Be S	Bi Sb	C Se	Co Si	Cr Sn	Cu Zn	Fe Zr	Mn Nb
89A	CDA 903	---	<0.01	---	---	---	(0.009)	(<0.01)	---	---	0.009	<0.01
CHIPS ONLY	C90300	0.15	0.11	0.09	0.018	<0.01	---	<0.01	8.14	3.48	---	
89B	CDA 903	---	(<0.01)	---	---	---	---	(<0.01)	---	---	0.013	(<0.01)
Final	C90300	0.15	0.087	0.089	0.018	(<0.01)	---	(<0.01)	8.17	3.96	---	
89C	CDA 903	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C90300	---	---	---	---	---	---	---	---	---	---	
90A	CDA 922	0.090	<0.01	(0.009)	---	---	(0.009)	(<0.01)	---	---	0.02	<0.01
CHIPS ONLY	C92200	0.69	0.047	1.64	0.037	0.063	---	<0.005	6.45	2.87	---	
90B	CDA 922	---	(<0.01)	---	---	---	---	(<0.01)	---	---	0.019	(<0.01)
Final	C92200	0.69	0.054	1.66	0.035	0.06	---	(<0.01)	6.44	2.98	---	
91A	CDA 932	(0.008)	<0.01	(<0.01)	---	---	(0.010)	(<0.01)	---	---	0.08	<0.01
CHIPS ONLY	C93200	0.09	0.01	6.39	0.052	0.07	---	<0.005	6.71	3.19	---	
91B	CDA 932	0.021	(0.002)	(0.01)	---	---	---	0.003	---	82.0	0.056	<0.01
CHIPS ONLY	C93200	0.56	0.012	7.15	0.045	0.19	---	<0.005	6.57	3.49	---	
91C	CDA 932	(0.02)	0.002	0.012	---	0.029	(0.002)	<0.005	<0.002	83.2	0.027	0.0022
Final	C93200	0.46	0.054	6.8	0.043	0.164	---	0.012	6.77	2.62	---	
92C	CDA 937	---	---	---	---	---	---	---	---	---	---	---
Coming 2007	C93700	---	---	---	---	---	---	---	---	---	---	
93B	CDA 954	(0.004)	10.33	<0.01	---	---	0.007	0.006	(0.007)	85.4	3.87	0.024
Final	C95400	0.088	(0.002)	0.012	0.002	(0.012)	---	0.024	0.009	0.17	---	
204A	CDA 954 Modified	0.009	10.55	(<0.01)	---	---	0.006	0.008	0.008	83.3	3.87	0.052
Final	N/A	1.95	0.007	0.004	(0.002)	(<0.01)	---	0.034	0.005	0.22	---	
94A	CDA 955	---	10.63	(<0.01)	---	---	(0.014)	0.01	---	---	4.04	0.16
Final	C95500	4.37	<0.01	0.009	(0.003)	(<0.01)	---	<0.01	(<0.01)	0.09	---	
94B	CDA 955	0.017	10.8	<0.01	---	---	(0.006)	0.011	0.017	80.6	3.99	0.071
Final	C95500	4.31	0.011	0.004	0.002	(0.011)	---	0.028	(0.003)	0.14	---	
235A	CDA 958	<0.005	8.9	<0.005	---	(0.004)	0.009	0.01	0.01	81.2	4.07	1.17
Final	C95800	4.44	0.012	0.012	0.002	(0.004)	---	0.061	0.018	0.083	---	
236A	CDA 964	[<0.002]	[(0.004)]	[<0.005]	[<0.001]	[(0.004)]	[0.012]	[0.006]	[0.002]	[66.6]	[0.91]	[1.05]
Provisional	C96400	[30.1]	[0.004]	[(0.004)]	[0.003]	[<0.05]	---	[0.19]	[(0.005)]	[(0.03)]	---	[0.96]
159A	NARloy-A	3.48	(<0.01)	---	---	---	(0.002)	(<0.01)	(<0.01)	---	(<0.01)	(<0.01)
Final	N/A	(<0.01)	(<0.01)	(<0.01)	(<0.01)	---	---	(<0.01)	(<0.01)	(<0.01)	---	

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IARM Status	CDA Grade UNS#	Ag Ni	Al P	As Pb	Be S	Bi Sb	C Se	Co Si	Cr Sn	Cu Zn	Fe Zr	Mn Nb
160A Final	NARloy-Z N/A	3.03 (<0.01)	(<0.01) (0.004)	--- (<0.01)	--- (<0.003)	--- ---	0.003 ---	(<0.01) (<0.01)	(<0.01) (<0.01)	--- (<0.01)	(<0.01) 0.40	(<0.01)

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MBH Copper Based Alloys

Gun Metal

			Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	P	Cr	Ag	S	Co	Cu	Size (mm) Ø x H
Chill Cast	*	**33 X GM 4**	2.50	4.96	7.24	0.0616	2.00	0.005	(0.0013)	0.0116	0.0012	0.009	0.022	0.0108	(0.0003)	0.0120	0.143	. . .	83.04	42 x 18
	CRM	**33 X GM 5**	5.00	4.98	4.21	0.080	0.804	(0.001)	0.0013	0.0148	0.0008	0.080	0.086	0.0107	. . .	0.0093	0.043	0.0399	84.66	42 x 18
	*	**33 X GM 6**	7.31	3.11	2.99	0.131	1.069	0.136	0.124	0.175	0.0912	0.037	0.258	0.0566	0.0019	0.0114	0.070	. . .	84.46	42 x 17
	*	**33 X GM 7**	9.97	0.97	2.29	0.0278	0.500	0.051	0.065	0.133	0.151	0.085	0.111	0.034	0.0146	0.0574	0.0139	. . .	85.49	42 x 18
	*	**33 X GM 8 ***	4.05	6.75	6.20	0.30	0.12	0.007	<0.001	0.007	0.001	0.015	<0.001	0.022	0.005	0.11	0.006	. . .	82.4	
st/Wrought		**33 X GM 24**	3.85	3.35	3.67	0.0083	0.0087	(0.0001)	0.0028	0.0010	<0.0005	0.0009	0.0012	0.190	(0.0013)	0.0046	0.003	. . .	88.88	44 x 17
Cast		**33 X GM 29**	6.12	0.050	4.23	0.0102	0.0289	(0.0004)	0.0027	0.0017	(0.0005)	0.0019	0.0015	0.138	(0.0004)	0.0026	0.0024	. . .	89.36	33 x 19
			* approximate composition - currently being certified																	
Chill Cast		**33 X RB1**	2.137	5.02	7.95	0.928	0.0539	0.0048	0.063	0.0030	0.0167	0.0029	0.432	0.020	0.0013	0.0174	0.0044	. . .	83.25	42 x 17
		34 X RB2	3.19	3.85	9.14	0.493	0.255	0.0362	0.0116	0.0211	0.0028	0.101	0.019	0.0208	0.0017	0.0029	0.078	. . .	82.67	42 x 17

Nickel Silver

			Sn	Pb	Zn	Fe	Ni	Si	Mn	P	S	Mg	Co	Cr	Ag	Cu	Size (mm) Ø x H
Chill Cast	*	**34 X NS 1**	0.0110	0.0141	33.41	0.064	7.81	(0.002)	0.0009	0.0140	(0.0004)	0.0020	. . .	. . .	. . .	58.63	42 x 18
	*	**34 X NS 2**	0.009	0.057	26.0	0.065	13.12	0.06	0.145	0.005	0.018	<0.0005	. . .	. . .	. . .	60.6	
	*	**34 X NS 3 ***	0.01	0.12	18.5	0.20	15.0	0.01	0.01	0.002	0.03	0.005	. . .	. . .	. . .	66.0	
	CRM	**34 X NS 4**	0.02	0.152	15.58	0.351	16.96	(0.0009)	0.0100	0.0099	0.012	<0.0001	0.222	0.0005	0.0298	66.71	42 x 17
	*	**34 X NS 5**	0.124	1.13	24.2	0.56	19.4	0.051	0.096	0.044	0.017	0.0015	. . .	. . .	. . .	54.3	
			* target composition														

Phosphorus Deoxidised Copper

		P	Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	S	Cu	Size (mm) Ø x H
Chill Cast	**35 X CUP 8**	8.9	0.18	0.006	0.017	. . .	0.019	<0.002	<0.005	<0.002	<0.002	<0.005	(0.003)	0.015	90.7	40 x 15

Cupro-Nickel

			Sn	Pb	Fe	Ni	Co	Si	Mn	Mg	S	P	Bi	B	C	Cr	Ti	Nb	Zn	Cu	Size (mm) Ø x H
Chill Cast		**36 X CN1**	0.031	0.07	1.67	10.8	0.12	0.09	1.75	<0.001	0.010	(0.004)	. . .	. . .	0.004	<0.002	. . .	0.07	. . .	85	40 x 15
Chill Cast		**36 X CN2**	0.061	0.048	1.70	15.47	0.264	0.044	1.26	0.0006	0.035	0.015	0.0045	. . .	0.004	0.240	0.0102	(0.032)	0.0358	80.78	40 x 17
Cast		**36 X CN3**	0.04	0.01	0.91	20.5	0.05	0.41	0.72	<0.005	0.02	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(Rem)	
Cast		**36 X CN4**	0.009	(0.023)	2.67	27.49	0.052	0.025	0.164	(0.0004)	0.0076	0.0079	0.0077	. . .	0.0053	0.022	(0.004)	0.0139	0.041	69.48	40 x 17
Cast		**36 X CN5**	0.02	0.01	0.21	32.9	0.01	0.98	0.07	<0.005	0.007	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	(Rem)	
Chill Cast		**36 X CN6**	0.0307	0.0066	0.878	33.46	0.0440	0.144	0.451	. . .	0.0109	0.031	0.0058	(0.0016)	0.0180	1.10	0.0066	0.51	0.026	63.34	40 x 15
Chill Cast	CRM	**36 X CN7**	0.039	0.028	1.021	29.95	0.108	0.304	0.659	0.0041	0.0151	(0.021)	(0.014)	(0.004)	0.0106	1.51	(0.037)	0.58	0.203	65.58	continued
Chill Cast	*	**36 X CN8**	0.046	0.095	0.89	30.61	0.104	0.123	0.881	0.021	0.022	0.046	0.103	0.0025	0.0225	1.28	. . .	0.18	0.159	65.51	
Chill Cast		**36 X CN9**	. . .	0.024	0.99	28.3	0.008	0.56	1.16	. . .	0.005	0.02	0.012	0.014	0.009	1.82	(0.009)	0.7(1)	. . .	(66.5)	
Chill Cast	*	**36 X CN10 ***	0.008	0.004	4.35	28.6	0.080	1.02	0.26	0.003	0.060	0.02	0.012	(0.003)	0.062	1.60	0.03	0.95	0.028	61.0	
			* approximate - this item is being certified																	

Continuation from above

	Cd	Zr	Size (mm) Ø x H
36 X CN7	0.0024	(0.003)	40 x 17

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

MBH Copper Based Alloys

Copper with Magnesium

		Mg	P	Ag	S	Al	Co	Cr	Size (mm) Ø H
Chill Cast	* **36 X CMG10**	0.375	0.028	0.075	0.0025	0.024	0.042	0.038	36-38 x 16
	* **36 X CMG11**	0.770	0.079	0.148	0.0020	0.044	(0.0001)	(0.0002)	
	* **36 X CMG12**	1.16	0.09	0.195	0.0022	0.008	0.093	0.075	

Cu/Be/Co

		Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Cr	Be	Co	Cu	Typical Alloy Type	Size (mm) Ø H
Wrought	**36 X CBC 1**	0.006	0.001	0.003	0.018	1.84	0.016	0.010	0.001	0.003	0.41	0.034	(Rem)	C17510	35-38 x 15
	36 X CBC 2	0.009	0.0099	0.0103	0.0208	0.0472	0.0231	0.0205	0.0015	0.0044	0.450	2.47	96.96		40 x 17
	36 X CBC 3	0.02	0.01	0.01	0.07	0.03	0.045	0.08	0.003	0.005	1.83	0.24	(Rem)	C17200	
	36 X CBC 4	0.017	0.31	0.022	0.054	0.025	0.036	0.057	0.004	0.002	1.83	0.20	(Rem)	C17300	
	* **36 X CBC 5**	0.01	0.009	0.038	0.028	1.69	0.021	0.036	(0.001)	0.006	0.32	0.14	97.6(4)		

Chromium Copper

		Sn	Fe	Ni	Si	Mn	Cr	Zr	Bi	Pb	Zn	Al	S	As	Mg	Size (mm) Ø H
Wrought	**36 X CCR1**	<0.005	0.015	<0.005	0.01	<0.001	0.855	0.11	<0.001	0.002	0.003	0.014	0.002	<0.002	0.001	40 x 15
	36 X CCZ	0.0045	0.033	0.0084	0.0031	0.0008	0.667	0.049	. . .	0.0023	0.0076	0.0003	0.0010	. . .	. . .	50 x 17

Copper with Cadmium

		Cd	Sn	Zn	Ag	Size (mm) Ø H
Wrought	**36 X CCD 1 ***	0.984	<0.001	(0.0011)	(0.0014)	30 x 15
	36 X CCD 2 *	1.16	0.191	(0.0011)	(0.0013)	
	36 X CCD 3 *	1.08	0.469	(0.0010)	(0.0012)	

* approximate - these items are being certifie

Cu/Ni/Sn

		Sn	Pb	Zn	Fe	Ni	Co	Si	Mn	Sb	Mg	P	S	Bi	B	Al	Ag	Cu	Size (mm) Ø H
Chill Cast	**36 X SP1**	5.75	0.0115	0.344	0.45	8.33	0.057	0.004	0.084	0.0177	. . .	(0.003)	0.005	0.0039	0.0007	0.0020	0.005	84.9	40 x 15
	37 X SP2	8.92	0.026	0.029	(0.09)	15.72	0.119	(0.0023)	0.0019	0.006	0.0002	(0.0006)	0.003	(0.0027)	0.0005	0.0003	0.0181	74.91	

Various Copper Alloys

		Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	P	S	C	Cr	Co	Zr	Cu	Size (mm) Ø H
Wrought	**36 X 274**	0.0140	0.0021	0.0395	0.0779	2.54	0.0013	0.594	0.0148	0.0011	0.0035	(0.0033)	0.531	0.0028	<0.005	96.23	46 x 17
Wrought	**37 X 218**	0.015	0.0025	0.027	0.074	2.52	0.0022	0.58	0.083	0.0014	0.007	0.0022	0.032	0.0013	. . .	96.57	38 x 17
	37 X 226	0.0030	(0.001)	2.82	1.51	0.0024	0.0020	3.55	0.577	0.0022	0.0005	0.006	0.0023	. . .	(0.0002)	91.58	57 x 17

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MBH Copper Based Alloys

	Residuals in Pure Copper - Wire	Pb	Zn	Fe	Ni	As (All elements ppm)	Bi	Sb	Co	Ag	Cd	Te	Mn	Sn	Cr	Se	S	O	Size (mm) Ø H
Wire	38 X C1A	0.4	1.5	2	0.8	<1.0	0.2	<1.0	<1.0	7.8	<0.1	0.4	<1.0	0.7	<1.0	0.7	. . .	. . .	
	38 X C1B	0.8	0.45	1.2	1.0	0.8	0.1	0.6	0.03	13	<0.01	0.3	1.2	<0.3	0.06	. . .	. . .	. . .	3 X 400
	* 38 X C1C	(0.05)	<0.1	1.7	0.27	0.19	0.10	0.10	<0.01	11.2	<0.01	(0.21)	(0.005)	(0.01)	<0.005	-0.25	2.0	266	
	38 X C2A	2.7	3.6	9.1	1.4	3.8	1.5	2.6	2.6	12	2.5	1.6	3.1	1.1	1.0	. . .	. . .	. . .	in packs of
	38 X C4	23	22	19	29	19	5	9	3	21	8	8	2.7	21	3	. . .	. . .	. . .	5 x 80mm pc
	38 X C6	111	40	107	166	98	22	45	33	104	32	30	0.3	120	1	. . .	. . .	. . .	

These reference materials are in wire form, intended for globule arc work.

	Residuals in Pure Copper - Discs	Sn	Pb	Zn	Fe	Ni (All elements ppm)	As	Bi	Sb	Co	Ag	Cd	Si	Mn	Al	
Chill Cast	* 39 X 17866	2100	240	340	101	548	400	63	58	229	61	327	(7)	1.6	<10	
	* 39 X 17867	450	290	440	270	440	430	290	46	720	62	550	1150	221	390	
	* 39 X 17868	350	380	390	470	330	294	430	330	480	250	330	1000	580	1390	continued
	39 X 17869	150	478	110	230	144	137	440	389	133	440	85	(7)	13	6	
	* 39 X 17870	170	590	130	440	70	43	750	470	120	460	97	(20)	200	(<10)	
	* 39 X 17871	(20)	90	8	20	275	290	700	180	8	270	32	(3)	10	(2)	

Continuation from above	Mg	S	P	Cr (All elements ppm)	Au	Se	Be	Te	B	Zr	In	Size (mm) Ø H
39 X 17866	2	510	160	15	. . .	30	(1)	53	. . .	. . .	. . .	40 x 17
39 X 17867	49	580	170	2560	85	115	3	210	(10)	(10)	. . .	40 x 17
39 X 17868	470	176	410	2000	220	40	13	320	30	(50)	. . .	40 x 17
39 X 17869	4	160	130	2.3	90	63	. . .	323	. . .	. . .	. . .	40 x 17
39 X 17870	4	194	490	(20)	730	76	<1	160	(3)	. . .	23	40 x 17
39 X 17871	(2)	80	<10	2	45	280	4	110	(2)	<5	. . .	40 x 17

MBH Brass Based Alloys

Brass - Cu/Zn Binaries

			Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Cu	As	Bi	Sb	Co	B	Size (mm) Ø x H
Chill Cast	*	**31 X B1**	0.0234	0.039	43.76	0.0193	0.0089	0.0011	0.0141	0.0022	56.07	0.0029	0.0044	0.0040	. . .	. . .	42 x 18
	CRM	**31 X B2**	0.151	0.0129	39.57	0.0191	0.0124	0.0172	(0.0072)	0.0249	60.13	0.0222	0.0107	0.0207	(0.0002)	0.0056	42 x 18
	*	**31 X B3**	0.0268	0.024	33.89	0.065	0.059	0.0114	0.017	0.0187	65.80	0.0200	0.0127	0.0096	. . .	. . .	42 x 18
		31 X B4	-0.006	(<0.005)	29.7	-0.005	-0.003	(<0.005)	(<0.002)	(<0.005)	70.2	(<0.001)	(<0.001)	(<0.001)	. . .	. . .	
	*	**31 X B5**	-0.015	-0.016	23.90	-0.015	-0.015	(<0.002)	(<0.001)	(<0.001)	76.01	(<0.001)	(<0.001)	(<0.001)	. . .	. . .	
		31 X B6	(<0.005)	(<0.005)	19.4	-0.01	(<0.005)	(<0.005)	(<0.005)	(<0.005)	80.6	(<0.005)	(<0.005)	(<0.005)	. . .	. . .	
		31 X B7	0.101	0.01	15.01	0.018	0.02	<0.005	<0.005	(0.0002)	84.80	0.0016	0.066	0.0019	. . .	. . .	42 x 17
		31 X B8	0.035	0.072	9.52	0.0267	0.0083	(0.0013)	0.0051	0.0012	90.28	0.0081	0.031	0.0108	. . .	. . .	42 x 18
		31 X B9	-0.011	-0.005	5.24	-0.004	-0.011	(<0.005)	(<0.002)	(<0.001)	94.7	(<0.001)	(<0.001)	(<0.005)	. . .	. . .	

Brass - Major Elements

			Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Cu	As	Bi	Sb	P	S	B	Size (mm) Ø x H
Chill Cast	*	**31 X B10**	(0.012)	(0.032)	36.8	1.83	1.51	0.63	(0.003)	0.217	59.0	(0.003)	(<0.001)	(<0.001)	. . .	. . .	. . .	40 x 15
	*	**31 X B11**	(0.010)	(0.041)	34.2	0.88	1.01	0.334	(0.001)	1.09	62.2	(0.003)	(<0.001)	(<0.001)	. . .	. . .	. . .	
	*	**31 X B12**	(0.008)	(0.053)	35.1	0.45	0.55	0.148	(0.001)	2.16	61.4	(0.002)	(<0.001)	(<0.001)	. . .	. . .	. . .	
	*	**31 X B13**	(0.005)	(0.033)	42.3	0.187	0.196	0.051	(0.001)	2.75	54.4	(<0.001)	(<0.001)	(<0.001)	. . .	. . .	. . .	
Chill Cast	*	**31 X B14 ***	0.5	(<0.005)	37.5	(<0.005)	(<0.005)	4.0	0.05	(<0.005)	58.0	(<0.005)	(<0.005)	(<0.005)	. . .	. . .	. . .	40 x 15
	*	**31 X B15**	1.01	(<0.02)	(Rem)	(0.017)	<0.005	2.76	0.12	(0.012)	60.5	<0.005	(<0.005)	<0.005	. . .	. . .	. . .	
	*	**31 X B16**	2.17	(0.04)	36.9	(0.02)	(0.01)	2.04	0.20	(0.01)	58.5	(0.006)	(<0.001)	(<0.001)	. . .	. . .	. . .	
	*	**31 X B17**	0.010	(0.05)	34.2	(0.02)	(0.01)	6.05	(0.007)	(<0.001)	59.5	(0.015)	(<0.001)	(<0.001)	. . .	. . .	. . .	
			* target values															
Chill Cast	CRM	**31 X B18**	0.045	0.916	39.11	0.0185	0.0143	0.0235	0.018	0.00110	59.82	0.0196	0.0051	0.0129	0.0117	<0.005	. . .	42 x 18
	*	**31 X B19**	0.0096	2.495	38.52	0.0123	0.0557	0.0120	0.0195	0.0071	58.84	0.0048	0.0080	0.0044	0.0126	<0.001	. . .	42 x 18
		31 X B20	(0.06)	5.39	(36.4)	(<0.01)	(<0.005)	(<0.005)	(<0.005)	(<0.005)	57.9	(<0.005)	(<0.01)	(<0.005)	. . .	. . .	. . .	
Chill Cast	CRM	**31 X B21**	0.132	0.120	29.50	0.129	0.107	0.121	0.147	0.0647	69.24	0.108	0.114	0.130	0.100	(0.002)	0.0050	42 x 18
	CRM	**31 X B22**	0.209	0.209	17.32	0.168	0.166	0.125	0.171	0.097	80.77	0.169	0.193	0.173	0.157	0.104	0.0033	42 x 18
		31 X B23	0.055	0.039	(10.0)	0.049	0.041	0.081	0.05	0.057	89.1	0.056	0.058	0.054	0.046	0.055	. . .	
	*	**31 X B24**	0.016	0.017	4.17	0.017	0.021	0.010	(0.009)	0.013	95.5	0.021	0.022	0.020	0.010	0.051	. . .	
		31 X B25	0.49	0.32	(Rem)	0.08	0.19	0.39	0.09	0.12	58.5	0.037	0.054	0.044	0.01	<0.005	. . .	
		31 X B26	1.566	1.08	29.68	1.29	1.48	1.123	0.46	0.337	62.60	0.108	0.123	0.075	0.0374	(0.0013)	. . .	42 x 18
		31 X B27	0.985	0.492	17.65	0.111	0.0315	0.0015	0.0044	0.0059	80.65	0.048	0.0320	0.0243	0.0159	0.0080	. . .	42 x 18
		31 X B95	0.45	(<0.001)	4.99	(0.007)	(<0.001)	(<0.005)	(0.01)	(<0.001)	94.4	(0.008)	(0.007)	(<0.001)	(<0.001)	(<0.001)	. . .	40 x 15

Brass - Trace Elements

			Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	Cu	Size (mm) Ø x H
Chill Cast		**31 X TB1**	0.22	0.27	(35.9)	0.070	0.23	0.18	0.088	0.19	0.35	0.053	0.13(6)	62.2	40 x 15
		31 X TB2	0.105	0.107	37.16	0.072	0.093	0.084	0.042	0.101	0.088	0.031	0.051	61.97	42 x 18
	*	**31 X TB3**	0.075	0.110	36.58	0.032	0.0401	0.0247	0.0226	0.0496	0.0350	0.0214	0.026	62.98	42 x 18
		31 X TB4	0.0356	0.0225	34.86	0.0229	0.0114	(0.0004)	(0.0027)	0.0065	0.0021	0.0056	0.0064	65.00	42 x 18

( ) Indicates non-certified value.
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MBH Brass Based Alloys

Naval Brass

		Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	P	S	Cu	Size (mm) Ø x H
Chill Cast	**31 X NB1**	0.48	0.54	(29.1)	0.014	0.10	<0.005	<0.005	0.16	0.13	<0.005	<0.005	0.033	<0.005	69.4	40 x 15
	31 X NB2 *	1.00	0.25	29.0	0.10	0.05	0.10	0.10	0.10	0.15	0.05	0.10	0.10	0.002	(rem)	
	31 X NB3	1.67	0.197	24.64	0.113	0.0299	0.094	0.145	0.074	0.0166	0.093	0.265	0.150	(0.006)	72.45	42 x 18
CRM	**31 X NB4**	2.06	0.08	(33.3)	0.226	0.166	0.20	0.20	<0.005	0.006	0.14	0.35	0.31	(0.001)	62.8	

* target values

Bismuth Brass

		Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	P	S	Cu	Se	Cd	B	Size (mm) Ø x H
Chill Cast	**31 X BIB1**	0.540	0.284	37.06	0.203	0.309	0.125	0.206	0.0335	0.0112	2.03	0.0054	0.014	(0.0034)	59.13	. . .	. . .	. . .	40 x 17
	31 X BIB2	1.186	0.0617	33.85	0.379	0.466	0.411	0.322	0.084	0.0451	0.921	0.119	0.0358	(0.0014)	62.05	. . .	. . .	. . .	42 x 18
	31 X BIB3	0.111	0.149	32.46	0.099	0.098	0.0298	0.061	0.057	0.243	4.05	0.0417	0.0175	(0.0005)	62.48	. . .	. . .	. . .	40 x 17
CRM	**31 X BIB4**	0.400	0.091	36.89	0.148	0.175	0.358	0.0018	. . .	0.0039	0.980	0.0144	0.0064	(0.0007)	60.88	0.0162	0.0005	0.0008	42 x 18

Leaded Brass

		Sn	Pb	Zn	Fe	Ni	Al	P	As	Sb	Cu	Cd	Si	Bi	Se	Co	S	B	Size (mm) Ø x H
Chill Cast	CRM **31 X 7835.1**	0.421	2.79	33.48	0.203	0.123	0.012	0.0465	0.0050	0.0048	62.67	0.0004	0.054	0.0339	0.0111	0.0173	(0.0037)	0.0009	42 x 18
	* **31 X 7835.2 ***	0.20	2.15	33.3	0.05	0.04	0.10	0.006	0.05	0.05	64.0	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
	31 X 7835.3	0.113	1.35	36.50	0.381	0.253	0.386	0.0378	0.097	0.096	60.67	. . .	. . .	. . .	. . .	. . .	. . .	. . .	42 x 18
	* **31 X 7835.4**	0.046	1.03	30.09	0.020	0.492	0.561	0.125	0.206	0.188	67.11	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
	31 X 7835.5	0.116	1.64	6.32	0.126	0.249	0.078	0.018	0.104	0.114	91.25	. . .	. . .	. . .	. . .	. . .	. . .	. . .	42 x 18
	CRM **31 X 7835.6**	0.080	1.498	38.05	0.091	0.0173	0.546	<0.0005	0.0006	0.0127	59.67	0.0010	(0.001)	0.0026	0.0007	0.0005	0.0017	0.0005	42 x 18

* target composition

See also section 3.1.1 products 31 X B18-20.

Manganese Brass

		Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Cu	Size (mm) Ø x H
Chill Cast	**31 X MNB1**	0.13	1.63	(Rem)	0.33	0.11	0.48	0.13	0.58	67.0	40 x 15
	* **31 X MNB2**	0.319	1.02	32.19	0.66	0.118	0.268	0.233	2.23	63.02	
	* **31 X MNB3**	0.549	0.458	24.10	1.306	2.77	0.98	1.36	2.77	68.20	42 x 18
	* **31 X MNB4**	1.080	0.640	27.12	1.73	3.23	2.16	0.90	4.14	58.95	42 x 18
	* **31 X MNB5**	1.75	0.127	37.91	0.56	1.31	3.35	0.49	0.243	54.14	
	* **31 X MNB6**	0.007	0.04	(28.0)	0.27	0.26	0.005	(0.007)	0.84	70.8	

Silicon Brass

		Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	P	S	Mg	Sb	Co	Cr	Cu	Bi	Size (mm) Ø x H
Cast	* **31 X WSB 1**	0.209	0.84	8.96	0.249	0.045	1.82	5.45	0.109	0.049	0.0151	(0.005)	0.0318	0.019	0.405	0.116	81.61	0.035	43 x 20
	* **31 X WSB 2**	0.390	0.62	12.80	0.312	0.150	0.95	4.01	0.069	0.730	0.033	(0.001)	0.018	0.042	0.199	0.018	79.6	. . .	
	* **31 X WSB 3**	0.60	0.39	9.66	0.51	0.36	0.70	3.48	0.053	1.44	0.044	<0.002	0.004	0.067	0.052	0.05	(82.4)	. . .	
	* **31 X WSB 4**	0.83	0.204	5.49	0.90	0.255	0.417	4.48	0.025	1.72	0.048	(0.001)	(0.0009)	0.080	0.074	0.044	85.4	. . .	
	31 X WSB 5	1.05	0.100	0.343	0.79	0.492	0.218	6.07	0.0284	0.496	0.080	0.0081	0.0012	0.124	0.057	0.0087	90.06	0.030	
	CRM **31 X WSB 6**	0.056	.95	.881	.032	.117	.059	2.48	.0051	.248	(0.020)	(0.002)	(0.001)	.007	.247	.058	94.74	.0056	43 x 20
	* **31 X WSB 7**	1.91	0.054	6.80	1.73	3.05	3.83	4.82	0.076	3.19	0.212	. . .	(0.0006)	0.61	(0.0019)	0.014	73.3	0.191	

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

TechLab Brass Alloy RMs - Sold as Sets Only

Set Name	Set Index #	Al	As	Bi	Co	Cd	Cu	Fe	Mg	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn
M20	201	---	0.015	0.0046	---	---	(70.9)	0.082	---	---	---	(0.02)	(0.7)	---	(0.02)	---	0.020	(28.0)
	202	---	0.0080	0.0039	---	---	(62.5)	0.27	---	---	---	(0.01)	0.29	---	0.020	---	0.010	(36.4)
	203	---	0.0045	0.0059	---	---	(59.8)	0.16	---	---	---	(0.006)	0.17	---	0.010	---	0.0096	(39.6)
	204	---	0.061	0.0026	---	---	(67.0)	0.095	---	---	---	(0.01)	0.086	---	0.0044	---	0.0053	(32.6)
	205	---	0.022	0.0018	---	---	(69.9)	0.050	---	---	---	(0.004)	0.043	---	(0.006)	---	0.0062	(29.9)
	206	---	0.012	0.0010	---	---	(56.7)	0.035	---	---	---	(0.003)	0.026	---	0.0072	---	0.0032	(43.1)
M22	221	3.68	---	0.0031	---	---	(59.4)	0.20	---	1.19	2.12	(0.01)	0.078	---	(0.004)	---	0.35	(38.2)
	222	2.61	---	0.0021	---	---	(64.4)	1.09	---	2.90	1.83	(0.01)	0.16	---	0.0040	---	0.77	(26.4)
	223	1.36	---	(0.0015)	---	---	(57.1)	0.80	---	2.44	1.09	(0.008)	0.68	---	0.090	---	0.60	(36.0)
	224	0.79	---	0.0039	---	---	(53.5)	0.53	---	2.03	3.15	(0.015)	0.89	---	0.074	---	0.21	(38.6)
	225	0.29	---	0.0051	---	---	(52.2)	(1.4)	---	1.83	3.07	(0.02)	0.58	---	0.037	---	0.14	(40.4)
	226	2.15	---	(0.006)	---	---	(60.4)	1.44	---	1.09	2.15	(0.02)	0.40	---	0.020	---	0.81	(31.6)
M37	371	---	---	(0.006)	---	---	92.17	0.042	---	---	---	(0.011)	0.0052	---	(0.002)	---	---	7.67
	372	---	---	0.0040	---	---	83.43	0.53	---	---	---	(0.007)	0.103	---	(0.008)	---	---	15.83
	373	---	---	0.0058	---	---	80.70	0.33	---	---	---	(0.0053)	0.050	---	(0.007)	---	---	18.86
	374	---	---	0.0031	---	---	84.25	0.25	---	---	---	(0.0015)	0.029	---	(0.006)	---	---	15.49
	375	---	---	0.0019	---	---	88.77	0.107	---	---	---	(0.003)	0.020	---	(0.004)	---	---	10.97
	376	---	---	(0.0011)	---	---	76.99	0.051	---	---	---	(0.0015)	0.012	---	(0.005)	---	---	22.73
M39	391	---	---	0.0055	---	---	57.76	0.17	---	---	0.027	(0.033)	0.38	---	0.015	0.49	0.30	40.57
	392	---	0.0044	0.0034	---	---	60.45	0.20	---	---	0.13	(0.018)	0.26	---	0.010	0.34	0.25	38.38
	393	---	0.0074	0.0017	---	---	63.99	0.11	---	---	0.24	(0.014)	0.17	---	0.0077	0.25	0.40	34.72
	394	---	0.010	0.0010	---	---	67.86	0.097	---	---	0.35	(0.0092)	0.094	---	0.0051	0.16	0.43	30.98
	395	---	0.019	---	---	---	72.04	0.049	---	---	0.52	(0.0059)	0.044	---	0.0023	0.055	2.10	25.34
M42	421	---	---	(0.0015)	---	---	(86.64)	0.16	---	---	0.24	(0.0042)	(0.011)	---	(0.0012)	0.0084	0.22	12.8
	422	---	---	(0.0012)	---	---	(87.65)	0.127	---	---	0.16	(0.0052)	0.046	---	(0.0012)	(0.03)	0.93	11.01
	423	---	---	(0.0038)	---	---	(91.57)	(0.096)	---	---	0.10	(0.0083)	0.035	---	0.0043	0.090	0.72	7.46
	424	---	---	(0.0034)	---	---	(90.17)	0.076	---	---	0.060	(0.019)	0.023	---	0.0050	0.21	0.56	8.85
	425	---	---	(0.0012)	---	---	(89.59)	0.050	---	---	0.027	(0.017)	0.017	---	0.007	0.36	0.20	9.76
M47	471	---	---	0.0044	---	---	(74.91)	0.043	---	---	---	(0.014)	0.052	---	0.0058	0.65	0.0064	24.23
	472	---	---	0.0030	---	---	(74.72)	0.054	---	---	---	(0.012)	0.042	---	0.0042	0.56	0.0038	24.46
	473	---	---	0.0023	---	---	(74.18)	0.053	---	---	---	(0.010)	0.031	---	0.0026	0.45	0.0025	25.05
	474	---	---	0.0015	---	---	(73.84)	0.042	---	---	---	(0.008)	0.023	---	0.0018	0.32	0.0016	25.64
	475	---	---	0.0011	---	---	(73.32)	0.033	---	---	---	(0.006)	(0.016)	---	0.0012	0.22	(0.0014)	26.28
M50	501	0.56	---	0.0037	---	---	86.16	0.021	---	---	---	---	(0.001)	---	0.0016	---	---	13.14
	502	0.61	---	0.0024	---	---	85.35	0.046	---	---	---	---	(0.001)	---	0.0026	---	---	13.97
	503	0.43	---	0.0018	---	---	83.58	0.076	---	---	---	---	(0.0028)	---	0.0045	---	---	15.79
	504	1.24	---	(0.0012)	---	---	83.04	0.15	---	---	---	---	(0.034)	---	0.0063	---	---	15.53
	505	0.79	---	(0.0009)	---	---	82.48	0.24	---	---	---	---	(0.07)	---	0.0090	---	---	16.31

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TechLab Brass Alloy RMs - Sold as Sets Only

Set Name	Set Index #	Al	As	Bi	Co	Cd	Cu	Fe	Mg	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn
A6491 (M51)	6491 (511)	---	---	---	---	---	50.05	0.039	---	0.012	14.77	0.0021	---	---	---	---	---	---
	6492 (512)	---	---	---	---	---	49.54	0.052	---	0.057	12.65	0.0041	---	---	---	0.025	---	---
	6493 (513)	---	---	0.0016	---	---	50.30	0.065	---	0.16	10.95	0.0073	0.042	---	0.0026	0.11	---	---
	6464 (514)	---	---	0.0026	---	---	51.70	0.072	---	0.27	9.15	0.0094	0.067	---	0.0044	0.19	---	---
	6495 (515)	---	---	0.0037	---	---	52.96	0.17	---	0.55	7.82	0.0098	0.15	---	0.0068	0.40	---	---
M58	581	1.01	---	---	---	---	64.83	0.36	---	0.19	---	---	0.63	---	0.047	---	1.71	(30.9)
	582	1.86	---	---	---	---	65.74	0.47	---	0.28	---	---	0.90	---	0.071	---	1.25	(29.1)
	583	1.99	---	---	---	---	65.74	0.57	---	0.39	---	---	1.27	---	0.094	---	1.15	(28.6)
	584	2.43	---	---	---	---	66.34	0.73	---	0.50	---	---	1.54	---	0.12	---	0.70	(27.4)
	585	2.64	---	---	---	---	67.03	0.84	---	0.59	---	---	1.78	---	0.18	---	0.41	(26.3)
A169 (M60)	5011 (601)	(0.05)	---	---	---	---	57.4	0.61	---	---	0.187	---	3.30	---	0.030	0.037	0.23	38.1
	5012 (602)	(0.69)	---	---	---	---	(57.78)	0.53	---	---	0.24	---	2.85	---	(0.065)	(0.050)	0.32	37.1
	5013 (603)	(0.76)	---	---	---	---	58.8	0.39	---	---	0.41	---	2.03	---	0.064	0.106	0.61	36.6
	5014 (604)	(0.74)	---	---	---	---	59.4	0.36	---	---	0.58	---	1.71	---	0.049	0.089	0.89	35.95
	5015 (605)	(0.85)	---	---	---	---	60.1	0.29	---	---	0.80	---	1.20	---	0.032	0.23	1.20	35.20
M63	631	(0.001)	---	0.0080	---	---	71.7	0.063	---	---	---	(0.0058)	1.67	---	0.013	---	---	26.38
	632	(0.0055)	---	0.0053	---	---	72.7	0.13	---	---	---	(0.0034)	2.11	---	(0.0088)	---	---	24.78
	633	(0.0039)	---	0.0037	---	---	73.3	0.070	---	---	---	(0.0056)	2.62	---	0.0051	---	---	(24.2)
	634	(0.0013)	---	0.0028	---	---	74.5	0.022	---	---	---	(0.0079)	2.94	---	0.0030	---	---	22.5
	635	(0.001)	---	0.0019	---	---	75.5	0.0097	---	---	---	(0.012)	3.44	---	0.0021	---	---	21.10
M70	701	0.88	---	(0.001)	---	---	72.8	0.038	---	0.095	3.47	(0.001)	0.017	---	(0.001)	0.98	---	---
	702	1.38	---	(0.0026)	---	---	73.2	0.056	---	0.20	2.96	(0.007)	0.019	---	0.0022	0.74	---	---
	703	1.93	---	(0.0050)	---	---	74.4	0.094	---	0.40	2.43	(0.008)	0.083	---	0.0045	0.46	---	---
	704	2.74	---	(0.0079)	---	---	75.5	0.17	---	0.67	1.64	(0.02)	0.032	---	0.0092	0.28	---	---
	705	3.56	---	(0.0028)	---	---	75.6	(0.12)	---	0.94	1.38	(0.01)	0.045	---	0.014	0.16	---	---
M74	741	---	---	(0.00045)	---	---	(93.71)	0.026	---	---	0.048	(0.0023)	0.0032	---	(0.0032)	---	---	5.88
	742	0.12	---	(0.0008)	---	---	(93.92)	0.051	---	---	0.074	(0.0064)	0.0085	---	0.0036	(0.1)	0.12	5.55
	743	0.076	---	0.0013	---	---	(94.81)	0.078	---	---	0.12	(0.0086)	0.024	---	0.0038	(0.08)	0.091	4.68
	744	0.073	---	0.0020	---	---	(95.96)	0.12	---	---	0.21	(0.014)	0.043	---	0.0064	(0.082)	0.095	3.42
	745	0.056	---	0.0037	---	---	(97.15)	0.17	---	---	0.34	(0.019)	0.068	---	0.0086	(0.077)	0.098	1.99
M77	771	1.26	---	0.0012	---	---	75.2	0.15	---	0.012	1.35	0.028	0.022	---	0.0025	0.18	---	21.7
	772	1.65	---	0.0020	---	---	76.5	0.10	---	0.021	0.86	0.019	0.033	---	0.0031	0.082	---	20.70
	773	1.95	---	0.0033	---	---	77.6	0.057	---	0.026	0.48	0.012	0.053	---	0.0048	0.022	---	19.89
	774	2.46	---	0.0050	---	---	78.8	0.036	---	0.009	0.33	(0.0040)	0.078	---	0.0071	0.0042	---	18.24
	775	3.03	---	0.0078	---	---	80.1	0.013	---	0.010	0.097	(0.0021)	0.091	---	0.0098	(0.006)	---	16.62

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TechLab Brass Alloy RMs - Sold as Sets Only

Set Name	Set Index #	Al	As	Bi	Co	Cd	Cu	Fe	Mg	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn
M78	781	(0.004)	---	---	---	---	61.78	0.041	---	---	---	0.015	3.58	---	0.0075	(0.6)	0.030	---
	782	0.0020	---	---	---	---	(64.18)	0.076	---	---	---	0.0065	3.50	---	0.018	0.90	0.0076	---
	783	0.0075	---	---	---	---	64.03	0.10	---	---	---	0.0105	3.19	---	(0.03)	1.18	0.012	---
	784	0.0159	---	---	---	---	65.00	0.14	---	---	---	0.024	2.63	---	0.041	1.57	0.022	---
	785	0.040	---	---	---	---	65.71	0.26	---	---	---	0.031	2.13	---	0.059	2.04	0.042	---
M89	891	0.076	---	---	---	---	80.8	0.79	---	0.40	1.07	---	4.2	---	0.12	1.87	0.12	10.6
	892	0.18	---	---	---	---	79.8	0.71	---	0.74	0.75	---	3.5	---	0.16	2.66	0.23	11.1
	893	0.25	---	---	---	---	77.3	0.51	---	0.92	0.43	---	2.88	---	0.20	3.72	0.29	13.1
	894	0.48	---	---	---	---	76.4	0.23	---	1.13	0.30	---	2.30	---	0.34	4.38	0.45	13.5
	895	(0.74)	---	---	---	---	74.8	0.19	---	1.38	0.10	---	1.61	---	0.46	4.22	0.95	14.6
M113	901	(0.17)	---	---	---	---	61.30	(0.29)	---	3.30	0.066	(0.0039)	(1.07)	---	0.0058	1.34	---	32.46
	902	0.41	---	---	---	---	59.91	0.19	---	2.92	0.099	(0.0050)	(1.46)	---	(0.011)	1.11	---	33.90
	903	0.69	---	---	---	---	58.34	0.14	---	2.14	0.11	(0.0068)	(1.80)	---	0.009	0.80	---	35.96
	904	1.17	---	---	---	---	57.77	0.061	---	1.79	0.31	(0.0095)	(2.23)	---	0.013	0.52	---	36.16
	905	1.53	---	---	---	---	56.53	0.052	---	1.47	0.19	(0.012)	(2.74)	---	0.023	0.28	---	36.92
M97	971	0.032	---	---	---	---	63.09	0.14	---	---	0.12	(0.0072)	(2.64)	---	0.0058	0.066	0.058	---
	972	0.13	---	---	---	---	64.99	0.28	---	---	0.24	(0.014)	1.65	---	0.0033	0.040	0.11	---
	973	0.058	---	---	---	---	64.08	0.20	---	---	0.16	(0.010)	2.14	---	0.0049	0.050	0.068	---
	974	0.21	---	---	---	---	65.93	0.33	---	---	0.32	(0.019)	1.15	---	0.0027	0.032	(0.10)	---
	975	0.024	---	---	---	---	61.65	0.096	---	---	0.083	(0.0054)	3.18	---	0.0068	0.17	0.042	---
M107	1071	---	---	0.0040	---	---	62.7	0.23	---	(0.016)	4.64	---	0.16	(0.003)	(0.0021)	---	---	31.9
	1072	---	---	(0.0050)	---	---	65.4	0.024	---	0.0030	5.77	(0.0069)	0.018	(0.004)	0.0029	---	---	(29.1)
	1073	---	---	0.0029	---	---	65.3	0.16	---	(0.068)	5.9	(0.0074)	0.16	(0.025)	(0.0048)	---	---	28.2
	1074	---	---	0.0020	---	---	66.7	0.067	---	0.028	6.56	(0.015)	0.028	(0.025)	0.0071	---	---	26.3
	1075	---	---	0.0011	---	---	67.9	0.039	---	0.012	7.03	(0.022)	0.043	(0.03)	0.0097	---	---	24.8
M108	1081	0.21	---	---	---	---	(58.3)	0.061	---	1.27	0.045	(0.023)	0.50	---	0.0041	0.25	---	38.9
	1082	0.59	---	---	---	---	(58.7)	0.106	---	1.80	0.073	(0.014)	0.20	---	0.0056	0.46	---	38.05
	1083	0.89	---	---	---	---	(58.2)	0.15	---	2.22	0.085	(0.0103)	0.109	---	0.0028	0.73	---	37.7
	1084	1.69	---	---	---	---	(59.7)	0.20	---	2.89	(0.125)	(0.0105)	0.050	---	0.0075	1.27	---	34.14
	1085	2.55	---	---	---	---	(60.7)	0.33	---	3.56	0.25	(0.0108)	(0.045)	---	0.011	(1.88)	---	30.7

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TechLab Brass Alloy RMs - Sold as Sets Only

Set Name	Set Index #	Al	As	Bi	Co	Cd	Cu	Fe	Mg	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn
M109	1091	(0.027)	---	0.0080	---	---	(60.5)	0.65	---	6.77	6.37	---	0.025	---	(0.002)	0.13	---	25.6
	1092	(0.027)	---	0.0055	---	---	58.6	0.175	---	5.39	7.54	---	0.027	---	0.0032	0.09	---	28.1
	1093	(0.005)	---	0.0038	---	---	60.3	0.14	---	4.45	8.85	---	0.051	---	0.0051	(0.017)	---	26.4
	1094	(0.076)	---	0.0024	---	---	60.9	0.15	---	3.58	9.59	---	0.077	---	0.007	0.051	---	25.4
	1095	(0.0058)	---	0.0014	---	---	62.2	0.41	---	(2.65)	10.85	---	0.071	---	0.010	0.025	---	23.65
M112	1121	---	0.023	0.0072	---	---	72.8	0.063	---	---	---	(0.0049)	0.10	---	0.0082	---	1.41	---
	1122	---	0.029	0.0036	---	---	67.9	0.148	---	---	---	(0.0031)	0.057	---	0.0056	---	0.95	---
	1123	---	0.0050	0.0030	---	---	69.5	0.073	---	---	---	(0.001)	0.070	---	0.0042	---	1.00	---
	1124	---	0.046	0.0026	---	---	66.5	0.14	---	---	---	(0.0056)	0.052	---	0.0043	---	0.74	---
	1125	---	0.067	0.0020	---	---	67.3	0.12	---	---	---	(0.0074)	0.043	---	0.0035	---	1.66	---
M113	1131	---	---	---	---	---	59.66	0.37	---	0.0061	0.046	0.020	0.035	---	0.0028	---	---	39.8
	1132	---	---	---	---	---	61.61	0.18	---	0.0054	0.060	0.0091	0.118	---	0.0039	---	---	97.82
	1133	---	---	---	---	---	63.06	0.101	---	0.040	0.075	0.012	0.083	---	0.0058	---	---	36.54
	1134	---	---	---	---	---	64.35	0.068	---	0.018	0.34	0.014	0.042	---	0.0075	---	---	35.11
	1135	---	---	---	---	---	65.44	0.053	---	(0.012)	0.102	(0.0039)	0.013	---	0.0084	---	---	64.29
M122	6291 (1221)	---	(0.0018)	0.0063	---	---	66.8	0.0184	---	---	---	(0.00441)	0.0104	---	0.0087	---	0.0105	32.92
	6292 (1222)	---	0.00235	0.0040	---	---	68.1	0.098	---	---	---	(0.00285)	0.0125	---	0.0125	---	0.0074	31.5
	6293 (1223)	---	(0.0021)	0.00256	---	---	70.3	0.065	---	---	---	(0.0040)	0.0288	---	0.0062	---	0.0044	29.28
	6294 (1224)	---	0.0063	0.00186	---	---	71.2	0.0348	---	---	---	(0.0061)	0.0491	---	0.00370	---	0.0035	28.58
	6295 (1225)	---	0.0104	0.00104	---	---	72.7	0.0215	---	---	---	(0.0024)	0.074	---	0.00222	---	0.00220	27.05
M124	6341 (1241)	0.078	---	(0.001)	---	---	76.79	(0.9)	---	0.14	---	0.0075	(0.29)	---	0.015	1.86	0.056	19.77
	6342 (1242)	0.11	---	0.0022	---	---	78.17	0.29	---	0.20	---	0.0092	(0.22)	---	0.022	2.64	0.090	18.44
	6343 (1243)	0.15	---	0.0042	---	---	79.34	0.20	---	0.31	---	0.012	(0.13)	---	0.032	3.20	0.13	16.60
	6344 (1244)	0.20	---	0.0055	---	---	79.82	0.32	---	0.53	---	0.022	(0.089)	---	0.048	3.84	0.22	14.95
	6345 (1245)	0.40	---	0.0078	---	---	81.27	0.22	---	0.83	---	0.047	(0.069)	---	0.067	4.62	0.41	12.11
M129	1291	2.28	---	(0.0015)	---	---	55.89	0.82	---	---	3.84	(0.0039)	0.042	---	0.0022	---	---	---
	1292	2.44	---	0.0021	---	---	56.91	0.35	---	---	3.06	(0.0055)	0.055	---	0.0030	---	---	---
	1293	2.92	---	0.0032	---	---	58.03	0.063	---	---	2.51	(0.0086)	0.090	---	0.0052	---	---	---
	1294	3.49	---	0.0052	---	---	59.08	0.155	---	---	2.07	(0.011)	0.13	---	0.0072	---	---	---
	1295	4.13	---	0.0076	---	---	60.08	(0.075)	---	---	1.51	(0.021)	0.23	---	0.015	---	---	---

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TechLab Brass Alloy RMs - Sold as Sets Only

Set Name	Set Index #	Al	As	Bi	Co	Cd	Cu	Fe	Mg	Mn	Ni	P	Pb	S	Sb	Si	Sn	Zn
M131	1311	2.03	---	0.0020	---	---	(57.52)	1.31	---	1.96		(0.0066)	0.067	---	0.0024	---	---	---
	1312	(0.3)	---	0.0013	---	---	(55.73)	0.16	---	3.68		(0.018)	(0.1)	---	0.0041	---	---	---
	1313	1.03	---	0.0034	---	---	(66.98)	0.71	---	2.54		(0.025)	0.11	---	0.0081	---	---	---
	1314	0.56	---	0.0062	---	---	(57.51)	0.60	---	3.15		(0.013)	0.50	---	(0.007)	---	---	---
	1315	0.33	---	0.0079	---	---	(56.51)	0.53	---	3.46		(0.033)	0.26	---	0.014	---	---	---
M136	1361	---	---	(0.0021)	---	---	56.2	0.69	---	(0.007)	0.23	(0.0049)	(0.22)	---	0.064	(0.004)	0.50	41.2
	1362	---	---	0.0033	---	---	57.7	0.37	---	(0.2)	(0.12)	(0.008)	0.50	---	0.040	(0.11)	0.33	40.3
	1363	---	---	0.0052	---	---	59.2	0.22	---	0.20	0.080	(0.015)	0.79	---	0.015	(0.20)	0.200	38.5
	1364	---	---	0.0085	---	---	60.5	0.080	---	0.059	0.068	(0.021)	1.53	---	0.0093	(0.053)	0.102	37.4
	1365	---	---	0.009	---	---	62.8	0.071	---	0.041	0.038	(0.032)	2.05	---	0.0053	(0.023)	0.070	34.3
M140	1401	0.14	---	0.0048	---	---	(48.9)	0.29	---	8.00	4.97	(0.054)	0.027	---	0.0050	---	0.95	---
	1402	0.11	---	0.0030	---	---	(49.4)	0.40	---	9.66	4.38	(0.021)	0.035	---	0.0020	---	0.66	---
	1403	(0.045)	---	0.0020	---	---	(49.1)	0.90	---	9.85	3.94	(0.014)	0.054	---	0.0032	---	0.51	---
	1404	0.34	---	0.0010	---	---	(50.3)	0.68	---	10.77	3.44	(0.058)	(1.90)	---	0.0069	---	0.34	---
	1405	0.74	---	0.0011	---	---	(52.2)	0.24	---	9.50	3.07	(0.0086)	0.113	---	0.0087	---	0.18	---
M142	1421	2.49	---	0.0051	---	---	83.0	0.0104	---	---	6.0	0.012	0.016	---	0.0033	(0.14)	---	7.9
	1422	2.03	---	0.0051	---	---	80.9	0.0077	---	---	7.1	0.009	0.023	---	0.0025	0.30	---	9.5
	1423	1.76	---	0.0029	---	---	79.3	0.022	---	---	5.7	(0.008)	0.035	---	(0.003)	0.58	---	12.5
	1424	1.08	---	0.0030	---	---	82.5	0.13	---	---	5.3	0.048	(0.2)	---	0.022	0.97	---	9.7
	1425	1.02	---	0.0011	---	---	76.5	0.033	---	---	4.6	0.021	0.081	---	0.0089	1.32	---	16.5
M149	1491	0.0085	(0.00065)	0.0022	0.027	(0.001)	0.057	0.14	0.070	0.048	Bal.	(0.0009)	0.0020	---	0.0016	0.070	0.0015	0.0036
Nickel Base	1492	0.038	(0.0016)	0.0087	0.023	(0.001)	(0.074)	(0.035)	(0.0041)	0.0046	Bal.	(0.0050)	0.0059	---	0.0045	0.22	0.0047	0.0061
	1493	0.018	(0.0020)	0.0063	0.052	(0.001)	0.17	0.044	0.015	0.0069	Bal.	(0.0029)	0.0041	---	0.0035	0.17	0.0038	0.0086
	1494	0.0050	(0.0016)	0.0047	0.040	(0.001)	0.11	0.033	0.024	0.0096	Bal.	(0.0021)	0.0031	---	0.0030	0.13	0.0026	0.0074
	1945	0.0048	(0.0009)	0.0030	0.034	(0.001)	0.075	0.080	0.049	0.020	Bal.	(0.0013)	0.0019	---	0.0019	0.092	0.0015	0.0054
M157	1571	(0.1)	---	0.009	---	---	62.3	0.047	---	---	0.21	0.0080	0.050	---	(0.012)	0.049	1.04	36.2
	1572	(0.02)	---	(0.001)	---	---	59.5	0.078	---	---	0.15	0.0059	0.13	---	(0.0037)	0.046	0.58	39.5
	1573	(0.02)	---	0.0039	---	---	58.5	0.20	---	---	0.065	0.025	0.18	---	(0.0040)	0.18	0.32	40.5
	1574	(0.03)	---	0.0020	---	---	64.5	(0.062)	---	---	0.041	0.013	0.086	---	(0.0040)	0.52	0.20	34.6
	1575	(0.03)	---	0.0041	---	---	64.4	(0.075)	---	---	0.033	0.019	0.068	---	(0.0047)	0.77	0.11	34.4

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MBH Bronze Based Alloys

Phosphor-Bronze

			Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	P	S	Mg	Cu	C	Size (mm) Ø x H
Cast		**32 X PB4**	9.75	0.114	0.107	0.014	0.081	(0.0005)	0.099	<0.01	1.17	. . .	(0.0032)	0.178	. . .	. . .	88.4	. . .	40 x 15
																		. . .	
Cast	*	**32 X PB10**	11.93	0.054	0.0362	0.009	0.0567	<0.0005	0.0015	0.010	0.0009	0.0239	0.0050	0.0240	0.0189	0.0035	87.77	. . .	42 x 18
	CRM	**32 X PB11**	3.75	0.900	1.43	.75	.768	(0.001)	.099	.199	.111	.0065	.502	.799	.007	.0022	90.55	. . .	40 x 17
	*	**32 X PB12**	5.35	0.142	0.786	0.190	0.427	<0.001	0.150	0.109	0.334	0.094	0.272	0.473	0.012	(0.0004)	91.67	. . .	42 x 18
	CRM	**32 X PB13**	7.41	0.195	0.199	0.099	0.212	0.042	0.040	0.060	0.097	0.0130	0.100	0.211	(0.0022)	0.119	91.19	(0.002)	42 x 18
	*	**32 X PB14 ***	9.1	0.09	0.23	0.043	0.098	<0.001	0.045	0.026	0.035	0.150	0.040	0.050	0.066	<0.0005	(89.9)	. . .	43 x 20
st/Wrought		**32 X PB20**	4.55	0.0045	0.007	0.0013	0.0090	(<0.001)	0.0046	0.0011	(0.0007)	. . .	0.0012	0.196	0.0030	. . .	95.22	. . .	38 x 17
		32 X PB23	7.56	0.0042	0.0020	(0.0005)	0.0033	(0.0004)	0.0016	0.0011	(0.0006)	. . .	0.0025	0.319	0.0015	. . .	92.04	. . .	49 x 17

* approximate values - being certified

Leaded Bronze

			Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	P	S	Cu	Size (mm) Ø x H
Cast		**32 X LB3**	10.71	9.96	0.051	0.095	1.54	(0.0006)	(0.0024)	0.021	0.025	0.0091	0.024	0.0050	(0.0015)	77.5	40 x 15
Chill Cast	*	**32 X LB10**	8.30	12.15	0.44	0.0108	1.71	(0.0006)	0.0005	0.240	0.0011	0.0634	0.635	0.0030	0.010	76.16	42 x 18
	*	**32 X LB11**	10.6	10.3	0.31	0.019	1.09	<0.002	(0.003)	0.094	0.005	0.034	0.061	0.008	0.047	77.3	
		32 X LB12	12.50	9.53	1.262	0.042	0.398	(0.0006)	0.0022	0.0064	0.0032	0.0245	0.314	0.173	0.085	75.70	42 x 18
	*	**32 X LB13 ***	6.05	8.17	0.580	0.025	1.29	0.013	0.022	0.116	<0.001	0.036	0.028	0.064	0.100	83.5	
	*	**32 X LB14**	4.02	15.48	0.028	0.0039	0.099	0.0004	0.0012	0.0658	0.0007	1.142	0.0527	0.0029	(0.019)	79.01	42 x 18
	*	**32 X LB15**	1.163	20.02	0.076	0.0012	0.095	0.0015	0.0009	0.0218	(0.0002)	0.011	0.030	0.0019	(0.024)	78.53	42 x 18

* approximate values - being certified

Aluminium Bronze

			Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	P	Mg	Cr	Cu	C	Ag	Co	Size (mm) Ø x H
Cast	*	**32 X ALB 1**	0.023	0.223	0.032	3.04	6.03	10.09	0.13	(<0.001)	0.088	0.017	0.084	0.012	80.2	. . .	. . .	. . .	43 x 20
		32 X ALB 2	0.08	0.09	0.229	4.60	4.64	9.52	0.302	0.0114	0.393	0.027	0.0104	0.0261	80.0	. . .	. . .	. . .	43 x 20
		32 X ALB 3	0.10	0.11	0.325	4.15	3.72	11.56	0.135	0.0060	0.374	0.025	0.088	0.0089	79.4	. . .	. . .	. . .	43 x 20
		32 X ALB 4	0.093	0.149	0.305	4.68	7.02	7.96	0.335	0.010	1.20	0.028	0.297	0.0275	(77.91)	. . .	. . .	. . .	43 x 20
		32 X ALB 5	0.102	0.216	0.311	2.52	4.15	7.26	0.102	0.0158	0.996	0.031	0.009	0.0060	84.27	. . .	. . .	. . .	43 x 20
	CRM	**32 X ALB 6**	0.147	0.096	0.685	2.53	5.31	8.05	0.295	0.012	0.904	0.0101	0.0019	0.0097	81.98	(0.0025)	. . .	. . .	42 x 18
	*	**32 X ALB 7 ***	0.35	0.029	0.51	5.00	4.90	3.95	0.40	0.048	0.570	0.050	0.013	0.095	84.0	. . .	. . .	. . .	43 x 20
	*	**32 X ALB 8**	0.699	0.35	1.051	5.58	6.50	6.60	0.736	0.155	1.67	0.218	0.0152	0.046	76.29	. . .	. . .	. . .	42 x 18
	*	**32 X ALB 9**	0.032	0.285	0.040	3.79	0.773	12.79	0.160	(0.001)	0.069	0.019	0.0023	0.013	81.3	. . .	. . .	. . .	43 x 20
Chill Cast		**32 X ALB 10**	0.202	0.107	0.315	4.23	7.58	11.25	0.169	0.017	1.73	0.040	0.0029	0.0103	74.28	. . .	. . .	. . .	42 x 18
Wrought	CRM	**32 X CA1**	0.0180	0.007	0.162	4.63	4.94	9.79	0.090	. . .	0.296	0.003	0.0003	0.0049	80.03	(0.007)	0.0012	. . .	42 x 18
	CRM	**32 X CA7**	0.0172	(0.004)	0.006	2.09	0.234	9.37	0.017	. . .	0.151	. . .	0.0004	0.0028	88.06	0.0028	0.0009	0.0003	42 x 18
	CRM	**32 X CA12**	0.0157	(0.0017)	0.0405	0.657	0.088	6.14	2.57	. . .	0.0290	. . .	0.0005	0.0008	90.48	(0.002)	0.0010	(0.0003)	42 x 18
	CRM	**32 X CA23**	0.0164	(0.0026)	0.031	3.63	4.71	9.19	0.026	. . .	1.298	0.0011	0.0003	0.0018	81.05	(0.0050)	0.0008	(0.0036)	50 x 18
	CRM	**32 X CA31**	0.0037	(0.0024)	0.041	4.06	4.28	8.95	0.036	. . .	0.336	(0.003)	0.0008	0.0026	82.24	0.006	0.0008	0.0029	42 x 18

* approximate values - being certified

( ) Indicates non-certified value.

These standards are produced by MBH Analytical Limited, England

MBH Bronze Based Alloys

Bismuth Bronze

			Sn	Pb	Zn	Fe	Ni	As	P	Sb	Co	Se	Bi	Ce	La	Cu	Size (mm) Ø x H
Chill Cast	*	**32 X SEB1**	4.23	0.209	8.79	0.0293	0.101	0.043	0.0054	0.355	0.0089	0.97	5.31	. . .	. . .	79.96	40 x 17
	*	**32 X SEB2**	9.34	0.424	3.73	0.078	0.028	0.0094	0.013	0.012	0.0120	0.026	4.36	(0.0039)	(0.0027)	(81.8)	40 x 17
	*	**32 X SEB3**	2.07	0.109	0.85	0.082	1.52	0.0161	0.040	0.054	0.025	1.42	(5.4)	. . .	. . .	(88.4)	40 x 17
	*	**32 X SEB4**	9.29	0.011	8.60	0.366	0.0091	0.0012	(0.006)	0.0056	0.48	0.105	2.65	. . .	. . .	78.6	42 x 17
		32 X SEB5	5.28	0.0149	6.64	0.360	0.308	0.0121	0.183	0.0344	0.0048	0.512	1.17	. . .	. . .	85.5	40 x 17
	*	**32 X SEB6**	7.14	0.0463	4.55	0.151	0.860	0.083	0.0118	0.235	0.231	0.322	0.615	. . .	. . .	85.66	40 x 17
		32 X SEB7	3.20	0.343	4.42	0.074	1.165	0.038	0.0206	0.262	0.119	1.19	3.58	. . .	. . .	85.46	42 x 17

Bronzes

			Sn	Pb	Zn	Fe	Ni	Al	Si	Mn	Sb	P	S	Cu	Co	As	Size (mm) Ø x H
Chill Cast		**32 X SN1**	11.45	4.48	0.73	0.03	1.62	0.054	<0.01	0.002	0.008	0.008	0.022	(81.55)	. . .	. . .	40 x 15
	*	**32 X SN2**	13.54	1.97	1.28	0.0332	0.104	0.0004	(0.0028)	0.0043	0.100	0.082	0.0326	82.80	. . .	. . .	42 x 18
	*	**32 X SN3**	16.51	0.270	0.43	0.0782	0.513	0.0004	(0.002)	0.0026	0.260	0.297	0.096	81.32	. . .	. . .	42 x 18
	CRM	**32 X SN4**	18.80	1.059	0.342	0.060	0.556	0.034	(0.004)	0.0065	0.102	0.988	0.040	77.88	0.151	0.0468	42 x 18

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

Titanium & Titanium Alloys

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

IARM Status	CDA Grade UNS#	Al N	C Ni	Cr O	Cu Si	Fe Sn	H V	Mn Zr	Mo
174B	Ti CP Grade 4	0.016	0.007	0.016	0.003	0.132	0.0018	0.002	<0.002
Final	R50700	0.013	---	0.335	0.003	0.004	<0.005	<0.001	
303A	Ti CP Grade 7	---	---	---	---	---	---	---	---
Coming 2007	R562400	---	---	---	---	---	---	---	
271A	Ti 5-2.5	[5.26]	[0.026]	[0.016]	[0.004]	[0.29]	[0.015]	[0.002]	[0.014]
Provisional	R54810	[0.012]	[0.03]	[0.17]	[0.018]	[2.47]	[0.09]	[0.014]	
177B	Ti 6-2-4-2	6.04	0.008	<0.005	0.005	0.031	0.0140	(0.001)	1.93
Final	R54620	0.0033	0.003	0.098	0.083	1.95	0.006	3.97	
269A	Ti 8-1-1	[7.8]	[0.016]	[0.010]	[0.003]	[0.13]	[0.006]	[0.006]	[1.01]
Provisional	R54810	[0.004]	[0.011]	[0.10]	[0.08]	[0.005]	[1.00]	[0.001]	
285A	Ti 6-2-1-1	[5.82]	[0.007]	---	[0.011]	[0.037]	[0.0038]	---	[0.76]
Provisional	R56210	[0.004]	[0.007]	[0.075]	[(0.01)]	---	[(0.01)]	[(0.003)]	
175B	Ti 6-4	6.160	0.031	0.003	0.002	0.153	0.008	0.001	0.004
Final	R56400	0.006	0.002	0.165	0.011	0.019	4.00	---	
261A	Ti 3-2.5	[3.01]	[0.008]	[0.013]	[0.003]	[0.19]	[0.0031]	[0.001]	[0.003]
Provisional	R56320	[0.007]	[0.006]	[0.099]	[0.011]	[0.006]	[2.48]	[(0.002)]	
176B	Ti 6-4 ELI	5.86	0.010	0.013	0.003	0.111	0.0036	0.001	0.006
Final	R56402	0.0051	0.012	0.109	0.017	0.01	3.87	(0.002)	
178B	Ti-6-6-2	[5.57]	[0.030]	[0.016]	[0.51]	[0.56]	[0.003]	[0.003]	[0.008]
Provisional	R56620	[0.008]	[0.015]	[0.16]	[0.026]	[1.99]	[5.57]	[0.004]	
297A	Ti 10-2-3	[3.14]	[0.014]	[0.007]	[(0.002)]	[1.88]	[0.0044]	[0.007]	---
Provisional	R56410	[0.008]	[0.004]	[0.109]	[0.020]	---	[9.7]	[(0.002)]	
286A	Ti 3-8-6-4-4	[3.2]	[0.009]	[6.3]	---	[0.09]	[0.0040]	---	[4.1]
Provisional	R56620	[0.009]	[(0.01)]	[0.088]	[0.03]	---	[8.1]	[4.0]	
300A	Ti 6-7	---	---	---	---	---	---	---	---
Coming 2007	R56700	---	---	---	---	---	---	---	
262A	Ti 7-4	[7.1]	[0.012]	[0.007]	[0.010]	[0.22]	[0.008]	[0.007]	[4.17]
Provisional	R56740	[0.009]	[0.006]	[0.093]	[0.046]	[0.016]	[0.010]	[(0.002)]	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Revised - 6/7/2007

MBH Titanium Based Alloys

	Various Ti Alloys	Al	Mo	Si	Sn	Zr	Mn	Cu	V	Fe	Nb	Pd		Size (mm) Ø H
Cast	**101 P 205**	. . .	15	. . .	. . .	. . .	. . .	. . .	. . .	0.03	. . .	. . .		32 x 8
	101 P 230	. . .	. . .	. . .	. . .	. . .	. . .	2.5	. . .	0.05	. . .	. . .		
	101 P 260	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.05	. . .	0.15		
	101 P 315	1.5	. . .	. . .	. . .	. . .	1.5	. . .	. . .	0.05	. . .	. . .		
	101 P 317	5.0	. . .	. . .	2.5	. . .	. . .	. . .	. . .	0.2	. . .	. . .		
	101 P 318	6.0	. . .	. . .	. . .	. . .	. . .	. . .	4.0	0.2	. . .	. . .		
	101 P 367	6.0	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.1	7.0	. . .	Suitable for	
	101 P 550	4.0	4.0	0.5	2.0	. . .	. . .	. . .	. . .	0.05	. . .	. . .	use with X.R.F.	
	101 P 551	4.0	4.0	0.5	4.0	. . .	. . .	. . .	. . .	0.05	. . .	. . .	spectrometers	
	101 P 679	2.25	1.0	0.2	11.0	5.0	. . .	. . .	. . .	0.05	. . .	. . .	only	
	101 P 685	6.0	0.5	0.3	0.05	5.0	. . .	. . .	. . .	0.03	. . .	. . .		
	101 P 829	5.5	0.3	0.3	3.5	3.0	. . .	. . .	. . .	0.03	1.0	. . .		
	101 P 811	8.0	1.0	. . .	. . .	. . .	. . .	. . .	1.0	0.03	. . .	. . .		
	101 P 6242	6.0	2.0	0.1	2.0	4.0	. . .	. . .	. . .	0.07	. . .	. . .		
	101 P 6246	6.0	6.0	0.05	2.0	4.0	. . .	. . .	. . .	0.05	. . .	. . .		

( ) Indicates non-certified value.
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MBH Magnesium Pure & Alloys

Residuals in Pure Magnesium

			Al	Zn	Mn	Zr	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Be	Cd	Ce	La	Size (mm) Ø x H
Cast	*	**61 X MgP1**	0.014	(0.0017)	0.0035	<0.0005	0.0008	0.005	0.027	(0.0006)	<0.001	<0.002	<0.002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	45 x 20
	*	**61 X MgP2**	0.065	0.0122	0.0118	(0.0007)	0.0109	0.031	0.0061	0.0029	0.0138	0.0073	0.0061	0.003	<0.0001	0.0063	0.0019	0.0014	45 x 20
	*	**61 X MgP3**	0.096	0.0196	0.0137	(0.0014)	0.0292	0.044	0.014	0.0048	0.054	0.0155	0.0148	0.0125	<0.0001	0.0154	0.0055	0.0038	45 x 20
	CRM	**61 X MgP4**	0.0247	0.0158	0.0100	0.030	0.0108	0.037	(0.0044)	0.0028	0.028	0.0067	0.0066	0.0203	<0.0001	0.0071	0.0041	0.0030	45 x 20

Mg/Mn

			Al	Zn	Mn	Zr	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Be	Cd	Ti	Ce	La	Size (mm) Ø x H
Cast	CRM	**63 X MgE1**	0.056	0.0514	0.492	<0.001	0.0486	0.040	0.0045	0.0091	(0.014)	0.0033	0.0113	0.0197	0.00036	. . .	0.00012	0.0010	0.0006	40 x 18
		63 X MgE2	0.07	0.02	1.47	<0.002	0.02	0.01(5)	0.02	0.005	0.01	0.01	0.007	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	CRM	**63 X MgE3**	0.015	0.022	2.36	<0.001	0.012	(0.009)	0.004	0.0023	0.13	0.0055	0.005	0.0048	. . .	0.0009	<0.001	. . .	. . .	40-45 x 15-20

Mg/Al/Zn

			Al	Zn	Mn	Zr	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Be	Cd	Ce	La	Sr	Ti	Size (mm) Ø x H
Cast	*	**65 X MgA1H**	3.83	1.40	0.20	. . .	0.148	0.17	(0.01)	0.008	0.007	0.090	0.016	. . .	0.00055	. . .	. . .	. . .	0.0007	. . .	45 x 20
	*	**65 X MgA1J**	5.45	1.26	0.060	(0.0015)	0.221	0.20	0.021	0.021	0.029	0.072	0.012	0.012	0.006	0.013	0.009	0.007	. . .	. . .	45 x 20
	*	**65 X MgA2**	7.31	0.97	0.139	. . .	0.112	0.15	0.011	(0.002)	(0.01)	0.049	0.007	. . .	0.0007	. . .	. . .	. . .	0.0005	. . .	45 x 20
	*	**65 X MgA3**	8.99	0.706	0.152	. . .	0.0061	0.047	0.004	(0.001)	<0.001	0.0026	0.004	. . .	0.0007	. . .	. . .	. . .	<0.0002	. . .	45 x 20
	*	**65 X MgA4**	11.67	0.0050	0.0062	. . .	0.061	0.025	0.0092	0.0036	0.033	0.0102	0.0040	0.0186	0.0011	. . .	. . .	. . .	. . .	. . .	45 x 20
	CRM	**65 X MgA5**	8.00	0.411	0.401	. . .	0.0195	0.110	0.006	0.0201	(0.014)	0.0124	0.042	0.0050	0.0013	0.0035	. . .	. . .	0.0004	(0.001)	40-50 x 15-20
	*	**65 X MGA7 ***	9.25	0.65	0.27	. . .	0.0015	0.005	0.010	0.001	. . .	0.005	0.001	<0.001	. . .	. . .	. . .	. . .	0.015	. . .	40 x 15
			* approximate composition - currently being certified																		
Cast		**65 X MgB1C**	2.34	1.71	0.61	(0.001)	0.195	0.14	0.006	0.012	0.001	0.012	0.01	0.03	0.0006	0.07	0.010	0.010	. . .	. . .	45 x 20
		65 X MgB1D	2.39	1.71	0.68	<0.005	0.20	0.17	0.016	0.012	0.41	0.011	0.01(5)	0.03	0.0007	0.07	0.015	0.013	. . .	. . .	45 x 20
	CRM	**65 X MgB2**	2.67	0.95	0.333	<0.001	0.113	0.069	0.010	0.0028	0.011	0.0047	0.0036	0.0099	0.0008	0.0115	0.0009	0.0007	. . .	0.0003	40 x 18
		65 X MgB3	3.19	0.608	0.0122	<0.001	0.0214	0.012	(0.0049)	0.0020	0.030	0.0050	0.0037	(0.0024)	0.0029	0.012	. . .	. . .	. . .	. . .	45 x 20
		65 X MgB4	3.86	0.333	0.031	<0.001	0.0183	0.037	(0.009)	0.0003	0.0010	0.0050	0.0037	0.0046	0.0033	0.00016	0.0003	(0.0001)	. . .	. . .	40 x 18

Mg/Zn

			Al	Zn	Mn	Zr	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Be	Ce	La	Sr	Size (mm) Ø x H
Cast		**66 X MgD1**	0.063	0.67	1.49	<0.0002	0.089	0.039	0.019	0.012	0.009	<0.005	0.008	. . .	. . .	. . .	. . .	. . .	40 x 15
		66 X MgD2	0.30	1.13	0.74	<0.01	0.08	0.07	0.014	0.008	<0.005	0.011	0.012	. . .	. . .	. . .	. . .	. . .	40 x 15
		66 X MgD3	0.041	1.97	0.28	0.029	0.058	0.020	0.023	0.002	(0.07)	0.007	0.009	0.005	0.0003	0.004	0.004	. . .	45 x 20
	*	**66 X MgD4 ***	<0.002	2.80	0.006	0.68	0.004	<0.005	(0.0015)	<0.0005	. . .	<0.005	(0.001)	0.0015	<0.0002	0.015	0.013	. . .	40 x 15
			* approximate values - currently being certified																
Cast	*	**66 X MgC1**	<0.002	2.54	0.010	0.74	0.056	<0.005	(0.0014)	(0.0008)	. . .	<0.002	0.010	0.006	<0.0002	. . .	. . .	. . .	40 x 15
	CRM	**66 X MgC2**	<0.003	4.82	0.0036	0.47	0.037	(0.0013)	0.0009	0.0044	. . .	0.0007	0.0074	0.0048	<0.0001	0.0206	0.0164	. . .	40 x 15
	*	**66 X MgC3**	0.011	4.97	0.020	0.13	0.009	(0.003)	(0.001)	0.006	. . .	<0.002	0.003	0.001	(0.0002)	. . .	. . .	. . .	40 x 15
	CRM	**66 X MgC4**	0.039	6.81	0.166	<0.001	0.0024	0.06	0.006	0.0009	(<0.001)	0.021	0.0030	0.0074	(0.0001)	. . .	. . .	(0.00014)	40-50 x 15-20

* approximate values - currently being certified

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MBH Magnesium Pure & Alloys

	Mg/Rare Earth	Al	Zn	Mn	Zr	Ce	La	Nd	Pr	Th	Cu	Si	Fe	Ni	Sn	Pb	Size (mm) Ø x H
Cast	* 67 X MgF1 *	0.02	0.50	0.004	0.025	2.00	1.25	0.11	0.42	. . .	0.005	0.003	0.002	<0.001	<0.001	<0.001	40 x 15
	* 67 X MgF2 *	0.001	1.70	0.005	0.27	1.40	1.00	0.32	0.12	. . .	0.003	<0.001	0.001	0.001	0.001	0.018	
	* 67 X MgF3 *	0.001	3.30	0.004	0.50	1.10	0.82	0.24	0.10	. . .	0.001	0.003	0.001	<0.001	0.001	0.014	
	* 67 X MgF4 *	0.08	5.10	0.002	0.04	0.75	0.45	0.07	0.15	. . .	0.030	0.001	0.0005	<0.001	0.002	<0.001	
	* 67 X MgF5 *	0.10	6.30	0.17	0.005	0.36	0.22	0.025	0.080	. . .	0.075	0.002	0.030	<0.001	0.002	<0.001	
		* approximate values - currently being certified															
Cast	67 X MgG2	0.003	2.35	0.008	0.53	. . .	. . .	. . .	. . .	2.5	0.013	0.010	0.002	0.005	<0.005	0.001	40 x 15
		Note: stocks of MgG2 are low. This product will not be replaced.															

	Mg/Ag/ Rare Earth	Al	Zn	Mn	Zr	Tot R.E.	Ce	La	Nd	Pr	Th	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Size (mm) Ø x H
Cast	* 68 X MgH1 *	<0.001	0.055	0.003	0.48	. . .	0.12	0.04	2.75	0.08	. . .	0.005	0.003	0.001	<0.001	. . .	<0.001	0.001	3.25	40 x 15
	* 68 X MgH2 *	<0.001	0.13	0.004	0.44	. . .	0.11	0.05	2.30	0.07	. . .	0.006	0.001	0.0005	<0.001	. . .	0.001	0.002	3.00	40 x 15
		* approximate values - currently being certified																		
Cast	68 X MgH3	<0.002	0.030	0.009	0.36	2.6	. . .	. . .	. . .	. . .	. . .	0.011	<0.005	0.002	0.001	0.007	<0.005	0.007	2.4	40 x 15
	68 X MgH4	0.003	0.046	0.010	0.11	2.1	. . .	. . .	. . .	. . .	. . .	0.032	<0.005	0.002	0.001	0.009	<0.005	0.008	2.03	40 x 15
	68 X MgH5	0.009	0.13	0.010	<0.01	1.8	. . .	. . .	. . .	. . .	. . .	0.053	<0.005	0.013	0.001	0.005	<0.005	<0.001	1.57	40 x 15
	68 X MgH6	0.23	0.21	0.17	<0.01	(1.0)	. . .	. . .	. . .	. . .	. . .	0.11	0.01(5)	0.03	0.01	. . .	<0.002	<0.005	1.13	40 x 15
Cast	68 X MgL1	0.003	<0.002	0.008	0.56	0.52	. . .	. . .	. . .	. . .	0.35	0.002	<0.005	0.001	<0.002	0.002	0.006	<0.001	1.42	40 x 15
	68 X MgL2	0.003	<0.002	0.008	0.54	1.02	. . .	. . .	. . .	. . .	0.69	0.012	<0.005	<0.001	<0.002	0.003	<0.005	<0.001	2.32	40 x 15
	68 X MgL3	0.003	<0.002	0.008	0.39	1.23	. . .	. . .	. . .	. . .	1.22	0.029	<0.005	0.002	<0.002	0.003	<0.005	<0.001	2.91	40 x 15
	68 X MgL4	0.023	0.19	0.17	<0.005	1.33	. . .	. . .	. . .	. . .	1.32	0.049	0.01	0.017	0.012	0.006	0.009	<0.001	<0.005	40 x 15

The rare-earths in the above two series were added as Neodymium rich R.E, but breakdowns of the individual R.E. values are not available.

	Mg/Y/ Rare Earth	Al	Zn	Mn	Zr	Y	Nd	Li	Cu	Si	Fe	Ni	Sn	Pb	Ag	Ce	Typical Alloy Type		Size (mm) Ø x H
Cast	* 69X MgY1 *	0.002	0.125	0.010	0.40	4.65	2.20	0.120	0.002	0.001	0.002	0.0005	<0.001	0.015	0.0005	. . .	WE 43		40 x 16
	CRM 69X MgY2	(0.0014)	0.354	0.0026	0.41	1.98	2.96	0.012	0.0013	. . .	0.0014	0.0011	. . .	(0.002)	. . .	0.047	MRI 201 S	cont'd	40 x 16
	CRM 69X MgY3	(0.0010)	0.315	0.0028	0.43	3.46	2.82	0.014	0.0010	. . .	0.0015	0.0012	. . .	(0.0055)	. . .	0.020	WE 43	cont'd	40 x 16
	CRM 69X MgY4	(0.0023)	0.495	0.0104	0.29	. . .	2.36	. . .	0.0011	. . .	0.0012	0.0009	. . .	(0.0009)	. . .	0.011	MRI 201 S	cont'd	60 x 6

Continuation from above	La	Pr	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Size (mm) Ø x H
69X MgY2	0.0352	0.016	0.013	<0.0005	0.082	0.0046	0.085	0.0037	0.0174	0.0009	0.0094	0.00046	
69X MgY3	0.023	0.015	0.02	(<0.0005)	0.221	0.0057	0.225	0.0049	0.041	0.0011	0.0168	0.00054	
69X MgY4	0.0078	0.0056	0.0083	. . .	1.54	. . .	. . .	. . .	. . .	. . .	. . .	. . .	

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MBH Tin Pure & Alloys

Tin with Impurities

			Sb	As	Bi	Pb	Cu	Fe	Ni	Al	Cd	Zn	In	Te	Ag	Au	Size (mm) Ø H
Cast	*	**71 X SR0**	0.0185	0.0005	0.0135	0.035	0.0020	(0.002)	0.0025	0.0138	0.0013	0.0075	0.0097	(0.0006)	0.0024	(0.0001)	40 x 15
	*	**71 X SR1**	0.013	0.003(5)	0.010	0.030	0.009	0.0017	(0.0009)	(0.0007)	0.007	0.007	0.014	0.003	0.009	0.003	
	*	**71 X SR2**	0.057	0.041	0.056	0.127	0.054	0.002(7)	0.0096	0.002(5)	0.041	0.015	0.049	0.022	0.025	0.008	
	*	**71 X SR3**	0.145	0.061	0.105	0.29	0.101	0.003(4)	0.0009	(0.0009)	0.022	0.014	0.028	0.008	0.007	0.003	

Tin/Antimony

		Sb	As	Bi	Pb	Cu	Fe	Cd	Zn	Size (mm) Ø H
Cast	**72 X SA4R**	4	0.03	0.10	0.08	0.02	0.10	0.003	0.007	40 x 15
	72 X SA5R	5	0.02	0.005	0.025	0.005	0.003	0.02	0.001	
	72 X SA6R	6	0.05	0.25	0.25	0.10	0.05	0.01	0.02	

A set of Sn/Sb binaries is also available, with certified levels of Sb in the range from 1% to 12%. Please enquire for details.

Tin White Metals (Pewter/Babbitt)

			Sb	As	Bi	Pb	Cu	Fe	Ni	Al	Cd	Zn	In	Ag	Co	S	Size (mm) Ø H
Cast	*	**73 X SC1**	1.48	0.008	0.084	0.067	2.02	0.0025	0.0041	0.0025	0.006	0.003	0.008	0.010	<0.001	(<0.002)	40 x 15
	*	**73 X SC2**	3.07	0.035	0.62	0.029	1.06	0.030	0.0048	(0.002)	0.036	0.003	(0.002)	0.006	0.021	(<0.001)	
	*	**73 X SC3**	4.60	0.029	0.020	0.040	0.222	0.017	0.0136	0.001	0.024	0.0014	0.031	0.013	0.006	(0.002)	
	*	**73 X SC4**	6.02	0.005	0.218	0.514	3.05	0.011	0.017	0.005	0.052	0.008	0.011	0.042	0.0035	(0.003)	
	*	**73 X SC5**	7.03	0.013	0.43	0.136	0.57	0.004	0.0058	0.003	0.008	0.001	0.036	0.063	0.011	(0.001)	
	*	**73 X SC6**	0.092	0.204	0.115	0.100	5.17	0.007	0.013	(0.003)	0.0125	0.01	0.058	0.08	0.0050	(0.004)	
	*	**73 X SC7**	14.01	0.047	0.009	0.356	6.51	0.046	0.008	0.001	0.0018	(0.003)	0.014	0.006	0.0160	(<0.001)	
	*	**73 X SC8**	9.65	0.121	0.037	0.037	3.89	0.073	0.014	0.004	0.133	(0.008)	0.017	(0.0015)	0.017	(0.011)	
	*	**73 X SC9**	8.18	0.53	0.066	0.20	8.47	0.037	0.008	<0.001	0.078	(0.003)	0.010	0.004	0.0030	(0.008)	
	CRM	**73 X SC11**	12.01	0.292	0.560	0.061	11.18	0.011	0.452	0.0025	1.75	0.063	. . .	0.066	. . .	. . .	40 x 15
	*	**73 X SC12**	8.05	0.024	0.020	0.024	7.72	0.051	0.384	<0.002	0.625	0.020	. . .	0.83	. . .	. . .	

( ) Indicates non-certified value.
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MBH Tin Pure & Alloys

		Tin-base (Lead-Free) Solders	Cu	Ag	Pb	Sb	Bi	Zn	Ni	Fe	As	Cd	Se	P	Au		Size (mm) Ø x H
Cast	CRM	**74 X E**	3.01	0.632	0.0457	0.014	0.0111	0.0011	0.0097	0.015	0.068	0.0016	0.0034	0.009			40 x 15
	CRM	**74 X HN Lot B**	4.08	0.147	0.0725	0.034	0.122	0.0007	0.215	0.0073	0.011	0.0040	0.0062	0.0053			40 x 15
	CRM	**74 X HN Lot C**	4.09	0.135	0.059	0.049	0.119	0.0010	0.189	0.0049	0.0028	0.0045	0.0010	(0.0021)			40 x 15
	CRM	**74 X TC Lot B**	4.75	0.0092	0.183	0.048	0.0413	0.0045	0.0042	0.045	0.0156	0.0094	0.089	0.0214			40 x 15
	CRM	**74 X TC Lot C**	4.83	0.0108	0.192	0.056	0.0367	0.006	0.0041	0.010	0.017	0.0094	0.082	(0.0167)			40 x 15
Cast	CRM	**74 X AM Lot B**	2.94	0.551	0.103	1.06	0.174	0.0036	0.0193	0.011	0.058	0.0056	(0.0004)	0.008			40 x 15
	CRM	**74 X AM Lot C**	2.82	0.540	0.093	1.023	0.182	0.004	0.0222	0.0234	0.048	0.0063	<0.001	(0.0015)			40 x 15
	CRM	**74 X HA Lot B**	.676	2.56	.0325	1.96	0.071	2.36	.0165	0.0032	0.0178	0.00084	. . .	0.0102	0.0010	continued	40 x 15
	CRM	**74 X HA Lot C**	0.661	2.62	0.0615	2.02	0.0612	2.63	0.0162	0.0056	0.0142	0.0015	. . .	(0.009)	0.0016	continued	40 x 15
	CRM	**74 X HA Lot D**	0.060	.0209	0.112	0.061	0.060	0.007	0.019	0.016	0.043	0.0435	0.0097	. . .	0.0084	continued	40 x 15
	CRM	**74 X HB Lot B**	4.35	0.061	0.080	4.73	0.0195	0.0009	1.012	0.036	0.0342	0.0081	. . .	0.013	(0.0001)	continued	40 x 15
	CRM	**74 X HB Lot C**	4.53	0.0651	0.0510	4.99	0.0140	0.010	1.086	0.098	0.0310	0.0077	. . .	0.011	(0.00014)	continued	40 x 15
	CRM	**74 X HB Lot D**	4.63	0.071	0.055	5.03	0.0052	0.015	1.41	0.034	0.0346	0.0077	<0.002	(0.0028)	. . .	continued	40 x 15
	CRM	**74 X OA**	3.41	0.100	0.128	0.0098	1.065	(0.002)	0.0025	0.007	0.080	0.00063	. . .	0.0072	(0.00010)	continued	40 x 15
	CRM	**74 X WS**	4.58	0.298	0.037	1.49	0.0063	0.0009	0.0048	(0.0036)	0.0105	0.00140	. . .	0.0122	(0.0002)	continued	40 x 15
Cast		**74 X CA1**	0.696	0.406	0.077	0.016	0.013	. . .	. . .	. . .	. . .	. . .	. . .	. . .			40 x 15
	CRM	**74 X CA2**	0.782	3.50	0.0331	0.0737	0.0329	0.0003	0.0308	0.0021	0.0100	0.0010	0.0015	0.0055	0.0014	continued	40 x 15
	CRM	**74 X CA4**	0.473	2.95	0.0621	0.041	0.0641	0.0008	0.065	0.007	0.0171	(0.00009)	0.0065	(0.0013)	0.0021	continued	40 x 15
	CRM	**74 X CA5**	1.098	4.01	0.0116	0.133	0.0207	0.0009	0.0147	0.0019	0.0353	0.0025	0.003	0.0108	0.0049	continued	40 x 15
	CRM	**74 X CA6**	0.629	0.282	0.0174	0.0078	0.0087	0.0006	0.0194	0.0061	0.0086	0.00033	0.0007	0.0046	0.0106	continued	40 x 15
	CRM	**74 X CA7**	0.333	4.21	0.0965	0.0103	0.0081	. . .	0.0007	0.0047	0.0095	0.0045	. . .	0.003	. . .	continued	40 x 15
	CRM	**74 X CA8**	0.947	2.44	0.0403	0.0045	0.0032	. . .	0.0007	0.0037	0.0100	0.0103	. . .	0.0077	. . .	continued	40 x 15

Continuation from above	In	Al	S	Hg	Size (mm) Ø H
74 X HA Lot C	0.0029	0.0028	. . .	. . .	
74 X HA Lot D					
74 X HB	0.0026	0.005	. . .	. . .	
74 X OA	0.0034	(0.0007)	. . .	. . .	
74 X WS	0.0032	(0.0007)	. . .	. . .	
74 X CA2	0.0062	0.0002	(0.0048)	0.0007	
74 X CA4	0.0040	0.0002	(0.0056)	0.0015	
74 X CA5	0.0111	(0.0003)	0.0006	0.0006	
74 X CA6	0.0218	0.0006	(0.0008)	0.0064	40 x 15
74 X CA7	0.0026	. . .	. . .	0.053	40 x 15
74 X CA8	0.0041	. . .	. . .	0.101	40 x 15

( ) Indicates non-certified value.

MBH Lead Based Alloys

Binaries. Lead-Antimony, Lead-Arsenic

			Sb		Sb		Sb		Sb		As	Size (mm) Ø x H
Cast	*	81 X PA0.5	0.481	* 81 X PA2.0	1.996	* 81 X PA7.0	7.02	* 81 X PA12.5	12.72	81 X PAs1	1.25	40 x 15
	*	81 X PA1.0	0.989	* 81 X PA3.5	3.53	* 81 X PA10.0	9.6					

Lead/Silver

			Sn	Sb	Bi	Cu	As	Ag	Zn	Cd	Fe	Al	In	Size (mm) Ø x H
Cast	*	82 X PAg 1.5R	0.036	0.386	0.065	0.27	0.005	1.55	(0.004)	. . .	. . .	. . .	. . .	40 x 15
	*	82 X PAg 2.5R	0.082	0.246	0.13	0.26	0.009	2.21	(0.0024)	. . .	. . .	. . .	. . .	
	*	82 X PAg 3.5R	0.25	0.106	0.290	0.073	0.020	3.54	(0.0004)	0.0027	<0.001	0.0015	0.037	
	*	82 X PAg 6.0R	0.50	0.48	0.52	0.18	0.021	5.93	0.007	0.010	<0.001	<0.001	0.008	

Lead with Impurities

			Sn	Sb	Bi	Cu	As	Ag	Zn	Cd	Ni	Fe	Te	Al	In	Ca	Na	Se	Au	Hg	Size (mm) Ø x H
Cast		83 X PR1	0.0062	0.0081	0.0525	0.0021	0.043	0.111	. . .	0.0759	0.0003	. . .	0.0011	. . .	0.038	. . .	. . .	(0.0002)	. . .	. . .	40 x 15
	*	83 X PR2	0.095	0.053	0.0177	0.039	0.018	0.053	(0.0004)	0.0021	0.0010	<0.0005	0.0064	. . .	0.0015	(0.0010)	(0.0003)	0.004	(0.0011)	0.0024	40 x 15
	*	83 X PR3	0.048	0.09	0.193	0.057	(0.001)	0.003	0.0017	0.050	0.0024	<0.001	0.004	<0.001	0.002	0.001	(0.003)	(0.01)	(0.005)	. . .	40 x 15
		83 X PR4E	0.025	0.021	0.005	0.027	<0.001	0.010	0.02	0.019	0.010	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
		83 X PR4F	0.009	0.012	0.014	0.015	(0.002)	0.014	0.005	0.010	0.013	<0.005	0.025	0.001	0.005	0.0026	0.001	0.003	0.002	. . .	40 x 15
	CRM	83 X PR5	0.00028	0.00023	0.0041	0.00038	0.0003	0.0008	0.0005	(0.0001)	0.00046	. . .	0.00023	. . .	0.00013	. . .	. . .	0.00018	. . .	0.00046	40 x 15
	*	83 X PR7	0.208	0.83	0.507	0.23	0.052	0.302	0.0021	0.496	0.006	(0.0009)	0.0014	. . .	0.076	(0.0012)	0.004	. . .	(0.0016)	. . .	40 x 15
	CRM	83 X PR8	0.556	0.262	1.155	0.0695	0.155	0.490	(0.0015)	0.220	0.0044	. . .	0.0059	0.0008	0.664	. . .	0.0057	0.0038	0.0083	0.049	40 x 15
		83 X PBTE/2	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	. . .	. . .	(<0.001)	0.060								40 x 15

Lead/Tin/Calcium (Battery Alloys)

			Sn	Sb	Bi	Cu	As	Ag	Zn	Cd	Te	Al	Ca	Ni	Fe	Mn	Mg	Se	S	Hg	Size (mm) Ø x H
Cast	*	84 X BA1	0.905	0.0003	0.0169	0.0009	(0.0003)	0.0078	0.0033	0.0030	0.0004	0.021	0.099	0.00015	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	CRM	84 X BA2	0.490	0.0010	0.0319	0.0033	0.0008	0.0107	0.0129	0.0040	. . .	0.0127	0.0754	0.00025	. . .	. . .	. . .	. . .	. . .	(0.003)	40 x 15
	*	84 X BA3	0.233	0.0049	0.034	0.0042	(0.0007)	0.0044	0.0069	0.0032	(0.0003)	0.0051	0.017	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	*	84 X BA4	0.108	0.061	0.074	0.031	(0.0008)	0.003	(0.0003)	0.010	0.030	. . .	(0.0014)	0.0007	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
		84 X BA5	1.18	<0.001	0.01	(0.0007)	<0.001	0.002	<0.0005	(0.0002)	<0.001	. . .	0.093	. . .	. . .	. . .	. . .	. . .	. . .	. . .	52 x 14
		84 X BA6	0.73	0.001	0.008	0.0010	<0.001	0.002	<0.001	(0.0002)	<0.001	. . .	0.095	. . .	. . .	. . .	. . .	. . .	. . .	. . .	52 x 14
		84 X BA7	0.61	0.002	0.009	0.0009	<0.001	0.002	<0.0005	<0.0002	<0.001	. . .	0.036	. . .	. . .	. . .	. . .	. . .	. . .	. . .	52 x 14
	CRM	84 X BA8	0.346	0.0009	0.0198	0.0009	0.0006	0.0064	0.0028	0.00096	. . .	0.0298	0.141	0.00015	. . .	. . .	. . .	. . .	. . .	(0.002)	40 x 15
	*	84 X BA9 *	3.00	0.001	0.017	0.0008	0.001	0.0015	(0.0002)	<0.0005	<0.0005	0.018	0.095	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
			* values approximate - this item is still being certified																		
Cast		84 X BA20	0.299	0.0030	0.0194	. . .	. . .	0.0290	0.0438	0.0057	. . .	0.0483	0.334	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	CRM	84 X BA21	0.161	0.0091	0.0224	. . .	. . .	0.0122	0.0136	0.0057	. . .	0.0067	0.608	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
		84 X BA22	0.108	0.00114	0.0162	. . .	. . .	0.0059	0.0053	0.00139	. . .	0.033	0.911	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	CRM	84 X BA23	0.170	0.0020	0.0163	. . .	. . .	0.0039	0.00218	0.00014	. . .	0.0229	1.21	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
	*	84 X BACM	0.650	(0.0002)	0.0023	(0.0003)	(0.0001)	0.0004	0.0003	0.0001	(0.0001)	0.012	0.100	0.0001	0.0002	<0.0001	0.0001	<0.0005	<0.0001	. . .	55 x 12
	*	84 X BAHC	(0.0002)	(0.0002)	0.0125	0.0005	(0.0002)	0.0005	0.0002	<0.0001	<0.0001	0.031	0.140	(0.0001)	0.0001	0.0001	(0.0002)	<0.0005	<0.0001	. . .	55 x 12

( ) Indicates non-certified value.
These standards are produced by MBH Analytical Limited, England

MBH Lead Based Alloys

Various Lead Alloys

		Sn	Sb	Bi	Cu	As	Ag	Ni	Cd	Zn	Te	Se	Fe	S	Size (mm) Ø x H
	85 X PSn2	1.97	0.0269	0.0508	0.0344	0.0047	0.0033	0.0010	0.0012	0.0005	0.0041	0.0011	. . .	(0.0008)	40 x 15
*	**85 X PSb3B**	0.242	2.67	0.017	0.039	0.150	0.002	0.0011	0.0012	(0.0003)	0.0030	0.022	(0.0005)	(0.003)	40 x 15
*	**85 X PSb3C ***	0.225	3.28	0.015	0.040	0.125	0.0018	0.0005	(0.0002)	(0.0001)	0.0007	0.010	(<0.0005)	(0.0035)	40 x 15
	85 X PSb3D	0.268	2.80	0.0247	0.045	0.139	0.0049	0.0011	0.0027	. . .	0.0015	0.023	. . .	(0.0013)	40 x 15
CRM	**85 X PSb5**	.94	4.46	.0195	.0346	.197	.0257	.0011	.0011	(0.0017)	.0018	0.0020	. . .	(0.0040)	40 x 15
	85 X PSb8	0.085	8.43	0.010	0.032	0.02	0.0016	0.0014	<0.001	(0.0002)	<0.005	0.0007	<0.001	(0.0011)	52 x 14
	85 X PSb10	0.080	10.2	0.007(6)	0.14	0.11	0.0015	0.0013	<0.001	0.014	<0.002	<0.001	<0.005	. . .	52 x 14
	85 X PSb12	0.21	11.4	0.007	0.30	0.11	0.0015	0.0016	<0.001	0.087	<0.005	<0.001	<0.001	. . .	52 x 14
*	**85 X ANTH**	1.32	6.32	0.059	0.0234	0.487	0.0058	0.0035	0.0052	0.0004	0.010	0.017	0.0041	(0.0030)	40 x 15
*	**85 X HRH**	0.874	1.13	0.092	0.080	0.74	0.247	0.001	(0.0002)	. . .	0.002	0.037	. . .	(0.0008)	55 x 12

* values approximate - this item is still being certified

		Sn	Sb	Bi	Cu	As	Ag	Ni	Cd	Zn	Te	Se	Fe	S	Size (mm) Ø x H
*	**85 X 0494Pb1**	0.051	0.95	0.0017	0.012	0.049	. . .	. . .	. . .	. . .	. . .	0.004	. . .	. . .	40 x 15
*	**85 X 0494Pb2**	0.155	2.07	0.0018	0.054	0.128	. . .	. . .	. . .	. . .	. . .	0.023	. . .	. . .	40 x 15
*	**85 X 0494Pb3**	0.294	3.02	0.038	0.100	0.277	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	40 x 15
*	**85 X 0616Pb1**	0.070	1.76	0.026	0.047	0.068	0.0023	0.0010	0.0022	0.0009	(0.0016)	0.017	<0.001	. . .	40 x 15

Lead Babbitts

		Sn	Sb	Bi	Cu	As	Ag	Ni	Cd	Zn	Fe	Al	In	Pd	Size (mm) Ø x H
*	**86 X PSS1**	4.42	12.11	0.21	0.028	0.59	0.003	0.0014	0.006	<0.001	(0.0005)	<0.001	0.008	(<0.0005)	40 x 15
*	**86 X PSS2**	6.33	8.16	0.054	0.118	1.42	0.004	0.0080	0.069	<0.002	<0.001	<0.0005	(0.002)	(0.001)	40 x 15
*	**86 X PSS3**	9.01	14.02	0.031	0.608	0.10	0.006	0.0040	0.020	<0.001	(0.0016)	<0.001	0.004	(0.003)	40 x 15
*	**86 X PSS4**	10.69	16.97	0.120	0.328	0.278	(0.006)	0.0031	0.047	<0.002	(0.0013)	<0.001	0.013	(0.007)	40 x 15

MBH Solder (Pb/Sn) Alloys

		Tin/Lead Solders	Sn	Sb	Bi	Cu	As	Ag	Fe	Zn	Cd	Ni	Au	In	Te		Pb	Size (mm) Ø H
Cast		**91 X S10 PR1**	8.81	0.04	0.03	0.015	0.006	0.005	0.003	0.008	0.003	0.009	. . .	. . .	. . .	. . .	(Rem)	40 x 15
		91 X S10 PR2	10.38	0.51	0.15	0.05	0.04	0.050	0.003	0.030	0.007	0.003	. . .	. . .	. . .	. . .	(Rem)	
		91 X S10 PR3	11.97	0.26	0.23	0.12	0.02	0.030	0.002	0.003	0.011	(0.02)	. . .	. . .	. . .	. . .	(Rem)	
Cast		**91 X S10 P**	10.14	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	. . .	. . .	. . .	. . .	(Rem)	40 x 15
Cast		**91 X S30 PR1**	29.3	0.047	0.057	0.19	0.006	0.007	(0.08)	0.0013	0.0024	0.0023	. . .	. . .	. . .	. . .	(Rem)	40 x 15
		91 X S30 PR2	30.2	0.60	0.15	0.076	0.028	0.044	0.04	0.031	0.0070	0.007	. . .	. . .	. . .	. . .	(Rem)	
		91 X S30 PR3	30.88	0.269	0.294	0.102	0.0126	0.024	0.0016	(0.003)	0.0115	0.0269	0.0063	0.0085	. . .	. . .	(Rem)	40 x 15
Cast		**91 X S30 P**	30.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	. . .	. . .	. . .	. . .	(Rem)	40 x 15
Cast		**91 X S40 PR1**	39.1	0.059	0.060	0.20	0.006	0.005	<0.005	0.008	0.001	0.002	. . .	. . .	. . .	. . .	(Rem)	40 x 15
		91 X S40 PR2	40.4	0.60	0.15	0.050	0.026	0.050	(0.003)	0.028	0.0057	0.007	. . .	. . .	. . .	. . .	(Rem)	
		91 X S40 PR3	41.8	0.25	0.25	0.094	0.018	0.022	0.01	0.002	0.010	0.016	. . .	. . .	. . .	. . .	(Rem)	
Cast		**91 X S40 P**	40.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	. . .	. . .	. . .	. . .	(Rem)	40 x 15
Cast		**91 X S50 PR1**	49.5	0.062	0.060	0.214	0.008	0.006	0.01	0.004	0.006	0.007	. . .	. . .	. . .	. . .	(Rem)	40 x 15
		91 X S50 PR2	50.5	0.56	0.16	0.059	0.026	0.053	0.01	0.023	0.011	0.003	. . .	. . .	. . .	. . .	(Rem)	
		91 X S50 PR3	51.4	0.26	0.25	0.10	0.015	0.020	0.009	0.008	0.002	0.016	. . .	. . .	. . .	. . .	(Rem)	
	*	**91 X S50 PR4**	54.6	0.098	0.097	1.58	0.044	0.045	(0.0034)	0.0105	0.0118	0.0114	0.029	0.052	. . .	. . .	(Rem)	40 x 15
Cast		**91 X S50 P**	50.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	. . .	. . .	. . .	. . .	(Rem)	40 x 15
Cast	*	**91 X S63 PR0**	59.8	0.013	0.007	0.023	0.008	0.010	(0.0026)	<0.001	0.012	<0.005	0.018	0.01	<0.001	. . .	(Rem)	40 x 15
		91 X S63 PR1	61.30	0.075	0.062	0.252	(0.001)	0.0065	0.012	0.0032	0.0057	0.0010	0.040	0.028	0.0008	. . .	(Rem)	40 x 15
	CRM	**91 X S63 PR2**	62.38	0.479	0.147	0.0846	0.0262	0.0605	0.012	0.0041	0.0106	0.0080	0.0771	0.0031	0.0016	(0.0012)	(Rem)	40 x 17
		91 X S63 PR3	64.27	0.253	0.255	0.133	0.0190	0.0222	0.0054	(0.002)	0.0015	0.0196	0.175	0.0087	(0.0002)	. . .	(Rem)	40 x 15
	*	**91 X S63 PR4**	66.8	0.093	0.030	0.021	<0.002	0.030	<0.005	<0.001	0.021	<0.005	0.05	0.014	0.006	. . .	(Rem)	
Cast		**91 X S63 P**	62.6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	. . .	. . .	. . .	(Rem)	40 x 15

( ) Indicates non-certified value.
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MBH Solder (Pb/Sn) Alloys

Tin/Lead/Antimony Solders

			Sn	Sb	Bi	Cu	As	Ag	Fe	Zn	Cd	Ni	Pb	Size (mm) Ø x H
Cast	*	**93 X S20 APR1 ***	20.2	1.58	0.36	0.12	0.060	0.025	0.012	(0.004)	0.010	(0.2)	(Rem)	40 x 15
			* approximate values only - this item is still being certified											
Cast		**93 X S30 APR1**	28.52	2.52	0.056	0.20	0.006	0.006	0.017	0.003	0.002	0.002	(Rem)	40 x 15
		93 X S30 APR2	30.37	1.90	0.16	0.055	0.03	0.05	0.005	0.025	0.006	0.007	(Rem)	
	*	**93 X S30 APR3**	33.0	0.96	0.28	0.008	0.018	0.021	0.0026	0.005	0.009	0.010	(Rem)	
Cast		**93 X S40 APR1**	28.58	2.54	0.059	0.192	0.010	0.0144	(0.012)	(0.0004)	0.0014	0.0010	(Rem)	40 x 15
		93 X S40 APR2	30.68	1.80	0.168	0.062	0.0178	0.049	0.0026	0.028	0.0061	0.042	(Rem)	40 x 15
		93 X S40 APR3	41.4	1.70	0.26	0.12	0.024	0.021	(0.03)	0.022	0.011	0.014	(Rem)	
Cast		**93 X S50 APR1**	48.4	3.2	0.052	0.18	0.007	0.010	(0.01)	0.002	0.002	0.002	(Rem)	40 x 15
		93 X S50 APR2	49.6	2.8	0.15	0.049	0.027	0.055	0.01	0.042	0.006	0.014	(Rem)	
		93 X S50 APR3	51.2	2.3	0.25	0.093	0.023	0.025	(0.02)	0.013	0.010	0.010	(Rem)	

Various Solders

		Sn	Sb	Bi	Cu	As	Ag	Fe	Zn	Cd	Al	In	Pb		Size (mm) Ø x H
Cast	**95 X 174**	16.79	0.082	57.12	0.0029	. . .	0.0076	. . .	0.036	0.0089	. . .	26.2	0.081		40 x 15
Cast	**95 X BIS40 P1A**	42.8	0.11	(56.3)	0.11	0.005	0.036	0.002	0.014	0.013	0.001	0.054	0.087	Tin/Bismuth	40 x 15
Cast	**95 X CDS50 P1A**	49.9	0.12	0.15	0.25	0.030	0.034	0.002	0.008	17.9	0.001	0.093	(31.1)	Tin/Cadmium/Lead	

( ) Indicates non-certified value.

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MBH Zinc Based Alloys

Residuals in Pure Zinc

			Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	In	Tl	Sb	Bi	Ti	Hg	Typical Alloy Type	Size (mm) Ø H
Cast	CRM	**41 X Z1**	0.00232	0.00028	0.0014	0.00066	0.00059	0.00059	0.00060	0.0002	0.00044	0.0003	0.0002	0.0004	0.0007	. . .	(0.0003)		50 x 20
	*	**41 X Z2**	0.0036	0.0064	0.017	0.0017	0.0028	0.0017	0.016	0.0014	0.0017	(0.0002)	(0.0023)	(0.0011)	. . .	(0.0005)			
	CRM	**41 X Z3**	0.0080	.0138	.0164	0.0050	.0022	.0029	.0066	.0029	0.0029	0.0010	0.0012	0.0045	0.0022	0.0012	(0.0013)	BS 3436	50 x 20
	*	**41 X Z4**	0.0091	0.0019	0.0096	0.0066	0.003	0.0070	0.0047	0.0069	0.0012	0.0015	(0.0037)	0.005	. . .	<0.0005			
	*	**41 X Z5**	0.0275	0.0098	0.041	0.0310	0.011	0.0275	0.0296	0.00054	0.0138	0.0050	0.0073	0.0098	. . .	0.00044			50 x 20
	*	**41 X Z6**	0.031	<0.0005	0.0096	0.0093	(0.002)	0.0038	0.0088	0.0002	0.0002	0.0228	0.0004	. . .	0.0122	. . .		Battery Alloy	50 x 20

Zinc with Impurities

			Pb	Mg	Al	Cd	Fe	Sn	Cu	Mn	Ni	Bi	Sb	In	Tl	As	Ag	Size (mm) Ø H
Cast	*	**41 X 0336 Zn1**	0.95	0.0049	0.014	0.0056	0.0124	0.0053	0.0070	0.0035	(0.0006)	. . .	. . .	. . .	. . .	. . .	. . .	50 x 20
	*	**41 X 0336 Zn2**	0.268	0.0243	0.0153	0.284	0.048	0.0021	0.0288	0.0087	0.0023	0.0076	0.0093	. . .	. . .	. . .	. . .	50 x 20
	*	**41 X 0336 Zn3**	0.180	0.0220	0.0203	0.0950	0.017	0.080	0.073	0.0180	0.0120	0.0103	0.0046	. . .	. . .	. . .	. . .	50 x 20
	*	**41 X 0336 Zn4 ***	2.75	0.16	1.35	0.60	0.01	2.20	0.85	0.04	0.008	0.025	0.025	0.003	0.003	0.01	0.002	
	*	**41 X 0336 Zn5**	0.140	0.00165	0.0215	0.0571	0.0120	0.0101	0.071	0.035	0.00147	0.0308	0.0061	. . .	. . .	. . .	. . .	50 x 20
	*	**41 X 0336 Zn6**	1.82	0.0008	0.105	0.0140	0.08	0.0023	0.0203	0.0010	0.0018	0.123	0.234	0.0123	0.0132	0.0020	0.0055	50 x 20

* target values

			Pb	Mg	Al	Cd	Fe	Sn	Cu	Mn	Ni	Ti	Cr	In	Tl	Sb	Bi	Si	Size (mm) Ø H
Cast	*	**41 X 4380 Zn1**	0.068	0.0011	0.055	0.376	0.01	0.049	0.175	0.0015	0.0029	(0.001)	0.002	. . .	. . .	0.002	0.0017	0.006	50 x 20
		41 X 4380 Zn2	0.268	0.0243	0.0153	0.284	0.048	0.0021	0.0288	0.0087	0.0023	0.0251	0.0027	. . .	. . .	0.0093	0.0076	. . .	50 x 20
		41 X 4380 Zn3	0.180	0.0220	0.0203	0.0950	0.017	0.080	0.073	0.0180	0.0120	0.125	0.0029	. . .	. . .	0.0046	0.0103	. . .	50 x 20
	*	**41 X 4380 Zn4**	0.325	0.126	0.144	0.094	0.056	0.038	0.0022	0.0007	0.0040	0.005	(0.0003)	. . .	. . .	0.017	0.011	(0.002)	50 x 20
		41 X 4380 Zn5	0.140	0.00165	0.0215	0.0571	0.0120	0.0101	0.071	0.035	0.00147	0.339	0.0075	. . .	. . .	0.0061	0.0308	. . .	50 x 20
		41 X 4380 Zn6	0.411	0.0043	0.0051	0.0423	0.018	0.110	0.022	0.024	0.00058	0.062	0.0022	. . .	. . .	0.0359	0.00109	. . .	50 x 20
	*	**41 X 4380 Zn7**	1.25	0.0028	0.137	0.015	(0.0044)	0.0047	0.012	. . .	0.012	0.009	0.0045	. . .	. . .	0.090	. . .	. . .	50 x 20
	*	**41 X 4380 Zn8**	0.73	0.007	0.225	0.0079	0.003	0.011	0.020	0.0015	0.024	0.012	0.0019	. . .	. . .	0.016	0.011	(0.005)	50 x 20
	CRM	**41 X Z11**	0.0077	. . .	0.0261	0.0155	0.0019	0.0072	0.0116	. . .	. . .	. . .	. . .	0.0345	(0.0010)	0.0026	0.0189	(0.0009)	50 x 20

Galvanizing Alloys

			Pb	Al	Cd	Fe	Sn	Cu	Ni	Bi	Sb	As	Cr	Mn	Co	V	Mg	Size (mm) Ø H
Cast	*	**41 X GLV1**	0.056	0.115	0.0093	0.059	0.010	0.0028	0.0141	0.0025	<0.001	<0.001	. . .	. . .	. . .	. . .	. . .	50 x 20
	*	**41 X GLV2**	0.214	0.068	0.0025	0.048	0.003	0.0052	0.0070	0.017	0.006	<0.001	. . .	. . .	. . .	. . .	. . .	
	*	**41 X GLV3**	0.0080	0.31	0.021	0.012	0.006	0.0188	0.0301	0.0011	0.048	-0.0008	. . .	. . .	. . .	. . .	. . .	
	CRM	**41 X GLV4**	0.0041	0.184	0.00073	(0.006)	0.0016	0.0050	0.0368	0.0053	0.045	0.0002	(0.00016)	0.0010	. . .	. . .	0.0005	50 x 20
	*	**41 X GLV5**	0.0187	0.014	0.0138	0.076	0.020	0.0116	0.0030	0.0105	0.162	0.0041	. . .	. . .	. . .	. . .	. . .	
	*	**41 X GLV6**	0.120	0.474	0.0053	0.0047	0.0150	0.039	0.0008	0.0248	0.011	0.0014	0.0029	0.0013	0.0047	<0.0005	. . .	
	*	**41 X GLV7**	0.082	0.399	0.00056	0.0031	(0.0006)	0.023	0.0060	0.0108	0.0031	0.0016	0.0010	0.0025	(0.0001)	<0.0001	. . .	50 x 20
	CRM	**41 X GLV8**	0.0037	0.263	0.0003	0.0062	0.0005	0.0139	0.0006	0.0005	0.0057	. . .	0.0012	0.0012	. . .	. . .	0.0012	50 x 20
Cast	*	**41 X CGL**	0.046	0.28	(0.0015)	. . .	(<0.001)	(0.0005)	. . .	. . .	. . .	. . .	. . .	. . .	. . .			42-48 x 20

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MBH Zinc Based Alloys

		Binaries	Mn	Ni	Pb	Mg	Al	Cd	Fe	Cu	Sb	Size (mm) Ø x H
Cast	RM	**41 X ZMn1**	. . .	. . .	. . .	1.13	. . .	. . .	. . .	. . .	. . .	40 x 15
	RM	**41 X ZMg3**	. . .	. . .	. . .	2.80	. . .	. . .	. . .	. . .	. . .	40 x 15
	RM	**41 X ZSb1**	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.03	40 x 15
	RM	**41 X ZSb4**									3.78	40 x 15
	RM	**41 X ZSb8**									7.68	40 x 15

	Specialty Alloys	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Ti	Cr	Typical Alloy Type	Size (mm) Ø x H
*	**41 X 2951Zn1**	0.0042	0.0029	0.029	0.0005	0.011	(0.0007)	0.79	0.0038	0.0013	0.278	0.083		50 x 20
*	**41 X 2951Zn2**	0.0040	0.0123	0.032	0.0037	0.019	(0.0015)	1.37	0.0027	0.0011	0.209	0.142	ILZRO16	
*	**41 X 2951Zn3**	0.0065	0.0164	0.078	0.0062	0.029	(0.006)	1.89	0.0010	0.0018	0.133	0.184		

		Zn/Al	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Cr	Si	Sb	Ce	La		Typical Alloy Type	Size (mm) Ø x H
Cast	*	**42 X Z1**	0.0022	0.0041	4.61	0.0005	0.0024	0.0006	0.0019	0.0017	0.0007	<0.0005	0.0046	-0.0009	0.0027	0.0026		BS 1004 A	50 x 20
	*	**42 X Z2**	0.0052	0.0147	4.04	0.0010	0.0040	0.0021	0.0186	0.0051	0.0012	0.0018	0.0089	0.0026	0.0049	0.0044		ASTM 13	50 x 20
	*	**42 X Z3 ***	0.008	0.03	3.85	0.005	0.10	0.004	0.15	0.01	0.012	0.02	0.015	0.001	0.001	0.001		ASTM AG40A	50 x 20
	*	**42 X Z4**	0.0113	0.058	3.55	0.0076	0.012	0.0060	0.063	0.0177	0.0077	. . .	. . .	(0.0029)	0.020	0.020	In 0.0016		50 x 20
	*	**42 X Z5**	0.0048	0.073	4.22	0.0021	0.029	0.0022	0.098	0.0185	0.0068	0.0018	. . .	(0.0055)	0.0109	0.0090	In 0.0048		50 x 20
		42 X Z6	0.0093	0.177	3.67	0.0039	0.008	0.0057	0.238	0.00030	0.0157	0.0034	(0.010)	0.0169	(0.012)	(0.011)			50 x 20
			* target values																
Cast	*	**42 X Z7**	0.0097	0.0095	4.39	0.030	0.027	0.012	0.0249	0.0067	0.0045	. . .	0.006	. . .	0.053	0.047			50 x 20
	*	**42 X Z8**	0.0025	0.0033	7.03	0.0003	0.013	(0.0023)	0.0215	0.0019	0.0014	. . .	0.013	. . .	0.0081	0.0079		GALFAN	
	*	**42 X Z9**	0.0021	0.0464	5.55	0.0054	0.0324	(0.0003)	0.0070	(0.0003)	0.0006	. . .	0.004	. . .	0.0047	0.0044	Ti 0.020, Zr 0.011		

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MBH Zinc Based Alloys

		Zn/Al/Cu	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Si	Cr	Ti	Sb	Bi	Be	Typical Alloy Type	Size (mm) Ø x H
Cast	*	**43 X Z1**	0.0017	0.0145	4.50	0.00037	0.0058	(0.0007)	0.501	0.0010	0.0005	(0.0037)	0.0009	0.0014	0.0016	0.0031	. . .	BS 1004 Alloy B	50 x 20
	CRM	**43 X Z2**	0.0088	0.093	3.53	0.0044	0.012	0.0061	0.949	0.00037	0.0025	0.0102	(0.00015)	0.0010	0.0112	0.0015	. . .	ASTM Alloy 11	50 x 20
	*	**43 X Z3**	0.0132	0.0143	3.64	0.0132	0.061	0.0125	1.58	0.0061	0.0125	0.005	0.0045	. . .	(0.0030)	0.018	. . .	ASTM Alloy AG41A	
	*	**43 X Z4 ***	0.003	0.055	4.25	0.003	0.10	0.002	3.25	0.018	0.10	0.002	0.007	0.003	0.001	0.010	. . .	ZL2	
	*	**43 X Z5**	0.0045	0.041	3.05	0.0111	0.023	0.0032	6.05	0.0021	0.0030	0.003	0.0010	0.0009	. . .	. . .	. . .	ACuZinc5'	
	*	**43 X Z6**	0.0016	0.0256	4.02	0.0016	0.019	0.0053	2.72	0.029	0.0006	0.012	0.0006	0.0013	0.0045	0.005	. . .		
	CRM	**43 X Z7**	0.0058	0.062	3.68	0.00092	0.029	0.0031	3.14	0.0005	0.0025	. . .	0.0003	0.067	0.0016	(0.0009)	0.0194		50 x 20
			* target values																
Cast	*	**43 X Z11**	0.0305	0.0531	11.61	0.0224	0.0090	0.0206	0.515	0.0014	0.0089	0.020	0.0010	0.0125	0.0091	0.0036			50 x 20
	*	**43 X Z12**	0.0133	0.027	10.05	0.0114	0.047	0.0089	0.796	0.0035	0.0059	(0.008)	0.0023	0.0054	0.0039	(0.002)		ASTM B669	50 x 20
	*	**43 X Z13**	0.0125	0.0204	9.55	0.0100	0.05	0.0111	0.981	0.0109	0.0070	(0.0048)	. . .	. . .	0.009	. . .		ZA8	50 x 20
	*	**43 X Z14**	0.0082	0.0026	8.24	0.0067	0.015	0.0053	1.23	0.0052	0.0033	0.010	0.0046	0.0012	0.011	0.010		ZA12	50 x 20
	*	**43 X Z15**	0.0054	0.0024	7.36	0.0030	0.009	0.004	1.53	0.0019	0.0020	(0.011)	0.0025	0.0020	0.005	0.005			50 x 20
Cast	*	**43 X Z21**	0.012	0.047	23.5	0.027	0.12	0.0140	1.81	0.043	0.0104	0.022	0.0087	0.013	. . .	. . .		ASTM B669	50 x 20
	*	**43 X Z22**	0.0060	0.022	27.4	0.0050	(0.36)	0.0061	2.32	0.027	0.0096	0.038	0.019	0.0065	. . .	. . .		ZA27	
	*	**43 X Z23**	0.0028	0.0133	31.4	0.0024	(0.24)	(0.002)	2.74	0.0115	0.0124	0.061	0.036	0.0026	. . .	. . .			

		High-Alloy Zinc	Al	Sb	Mg	Cu	Pb	Cd	Bi	Sn	Fe	Zn	Ni	Ag	Size (mm) Ø x H
Cast		**44 X Z1**	8.0	10.6	0.001	0.028	0.019	0.027	0.024	0.024	0.007	(rem)	. . .	. . .	40 x 15
		44 X Z2	12.6	9.5	0.035	0.003	0.053	0.005	0.030	0.018	0.007	(rem)	. . .	. . .	
		44 X Z3	17.8	8.1	0.005	0.011	0.020	0.012	0.013	0.019	0.009	(rem)	. . .	. . .	
		44 X Z4	20.3	6.7	0.008	0.007	0.032	0.011	0.016	0.018	0.011	(rem)	. . .	. . .	
		44 X Z5	20.4	5.2	<0.001	0.001	0.010	0.001	0.004	0.003	0.010	(rem)	. . .	. . .	
			Note: the above series has some Sb segregation, and must therefore be used with caution												
Cast	RM	**44 X ZnCd30**	. . .	1.03	. . .	0.046	0.089	31.0	0.051	0.053	0.0015	(bal)	0.0014	0.046	40 x 15

	Zn/Al 'Galvalume'	Zn	Si	Fe	Cu	Sn	Pb	Mg	Ti	Ca	Li	Al	Size (mm) Ø x H
Chill Cast	**45 X ZnAl1**	24.5	2.72	0.28	0.065	0.020	0.020	0.013	0.022	(0.018)	(0.0022)	(72.6)	60 x 6
	45 X ZnAl2	36.1	2.58	0.20	0.048	0.008	0.010	0.007	0.025	(0.009)	(0.0034)	(60.9)	
	45 X ZnAl3	45.8	1.00	0.127	0.021	0.003	0.0046	0.003	0.0087	(0.006)	(0.0006)	(53.0)	
	45 X ZnAl4	54.65	0.67	0.095	0.013	0.0023	0.003	<0.0005	0.0038	(0.0023)	(0.0002)	(44.5)	
	45 X ZnAl5	40.8	1.88	0.050	0.0035	(0.0024)	0.004	0.030	0.003	(0.009)	(0.005)	(57.0)	

Set-Up Standards (SUSs) **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

Cast Irons

IARM Status	Grade	Al Ni	As P	B Pb	Bi S	C Sb	Co Si	Cr Sn	Cu Ti	Mg V	Mn W	Mo Zn	Nb Zr
215A	QA 21	(0.037)	---	---	---	(3.5)	---	(0.6)	(0.6)	---	(1.3)	(0.5)	---
Final		(0.9)	(0.3)	---	(0.13)	---	(2.1)	(0.17)	(0.07)	(0.5)	---	---	---
216A	QA 22	(0.06)	(0.03)	(0.037)	(0.004)	(3)	(0.6)	(1.5)	(0.08)	(0.08)	(0.3)	(0.004)	(0.3)
Final		(2)	(0.026)	(0.005)	(0.001)	(0.06)	(3)	(0.04)	(0.007)	(0.03)	(0.043)	(0.01)	(0.05)

LAS

IARM Status	Grade	Al P	As Pb	B S	C Sb	Ca Si	Co Sn	Cr Ta	Cu Ti	Mn V	Mo W	N Zn	Nb Zr	Ni
217A	QA A	(0.0002)	(0.003)	(<0.0001)	(0.01)	(0.0001)	(0.004)	(0.01)	(0.001)	(0.003)	(0.01)	-0.0005	(0.001)	(0.01)
Final		(0.002)	(0.004)	(0.001)	(0.006)	(0.01)	(0.0005)	(0.01)	(0.0001)	(0.002)	(0.005)	(<0.0001)	(0.005)	
218A	QA C	(0.003)	(0.1)	(0.0004)	(0.05)	(<0.0001)	(0.01)	(0.1)	(0.6)	(2)	(0.1)	(0.007)	(<0.0001)	(5)
Final		(0.1)	(<0.001)	(0.07)	(0.02)	(0.1)	(0.1)	(0.02)	(0.01)	(1)	(0.7)	(<0.001)	(<0.00)	
219A	QA D	(0.2)	(0.01)	(0.01)	(0.9)	(<0.0001)	(1)	(5)	(0.6)	(0.02)	(1.5)	(0.002)	(0.4)	(2.8)
Final		(0.003)	(0.003)	(0.002)	(0.1)	(2)	(0.06)	(0.01)	(1.7)	(0.3)	(0.01)	(0.01)	(0.002)	

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

Set-Up Standards (SUSs) **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

Aluminum

IARM	Grade	Ag	B	Be	Bi	Ca	Cd	Cr	Co	Cu	Fe	Ga	Li	Mg
Status		**Mn**	**Na**	**Ni**	**P**	**Pb**	**Si**	**Sb**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**
220B	QA 10	---	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0003)	(0.0003)	(0.0003)	(<0.0001)	(<0.0001)	(0.0004)
Final		(0.0002)	(<0.0001)	(0.0001)	(0.0001)	---	(0.0004)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
220C	QA 10	---	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0003)	(0.0003)	(0.0003)	(<0.0001)	(<0.0001)	(0.0004)
Final		(0.0002)	(<0.0001)	(0.0001)	(0.0001)	---	(0.0004)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
221A	QA 11	---	---	(0.005)	---	(0.03)	---	(0.2)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	(0.2)	(0.01)	---	---	(0.1)	---	(6.7)	---
221B	QA 11	---	---	(0.005)	---	(0.03)	---	(0.2)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	(0.2)	(0.01)	---	---	(0.1)	---	(6.8)	---
221C	QA 11	---	---	(0.005)	---	(0.03)	---	(0.2)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	(0.2)	(0.01)	---	---	(0.1)	---	(6.8)	---
221D	QA 11	---	---	(0.005)	---	(0.03)	---	(0.2)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.7)
Final		(0.4)	---	---	---	---	(0.2)	(0.02)	---	---	(0.1)	---	(6.7)	---
222A	QA 12	(0.2)	---	(0.003)	---	---	(0.2)	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.003)	(0.1)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)
222B	QA 12	(0.2)	---	(0.003)	---	---	(0.2)	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.003)	(0.1)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)
222C	QA 12	(0.2)	---	(0.003)	---	---	(0.2)	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.004)	(0.1)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)
222D	QA 12	(0.2)	---	(0.003)	---	---	(0.2)	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.003)	(0.1)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)
223A	QA 15	---	---	---	---	(0.001)	---	(0.1)	---	(1)	(0.5)	---	---	(1.5)
Final		(0.2)	---	(2.4)	---	---	(12)	---	---	(0.033-.037)*i*	(0.1)	---	(0.01)	---
223B	QA 15	---	---	---	---	(0.001)	---	(0.1)	---	(1)	(0.5)	---	---	(1.3)
Final		(0.2)	---	(2.4)	---	---	(12)	---	---	(0.030-.033)*i*	(0.1)	---	(0.01)	---

( ) and < > Indicates non-certified value.
[ ] Indicates provisional value, certification in progress.

MBH Set-Up Samples (SUSs)

	Steels	C	Si	S	P	Mn	Ni	Cr	Mo	Cu	Co	Sn	Al	V	
Cast	162 X FESUS1	1.1	1.8	0.35	0.15	0.8	0.5	25	0.45	0.3	1.1	0.05	0.6	0.4	continued

Continuation from above	As	Nb	Pb	Ti	W	Zr	Sb	Bi	Zn	Size (mm) Ø H
162 X FESUS1	0.005	0.05	0.005	0.4	0.2	0.04	0.015	0.005	0.002	43 x 20

	Pure Aluminium	ppm Si	ppm Fe	ppm Cu	ppm Mn	ppm Mg	ppm Cr	ppm Zn	ppm Ti	ppm B	ppm Be	ppm Na	ppm Li	ppm Ca	ppm Ni	
HIP	164 X ALSUS 1	<2	<2	<2	<0.3	<2	<0.4	<0.7	<0.5	<0.2	<0.1	<0.5	<0.1	<1	<0.5	continued

Continuation from above	ppm Pb	ppm Sn	ppm Zr	ppm Bi	ppm Ag	ppm Ba	ppm In	ppm Co	ppm V	ppm Ga	ppm Sb	ppm Sr	Others	Size (mm) Ø H
164 X ALSUS 1	<0.5	<0.5	<0.3	<1	<0.5	<0.2	<1	<0.1	<1	<0.2	<1	. . .	20 other elements each at <1 ppm	60 x 75

	Aluminium	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	B	Be	Ca	Ni	
Wrought	164 X ALSUS 5	0.05	0.05	1.1	0.002	2.6	0.005	12	0.025	<0.005	<0.005	0.0005	0.005	
Cast	164 X ALSUS 6	0.5	0.2	12	0.1	0.03	0.02	0.05	0.05	. . .	0.005	. . .	0.1	continued
Spray Cast	164 X ALSUS 25	**27.15 ***	0.26	0.035	0.1	0.03	0.005	0.05	0.025	. . .	. . .	0.007	0.005	

* this value is certified

Continuation from above	Pb	Sn	Zr	Bi	Sr	Cd	Sb	Co	Ga	V	Size (mm) Ø H
164 X ALSUS 5	0.005	0.005	0.3	<0.005	<0.005	. . .	<0.005	. . .	0.005	0.003	50 x 25
164 X ALSUS 6	0.05	0.1	0.05	. . .	. . .	0.03	0.05	0.05	0.02	0.03	50 x 20
164 X ALSUS 25	0.01	<0.001	. . .	. . .	0.04	. . .	. . .	. . .	. . .	. . .	65 x 30

	Pure Copper	ppm Sn	ppm Pb	ppm Zn	ppm Fe	ppm Ni	ppm Al	ppm Si	ppm As	ppm Mn	ppm Bi	ppm Sb	ppm Mg	ppm P	ppm S	
Wrought	165 X CUSUS1	0.7	11	0.4	8	1	0.05	0.05	0.05	0.01	0.05	0.1	0.01	1	11	continued

Continuation from above	ppm Cr	ppm Ag	ppm Be	ppm Cd	ppm Co	ppm Se	ppm Te	ppm Au	ppm Zr	ppm C	ppm O	ppm N	% Cu	Size (mm) Ø H
165 X CUSUS1	0.01	0.05	<0.01	<0.01	0.1	0.05	<0.05	<0.05	<0.01	(0.5)	(370)	(6)	99.96	50 x 45

MBH Set-Up Samples (SUSs)

Copper

		Sn	Pb	Zn	Fe	Ni	Al	Si	As	Mn	Bi	Sb	Mg	P	S	Cr	Cu	Others	Size (mm) Ø x H
Wrought	**165 X CC102**	<0.005	<0.005	<0.01	0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.9	98	Zr 0.1	50 x 45
	165 X CA104	0.01	0.01	. . .	4.3	4.7	9.5	0.05	<0.005	0.4	<0.005	0.01	<0.005	<0.005	. . .	<0.005	80		45 x 45
Cast	**165 X MNB5SUS**	1.8	0.2	37	0.6	1.3	3.1	0.5	<0.001	0.25	. . .	<0.001	<0.001	<0.001	. . .	. . .	55		45 x 20
	165 X PB10SUS	12.7	0.015	0.015	0.001	0.01	<0.001	0.001	0.001	<0.001	. . .	0.005	<0.001	0.02	0.002	. . .	87		
	165 X ALB1SUS	0.02	0.20	0.005	3.0	5.8	9.3	0.10	0.002	0.08	. . .	. . .	<0.002	0.01	. . .	0.01	81.5		
	165 X WSB4SUS	0.9	0.25	5.3	0.9	0.3	0.6	4.4	0.04	1.9	. . .	0.08	0.001	0.05	0.005	0.05	. . .	Co 0.09	
Chill Cast	**165 X GM4SUS**	2.5	5.3	7.4	0.06	2.0	0.001	0.001	0.02	0.005	0.02	0.04	. . .	0.01	0.35	. . .	82	Ag 0.005	40 x 15

Magnesium

		Mn	Cu	Si	Fe	Ni	Al	Zn	Pb	Sn	Zr	Cd	Na	Be	Ag	Sr	Ca	Size (mm) Ø x H
Cast	**166 X MGSUS1**	0.17	0.002	0.06	0.005	0.001	0.04	6.8	0.003	0.02	<0.001	. . .	. . .	0.0001	0.007	0.0001	<0.001	45 x 50
	166 X MGSUS2	0.4	0.02	0.12	0.005	0.02	8	0.4	0.04	0.01	. . .	0.004	. . .	0.0015	0.005	0.0003	0.015	

Lead

		Sn	Sb	Bi	Cu	As	Ag	Zn	Cd	Ni	Te	Fe	Tl	Se	S	In	Ca	Au	Size (mm) Ø x H
Cast	**168 X PBSUS1**	1.4	6.2	0.04	0.02	0.4	0.01	0.002	0.005	0.005	0.01	0.005	. . .	0.005	0.002	0.005	. . .	0.001	44 x 40
	168 X PBSUS5	0.85	0.5	0.35	0.1	0.25	0.2	0.003	0.12	0.001	0.006	0.0001	0.005	0.0002	0.0005	0.3	0.001	0.002	40 x 40
	168 X PBSUS6	0.15	0.1	0.2	0.1	0.025	0.04	0.005	0.025	0.001	0.005	0.0005	0.03	0.003	0.001	0.015	0.01	0.001	43 x 45
	168 X PBSUS7	0.05	10	0.02	0.04	0.7	0.005	0.001	0.002	0.01	0.025	. . .	0.005	0.015	0.005	0.001	0.001	0.005	43 x 45
	168 X PBSUS9	25	2.5	0.3	1.0	0.002	0.1	0.01	0.05	0.03	0.001	0.005	. . .	0.005	0.001	0.5	. . .	0.05	43 x 45

Zinc

		Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Ti	Cr	Ag	In	Tl	Sb	Si	Bi	Size (mm) Ø x H
	169 X ZnSUS1	0.6	0.002	0.35	0.3	0.05	0.3	0.35	0.06	0.001	0.001	0.001	0.04	0.25	0.06	0.2	0.003	0.005	50 x 20

Tin

		Ag	Sb	As	Bi	Pb	Cu	Zn	Cd	Fe	In	Tl	Al	Ni	Co	Au	Pt	Pd	Size (mm) Ø x H
Cast	**1611 X SnSUS6**	0.1	0.14	0.45	0.08	0.9	0.45	0.001	0.01	0.01	0.005	0.005	0.002	0.1	0.015	0.003	0.003	0.003	40 x 40
	1611 X SnSUS7	0.12	10.5	2.5	2.4	0.3	11.2	0.01	0.015	0.3	0.05	0.05	0.002	0.1	0.03	0.001	. . .	0.001	45 x 25

Cobalt

		C	Si	Mn	Ni	Cr	W	Mo	Nb	Fe	Al	B	S	P	
Cast	**1612 X CoSUS1**	0.9	1.3	0.9	12	27	5	5	1.1	4	2	0.01	0.1	0.05	continued

Continuation from above

	Ti	Ta	Zr	Cu	V	Sn	Pb	Size (mm) Ø x H
1612 X COSUS1	0.05	0.1	0.05	0.1	0.1	0.1	0.02	45 x 20

( ) Indicates non-certified value.

These standards are produced by MBH Analytical Limited, England

Heavy Metals in Plastic RMs - XRF Analysis

European Communion (EC) directives have defined specific limits for heavy metals in plastic. Sets of PE and PVC have been designed for screening heavy metals to check for compliance with these limits.

These sets of reference materials consist of 3 individual discs. Each disc is 31 mm in diameter and approximately 13 mm thick. The overall error of concentration of the added element is estimated at less than 4% relative at a 95% confidence level. Except, below 100 mg/kg, the estimated error is 5 mg/kg absolute at a 95% confidence level.

There are many various additives combined with different plastics or polymers to give specific properties. XRF is often used to monitor these products. If you have a specific or special application need, please contact us for the possibility of custom made reference materials.

<u>These RMs are sold as sets only.</u>

Heavy Metals in PE

Element	PE-High Conc. added, (mg/kg)	PE-Low Conc. added, (mg/kg)	PE-Blank Conc. added, (mg/kg)
Br	1095	499	0
Hg	1094	203	0
Cr	998	398	0
Pb	1202	400	0
Cd	303	100	0

Heavy Metals in PVC

Coming Soon

Element	PVC-High Conc. added, (mg/kg)	PVC-Low Conc. added, (mg/kg)	PVC-Blank Conc. added, (mg/kg)
Br			
Hg			
Cr			
Pb			
Cd			

Every effort is made to assure the high quality of these standards and their data. The use of these standards and the interpretation of the results is the sole responsibility of the user.

Sulfur in Oils

Sulfur In Refined Petroleum Products
Certified Reference Materials
&
Reference Materials

Analytical Reference Materials International is pleased to introduce its new Sulfur In Refined Petroleum Products Standards.

Developed in cooperation with the leading companies in the oil and petrochemical refining and inspection industries, ARMI has produced a complete line of true certified reference materials for Sulfur in #2 Diesel Fuel, Residual Fuel Oil, and White Mineral Oil for sulfur levels ranging from 0.0000% to 4.50%, depending upon the specific base material selected. Also, ARMI now has a line of #2 Diesel Fuel reference materials for drift correction. The CRMs are packaged 4 ounces (118 ml) per bottle and the RMs are in 16 ounce bottles. Also, there is a 10% discount given for complete set purchases.

These CRMs and RMs are manufactured following ASTM's stringent procedures and protocols resulting in products that are fully certified, traceable to NIST, and backed by statistical data from the leading laboratories in the Industry. They have the quality, stability, reliability, repeatability, and solid performance that you would expect and demand from CRMs and RMs produced specifically for the Energy Sector.

Using ARMI's standards will insure that your reported results are indisputable and as correct as they can possibly be. Now you can be completely confident in finally having the ability to perform quality matrix specific instrument calibrations across the full range of refined petroleum products.

Sulfur in Refined Petroleum Products CRMs & RMs **Please call for availability and current pricing - 303. 216.2621 or 800. 421.9454**

Residual Fuel Oil	
IARM	**Sulfur Level**
HP-11Set	Set of All
HP-11000*	0.0000%
HP-11010	0.10%
HP-11050	0.50%
HP-11100	1.00%
HP-11200	2.00%
HP-11300	3.00%
HP-11450	4.50%
*Pure Mineral Oil	

White Mineral Oil	
IARM	**Sulfur Level**
HP-13Set	Set of All
HP-13000	0.0000%
HP-13001	0.01%
HP-13005	0.05%
HP-13010	0.10%
HP-13050	0.50%
HP-13100	1.00%
HP-13200	2.00%
HP-13300	3.00%

#2 Diesel Fuel CRMs	
IARM	**Sulfur Level**
HP-14Set	Set of All
HP-14000	0.0000%
HP-1400005	0.0005%
HP-140001	0.0010%
HP-140002	0.0020%
HP-140005	0.0050%
HP-14001	0.01%
HP-14003	0.03%
HP-14005	0.05%
HP-14010	0.10%
HP-14050	0.50%
HP-14100	1.00%
HP-14200	2.00%
HP-14300	3.00%
HP-14450	4.50%

#2 Diesel Fuel RMs	
IARM	**Sulfur Level**
HP-140005R	0.0050%
HP-14001R	0.01%
HP-14005R	0.05%
HP-14050R	0.50%
HP-14150R	1.50%
HP-14300R	3.00%

Sulfur in Coal

Coal Certified Reference Materials

Analytical Reference Materials International is pleased to introduce its Coal Standards, developed in cooperation with the leading analytical laboratories in the Coal Industry. ARMI has produced a complete line of true certified reference materials for Sulfur and Sulfur plus Prox analysis of coal for sulfur levels ranging from 0.25% to 9.0%. The coal standards are packaged 50 grams per bottle for both Sulfur Analysis only and for Sulfur plus Prox Analysis. There is a 10% discount given for complete set purchases of all standards.

These CRMs are manufactured following ASTM's stringent procedures and protocols and ARMI's ISO accredited internal testing protocol, resulting in products that are fully certified, traceable to NIST, and backed by statistical data from the leading analytical laboratories in the Industry. They have the quality, stability, reliability, repeatability, and solid performance that you would expect and demand from CRMs produced specifically for Industry and the Energy Sector.

Using ARMI's standards will insure that your reported results are indisputable and as correct as they can possibly be. Now you can be completely confident in finally having the ability to perform quality instrument calibrations across the full range of Sulfur and Prox values.

New for 2007 - ARMI is working to expand its line-up of coal CRMs by adding mercury and chlorine standards. Testing is currently underway and availability is projected for the third calendar quarter of 2007.

Coal CRM Products	**Please call for availability and current pricing - (303) 216-2621 or (800) 421-9454**

IARM Number	Sulfur Class	Certified Sulfur	* Ash	* BTU	* Fixed Carbon	* Vol. Matter	* Moisture	* C	* H	* N	* O
HC-20025B	0.25%	0.28%									
HC-20075B	0.75%	0.78%									
HC-20100B	1.00%	1.00%									
HC-20150C	1.50%	1.71%									
HC-20300B	3.00%	3.02%									
HC-20450A	4.50%	4.69%									
HC-20500B	5.00%	5.41%									
HC-20900A	9.00%	In Process									
HC-30025B	0.25%	0.28%	5.8	11,800	44	47	18	70	4	1	18
HC-30075B	0.75%	0.78%	8.6	12,000	50	41	13	71	5	1	14
HC-30100B	1.00%	1.00%	6.9	13,400	57	35	6	74	5	2	9
HC-30150C	1.50%	1.71%	18.8	12,100	47	34	2	67	5	1	6
HC-30300B	3.00%	3.02%	8.6	13,900	52	40	1	77	5	2	6
HC-30450A	4.50%	4.69%	16.8	11,700	44	39	5	64	5	1	8
HC-30500B	5.00%	5.41%	22.3	11,600	45	32	1	64	4	1	3
HC-30900A	9.00%	In Process									

* Approximate values only, actual values supplied on certificate of analyisis.

LABORATORY PROFICIENCY TESTING

"Let ARMI be a cornerstone member of your Quality Team!"

In support of "Total Quality Assurance" programs, Analytical Reference Materials International (ARMI) developed its Laboratory Proficiency Testing (PT) Program in 1991. Having been in the business of CRM characterization, statistical evaluation, and certification of standards for many years, the Company has compiled a vast database of statistical information that is easily utilized as an extremely effective quality assurance tool. This statistical information library, combined with ARMI's CRMs, composes the basis for an unrivaled PT program to support your internal Quality System.

The PT Program offers benchmark proficiency testing which is directed towards supporting internal quality assurance programs, as well as fulfilling the accreditation requirements of several accrediting bodies, such as A2LA, NADCAP, and many others. The Program can also be incorporated into ISO 9000 and ISO 17025 certification requirements.

ARMI's PT Program is a direct, tailor made program, custom designed for the individual subscribing company. The participating company selects the timing and material matrix for testing. ARMI then selects the specific material from its extensive CRM inventory and sends it to the subscriber for testing and evaluation. Once the analysis results are received, ARMI reports back within 48 hours the results of the company's testing versus the certified values for that specific material. The results are reported in an easily read graphical format that allows for instant performance level recognition. This rapid turnaround ensures the company's ability to take corrective action for any problem quickly and efficiently and furthermore, the information is kept totally confidential. Finally, since the material used for testing is from a CRM, the company also now has an actual standard for use in its daily operations.

The PT Program is NOT method or instrument specific. The Program can be used for a single technique, method, and instrument or for several techniques, methods, and instruments. The Program has the flexibility to be adapted for most any laboratory situation. Also, the PT Program is NOT a round-robin comparison. Your results are only compared against certified values and the results are returned to you within 48 hours, not 30, 60, or even 90 days.

The PT Program samples used are all actual CRMs and traceable to NIST. The analytical data used for the evaluation of the PT Program results is the same data generated by the expert members of ARMI's ILAP group. This is the same group of Industry and commercial laboratories that supports ARMI's CRM development and certification program. The data has been thoroughly critiqued, statistically evaluated, and it is free of any outliers. The end result is that by utilizing ARMI's PT Program, your performance test results are now indisputable and traceable to NIST!

Laboratory Proficiency Testing	Prices subject to change		(303) 216-2621 or (800) 421-9454
	Plan 1 - Monthly **12 Samples per Year** Unit Price per Sample	**Plan 2 - Quarterly** **4 Samples per Year** Unit Price per Sample	**Plan 3 - Bi-Annual** **2 Samples per Year** Unit Price per Sample
Carbon Steel	$160.00	$220.00	$280.00
Cast Iron (Solid Disk Only)	'N/A	$325.00	$385.00
Low Alloy Steel	$160.00	$220.00	$280.00
Tool Steel	$160.00	$220.00	$280.00
Stainless Steel	$170.00	$230.00	$290.00
High Temperature Steel	$170.00	$230.00	$290.00
Nickel Based	$185.00	$250.00	$305.00
Cobalt Based	$200.00	$265.00	$320.00
Copper Based	$160.00	$220.00	$280.00
Aluminum Based	$225.00	$285.00	$340.00
Titanium Based	$275.00	$325.00	$385.00
***New* - Magnesium**	Call for quote	Call for quote	Call for quote
Sulfur in Refined Petroleum	$70.00	$87.50	$112.50
Sulfur in Coal	$70.00	$87.50	$112.50
Sulfur & Prox in Coal	$135.00	$150.00	$175.00

Terms and Conditions

A one-time ***Initial Setup & Administrative Fee*** of $225.00 will be added to invoices for new customers only. This includes a subscriber, instrument, and/or technique profile plus the set up of an individual historical database. A single invoice will be issued prior to the first sample being shipped for the total subscription period. Terms are 'Net 30 days'.

Unit prices apply to one set of data points per sample. In the case of a subscriber reporting multiple data sets from a single sample, add $65.00 for each additional data set submitted. For metals, all prices include a single solid sample. Optional 10g Chip Sample Packs and/or a Pin Disk or Solid Pin Packs for C, S, O2, and N2 are available at an additional charge of $25.00 per sample pack. Subscribers desiring chip samples only will be provided an equivalent gram wieght to the standard solid sample.

Price includes hard copy reports and delivery of samples in the United States and Canada. Shipping will be added for other destinations.

Please contact ARMI for a formal price quotation.

Revised - 6/7/2007

The 90/10 Share Program

In the same spirit of cooperation that has become the very foundation of ARMI's efforts to develop new CRMs in the private sector, in May of 1990, the Company launched its **"90/10 Share Program."** Although many materials are quite common, spectrochemical standards for these materials are frequently non-existent. The 90/10 Program was created to solve this all to common problem.

The 90/10 Program is a very simple and cost effective service offered by ARMI allowing the Company (which is a leading producer of CRMs) to work together with the scientific community by sharing the task, as well as the costs, of developing new commercially available CRMs.

Here is how it works! The customer furnishes ARMI with the material of the specific alloy, usually in the form of round bar stock. The bar stock needs to be a minimum of 1.25" outside diameter and a 1.5" outside diameter is ideal. The overall length should be at least 10 to 12 feet. Forms other than bar stock are acceptable as long as the quantity is sufficient for the sampling that is required for the laboratories' examinations. The material is then processed through ARMI's ILAP for certification as a CRM. Approximately 15% to 20% of the material is expended in the analysis process. After certification, 10% of the remaining material is returned to the customer in any form desired (OES solids, chips, X-Ray discs, etc.) and ARMI retains the balance for sale commercially.

The only cost to the customer is the cost of the material. ARMI has well-established vendors for most alloy materials and will also assist in the location and acquisition of the base stock material.

That's all there is to it! By working together, we make available a new CRM, traceable to NIST, for the scientific community.

Sample Preparation Equipment Parts List

BR Number	Description	Quantity/Pack
HK200 - Disk Grinder		
HK200	Manual disc grinding machine for preparation of iron and steel samples for OES and XRF analysis, desktop machine.Dimensions - ~40x45x40cm, Weight 22kg, 220V/60Hz	1
HKPACK	Export packing, wooden box	1
Optional Accessories		
HKHOLD3	Magnetic sample holder, round, 40-50mm Ø	1
HKHOLD4	Magnetic sample holder, rectangular, 35x35mm	1
Consumables		
PAP200K/40	Grinding paper Al2O3, 40 grit, PSA, 200mm Ø	100 pcs/pack
PAP200K/60	Grinding paper Al2O3, 60 grit, PSA, 200mm Ø	100 pcs/pack
PAP200K/80	Grinding paper Al2O3, 80 grit, PSA, 200mm Ø	100 pcs/pack
PAP200S/40	Grinding paper SiC, 40 grit, PSA, 200mm Ø	100 pcs/pack
PAP200S/60	Grinding paper SiC, 60 grit, PSA, 200mm Ø	100 pcs/pack
PAP200S/80	Grinding paper SiC, 80 grit, PSA, 200mm Ø	100 pcs/pack
PAP200Z/40	Grinding paper ZrO2, 40 grit, PSA, 200mm Ø	100 pcs/pack
PAP200Z/60	Grinding paper ZrO2, 60 grit, PSA, 200mm Ø	100 pcs/pack
PAP200Z/80	Grinding paper ZrO2, 80 grit, PSA, 200mm Ø	100 pcs/pack
Special Accessories		
HK200W	Disc Grinder, dry & wet applications	1
HK210	Disc Grinder, Spectrographic & Metallographic	1
HKHOLD5	Non-magnetic sample holder, round	1
HKHOLD6	Magnetic sample holder, rectangular, 50x50mm	1

BR Number	Description	Quantity/Pack
	HK350 - Disk Grinder	
HK350	Manual disc grinding machine for preparation of iron and steel samples for OES and XRF analysis. Disk grinder, complete with dust trap and exhauster.Dimensions - ~70x70x105cm, Weight 100kg, 220V/60Hz	1
HKPACK	Export packing, wooden box	1
	Optional Accessories	
HK350ERS	Spare parts set (bellows, safety glass, lamp, fuses)	1
HKHOLD3	Magnetic sample holder, round, 40-50mm Ø	1
HKHOLD4	Magnetic sample holder, rectangular, 35x35mm	1
HKEXFILT	Round filter, exhauster HK150/350, PAS 11-21	1
	Consumables	
PAP350K/40G	Grinding paper Al2O3, grit 40, 350mm Ø	100 pcs/pack
PAP350K/60G	Grinding paper Al2O3, grit 60, 350mm Ø	100 pcs/pack
PAP350K/80G	Grinding paper Al2O3, grit 80, 350mm Ø	100 pcs/pack
PAP350S/40	Grinding paper SiC, grit 40, 350mm Ø	100 pcs/pack
PAP350S/60	Grinding paper SiC, grit 60, 350mm Ø	100 pcs/pack
PAP350S/80	Grinding paper SiC, grit 80, 350mm Ø	100 pcs/pack
PAP350Z/40	Grinding paper ZrO2, grit 40, 350mm Ø	100 pcs/pack
PAP350Z/60	Grinding paper ZrO2, grit 60, 350mm Ø	100 pcs/pack
PAP350Z/80	Grinding paper ZrO2, grit 80, 350mm Ø	100 pcs/pack
	Special Accessories	
HKHOLD5	Non-magnetic sample holder, round	1
HKHOLD6	Magnetic sample holder, rectangular, 50x50mm	1
HKEXFILT	Round filter, exhauster HK150/350, PAS 10-20	1
HKDUST	Spark arrester with metal tube for HK150 & HK350	1
PAP350K/60PE	Grinding paper PE63, grit 60, 350mm Ø	100 pcs/pack

Sample Preparation Equipment Parts List

BR Number	Description		Quantity/Pack
HK150 - Disk Grinder			
HK150	Manual sample grinding machine for preparation of iron and steel samples for OES and XRF analysis. Pendulum grinder (bench top) complete for operation with stones (BR HKT32J), tools, and vice with low and high brackets.Dimensions - ~70x70x105cm, Weight 120kg, 220V/60Hz		1
HKPACK	Export packing, wooden box		1
Alternate Configuration			
HK150EXS	HK150 configuration as above with steel cabinet, exhauster, spark arrester, and tubing (floor standing).Dimensions - ~70x70x105cm, Weight 120kg, 3Ø 230/60Hz - Cabinet & Exhauster ~70x70x105cm, Weight 70kg		1
HKPACK	Export packing, wooden boxes (2)		2
Optional Accessories			
HK150ERS	Spare parts set (bellows, safety glass, lamp, fuses)		1
HK150MS	Magnetic plate, complete with arm, 100x65mm		1
HK150VICE	Vice for samples 44-58mm Ø		1
HKEXFILT	Round filter, exhauster HK150/350, PAS 11-21		1
Consumables			
HKT32J1	Al2O3-grinding stone	1-3 packs	3 pcs/pack
HKT32J2	Al2O3-grinding stone	4-8 packs	3 pcs/pack
HKT32J3	Al2O3-grinding stone	9+ packs	3 pcs/pack
HKT49M1	SiC-grinding stone	1-3 packs	3 pcs/pack
HKT49M2	SiC-grinding stone	4-8 packs	3 pcs/pack
HKT49M3	SiC-grinding stone	9+ packs	3 pcs/pack
Special Accessories			
HKEXFILT	Round filter, exhauster HK150/350, PAS 10-20		1
HKDUST	Spark arrester with metal tube for HK150 & HK350		1

Sample Preparation Equipment Parts List

BR Number	Description	Quantity/Pack
HK80F - Milling Machine		
HK80F	Semi-automatic milling machine for preparation of non-ferrous metal samples for OES and XRF analysis. Dimensions - ~56x78x75cm, Weight 140kg, 220V/60Hz	1
HK80F80	Standard milling head with cutters, 80mm Ø	1
HKPACK	Export packing, wooden box	1
Optional Accessories		
HK80FERS	Spare parts set (bellows, safety glass, lamp, fuses)	1
HK80FWP	Hard metal cutters (standard)	10 pcs/pack
HK80FSN	Brackets for lower samples >3mm, 16-52mm Ø	1
HK80FSG	Brackets for universal use >9mm, 16-52mm Ø	1
HK80WZ	Measuring base, cutter positioning	1
HK80FSR	Special chuck, rectangular samples	1
Special Accessories		
HK80F63	Milling head complete with cutters, 63mm Ø	One
HK80F8022	Special milling head with special cutters, 80mm Ø	One
HK80FWPS	Special hard metal cutters, octagonal	6 pcs/pack

BR Number	Description	Quantity/Pack
HK40 - Swing Grinder		
HK40	Swing grinder, desktop model for grinding of mineral samples for XRF or solution analysis. Dimensions - ~50x40x67cm, Weight 48kg, 115V/60Hz	1
HK40MG1	Vessel, Corundum 99.6%, bio-inert, 100ml	
HKPACK	Export packing, wooden box	1
Optional Accessories		
HK40MG2	Vessel, Corundum 99.9%, bio-inert, 100ml	1
HK40MG3	Vessel, Hardened Cr-steel, 100ml	1
HK40MG4	Vessel, Nitrided, Cr-steel, 100ml	1
HK40MG5	Vessel, Tungsten Carbide, 100ml	1
HK40MG6	Vessel, Zirconia Oxide >99.9%, 100ml	1
SPECTAB 20	Grinding & Pelletizing agent, tablets	4000 x 0.25g
BR70 - Jaw Crusher		
HK40	Jaw crusher, laboratory model for crushing of mineral samples for XRF or solution analysis (with regular acc). Dimensions - ~50x60x60cm, Weight 90kg, 3Ø 220/60Hz	1
HKPACK	Export packing, wooden box	1

Sample Preparation Equipment Parts List

BR Number	Description	Quantity/Pack
	Manual Hydraulic Press	
HK40	Hydraulic press, manual, variable from 0-20 tons available pressure for preparation of XRF and IR pellets. Dimensions - ~70x59x47cm, Weight 55kg	1
HKPACK	Export packing, wooden box	1
	Optional Accessories	
4030	Evacuated Die Set, SS, includes 2 SS-pellets, 32mm Ø	1
4038	Evacuated Die Set, SS, includes 2 SS-pellets, 35mm Ø	1
4040	Evacuated Die Set, SS, includes 2 SS-pellets, 40mm Ø	1
	Special Accessories	
4035	Press plate, tungsten carbide, 32mm Ø	1
4037	Press plate, tungsten carbide, 35mm Ø	1
4045	Press plate, tungsten carbide, 40mm Ø	1
4060	Press plate, stainless steel, 40mm Ø	1
	Consumables	
HWC	Micropowder C, binder XRF-pellets	1 kg
HWC	Micropowder C, binder XRF-pellets	5 kg
HWC	Micropowder C, binder XRF-pellets	10 kg
HWC	Micropowder C, binder XRF-pellets	20 kg

Sample Preparation Equipment Parts List

BR Number	Description	Quantity/Pack
Electro-Hydraulic Press		
HK40	Electro-hydraulic press, manual, variable from 0-20 tons available pressure for preparation of XRF and IR pellets. Dimensions - ~70x59x47cm, Weight 70kg, 120V/60Hz	1
HKPACK	Export packing, wooden box	1
Optional Accessories		
4030	Evacuated Die Set, SS, includes 2 SS-pellets, 32mm Ø	1
4038	Evacuated Die Set, SS, includes 2 SS-pellets, 35mm Ø	1
4040	Evacuated Die Set, SS, includes 2 SS-pellets, 40mm Ø	1
Special Accessories		
4035	Press plate, tungsten carbide, 32mm Ø	1
4037	Press plate, tungsten carbide, 35mm Ø	1
4045	Press plate, tungsten carbide, 40mm Ø	1
4060	Press plate, stainless steel, 40mm Ø	1
Consumables		
HWC	Micropowder C, binder XRF-pellets	1 kg
HWC	Micropowder C, binder XRF-pellets	5 kg
HWC	Micropowder C, binder XRF-pellets	10 kg
HWC	Micropowder C, binder XRF-pellets	20 kg

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Introduction

Analytical Reference Materials International (ARMI) was founded in 1984 for the purpose of providing Certified Reference Materials (CRMs) to the Metals Industry. Since that time, ARMI has expanded its metals inventory to include CRMs for the following matrices:

Carbon & Low Alloy Steels	Stainless Steels	Copper Alloys
High Temperature Steels	Nickel Alloys	Titanium Alloys
Tool Steels	Cobalt Alloys	Aluminum Alloys

Since January 1992, ARMI has been the worldwide distributor for the ALCAN International line of aluminum CRMs. These CRMs are the finest standards in the world produced for the Aluminum Industry. Their quality and homogeneity is without equal in the world. And their analysis is one of the most thorough and complete in the wolrd for a commercially produced product. ARMI carries ALCAN's full line of aluminum alloys, as well as high purity and binary CRMs.

ALCAN's non-metallic standards are now included in our catalog. The standards available include:

Bauxite	Aluminum Fluoride	Fluorspar	Calcined Petroleum Coke
Bayer Process Red Mud	Alumina	Cryolite	Metallurgical Coke
Electrolytic Bath	Pitch	Green Petroleum Coke	Scrubber Alumina

All of these products are packaged in powder form. Stocks are limited for some items. Please contact us for price and availability.

ARMI also carries Aluminum Setting-Up Standards (SUSs). In addition to its internally produced SUSs, ARMI carries the full line of Alcoa Aluminum SUSs.

In addition to its listed CRMs, ARMI has access to additonal aluminum standards from ALCAN's affiliates and ARMI's associates throughout the world. ARMI also has the ability to have custom standards produced for any special chemistry requirement. Let the staff at ARMI help you fill your aluminum standard needs.

Thank you for considering ALCAN's and ARMI's products and we look forward to supplying your Certified Reference Material needs. If you have any questions, require additional information or need assistance in locating a special CRM, please contact us. We will be happy to assist you in any way we can.

Let ARMI's staff help fill your standards needs!

Best Regards,

William D Britt

William D. Britt
President & General Manager

The ALCAN Spectrochemical Standard and ARMI

In January of 1992, Analytical Reference Materials International (ARMI) and ALCAN International Limited, Arvida Research and Development Center of Canada (ALCAN), entered into a strategic alliance for the marketing, sales, and future development of aluminum spectrochemical Certified Reference Materials (CRMs) worldwide. As a result, all CRMs produced by ALCAN are available through ARMI in Golden, Colorado, USA. The inventory consists of over 500 aluminum spectrochemical CRMs. In addition to the traditional spectrochemical disk for Optical Emission, all CRMs are also available in chips for classical chemistry and wet instrumental techniques, and thin disks for EDXRF/WDXRF.

ALCAN spectrochemical standards are not derived from production material. They are produced from a direct-chill continuous casting process resulting in bar stock of 75mm in diameter. Each billet is scalped and thereafter cut into 25mm thick slices of 57mm in finished diameter. Although this method of manufacture is expensive, the continuous-cast disk has resulted in excellent homogeneity leading to reliable results for the analysis of both the simple and the most complex aluminum alloys for over 50 years.

For homogeneity testing, 12 samples are selected from each billet cast and are each sparked 7 times on the spectrometer following a pseudo-random technique. The results obtained are statistically evaluated by an analysis of variance to determine the uniformity of composition within and among the samples tested. Once the series is determined to be homogenous, chips are prepared for wet chemical analysis. Every element to be certified is then analyzed using the most widely recognized methods. Each sample is analyzed at least in duplicate by two technicians using two different analytical techniques that include ICP, AA, X-Ray fluorescence, colorimetric, fluorimetric, and titrimetric methods. The individual values reported are statistically evaluated, and the mean values are compared to the results obtained by Optical Emission Spectrometry. Finally, the check samples are circulated among other ALCAN laboratories for verification. These laboratories perform their own chemical analysis and report their results to the Arvida Research Center. Worldwide comparison analysis involving top specialists in the field ensures high confidence in the values obtained.

ALCAN produces three basic categories of CRMs. Alpha characters located at the end of a part number indicate the alloy series or heat.

> Standard Alloy part numbers have a 2 alpha characters suffix such as **"-AC"** and are alloys in which some 23+ elements including traces are certified.
>
> Ultra Hi-Purity Alloys have a 3 alpha characters suffix such as **"-CAD"** and are alloys produced from ultra hi-purity ingredients without any trace elements present.
>
> Special Alloys are prefixed by an unusual designation such as **"1S"** and are located in a separate section in the ALCAN portion of the catalog. These alloys include some binaries and special experimental compositions.

Alcan Foundry Aluminum Alloy CRMs Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	**Ge**
	220-AA	---	---	---	---	---	---	---	5.94	0.16	---	---	0.23	0.049
Standard		---	---	---	---	---	0.14	---	---	0.021	---	0.035	0.39	0.14
	220-AB	---	---	---	---	---	---	---	4.50	0.048	---	---	0.011	0.005
Standard		---	---	---	---	---	0.012	---	---	0.009	---	0.016	0.088	0.008
	220-AC	---	---	---	---	---	---	---	4.98	0.020	---	---	0.068	0.010
Standard		---	---	---	---	---	0.037	---	---	0.011	---	0.023	0.20	0.04
	220-AD	---	---	---	---	---	---	---	5.55	0.095	---	---	0.15	0.021
Standard		---	---	---	---	---	0.10	---	---	0.019	---	0.034	0.28	0.093
	220-AE	---	---	---	---	---	---	---	5.94	0.087	---	---	0.24	0.027
Standard		---	---	---	---	---	0.13	---	---	0.032	---	0.049	0.38	0.11
	220-AF	---	---	---	---	---	---	---	6.95	0.26	---	---	0.32	0.060
Standard		---	---	---	---	---	0.24	---	---	0.050	---	0.066	0.48	0.18
	X332.0-AC	---	0.0011	0.005	0.0039	0.0013	0.0021	0.030	6.95	0.20	0.021	0.0032	1.29	0.032
Standard		0.0062	0.031	0.0031	0.028	---	11.33	0.020	0.0030	0.25	0.019	0.067	0.0030	
	A355.0-CAA	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.95)	(0.21)	<0.0001	<0.0001	(0.60)	<0.0001
High Purity		<0.0001	<0.0001	0.0001	<0.0001	0.0003	(4.00)	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
208.2	224-AC	---	---	0.019	---	---	---	0.027	4.26	0.53	0.016	---	0.022	0.042
Standard		---	0.030	---	0.021	---	2.64	0.024	---	0.15	0.014	0.039	---	---
208.2	224-CAB	---	---	<0.001	---	---	---	<0.001	(3.95)	(0.45)	(0.001)	---	(0.002)	(0.002)
High Purity		---	(0.001)	---	<0.001	---	(2.28)	<0.001	---	(0.001)	(0.002)	<0.001	---	---
213	236-AE	---	---	0.026	---	---	---	0.028	6.94	1.22	0.020	---	0.06	0.11
Standard		---	0.045	---	0.023	---	2.03	0.024	---	0.12	0.015	0.040	---	---
238.2	S250-AB	---	---	0.042	---	---	---	0.027	9.95	0.74	---	---	0.27	0.041
Standard	**1 ONLY**	---	0.04	---	0.04	---	4.15	0.038	---	(0.05)	---	0.05	---	---
238.2	S250-AE	---	---	0.026	---	---	---	0.028	9.99	1.11	0.014	---	0.30	0.047
Standard		---	0.038	---	0.026	---	4.06	0.025	---	0.057	0.007	0.047	---	---
238.2	S250-CAC	---	---	(0.001)	---	---	---	(0.001)	(10.0)	(1.0)	(0.002)	---	(0.002)	0.005
High Purity		---	(0.001)	---	(0.001)	---	(4.5)	(0.001)	---	0.003	(0.002)	(0.001)	---	---
242.2	218-AR	---	---	0.040	---	---	---	0.030	4.00	0.49	---	---	1.50	0.037
Standard		---	2.00	---	0.047	---	0.18	0.048	---	0.12	---	0.035	---	---
295.2	225-AH	---	---	0.033	---	---	---	0.031	4.48	0.39	0.020	---	0.020	0.057
Standard		---	0.032	---	0.030	---	0.85	0.033	---	0.17	0.015	0.032	---	---

i = Individual Value ( ) = Not Certified
< = Less than 'Type' - M = Mushroom

Revised - 01/14/2010

Alcan Foundry Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No. / Type	Part No. / ALC-xxx	B / Na	Be / Ni	Bi / P	Ca / Pb	Cd / Sb	Co / Si	Cr / Sn	Cu / Sr	Fe / Ti	Ga / V	Li / Zn	Mg / Zr	Mn / Ge
305.2	125-CAP	<0.0001	<0.0001	<0.001	0.0004	---	---	<0.001	(1.22)	(0.03)	<0.001	<0.0001	(0.54)	0.0004
High Purity	**3 ONLY**	<0.0001	<0.001	0.0002	0.001	---	(4.90)	<0.001	<0.0001	0.001	0.0007	0.0006	0.0003	---
308	127-AB	---	---	(0.024)	0.006	---	---	0.022	4.85	0.39	0.016	0.0004	0.030	0.027
Standard		---	0.027	---	0.031	---	4.59	0.030	---	0.033	0.013	0.035	0.02	---
319	319-AA	---	0.0012	0.027	0.0033	0.0011	---	0.072	3.52	0.40	0.020	0.0023*i*	0.34	0.27
Standard		0.0022*i*	0.072	0.0023*i*	0.068	0.0027	7.62	0.064	0.0040*i*	0.13	0.019	0.23	0.0038	---
319	117-CAG	---	<0.0001	<0.001	---	---	---	<0.001	(3.00)	0.025	<0.001	<0.0001	<0.001	(0.60)
High Purity	**4 ONLY**	---	<0.001	---	<0.001	---	(4.3)	<0.001	---	0.002	<0.001	<0.001	---	---
319.1	B319.1-AF	---	0.0017	0.022*i*	0.0040*i*	0.0013	---	0.015	3.11	0.64	0.024	0.0024*i*	0.33	0.43
Standard		0.0026*i*	0.049	0.0016*i*	0.013	(0.002)	6.14	0.014	0.044*i*	0.060	0.020	0.72	0.0030	---
319.1	B319.1-CAE	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	(3.34)	(0.65)	<0.0001	<0.0001	(0.32)	(0.43)
High Purity	**2 ONLY**	<0.0001	<0.0001	0.0001	0.0002	0.0002	(6.30)	0.0002	<0.0001	0.0001	<0.0001	(0.70)	0.0001	---
319.1	B319.1-CAG	0.0002	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.001	(3.23)	(0.60)	<0.0001	<0.0001	(0.33)	(0.42)
High Purity		<0.0001	0.0008	0.0005	0.0002	0.0023	(6.35)	0.0003	<0.0001	0.0001	0.0001	(0.77)	<0.0001	---
332	332.0-AB	---	0.0013	0.028*i*	0.0064	---	---	0.058	2.65	0.620	0.031	0.0026*i*	1.67	0.42
Standard		0.0039*i*	0.21	0.001	0.030	0.0042	10.47	0.034	0.018	0.22*i*	0.042	0.65	0.026	---
332	6495-AA	---	---	0.040	---	---	---	0.030	2.36	1.05	---	---	1.31	0.53
Standard		---	0.051	---	0.032	---	10.40	0.028	---	0.10	---	0.055	---	---
332.1	6195-AE	---	(0.001)	0.020	(0.01)	---	---	0.027	3.45	0.70	0.015	---	1.05	0.43
Standard		---	0.028	---	0.033	---	10.70	0.028	---	0.017	0.012	0.93	---	---
332.1	A143-AW	---	0.0018	0.032	0.006	---	---	0.040	3.03	0.73	0.013	0.0005	0.91	0.30
Standard		0.0004	0.89	---	0.036	---	10.02	0.031	---	0.11	0.015	0.035	---	---
332.1	A143-CAX	0.0001	<0.0001	0.0001	0.0001	<0.0001	0.0007	0.0004	(3.04)	(0.48)	0.0008	<0.0001	(0.90)	(0.30)
High Purity		<0.0001	(0.97)	0.0002	0.0001	0.002	(10.0)	0.0001	<0.0001	(0.14)	0.007	0.0004	0.0005	---
333	A333.0-AE	---	<0.0001	0.021	0.0039*i*	---	---	0.015	3.53	0.78	0.030	0.0018*i*	0.076*i*	0.32
Standard		0.0038*i*	0.13	0.001	0.016	0.0055	9.08	0.018	0.0029*i*	0.034	0.029	2.36	0.015	---
333	A333.0-AF	---	<0.0001	0.021	0.0043*i*	---	---	0.015	3.54	0.85	0.030	0.0015*i*	0.082*i*	0.35
Standard		0.0033*i*	0.13	0.001	0.015	0.0057	9.13	0.017	0.0029*i*	0.032	0.030	2.34	0.018	---
333	A333.0-AI	---	0.0012	0.019	0.0021	0.0012	---	0.11	3.47	0.90	0.017	0.0022*i*	0.14	0.33
Standard		0.0028*i*	0.15	0.0032*i*	0.13	0.0039	9.7	0.17	0.0031*i*	0.12	0.020	2.56	0.0029	---
333	A333.0-CAH	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(3.55)	(1.00)	<0.0001	<0.0001	0.0003	(0.37)
High Purity	**Cert Pending**	<0.0001	<0.0001	0.0005	0.0001	0.0028	(9.64)	<0.0001	<0.0001	<0.0001	<0.0001	(2.56)	<0.0001	---

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Revised - 01/14/2010

Alcan Foundry Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	**Ge**
336.2	162-CBB	---	---	---	---		---	---	(0.80)	(0.007)	---	---	(1.1)	(0.001)
High Purity		---	(2.6)	---	---	---	(11.5)	---	---	<0.001	---	(0.001)	---	---
339	339.0-AD	---	0.0013	0.04	0.0020	---	---	0.051	1.40	0.048	0.031	0.0009	1.23	0.37
Standard		0.0025	1.12	0.0061	0.046	0.0010	12.73	0.046	0.0021	0.048	0.032	0.099	0.0029	---
339	339.0-CAB	---	<0.0001	0.0001	0.0004	---	0.0014	0.0004	(1.40)	(0.50)	0.0010	<0.0001	(1.17)	(0.27)
High Purity		0.0011	(1.10)	0.0003	0.0001	0.0003	(12.50)	0.0001	0.0001	0.0007	0.0008	0.0005	0.0009	---
339	6365-AB	---	---	0.02	---	---	---	0.03	1.09	0.33	---	---	0.94	0.17
Standard		---	1.09	---	0.03	---	11.89	0.02	---	0.090	---	0.06	---	---
339.1	B162-AG	---	---	0.030	---	---	---	0.033	2.56	0.40	0.016	---	1.07	0.08
Standard		---	0.68	---	0.031	---	12.04	0.027	---	0.054	0.012	0.044	---	---
350	350-CAU	---	---	<0.001	---	---	---	<0.001	(0.004)	(0.009)	<0.001	---	(10.00)	(0.001)
High Purity		---	<0.001	---	(0.002)	---	(0.006)	<0.001	---	<0.001	(0.001)	(0.002)	---	---
354.1	6285-CAB	---	---	(0.001)	---	---	---	<0.001	(1.90)	(0.002)	<0.001	---	(0.48)	<0.001
High Purity		---	<0.001	---	<0.001	---	(8.9)	<0.001	---	(0.001)	(0.003)	<0.001	---	---
355	125-AL	---	---	0.027	---	---	---	0.033	1.20	0.19	---	---	0.025	0.042
Standard		---	0.028	---	0.027	---	4.95	0.029	---	0.15	---	0.030	---	---
355.2	125-AQ	---	---	0.021	---	---	---	0.027	1.22	0.24	0.011	---	0.037	0.038
Standard		---	0.032	---	0.018	---	5.50	0.025	---	0.15	0.016	0.033	---	---
355.2	125-AR	---	---	0.024	---	---	---	0.037	1.29	0.23	0.014	---	0.60	0.039
Standard		---	0.030	---	0.033	---	5.33	0.029	---	0.15	0.017	0.037	---	---
355.2	125-AS	---	0.0009	0.027	---	---	---	0.18	1.28	0.25	0.013	0.00	0.61	0.039
Standard		---	0.028	---	0.035	---	4.88	0.029	---	0.12	0.015	0.037	---	---
355.2	125-AT	---	0.0011	0.031	0.022	---	---	0.023	1.17	0.63	0.009	0.0006	1.08	0.22
Standard		0.0014	0.032	---	0.036	---	4.83	0.032	---	0.068	0.015	0.16	0.02	---
356.2	356.2-AL	---	0.0015	0.022	0.0030*i*	0.0011	---	0.017	0.062	0.15	0.029	0.0026*i*	0.41	0.029
Standard	Replaces AF	0.0022*i*	0.030	0.0026*i*	0.014	0.0048	7.49	0.015	0.0031*i*	0.10	0.029	0.068	0.0034	---
356.2	356.2-AP	---	0.0011	0.0075	0.0040	0.0012	---	0.020	0.069	0.18	0.019	0.0025*i*	0.41	0.019
Standard	Replaces AN	0.0025*i*	0.019	0.0017	0.0081	0.0027	7.26	0.014	0.032	0.107	0.021	0.069	0.0028	---
356.2	356.2-AS	---	0.0012	0.0073	0.0010	0.0009	---	0.030	0.066	0.19	0.018	0.0030*i*	0.39*i*	0.31*i*
Standard		0.0025*i*	0.032	0.0023	0.0071	0.0030	7.27	0.014	0.015	0.170	0.023	0.069	0.0028	---
356.2	356.2-CAK	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	(0.20)	<0.0001	<0.0001	(0.44)	<0.0001
High Purity	**1 ONLY**	<0.0001	<0.0001	0.0002	0.0001	0.0020	(7.49)	<0.0001	<0.0001	(0.12)	<0.0001	0.0002	<0.0001	---

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Revised - 01/14/2010

Alcan Foundry Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	**Ge**
356.2	356.2-CAR	<0.0001	<0.0001	---	0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.17)	<0.0001	<0.0001	(0.41)	<0.0001
High Purity		<0.0001	<0.0001	0.0001	0.0001	<0.0001	(7.14)	<0.0001	<0.0001	(0.11)	<0.0001	0.0002	<0.0001	---
357	B116-AD													
Standard	**Replaced by 443.2-AC**													
360	6490-AC	---	---	0.046	0.010	---	0.45	0.037	0.039	0.32	0.014	0.0010	0.22	0.036
Standard		0.0014	0.040	---	0.038	---	9.02	0.039	---	0.042	0.005	0.049	0.021	---
363.1	6252-AE	---	---	0.029	---	---	---	0.034	3.01	0.33	0.011	---	0.33	0.60
Standard		---	0.041	---	0.026	---	5.41	0.029	---	0.12	0.012	3.46	---	---
363.1	6252-CAC	---	---	<0.001	---	---	---	<0.001	(3.0)	(0.02)	(0.001)	---	(0.30)	(0.60)
High Purity		---	<0.001	---	<0.001	---	(5.5)	<0.001	---	(0.003)	(0.004)	(3.5)	---	---
369	161-CAH	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.024	0.0001	(0.14)	<0.0001	<0.0001	(0.34)	0.0001
High Purity		0.0002	<0.0001	0.0004	<0.0001	<0.0001	(12.00)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---	---
380.2	A380.2-AD													
Standard	**Coming 2010**													
380.2	A380.2-CAC	0.0002	<0.0001	<0.0001	0.0001	0.0002	<0.0001	0.0006	(3.64)	(0.39)	<0.0001	<0.0001	0.0005	0.0008
High Purity		0.0001	0.0003	0.0003	0.0001	<0.0001	(9.45)	0.0001	<0.0001	0.0011	0.0002	0.0002	0.0001	---
383.1	383.1-AB	---	0.0013	0.016	0.0033*i*	0.0009	---	0.10	2.67	0.97	0.026	0.0030*i*	0.12	0.35
Standard		0.0023i	0.22	0.0020	0.10	0.0069	11.24	0.11	0.0034*i*	0.15	0.036	2.65	0.017	---
383.1	383.1-CAC	0.0004	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0007	(2.69)	(1.03)	<0.0001	<0.0001	0.0001	(0.38)
High Purity		<0.0001	0.0005	0.0007	0.0004	0.0001	(10.93)	<0.0001	<0.0001	0.0011	0.0002	(2.63)	<0.0001	---
390	A390.1-AA	---	0.0011	0.0029	0.0016	0.0014	(0.0016)	0.050	4.84	0.38	0.016	---	0.62	0.052
Standard		---	0.051	0.0037	0.0035	0.0028	17.70	0.046	---	0.13	0.018	0.047	0.0032	---
392	392.0-AB	---	---	---	---	---	---	---	(1.00)	---	---	---	(1.00)	---
Standard		---	(1.00)	---	---	---	(17.00)	---	---	---	---	---	---	---
413.2	160-DD	---	---	0.040	<0.001	---	---	0.042	0.044	0.52	---	---	0.040	0.037
Standard		(0.001)	0.037	---	0.042	---	12.40	0.042	---	0.040	---	0.048	---	---
413.2	160-DF	---	---	0.044	0.003	---	---	0.045	0.047	0.52	---	---	0.034	0.036
Standard		0.002	0.038	---	0.038	---	12.23	0.039	---	0.040	---	0.047	---	---
413.2	160-DP	---	---	0.018	---	---	---	0.027	0.053	0.30	0.014	---	0.024	0.033
Standard		0.004	0.030	---	0.026	---	11.77	0.025	---	0.048	0.014	0.043	---	---
413.2	160-DQ	---	---	0.031	0.0020	---	---	0.030	0.053	0.32	0.012	0.0003	0.031	0.034
Standard		0.0001	0.028	---	0.028	---	12.12	0.029	---	0.030	0.011	0.045	---	---

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Alcan Foundry Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	**Ge**
413.2	160-DS	---	0.0013	0.029	0.0020*i*	---	---	0.020	0.042	0.37	0.025	0.0005*i*	0.024	0.042
Standard		0.0006*i*	0.025	---	0.025	---	12.12	0.026	0.010*i*	0.020	0.013	0.024	---	---
413.2	A413.2-AD	---	0.0009	0.0069	0.0025*i*	0.0014	---	0.016	0.033	0.40	0.020	0.0029*i*	0.260	0.039
Standard		0.0040*i*	0.031	0.0026	0.0080	0.0039	12.06	0.014	0.064*i*	0.031	0.019	0.030	0.0034	---
413.2	A413.2-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	0.0006	(0.37)	<0.0001	<0.0001	<0.0001	0.0016
High Purity		<0.0001	0.0001	0.0003	<0.0001	0.0014	(11.99)	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
443.2	123-CAM	<0.0001	<0.0001	<0.001	0.0002	<0.0001	0.0001	<0.001	0.0010	(0.34)	<0.001	<0.0001	0.0012	0.0004
High Purity	**1 ONLY**	<0.0001	<0.001	0.0003	0.001	0.0001	(4.90)	<0.001	<0.0001	0.002	0.0009	<0.001	0.0001	---
443.2	443.2-AC	---	0.0010	0.0085*i*	0.0024*i*	0.0010	---	0.027	0.048	0.35	0.021	0.0017*i*	0.0022*i*	0.046
Standard		---	0.028	0.0032	0.0073	0.0033	5.31	0.012	0.0038*i*	0.155	0.024	0.041	0.0026	---
443.2	443.2-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	(0.35)	<0.0001	<0.0001	0.0003	<0.0001
High Purity		<0.0001	<0.0001	0.0001	<0.0001	(0.0012)	(5.46)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	---
511.2	A320-AC	---	0.005	0.037	---	---	---	0.020	0.057	0.20	0.018	---	4.10	0.036
Standard		---	0.032	---	0.042	---	0.54	0.038	---	0.15	0.012	0.047	---	---
511.2	A320-CAB	---	---	<0.001	---	---	---	<0.001	(0.003)	---	<0.001	---	(3.90)	<0.001
High Purity		---	<0.001	---	(0.001)	---	(0.001)	<0.001	---	<0.001	<0.001	<0.001	---	---
512	6475-CAB	---	---	<0.001	---	---	---	<0.001	(0.51)	---	(0.001)	---	(5.0)	<0.001
High Purity		---	<0.001	---	<0.001	---	(1.05)	<0.001	---	<0.001	(0.002)	<0.001	---	---
515.2	B320-AA	---	---	0.042	---	---	---	0.032	0.054	0.80	0.017	---	3.38	0.54
Standard		---	0.029	---	0.041	---	0.83	0.040	---	0.047	0.011	0.041	---	---
515.2	B320-CAB	---	---	<0.001	---	---	---	<0.001	(0.003)	(0.78)	<0.001	---	(3.4)	(0.47)
High Purity		---	<0.001	---	(0.002)	---	(0.76)	(0.001)	---	<0.001	<0.001	<0.001	---	---
518.2	340-AB	---	---	0.041	---	---	---	0.037	0.049	0.37	0.012	---	8.11	0.056
Standard		---	0.046	---	0.043	---	0.20	0.035	---	0.040	0.010	0.056	---	---
535.0	A535.0-AA	---	0.0012	.043*i*	.0025*i*	0.0012	---	0.053	0.053	0.17	0.021	0.0033	7.30	0.17
Standard		.0019*i*	0.052	.0010*i*	0.044	0.0024	0.12	0.047	.0025*i*	0.16	0.020	0.044	0.0048	
707	6392-AC	---	(0.006)	0.042	---	---	---	0.051	0.10	0.11	0.021	---	1.26	0.055
Standard		---	0.046	---	0.044	---	0.10	0.042	---	0.043	0.011	4.26	---	---
771.2	6348-AC	---	0.0012	0.055	0.0032	0.0012	---	0.180	0.082	0.093	0.020	0.0024	0.91	0.087
Standard	Replaces AB	0.0028*i*	0.052	0.0032*i*	0.044	0.0041	0.081	0.047	0.0034	0.17	0.023	6.94	0.0031	---
771.2	6348-CAD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.14)	0.0001	(0.07)	<0.0001	<0.0001	(0.98)	0.0001
High Purity	Replaces AB	<0.0001	<0.0001	0.0001	0.0003	<0.0001	0.081	<0.0001	<0.0001	(0.19)	<0.0001	(6.98)	<0.0001	---

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Revised - 01/14/2010

Alcan Foundry Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	**Ge**
850	6363-AC	---	---	0.037	---	---	---	0.046	0.99	0.35	0.016	---	0.94	0.043
Standard		---	1.82	---	(0.05)	---	0.57	7.33	---	(0.04)	---	0.037	---	---
850	6363-CAB	---	---	(0.002)	---	---	---	<0.001	(1.0)	(0.02)	<0.001	---	(0.9)	<0.001
High Purity		---	(1.7)	---	(0.07)	---	---	(7.0)	---	<0.001	(0.002)	(0.02)	---	---

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No. / Type	Part No. / ALC-xxx	B / Na	Be / Ni	Bi / P	Ca / Pb	Cd / Sb	Co / Si	Cr / Sn	Cu / Sr	Fe / Ti	Ga / V	Li / Zn	Mg / Zr	Mn
1000	HP-FK	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
High Purity	Replaces FJ	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
1050	1050-AH	---	0.0013	0.027	0.0040*i*	(0.003)	---	0.021	0.036	0.30	0.027	0.0021*i*	0.042	0.041
Standard	Replaces FH	0.0015*i*	0.014	0.001	0.027	0.0056	0.14	0.020	0.0012	0.030	0.025	0.038	0.0045	
1050	1050-AI	---	0.0011	0.0082	0.0015*i*	0.0013	---	0.017	0.038	0.30	0.022	0.0018*i*	0.028	0.029
Standard		0.0011*i*	0.021	0.0024	0.0084	0.0022	0.15	0.016	0.0022*i*	0.029	0.020	0.044	0.0034	
1100	1100-AG	---	0.0009	0.019	0.0023*i*	(0.0011)	---	0.017	0.084	0.58	0.021	0.0020*i*	0.015	0.029
Standard		0.0016*i*	0.029	0.0041	0.012	0.0039	0.18	0.015	0.0026*i*	0.030	0.020	0.033	0.0029	
1100	1100-AI	0.0023	0.0010	0.0031	0.0016*i*	0.0011	0.0020	0.021	0.14	0.50	0.018	0.0014*i*	0.0033	0.032
Standard		0.0019*i*	0.0047	0.0031	0.0031	0.0033	0.10	0.0035	0.0016*i*	0.027	0.020	0.029	0.0030	
1100	X1100-AH	---	0.0010	0.016	0.0021*i*	0.0010	----	0.016	0.088	0.42	0.022	0.0014*i*	0.015	0.037
Standard		0.0021*i*	0.031	0.0038	0.013	0.0039	0.43	0.015	0.0024*i*	0.028	0.0215	0.026	0.0032	
1120	X1120-AB	---	0.0010	0.009	0.0020	0.0012	---	0.021	0.47	0.15	0.019	0.0014	0.018	0.16
Standard	**Limited Stock**	0.0012	0.021	0.0030	0.0085	0.0034	0.094	0.017	0.0019	0.021	0.020	0.019	0.0030	
1120	X1120-AC													
Standard	**Coming 2010**													
1145	1145-AD	---	0.0011	0.011	0.0024*i*	(0.0011)	---	0.021	0.038	0.38	0.021	0.0022*i*	0.030	0.032
Standard		0.0024*i*	0.031	0.0027	0.0076	0.0040	0.098	0.018	0.0028*i*	0.028	0.022	0.036	0.0026	
1170	1170-AK	---	0.0009	0.0079	0.0016*i*	0.0012	---	0.030	0.028	0.18	0.019	0.0016*i*	0.022*i*	0.030
Standard		0.0020*i*	0.032	0.0023	0.0083	0.0031	0.086	0.030	0.0018*i*	0.029	0.020	0.029	0.0030	---
1188	1188-AC	---	0.0008*i*	0.0073	0.0019*i*	0.0011	0.0013	0.0073	0.0059*i*	0.058	0.020	0.0019*i*	0.0050*i*	0.0073*i*
Standard	Replaces AB	0.0021*i*	0.0071	0.0027	0.0074	0.0035	0.057*i*	0.0069	0.0024*i*	0.0078*i*	0.0206	0.0071*i*	0.0030	
1200	1200-AI	---	0.0011	0.0073	0.0027	0.0009	---	0.030	0.030	0.64	0.019	0.0026	0.023	0.029
Standard	Replaces AH	0.0017	0.032	0.0032	0.0083	0.0029	0.19	0.020	0.0030	0.032	0.023	0.055	0.0028	
2011	226-AD	---	---	0.044	---	---	---	0.047	4.88	0.19	---	---	0.039	0.045
Standard		---	0.039	---	0.041	---	0.16	0.041	---	0.16	---	0.057	---	
2011	2011-AC	---	0.0004	0.49	0.0009*i*	0.0011	---	0.019	5.62	0.26	0.020	0.0007*i*	0.015	0.023
Standard		0.0005*i*	0.024	0.002	0.53	0.0029	0.12	0.019	0.0009*i*	0.017	0.017	0.047	0.0027	
2011	2011-CAB	---	<0.0001	(0.45)	<0.0001	<0.0001	0.0001	<0.0001	(6.0)	(0.30)	<0.0001	<0.0001	<0.0001	<0.0001
High Purity		<0.0001	0.0003	<0.0001	(0.60)	0.0010	(0.13)	0.0035	<0.0001	<0.0001	<0.0001	0.0005	<0.0001	
2014	2014-AD	---	0.0014	0.025	0.0025*i*	0.0014	---	0.018	4.58	0.46	0.026	0.0018*i*	0.45	0.81
Standard		0.0020*i*	0.028	0.0038*i*	0.023	0.0040	0.88	0.037	0.0024*i*	0.030	0.031	0.029	0.0035	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
2014	2014-CAC	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(4.56)	(0.48)	0.0001	<0.0001	(0.43)	(0.90)
High Purity		<0.0001	0.0001	0.0003	0.0002	0.0002	(0.90)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
2017	17S-BE	---	---	0.021	---	---	---	0.032	4.33	0.40	0.020	---	0.69	0.66
Standard	**5 ONLY**	---	0.041	---	0.03	---	0.54	0.032	---	0.039	0.010	0.046	---	
2017	2017-AC	---	0.0012	0.019	0.0025*i*	0.0013	---	0.017	4.24	0.41	0.020	0.0025*i*	0.75	0.63
Standard		0.0019*i*	0.034	0.0031*i*	0.015	0.0031	0.57	0.015	0.0028*i*	0.018	0.022	0.015	0.0026	
2017	2017-CAB	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	(4.21)	(0.41)	<0.0001	<0.0001	(0.78)	(0.72)
High Purity		<0.0001	<0.0001	0.0001	0.0001	<0.0001	(0.51)	<0.0001	<0.0001	0.0001	<0.0001	0.0001	0.0001	
2018	2018-AB	---	0.0011	0.021	0.0025	0.0012	0.0017	0.028	4.14	0.34	0.020	0.0017*i*	0.62	0.015
Standard		0.0009*i*	2.15	0.0030	0.017	0.0025	0.48	0.015	0.0026	0.027	0.016	0.030	0.0018	
2022	B206-AA	---	0.0008	0.009	0.0037*i*	0.0011	---	0.028	4.68	0.16	0.017	0.0030*i*	0.30*i*	0.43
Standard		0.0033*i*	0.03	0.0030	0.011	0.0038	0.08	0.020	0.0037*i*	---	0.020	0.029	0.0030	
2024	24S-AZ	---	0.0008	(0.030)	0.007	---	---	0.042	4.59	0.27	0.013	0.0006	1.56	0.67
Standard	**1 X-Ray Only**	---	0.043	---	0.042	---	0.22	0.040	---	0.028	0.003	0.050	0.02	
2024	2024-AF	---	0.0010	0.008	0.0031*i*	0.0011*i*	---	0.028	4.55	0.25	0.022	0.0030*i*	1.57	0.66
Standard	Replaces 24S-AV	0.0026*i*	0.031	0.0023	0.0077	0.0030	0.25	0.015	0.0029	0.032	0.022	0.073	0.0024	
2024	2024-CAA	---	<0.0001	<0.001	0.0001	---	---	<0.001	(4.59)	(0.27)	<0.001	<0.0001	(1.57)	(0.75)
High Purity		<0.0001	<0.001	---	<0.001	---	(0.28)	0.0006	---	<0.001	<0.001	<0.001	---	
2117	16S-AN	---	---	0.040	---	---	---	0.032	2.56	0.37	0.010	---	0.32	0.052
Standard		---	0.041	---	0.042	---	0.37	0.041	---	0.044	0.007	0.054	---	
2036	16S-AQ	---	0.0010	0.028	---	---	---	0.028	2.37	0.29	0.018	0.0005	0.49	0.25
Standard		---	0.029	---	0.029	---	0.26	0.032	---	0.03	0.015	0.05	0.03	
2117	16S-AR	---	---	0.03	0.0087*i*	---	---	0.038	2.50	0.38	0.017	---	0.30	0.032
Standard		0.0043i	0.011	---	(0.037)	---	0.35	0.041	---	0.003	0.005	0.043	---	
2219	2219-AA	---	0.0036*i*	0.019	0.0015*i*	---	---	0.019	6.48	0.20	0.021	0.0014*i*	0.020	0.28
Standard		0.0015*i*	0.026	0.004	0.019	---	0.15	0.023	0.0015*i*	0.054	0.062	0.10	0.15	
2219	2219-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	(6.53)	(0.18)	0.0001	<0.0001	0.0001	(0.29)
High Purity		<0.0001	0.0002	0.0001	<0.0001	0.0001	(0.15)	<0.0001	<0.0001	0.0003	0.0001	0.0005	(0.14)	
2618	2618-AC	---	0.0010	0.011	0.0035	0.0018	(0.0022)	0.019	2.55	1.12	0.018	0.0030	1.66	0.18
Standard	Replaces AA	0.0040*i*	1.36	0.0021	0.011	0.0027	0.23	0.021	0.0034	0.058	0.019	0.077	0.0027	
2618	2618-CAB	0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0005	0.0005	(2.44)	(1.13)	0.0007	<0.0001	(1.52)	(0.18)
High Purity		<0.0001	(1.43)	0.0001	<0.0001	<0.0001	(0.22)	<0.0001	<0.0001	0.0010	0.0006	0.0005	0.0003	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
3002	3002-AB	---	0.0011	0.009	0.0027*i*	0.0013	---	0.021	0.12	0.086	0.02	0.0018*i*	0.1500	0.24
Standard	Replaces AA	0.0017*i*	0.021	0.0041	0.008	0.0038	0.075	0.021	0.0030*i*	0.020	0.019	0.048	0.0020	
3003	D3S-BC	---	0.0008	0.030	0.0032*i*	---	---	0.030	0.15	0.56	0.014	0.0003i	0.022	0.40
Standard		0.0034*i*	0.034	0.0002	0.030	---	0.092	0.037	---	0.034	0.003	0.044	0.021	
3003	3003-AI	---	0.0010	0.008	0.0019*i*	0.0012	---	0.021	0.085	0.64	0.020	0.0019*i*	0.014*i*	1.10
Standard		0.0024*i*	0.019	0.0028	0.0082	0.0037	0.25	0.021	0.0017*i*	0.021	0.019	0.020	0.0025	
3003	3003-AJ	---	0.0011	0.0073	0.0017*i*	0.0011	---	0.016	0.130	0.22	0.020	0.0021*i*	0.0065	1.07
Standard		0.0025*i*	0.020	0.0034	0.0086	0.0025	0.45	0.022	0.130	0.040	0.021	0.083	0.0027	
3003	X3003-AA	---	---	0.016	0.0024*i*	---	---	0.012	0.08	0.60	0.011	0.0004*i*	0.016	1.10
Standard		0.0008*i*	0.021	0.0025	0.016	---	0.23	0.018	---	0.014	0.010	0.98	0.007	
3003	X3003-AC	---	0.0016	0.015	0.0008*i*	---	---	0.022	0.085	0.63	0.030	0.0002*i*	0.016	1.12
Standard		0.0005*i*	0.028	0.0025	0.015	---	0.25	0.019	---	0.026	0.029	1.49	0.020	
3003	X3003-CAB	---	<0.0001	<0.001	<0.0001	---	---	<0.001	<0.001	(0.59)	<0.001	<0.0001	<0.001	(1.09)
High Purity		<0.0001	<0.001	0.0006	<0.001	---	(0.23)	<0.001	---	<0.001	<0.001	(0.98)	<0.001	
3004	3004-AO	---	0.0012	0.0069	0.0038	0.0013	---	0.029	0.21	0.48	0.022	0.0019*i*	1.24	1.20
Standard	Replaces AK	0.0028*i*	0.027	0.0020	0.008	(0.0035)	0.23	0.013	0.0031	0.029	0.019	0.13	0.0033	
3004	3004-CAN	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.17)	(0.62)	0.0008	<0.0001	(1.27)	(1.23)
High Purity	Replaces CAM	<0.0001	0.0001	<0.0001	0.0001	<0.0001	(0.22)	0.0001	<0.0001	0.0004	0.0001	0.0008	0.0002	
3005	3005-AC	---	0.0012	0.012	0.0032	---	---	0.021	0.12	0.42	0.022	0.0023*i*	0.49	1.12
Standard		0.0034*i*	0.023	0.0029	0.009	0.0041	0.19	0.017	0.0035*i*	0.020	0.020	0.049	0.0030	
3005	3005-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0001	(0.44)	<0.0001	<0.0001	(0.45)	(1.16)
High Purity		<0.0001	0.0003	0.0002	<0.0001	0.0001	(0.19)	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	
3005	X3005-AB	---	0.0011	0.008	0.0017	0.0020	---	0.016	0.53	0.21	0.020	0.0018*i*	0.12	1.51
Standard		0.0018*i*	0.021	0.0030	0.009	0.0020	0.081	0.018	0.0021	0.020	0.020	0.025	0.0018	
3005	X3005-CAC	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.59)	(0.22)	<0.0001	<0.0001	(0.16)	(1.56)
High Purity		0.0001	0.0003	0.0001	<0.0001	<0.0001	(0.19)	<0.0001	<0.0001	0.0001	0.0001	0.0003	0.0002	
3012	X3012-AA	---	0.0012	0.0078	0.0015*i*	0.0014	---	0.016	0.520	0.20	0.020	0.0012*i*	0.031	1.23
Standard		0.0014*i*	0.020	0.0036	0.0085	0.002	0.49	0.022	0.0019*i*	0.014	0.020	0.084	0.0030	
3102	3102-AA	---	0.0040	0.021	0.0022*i*	---	---	0.022	0.031	0.69	0.032	0.0004	0.033	0.18
Standard		0.0005*i*	0.031	---	0.031	---	0.16	0.022	---	0.038	0.027	0.031	0.021	
3102	3102-AD	---	0.0010	0.0082	0.0016	0.0012	---	0.021	0.086	0.54	0.019	0.0014*i*	0.028	0.37
Standard	Replaces AB	0.0010*i*	0.019	0.0030	0.009	0.0035	0.35	0.021	0.0018*i*	0.0271	0.0191	0.029	0.0040	

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Alcan Wrought Aluminum Alloy CRMs

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
3102	3102-CAF	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.07)	(0.55)	<0.0001	<0.0001	0.0002	(0.31)
High Purity		<0.0001	<0.0001	0.0001	<0.0001	<0.0001	(0.29)	<0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.0001	
3104	3104-AM	---	0.0013	0.0087	0.0031*i*	0.0012	---	0.016	0.24	0.41	0.016	0.0032*i*	1.17	0.93
High Purity		0.0021*i*	0.030	0.0024*i*	0.0088	0.0029	0.23	0.013	0.0035*i*	0.026	0.020	0.12	0.0029	
3104	3104-AN	---	0.0012	0.008	0.0036	0.0012	---	0.016	0.25	0.44	0.016	0.0036*i*	1.20	0.95
High Purity		0.0032*i*	0.032	0.0005	0.0083	0.0023	0.22	0.015	0.0032	0.031	0.019	0.13	0.0036	
3104	3104-CAJ	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.17)	(0.45)	0.0001	<0.0001	(1.20)	(0.98)
High Purity	Replaces CAH	<0.0001	<0.0001	0.0004	0.0001	<0.0001	(0.22)	<0.0001	<0.0001	0.0001	<0.0001	0.0003	0.0001	
3104	3104-CAO	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	(0.23)	(0.43)	<0.0001	<0.0001	(1.20)	(0.95)
High Purity	Replaces CAJ	0.0002	<0.0001	0.0002	<0.0001	<0.0001	(0.22)	0.0001	<0.0001	0.0001	<0.0001	0.0001	0.0001	
3104	3104-CAP	0.0003	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.001	(0.23)	(0.42)	<0.0001	<0.0001	(1.13)	(0.99)
High Purity		0.0001	<0.0001	0.0003	0.0001	<0.0001	(0.23)	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
3105	B3S-AF	---	0.007	0.037	---	---	---	0.027	0.043	0.48	0.015	0.003	0.35	0.88
Standard		---	0.036	0.0001	0.038	---	0.27	0.045	---	0.032	0.012	0.051	---	
3105	3105-AD	---	0.0010	0.015	0.0026*i*	---	---	0.094	0.090	0.49	0.023	0.011*i*	0.50	0.52
Standard	Replaces AC	0.0013*i*	0.029	0.002	0.013	0.0029	0.23	0.014	0.0024*i*	0.038	0.023	0.14	0.0026	
3105	3105-AE	---	0.0012	0.01	0.0024	0.0014	---	0.089	0.26	0.60	0.021	0.0025*i*	0.51	0.56
Standard		0.0034*i*	0.031	0.0034	0.006	0.0038	0.28	0.0058	0.0029	0.053	0.021	0.19	0.0035	
3105	3105-CAF	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	(0.10)	(0.09)	(0.54)	<0.0001	<0.0001	(0.52)	(0.53)
High Purity		<0.0001	0.0004	0.0002	<0.0001	<0.0001	(0.25)	<0.0001	<0.0001	<0.0001	0.0001	(0.14)	0.0002	
3203	3S-CBW	---	0.004	0.043	0.0050*i*	---	---	0.0380	0.08	0.45	0.015	0.0006*i*	0.021	1.53
High Purity		0.0004*i*	0.039	---	0.039	---	0.23	0.048	---	0.032	0.002	0.044	0.03	
3203	3203-AG	---	0.0011	0.028	0.0022*i*	0.0016	---	0.029	0.052	0.54	0.022	0.0017*i*	0.032	1.14
Standard		0.0021*i*	0.033	0.0069	0.021	0.0042	0.33	0.023	0.0023*i*	0.029	0.025	0.039	0.0039	
3203	3203-CAH	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.53)	0.0001	<0.0001	0.0002	(1.17)
High Purity	Replaces CAF	<0.0001	<0.0001	0.0002	<0.0001	0.0001	(0.30)	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	
3204	3204-AA	---	0.0010	0.017	0.0024*i*	---	---	0.027	0.21	0.43	0.018	0.0016*i*	1.34	0.91
Standard		0.0018*i*	0.031	0.001	0.012	---	0.23	0.013	0.0026*i*	0.035	0.022	0.028	0.0029	
4002	4002-AB	---	---	0.040	---	0.67	---	0.045	0.10	0.32	0.016	---	0.12	0.077
Standard		---	0.050	---	0.062	---	4.52	0.059	---	0.050	0.013	0.052	---	
4002	4002-AD	---	---	0.018	---	1.28	---	0.019	0.15	0.39	0.016	---	0.14	0.032
Standard		---	0.0027	---	0.022	---	4.38	0.028	---	0.019	0.007	0.028	---	

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Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
4002	4002-CAC	---	<0.0001	(0.003)	---	(1.10)	---	<0.001	0.003	(0.30)	<0.001	<0.0001	0.003	<0.001
High Purity		0.0003	<0.001	0.0009	<0.001	---	(4.00)	0.0004	---	0.002	<0.001	<0.001	---	
4002	X4002-AA	---	---	1.06*i*	0.0065*i*	0.041	---	0.028	0.13	0.29	0.031	0.0022*i*	0.13	0.037
Standard		0.0016	0.038	0.006	0.034	---	4.10	0.029	0.008	0.019	0.027	0.045	0.014	
4002	X4002-CAB	---	<0.0001	(1.00)	<0.0001	---	---	0.0001	(0.10)	(0.30)	<0.0001	<0.0001	(0.11)	0.0001
High Purity		<0.0001	0.0002	0.0001	<0.0001	---	(3.90)	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	
4007	4007-AA	---	0.0011	0.007	0.0011*i*	0.0012	---	0.091	0.011	0.55	0.019	0.0009*i*	0.008	1.43
Standard		0.0012*i*	0.21	0.0023	0.0041	0.0042	1.62	0.0022	0.0012*i*	0.029	0.015	0.029	0.0022	
4043	4043-AA	---	0.0024	0.035	0.0013*i*	---	---	0.029	0.18	0.46	0.029	0.0002*i*	0.048	0.050
Standard		0.0006*i*	0.048	---	0.032	---	5.45	0.029	0.006	0.13	0.036	0.10	0.021	
4043	4043-AB	---	0.0042*i*	0.02	0.0054*i*	---	---	0.026	0.053	0.33	0.030	0.0031*i*	0.047	0.050
Standard		0.0056*i*	0.052	0.003	0.030	---	5.22	0.031	0.0023*i*	0.045	0.014	0.050	0.006	
4045	X4045-AC	---	0.0009	0.008	0.0024*i*	0.0013	---	0.013	0.015	0.32	0.016	0.0019*i*	0.015	0.013
Standard		0.0041*i*	0.014	0.0058	0.008	0.0038	10.03	0.012	0.0029*i*	0.013	0.012	0.99	0.0031	
4045	X4045-CAB	---	<0.0001	<0.001	(0.003)	---	---	<0.001	(0.002)	(0.33)	<0.001	<0.0001	<0.001	(0.003)
High Purity		<0.0001	(0.001)	0.0008	<0.001	---	(9.75)	<0.001	<0.0001	(0.003)	<0.001	(1.0)	<0.0001	
4104	4104-AC	---	0.0013	0.058*i*	0.0021*i*	0.0027	---	0.032	0.12	0.70	0.021	0.0030*i*	1.56	0.046
Standard		0.0009*i*	0.033	0.001	0.034	0.0013	9.63	0.032	0.0011*i*	0.027	0.022	0.120	0.0029	
4104	4104-AE	---	0.0012	0.11	0.0029	0.0013	---	0.030	0.10	0.59	0.019	0.0024	1.48	0.050
Standard		0.0024	0.030	0.0027	0.028	0.0028	10.06	0.033	0.0030	0.027	0.019	0.10	0.0025	
4104	4104-CAD	0.0002	<0.0001	(0.10)	<0.0001	0.0001	<0.0001	0.0001	(0.10)	(0.60)	<0.0001	<0.0001	(1.60)	0.0010
High Purity		<0.0001	0.0004	0.0002	0.002	0.0011	(10.0)	<0.0001	0.0001	0.0002	<0.0001	0.0005	<0.0001	
4145	4145-AB	---	0.0012	0.032	0.0023	0.0012	---	0.050	4.12	0.54	0.019	0.0016*i*	0.050	0.050
Standard		0.0018*i*	0.054	0.0033*i*	0.031	(0.0038)	10.66	0.030	0.0031	0.046	0.020	0.058	0.0028	
4343	135-AQ	---	---	0.042	---	---	---	0.040	0.053	0.18	0.009	---	0.037	0.035
Standard	**2 ONLY**	---	0.038	---	0.047	---	7.40	0.040	---	0.015	0.012	0.044	---	
4343	4343-AE	---	0.0035*i*	0.020	0.0033*i*	---	---	0.020	0.056	0.48	0.029	0.0029*i*	0.025	0.049
Standard	**9 ONLY**	0.0072*i*	0.032	0.003	0.019	---	7.56	0.023	0.014*i*	0.050	0.009	0.490	0.0150	
4343	4343-AF	---	0.0013	0.037	0.0028*i*	0.0010	---	0.032	0.050	0.50	0.023	0.0022*i*	0.031	0.052
Standard		0.0027*i*	0.029	0.0042*i*	0.021	0.0042	7.84	0.018	0.011*i*	0.031	0.026	0.050	0.0029	
4343	4343-CAB	---	<0.0001	<0.001	<0.0001	---	---	<0.001	<0.001	(0.41)	<0.001	<0.0001	<0.001	<0.001
High Purity	**1 ONLY**	<0.0001	(0.001)	0.0001	<0.001	---	(7.60)	(0.0005)	<0.0001	<0.001	<0.001	<0.001	<0.001	

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Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
4343	4343-CAG	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.50)	<0.0001	<0.0001	0.0005	<0.0001
High Purity		<0.0001	<0.0001	<0.0001	<0.0001	(0.002)	(7.83)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
4343	X4343-AA	---	0.0016	0.019	0.0023*i*	---	---	0.025	0.048	0.53	0.025	0.0004*i*	0.051	0.046
Standard		0.0006*i*	0.029	0.0019	0.016	---	7.57	0.017	---	0.031	0.028	0.98	0.026	
4643	4643-AD	---	0.0040	0.02	0.0054*i*	---	---	0.027	0.036	0.16	0.029	0.0027*i*	0.10	0.042
Standard		0.0047*i*	0.035	0.004	0.020	---	3.81	0.023	0.0021*i*	0.053	0.012	0.030	0.0006	
4643	4643-CAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0001	(0.18)	<0.0001	<0.0001	0.0001	<0.0001
High Purity		<0.0001	0.0001	<0.0001	<0.0001	0.0010	(3.78)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
5000	5000-AC	---	---	0.045	---	---	---	0.042	10.32	0.33	0.019	---	0.042	0.034
Standard	**6 ONLY**	---	0.045	---	0.042	---	0.20	0.042	---	0.039	0.012	0.044	---	
5001	5001-BI	---	0.0012	0.052	0.0018	0.0013	---	0.049	19.5	0.30	0.020	0.0020*i*	0.053	0.050
Standard		0.0011*i*	0.052	0.0039*i*	0.048	0.0040	0.36	0.047	0.0027*i*	0.049	0.025	0.045	0.0030	
5001	5001-CBG	---	---	<0.001	---	---	---	(0.001)	(20.0)	(0.02)	(0.002)	---	(0.002)	(0.001)
High Purity		---	(0.003)	---	(0.002)	---	---	(0.002)	---	(0.001)	(0.002)	<0.001	---	
5005	5005-AE	---	0.0013	0.028	0.0032*i*	0.0030	---	0.027	0.066	0.49	0.024	0.0022*i*	0.91	0.039
Standard		0.0030*i*	0.017	0.0045*i*	0.014	0.0041	0.16	0.017	0.0038*i*	0.018	0.024	0.026	0.0032	
5005	5005-CAB	---	<0.0001	<0.001	<0.0001	---	---	<0.001	0.07	(0.57)	<0.001	<0.0001	(0.87)	<0.001
High Purity	**4 ONLY**	<0.0001	<0.001	0.0001	<0.001	---	(0.16)	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	
5005	5005-CAD	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.07)	(0.58)	<0.0001	<0.0001	(0.86)	<0.0001
High Purity		<0.0001	<0.0001	0.0002	0.0001	<0.0001	(0.16)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
5010	5010-AE	---	0.0014	0.023	0.0031*i*	0.0016	---	0.025	0.032	0.44	0.026	0.0034*i*	0.57	0.26
Standard		0.0031*i*	0.022	0.0058*i*	0.016	---	0.18	0.018	0.0020*i*	0.025	0.024	0.027	0.0034	
5010	5010-CAF	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.44)	<0.0001	<0.0001	(0.46)	(0.21)
High Purity		<0.0001	<0.0001	0.0001	<0.0001	<0.0001	(0.15)	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
5016	5016-AA	---	0.0038	0.019*i*	0.0031*i*	0.0012	---	0.017	0.036	0.76	0.023	0.0028*i*	2.48	0.50
Standard		0.0026*i*	0.015	0.0014*i*	0.014	0.0025	0.25	0.014	0.0029*i*	0.015	0.023	0.080	0.0033	
5016	B53S-AH	---	---	0.010	0.0084	---	---	0.027	0.022	0.54	0.014	0.0006	1.84	0.70
Standard		0.006	0.032	0.0002	0.028	---	0.15	0.029	---	0.026	0.017	0.030	---	
5017	5017-AA	---	0.0030	0.02	0.0050	---	---	0.016	0.28	0.40	0.026	0.0040	1.95	0.70
Standard		0.0044	0.030	---	0.026	---	0.37	0.027	0.0022	0.036	0.009	0.026	0.014	
5017	5017-AB	---	0.0035	0.013	0.0054	---	---	0.018	0.40	0.27	0.020	0.0046*i*	2.01	0.28
Standard		0.0042	0.030	0.001	0.020	---	0.28	0.021	---	0.056	0.015	0.026	0.014	

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Alcan Wrought Aluminum Alloy CRMs — Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No. Type	Part No. ALC-xxx	B Na	Be Ni	Bi P	Ca Pb	Cd Sb	Co Si	Cr Sn	Cu Sr	Fe Ti	Ga V	Li Zn	Mg Zr	Mn
5017	5017-CAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0002	(0.38)	(0.29)	<0.0001	<0.0001	(2.00)	(0.35)
High Purity		<0.0001	0.0003	0.0001	0.0003	<0.0001	(0.25)	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	
5017	5017-CAD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0003	0.0003	(0.19)	(0.38)	<0.0001	<0.0001	(2.0)	(0.80)
High Purity		<0.0001	0.0005	0.0003	<0.0001	0.0001	(0.36)	<0.0001	<0.0001	0.0004	0.0002	<0.0003	0.0002	
5042	5042-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0001	(0.25)	<0.0001	<0.0001	(3.68)	(0.33)
High Purity		<0.0001	0.0001	0.0001	<0.0001	<0.0001	0.0018	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	
5050	K57S-AE	-0.003	0.0012	0.041	0.0073	---	---	0.041	0.06	0.50	0.013	0.0007	1.37	0.04
Standard		0.00050	0.043	0.0001	0.039	---	0.12	0.048	---	0.026	0.013	0.05	0.0200	
5050	K57S-CAF	0.0004	<0.0001	<0.0001	0.0001	---	---	<0.001	(0.003)	(0.50)	<0.0001	<0.0001	(1.35)	0.0002
High Purity		<0.0001	<0.001	0.0008	<0.0001	---	(0.12)	<0.001	<0.0001	<0.001	<0.001	0.0003	<0.0001	
5052	5052-AM	---	0.0013	0.008	0.0037*i*	0.0012	---	0.27	0.075	0.24	0.018	0.0040*i*	2.59	0.072
Standard		0.0027*i*	0.032	0.0013*i*	0.0076	0.0029	0.19	0.020	0.0033*i*	0.059	0.023	0.031	0.0026	
5052	C57S-AB	---	0.001	0.01	---	---	---	0.032	0.055	0.100	0.020	---	2.44	0.0350
Standard	**1 ONLY**	0.00320	0.03	---	0.028	---	0.076	0.032	---	0.033	0.011	0.03	---	
5052	P57S-AA	---	---	0.040	0.0029	---	---	0.049	0.10	0.56	0.01	0.0018	1.81	0.90
Standard	**1 ONLY**	0.0013	0.041	---	0.037	---	0.20	0.040	---	0.05	0.02	0.100	---	
5052	5052-CAH	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.21)	0.0003	(0.28)	<0.0001	<0.0001	(2.50)	0.0012
High Purity	**1 ONLY**	<0.0001	0.0003	0.0001	<0.0001	<0.0001	0.007	<0.0001	<0.0001	<0.0001	0.0001	0.0002	<0.0001	
5052	5052-CAL	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.21)	0.0001	(0.32)	<0.0001	<0.0001	(3.0)	0.0001
High Purity		<0.0001	0.0003	0.0001	<0.0001	<0.0001	(0.08)	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	
5056	5056-AD	---	0.0011	0.010	0.0023*i*	0.0015	---	0.086	0.053	0.27	0.021	0.0031	4.97	0.13
Standard		0.0034	0.032	0.0014*i*	0.008	0.0032	0.12	0.012	0.0025*i*	0.028	0.020	0.040	0.0023	
5056	5056-CAA	<0.0001	<0.0001	<0.0001	<0.0001	---	---	<0.001	0.0003	(0.001)	<0.001	<0.0001	(4.8)	<0.001
High Purity		0.0010	<0.001	0.0004	<0.001	---	(0.002)	<0.001	---	<0.001	---	<0.001	<0.0001	
5056	5056-CAC	<0.0001	<0.0001	<0.001	<0.0001	---	---	(0.10)	0.0003	(0.29)	<0.001	<0.0001	(5.06)	(0.14)
High Purity		<0.0001	0.0005	0.0001	<0.001	---	(0.13)	<0.001	<0.0001	0.0006	<0.001	<0.001	0.0001	
5082	5082-AA	---	0.0015	0.006	0.0010	---	---	0.030	0.030	0.20	0.026	0.0005	4.62	0.022
Standard		0.0010	0.032	---	0.008	---	0.079	0.007	---	0.047	0.020	0.051	0.019	
5082	5082-CAB	<0.0001	<0.0001	<0.001	<0.0001	---	---	<0.001	<0.001	(0.20)	<0.001	<0.0001	(4.57)	<0.001
High Purity		0.0002	<0.001	0.0002	<0.001	---	(0.08)	0.0004	<0.0001	<0.001	<0.001	<0.001	<0.001	
5083	5083-AF	---	0.0012	0.008	0.0031	0.0012	---	0.15	0.078	0.34	0.022	0.0039*i*	4.85	0.74
Standard		0.0039*i*	0.030	0.0014	0.0077	0.0012	0.17	0.020	0.0033	0.027	0.021	0.050	0.0035	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No. Type	Part No. ALC-xxx	B Na	Be Ni	Bi P	Ca Pb	Cd Sb	Co Si	Cr Sn	Cu Sr	Fe Ti	Ga V	Li Zn	Mg Zr	Mn
5083	D54S-CAB	<0.001	<0.0001	<0.0001	<0.0002	---	---	<0.001	0.003	(0.44)	<0.001	<0.0001	(4.5)	(0.83)
High Purity		<0.0001	<0.001	<0.0002	<0.001	---	0.005	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0002	
5083	5083-CAE	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.13)	0.0001	(0.30)	0.0001	<0.0001	(5.0)	(0.68)
High Purity	Replaces CAD	<0.0001	<0.0001	0.0001	0.0001	<0.0001	(0.15)	<0.0001	<0.0001	0.0002	0.0001	0.0001	<0.0001	
5100	5100-BS	---	---	0.040	(0.0033)	---	---	0.031	0.06	3.9	0.032	(0.0006)	0.026	0.041
Standard		(0.0006)	0.046	(0.002)	0.035	---	0.20	0.043	---	0.038	0.013	0.040	0.02	
5100	5100-CBR	0.0002	---	<0.001	---	---	---	<0.001	(0.003)	(3.7)	<0.001	---	<0.001	(0.002)
High Purity		---	<0.001	---	<0.001	---	0.024	---	---	<0.001	<0.001	<0.001	---	
5154	5154-AA	---	0.0012	0.013*i*	0.0037	---	---	0.22	0.053	0.23	0.020	0.0020*i*	3.46	0.033
Standard		0.0060*i*	0.037	0.001	0.014	0.0025	0.12	0.015	0.0026	0.029	0.021	0.030	0.0030	
5154	A5154-AA	---	0.0011	0.021*i*	0.0027	0.0015	---	0.031	0.040	0.19	0.017	0.0023	3.40*i*	0.18
Standard		0.0012*i*	0.031	0.001	0.026	0.0035	0.19	0.014	0.0025*i*	0.031	0.024	0.032	0.0031	
5154	5154-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.22)	0.0004	(0.21)	<0.0001	<0.0001	(3.56)	0.0003
High Purity		<0.0001	0.0002	0.0001	<0.0001	<0.0001	(0.12)	<0.0001	<0.0001	<0.0001	0.0001	0.0002	<0.0001	
5154	A5154-CAB	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0017	(0.19)	<0.0001	0.0001	(3.53)	(0.20)
High Purity		<0.0001	0.0003	0.0003	0.0001	<0.0001	(0.21)	0.0001	0.0002	0.0001	<0.0001	0.0003	<0.0001	
5182	5182-AX	---	0.0013	0.0089	0.0031	0.0013	---	0.031	0.039	0.26	0.023	0.0019	5.01	0.35
Standard		0.0048	0.016	(0.0014)	0.0077	0.0028	0.12	0.014	0.0033	0.049	0.020	0.046	0.0030	
5182	B54S-CBE	---	<0.0001	<0.001	0.0010	---	---	<0.001	(0.004)	0.008	<0.001	<0.0001	(4.50)	(0.30)
High Purity		0.0010	<0.001	0.0010	<0.001	---	0.012	<0.001	---	0.0002	(0.001)	<0.001	---	
5251	5251-AD	---	0.0013	0.015*i*	0.0031*i*	0.0015	---	0.031	0.089	0.33	0.021	0.0026*i*	2.30	0.33
Standard		0.0026*i*	0.020	0.001	0.015	0.0016	0.21	0.016	0.0022*i*	0.030	0.021	0.047	0.0031	
5251	5251-CAC	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0003	(0.46)	<0.0001	<0.0001	(2.21)	(0.45)
High Purity		<0.0001	0.0003	0.0002	<0.0001	0.0001	(0.35)	<0.0001	<0.0001	0.0001	0.0001	0.0002	<0.0001	
5454	5454-AC	---	0.0011	0.0048	0.0022*i*	0.0014	0.0015	0.030	0.10	0.40	0.022	0.0030*i*	3.16	0.75
Standard		0.0038*i*	0.033	0.0013	0.0035	0.0032	0.25	0.0029	0.0020	0.064	0.020	0.030	0.0029	
5454	B53S-AD	---	0.001	0.019	---	---	---	0.023	0.15	0.58	0.015	---	2.50	0.76
Standard		---	0.031	---	0.023	---	0.16	0.026	---	0.042	0.018	0.033	---	
5454	B53S-AG	---	---	(0.016)	0.0083	---	---	0.023	0.077	0.54	0.014	0.0005	1.72	0.67
Standard		0.005	0.031	0.0002	0.027	---	0.16	0.029	---	0.026	0.017	0.030	---	
5454	B53S-AH	---	---	0.010	0.0084	---	---	0.027	0.022	0.54	0.014	0.0006	1.84	0.70
Standard		0.006	0.032	0.0002	0.028	---	0.16	0.029	---	0.026	0.017	0.030	---	

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Alcan Wrought Aluminum Alloy CRMs

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AA No. / Type	Part No. / ALC-xxx	B / Na	Be / Ni	Bi / P	Ca / Pb	Cd / Sb	Co / Si	Cr / Sn	Cu / Sr	Fe / Ti	Ga / V	Li / Zn	Mg / Zr	Mn
5454	5454-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.10)	0.0004	(0.15)	<0.0001	<0.0001	(2.66)	(0.79)
High Purity		<0.0001	0.0001	0.00	<0.0001	<0.0001	(0.13)	<0.0001	<0.0001	0.0002	<0.0001	0.0004	<0.0001	
5457	5457-AA	---	0.0030	0.019	0.0016	---	---	0.014	0.13	0.082	0.021	0.0028*i*	0.93	0.25
Standard		0.0044*i*	0.021	0.003	0.019	---	0.078	0.022	0.007	0.029	0.011	0.020	0.012	
5556	A56S-CAF	---	<0.0001	<0.001	0.0004	---	---	<0.001	0.003	(0.25)	<0.001	<0.0001	(5.0)	(0.6)
High Purity		0.0006	<0.001	0.001	0.0002	---	(0.15)	<0.001	---	<0.001	<0.001	<0.001	---	
5657	5657-AA	---	0.0042	0.018	0.0066*i*	---	---	0.020	0.050	0.077	0.030	0.0022*i*	0.740	0.030
Standard		0.0027*i*	0.020	0.004	0.019	---	0.052	0.022	---	0.022	0.027	0.029	---	
5700	5700-CAB	---	---	(2.9)	---	---	---	---	(0.003)	---	---	---	<0.004	(0.002)
High Purity		---	(0.003)	---	---	---	---	---	---	(0.003)	---	(0.003)	---	
5754	5754-AD	---	0.0013	0.0048	0.0011	0.0016	---	0.11	0.048	0.24	0.022	0.0018	3.15	0.26
Standard		0.0022	0.030	0.003	0.0032	0.0037	0.15	0.0029	0.0012	0.048	0.021	0.11	0.0031	
5754	X5754-AE	---	0.0011	0.0045	0.0024*i*	0.0009	---	0.051	0.057	0.35	0.029	0.0036*i*	3.18	0.45
Standard		0.0045*i*	0.031	0.0018	0.0038	0.0018	0.38	0.026	0.0017*i*	0.053	0.021	0.056	0.0024	
5754	5754-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0002	0.0002	(0.31)	<0.0001	<0.0001	(2.73)	(0.29)
High Purity		<0.0001	0.0003	0.0001	<0.0001	0.0001	(0.16)	<0.0001	0.0001	0.0001	0.0001	<0.0001	<0.0001	
5754	5754-CAF	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001	0.0001	(0.34)	<0.0001	<0.0001	(2.72)	(0.32)
High Purity		0.0002	<0.0001	0.0004	<0.0001	<0.0001	(0.18)	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
6005	6005-AB	---	0.0012	0.012	0.0035	0.0014	---	0.019	0.055	0.27	0.021	0.0028*i*	0.51	0.053
Standard		0.0018*i*	0.022	0.0029	0.0085	0.0040	0.82	0.017	0.0036*i*	0.03	0.023	0.020	0.0028	
6005	A6005-AB	---	0.0045	0.015	0.0044*i*	---	---	0.018	0.12	0.22	0.02	0.0019*i*	0.50	0.23
Standard		0.0040*i*	0.028	0.0029	0.015	0.0051	0.71	0.016	0.0036*i*	0.021	0.022	0.015	0.021	
6005	A6005-AE	---	0.0013	0.010	0.0031	0.0012	---	0.019	0.012	0.22	0.022	0.0019*i*	0.61	0.24
Standard		0.0015*i*	0.031	0.0032	0.0084	0.0036	0.84	0.017	0.0030	0.031	0.020	0.030	0.0032	
6005	A6005-CAD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	(0.11)	(0.21)	<0.0001	<0.0001	(0.50)	(0.25)
High Purity		<0.0001	0.0002	0.0001	<0.0001	0.0002	(0.68)	<0.0001	<0.0001	0.0001	0.0001	<0.0001	<0.0001	
6005	A6005-CAF	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.12)	(0.22)	<0.0001	<0.0001	(0.52)	(0.23)
High Purity		0.00010	---	0.0002	<0.0001	<0.0001	(0.79)	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	
6006	6006-AB	---	0.0013	0.015	0.0029	0.0013	---	0.016	0.24	0.29	0.020	0.0024*i*	0.57	0.17
Standard	Replaces AA	0.0025*i*	0.032	0.0034	0.016	0.0031	0.45	0.015	0.0031	0.043	0.020	0.044	0.0030	
6006	6006-AC	---	0.0012	0.0049	0.0034	0.0012	---	0.090	0.20	0.24	0.021	0.0029*i*	0.70	0.20
Standard		0.0023*i*	0.031	0.0034	0.0039	0.0034	0.71	0.0035	0.0034	0.031	0.021	0.029	0.0033	

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Alcan Wrought Aluminum Alloy CRMs

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No. / Type	Part No. / ALC-xxx	B / Na	Be / Ni	Bi / P	Ca / Pb	Cd / Sb	Co / Si	Cr / Sn	Cu / Sr	Fe / Ti	Ga / V	Li / Zn	Mg / Zr	Mn
6006	6006-CAD	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.08)	(0.14)	(0.18)	<0.0001	<0.0001	(0.69)	(0.15)
Standard		<0.0001	<0.0001	0.0001	0.0001	<0.0001	(0.69)	0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	
6008	6008-AA	---	0.0012	0.0080	0.0035	0.0014	---	0.015	0.30	0.21	0.021	.0024*i*	0.60	0.067
Standard		0.0029*i*	0.030	0.004	0.0080	0.0032	0.67	0.013	0.0031	0.030	0.10	0.019	0.0030	
6012	6012-AF	---	---	0.038	---	---	---	0.047	6.05	0.21	0.016	---	0.020	0.28
Standard		---	0.045	---	0.037	---	0.13	0.040	---	0.14	0.010	0.049	---	
6024	6024-AB	---	---	0.036	---	---	---	0.037	0.056	0.47	0.015	---	0.40	0.57
Standard	**Limited Qty**	---	0.042	---	0.034	---	9.77	0.021	---	0.10	0.012	0.046	---	
6052	6052-AD	---	---	0.024	---	---	---	0.036	0.73	0.78	0.015	---	0.45	0.039
Standard		---	0.034	---	0.029	---	0.20	0.036	---	0.13	0.010	7.77	---	
6052	6052-CAE	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.56)	(0.60)	<0.0001	<0.0001	(0.52)	<0.0001
High Purity		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.19)	<0.0001	<0.0001	<0.0001	<0.0001	(8.0)	<0.0004	
6061	6061-xx													
Standard	**Coming Late Spring 2010**													
6063	6063-BA	0.0014	0.0011	0.006	0.0021*i*	0.0014	---	0.015	0.11	0.24	0.020	0.0023*i*	0.55	0.079
Standard		0.0019i	0.029	0.0032	0.0084	0.0026	0.47	0.014	0.0027i	0.029	0.020	0.029	0.0032	
6063	6063-CAH	---	<0.0001	<0.001	<0.0001	---	---	<0.001	<0.001	(0.21)	<0.001	<0.0001	(0.52)	<0.001
High Purity	**1 ONLY**	<0.0001	<0.001	<0.0001	<0.001	---	(0.43)	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	
6063	6063-CBB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.20)	<0.0001	<0.0001	(0.55)	0.0008
High Purity	Replaces CAW	0.0001	<0.0001	0.0004	<0.0001	<0.0001	(0.47)	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	
6066	6066-AF	---	0.0013	0.007	0.0028	0.0011	---	0.018	0.96	0.60	0.021	0.0034	0.97	0.71
Standard		0.0042	0.032	0.0032	0.0075	0.0026	0.97	0.014	0.0029	0.032	0.021	0.28	0.0032	
6070	6070-AC	---	0.0012	0.0063	0.0029	0.0010	---	0.019	0.33	0.26	0.020	0.0029*i*	0.75	0.74
Standard		0.0033*i*	0.019	0.0036	0.008	0.0027	1.25	0.0069	0.0036	0.021	0.016	0.021	0.0030	
6070	6070-CAB	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.32)	(0.28)	<0.0001	<0.0001	(0.77)	(0.72)
High Purity		<0.0001	<0.0001	0.0002	0.0002	0.0004	1.35	<0.0001	<0.0001	<0.0001	<0.0001	0.0010	<0.0001	
6111	6111-AA	---	0.0036	0.015	0.0049*i*	---	---	0.014	0.96	0.18	0.028	0.0034*i*	0.46	0.17
Standard		0.0034*i*	0.020	0.007	0.016	0.004	0.73	0.016	0.0030*i*	0.032	0.028	0.015	0.017	
6111	6111-AB	---	0.0034	0.014	0.0054*i*	---	---	0.014	0.76	0.27	0.030	0.0032*i*	0.65	0.32
Standard		0.0055*i*	0.020	0.004	0.018	---	0.83	0.017	0.0028*i*	0.035	0.025	0.015	0.013	
6111	6111-AC	---	0.0049	0.016*i*	0.0042	---	---	0.056	0.76	0.15	0.021	0.0031*i*	0.75	0.15
Standard		0.0038*i*	0.024	0.003	0.020	---	0.66	0.022	0.0031	0.074	0.024	0.029	0.014	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs — **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
6111	6111-AE	---	0.0013	0.025	0.0023*i*	0.0014	---	0.072	0.75	0.24	0.019	0.0025*i*	0.77	0.20
Standard		0.0019*i*	0.028	0.003	0.016	0.0031	0.60	0.018	0.0026*i*	0.065	0.023	0.027	0.0031	
6151	6151-AB	---	---	---	---	---	---	---	---	---	---	---	---	---
Standard	**Due 2010**	---	---	---	---	---	---	---	---	---	---	---	---	
6166	6166-CAB	---	---	---	(0.004)	---	---	(0.40)	(1.35)	0.11	---	---	(1.00)	---
High Purity	**1 ONLY**	---	(1.0)	---	---	---	(24.50)	---	---	0.013	---	---	---	
6201	6201-AD	---	0.0013	0.030	0.0033*i*	0.0015	---	0.019	0.021	0.25	0.024	0.0028*i*	0.72	0.018
Standard		0.0026*i*	0.022	0.0046*i*	0.019	0.0043	0.68	0.021	0.0031*i*	0.020	0.022	0.021	0.0032	
6205	6205-AA	---	---	0.036	(0.02)	---	---	0.05	20.4	1.25	---	---	---	1.05
Standard		---	0.051	---	0.04	---	2.45	0.052	---	---	---	5.55	---	
6235	6235-AB	---	---	0.048	---	---	---	0.040	0.046	0.15	---	---	0.031	0.040
Standard		---	0.040	---	0.046	---	0.10	0.038	---	0.041	---	5.45	---	
6253	Z55S-AC	---	---	0.04	---	---	---	0.23	0.06	0.23	0.018	---	1.34	0.04
Standard		---	0.038	---	0.035	---	0.70	0.028	---	0.03	0.010	2.09	---	
6253	Z55S-CAD	---	---	<0.001	---	---	---	(0.001)	(0.002)	---	(0.002)	---	(1.2)	<0.001
High Purity		---	(0.001)	---	---	---	(0.74)	(0.002)	---	(0.001)	(0.003)	(2.0)	---	
6261	6261-AC	---	0.0014	0.023*i*	0.0035*i*	0.0013	---	0.021	0.33	0.23	0.020	0.0025*i*	0.82	0.25
Standard		0.0033*i*	0.022	0.003	0.013	0.0037	0.66	0.016	0.0031*i*	0.025	0.019	0.033	0.0027	
6261	6261-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0001	(0.31)	(0.26)	<0.0001	<0.0001	(0.76)	(0.29)
High Purity		<0.0001	0.0001	0.0001	<0.0001	0.0002	(0.64)	<0.0001	<0.0001	0.0005	0.0001	<0.0001	<0.0001	
6351	6351-AK	---	0.0012	0.007	0.0026	0.0012	---	0.033	0.061	0.23	0.020	0.0028*i*	0.65	0.56
Standard		0.0036*i*	0.03100	0.00300	0.00750	0.00270	1.08000	0.020	0.00320	0.05100	0.01900	0.04900	0.0025	
6351	6351-CAL	0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.32)	<0.0001	<0.0001	(0.59)	(0.63)
High Purity		0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(1.13)	<0.0001	0.0001	<0.0001	<0.0001	0.0001	<0.0001	
6449	6449-CAB	---	---	(0.45)	---	---	---	<0.001	(0.34)	(0.001)	(0.001)	---	(0.89)	<0.001
High Purity	**1 ONLY**	---	(0.002)	---	(0.48)	---	(0.67)	(0.003)	---	<0.001	<0.001	<0.001	---	
6463	6463-AC	---	0.0011	0.012	0.0033*i*	0.0012	---	0.020	0.14	0.12	0.018	0.0024*i*	0.49	0.019
Standard		0.0026*i*	0.020	0.0048	0.007	0.0038	0.35	0.019	0.0047*i*	0.017	0.020	0.020	0.0031	
7003	7003-AA	---	0.0041	(0.025)	0.0080	---	---	0.020	0.037	0.33	0.016	0.0005	0.70	0.15
Standard		0.0005	0.036	---	0.029	---	0.14	0.033	---	0.025	0.012	5.67	(0.15)	
7003	7003-AC	---	0.0012	0.007	0.0026	0.0016	---	0.18	0.15	0.28	0.020	0.0032	0.90	0.12
Standard		0.0030*i*	0.030	0.0031	0.008	0.0035	0.14	0.017	0.0029	0.032	0.019	6.23	0.17	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
7003	7003-CAB	---	<0.001	<0.001	0.0001	---	---	<0.001	(0.004)	(0.002)	<0.001	<0.0001	(0.70)	<0.001
High Purity		0.0001	<0.001	---	<0.001	---	(0.001)	<0.001	---	<0.001	<0.001	(5.60)	---	
7004	7004-AA	---	0.0013	0.022*i*	0.0040	0.0014	---	0.034	0.052	0.27	0.030	0.0015	1.76	0.52
Standard		0.0049*i*	0.043	0.001	0.029	0.0028	0.17	0.032	0.0027	0.051	0.032	5.15	0.14	
7004	74S-AC	---	(0.006)	0.038	---	---	---	0.034	0.054	0.30	---	---	1.92	0.69
Standard	**2 ONLY**	---	0.041	---	0.045	---	0.014	0.046	---	0.041	---	4.42	---	
7004	74S-AF	---	---	0.02	---	---	---	0.03	0.08	0.17	0.02	---	3.41	0.08
Standard		---	0.03	---	0.03	---	0.17	0.02	---	0.07	0.01	2.87	---	
7004	74S-CAB	<0.0001	<0.0001	<0.0001	0.0001	---	---	0.0001	0.002	0.004	0.0002	<0.0001	(1.90)	0.0001
High Purity		0.0001	0.0001	0.0001	0.0002	---	0.003	<0.0001	<0.0001	0.0001	0.0001	(3.90)	<0.0001	
7004	74S-CAH	---	<0.0001	<0.001	<0.001	---	---	<0.001	0.001	(0.003)	<0.001	<0.0001	(3.4)	0.001
High Purity		<0.0001	<0.001	0.0003	<0.001	---	(0.004)	<0.001	---	<0.001	<0.001	(2.9)	---	
7010	7010-AC	---	0.0013	0.020*i*	0.0024*i*	0.0013	---	0.057	1.84	0.12	0.035	0.0029*i*	2.37	0.084
Standard		0.0027*i*	0.049	0.0014*i*	0.027	0.0026	0.11	0.020	0.0024*i*	0.062	0.024	6.22	0.14	
7010	7010-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(1.89)	(0.140)	<0.0001	<0.0001	(2.51)	(0.081)
High Purity	**4 ONLY**	<0.0001	0.0001	0.0001	0.0001	<0.0001	(0.11)	<0.0001	<0.0001	0.0001	0.0001	(6.45)	(0.15)	
7010	7010-CAD	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(1.90)	(0.14)	<0.0001	<0.0001	(2.5)	(0.09)
High Purity		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.11)	0.0003	<0.0001	0.0001	<0.0001	(6.45)	(0.14)	
7018	7018-AC	---	0.0010	0.0059	.0033*i*	0.0012	---	0.12	0.15	0.33	0.019	0.0027*i*	1.09	0.30
Standard		0.0028*i*	0.074	0.0021	0.0079	0.0028	0.20	0.015	0.0036*i*	0.080	0.018	4.87	0.16	
7018	7018-CAB	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	(0.14)	(0.15)	(0.39)	0.0001	<0.0001	(1.03)	(0.29)
High Purity		<0.0001	0.0003	0.0001	0.0001	0.0001	(0.20)	<0.0001	<0.0001	0.0002	0.0001	(4.81)	(0.14)	
7019	7019-AA	---	<0.0001	0.029	0.0015	---	---	0.033	0.19	0.22	0.021	0.0009	2.01	0.25
Standard		0.0005	0.021	0.0001	0.032	---	0.15	0.034	0.0003	0.034	0.028	3.95	0.16	
7019	7019-CAB	0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	0.0029	(0.17)	(0.20)	0.0054	<0.0001	(2.04)	(0.24)
High Purity		<0.0001	0.0072	0.0001	0.0010	<0.0001	(0.14)	0.0030	<0.0001	0.0021	0.0010	(4.00)	(0.13)	
7021	7021-AA	---	---	0.027	0.033	---	---	0.033	0.029	0.38	(0.15)	---	1.48	0.037
Standard		---	0.035	---	---	---	0.22	0.031	---	0.041	0.012	5.42	0.16	
7021	7021-AC	---	---	0.031	0.0022	---	---	0.025	0.05	0.28	0.027	0.0007	1.60	0.059
Standard	**1 ONLY**	0.0005	0.034	---	0.033	---	0.10	0.032	---	0.030	0.012	5.52	0.15	
7021	7021-CAB	---	---	(0.002)	<0.0001	---	---	<0.001	(0.003)	0.006	---	<0.0001	(1.60)	<0.001
High Purity		0.0001	<0.001	---	<0.001	---	0.005	<0.001	---	<0.001	---	(5.5)	---	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No. Type	Part No. ALC-xxx	B Na	Be Ni	Bi P	Ca Pb	Cd Sb	Co Si	Cr Sn	Cu Sr	Fe Ti	Ga V	Li Zn	Mg Zr	Mn
7022	7022-AA	---	0.0013	0.015	0.0034	---	---	0.25	0.89	0.47	0.021	0.0016	3.44	0.30
Standard		0.0055*i*	0.039	0.001	0.017	0.0032	0.39	0.016	0.0027	0.023	0.023	4.92	0.0028	
7022	7022-CAB	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(0.24)	(0.89)	(0.45)	<0.0001	<0.0001	(3.47)	(0.29)
High Purity		<0.0001	0.0002	0.0006	0.0002	<0.0001	(0.39)	<0.0001	0.0003	0.0001	0.0001	(4.84)	<0.0001	
7031	7031-AA	---	0.0035*i*	0.008*i*	0.0028*i*	---	---	0.024	0.029	1.15	0.015	0.0032*i*	0.013	0.21
Standard		0.0033*i*	0.019	0.005	0.017	---	0.13	0.015	---	0.025	0.015	1.12	0.007	
7031	7031-CAB	<0.0001	<0.0001	<0.0001	<0.0001	---	---	0.0005	0.0005	(1.23)	<0.0001	<0.0001	0.0002	(0.21)
High Purity		<0.0001	0.001	0.0003	<0.0001	<0.0001	(13.0)	<0.0001	<0.0001	0.0002	0.0004	(1.04)	<0.0001	
7049	75S-CL	---	0.0009	0.023	0.0068	---	---	0.18	1.55	0.37	0.012	0.0007	1.92	0.058
Standard		---	0.040	---	0.04	---	0.15	0.041	---	0.061	0.004	7.65	---	
7050	7050-AC	---	0.0013	0.021	0.0028*i*	0.0011	---	0.026	2.36	0.13	0.023	0.0032*i*	2.58	0.082
Standard		0.0019*i*	0.019	0.0015*i*	0.021	0.0019	0.11	0.018	0.0036*i*	0.051	0.021	6.30	0.13	
7050	7050-CAD	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	(2.00)	(0.15)	<0.0001	<0.0001	(2.0)	(0.08)
High Purity		<0.0001	<0.0001	0.0001	0.0002	0.0002	(0.11)	0.002	<0.0001	0.0001	<0.0001	(7.0)	(0.14)	
7072	7072-AA	---	0.0029*i*	0.015*i*	0.0009*i*	---	---	0.023	0.041	0.26	0.019	0.0013*i*	0.04	0.040
Standard		0.0017*i*	0.034	0.005*i*	0.031	---	0.13	0.031	0.0019*i*	0.040	0.013	1.08	0.012	
7072	72S-AV	---	0.0007	0.040	0.0049	---	---	0.035	0.047	0.20	0.015	<0.0001	0.039	0.040
Standard		0.0022	0.040	(0.0001)	0.029	---	0.10	0.043	---	0.034	0.005	0.98	---	
7072	72S-CAU	<0.0001	<0.0001	0.0001	0.0001	---	---	<0.001	0.003	(0.14)	0.010	<0.0001	<0.001	(0.002)
High Purity		<0.0001	0.003	0.0003	0.001	---	(0.05)	0.0006	---	(0.006)	0.015	(1.3)	---	
7075	7075-AF	---	0.0011	0.007	0.0034*i*	0.0009*i*	---	0.22	1.75	0.17	0.019	0.0028*i*	2.66	0.031
Standard		0.0029*i*	0.027	0.001	0.0073	0.0026	0.19	0.014	0.0032*i*	0.092	0.020	5.75	0.002	
7075	75S-CCI	---	---	(0.001)	---	---	0.004	(0.001)	(1.6)	(0.001)	(0.001)	---	(2.4)	(0.001)
Standard		---	(0.001)	---	(0.001)	---	---	(0.001)	---	(0.001)	(0.001)	(7.5)	---	
7075	B75S-AF	---	0.009	---	0.011	0.022	0.024	0.19	0.96	0.270	---	0.0082	2.52	0.21
Standard	**5 ONLY**	0.011	---	---	---	---	0.2	---	0.011	---	---	5.95	---	
7075	X75S-AA	---	---	0.037	---	---	---	0.034	4.25	0.170	---	---	0.032	0.033
Standard		---	0.03	---	0.045	---	0.49	0.032	---	0.029	---	6.71	---	
7075	7075-CAC	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	(0.21)	(1.66)	(0.31)	<0.0001	<0.0001	(2.64)	0.0002
High Purity		<0.0001	0.0001	0.0003	0.0004	<0.0001	(0.14)	<0.0001	<0.0001	<0.0001	0.0001	(5.64)	<0.0001	
7075	7075-CAE	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	(0.21)	(1.65)	(0.29)	<0.0001	<0.0001	(2.58)	0.0005
High Purity		<0.0001	0.0001	0.0001	0.0002	<0.0001	(0.18)	0.0003	<0.0001	0.0002	0.0001	(5.76)	<0.0001	

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Revised - 01/14/2010

Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
7079	7079-AA	---	0.0013	0.020	0.0026	0.0014	---	0.22	0.66	0.24	0.020	0.0038	3.28	0.25
Standard		0.0018	0.029	0.0015	0.014	0.0034	0.20	0.022	0.0028	0.056	0.021	4.55	0.0037	
7079	79S-AF	---	---	0.040	---	---	---	0.20	0.64	0.27	0.02	---	3.38	0.22
Standard	**3 ONLY**	---	0.040	---	0.040	---	0.19	0.042	---	0.067	---	4.68	---	
7104	420-AA	---	---	0.034	---	---	---	0.028	0.026	0.12	0.014	---	0.028	0.033
Standard		---	0.032	---	0.032	---	0.16	0.10	---	0.024	---	4.70	---	
7104	420-CAB	---	---	<0.001	---	---	---	<0.001	(0.002)	---	(0.001)	---	<0.001	<0.001
High Purity		<0.0001	<0.001	---	<0.001	---	---	<0.001	---	<0.001	(0.002)	(4.5)	---	
7104	B8050-AA	---	---	(0.02)	4.01	---	---	0.025	0.040	0.27	0.02	---	0.12	0.044
Standard	**5 ONLY**	---	0.031	---	0.029	---	0.15	0.025	---	(0.02)	---	4.10	---	
7146	7146-AA	---	---	0.025	---	---	---	0.028	0.031	0.36	0.015	---	1.41	0.037
Standard		---	0.036	---	0.030	---	0.22	0.032	---	0.042	0.011	6.86	0.16	
7146	7146-CAD	---	<0.0001	<0.0001	<0.0001	---	---	0.0011	0.0006	0.33	0.014	<0.0001	1.39	0.0029
High Purity		0.0002	0.0043	<0.0001	0.0027	<0.0001	0.22	0.0004	0.0002	0.0065	0.010	6.40	0.15	
7146	7146-CAE	---	---	---	---	---	---	---	---	0.34	---	---	1.41	---
High Purity		---	---	---	---	---	0.23	---	---	---	---	7.64	0.001	
8001	A200-AA	---	---	0.04	---	3.1	---	0.047	1.15	0.20	---	---	0.027	0.043
Standard	**2 ONLY**	---	1.14	---	0.046	---	0.20	0.042	---	0.049	---	0.05	---	
8001	8001-CAB	0.001	---	---	---	0.034	0.013	---	(0.001)	(0.60)	---	(0.001)	<0.001	---
High Purity	**6 ONLY**	---	(1.20)	---	---	---	---	---	---	---	---	---	---	
8001	8001-CAC	0.001	---	---	---	0.004	0.004	---	---	---	---	---	---	---
High Purity	**1 ONLY**	---	1.22	---	---	---	---	---	---	---	---	---	---	
8006	8006-AG	---	0.0012	0.009	0.0017*i*	0.0015	---	0.020	0.042	1.60	0.020	0.0014*i*	0.0030*i*	0.55
Standard		0.0015*i*	0.021	0.0034	0.010	0.004	0.22	0.012	0.0019*i*	0.014	0.021	0.046	0.0030	
8006	8006-CAD	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	0.0005	0.0006	(1.62)	<0.0001	<0.0001	0.0002	(0.55)
High Purity		<0.0001	0.0013	0.0004	<0.0001	0.0001	(0.20)	<0.0001	<0.0001	0.0006	0.0005	0.0002	<0.0001	
8007	8007-AE	---	0.0021*i*	0.020	0.0027*i*	---	---	0.031	0.049	1.61	0.031	0.0007*i*	0.014	0.56
Standard		0.0018*i*	0.029	0.0032	0.015	---	0.025	0.018	---	0.011	0.020	1.11	---	
8007	8007-AG	---	0.0023	0.017	0.0002	---	---	0.030	0.051	1.63	0.018	0.0002	0.0011	0.47
Standard		<0.0001	0.029	0.002	0.016	---	0.20	0.0170	0.0004	0.014	0.019	1.10	0.019	
8007	8007-CAF	---	<0.0001	<0.001	<0.0001	---	---	0.0007	0.0008	(1.57)	<0.001	<0.0001	0.0008	(0.55)
High Purity		<0.0001	0.0008	0.0004	<0.001	---	0.002	0.001	<0.0001	0.0002	0.001	(1.09)	<0.001	

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Alcan Wrought Aluminum Alloy CRMs **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
8008	8008-AC	---	0.0012	0.024	0.0022*i*	0.0014	---	0.053	0.17	1.12	0.024	0.0017*i*	0.013	0.74
Standard	Replaces AB	0.0017*i*	0.028	0.0042	0.016	0.0037	0.19	0.017	0.0025*i*	0.030	0.032	0.049	0.0039	
8011	A8011-xx													
Standard	**Coming Late Spring 2010**													
8015	8015-AA	---	0.0033	0.02	0.0025*i*	---	---	0.016	0.030	1.05	0.015	0.0026*i*	0.012	0.18
Standard		0.0041*i*	0.020	0.004	0.016	---	0.13	0.017	0.0016*i*	0.021	0.010	0.026	0.014	
8015	8015-CAB	<0.0001	<0.0001	<0.0001	<0.0001	---	---	0.0004	0.0005	(1.10)	<0.0001	<0.0001	0.0003	(0.22)
High Purity		<0.0001	0.001	0.0003	<0.0001	---	(0.13)	<0.0001	<0.0001	0.0002	0.0004	0.0005	<0.0001	
8018	8018-AB	---	0.0010	0.0076	0.0016*i*	0.0016	---	0.017	0.46	0.77	0.015	0.0015*i*	0.0075*i*	0.069
Standard		0.0017*i*	0.015	0.0026	0.0094	0.0036	0.76	0.015	0.0031*i*	0.043	0.016	0.015	0.0030	
8021	8021-AA	---	0.0011	0.010	0.0018	0.0013	---	0.010	0.014	1.43	0.320	0.0014	0.0048*i*	0.0075
Standard		0.0010*i*	0.010	0.0028	0.0082	0.003	0.11	0.0083	0.0020	0.021	0.022	0.010	0.0033	
8030	8030-AC	---	0.0009	0.027	0.0025*i*	0.0018	---	0.020	0.20	0.830	0.029	0.0016*i*	0.018	0.0032
Standard		0.0018*i*	0.024	0.006	0.016	(0.006)	0.066	0.016	0.0027*i*	0.003	0.020	0.014	0.0028	
8050	8050-CAB	---	---	---	(4.9)	---	---	---	---	---	---	---	0.023	---
High Purity		---	---	---	---	---	---	---	---	---	---	(4.9)	---	
8079	8079-AD	---	0.0010	0.0080	0.0016*i*	0.0012	---	0.019	0.020	1.11	0.018	0.0014*i*	0.0046*i*	0.018
Standard		0.0015*i*	0.020	0.0032	0.0079	0.0023	0.20	0.020	0.0019*i*	0.017	0.024	0.017	0.0017	
8079	8079-CAE	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0001	(1.06)	<0.0001	<0.0001	0.0002	0.0001
Standard		<0.0001	0.0001	0.0001	<0.0001	<0.0001	(0.21)	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	0.0001	
8081	8081-CAB	---	---	(0.001)	<0.0001	---	---	---	(0.97)	(0.40)	(0.001)	<0.0001	0.001	(0.005)
High Purity		<0.0001	(0.003)	---	(0.08)	---	(0.003)	(19.5)	---	(0.002)	(0.001)	(0.02)	---	
8112	8112-AA	---	0.0011	0.011	0.0025*i*	0.0035	---	0.024	0.26	0.66	0.028	0.0012*i*	0.014	0.11
Standard		0.0026*i*	0.020	0.0056	0.008	0.0051	0.52	0.018	0.0044*i*	0.028	0.028	0.035	0.015	
8280	8280-CAC	---	---	(0.002)	(0.002)	---	---	<0.001	(1.0)	(0.4)	---	<0.0001	(0.002)	<0.001
High Purity		(0.0003)	(0.45)	0.0002	(0.05)	---	(1.4)	(6.9)	<0.0001	(0.002)	---	<0.005	---	

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Alcan Specialty Aluminum Alloy CRMs | **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

AA No.	Part No.	B	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Ga	Li	Mg	Mn
Type	**ALC-xxx**	**Na**	**Ni**	**P**	**Pb**	**Sb**	**Si**	**Sn**	**Sr**	**Ti**	**V**	**Zn**	**Zr**	
Binary	1S-CAF	0.029	---	---	---	---	---	---	---	(0.13)	---	---	---	---
High Purity	Replaces CAB	---	---	---	---	---	(0.06)	---	---	---	---	---	---	
Binary	1S-CAG	0.0078	---	---	---	---	---	---	---	(0.25)	---	---	---	---
High Purity	Replaces CAE	---	---	---	---	---	(0.10)	---	---	---	---	---	---	
Binary	1S-CAM	0.0082	---	---	---	---	---	---	---	0.25	---	---	---	---
High Purity	Replaces VF	---	---	---	---	---	0.16	---	---	---	---	---	---	
Binary	1S-CLP	---	---	---	---	---	---	---	---	(0.05)	---	---	---	---
High Purity - M	**1 ONLY**	---	---	---	---	---	(0.05)	0.40	---	---	---	---	---	
Binary	1S-CNT	---	---	---	---	---	---	---	---	(0.17)	---	---	---	---
High Purity - M	**1 ONLY**	(0.012)	---	---	---	---	(0.05)	---	---	---	---	---	---	
Binary	1S-CPJ	0.003	---	---	---	---	---	---	---	<0.01	---	---	---	---
High Purity - M	**1 ONLY**	---	---	---	---	---	<0.01	---	---	---	---	---	---	
Binary	1S-CPN	---	---	---	---	---	---	---	---	(0.12)	---	---	---	---
High Purity - M	**3 ONLY**	---	---	---	---	---	(0.10)	---	---	---	---	0.40	---	
Binary	1S-CPS	---	---	---	---	---	0.19	---	---	(0.07)	---	---	---	---
High Purity - M	**6 ONLY**	---	---	---	---	---	(0.07)	---	---	---	---	---	---	
Binary	1S-CQL	---	---	---	---	---	---	---	---	(0.06)	---	---	---	---
High Purity - M	**1 ONLY**	---	---	---	0.10	---	(0.05)	---	---	---	---	---	---	
Binary	1S-CSN	---	---	---	---	---	0.011	---	---	(0.10)	---	---	---	---
High Purity - M	**3 ONLY**	---	---	---	---	---	(0.05)	---	---	---	---	---	---	
Binary	1S-CSO	---	---	---	---	---	0.023	---	---	(0.10)	---	---	---	---
High Purity - M	**3 ONLY**	---	---	---	---	---	(0.05)	---	---	---	---	---	---	
Binary	1S-CTR	---	---	---	---	---	---	---	---	(0.10)	---	---	---	---
High Purity - M		---	---	---	---	---	(0.08)	---	---	0.49	---	---	---	
Binary	1S-CTX	---	---	---	---	---	---	---	---	(0.10)	---	---	---	---
High Purity - M	**1 ONLY**	---	---	---	---	---	1.06	---	---	---	---	---	---	
Binary	1S-CVD	---	---	(0.03)	---	---	---	(0.03)	(0.03)	0.19	---	---	(0.03)	(0.03)
High Purity		---	(0.03)	---	(0.03)	---	0.10	(0.03)	---	(0.03)	---	7.44	---	
Binary	1S-CVE	---	---	(0.03)	---	---	---	(0.03)	(0.03)	0.19	---	---	(0.03)	(0.03)
High Purity		---	(0.03)	---	(0.03)	---	0.10	(0.03)	---	(0.03)	---	9.18	---	
Binary	1S-CVL	---	---	---	---	---	---	---	0.29	0.15	---	---	---	---
High Purity - M	**2 ONLY**	---	---	---	---	---	0.08	---	---	---	---	---	---	
Binary	1S-CVY	---	---	---	1.91	---	---	---	---	(0.12)	---	---	---	---
High Purity		---	---	---	---	---	(0.04)	---	---	---	---	---	---	

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AA No. / Type	Part No. / ALC-xxx	B / Na	Be / Ni	Bi / P	Ca / Pb	Cd / Sb	Co / Si	Cr / Sn	Cu / Sr	Fe / Ti	Ga / V	Li / Zn	Mg / Zr	Mn
Binary	1S-CWV	---	---	---	---	---	---	---	---	(0.16)	---	---	0.08	---
High Purity - M	**2 ONLY**	---	---	---	---	---	(0.06)	---	---	---	---	0.12	0.11	
Binary	1S-CWW	---	---	---	---	---	---	0.24	---	0.15	---	---	---	0.08
High Purity - M	**2 ONLY**	---	---	---	---	---	0.06	---	---	---	---	---	---	
Binary	1S-CXM	---	---	---	---	---	---	---	---	(0.140)	---	---	---	---
High Purity - M	**2 ONLY**	---	---	---	---	---	(0.07)	---	---	---	---	---	0.1800	
Binary	1S-CXN	---	---	---	---	---	---	---	---	(0.13)	---	---	---	---
High Purity - M	**1 ONLY**	---	---	---	---	---	(0.06)	---	---	---	---	---	0.180	
Binary	1S-CXO	(0.01)	0.0008	0.0160	0.01	---	---	<0.001	0.20	0.18	0.015	0.0005	0.019	0.00
High Purity	**2 ONLY**	0.0016	0.013	---	0.0130	---	0.11	0.024	---	(0.004)	(0.002)	0.021	(0.0100)	
Binary	1S-CXS	---	0.0032	---	0.0031	---	---	---	---	(0.090)	---	0.0026	---	---
High Purity		0.0027	---	---	---	---	(0.08)	---	---	---	---	---	---	
Binary	1S-CXT	---	0.0016	---	0.00	---	---	---	---	(0.10)	---	0.0005	---	---
High Purity		0.0009	---	---	---	---	(0.07)	---	---	---	---	---	---	
Binary	1S-CYF	---	0.0056	---	0.008	---	---	---	---	(0.10)	---	0.0037	---	---
High Purity		0.0027	---	---	---	---	(0.07)	---	---	---	---	---	---	
Binary	1S-CZL	---	---	---	---	---	---	---	---	(0.16)	---	---	---	---
High Purity		---	---	0.0027	---	---	(0.07)	---	0.077	---	---	---	---	
Binary	1S-CZN	---	---	---	---	---	---	---	---	(0.20)	---	---	---	---
High Purity	**2 ONLY**	---	---	0.0037	---	---	(0.10)	---	---	---	---	---	---	
Binary	1S-CZS	---	0.00	---	---	0.001	0.0020	---	---	(0.15)	---	---	---	---
High Purity		0.0011*i*	---	---	---	---	(0.11)	---	0.024i	---	---	---	0.002	
Binary	1S-CZU	<0.0001	<0.0001	<0.0001	<0.0001	---	---	0.001	0.001	2.47	0.000	<0.0001	0.001	0.00
High Purity		<0.0001	0.002	0.00	<0.0001	<0.0001	0.11	<0.0001	<0.0001	0.001	0.001	<0.0001	<0.0001	
Binary	1S-CZW	<0.0001	<0.0001	<0.0001	<0.0001	---	---	0.000	0.000	0.59	<0.0001	<0.0001	0.000	0.00
High Purity		<0.0001	0.001	0.0001	<0.0001	<0.0001	0.00	<0.0001	<0.0001	<0.0001	0.000	<0.0001	0.000	
Binary	1S-CZZ	---	---	---	---	---	---	---	---	1.44	---	---	---	---
High Purity		---	---	---	---	---	0.094	---	---	---	---	---	---	
Binary	1S-WN	---	---	0.04	---	---	0.0050	0.0400	0.0440	0.80	0.003	---	0.04	0.21
High Purity	**1 ONLY**	---	0.04	---	0.038	<0.0001	0.15	0.045	---	0.0280	0.0140	0.0420	---	

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< = Less than 'Type' - M = Mushroom

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by XRF, ICP and gravimetry

Bauxite	Loss of Mass LOM	Al as Al_2O_3	Fe as Fe_2O_3	Si as SiO_2	Ti as TiO_2	Zr as ZrO_2	P as P_2O_5	V as V_2O_5	S* as SO_3	Cr as Cr_2O_3	Ca as CaO	Mg as MgO	Mn as MnO_2	Zn as ZnO	K as K_2O	Na as Na_2O	Organic C as C
BXT-11	27.4	54.2	12.8	1.49	3.39	0.08	0.15	0.11	---	0.10	0.01	0.03	0.01	0.003	0.02	0.03	0.11
Replaces -01	± 0.1	± 0.3	± 0.2	± 0.06	± 0.06	± 0.01	± 0.01	± 0.01	---	± 0.01	± 0.01	± 0.01	± 0.01	± 0.001	± 0.01	± 0.01	± 0.02
BXT-02	27.0	50.9	17.8	1.56	1.87	0.05	0.15	0.06	0.08	0.068	0.04	0.09	0.01	0.009	0.01	0.04	0.07
	± 0.1	± 0.6	± 0.2	± 0.04	± 0.04	± 0.01	± 0.02	± 0.01	---	± 0.009	± 0.02	± 0.02	± 0.01	± 0.004	± 0.01	---	± 0.01
BXT-13	28.52	53.4	11.44	4.82	1.54	0.08	0.02	0.04	0.09	0.016	0.02	0.01	0.01	0.002	0.01	0.01	0.051
Replaces -03	± 0.2	± 0.1	± 0.02	± 0.01	± 0.01	± 0.01	± 0.01	± 0.01	± 0.02	± 0.001	± 0.01	± 0.01	± 0.01	± 0.001	± 0.01	± 0.01	± 0.002
BXT-04	25.7	48.5	17.0	2.68	5.32	0.06	0.13	0.19	0.13	0.090	0.02	0.05	0.04	0.003	0.03	0.02	0.12
	± 0.1	± 0.4	± 0.2	± 0.07	± 0.06	± 0.01	± 0.02	± 0.03	---	± 0.05	± 0.01	± 0.01	± 0.01	± 0.003	± 0.01	---	± 0.02
BXT-05	27.2	46.8	19.2	1.98	2.25	0.06	0.38	0.11	0.21	0.108	1.13	0.08	0.32	0.026	0.01	0.03	0.28
	± 0.2	± 0.4	± 0.2	± 0.05	± 0.04	± 0.01	± 0.02	± 0.02	---	± 0.003	± 0.08	± 0.02	± 0.02	± 0.003	± 0.01	---	± 0.03
BXT-06	27.2	48.7	18.9	0.80	2.67	0.07	0.61	0.13	0.15	0.134	0.13	0.06	0.27	0.023	0.01	0.03	0.14
	± 0.3	± 0.5	± 0.3	± 0.02	± 0.04	± 0.01	± 0.03	± 0.02	---	± 0.002	± 0.03	± 0.02	± 0.04	± 0.002	± 0.01	---	± 0.02
BXT-07	24.7	44.6	25.2	2.41	2.41	0.07	0.14	0.07	0.16	0.047	0.01	0.04	0.08	0.006	0.01	0.02	0.08
	± 0.2	± 0.7	± 0.6	± 0.07	± 0.07	± 0.01	± 0.02	± 0.01	---	± 0.004	± 0.01	± 0.01	± 0.01	± 0.002	± 0.01	---	± 0.01
BXT-08	25.6	51.5	9.6	3.17	9.41	0.10	0.26	0.19	---	0.048	0.02	0.04	0.02	0.006	0.02	0.02	0.07
	± 0.2	± 0.5	± 0.3	± 0.05	± 0.05	± 0.01	± 0.01	± 0.04	---	± 0.004	± 0.01	± 0.02	± 0.01	± 0.001	± 0.01	---	± 0.01
BXT-09	20.8	53.4	14.5	7.57	2.98	0.12	0.07	0.06	0.06	0.037	0.01	0.002	0.03	0.04	0.01	0.01	0.20
	± 0.1	± 0.4	± 0.3	± 0.07	± 0.06	± 0.01	± 0.01	± 0.01	---	± 0.004	± 0.01	± 0.002	± 0.01	± 0.01	± 0.01	---	± 0.03

* Tentative values

Certificate of Analysis values control in all cases

< = Less than

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by Laboratory Bomb Digests

Bauxite	Low Temperature Extractable alumina Al 150		HighTemperature Extractable alumina Si 150		HighTemperature Extractable alumina Al 225		HighTemperature Extractable alumina Si 225	
BXT-01	54.3	± 0.5	0.5	± 0.1	57.2	± 0.4	0.9	± 0.1
BXT-02	46.5	± 0.7	1.1	± 0.1	49.5	± 0.6	1.3	± 0.1
BXT-04	42.5	± 0.4	2.3	± 0.1	46.3	± 0.4	2.5	± 0.2
BXT-05	42.4	± 0.6	1.5	± 0.1	44.5	± 0.6	1.7	± 0.1
BXT-06	45.5	± 0.6	0.5	± 0.1	47.4	± 0.6	0.7	± 0.1
BXT-07	39.7	± 0.6	0.6	± 0.2	39.5	± 0.8	2.1	± 0.2
BXT-08	41.7	± 0.4	2.9	± 0.1	48.5	± 0.9	3.0	± 0.1
BXT-09	26.4	± 1.0	5.9	± 0.4	46.5	± 0.8	6.8	± 0.7

Certificate of Analysis values control in all cases
< = Less than

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) | Determined by Laboratory Bomb Digests

Red Mud	Loss of Mass LOM	Al as Al_2O_3	Fe as Fe_2O_3	Si as SiO_2	Ti as TiO_2	Ca as CaO	Na as Na_2O	Al 143 or g.Al_2O_3	T.E.A.	Organic C as C
RM-01	12.0	16.8	53.8	5.4	5.9	3.5	1.4	0.6	4.6	0.36
	± 0.02	± 0.4	± 0.8	± 0.1	± 0.2	± 0.2	± 0.2	± 0.1	± 0.3	± 0.03
RM-02	8.4	13.9	30.7	6.2	22.6	11.2	3.0	1.9	5.7	0.16
	± 0.02	± 0.4	± 0.8	± 0.2	± 0.8	± 0.4	± 0.1	± 0.3	± 0.2	± 0.04
RM-03	12.1	13.3	49.2	4.6	6.5	8.3	1.4	0.4	6.4	0.28
	± 0.4	± 0.3	± 0.8	± 0.1	± 0.2	± 0.2	± 0.1	± 0.1	± 0.2	± 0.02
RM-04	12.7	20.6	29.0	13.9	6.0	7.7	6.8	1.2	6.6	0.43
	± 0.5	± 0.3	± 0.5	± 0.4	± 0.2	± 0.3	± 0.4	± 0.2	± 0.3	± 0.07
RM-05	8.9	21.9	35.6	15.7	7.1	0.9	8.3	1.7	6.9	0.22
	± 0.3	± 0.4	± 0.4	± 0.02	± 0.1	± 0.1	± 0.3	± 0.3	± 0.2	± 0.02

Certificate of Analysis values control in all cases
< = Less than

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by XRF, ICP and gravimetry

Alumina	Loss of Mass LOM	Na as Na_2O	Si as SiO_2	Fe as Fe_2O_3	Ca as CaO	V as V_2O_5	P as P_2O_5	Ga as Ga_2O_3	S as SO_3	Ti as TiO_2	Zn as ZnO
ALU-01	1.2	0.27	0.013	0.016	0.017	0.002	0.0005	0.011	0.12	0.004	0.001
	± 0.1	± 0.02	± 0.002	± 0.001	± 0.001	± 0.001	± 0.003	± 0.001	± 0.02	± 0.001	± 0.001
ALU-03	0.77	0.44	0.010	0.011	0.010	0.001		0.009	0.05	0.006	0.001
	± 0.08	± 0.01	± 0.002	± 0.001	± 0.001	± 0.001		± 0.001	± 0.01	± 0.001	± 0.001
ALU-04	0.49	0.46	0.021	0.017	0.020	0.003		0.009	0.07	0.009	0.001
	± 0.09	± 0.01	± 0.005	± 0.001	± 0.001	± 0.001		± 0.001	± 0.02	± 0.001	± 0.001
ALU-05	0.83	0.37	0.014	0.008	0.033	0.001		0.007	0.13	0.002	0.010
	± 0.08	± 0.02	± 0.002	± 0.002	± 0.001	± 0.001		± 0.001	± 0.03	± 0.001	± 0.001
ALU-06	1.31	0.36	0.017	0.008	0.043	0.001		0.005	0.11	0.001	0.009
	± 0.05	± 0.02	± 0.003	± 0.001	± 0.002	± 0.001		± 0.001	± 0.03	± 0.001	± 0.001
ALU-07	0.89	0.46	0.025	0.023	0.049	0.004		0.006	0.17	0.004	0.001
	± 0.010	± 0.02	± 0.003	± 0.002	± 0.001	± 0.001		± 0.001	± 0.04	± 0.001	± 0.001
ALU-08	0.57	0.42	0.007	0.022	0.008	0.003		0.014	0.09	0.002	0.001
	± 0.09	± 0.02	± 0.001	± 0.001	± 0.002	± 0.001		± 0.001	± 0.03	± 0.001	± 0.001
ALU-09	0.60	0.42	0.018	0.008	0.026	0.001	0.0002	0.009	0.08	0.001	0.001
	± 0.05	± 0.02	± 0.002	± 0.001	± 0.001	± 0.001	± 0.0001	± 0.001	± 0.03	± 0.001	± 0.001
ALU-10	0.6	0.37	0.005	0.015	0.004	0.002	0.002	0.013	0.08	0.002	---
	± 0.1	± 0.01	± 0.002	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.01	± 0.001	

Certificate of Analysis values control in all cases
< = Less than

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Alumina: Physical Properties

Alumina	Monodimensional MODE (µm)	Median (µm)
CGC-70	69.0 ± 1	69.00 ± 1
CGC-95	97.00 ± 2	96.0 ± 2

Sample	Min. Bulk Density (g/cm^3)	Max. Bulk Density (g/cm^3)	Angle of repose	Air Permeability (Centidarcys)	SSA (g/cm^3)	Flowability
ALU-87	0.96 ± 0.01	1.15 ± 0.01	33.6 ± 0.7	4.3 ± 0.3	---	1 *
Alpha 85	0.80 ± 0.05	---	---	---	0.88 ± 0.02	---
ALU-11 Replaces AL-DWS-92	---	---	---	---	71.30 ± 0.6	---
ALU-10	0.967 ± 0.001	1.19 ± 0.01	---	---	55.60 ± 2.6	---

* Tentative value

Sample	Attrition Index (%)	Dustiness Index (kg/t)
ALU-10	29.4 ± 1.8	0.54 ± 0.03
Perra-88	---	1.4 ± 0.2

Alcan Bayer Process Standards

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

DSC-DTA Standards

	DSC-1	DSC-2	DSC-3	DSC-4	DSC-5	DSC-6	DSC-7	DSC-8	DSC-9
$Al(OH)_3$	0	0.5 ± 0.1	1.0 ± 0.1	2.0 ± 0.1	5.0 ± 0.4	10.0 ± 0.3	15.0 ± 0.3	20.0 ± 0.4	25.0 ± 0.2

	DSC-10	DSC-12	DSC-13	DSC-14	DSC-15	DSC-16
AlOOH	0	1.0 ± 0.3	2.0 ± 0.2	5.0 ± 0.1	10.0 ± 0.2	20.0 ± 0.3

Alumina: Physical Properties-Particle Sizing

Alumina	Ro-Tap (Woven sieves)						Wet Sieving				
	>150 µm (%)	>106 µm (%)	>75 µm (%)	>53 µm (%)	>45 µm (%)	Median (µm)	>45 µm (%)	>33 µm (%)	>20 µm (%)	>10 µm (%)	>5 µm (%)
Al-WDS-92	2.5 ± 0.4	14 ± 1	44 ± 2	76 ± 1	87 ± 1	70 ± 1	89 ± 1	96 ± 1	98 ± 1	---	---
C 71 RG	---	---	---	---	---	---	0.7 ± 0.2	2.3 ± 0.3	6.4 ± 1.0	23.4 ± 1.1	46.8 ± 1.7
ALU-10	0.0 ± 0.1	8.7 ± 1.6	55.7 ± 3.3	80.8 ± 1.6	86.6 ± 1.6	75.9 ± 1.4	---	---	---	---	---

Alumina	Electric Zone Sensing (Elzone-1 capillary)									
	>149 µm (%)	>105 µm (%)	>74 µm (%)	>53 µm (%)	>45 µm (%)	>33 µm (%)	>20 µm (%)	Median (µm)	Q_{25} (µm)	Q_{75} (µm)
CFX	1.7 ± 0.9	14.5 ± 2.1	55.7 ± 3.1	88.8 ± 0.8	95.2 ± 0.6	99.2 ± 0.1	99.9 ± 0.1	78 ± 2	94 ± 2	64 ± 1
CFY	0.8 ± 0.6	12.7 ± 1.6	44.4 ± 2.3	75.9 ± 1.7	85.6 ± 1.4	96.0 ± 0.7	99.8 ± 0.1	71 ± 1	90 ± 2	53 ± 1
CFZ	0.6 ± 0.3	8.7 ± 1.4	43.5 ± 1.9	80.7 ± 1.9	89.6 ± 0.8	96.6 ± 0.5	99.6 ± 0.1	71 ± 1	87 ± 1	57 ± 1

Certificate of Analysis values control in all cases
< = Less than

Green Petroleum Coke

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis)

Determined by XRF, ICP and gravimetry

Green Coke	DF		DG		DH		DI		DJ		DL (Limited Supply)	
Fe	0.028	± 0.003	0.023	± 0.002	0.019	± 0.001	0.017	± 0.001	0.027	± 0.001	0.010	± 0.001
Mn	0.0003	± 0.0001	0.0002	± 0.0001	0.0001	± 0.0001	0.0001	± 0.0001	0.0005	± 0.0001	0.0003	± 0.0001
Ni	0.050	± 0.005	0.038	± 0.005	0.021	± 0.003	0.004	± 0.001	0.003	± 0.001	0.012	± 0.001
Si	0.022	± 0.002	0.014	± 0.001	0.006	± 0.001	0.013	± 0.001	0.12	± 0.01	0.018	± 0.001
Zn	0.006	± 0.001	0.0011	± 0.0002	0.0008	± 0.0001	0.0008	± 0.0001	0.0004	± 0.0001	0.0003	± 0.0001
Ca	0.028	± 0.001	0.0130	± 0.0005	0.004	± 0.001	0.007	± 0.001	0.015	± 0.001	0.011	± 0.001
V	0.040	± 0.003	0.035	± 0.002	0.034	± 0.002	0.004	± 0.001	0.0030	± 0.0005	0.006	± 0.001
S	1.58	± 0.03	1.59	± 0.04	2.40	± 0.03	1.02	± 0.02	0.64	± 0.01	0.78	± 0.04
Ti	---	---	---	---	---	---	---	---	---	---	---	---
Na	---	---	---	---	---	---	---	---	---	---	0.021	± 0.001
Ash	---	---	---	---	---	---	---	---	---	---	0.20	± 0.03
Volitile Matters	---	---	---	---	---	---	---	---	---	---	10.4	± 0.2

Certificate of Analysis values control in all cases
< = Less than

Calcined Petroleum Coke

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) | Determined by XRF, ICP and gravimetry

Calcined Coke	CAA (Limited Supply)		CAD (Sold Out)		BR		BS (Sold Out)		PCC-02		PCC-04	
Fe	0.029	± 0.003	0.025	± 0.003	---	---	0.038	± 0.003	---	---	---	---
Mn	---	---	---	---	---	---	---	---	---	---	---	---
Ni	0.008	± 0.001	0.011	± 0.002	---	---	0.018	± 0.003	---	---	---	---
Si	0.011	± 0.001	0.019	± 0.002	0.011	± 0.001	0.033	± 0.003	---	---	---	---
Zn	---	---	---	---	---	---	---	---	---	---	---	---
Ca	0.021	± 0.001	0.11	± 0.01	---	---	0.014	± 0.002	---	---	---	---
V	0.018	± 0.001	0.021	± 0.001	0.027 *		0.024	± 0.001	---	---	---	---
S	---	---	2.49	± 0.05	2.06	± 0.04	2.10	± 0.02	---	---	---	---
Na	---	---	---	---	---	---	---	---	---	---	---	---
Ash	---	---	---	---	---	---	---	---	---	---	---	---
Real Density g/cm$_2$	---	---	---	---	---	---	---	---	---	---	---	---
Bulk Density g/cm$_2$	---	---	---	---	---	---	---	---	0.86	± 0.01	0.871	± 0.003

* Tentative values

Certificate of Analysis values control in all cases
< = Less than

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis)				Determined by XRF, ICP and gravimetry				
Anthracite	**Fe**	**Ni**	**Si**	**Ca**	**V**	**S**	**Ash**	**Real Density g/cm$_3$**
AU	0.32	0.004 *	1.8	0.083	0.004 *	0.57	7.8	1.76
	± 0.02	---	± 0.1	± 0.005	---	± 0.01	± 0.1	± 0.01
DM	0.32	0.003 *	1.9	0.17	0.004 *	0.40	8.6	1.85
	± 0.02	---	± 0.1	± 0.01	---	± 0.02	± 0.1	± 0.01

* Tentative Values

Percentage by Weight (Dry basis)					Determined by XRF, ICP and gravimetry					
Metallurgical Coke	**Fe**	**Mn**	**Ni**	**Si**	**Zn**	**Ca**	**V**	**S**	**H**	**Ash**
AS	0.45	---	---	2.3	---	---	---	0.84	---	---
Limited supply	± 0.03			± 0.1				± 0.02		
AZ	0.77	---	---	2.4	---	0.099	0.005	1.05	---	---
Limited supply	± 0.01			± 0.1		± 0.002	± 0.001	± 0.01		
BY	0.60	---	0.002	2.4	---	0.085	0.004	0.96	---	10.0
Limited supply	± 0.03		± 0.001	± 0.1		± 0.002	± 0.001	± 0.02		± 0.1
CA	0.40	---	---	2.64	---	0.066	<0.001	0.65	0.50	10.1
Limited supply	± 0.01			± 0.03		± 0.002		± 0.01	± 0.02	± 0.1
CB	0.36	---	0.011	1.62	---	---	0.003	0.54	---	7.5
Limited supply	± 0.02		± 0.002	± 0.05			± 0.001	± 0.01		± 0.1

Certificate of Analysis values control in all cases
< = Less than

Pitch Elemental Compositon

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) Determined by XRF, ICP and gravimetry

Pitch	Pitch-02		Pitch-03		Pitch-04		Pitch-05		Pitch-06		Pitch-07		Pitch-08	
Fe	0.032	± 0.002	0.042	± 0.003	0.015	± 0.002	0.059	± 0.006	0.027	± 0.002	0.032	± 0.003	---	---
Mn	0.0004	± 0.0001	0.0005	± 0.0001	0.0009	± 0.0001	0.0004	± 0.0001	0.0003	± 0.0001	0.0010	± 0.0001	---	---
Ni	0.0004	± 0.0001	0.0004	± 0.0001	0.0003	± 0.0001	0.0004	± 0.0001	0.0003	± 0.0001	0.0004	± 0.0001	---	---
Si	0.041	± 0.002	0.066	± 0.006	0.075	± 0.008 ◘	0.154	± 0.007 ◘	0.082	± 0.006 ◘	0.0080	± 0.0005	---	---
Zn	0.0085	± 0.0003	0.010	± 0.001	0.047	± 0.003	0.016	± 0.001	0.0074	± 0.0005	0.074	± 0.007	---	---
Ca	0.0150	± 0.0005	0.017	± 0.003	0.0076	± 0.004	0.0066	± 0.0009	0.0042	± 0.0003	0.0082	± 0.0006	---	---
V	0.0002	± 0.0001	0.00010	± 0.00005	0.0001	± 0.0001	0.00020	± 0.00006	0.00010	± 0.00003	0.00003	± 0.00001	---	---
S	0.53	± 0.02	0.76	± 0.04	1.05	± 0.05	0.54	± 0.02	0.50	± 0.02	0.57	± 0.02	0.55	± 0.03
Na	0.042	± 0.001	0.021	± 0.002	0.011	± 0.001	0.0020	± 0.0006	0.013	± 0.001	0.011	± 0.001	---	---
Pb	0.0097	± 0.0003	0.012	± 0.001	0.036	± 0.002	0.027	± 0.002	0.0081	± 0.0003	0.051	± 0.005	---	---
Ti	0.0018	± 0.0002	0.0015	± 0.0001	0.0003	± 0.0001	0.0025	± 0.0002	0.0015	± 0.0002	0.00030	± 0.00003	---	---
P	---	---	0.0027	± 0.0002	0.0066	± 0.0009	0.0030	± 0.0001	0.0003	± 0.0001	0.0018	± 0.0001	---	---
C	---	---	---	---	---	---	---	---	---	---	---	---	93.5	± 0.4
H	---	---	---	---	---	---	---	---	---	---	---	---	4.1	± 0.1

◘ Not to be used for XRF calibration

Certificate of Analysis values control in all cases
< = Less than

Pitch Physical Properties

	Expressed as Percentage										g/mL	
Pitch	Ash - 700° C		Ash - 900° C		Coking Value		Quinoline Insoluble		Toluene Insoluble		Real Density	
Pitch-02	0.37	± 0.3	---	---	---	---	---	---	---	---	---	---
Pitch-08	0.17	± 0.01	1.16	± 0.01	60.9	± 0.7	14.4	± 0.3	28.5	In Process	1.34	± 0.01

	°C					
Pitch	Softening Point		EVT_1		EVT_{100}	
Pitch-02	---	---	---	---	---	---
Pitch-08	111.6	± 0.4	167	± 1	121	± 2

Raw Fluorspar

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by Wet Chemestry ICP and XRF

Raw Fluorspar	F		Si		CO_2		Fe		Al		Mg		Pb		P	
CAA	35.4	± 0.4	8.3	± 0.4	3.3	± 0.1	0.46 *		---	---	---	---	---	---	0.0038	± 0.0001
CAB	35.0	± 0.4	8.6	± 0.5	3.3	± 0.2	---	---	---	---	---	---	---	---	0.0038	± 0.0001
CAC	35.6	± 0.5	8.5	± 0.4	2.6	± 0.2	0.57	± 0.03	---	---	---	---	---	---	0.0041	± 0.0001
CAG Limited Supply	40.5	± 0.3	2.61	± 0.05	5.5 *		---	---	---	---	---	---	---	---	0.021	± 0.002
CAH Limited Supply	37.2	± 0.3	6.4	± 0.2	2.6 *		0.43	± 0.03	---	---	---	---	---	---	0.048	± 0.002
CAI Limited Supply	30.0	± 0.3	9.3	± 0.4	4.9 *		0.77 *		1.10 *		0.48 *		0.25 *		0.0070	± 0.0005
CAJ Limited Supply	46.4	± 0.5	0.42 *		0.7 *		0.063 *		---	---	---	---	---	---	0.025	± 0.001
CAK Limited Supply	44.80	± 0.5	0.47	± 0.02	3.30	± 0.06	0.10	± 0.01	0.095 *		---	---	---	---	0.0052	± 0.0004

* Tentative Values

Fluorspar Final Concentrate

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by Wet Chemestry ICP and XRF

Fluorspar Final Concentrate	F		Si		CO_2		Fe		Al		Mg		Pb		P	
CAA	47.2	± 0.7	0.72	± 0.05	0.37	± 0.02	0.028 *		---	---	---	---	---	---	0.0021	± 0.0005
CAB	45.6	± 0.4	1.20	± 0.05	1.58	± 0.02	---	---	---	---	---	---	---	---	0.0021 *	
CAC	47.2	± 0.4	0.51	± 0.05	0.53	± 0.05	0.03	± 0.01	---	---	---	---	---	---	0.0021	± 0.0001
CAL	44.8	± 0.5	0.34	± 0.02	3.42	± 0.06	0.09	± 0.01	0.074 *		---	---	---	---	0.0048	± 0.0002
CBG Limited Supply	43.5 *		2.87 *		2.99 *		---	---	---	---	---	---	---	---	---	---
CBI	45.4 *		0.58 *		1.98 *		0.077 *		---	---	0.42 *		---	---	---	---

* Tentative Values

Electrolytic Bath

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) Determined by Wet Chemestry ICP and XRF

Bath	Calcium as CaF_2		Ratio NaF/AlF_3		Excess AlF_3		Magnesium as MgF_2		Free Alumina		Alpha Alumina		Cloride as NaCl		Lithum as LiF	
BA-01	6.2	± 0.1	1.06	± 0.01	12.4	± 0.2	--- ---	--- ---	7.0	± 0.1	1.5	± 0.1	---	---	---	---
BA-02	5.7	± 0.1	1.12	± 0.01	10.8	± 0.3	--- ---	--- ---	2.7	± 0.1	0.3	± 0.1	---	---	---	---
BA-03	5.7	± 0.1	1.46	± 0.01	0.9	± 0.1	--- ---	--- ---	4.1	± 0.2		< 0.2	---	---	---	---
BA-04	7.4	± 0.1	1.25	± 0.01	6.4	± 0.2	--- ---	--- ---	5.5	± 0.1	3.2	± 0.1	---	---	---	---
BA-05	4.5	± 0.1	1.02	± 0.01	11.3	± 0.3	--- ---	--- ---	23.6	± 0.3	17.3	± 0.3	---	---	---	---
BA-06	4.5	± 0.1	1.00	± 0.01	12.2	± 0.3	--- ---	--- ---	23.3	± 0.2	16.7	± 0.2	0.25 *		---	---
BA-07	8.3	± 0.1	1.23	± 0.01	6.9	± 0.2	--- ---	--- ---	6.8	± 0.2	5.3	± 0.2	---	---	---	---
BA-08	9.0	± 0.1	1.37	± 0.01	3.2	± 0.1	--- ---	--- ---	7.3	± 0.2	4.6	± 0.2	---	---	---	---
BA-09	9.5	± 0.1	1.44	± 0.01	1.3	± 0.1	--- ---	--- ---	7.8	± 0.2	5.8	± 0.2	---	---	---	---
BA-10	6.7	± 0.1	1.30	± 0.01	5.2	± 0.2	---	---	6.0	± 0.2	4.9	± 0.2	---	---	---	---
BA-11	8.1	± 0.1	1.46	± 0.01	1.1	± 01	---	---	5.3	± 0.1	2.9	± 0.1	---	---	---	---
BA-12	6.0	± 0.1	---	---	3.8	± 0.3 ♣	0.21	± 0.01	4.2	± 0.2	2.8	± 0.2	---	---	2.72	± 0.05
BA-13	5.4	± 0.1	---	---	0.6	± 0.2 ♣	0.24	± 0.03	4.2	± 0.2	0.7	± 0.1	---	---	2.47	± 0.04
BA-14	3.65	± 0.04	---	---	1.4	± 0.3 ♣	3.40	± 0.07	3.3	± 0.1	1.9	± 0.1	0.25 *		2.04	± 0.06
BA-15	6.9	± 0.1	---	---	5.7	± 0.2 ♣	0.28	± 0.03	6.0	± 0.1	4.4	± 0.2	---	---	0.95	± 0.02

♣ Not intended for XRD calibration

Certificate of Analysis values control in all cases

< = Less than

Electrolytic Bath

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis)												Determined by Wet Chemestry ICP and XRF				
Bath	**Calcium as CaF_2**		**Ratio NaF/AlF_3**		**Excess AlF_3**		**Magnesium as MgF_2**		**Free Alumina**		**Alpha Alumina**		**Cloride as NaCl**		**Lithum as LiF**	
BA-16	6.3	± 0.1	---	---	3.7	± 0.3 ♣	0.22	± 0.02	4.0	± 0.1	3.3	± 0.2	---	---	3.08	± 0.02
BA-17	5.4	± 0.1	---	---	0.6	± 0.3 ♣	0.16	± 0.03	5.1	± 0.1	3.4	± 0.1	0.25 *		2.61	± 0.05
CCB Limited Supply	21.3	± 0.3	1.71	± 0.01	-3.9	± 0.3	0.19	± 0.02	2.6	± 0.1	---	---	---	---	---	---
CCC Limited Supply	9.2	± 0.2	---	---	---	---	0.25	± 0.03	4.0	± 0.2	---	---	---	---	---	---
CCE Limited Supply	4.0	± 0.1	1.51	± 0.01	-0.2	± 0.2	0.19	± 0.02	10.6	± 0.2	---	---	---	---	---	---

♣ Not intended for XRD calibration

Certificate of Analysis values control in all cases
< = Less than

Aluminum Fluoride

Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454

Percentage by Weight (Dry basis) — Determined by Wet Chemestry, ICP and XRF

Aluminum Fluoride	Fe		Si		Na		F		S		P		Ca	
ALF-01	0.009	± 0.002	0.070	± 0.005	0.32	± 0.02	62.0	± 0.4	0.28	± 0.01	0.0100	± 0.0005	0.017	± 0.002
ALF-02	0.010	± 0.002	0.130	± 0.005	0.26	± 0.02	63.0	± 0.4	0.26	± 0.01	0.0100	± 0.0005	0.014	± 0.002
ALF-03	0.009	± 0.002	0.120	± 0.005	0.27	± 0.02	64.3	± 0.4	0.25	± 0.01	0.0090	± 0.0005	0.014	± 0.002
ALF-04	0.007	± 0.002	0.100	± 0.005	0.29	± 0.02	63.0	± 0.4	0.13	± 0.01	0.0090	± 0.0005	0.016	± 0.002
ALF-05	0.006	± 0.002	0.090	± 0.005	0.29	± 0.02	63.3	± 0.4	0.10	± 0.01	0.0060	± 0.0005	0.015	± 0.002
CAA	0.056	± 0.004	0.500	± 0.001	1.16	± 0.03	60.4	± 0.5	0.11	± 0.03	0.0017	± 0.0001	0.026	± 0.002
CAB	0.056	± 0.004	0.420	± 0.005	1.00	± 0.05	57.2	± 0.5	0.16	± 0.03	0.0026	± 0.0002	0.024	± 0.001
CAC	0.049	± 0.004	0.680	± 0.005	0.92	± 0.05	61.8	± 0.5	0.20	± 0.03	0.0017	± 0.0002	0.024	± 0.001
CAN	0.018	± 0.002	0.100	± 0.005	0.22	± 0.02	62.4	± 0.4	0.23	± 0.01	0.0090	± 0.0005	0.160	± 0.005
CAO	0.020	± 0.002	0.130	± 0.005	0.69	± 0.02	57.7	± 0.4	---	---	0.0040	± 0.0005	0.180	± 0.005

Certificate of Analysis values control in all cases
< = Less than

Scrubber Alumina

Percentage by Weight (Dry basis) determined by Wet Chemistry

Scrubber Alumina	F	
CAE	0.75	± 0.05
CAF	1.95	± 0.05
CDH Metallurgical Alumina	0.074	± 0.004

Cryolite

Percentage by Weight (Dry basis) determined by Wet Chemistry, ICP and XRF

Cryolite	Fe		Si		Al		S		Na		F	
CAA	0.053	± 0.007	0.26	± 0.05	13.5	± 0.3	1.71	± 0.07	30.6	± 0.4	40.5	± 1.1
CAB	0.067	± 0.01	0.16	± 0.03	11.9	± 0.3	2.59	± 0.07	30.1	± 0.4	44.3	± 0.9
CAC	0.039	± 0.007	0.24	± 0.03	11.9	± 0.3	2.16	± 0.07	32.9	± 0.4	44.7	< 0.9
CAG	0.013	± 0.001	0.035	± 0.03	12.2	± 0.3	1.28	± 0.09	31.9	± 0.4	47.7	± 0.6

Certificate of Analysis values control in all cases
< = Less than

Set-Up Standards (SUSs) **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

Aluminum

IARM Status	Grade	Ag Mn	B Na	Be Ni	Bi P	Ca Si	Cd Sb	Cr Sn	Co Sr	Cu Ti	Fe V	Ga Zn	Li Zr	Mg Mo
220D	QA 10	---	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(0.0001)	(<0.0001)	(<0.0001)	(0.0003)
Final		(<0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(0.0004)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	
220E	QA 10	---	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0002)	(0.0003)	(<0.0001)	(<0.0001)	(0.0002)
Final		(<0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(<0.0001)	(<0.0001)	(0.0001)	(0.0002)	0.0001	(<0.0001)
221A	QA 11	---	---	(0.005)	---	(0.03)	---	(0.22)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	(0.2)	(0.01)	---	---	(0.1)	---	(6.8)	---	
221B	QA 11	---	---	(0.005)	---	(0.03)	---	(0.22)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	(0.01)	---	---	(0.1)	---	(6.8)	---	
221C	QA 11	---	---	(0.005)	---	(0.03)	---	(0.22)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	(0.01)	---	---	(0.1)	---	(6.8)	---	
221D	QA 11	---	---	(0.005)	---	(0.03)	---	(0.22)	(0.2)	(0.6)	(0.2)	(0.03)	---	(4.8)
Final		(0.4)	---	---	---	---	---	---	---	(0.1)	---	(6.8)	---	
222A	QA 12	---	---	(0.003)	---	(0.2)	---	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.0025)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)	
222B	QA 12	(0.2)	---	(0.003)	---	(0.2)	---	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.0025)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)	
222C	QA 12	(0.2)	---	(0.003)	---	(0.2)	---	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.0025)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)	
222D	QA 12	(0.2)	---	(0.003)	---	(0.2)	(0.2)	---	(0.02)	(4.9)	(0.9)	(0.06)	---	(0.2)
Final		(1.1)	---	(0.3)	(0.003)	(1.1)	---	(0.1)	---	(0.2)	(0.1)	(0.3)	(0.2)	
223A	QA 15	---	---	---	---	(0.001)	---	(0.1)	---	(1)	(0.5)	---	---	(1.5)
Final		(0.2)	---	(2.4)	---	(12)	---	---	(0.033-.037)*i*	(0.1)	---	(0.013)	---	
223B	QA 15	---	---	(0.1)	---	(0.001)	---	(0.1)	---	(1)	(0.5)	---	---	(1.5)
Final		(0.2)	---	(2.4)	---	---	---	---	(0.033-.030)*i*	(0.013)	---	---	---	

( ) and < > Indicates non-certified value.

Alcoa Aluminum Set-Up Standards (SUSs) **Please call for availability and current pricing – (303) 216-2621 or (800) 421-9454**

Grade	Ag Mn	As Mo	B Na	Be Ni	Bi P	Ca Pb	Cd Sb	Co Si	Cr Sn	Cu Sr	Fe Ti	Ga V	Hg Zn	Li Zr	Mg
SQ-10	---	---	---	---	---	---	---	---	---	---	---	---	---		---
	---	---	---	---	---	---	---	---	---	---	---	---	---		
SQ-10 is 1199 alloy (99.99% aluminum) and no analysis is issued (Used for low SUS and low point calibration)															
SQ-11	---	---	---	(0.005)	---	(0.02)	---	(0.01)	(0.25)	(0.5)	(0.2)	(0.03)	---	---	(3.0)
	(0.4)	---	---	---	---	---	(0.01)	(0.20)	---	---	(0.10)	---	(6.6)	---	
SQ-12	(0.05)	---	---	(0.005)	(0.06)	---	(0.20)	(0.01)	---	(4.8)	(0.6)	(0.03)	(0.01)	---	(0.15)
	(1.1)	---	---	(0.25)	(0.015)	(0.06)	---	(1.1)	(0.06)	---	---	(0.10)	(0.20)	(0.15)	
SQ-13	---	---	---	(0.005)	(0.04)	---	(0.04)	(0.01)	(0.04)	(0.04)	(0.6)	(0.03)	---	---	(0.04)
	(0.04)	---	---	(0.04)	---	(0.04)	---	(0.5)	(0.04)	---	(0.04)	(0.04)	(0.04)	(0.04)	
SQ-14	---	---	---	(0.002)	(0.5)	---	---	---	---	(0.5)	(0.1)	---	---	---	(0.9)
	(0.4)	---	---	(0.4)	---	(0.5)	---	(0.1)	(0.1)	---	(0.1)	---	(1.2)		
SQ-15	---	---	---	---	---	---	---	---	(0.05)	(0.5)	(0.7)	---	---	---	(1.2)
	(0.05)	---	---	(2.5)	---	---	---	(12.0)	---	(0.02)	(0.1)	---	---		
SQ-16	---	---	---	---	---	---	---	---	---	(10.0)	(1.0)	---	---	---	(0.3)
	(0.2)	---	---	(0.2)	---	---	---	(4.0)	---	---	---	---	(0.2)		
SQ-17	---	---	---	(0.005)	(0.08)	---	---	---	(0.25)	(0.35)	(0.4)	(0.03)	---	---	(1.6)
	(0.12)	---	---	(0.12)	---	(0.1)	---	(0.7)	(0.1)	---	(0.08)	(0.03)	(0.12)		
SQ-18	---	(0.01)	(0.02)	---	---	---	---	---	---	---	---	---	---	(0.02)	---
		---	(0.02)	---	---	---		---	---	---	---	---	---	---	
SQ-18 is 1075 alloy with added B, Na, and Li Typical Analysis - Weight Percent															

( ) Indicates non-certified value.

LABORATORY PROFICIENCY TESTING

"Let ARMI be a cornerstone member of your Quality Team!"

In support of "Total Quality Assurance" programs, Analytical Reference Materials International (ARMI) developed its Laboratory Proficiency Testing (PT) Program in 1991. Having been in the business of CRM characterization, statistical evaluation, and certification of standards for many years, the Company has compiled a vast database of statistical information that is easily utilized as an extremely effective quality assurance tool. This statistical information library, combined with ARMI's CRMs, composes the basis for an unrivaled PT program to support your internal Quality System.

The PT Program offers benchmark proficiency testing which is directed towards supporting internal quality assurance programs, as well as fulfilling the accreditation requirements of several accrediting bodies, such as A2LA, NADCAP, and many others. The Program can also be incorporated into ISO 9000 and ISO 17025 certification requirements.

ARMI's PT Program is a direct, tailor made program, custom designed for the individual subscribing company. The participating company selects the timing and material matrix for testing. ARMI then selects the specific material from its extensive CRM inventory and sends it to the subscriber for testing and evaluation. Once the analysis results are received, ARMI reports back within 48 hours the results of the company's testing versus the certified values for that specific material. The results are reported in an easily read graphical format that allows for instant performance level recognition. This rapid turnaround ensures the company's ability to take corrective action for any problem quickly and efficiently and furthermore, the information is kept totally confidential. Finally, since the material used for testing is from a CRM, the company also now has an actual standard for use in its daily operations.

The PT Program is NOT method or instrument specific. The Program can be used for a single technique, method, and instrument or for several techniques, methods, and instruments. The Program has the flexibility to be adapted for most any laboratory situation. Also, the PT Program is NOT a round-robin comparison. Your results are only compared against certified values and the results are returned to you within 48 hours, not 30, 60, or even 90 days.

The PT Program samples used are all actual CRMs and traceable to NIST. The analytical data used for the evaluation of the PT Program results is the same data generated by the expert members of ARMI's ILAP group. This is the same group of Industry and commercial laboratories that supports ARMI's CRM development and certification program. The data has been thoroughly critiqued, statistically evaluated, and it is free of any outliers. The end result is that by utilizing ARMI's PT Program, your performance test results are now indisputable and traceable to NIST!

Laboratory Proficiency Testing	Prices subject to change		(303) 216-2621 or (800) 421-9454
	Plan 1 - Monthly **12 Samples per Year** Unit Price per Sample	**Plan 2 - Quarterly** **4 Samples per Year** Unit Price per Sample	**Plan 3 - Bi-Annual** **2 Samples per Year** Unit Price per Sample
Carbon Steel	$160.00	$220.00	$280.00
Cast Iron (Solid Disk Only)	'N/A	$325.00	$385.00
Low Alloy Steel	$160.00	$220.00	$280.00
Tool Steel	$160.00	$220.00	$280.00
Stainless Steel	$170.00	$230.00	$290.00
High Temperature Steel	$170.00	$230.00	$290.00
Nickel Based	$185.00	$250.00	$305.00
Cobalt Based	$200.00	$265.00	$320.00
Copper Based	$160.00	$220.00	$280.00
Aluminum Based	$225.00	$285.00	$340.00
Titanium Based	$275.00	$325.00	$385.00
***New* - Magnesium**	Call for quote	Call for quote	Call for quote
Sulfur in Refined Petroleum	$70.00	$87.50	$112.50
Sulfur in Coal	$70.00	$87.50	$112.50
Sulfur & Prox in Coal	$135.00	$150.00	$175.00

Terms and Conditions

A one-time *Initial Setup & Administrative Fee* of $225.00 will be added to invoices for new customers only. This includes a subscriber, instrument, and/or technique profile plus the set up of an individual historical database. A single invoice will be issued prior to the first sample being shipped for the total subscription period. Terms are 'Net 30 days'.

Unit prices apply to one set of data points per sample. In the case of a subscriber reporting multiple data sets from a single sample, add $65.00 for each additional data set submitted. For metals, all prices include a single solid sample. Optional 10g Chip Sample Packs and/or a Pin Disk or Solid Pin Packs for C, S, O2, and N2 are available at an additional charge of $25.00 per sample pack. Subscribers desiring chip samples only will be provided an equivalent gram wieght to the standard solid sample.

Price includes hard copy reports and delivery of samples in the United States and Canada. Shipping will be added for other destinations.

Please contact ARMI for a formal price quotation.

Revised - 01/14/2010

RioTintoAlcan

RIO TINTO ALCAN
CERTIFIED REFERENCE MATERIALS
FOR SPECTROCHEMICAL ANALYSIS

ALUMINIUM AND ALUMINIUM ALLOYS

RIO TINTO ALCAN
CERTIFIED REFERENCE MATERIALS FOR SPECTROCHEMICAL ANALYSIS

CATALOGUE **PAGE**

1. INTRODUCTION

The Arvida Research and Development Centre (ARDC) produces, certifies and distributes standard samples of aluminium and its alloys for use as certified reference materials (CRM)

These standards are designed for use with direct reading optical emission spectrometers for spark emission analysis.

ARDC has produced these standards since 1949, primarily to analyse aluminium alloys produced by the Rio Tinto Alcan group.

2. INTENT OF USE

Rio Tinto Alcan Certified Reference Material (CRM) for the spectrochemical analysis of aluminium and its alloys is produced by a direct chill, continuous cast method.

The cast billets measure generally 70 mm in diameter and up to 3 m in length. They are subsequently scalped and sliced, producing about 300 to 600 disks per cast.

Each finished disk measures 57 mm in diameter by 25 mm thick. The disk is permanently stamped or labelled with:

- The Rio Tinto Alcan logo
- The reference material name
- A unique identifier indicating the source billet and the disk position within the billet.

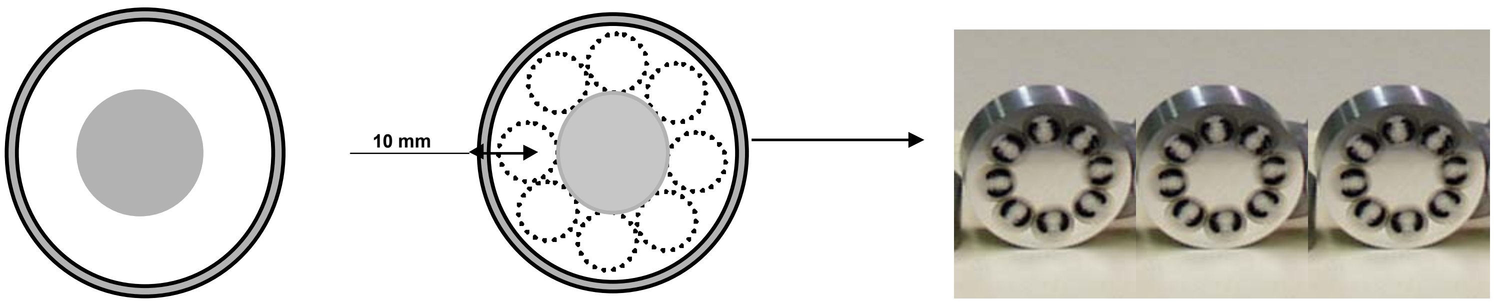
Some older standards may also have individually certified concentration values stamped on their back.

Figure 1
8079 AF "CRM" Slice 55 of Billet A

Figure 2
3104 AR "CRM" Slice 96 of Billet A

The Rio Tinto Alcan CRMs are specifically prepared and certified for the spectrochemical analysis of metallic aluminium and its alloys.

To minimize any residual effects of macro and microstructure on the spectral response, the CRMs should be analyzed by Optical Emission Spectrometric method, on the annular band at a distance of 10 mm from the edge of the sample, as specified in the Rio Tinto Alcan Method of analysis 1304 or ASTM E1251.



3. NOMENCLATURE

Rio Tinto Alcan reference material names take the form **AAAA**SSS, where “**AAAA**” is generally the identification of the alloy using the Aluminum Association nomenclature and “SSS” identifies the particular cast (series) with the exception of special CRMs (examples: the boron standards).

The series identification is two-letters, in the sequence from “AA” to “ZZ”, with an optional single letter prefix indicating the category of standard.

ARDC produces five basic types of drift RM and OES CRMs:

- **High purity standards** use HP as the alloy identification followed by the two-letter series identification, for example HP FK. HP standards are samples of aluminium with very high purity, >99.999%. They are used during the standardization of the instrument to fix the bottom of the analytical curve for alloying elements.

- **Blank standards** use the alloy identification with a “C” prefix to the two-letter series identification, for example 3104 CAP. Blank standards are aluminium alloy standards fabricated from high purity aluminium, so therefore have trace element concentrations < 1 ppm. They are used during the standardization to fix the bottom of the analytical curve generally for minor and trace elements to compensate for matrix effects of the alloying elements.

- **Working standards** use the alloy identification followed by the two-letter series identification, for example 3104 AR. They are also known as TOP standards and are generally certified for 24 or more alloying and trace elements.

- **Boron standards** are aluminium samples containing only three elements used for boron analysis. They are certified for boron, silicon and iron. Example: 1S CAM.

- **Drift samples** use the alloy identification with a “D” prefix to the two-letter series identification, for example 3104 DAS. They are aluminium alloy samples with a low concentration of trace elements.

Drift samples are very homogeneous but are not certified. They are used to determine whether the measuring instrument has drifted enough to require standardization.

4. METHOD OF ANALYSIS

Methods of analysis used for certification vary from classical wet chemistry to modern instrumental techniques. They include:

- Photometric method
- Atomic Absorption Spectrometry (AAS)
- Inductively Coupled Plasma- Atomic Emission Spectrometry and Mass Spectrometry (ICP/AES and ICP/ MS)
- Optical Emission Spectrometry (OES)
- Glow Discharge Mass Spectrometry (GDMS).

Values below 0.5 ppm are indicated by “**L**” within the catalogue, uncertified values used for alloy identification are indicated by “**N**” within the catalogue.

5. TRACEABILITY

The traceability of the certified values is ensured by the comparative use of other internationally recognized certified reference materials produced by NIST, and other suppliers of OES CRMs.

6. ASSIGNMENT OF UNCERTAINTY

The certified values listed are the mean values from several analyses, using at least two methods performed by two different analysts when possible. Generally values from an external laboratory are also included in the certification process.

Each analytical measurement has the uncertainty reported with a 95% level of confidence. The uncertainty reported for the certified value includes the standard deviation of the homogeneity within the billet (for elements not certified individually).

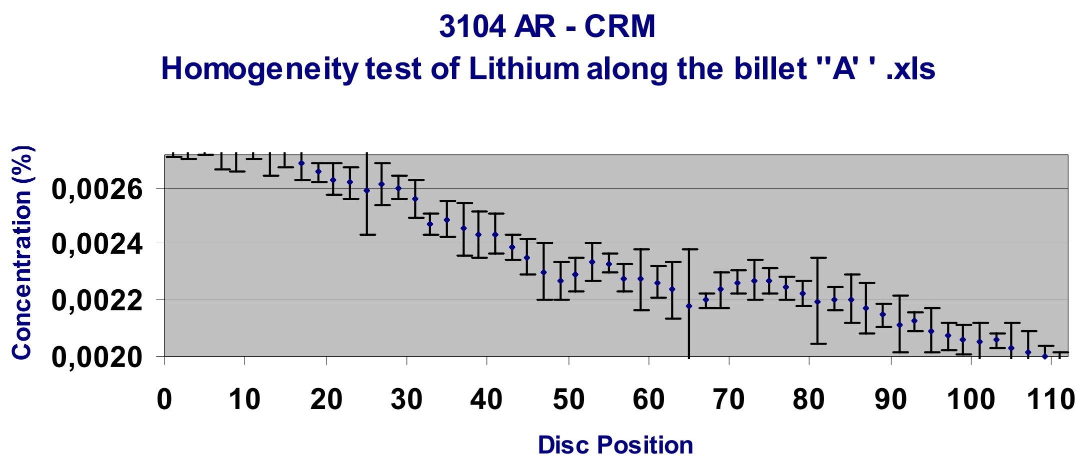
7. INDIVIDUAL CERTIFICATION

All billets are tested for cast homogeneity using OES. When indicated by the homogeneity test, each disk is assigned an individual certified value.

Homogeneity testing reveals that some elements are not always uniformly distributed, usually because of the loss (burn off) of light elements (e.g. Li, Na, Ca, Mg) during casting. In these cases, each disk is assigned an individual value as determined from the homogeneity test.

The uncertainty reported for individually certified elements is on the individual value and does not include any variation due to billet homogeneity.

Individually certified elements are indicated by an "i" on the global certificate and in the catalogue



8. CERTIFICATE OF ANALYSIS

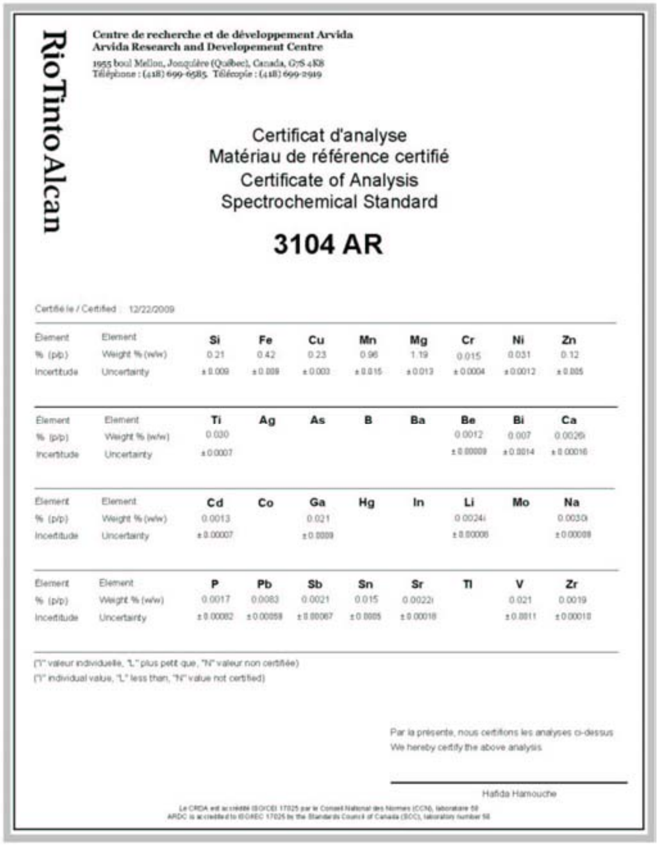
There are two formats of certificate of analysis.

- A global certificate of analysis indicates the certified values with the uncertainties and the elements individually certified.

- Individual certificates are generated for standards with individually certified elements. The certificate for each disc reports its certified composition, including the individual values.

Rio Tinto Alcan Certified Reference Materials

➢ For blank, boron and HP standards, only the global certificate is provided; these CRMs do not contain individually certified elements.



RioTintoAlcan

Centre de recherche et de développement Arvida
Arvida Research and Development Centre
1955 boul Mellon, Jonquière (Québec), Canada, G7S 4K8
Téléphone : (418) 699-6585 Télécopie : (418) 699-2919

Certificat d'analyse
Matériau de référence certifié
Certificate of Analysis
Spectrochemical Standard

3104 AR

Certifié le / Certified : 12/22/2009

Element	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn
% (p/p)	Weight % (w/w)	0.21	0.42	0.23	0.96	1.19	0.015	0.031	0.12
Incertitude	Uncertainty	± 0.009	± 0.008	± 0.003	± 0.015	± 0.013	± 0.0004	± 0.0012	± 0.005
Element	Element	Ti	Ag	As	B	Ba	Be	Bi	Ca
% (p/p)	Weight % (w/w)	0.030					0.0012	0.007	0.0026i
Incertitude	Uncertainty	± 0.0007					± 0.00009	± 0.0014	± 0.00016
Element	Element	Cd	Co	Ga	Hg	In	Li	Mo	Na
% (p/p)	Weight % (w/w)	0.0013		0.021			0.0024i		0.0030i
Incertitude	Uncertainty	± 0.00007		± 0.0009			± 0.00006		± 0.00008
Element	Element	P	Pb	Sb	Sn	Sr	Tl	V	Zr
% (p/p)	Weight % (w/w)	0.0017	0.0083	0.0021	0.015	0.0022i		0.021	0.0019
Incertitude	Uncertainty	± 0.00082	± 0.00058	± 0.00067	± 0.0005	± 0.00018		± 0.0011	± 0.00010

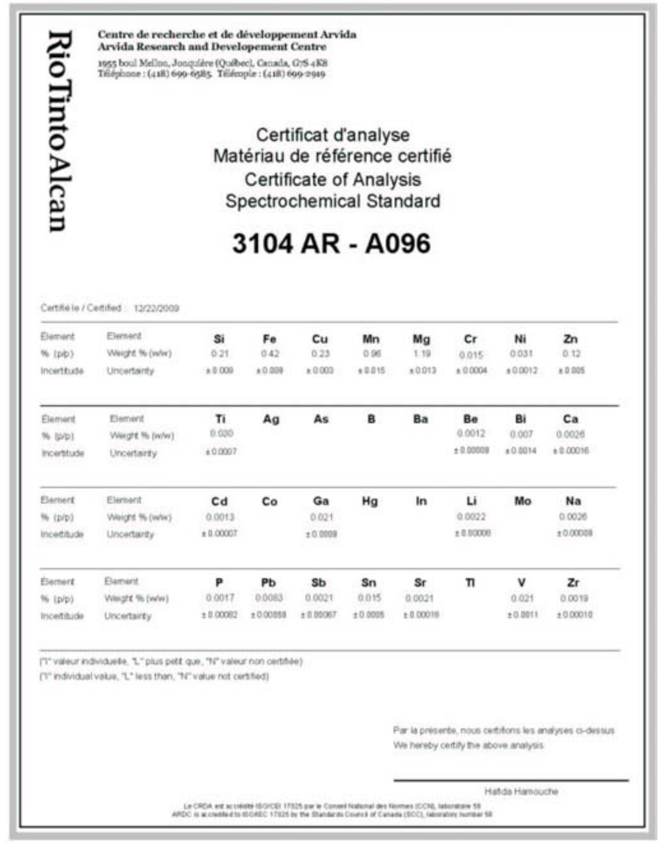
("I" valeur individuelle, "L" plus petit que, "N" valeur non certifiée)
("I" individual value, "L" less than, "N" value not certified)

Par la présente, nous certifions les analyses ci-dessus
We hereby certify the above analysis

Hafida Hamouche

Le CRDA est accrédité ISO/CEI 17025 par le Conseil National des Normes (CCN), laboratoire 58
ARDC is accredited to ISO/IEC 17025 by the Standards Council of Canada (SCC), laboratory number 58

Global Certificate



RioTintoAlcan

Centre de recherche et de développement Arvida
Arvida Research and Development Centre
1955 boul Mellon, Jonquière (Québec), Canada, G7S 4K8
Téléphone : (418) 699-6585 Télécopie : (418) 699-2919

Certificat d'analyse
Matériau de référence certifié
Certificate of Analysis
Spectrochemical Standard

3104 AR - A096

Certifié le / Certified : 12/22/2009

Element	Element	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn
% (p/p)	Weight % (w/w)	0.21	0.42	0.23	0.96	1.19	0.015	0.031	0.12
Incertitude	Uncertainty	± 0.009	± 0.008	± 0.003	± 0.015	± 0.013	± 0.0004	± 0.0012	± 0.005
Element	Element	Ti	Ag	As	B	Ba	Be	Bi	Ca
% (p/p)	Weight % (w/w)	0.030					0.0012	0.007	0.0026
Incertitude	Uncertainty	± 0.0007					± 0.00009	± 0.0014	± 0.00016
Element	Element	Cd	Co	Ga	Hg	In	Li	Mo	Na
% (p/p)	Weight % (w/w)	0.0013		0.021			0.0022		0.0026
Incertitude	Uncertainty	± 0.00007		± 0.0009			± 0.00006		± 0.00008
Element	Element	P	Pb	Sb	Sn	Sr	Tl	V	Zr
% (p/p)	Weight % (w/w)	0.0017	0.0083	0.0021	0.015	0.0021		0.021	0.0019
Incertitude	Uncertainty	± 0.00082	± 0.00058	± 0.00067	± 0.0005	± 0.00018		± 0.0011	± 0.00010

("I" valeur individuelle, "L" plus petit que, "N" valeur non certifiée)
("I" individual value, "L" less than, "N" value not certified)

Par la présente, nous certifions les analyses ci-dessus
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Hafida Hamouche

Le CRDA est accrédité ISO/CEI 17025 par le Conseil National des Normes (CCN), laboratoire 58
ARDC is accredited to ISO/IEC 17025 by the Standards Council of Canada (SCC), laboratory number 58

Individual Certificate

Slice 96 of billet A

9. PERIOD OF VALIDITY

The Rio Tinto Alcan certification is valid within the stated uncertainty for the lifetime of the CRM when used for the intended methods of analysis.

A certification revision may be required when an improved method of analysis becomes available.

10. SIGNATURES

The original unmodified certificate provided by RioTinto Alcan is valid without signature (refer to ISO Guide 31) as long as it includes, in the heading of the certificate, the name of the organization, the full address, the telephone and fax numbers, and the name of the person responsible for the information appearing on the certificate.

11. ACCREDITATION TESTING

The Arvida Research and Development Centre analytical laboratory is accredited ISO 17025 and is audited biannually by the Standard Council of Canada. The laboratory prides itself in maintaining its high standards in performing the methods of analysis referred to above. The original certification date is August 8th, 1989.

List of Rio Tinto Alcan Certified Reference Materials

(Revision 162)

Arvida Research and Developement Centre

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
HP FK	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.00000	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
1S CAF	0.065 N	0.135 N								0.029			
1S CAM	0.16	0.25								0.0082			
125 AR	5.33	0.23	1.29	0.039	0.60	0.037	0.030	0.037	0.15			0.024	
			0.014					0.033		0.029		0.017	
125 AS	4.88	0.25	1.28	0.039	0.61	0.18	0.028	0.037	0.12		0.0009	0.027	
			0.013		0.0005			0.035		0.029		0.015	
125 AT	4.83	0.63	1.17	0.22	1.08	0.023	0.032	0.16	0.068		0.0011	0.031	0.022
			0.009		0.0006	0.0014		0.036		0.032		0.015	0.018
127 AB	4.59	0.39	4.85	0.027	0.030	0.022	0.027	0.035	0.033			0.024 N	0.006
			0.016		0.0004			0.031		0.030		0.013	0.02
161 AG	11.94	0.39	0.060	0.58	0.54	0.024	0.029	0.042	0.044			0.021	
			0.02					0.026		0.026		0.01	
161 CAH	12.0 N	0.14 N	0.0001	0.0001	0.34 N	0.0001L	0.0001L	0.0001	0.0001L	0.0001	0.0001L	0.0001L	0.0001
	0.0001	0.0001L	0.0001L		0.0001L	0.0002	0.0004	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
B206 AA	0.078	0.16	4.68	0.43	0.30i	0.028	0.029	0.029	0.22		0.0008	0.009	0.0037i
	0.0011		0.017		0.0030i	0.0033i	0.003	0.011	0.0038	0.020	0.0037i	0.020	0.0030
218 AR	0.18	0.49	4.00	0.037	1.50	0.030	2.00	0.035	0.12			0.040	
								0.047		0.048			
220 AA	0.14	0.16	5.94	0.049	0.23			0.035	0.021				
													0.39
220 AB	0.012	0.048	4.50	0.005	0.011			0.016	0.009				
													0.088

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
220 AC	0.037	0.020	4.98	0.010	0.068			0.023	0.011				
													0.20
220 AD	0.10	0.095	5.55	0.021	0.15			0.034	0.019				
													0.28
220 AE	0.13	0.087	5.94	0.027	0.24			0.049	0.032				
													0.38
220 AF	0.24	0.26	6.95	0.060	0.32			0.066	0.050				
													0.48
224 CAB	2.28 N	0.45 N	3.95 N	0.002 N	0.002 N	0.001L	0.001 N	0.001L	0.001 N			0.001L	
			0.001 N					0.001L		0.001L		0.002 N	
225 AH	0.85	0.39	4.48	0.057	0.020	0.031	0.032	0.032	0.17			0.033	
			0.020					0.030		0.033		0.015	
226 AD	0.16	0.19	4.88	0.045	0.039	0.047	0.039	0.057	0.16			0.044	
								0.041		0.041			
236 AE	2.03	1.22	6.94	0.11	0.06	0.028	0.045	0.040	0.12			0.026	
			0.020					0.023		0.024		0.015	
319 AA	7.62	0.40	3.52	0.27	0.34	0.072	0.072	0.23	0.13		0.0012	0.027	0.0033
	0.0011		0.020		0.0023i	0.0022i	0.0023i	0.068	0.0027	0.064	0.0040i	0.019	0.0038
B319.1 AF	6.14	0.64	3.11	0.43	0.33	0.015	0.049	0.72	0.060		0.0017	0.022i	0.0040i
	0.0013		0.024		0.0024i	0.0026i	0.0016i	0.013	0.002 N	0.014	0.044i	0.020	0.0030
B319.1 CAG	6.30 N	0.65 N	3.34 N	0.43 N	0.32 N	0.0001L	0.0001L	0.70 N	0.0001	0.0002	0.0001L	0.0001L	0.0001L
	0.0001	0.0001L	0.0001		0.0001L	0.0001L	0.0001	0.0002	0.0002	0.0002	0.0001L	0.0001L	0.0001
A320 AC	0.54	0.20	0.057	0.036	4.10	0.020	0.032	0.047	0.15		0.005	0.037	
			0.018					0.042		0.038		0.012	
A320 CAB	0.001 N		0.003 N	0.001L	3.90 N	0.001L	0.001L	0.001L	0.001L			0.001L	
			0.001L					0.001 N		0.001L		0.001L	

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
B320 AA	0.83	0.80	0.054	0.54	3.38	0.032	0.029	0.041	0.047			0.042	
			0.017					0.041		0.040		0.011	
B320 CAB	0.76 N	0.78 N	0.003 N	0.47 N	3.4 N	0.001L	0.001L	0.001L	0.001L			0.001L	
			0.001L					0.002 N		0.001 N		0.001L	
332.0 AB	10.47	0.62	2.65	0.42	1.67	0.058	0.21	0.65	0.22i		0.0013	0.028i	0.0064
			0.031		0.0026i	0.0039i	0.001	0.030	0.0042	0.034	0.018	0.042	0.026
X332.0 AC	11.33	0.20	3.28	0.032	1.29	0.030	0.031	0.067	0.25		0.0011	0.005	0.0039
	0.0013	0.0021	0.021		0.0032	0.0062	0.0031	0.028	0.0030	0.020	0.0030	0.019	0.0030
A333.0 AE	9.08	0.78	3.53	0.32	0.076i	0.015	0.13	2.36	0.034		0.0001L	0.021	0.0039i
			0.030		0.0018i	0.0038i	0.001	0.016	0.0055	0.018	0.0029i	0.029	0.015
A333.0 AF	9.13	0.85	3.54	0.35	0.082i	0.015	0.13	2.34	0.032		0.0001L	0.021	0.0043i
			0.030		0.0015i	0.0033i	0.001	0.015	0.0057	0.017	0.0029i	0.030	0.018
A333.0 AI	9.7	0.90	3.47	0.33	0.14	0.11	0.15	2.56	0.12		0.0012	0.019	0.0021
	0.0012		0.017		0.0022i	0.0028i	0.0032i	0.13	0.0039	0.17	0.0031i	0.020	0.0029
A333.0 CAH	9.64 N	1.00 N	3.55 N	0.37 N	0.0003	0.0001	0.0001L	2.56 N	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0005	0.0001	0.0028	0.0001L	0.0001L	0.0001L	0.0001L
339.0 AD	12.73	0.48	1.40	0.37	1.23	0.051	1.12	0.099	0.048		0.0013	0.04	0.0020
			0.031		0.0009	0.0025	0.0061	0.046	0.0010	0.046	0.0021	0.032	0.0029
339.0 CAB	12.5 N	0.50 N	1.40 N	0.27 N	1.17 N	0.0004	1.10 N	0.0005	0.0007		0.0001L	0.0001	0.0004
		0.0014	0.0010		0.0001L	0.0011	0.0003	0.0001	0.0003	0.0001	0.0001	0.0008	0.0009
350 CAU	0.006 N	0.009 N	0.004 N	0.001 N	10.0 N	0.001L	0.001L	0.002 N	0.001L			0.001L	
			0.001L					0.002 N		0.001L		0.001 N	
A355.0 CAA	4.0 N	0.21 N	0.95 N	0.0001L	0.60 N	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0003	0.0001	0.0001L	0.0001L	0.0001L
356.2 AL	7.49	0.15	0.062	0.029	0.41	0.017	0.030	0.068	0.10		0.0015	0.022	0.0030i
	0.0011		0.029		0.0026i	0.0022i	0.0026i	0.014	0.0048	0.015	0.0031i	0.029	0.0034

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
356.2 AP	7.26	0.18	0.069	0.019	0.41	0.020	0.019	0.069	0.107		0.0011	0.0075	0.0040
	0.0012		0.019		0.0025i	0.0025i	0.0017	0.0081	0.0027	0.014	0.032	0.021	0.0028
356.2 AS	7.27	0.19	0.066	0.031i	0.39i	0.030	0.032	0.069	0.17		0.0012	0.0073	0.0041
	0.0009		0.018		0.0030i	0.0025i	0.0023	0.0071	0.0030	0.014	0.015	0.023	0.0028
356.2 CAR	7.14 N	0.17 N	0.0001	0.0001L	0.41 N	0.0001L	0.0001L	0.0001L	0.11 N	0.0001L	0.0001L	0.0001L	0.0001
	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
356.2 DAO	7.358 N	0.164 N	0.068 N	0.0035 N	0.422 N	0.0011 N	0.0031 N	0.0045 N	0.113 N	0.0000 N	0.0000 N	0.0042 N	0.0008 N
	0.0000 N	0.0002 N	0.0142 N		0.0000 N	0.0000 N	0.0014 N	0.0010 N	0.0004 N	0.0004 N	0.011 N	0.0122 N	0.0014 N
A380.2 AB	9.17	0.41	3.61	0.042	0.028	0.019	0.060	0.064	0.052		0.0010	0.049i	0.0030i
			0.030		0.0018i	0.0027i	0.002	0.050	0.0057i	0.056	0.0023i	0.033	0.016
A380.2 CAC	9.45 N	0.39 N	3.64 N	0.0008	0.0005	0.0006	0.0003	0.0002	0.0011	0.0002	0.0001L	0.0001L	0.0001
	0.0002	0.0001L	0.0001L		0.0001L	0.0001	0.0003	0.0001	0.0001L	0.0001	0.0001L	0.0002	0.0010
383.1 AB	11.24	0.97	2.67	0.35	0.12	0.10	0.22	2.65	0.15		0.0013	0.016	0.0033i
	0.0009		0.026		0.0030i	0.0023i	0.0020	0.10	0.0069	0.11	0.0034i	0.036	0.017
383.1 CAC	10.93 N	1.03 N	2.69 N	0.38 N	0.0001	0.0007	0.0005	2.63 N	0.0011	0.0004	0.0001L	0.0001L	0.0001L
	0.0001	0.0001L	0.0001L		0.0001L	0.0001L	0.0007	0.0004	0.0001	0.0001L	0.0001L	0.0002	0.0001L
A390.1 AA	17.70	0.38	4.84	0.052	0.62	0.050	0.051	0.047	0.13		0.0011	0.0029	0.0016
	0.0014	0.0016 N	0.016				0.0037	0.0035	0.0028	0.046		0.018	0.0032
A413.2 AD	12.06	0.40	0.033	0.039	0.026	0.016	0.031	0.030	0.031		0.0009	0.0069	0.0025i
	0.0014		0.029		0.0029i	0.0040i	0.0026	0.0080	0.0039	0.014	0.064i	0.019	0.0034
A413.2 CAE	11.74 N	0.34 N	0.0001L	0.0001L	0.0001	0.0001L	0.0002	0.0001L	0.0001L	0.001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
420 AA	0.16	0.12	0.026	0.033	0.028	0.028	0.032	4.70	0.024			0.034	
			0.014					0.032		0.10			
420 CAB			0.002 N	0.001L	0.001L	0.001L	0.001L	4.5 N	0.001L			0.001L	
			0.001 N			0.0001L		0.001L		0.001L		0.002 N	

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
443.2 CAB	5.46 N	0.35 N	0.0002	0.0001L	0.0003	0.0001	0.0001L	0.0002	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L		0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.001	0.0001L	0.0001L	0.0001L	0.0001L
A535.0 AA	0.12	0.17	0.053	0.17	7.30	0.053	0.052	0.044	0.16		0.0012	0.043i	0.0025i
	0.0012		0.021		0.0033	0.0019i	0.0010i	0.044	0.0024	0.047	0.0025i	0.020	0.0048
1050 AI	0.155	0.30	0.038	0.029	0.0272i	0.017	0.0209	0.044	0.029		0.0011	0.0082	0.0015i
	0.0013		0.022		0.0018i	0.0011i	0.0024	0.0084	0.0022	0.016	0.0022i	0.0204	0.0034
1100 AI	0.10	0.50	0.138	0.032	0.0033	0.021	0.0047	0.029	0.027	0.0023	0.0010	0.0031	0.0016i
	0.0011	0.0020	0.018	0.0021	0.0014i	0.0019i	0.0031	0.0031	0.0033	0.0035	0.0016i	0.020	0.0030
1100 AK	0.18	0.60	0.084	0.029	0.0123	0.018	0.030	0.031	0.030		0.0011	0.0056	0.0013i
	0.0011		0.020		0.0019i	0.0045i	0.0023	0.0085	0.0016	0.014	0.0018i	0.0178	0.0032
1100 AY	0.17	0.59	0.084	0.029	0.0096i	0.019	0.031	0.032	0.030		0.0009	0.0048	0.0008i
	0.0013		0.020		0.0018i	0.0057i	0.0027	0.0082	0.0021	0.014	0.0016i	0.020	0.0034
X1100 AH	0.43	0.42	0.088	0.037	0.015	0.016	0.031	0.026	0.028		0.0010	0.016	0.0021i
	0.0010		0.022		0.0014i	0.0021i	0.0038	0.013	0.0039	0.015	0.0024i	0.0215	0.0032
X1120 AB	0.094	0.15	0.47	0.16	0.018	0.021	0.021	0.019	0.021		0.0010	0.009	0.0020
	0.0012		0.019		0.0014	0.0012	0.0030	0.0085	0.0034	0.017	0.0019	0.020	0.0030
X1120 AC	0.10	0.15	0.45	0.15	0.015i	0.019	0.022	0.020	0.019		0.0010i	0.007	0.0016i
	0.0012		0.019		0.0020i	0.0021i	0.0016	0.0078	0.002	0.021	0.0019i	0.021	0.0019
1145 AD	0.098	0.38	0.038	0.032	0.030	0.021	0.031	0.036	0.028		0.0011	0.011	0.0024i
	0.0011		0.021		0.0022i	0.0024i	0.0027	0.0076	0.0040	0.018	0.0028i	0.022	0.0026
1145 AE	0.10	0.40	0.028	0.031	0.022i	0.020	0.030	0.030	0.031		0.0008	0.0082	0.0014i
	0.0011		0.019	0.0018 N	0.0019i	0.0021i	0.0025	0.0080	0.0021	0.020	0.0017i	0.020	0.0030
1170 AJ	0.085	0.17	0.029	0.023	0.026i	0.029	0.031	0.028	0.030		0.0007	0.0067	0.0024i
	0.0012		0.014		0.0031i	0.0029i	0.003	0.0076	0.003	0.020	0.0025i	0.019	0.0030
1170 AK	0.086	0.18	0.028	0.030	0.022i	0.030	0.032	0.029	0.029		0.0009	0.0079	0.0016i
	0.0012		0.019		0.0016i	0.0020i	0.0023	0.0083	0.0031	0.020	0.0018i	0.020	0.0030

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
1188 AC	0.057i	0.058	0.0059i	0.0073i	0.0050i	0.0073	0.0071	0.0071i	0.0078i		0.0008i	0.0073	0.0019i
	0.0011	0.0013	0.020	0.0021	0.0019i	0.0021i	0.0027	0.0074	0.0035	0.0069	0.0024i	0.0206	0.0030
1200 AH	0.20	0.56	0.030	0.032	0.033	0.016	0.022	0.010	0.020		0.0010	0.008	0.0025i
	0.0011		0.022		0.0022i	0.0020i	0.0036	0.009	0.0034	0.014	0.0029i	0.023	0.0026
1200 AI	0.19	0.64	0.030	0.029	0.023i	0.030	0.032	0.055	0.032		0.0011i	0.0075i	0.0029i
	0.0010i		0.019		0.0029i	0.0023i	0.0032	0.0083	0.0029	0.020	0.0032i	0.023	0.0028
2007 AA	0.46	0.41	4.24	0.58	0.56	0.023	0.075	0.071	0.024			0.14	0.0023i
			0.024		0.0014i	0.0010i		1.08		0.078		0.016	
2007 CAB	0.45 N	0.45 N	4.3 N	0.65 N	0.55 N	0.0002	0.0005	0.0001L	0.0001	0.0001L	0.0001L	0.0003	0.0001L
	0.0001L	0.0002	0.0001L		0.0001L	0.0001L	0.0001	1.1 N	0.01	0.006	0.0001	0.0002	0.0003
2011 CAB	0.13 N	0.30 N	6.0 N	0.0001L	0.0001L	0.0001L	0.0003	0.0005	0.0001L		0.0001L	0.45 N	0.0001L
	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001L	0.60 N	0.0010	0.0035	0.0001L	0.0001L	0.0001L
2014 AD	0.88	0.46	4.58	0.81	0.45	0.018	0.028	0.029	0.030		0.0014	0.025	0.0025i
	0.0014		0.026		0.0018i	0.0020i	0.0038i	0.023	0.0040	0.037	0.0024i	0.031	0.0035
2014 CAC	0.90 N	0.48 N	4.56 N	0.90 N	0.43 N	0.0001L	0.0001	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001		0.0001L	0.0001L	0.0003	0.0002	0.0002	0.0001L	0.0001L	0.0001L	0.0001L
2017 AC	0.57	0.41	4.24	0.63	0.75	0.017	0.034	0.015	0.018		0.0012	0.019	0.0025i
	0.0013		0.020		0.0025i	0.0019i	0.0031i	0.015	0.0032i	0.015	0.0028i	0.022	0.0026
2017 CAB	0.51 N	0.41 N	4.21 N	0.72 N	0.78 N	0.0001	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001
2024 AF	0.25	0.25	4.55	0.66	1.57	0.028	0.031	0.073	0.032		0.0010	0.008	0.0031i
	0.0011i		0.022		0.0030i	0.0026i	0.0023	0.0077	0.0030	0.015	0.0029	0.022	0.0024
2024 CAE	0.26 N	0.30 N	5.0 N	0.69 N	2.0 N	0.0001L	0.0001L	0.0002	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001		0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0005	0.0001L	0.0001	0.0001L
2219 AC	0.15	0.21	6.70	0.24	0.013	0.013	0.016	0.088	0.050		0.0011	0.0067	0.0011i
	0.0020		0.015		0.0012i	0.0012i	0.0021	0.0087	0.0029	0.017	0.0018i	0.092	0.13

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Arvida Research and Developement Centre

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
2219 CAB	0.15 N	0.18 N	6.53 N	0.29 N	0.0001	0.0001L	0.0002	0.0005	0.0003	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001	0.0001		0.0001L	0.0001L	0.0001	0.0001L	0.0001	0.0001L	0.0001L	0.0001	0.14 N
2618 AC	0.23	1.12	2.55	0.18	1.66	0.019	1.36	0.077	0.058		0.0010	0.011	0.0035
	0.0018	0.0022 N	0.018		0.0030i	0.0040i	0.0021	0.011	0.0027	0.021	0.0034	0.019	0.0027
2618 CAB	0.22 N	1.13 N	2.44 N	0.18 N	1.52 N	0.0005	1.43 N	0.0005	0.0010	0.0001	0.0001L	0.0001L	0.0001L
	0.0001	0.0005	0.0007		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0006	0.0003
3002 AB	0.075	0.086	0.12	0.24	0.15	0.021	0.021	0.048	0.020		0.0011	0.009	0.0027i
	0.0013		0.021		0.0018i	0.0017i	0.0041	0.008	0.0038	0.021	0.0030i	0.019	0.0020
3003 AI	0.25	0.64	0.085	1.10	0.014i	0.021	0.019	0.020	0.021		0.0010	0.008	0.0019i
	0.0012		0.020		0.0019i	0.0024i	0.0028	0.0082	0.0037	0.021	0.0017i	0.019	0.0025
X3003 AA	0.23	0.60	0.08	1.10	0.016	0.012	0.021	0.98	0.014			0.016	0.0024i
			0.011		0.0004i	0.0008i	0.0025	0.016		0.018		0.010	0.007
X3003 CAB	0.23 N	0.59 N	0.001L	1.09 N	0.001L	0.001L	0.001L	0.98 N	0.001L		0.0001L	0.001L	0.0001L
			0.001L		0.0001L	0.0001L	0.0006	0.001L		0.001L		0.001L	0.001L
3004 AO	0.23	0.48	0.21	1.20	1.24	0.029	0.027	0.13	0.029		0.0012	0.0069	0.0038
	0.0013		0.022		0.0019i	0.0028i	0.0020	0.008	0.0035 N	0.013	0.0031	0.019	0.0033
3004 CAN	0.22 N	0.62 N	0.17 N	1.23 N	1.27 N	0.0001	0.0001	0.0008	0.0004	0.0002	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0008		0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001	0.0001L	0.0001	0.0002
3005 AC	0.19	0.42	0.12	1.12	0.49	0.021	0.023	0.049	0.020		0.0012	0.012	0.0032
			0.022		0.0023i	0.0034i	0.0029	0.009	0.0041	0.017	0.0035i	0.020	0.0030
3005 AD	0.46	0.55	0.20	1.15	0.52	0.015	0.020	0.13	0.041		0.0011	0.0077	0.0026
	0.0011		0.020		0.0023i	0.0022i	0.0035	0.0080	0.0024	0.019	0.0030	0.022	0.0031
3005 CAF	0.21 N	0.44 N	0.0002	1.16 N	0.43 N	0.0001	0.0001	0.0010	0.0002	0.0002	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
X3005 AB	0.081	0.21	0.53	1.51	0.12	0.016	0.021	0.025	0.020		0.0011	0.008	0.0017
	0.0020		0.020		0.0018i	0.0018i	0.0030	0.009	0.002	0.018	0.0021	0.020	0.0018

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Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
X3005 CAC	0.19 N	0.22 N	0.59 N	1.56 N	0.16 N	0.0001	0.0001L	0.0003	0.0001	0.0001	0.0001L	0.0001	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0002
3102 AD	0.35	0.54	0.086	0.37	0.028	0.021	0.019	0.029	0.0271		0.0010	0.008	0.0016
	0.0012		0.019		0.0014i	0.0010i	0.0030	0.009	0.0035	0.021	0.0018i	0.0191	0.0040
3102 CAF	0.29 N	0.55 N	0.07 N	0.31 N	0.0002	0.0001L	0.0001L	0.0002	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
3104 AM	0.23	0.41	0.24	0.93	1.17	0.016	0.030	0.12	0.026		0.0013	0.0087	0.0031i
	0.0012		0.022		0.0032i	0.0021i	0.0024i	0.0088	0.0029	0.013	0.0035i	0.020	0.0029
3104 AN	0.22	0.44	0.25	0.95	1.20	0.016	0.032	0.13	0.031		0.0012	0.008	0.0036
	0.0012		0.016		0.0036i	0.0032i	0.0005	0.0083	0.0023	0.015	0.0032	0.019	0.0036
3104 AR	0.21	0.42	0.23	0.96	1.19	0.015	0.031	0.12	0.030		0.0012	0.007	0.0026i
	0.0013		0.021		0.0024i	0.0030i	0.0017	0.0083	0.0021	0.015	0.0022i	0.021	0.0019
3104 CAP	0.23 N	0.42 N	0.23 N	0.99 N	1.13 N	0.0001	0.0001L	0.0001	0.0001	0.0003	0.0001L	0.0001L	0.0001
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001	0.0003	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
3104 DAQ	0.17 N	0.37 N	0.16 N	0.95 N	1.12 N	0.015 N	0.010 N	0.12 N	0.008 N	0.0003 N	0.0012 N	0.0009 N	0.0024 N
	0.0009 N	0.0013 N	0.015 N		0.0017 N	0.0019 N	0.0015 N	0.0055 N	0.0015 N	0.0012 N	0.0022 N	0.011 N	0.0014 N
3104 DAS	0.17 N	0.42 N	0.19 N	0.93 N	1.21 N	0.015 N	0.009 N	0.13 N	0.0085 N		0.0013 N	0.001 N	0.0020 N
	0.0011 N		0.017 N		0.0017 N	0.0010 N	0.0020 N	0.0062 N	0.0021 N	0.0012 N	0.0016 N	0.014 N	0.0011 N
3105 AE	0.28	0.60	0.26	0.56	0.51	0.089	0.031	0.19	0.053		0.0012	0.0065	0.0024
	0.0014		0.021		0.0025i	0.0034i	0.0034	0.006	0.0038	0.0058	0.0029	0.021	0.0035
3105 CAI	0.24 N	0.54 N	0.098 N	0.52 N	0.49 N	0.099 N	0.0001L	0.16 N	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0003
3203 AG	0.33	0.54	0.052	1.14	0.032	0.029	0.033	0.039	0.029		0.0011	0.028	0.0022i
	0.0016		0.022		0.0017i	0.0021i	0.0069	0.021	0.0042	0.023	0.0023i	0.025	0.0039
3203 CAX	0.30 N	0.54 N	0.0001L	1.08 N	0.0002	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L

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Rio Tinto Alcan Certified Reference Materials

Revision:162

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Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
3204 AA	0.23	0.43	0.21	0.91	1.34	0.027	0.031	0.028	0.035		0.0010	0.017	0.0024i
			0.018		0.0016i	0.0018i	0.001	0.012		0.013	0.0026i	0.022	0.0029
3916 AA	0.22	0.17	0.75	1.38	0.025i	0.030	0.088	0.030	0.028		0.0011i	0.0087i	0.0016i
	0.0008		0.019		0.0017i	0.0021i	0.0034	0.0081	0.0033	0.020	0.0017i	0.020	0.0029
4002 AD	4.38	0.39	0.15	0.032	0.14	0.019	0.027	0.028	0.019			0.018	
	1.28		0.016					0.022		0.028		0.007	
4002 CAC	4.00 N	0.30 N	0.003	0.001L	0.003	0.001L	0.001L	0.001L	0.002		0.0001L	0.003 N	
	1.10 N		0.001L		0.0001L	0.0003	0.0009	0.001L		0.0004		0.001L	
X4002 AA	4.10	0.29	0.13	0.037	0.13	0.028	0.038	0.045	0.019			1.06i	0.0065i
	0.041		0.031		0.0022i	0.0016	0.006	0.034		0.029	0.008	0.027	0.014
X4002 CAB	3.90 N	0.30 N	0.10 N	0.0001	0.11 N	0.0001	0.0002	0.0001L	0.0001L		0.0001L	1.00 N	0.0001L
			0.0001L		0.0001L	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001	0.0001L
4007 AA	1.62	0.55	0.011	1.43	0.008	0.091	0.21	0.029	0.029		0.0011	0.007	0.0011i
	0.0012		0.019		0.0009i	0.0012i	0.0023	0.0041	0.0042	0.0022	0.0012i	0.015	0.0022
X4045 AC	10.03	0.32	0.015	0.013	0.015	0.013	0.014	0.99	0.0129		0.0009	0.008	0.0024i
	0.0013		0.016		0.0019i	0.0041i	0.0058	0.008	0.0038	0.012	0.0029i	0.0123	0.0031
X4045 CAB	9.75 N	0.33 N	0.002 N	0.003 N	0.001L	0.001L	0.001 N	1.0 N	0.003 N		0.0001L	0.001L	0.003 N
			0.001L		0.0001L	0.0001L	0.0008	0.001L		0.001L	0.0001L	0.001L	0.0001L
4104 AE	10.06	0.59	0.10	0.050	1.48	0.030	0.030	0.10	0.027		0.0012	0.11	0.0029
	0.0013		0.019		0.0024	0.0024	0.0027	0.028	0.0028	0.033	0.0030	0.019	0.0025
4104 CAD	10.0 N	0.60 N	0.10 N	0.0010	1.60 N	0.0001	0.0004	0.0005	0.0002	0.0002	0.0001L	0.10 N	0.0001L
	0.0001	0.0001L	0.0001L		0.0001L	0.0001L	0.0002	0.002	0.0011	0.0001L	0.0001	0.0001L	0.0001L
4145 AB	10.66	0.54	4.12	0.050	0.050	0.050	0.054	0.058	0.046		0.0012	0.032	0.0023
	0.0012		0.019		0.0016i	0.0018i	0.0033i	0.031	0.0038N	0.030	0.0031	0.020	0.0028
425A1 AA	4.58	0.27	0.19	0.12	0.34	0.11	0.020	0.020	0.057		0.0012	0.007	0.0026
	0.0011		0.019		0.0019i	0.0027i	0.0034	0.0067	0.0027	0.019	0.0027	0.018	0.0030

("i" individual value, "L" less than, "N" value not certified)

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Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
4343 AF	7.84	0.50	0.050	0.052	0.031	0.032	0.029	0.050	0.031		0.0013	0.037	0.0028i
	0.0010		0.023		0.0022i	0.0027i	0.0042i	0.021	0.0042	0.018	0.011	0.026	0.0029
4343 CAG	7.83 N	0.50 N	0.0001L	0.0001L	0.0005	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001L	0.0001L	0.002 N	0.0001L	0.0001L	0.0001L	0.0001L
X4343 AA	7.57	0.53	0.048	0.046	0.051	0.025	0.029	0.98	0.031		0.0016	0.019	0.0023i
			0.025		0.0004i	0.0006i	0.0019	0.016		0.017		0.028	0.026
462A1 AA	12.12	0.15	3.86	0.025	1.05	0.028	1.07	0.031	0.17		0.0011	0.009	0.0049
	0.0012		0.018		0.0029	0.0053	0.0043 N	0.0091	0.0023	0.013	0.0027	0.020	0.0035
4643 AB	3.81	0.16	0.036	0.042	0.10	0.027	0.035	0.030	0.053		0.0040	0.02	0.0054i
			0.029		0.0027i	0.0047i	0.004	0.020		0.023	0.0021i	0.012	0.006
4643 AD	3.88	0.25	0.029	0.029	0.11i	0.029	0.029	0.029	0.028		0.0012	0.0053	0.0031i
	0.0011i		0.019		0.0028i	0.0032i	0.0030	0.0077	0.0031	0.019	0.0098i	0.017	0.0032
4643 CAC	3.78 N	0.18 N	0.0001	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001L	0.0001L	0.0010	0.0001L	0.0001L	0.0001L	0.0001L
5000 CAB	0.001 N		10.0 N	0.001L	0.001 N	0.001L	0.001L	0.003 N	0.001L			0.001L	
			0.002 N					0.002 N		0.001L		0.002 N	
5001 BI	0.36	0.30	19.5	0.050	0.053	0.049	0.052	0.045	0.049		0.0012	0.052	0.0018
	0.0013		0.020		0.0020i	0.0011i	0.0039i	0.048	0.0040	0.047	0.0027i	0.025	0.0030
5001 CBG		0.02 N	20.0 N	0.001 N	0.002 N	0.001 N	0.003 N	0.001L	0.001 N			0.001L	
			0.002 N					0.002 N		0.002 N		0.002 N	
5005 AE	0.16	0.49	0.066	0.039	0.91	0.027	0.017	0.026	0.018		0.0013	0.028	0.0032i
	0.0030		0.024		0.0022i	0.0030i	0.0045i	0.014	0.0041	0.017	0.0038i	0.024	0.0032
5005 CAF	0.17 N	0.58 N	0.080 N	0.0001L	0.87 N	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
5010 AE	0.18	0.44	0.032	0.26	0.57	0.025	0.022	0.027	0.025		0.0014	0.023	0.0031i
	0.0016		0.026		0.0034i	0.0031i	0.0058i	0.016		0.018	0.0020i	0.024	0.0034

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Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
5016 AA	0.25	0.76	0.036	0.50	2.48	0.017	0.015	0.080	0.015		0.0038	0.019i	0.0031i
	0.0012		0.023		0.0028i	0.0026i	0.0014i	0.014	0.0025	0.014	0.0029i	0.023	0.0033
5017 AB	0.28	0.27	0.40	0.28	2.01	0.018	0.030	0.026	0.056		0.0035	0.013	0.0054
			0.020		0.0046i	0.0042	0.001	0.020		0.021		0.015	0.014
5017 CAC	0.25 N	0.29 N	0.38 N	0.35 N	2.00 N	0.0002	0.0003	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001	0.0003	0.0001L	0.0001L	0.0001L	0.0001	0.0001L
5017 CAD	0.36 N	0.38 N	0.19 N	0.80 N	2.0 N	0.0003	0.0005	0.0003L	0.0004	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0003L	0.0001L		0.0001L	0.0001L	0.0003	0.0001L	0.0001	0.0001L	0.0001L	0.0002	0.0002
5042 AC	0.15	0.25	0.031i	0.35	3.74	0.060	0.031	0.030	0.030		0.0013	0.009	0.0036i
	0.0012		0.020		0.0043i	0.0029i	0.0008	0.0081	0.0012	0.015	0.0028i	0.018	0.0016
5042 CAB	0.0018	0.25 N	0.0001	0.33 N	3.68 N	0.0001	0.0001	0.0002	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
5052 AM	0.19	0.24	0.075	0.072	2.59	0.27	0.032	0.031	0.059		0.0013	0.008	0.0037i
	0.0012		0.018		0.0040i	0.0027i	0.0013i	0.0076	0.0029	0.020	0.0033i	0.023	0.0026
5052 CAL	0.08 N	0.32 N	0.0001	0.0001	3.0 N	0.21 N	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L
5052 DAK	0.090 N	0.284 N	0.041 N	0.057 N	2.40 N	0.197 N	0.0051 N	0.0125 N	0.015 N	0.0002 N	0.0000 N	0.0000 N	0.0001 N
	0.0000 N	0.0003 N	0.019 N		0.0000 N	0.0001 N	0.0007 N	0.0011 N		0.0005 N	0.0000 N	0.0125 N	0.0023 N
5056 AD	0.12	0.27	0.053	0.13	4.97	0.086	0.032	0.040	0.028		0.0011	0.010	0.0023i
	0.0015		0.021		0.0031	0.0034	0.0014i	0.008	0.0032	0.012	0.0025i	0.020	0.0023
5056 CAC	0.13 N	0.29 N	0.0003	0.14 N	5.06 N	0.10 N	0.0005	0.001L	0.0006	0.0001L	0.0001L	0.001L	0.0001L
			0.001L		0.0001L	0.0001L	0.0001	0.001L		0.001L	0.0001L	0.001L	0.0001
5082 AA	0.079	0.20	0.030	0.022	4.62	0.030	0.032	0.051	0.047		0.0015	0.006	0.0010
			0.026		0.0005	0.0010		0.008		0.007		0.020	0.019
5082 CAB	0.08 N	0.20 N	0.001L	0.001L	4.57 N	0.001L	0.001L	0.001L	0.001L	0.0001L	0.0001L	0.001L	0.0001L
			0.001L		0.0001L	0.0002	0.0002	0.001L		0.0004	0.0001L	0.001L	0.001L

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Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
5083 AF	0.17	0.34	0.078	0.74	4.85	0.15	0.030	0.050	0.027		0.0012	0.008	0.0031
	0.0012		0.022		0.0039i	0.0039i	0.0014	0.0077	0.0012	0.020	0.0033	0.021	0.0035
5083 CAE	0.15 N	0.30 N	0.0001	0.68 N	5.0 N	0.13 N	0.0001L	0.0001	0.0002	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001		0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0001L	0.0001L	0.0001	0.0001L
5100 BS	0.20	3.9	0.06	0.041	0.026	0.031	0.046	0.040	0.038			0.040	0.0033N
			0.032		0.0006N	0.0006N	0.002 N	0.035		0.043		0.013	0.02
5100 CBR	0.024	3.7 N	0.003 N	0.002 N	0.001L	0.001L	0.001L	0.001L	0.001L	0.0002		0.001L	
			0.001L					0.001L				0.001L	
5154 AA	0.12	0.23	0.053	0.033	3.46	0.22	0.037	0.030	0.029		0.0012	0.013i	0.0037
			0.020		0.0020i	0.0060i	0.001	0.014	0.0025	0.015	0.0026	0.021	0.0030
5154 CAB	0.12 N	0.21 N	0.0004	0.0003	3.56 N	0.22 N	0.0002	0.0002	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L
A5154 AA	0.19	0.19	0.040	0.18	3.40 i	0.031	0.031	0.032	0.031		0.0011	0.021i	0.0027
	0.0015		0.017		0.0023	0.0012i	0.001	0.026	0.0035	0.014	0.0025i	0.024	0.0031
A5154 CAB	0.21 N	0.19 N	0.0017	0.20 N	3.53 N	0.0001	0.0003	0.0003	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001	0.0001L	0.0003	0.0001	0.0001L	0.0001	0.0002	0.0001L	0.0001L
5182 AX	0.12	0.26	0.039	0.35	5.01	0.031	0.016	0.046	0.049		0.0013	0.0089	0.0029i
	0.0013		0.023		0.0019	0.0046i	0.0014 N	0.0077	0.0028	0.014	0.0030i	0.020	0.0030
5182 BA	0.11	0.26	0.037	0.36	4.96	0.031	0.015	0.050	0.051		0.0012	0.008	0.0031
	0.0014		0.020		0.0028	0.0039i	0.0014	0.009	0.0025	0.015	0.0024	0.020	0.0031
5182 CBB	0.13 N	0.25 N	0.0001	0.33 N	4.86 N	0.0001	0.0008	0.0002	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001
	0.0001 L	0.0001 L	0.0001L	0.0001 L	0.0001L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L
5182 CBC	0.17 N	0.25 N	0.0001L	0.34 N	4.95 N	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.00000	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
5182 DAU	0.097 N	0.23 N	0.037 N	0.345 N	4.82 N	0.0011 N	0.0049 N	0.012 N	0.0059 N	0.0001 N	0.0000 N	0.0000 N	0.0002 N
	0.0000 N	0.0002 N	0.017 N		0.0000 N	0.0000 N	0.0003 N	0.0009 N		0.0005 N	0.0000 N	0.012 N	0.0022 N

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Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
5251 AD	0.21	0.33	0.089	0.33	2.30	0.031	0.020	0.047	0.030		0.0013	0.015i	0.0031i
	0.0015		0.021		0.0026i	0.0026i	0.001	0.015	0.0016	0.016	0.0022i	0.021	0.0031
5251 CAE	0.28 N	0.44 N	0.0001	0.41 N	2.20 N	0.0001	0.0002	0.0003	0.0001 L	0.0001	0.0001 L	0.0001 L	0.0002
	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001	0.0001	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L
5454 AC	0.25	0.40	0.10	0.75	3.16	0.030	0.033	0.030	0.064		0.0011	0.0048	0.0022i
	0.0014	0.0015	0.022		0.0030i	0.0038i	0.0013	0.0035	0.0032	0.0029	0.0020	0.020	0.0029
5454 CAD	0.20 N	0.32 N	0.0001 L	0.73 N	2.94 N	0.0001	0.0009	0.0004	0.0001	0.0001 L	0.0001 L	0.0001 L	0.0001
	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L	0.0001 L
5457 AA	0.078	0.082	0.13	0.25	0.93	0.014	0.021	0.020	0.029		0.0030	0.019	0.0016
			0.021		0.0028i	0.0044i	0.003	0.019		0.022	0.007	0.011	0.012
5657 AA	0.052	0.077	0.050	0.030	0.74	0.020	0.020	0.029	0.022		0.0042	0.018	0.0066i
			0.030		0.0022i	0.0027i	0.004	0.019		0.022		0.027	
5754 AD	0.15	0.24	0.048	0.26	3.15	0.11	0.030	0.11	0.048		0.0013	0.0048	0.0011
	0.0016		0.022		0.0018	0.0022	0.003	0.0032	0.0037	0.0029	0.0012	0.021	0.0031
5754 CAF	0.18 N	0.34 N	0.0001	0.32 N	2.72 N	0.0001	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001
	0.0001L	0.0001L	0.0001L		0.0001L	0.0002	0.0004	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
X5754 AE	0.38	0.35	0.057	0.45	3.18	0.051	0.031	0.056	0.053		0.0011	0.0045	0.0024i
	0.0009		0.029		0.0036i	0.0045i	0.0018	0.0038	0.0018	0.026	0.0017i	0.021	0.0024
X5754 CAF	0.35 N	0.34 N	0.0002	0.45 N	3.05 N	0.0002	0.0001L	0.0001	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
6005 AB	0.82	0.27	0.055	0.053	0.51	0.019	0.022	0.020	0.019		0.0012	0.012	0.0035
	0.0014		0.021		0.0028i	0.0018i	0.0029	0.0085	0.0040	0.017	0.0036i	0.023	0.0028
A6005 AE	0.84	0.22	0.12	0.24	0.61	0.019	0.031	0.030	0.031		0.0013	0.010	0.0031
	0.0012		0.022		0.0019i	0.0015i	0.0032	0.0084	0.0036	0.017	0.0030	0.020	0.0032
A6005 CAF	0.79 N	0.22 N	0.12 N	0.23 N	0.52 N	0.0001L	0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001	0.0002	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L

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Rio Tinto Alcan Certified Reference Materials

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Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
6006 AC	0.71	0.24	0.20	0.20	0.70	0.090	0.031	0.029	0.031		0.0012	0.0049	0.0034
	0.0012		0.021		0.0029i	0.0023i	0.0034	0.0039	0.0034	0.0035	0.0034	0.021	0.0033
6006 CAD	0.69 N	0.18 N	0.14 N	0.15 N	0.69 N	0.08 N	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
6008 AA	0.67	0.21	0.30	0.067	0.60	0.015	0.030	0.019	0.030		0.0012	0.0080	0.0035
	0.0014		0.021		0.0024I	0.0029I	0.004	0.0080	0.0032	0.013	0.0031	0.10	0.0030
6012 AF	0.13	0.21	6.05	0.28	0.020	0.047	0.045	0.049	0.14			0.038	
			0.016					0.037		0.040		0.010	
6024 AB	9.77	0.47	0.056	0.57	0.40	0.037	0.042	0.046	0.10			0.036	
			0.015					0.034		0.021		0.012	
6052 CAE	0.19 N	0.60 N	0.56 N	0.0001L	0.52 N	0.0001L	0.0001L	8.0 N	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0004L
6061 AQ	0.63	0.46	0.50	0.12	1.10	0.16	0.033	0.029	0.038		0.0013	0.006	0.0039i
	0.0013		0.020		0.0029i	0.0029i	0.0027	0.0070	0.0020	0.014	0.0030i	0.021	0.047
6061 CAR	0.70 N	0.34 N	0.31 N	0.0001	1.09 N	0.20 N	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
6061 DAO	0.646 N	0.239 N	0.299 N	0.0081 N	0.962 N	0.142 N	0.0048 N	0.013 N	0.0136 N	0.0002 N	0.0000 N	0.0000 N	0.0001 N
	0.0000 N	0.0002 N	0.017 N		0.0000 N	0.0001 N	0.0008 N	0.0010 N		0.0005 N	0.0000 N	0.012 N	0.0023 N
6063 BA	0.47	0.24	0.11	0.079	0.55	0.015	0.029	0.029	0.029	0.0014	0.0011	0.006	0.0021i
	0.0014		0.020		0.0023i	0.0019i	0.0032	0.0084	0.0026	0.014	0.0027i	0.020	0.0032
6063 BC	0.51	0.22	0.090	0.080	0.59	0.015	0.030	0.029	0.032		0.0012	0.0082	0.0029
	0.0012		0.020		0.0018i	0.0019i	0.0022	0.0080	0.0024	0.014	0.0027	0.021	0.0029
6063 CBB	0.43 N	0.20 N	0.0001	0.0008	0.53 N	0.0001L	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001	0.0004	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
6063 DAZ	0.443 N	0.197 N	0.021 N	0.078 N	0.517 N	0.0039 N	0.0048 N	0.0128 N	0.010 N	0.0003 N	0.0000 N	0.0000 N	0.0001 N
	0.0000 N	0.0003 N	0.0179 N		0.0000 N	0.0001 N	0.0008 N	0.0011 N	0.0002 N	0.0006 N	0.0000 N	0.0122 N	0.0026 N

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Arvida Research and Developement Centre

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Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
6066 AF	0.97	0.60	0.96	0.71	0.97	0.018	0.032	0.28	0.032		0.0013	0.007	0.0028
	0.0011		0.021		0.0034i	0.0039i	0.0032	0.0075	0.0026	0.014	0.0029	0.021	0.0032
6066 CAG	1.05 N	0.61 N	0.96 N	0.67 N	1.00 N	0.0002	0.0001	0.0001	0.0001	0.0004	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
6070 AC	1.25	0.26	0.33	0.74	0.75	0.019	0.019	0.021	0.021		0.0012	0.0063	0.0029
	0.0010		0.020		0.0029i	0.0033i	0.0036	0.008	0.0027	0.0069	0.0036	0.016	0.0030
6070 CAB	1.35	0.28 N	0.32 N	0.72 N	0.77 N	0.0001L	0.0001L	0.0010	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0002	0.0002	0.0004	0.0001L	0.0001L	0.0001L	0.0001L
6111 AE	0.60	0.24	0.75	0.20	0.77	0.072	0.028	0.027	0.065		0.0013	0.025	0.0023i
	0.0014		0.019		0.0025i	0.0019i	0.003	0.016	0.0031	0.018	0.0026i	0.023	0.0031
6111 CAF	0.64 N	0.15 N	0.69 N	0.17 N	0.69 N	0.068 N	0.0001	0.0001L	0.066 N	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0002
6151 AB	1.08	0.53	0.14	0.14	0.65	0.31	0.028	0.015i	0.036		0.0013	0.0079i	0.0030i
	0.0012		0.022		0.0020i	0.0016i	0.0024	0.0077	0.0017	0.014	0.0020i	0.020	0.016
6195 AE	10.70	0.70	3.45	0.43	1.05	0.027	0.028	0.93	0.017		0.001 N	0.020	0.01 N
			0.015					0.033		0.028		0.012	
6201 AD	0.68	0.25	0.021	0.018	0.72	0.019	0.022	0.021	0.020		0.0013	0.030	0.0033i
	0.0015		0.024		0.0028i	0.0026i	0.0046i	0.019	0.0043	0.021	0.0031i	0.022	0.0032
6205 AA	2.45	1.25	20.4	1.05		0.05	0.051	5.55				0.036	0.02 N
								0.04		0.052			
6235 AB	0.10	0.15	0.046	0.040	0.031	0.040	0.040	5.45	0.041			0.048	
								0.046		0.038			
6252 AE	5.41	0.33	3.01	0.60	0.33	0.034	0.041	3.46	0.12			0.029	
			0.011					0.026		0.029		0.012	
6252 CAC	5.5 N	0.02 N	3.0 N	0.60 N	0.30 N	0.001L	0.001L	3.5 N	0.003 N			0.001L	
			0.001 N					0.001L		0.001L		0.004 N	

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si / Cd	Fe / Co	Cu / Ga	Mn / Hg	Mg / Li	Cr / Na	Ni / P	Zn / Pb	Ti / Sb	B / Sn	Be / Sr	Bi / V	Ca / Zr
6261 AD	0.64	0.22	0.27	0.28	0.84	0.062	0.031	0.11	0.079		0.0011	0.0072i	0.0030i
	0.0013		0.020		0.0020i	0.0026i	0.0023	0.0075	0.0029	0.012	0.0029i	0.022	0.0034
6261 CAB	0.64 N	0.26 N	0.31 N	0.29 N	0.76 N	0.0001	0.0001	0.0001L	0.0005	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0002	0.0001L		0.0001L	0.0001L	0.0001	0.0001L	0.0002	0.0001L	0.0001L	0.0001	0.0001L
6348 AC	0.081	0.093	0.082	0.087	0.91	0.18	0.052	6.94	0.17		0.0012	0.055	0.0032
	0.0012		0.020		0.0024	0.0028i	0.0032i	0.044	0.0041	0.047	0.0034	0.023	0.0031
6348 CAD	0.08 N	0.07 N	0.0001	0.0001	0.98 N	0.14 N	0.0001L	6.98 N	0.19 N	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0003	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
6351 AK	1.08	0.23	0.061	0.56	0.65	0.033	0.031	0.049	0.051		0.0012	0.007	0.0026
	0.0012		0.020		0.0028i	0.0036i	0.003	0.0075	0.0027	0.020	0.0032	0.019	0.0025
6351 CAL	1.13 N	0.032 N	0.0001L	0.63 N	0.59 N	0.0001L	0.0001L	0.0001	0.0001L	0.0001	0.0001L	0.0001L	0.0001
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L
6363 CAB		0.02 N	1.0 N	0.001L	0.9 N	0.001L	1.7 N	0.02 N	0.001L			0.002 N	
			0.001L					0.07 N		7.0 N		0.002 N	
6392 AC	0.10	0.11	0.10	0.055	1.26	0.051	0.046	4.26	0.043		0.006 N	0.042	
			0.021					0.044		0.042		0.011	
6463 AC	0.35	0.12	0.14	0.019	0.49	0.020	0.020	0.020	0.017		0.0011	0.012	0.0033i
	0.0012		0.018		0.0024i	0.0026i	0.0048	0.007	0.0038	0.019	0.0047i	0.020	0.0031
6475 CAB	1.05 N		0.51 N	0.001L	5.0 N	0.001L	0.001L	0.001L	0.001L			0.001L	
			0.001 N					0.001L		0.001L		0.002 N	
6490 AC	9.02	0.32	0.039	0.036	0.22	0.037	0.040	0.049	0.042			0.046	0.010
		0.45	0.014		0.0010	0.0014		0.038		0.039		0.005	0.021
6495 AA	10.40	1.05	2.36	0.53	1.31	0.030	0.051	0.055	0.10			0.040	
								0.032		0.028			
7003 AC	0.14	0.28	0.15	0.12	0.90	0.18	0.030	6.23	0.032		0.0012	0.007	0.0026
	0.0016		0.020		0.0032	0.0030i	0.0031	0.008	0.0035	0.017	0.0029	0.019	0.17

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	B	Be	Bi	Ca
	Cd	Co	Ga	Hg	Li	Na	P	Pb	Sb	Sn	Sr	V	Zr
7003 CAB	0.001 N	0.002 N	0.004 N	0.001L	0.70 N	0.001L	0.001L	5.60 N	0.001L		0.001L	0.001L	0.0001
			0.001L		0.0001L	0.0001		0.001L		0.001L		0.001L	
7004 AA	0.17	0.27	0.052	0.52	1.76	0.034	0.043	5.15	0.051		0.0013	0.022 i	0.0040
	0.0014		0.030		0.0015	0.0049i	0.001	0.029	0.0028	0.032	0.0027	0.032	0.14
7010 CAD	0.10 N	0.14 N	1.83 N	0.09 N	2.41 N	0.0001L	0.0001L	6.22 N	0.0001	0.0001	0.0001L	0.0001	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0003	0.0001L	0.0001L	0.15 N
7018 AC	0.20	0.33	0.16	0.30	1.09	0.12	0.074	4.87	0.080		0.0010	0.0069	0.0033i
	0.0012		0.019		0.0027i	0.0028i	0.0021	0.0079	0.0028	0.015	0.0036i	0.018	0.16
7018 CAB	0.20 N	0.39 N	0.15 N	0.29 N	1.03 N	0.14 N	0.0003	4.81 N	0.0002	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001	0.0001		0.0001L	0.0001L	0.0001	0.0001	0.0001	0.0001L	0.0001L	0.0001	0.14 N
7019 AA	0.15	0.22	0.19	0.25	2.01	0.033	0.021	3.95	0.034		0.0001L	0.029	0.0015
			0.021		0.0009	0.0005	0.0001	0.032		0.034	0.0003	0.028	0.16
7019 CAB	0.14 N	0.20 N	0.17 N	0.24 N	2.04 N	0.0029	0.0072	4.00 N	0.0021	0.0001	0.0001L	0.0001L	0.0001L
	0.0001	0.0001	0.0054		0.0001L	0.0001L	0.0001	0.0010	0.0001L	0.0030	0.0001L	0.0010	0.13 N
7021 AA	0.22	0.38	0.029	0.037	1.48	0.033	0.035	5.42	0.041			0.027	
			0.015 N					0.033		0.031		0.012	0.16
7021 CAB	0.005	0.006	0.003 N	0.001L	1.6 N	0.001L	0.001L	5.5 N	0.001L			0.002 N	0.0001L
					0.0001L	0.0001		0.001L		0.001L			
7022 CAB	0.39 N	0.45 N	0.89 N	0.29 N	3.47 N	0.24 N	0.0002	4.84 N	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0006	0.0002	0.0001L	0.0001L	0.0003	0.0001	0.0001L
7031 AA	0.13	1.15	0.029	0.21	0.013	0.024	0.019	1.12	0.025		0.0035i	0.008i	0.0028i
			0.015		0.0032i	0.0033i	0.005	0.017		0.015		0.015	0.007
7031 CAB	0.13 N	1.23 N	0.0005	0.21 N	0.0002	0.0005	0.001	1.04 N	0.0002	0.0001L	0.0001L	0.0001L	0.0001L
			0.0001L		0.0001L	0.0001L	0.0003	0.0001L	0.0001L	0.0001L	0.0001L	0.0004	0.0001L
7050 AC	0.11	0.13	2.36	0.082	2.58	0.026	0.019	6.30	0.051		0.0013	0.021	0.0028i
	0.0011		0.023		0.0032i	0.0019i	0.0015i	0.021	0.0019	0.018	0.0036i	0.021	0.13

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
7050 CAD	0.11 N	0.15 N	2.0 N	0.08 N	2.0 N	0.0001L	0.0001L	7.0 N	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0002	0.0002	0.002	0.0001L	0.0001L	0.14 N
7075 AF	0.19	0.17	1.75	0.031	2.66	0.22	0.027	5.75	0.092		0.0011	0.007	0.0034i
	0.0009i		0.019		0.0028i	0.0029i	0.001	0.0073	0.0026	0.014	0.0032i	0.020	0.0024
7075 CAE	0.18 N	0.29 N	1.65 N	0.0005	2.58 N	0.21 N	0.0001	5.76 N	0.0002	0.0001	0.0001L	0.0001L	0.0001L
	0.0001	0.0001L	0.0001L		0.0001L	0.0001L	0.0001	0.0002	0.0001L	0.0003	0.0001L	0.0001	0.0001L
7079 AA	0.20	0.24	0.66	0.25	3.28	0.22	0.029	4.55	0.056		0.0013	0.020	0.0026
	0.0014		0.020		0.0038	0.0018	0.0015	0.014	0.0034	0.022	0.0028	0.021	0.0037
7146 AA	0.22	0.36	0.031	0.037	1.41	0.028	0.036	6.86	0.042			0.025	
			0.015					0.030		0.032		0.011	0.16
7146 CAD	0.22	0.33	0.0006	0.0029	1.39	0.0011	0.0043	6.40	0.0065		0.0001L	0.0001L	0.0001L
			0.014		0.0001L	0.0002	0.0001L	0.0027	0.0001L	0.0004	0.0002	0.010	0.15
7146 CAE	0.23	0.34			1.41			7.64					
													0.001
8006 AG	0.22	1.60	0.042	0.55	0.0030i	0.020	0.021	0.046	0.014		0.0012	0.009	0.0017i
	0.0015		0.020		0.0014i	0.0015i	0.0034	0.010	0.004	0.012	0.0019i	0.021	0.0030
8006 CAF	0.17 N	2.0 N	0.0001	0.53 N	0.0002	0.0001L	0.0001L	0.0002	0.0001	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001		0.0001L	0.0001L	0.0001	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
8007 AG	0.20	1.63	0.051	0.47	0.011	0.030	0.029	1.10	0.014		0.0023	0.017	0.0002
			0.018		0.0002	0.0001L	0.002	0.016		0.017	0.0004	0.019	0.019
8007 CAF	0.002	1.57 N	0.0008	0.55 N	0.0008	0.0007	0.0008	1.09 N	0.0002		0.0001L	0.001L	0.0001L
			0.001L		0.0001L	0.0001L	0.0004	0.001L		0.001	0.0001L	0.001	0.001L
8008 AC	0.19	1.12	0.17	0.74	0.013	0.053	0.028	0.049	0.030		0.0012	0.024	0.0022i
	0.0014		0.024		0.0017i	0.0017i	0.0042	0.016	0.0037	0.017	0.0025i	0.032	0.0039
8008 CAD	0.21 N	1.08 N	0.15 N	0.78 N	0.0001	0.0001L	0.0002	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001

("i" individual value, "L" less than, "N" value not certified)

Rio Tinto Alcan Certified Reference Materials

Revision:162

Date : 2010-10-11

Concentration reported in % (w/w)

Standard	Si Cd	Fe Co	Cu Ga	Mn Hg	Mg Li	Cr Na	Ni P	Zn Pb	Ti Sb	B Sn	Be Sr	Bi V	Ca Zr
A8011 AC	0.75	0.74	0.028	0.022	0.014i	0.020	0.021	0.021	0.020		0.0007i	0.0075	0.0009i
	0.0013		0.019		0.0009i	0.0013i	0.0029	0.0084	0.0016	0.015	0.0012i	0.019	0.0022
8015 AA	0.13	1.05	0.030	0.18	0.012	0.016	0.020	0.026	0.021		0.0033	0.02	0.0025i
			0.015		0.0026i	0.0041i	0.004	0.016		0.017	0.0016i	0.010	0.014
8015 CAB	0.13 N	1.10 N	0.0005	0.22 N	0.0003	0.0004	0.001	0.0005	0.0002	0.0001L	0.0001L	0.0001L	0.0001L
			0.0001L		0.0001L	0.0001L	0.0003	0.0001L		0.0001L	0.0001L	0.0004	0.0001L
8021 AA	0.11	1.43	0.014	0.0075	0.0048i	0.010	0.010	0.010	0.021		0.0011	0.010	0.0018
	0.0013		0.032		0.0014	0.0010i	0.0028	0.0082	0.003	0.0083	0.0020	0.022	0.0033
8030 AC	0.066	0.83	0.20	0.0032	0.018	0.020	0.024	0.014	0.003		0.0009	0.027	0.0025i
	0.0018		0.029		0.0016i	0.0018i	0.006	0.016	0.006 N	0.016	0.0027i	0.020	0.0028
8079 AD	0.201	1.11	0.020	0.018	0.0046i	0.019	0.020	0.017	0.017		0.0010	0.008	0.0016i
	0.0012		0.018		0.0014i	0.0015i	0.0032	0.008	0.0023	0.020	0.0019i	0.024	0.0017
8079 CAE	0.21 N	1.06 N	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L
	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001	0.0001L	0.0001L	0.0001L	0.0001L	0.0001L	0.0001
8081 CAB	0.003 N	0.40 N	0.97 N	0.005 N	0.001		0.003 N	0.02 N	0.002 N			0.001 N	0.0001L
			0.001 N		0.0001L	0.0001L		0.08 N		19.5 N		0.001 N	
8112 AA	0.52	0.66	0.26	0.11	0.014	0.024	0.020	0.035	0.028		0.0011	0.011	0.0025i
	0.0035		0.028		0.0012i	0.0026i	0.0056	0.008	0.0051	0.018	0.0044i	0.028	0.015
8112 AB	0.071	0.66	0.18	0.18	0.020	0.029	0.031	0.050	0.029		0.0011	0.011	0.0020
	0.0014		0.029		0.0017	0.0018	0.0036	0.011	0.0048	0.021	0.0022	0.029	0.0030
8280 CAC	1.4 N	0.4 N	1.0 N	0.001L	0.002 N	0.001L	0.45 N	0.005L	0.002 N			0.002 N	0.002 N
					0.0001L	0.0003N	0.0002	0.05 N		6.9 N	0.0001L		

("i" individual value, "L" less than, "N" value not certified)

ALCAN NON-METALLIC STANDARDS

Alcan International Limited
Arvida Research and Development Centre

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Bayer Process

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Bauxite

Percentage by Weight (Dry basis)									Determined by XRF, ICP and gravimetry
Bauxite	Loss of Mass LOM	Aluminum as AL_2O_3	Iron as Fe_2O_3	Silicon as SiO_2	Titanium as TiO_2	Zirconium as ZrO_2	Phosphorus as P_2O_5	Vanadium as V_2O_5	Sulphur* as SO_3
BXT-01	31.08 ± 0.02	58.3 ± 0.4	5.1 ± 0.2	0.95 ± 0.02	3.46 ± 0.07	0.09 ± 0.01	0.13 ± 0.02	0.07 ± 0.03	0.05
BXT-02	27.0 ± 0.1	50.9 ± 0.6	17.8 ± 0.2	1.56 ± 0.04	1.87 ± 0.04	0.05 ± 0.01	0.15 ± 0.02	0.06 ± 0.01	0.08
BXT-03	28.9 ± 0.2	54.1 ± 0.4	11.7 ± 0.2	3.79 ± 0.09	1.05 ± 0.09	0.06 ± 0.01	0.02 ± 0.01	0.04 ± 0.01	0.09
BXT-04	25.7 ± 0.1	48.5 ± 0.4	17.0 ± 0.2	2.68 ± 0.07	5.32 ± 0.06	0.06 ± 0.01	0.13 ± 0.02	0.19 ± 0.03	0.13
BXT-05	27.2 ± 0.2	46.8 ± 0.4	19.2 ± 0.2	1.98 ± 0.05	2.25 ± 0.04	0.06 ± 0.01	0.38 ± 0.02	0.11 ± 0.02	0.21
BXT-06	27.2 ± 0.3	48.7 ± 0.5	18.9 ± 0.3	0.80 ± 0.02	2.67 ± 0.04	0.07 ± 0.01	0.61 ± 0.03	0.13 ± 0.02	0.15
BXT-07	24.7 ± 0.2	44.6 ± 0.7	25.2 ± 0.6	2.41 ± 0.07	2.41 ± 0.07	0.07 ± 0.01	0.14 ± 0.02	0.07 ± 0.01	0.16
BXT-08	25.6 ± 0.2	51.5 ± 0.5	9.6 ± 0.3	3.17 ± 0.05	9.41 ± 0.05	0.10 ± 0.01	0.26 ± 0.01	0.19 ± 0.04	…
BXT-09	20.8 ± 0.1	53.4 ± 0.4	14.5 ± 0.3	7.57 ± 0.07	2.98 ± 0.06	0.12 ± 0.01	0.07 ± 0.01	0.06 ± 0.01	0.06

** Tentative values*

Bauxite

Percentage by Weight (Dry basis) — Determined by XRF, ICP and gravimetry

Bauxite	Chromium as Cr_2O_3	Calcium as CaO	Magnesium as MgO	Manganese as MnO_2	Zinc as ZnO	Potasium as K_2O	Sodium* as Na_2O	Organic Carbon as C
BXT-01	0.065 ± 0.005	0.57 ± 0.04	0.02 ± 0.01	0.02 ± 0.01	0.002 ± 0.001	0.01 ± 0.01	0.04	0.08 ± 0.01
BXT-02	0.068 ± 0.009	0.04 ± 0.02	0.09 ± 0.02	0.01 ± 0.01	0.009 ± 0.004	0.01 ± 0.01	0.04	0.07 ± 0.01
BXT-03	0.016 ± 0.02	< 0.01	0.01 ± 0.01	0.01 ± 0.01	0.002 ± 0.001	< 0.01	0.02	0.03 ± 0.01
BXT-04	0.090 ± 0.05	0.02 ± 0.01	0.05 ± 0.01	0.04 ± 0.01	0.003 ± 0.003	0.03 ± 0.01	0.02	0.12 ± 0.02
BXT-05	0.108 ± 0.003	1.13 ± 0.08	0.08 ± 0.02	0.32 ± 0.02	0.026 ± 0.003	0.01 ± 0.01	0.03	0.28 ± 0.03
BXT-06	0.134 ± 0.002	0.13 ± 0.03	0.06 ± 0.02	0.27 ± 0.04	0.023 ± 0.002	0.01 ± 0.01	0.03	0.14 ± 0.02
BXT-07	0.047 ± 0.004	0.01 ± 0.01	0.04 ± 0.01	0.08 ± 0.01	0.006 ± 0.002	0.01 ± 0.01	0.02	0.08 ± 0.01
BXT-08	0.048 ± 0.004	0.02 ± 0.01	0.04 ± 0.02	0.02 ± 0.01	0.006 ± 0.001	0.02 ± 0.01	0.02	0.07 ± 0.01
BXT-09	0.037 ± 0.004	0.01 ± 0.01	0.002 ± 0.002	0.03 ± 0.01	0.04 ± 0.01	0.01 ± 0.01	0.01	0.20 ± 0.03

** Tentative values*

Bauxite

Percentage by Weight (Dry basis) — Determined by Laboratory Bomb Digests

Bauxite	Low Temperature Extractable Alumina Al 150	Low Temperature Extractable Silica Si 150	High Temperature Net Extractable Alumina Al 225	High Temperature Extractable Silica Si 225
BXT-01	54.3 ± 0.5	0.5 ± 0.1	57.2 ± 0.4	0.9 ± 0.1
BXT-02	46.5 ± 0.7	1.1 ± 0.1	49.5 ± 0.6	1.3 ± 0.1
BXT-03	51.0 ± 0.4	2.9 ± 0.2	51.0 ± 0.5	3.6 ± 0.1
BXT-04	42.5 ± 0.4	2.3 ± 0.1	46.3 ± 0.4	2.5 ± 0.2
BXT-05	42.4 ± 0.6	1.5 ± 0.1	44.5 ± 0.6	1.7 ± 0.1
BXT-06	45.5 ± 0.6	0.5 ± 0.1	47.4 ± 0.6	0.7 ± 0.1
BXT-07	39.7 ± 0.6	0.6 ± 0.2	39.5 ± 0.8	2.1 ± 0.2
BXT-08	41.7 ± 0.4	2.9 ± 0.1	48.5 ± 0.9	3.0 ± 0.1
BXT-09	26.4 ± 1.0	5.9 ± 0.4	46.5 ± 0.8	6.8 ± 0.7

Bayer Process Red Mud

Percentage by Weight (Dry basis) — Determined by Wet Chemical Methods, ICP and XRF

Red Mud	Loss of Mass LOM	Aluminum as AL_2O_3	Iron as Fe_2O_3	Silicon as SiO_2	Titanium as TiO_2	Calcium as CaO	Sodium as Na_2O	Al 143 or g. Al_2O_3	T.E.A	Organic Carbon as C
RM-01	12.0 ± 0.2	16.8 ± 0.4	53.8 ± 0.8	5.4 ± 0.1	5.9 ± 0.2	3.5 ± 0.2	1.4 ± 0.2	0.6 ± 0.1	4.6 ± 0.3	0.36 ± 0.03
RM-02	8.4 ± 0.2	13.9 ± 0.4	30.7 ± 0.8	6.2 ± 0.2	22.6 ± 0.8	11.2 ± 0.4	3.0 ± 0.1	1.9 ± 0.3	5.7 ± 0.2	0.16 ± 0.04
RM-03	12.1 ± 0.4	13.3 ± 0.3	49.2 ± 0.8	4.6 ± 0.1	6.5 ± 0.2	8.3 ± 0.2	1.4 ± 0.1	0.4 ± 0.1	6.4 ± 0.2	0.28 ± 0.02
RM-04	12.7 ± 0.5	20.6 ± 0.3	29.0 ± 0.5	13.9 ± 0.4	6.0 ± 0.2	7.7 ± 0.3	6.8 ± 0.4	1.2 ± 0.2	6.6 ± 0.3	0.43 ± 0.07
RM-05	8.9 ± 0.3	21.9 ± 0.4	35.6 ± 0.4	15.7 ± 0.2	7.1 ± 0.1	0.9 ± 0.1	8.3 ± 0.3	1.7 ± 0.3	6.9 ± 0.2	0.22 ± 0.02
CAN	17.3 ± 0.1	27.9 ± 0.8	4.7 ± 0.1	16.5 ± 0.3	8.5 ± 0.3	13.5 ± 0.4	8.5 ± 0.3	0.2 ± 0.2	13.8 ± 0.3	0.23 ± 0.01

Alumina

Percentage by Weight (Dry basis) — Determined by XRF, ICP and gravimetry

Bauxite	Loss of Mass LOM	Sodium* as Na_2O	Silicon as SiO_2	Iron as Fe_2O_3	Calcium as CaO	Vanadium as V_2O_5	Phosphorus as P_2O_5	Gallium as Ga_2O_3	Sulphur as SO_3	Titanium as TiO_2	Zinc as ZnO
ALU-01	1.2 ± 0.1	0.27 ± 0.02	0.013 ± 0.002	0.016 ± 0.001	0.017 ± 0.001	0.002 ± 0.001	0.0005 ±0.0003	0.011 ± 0.001	0.12 ± 0.02	0.004 ± 0.001	0.001 ± 0.001
ALU-02	0.78 ± 0.06	0.25 ± 0.01	0.007 ± 0.002	0.017 ± 0.002	0.009 ± 0.002	0.002 ± 0.001	0.0005 ±0.0002	0.011 ± 0.001	0.12 ± 0.02	0.002 ± 0.001	0.002 ± 0.001
ALU-03	0.77 ± 0.08	0.44 ± 0.01	0.010 ± 0.002	0.011 ± 0.001	0.010 ± 0.001	0.001 ± 0.001	...	0.009 ± 0.001	0.05 ± 0.01	0.006 ± 0.001	0.001 ± 0.001
ALU-04	0.49 ± 0.09	0.46 ± 0.01	0.021 ± 0.005	0.017 ± 0.001	0.020 ± 0.001	0.003 ± 0.001	...	0.009 ± 0.001	0.07 ± 0.02	0.009 ± 0.001	0.001 ± 0.001
ALU-05	0.83 ± 0.08	0.37 ± 0.02	0.014 ± 0.002	0.008 ± 0.002	0.033 ± 0.001	0.001 ± 0.001	...	0.007 ± 0.001	0.13 ± 0.03	0.002 ± 0.001	0.010 ± 0.001
ALU-06	1.31 ± 0.05	0.36 ± 0.02	0.017 ± 0.003	0.008 ± 0.001	0.043 ± 0.002	0.001 ± 0.001	...	0.005 ± 0.001	0.11 ± 0.03	0.001 ± 0.001	0.009 ± 0.001
ALU-07	0.89 ± 0.10	0.46 ± 0.02	0.025 ± 0.003	0.023 ± 0.002	0.049 ± 0.001	0.004 ± 0.001	...	0.006 ± 0.001	0.17 ± 0.04	0.004 ± 0.001	0.001 ± 0.001
ALU-08	0.57 ± 0.09	0.42 ± 0.02	0.007 ± 0.001	0.022 ± 0.001	0.008 ± 0.002	0.003 ± 0.001	...	0.014 ± 0.001	0.09 ± 0.03	0.002 ± 0.001	0.001 ± 0.001
ALU-09	0.60 ± 0.05	0.42 ± 0.02	0.018 ± 0.002	0.008 ± 0.001	0.026 ± 0.001	0.001 ± 0.001	0.0002 ±0.0001	0.009 ± 0.001	0.08 ± 0.03	0.001 ± 0.001	0.001 ± 0.001
ALU-10	0.6 ± 0.1	0.37 ± 0.01	0.005 ± 0.002	0.015 ± 0.001	0.004 ± 0.001	0.002 ± 0.001	0.002 ± 0.001	0.013 ± 0.001	0.08 ± 0.01	0.002 ± 0.001	...

Alumina : Physical Properties

Alumina	Monodimensional	
	Mode (μm)	Median (μm)
CGC-70	69 ± 1	69 ± 1
CGC-95	97 ± 2	96 ± 2

Sample	Min. Bulk Density (g/cm^3)	Max. Bulk Density (g/cm^3)	Angle of repose	Air Permiability (Centidarcys)	SSA (g/cm^3)	Flowability
ALU-87	0.96 ± 0.01	1.15 ± 0.01	33.6 ± 0.7	4.3 ± 0.3	...	1*
Alpha 85	0.80 ± 0.05	...	...	...	0.88 ± 0.02	...
ALU-11	...	...	...	...	71.3 ± 0.6	...
ALU-10	0.967 ± 0.001	1.19 ± 0.01	...	...	55.6 ± 2.6	...

Sample	Attrition Index (%)	Dustiness Index (kg/t)
Al-DWS-92	15 ± 1	...
ALU-10	29.4 ± 1.8	0.54 ± 0.03
Perra-88	...	1.4 ± 0.2

DSC-DTA Standards									
	DSC-1	DSC-2	DSC-3	DSC-4	DSC-5	DSC-6	DSC-7	DSC-8	DSC-9
$Al(OH)_3$	0	0.5 ± 0.1	1.0 ± 0.1	2.0 ± 0.1	5.0 ± 0.4	10.0 ± 0.3	15.0 ± 0.3	20.0 ± 0.4	25.0 ± 0.2
	DSC-10	DSC-12	DSC-13	DSC-14	DSC-15	DSC-16			
AlOOH	0	1.0 ± 0.3	2.0 ± 0.2	5.0 ± 0.1	10.0 ± 0.2	20.0 ± 0.3			

** Tentative Values*

Alumina : Physical Properties-Particle Sizing

Alumina	Ro-TAP (Woven Sieves)						Wet Sieving				
	>150 μm (%)	>106 μm (%)	>75 μm (%)	>53 μm (%)	>45 μm (%)	Median (μm)	>45 μm (%)	>33 μm (%)	>20 μm (%)	>10 μm (%)	>5 μm (%)
Al-WDS-92	2.5 ± 0.4	14 ± 1	44 ± 2	76 ± 1	87 ± 1	70 ± 1	89 ± 1	96 ± 1	98 ± 1	...	...
C 71 RG	...	...	...	...	...	...	0.7 ± 0.2	2.3 ± 0.3	6.4 ± 1.0	23.4 ± 1.1	46.8 ± 1.7
ALU-10	0.0 ± 0.1	8.7 ± 1.6	55.7 ± 3.3	80.8 ± 1.6	86.6 ± 1.6	75.9 ± 1.4	...	...	...	...	...

Alumina	Electric Zone Sensing (Elzone-1 capillary)									
	>149 μm (%)	>105 μm (%)	>74 μm (%)	>53 μm (%)	>45 μm (%)	>33 μm (%)	>20 μm (%)	Median (μm)	Q_{25} (μm)	Q_{75} (μm)
CFX	1.7 ± 0.9	14.5 ± 2.1	55.7 ± 3.1	88.8 ± 0.8	95.2 ± 0.6	99.2 ± 0.1	99.9 ± 0.1	78 ± 2	94 ± 2	64 ± 1
CFY	0.8 ± 0.6	12.7 ± 1.6	44.4 ± 2.3	75.9 ± 1.7	85.6 ± 1.4	96.0 ± 0.7	99.8 ± 0.1	71 ± 1	90 ± 2	53 ± 1
CFZ	0.6 ± 0.3	8.7 ± 1.4	43.5 ± 1.9	80.7 ± 1.9	89.6 ± 0.8	96.6 ± 0.5	99.6 ± 0.1	71 ± 1	87 ± 1	57 ± 1

Electrolysis

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Green Petroleum Coke

Percentage by Weight (Dry Basis)				Determined by XRF, ICP and gravimetry		
Green Coke	DF	DG	DH	DI	DJ	DL✓
Fe	0.028 ± 0.003	0.023 ± 0.002	0.019 ± 0.001	0.017 ± 0.001	0.027 ± 0.001	0.010 ± 0.001
Mn	0.0003 ± 0.0001	0.0002 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001	0.0005 ± 0.0001	0.0003 ± 0.0001
Ni	0.050 ± 0.005	0.038 ± 0.002	0.021 ± 0.003	0.004 ± 0.001	0.003 ± 0.001	0.012 ± 0.001
Si	0.022 ± 0.002	0.014 ± 0.001	0.006 ± 0.001	0.013 ± 0.001	0.12 ± 0.01	0.018 ± 0.001
Zn	0.006 ± 0.001	0.0011 ± 0.0002	0.0008 ± 0.0001	0.0008 ± 0.0001	0.0004 ± 0.0001	0.0003 ± 0.0001
Ca	0.028 ± 0.001	0.0130 ± 0.0005	0.004 ± 0.001	0.007 ± 0.001	0.015 ± 0.001	0.011 ± 0.001
V	0.040 ± 0.003	0.035 ± 0.002	0.034 ± 0.002	0.004 ± 0.001	0.0030 ± 0.0005	0.006 ± 0.001
S	1.58 ± 0.03	1.59 ± 0.04	2.40 ± 0.03	1.02 ± 0.02	0.64 ± 0.01	0.78 ± 0.04
Ti	...	...	...	...	...	...
Na	...	...	...	...	...	0.021 ± 0.001
Ash	...	...	...	...	...	0.20 ± 0.03
Volatile Matters	...	...	...	...	...	10.4 ± 0.2

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Calcined Petroleum Coke

Percentage by Weight (Dry Basis)					Determined by XRF, ICP and gravimetry				
Calcined Coke	CAA✓	CAB	BR	BS	PCC-01	PCC-02	PCC-03	PCC-04	PCC-05
Fe	0.029 ± 0.003	0.025 ± 0.003	...	0.038 ± 0.003	...	...		...	
Mn	...	...	...	...	...	...		...	
Ni	0.008 ± 0.001	0.011 ± 0.002	...	0.018 ± 0.003	...	...	Being certified for real density and ash.	...	Being certified for real density and ash.
Si	0.011 ± 0.001	0.019 ± 0.002	0.011 ± 0.001	0.033 ± 0.003	...	...		...	
Zn	...	...	...	...	...	...		...	
Ca	0.021 ± 0.001	0.11 ± 0.01	...	0.014 ± 0.002	...	...		...	
V	0.018 ± 0.001	0.021 ± 0.001	0.027*	0.024 ± 0.001	...	...		...	
S	...	2.49 ± 0.05	2.06 ± 0.04	2.10 ± 0.02	...	...		...	
Na	...	...	...	...	...	...		...	
Ash	...	...	...	...	...	...		...	
Real Density g/cm^3	...	...	...	...	...	...		...	
Bulk Density g/cm^3	...	...	...	...	0.898 ± 0.004	0.86 ± 0.01		0.871 ± 0.003	

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Anthracite

Percentage by Weight (Dry Basis)					Determined by XRF, ICP and gravimetry			
Anthracite	Fe	Ni	Si	Ca	V	S	Ash	Real Density g/cm3
AU	0.32 ± 0.02	0.004*	1.8 ± 0.1	0.083 ± 0.005	0.004*	0.57 ± 0.01	7.8 ± 0.1	1.76 ± 0.01
DM	0.32 ± 0.02	0.003*	1.9 ± 0.1	0.17 ± 0.01	0.004*	0.40 ± 0.02	8.6 ± 0.1	1.85 ± 0.01

**Tentative values*

Metallurgical Coke

Percentage by Weight (Dry Basis)						Determined by XRF, ICP and gravimetry				
Metallurgical Coke	Fe	Mn	Ni	Si	Zn	Ca	V	S	H	Ash
AS✓	0.45 ± 0.03	...	...	2.3 ± 0.1	...	...	...	0.84 ± 0.02	...	...
AZ✓	0.77 ± 0.01	...	...	2.4 ± 0.1	...	0.099 ± 0.002	0.005 ± 0.001	1.05 ± 0.01	...	...
BY✓	0.60 ± 0.03	...	0.002 ± 0.001	2.4 ± 0.1	...	0.085 ± 0.002	0.004 ± 0.001	0.96 ± 0.02	...	10.0 ± 0.1
CA✓	0.40 ± 0.01	...	...	2.64 ± 0.03	...	0.066 ± 0.002	<0.001	0.65 ± 0.01	0.50 ± 0.02	10.1 ± 0.1
CB✓	0.36 ± 0.02	...	0.011 ± 0.002	1.62 ± 0.05	...	...	0.003 ± 0.001	0.54 ± 0.01	...	7.5 ± 0.1

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Pitch Elemental Composition

Percentage by Weight (Dry Basis)					Determined by XRF, ICP and gravimetry		
Pitch	Pitch-02	Pitch-03	Pitch-04	Pitch-05	Pitch-06	Pitch-07	Pitch-08
Fe	0.032 ± 0.002	0.042 ± 0.003	0.015 ± 0.002	0.059 ± 0.006	0.027 ± 0.002	0.032 ± 0.003	...
Mn	0.0004 ± 0.0001	0.0005 ± 0.0001	0.0009 ± 0.0001	0.0004 ± 0.0001	0.0003 ± 0.0001	0.0010 ± 0.0001	...
Ni	0.0004 ± 0.0001	0.0004 ± 0.0001	0.0003 ± 0.0001	0.0004 ± 0.0001	0.0003 ± 0.0001	0.0004 ± 0.0001	...
Si	0.041 ± 0.002	0.066 ± 0.006	0.075 ± 0.008 ¥	0.154 ± 0.007 ¥	0.082 ± 0.006 ¥	0.0080 ± 0.0005	...
Zn	0.0085 ± 0.0003	0.010 ± 0.001	0.047 ± 0.003	0.016 ± 0.001	0.0074 ± 0.0005	0.074 ± 0.007	...
Ca	0.0150 ± 0.0005	0.017 ± 0.003	0.0076 ± 0.0004	0.0066 ± 0.0009	0.0042 ± 0.0003	0.0082 ± 0.0006	...
V	0.0002 ± 0.0001	0.00010 ± 0.00005	0.0001 ± 0.0001	0.00020 ± 0.00006	0.00010 ± 0.00003	0.00003 ± 0.00001	...
S	0.53 ± 0.02	0.76 ± 0.04	1.05 ± 0.05	0.54 ± 0.02	0.50 ± 0.02	0.57 ± 0.02	0.55 ± 0.03
Na	0.042 ± 0.001	0.021 ± 0.002	0.011 ± 0.001	0.0020 ± 0.0006	0.013 ± 0.001	0.011 ± 0.001	...
Pb	0.0097 ± 0.0003	0.012 ± 0.001	0.036 ± 0.002	0.027 ± 0.002	0.0081 ± 0.0003	0.051 ± 0.005	...
Ti	0.0018 ± 0.0002	0.0015 ± 0.0001	0.0003 ± 0.0001	0.0025 ± 0.0002	0.0015 ± 0.0002	0.00030 ± 0.00003	...
P	...	0.0027 ± 0.0002	0.0066 ± 0.0009	0.0030 ± 0.0001	0.0003 ± 0.0001	0.0018 ± 0.0001	...
C	...	...	...	...	...	...	93.5 ± 0.4
H	...	...	...	...	...	...	4.1 ± 0.1

¥ *Not to be used for XRF calibration*

Raw Fluorspar

Percentage by Weight (Dry Basis) — Determined by Wet Chemistry, ICP and XRF

Raw Fluorspar	F	Si	CO_2	Fe	Al	Mg	Pb	P
CAA	35.4 ± 0.4	8.3 ± 0.4	3.3 ± 0.1	0.46*	…	…	…	0.0038 ± 0.0001
CAB	35.0 ± 0.4	8.6 ± 0.5	3.3 ± 0.2	…	…	…	…	0.0038 ± 0.0001
CAC	35.6 ± 0.5	8.5 ± 0.4	2.6 ± 0.2	0.57 ± 0.03	…	…	…	0.0041 ± 0.0001
CAG✓	40.5 ± 0.3	2.61 ± 0.05	5.5*	…	…	…	…	0.021 ± 0.002
CAH✓	37.2 ± 0.3	6.4 ± 0.2	2.6*	0.43 ± 0.03	…	…	…	0.048 ± 0.002
CAI✓	30.0 ± 0.3	9.3 ± 0.4	4.9*	0.77*	1.10*	0.48*	0.25*	0.0070 ± 0.0005
CAJ✓	46.4 ± 0.5	0.42*	0.7*	0.063*	…	…	…	0.025 ± 0.001
CAK✓	44.8 ± 0.5	0.47 ± 0.02	3.30 ± 0.01	0.10 ± 0.01	0.095*	…	…	0.0052 ± 0.0004

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Fluorspar Final Concentrate

Percentage by Weight (Dry Basis) — Determined by Wet Chemistry, ICP and XRF

Fluorspar Final Concentrate	F	Si	CO_2	Fe	Al	Mg	Pb	P
CAA	47.2 ± 0.7	0.72 ± 0.05	0.37 ± 0.02	0.028*	…	…	…	0.0021 ± 0.0005
CAB	45.6 ± 0.4	1.20 ± 0.05	1.58 ± 0.02	…	…	…	…	0.0021*
CAC	47.2 ± 0.4	0.51 ± 0.05	0.53 ± 0.05	0.03 ± 0.01	…	…	…	0.0021 ± 0.0001
CAL	44.8 ± 0.5	0.34 ± 0.02	3.42 ± 0.06	0.09 ± 0.01	0.074*	…	…	0.0048 ± 0.0002
CBG✓	43.5*	2.87*	2.99*	…	…	…	…	…
CBI	45.4*	0.58*	1.98*	0.077*	…	0.42*	…	…

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Electrolytic Bath

Percentage by Weight (Dry basis) — Determined by Wet Chemistry, XRD and XRF

Bath	Calcium as CaF_2	Ratio NaF / AlF_3	Excess AlF_3	Magnesium as MgF_2	Free Alumina	Alpha Alumina	Chloride as NaCl	Lithium as LiF
BA-01	6.2 ± 0.1	1.06 ± 0.01	12.4 ± 0.2	...	7.0 ± 0.1	1.5 ± 0.1	...	...
BA-02	5.7 ± 0.1	1.12 ± 0.01	10.8 ± 0.3	...	2.7 ± 0.1	0.3 ± 0.1	...	...
BA-03	5.7 ± 0.1	1.46 ± 0.01	0.9 ± 0.1	...	4.1 ± 0.2	< 0.2	...	...
BA-04	7.4 ± 0.1	1.25 ± 0.01	6.4 ± 0.2	...	5.5 ± 0.1	3.2 ± 0.1	...	...
BA-05	4.5 ± 0.1	1.02 ± 0.01	11.3 ± 0.3	...	23.6 ± 0.4	17.3 ± 0.3	...	...
BA-06	4.5 ± 0.1	1.00 ± 0.01	12.2 ± 0.3	...	23.3 ± 0.4	16.7 ± 0.2	...	...
BA-07	8.3 ± 0.1	1.23 ± 0.01	6.9 ± 0.2	...	6.8 ± 0.1	5.3 ± 0.2	...	...
BA-08	9.0 ± 0.1	1.37 ± 0.01	3.2 ± 0.1	...	7.3 ± 0.1	4.6 ± 0.2	...	...
BA-09	9.5 ± 0.1	1.44 ± 0.01	1.3 ± 0.1	...	7.8 ± 0.1	5.8 ± 0.2	...	...
BA-10	6.7 ± 0.1	1.30 ± 0.01	5.2 ± 0.2	...	6.0 ± 0.1	4.9 ± 0.2	...	...

Electrolytic Bath (Cont.)

Percentage by Weight (Dry basis) — Determined by Wet Chemistry, XRD and XRF

Bath	Calcium as CaF_2	Ratio NaF / AlF_3	Excess AlF_3	Magnesium as MgF_2	Free Alumina	Alpha Alumina	Chloride as NaCl	Lithium as LiF
BA-11	8.1 ± 0.1	1.46 ± 0.01	1.1 ± 0.1	...	5.3 ± 0.1	2.9 ± 0.1	...	...
BA-12	6.0 ± 0.1	...	3.8 ± 0.3▲	0.21 ± 0.01	4.2 ± 0.2	2.8 ± 0.2	...	2.72 ± 0.05
BA-13	5.4 ± 0.1	...	0.6 ± 0.2▲	0.24 ± 0.03	4.2 ± 0.2	0.7 ± 0.1	...	2.47 ± 0.04
BA-14	3.65 ± 0.04	...	1.4 ± 0.3▲	3.40 ± 0.07	3.3 ± 0.1	1.9 ± 0.1	...	2.04 ± 0.06
BA-15	6.9 ± 0.1	...	5.7 ± 0.2▲	0.28 ± 0.03	6.0 ± 0.1	4.4 ± 0.2	...	0.95 ± 0.02
BA-16	6.3 ± 0.1	...	3.7 ± 0.3▲	0.22 ± 0.02	4.0 ± 0.1	3.3 ± 0.2	...	3.08 ± 0.02
BA-17	5.4 ± 0.1	...	0.6 ± 0.3▲	0.16 ± 0.03	5.1 ± 0.1	3.4 ± 0.1	...	2.61 ± 0.04
CCB✓	21.3 ± 0.3	1.71 ± 0.01	-3.9 ± 0.3	0.19 ± 0.02	2.6 ± 0.1	...	...	...
CCC✓	9.2 ± 0.2	...	...	0.25 ± 0.03	4.0 ± 0.2	...	...	...
CCE✓	4.0 ± 0.1	1.51 ± 0.01	-0.2 ± 0.2	0.19 ± 0.02	10.6 ± 0.2	...	...	...

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▲ Not intended for XRD calibration

Aluminum Fluoride

Percentage by Weight (Dry Basis) — Determined by Wet Chemistry, ICP and XRF

Aluminum Fluoride	Fe	Si	Na	F	S	P	Ca
ALF-01	0.009 ± 0.002	0.070 ± 0.005	0.32 ± 0.02	62.0 ± 0.4	0.28 ± 0.01	0.0100 ± 0.0005	0.017 ± 0.002
ALF-02	0.010 ± 0.002	0.130 ± 0.005	0.26 ± 0.02	63.0 ± 0.4	0.26 ± 0.01	0.0100 ± 0.0005	0.014 ± 0.002
ALF-03	0.009 ± 0.002	0.120 ± 0.005	0.27 ± 0.02	64.3 ± 0.4	0.25 ± 0.01	0.0090 ± 0.0005	0.014 ± 0.002
ALF-04	0.007 ± 0.002	0.100 ± 0.005	0.29 ± 0.02	63.0 ± 0.4	0.31 ± 0.01	0.0090 ± 0.0005	0.016 ± 0.002
ALF-05	0.006 ± 0.002	0.090 ± 0.005	0.29 ± 0.02	63.3 ± 0.4	0.10 ± 0.01	0.0060 ± 0.0005	0.015 ± 0.002
CAA	0.056 ± 0.004	0.50 ± 0.01	1.16 ± 0.03	60.4 ± 0.5	0.11 ± 0.03	0.0017 ± 0.0001	0.026 ± 0.002
CAB	0.056 ± 0.004	0.42 ± 0.01	1.00 ± 0.05	57.2 ± 0.5	0.16 ± 0.03	0.0026 ± 0.0002	0.024 ± 0.001
CAC	0.049 ± 0.004	0.68 ± 0.01	0.92 ± 0.05	61.8 ± 0.5	0.20 ± 0.03	0.0017 ± 0.0002	0.024 ± 0.001
CAN	0.018 ± 0.002	0.100 ± 0.005	0.22 ± 0.02	62.4 ± 0.4	0.23 ± 0.01	0.0090 ± 0.0005	0.160 ± 0.005
CAO	0.020 ± 0.002	0.130 ± 0.005	0.69 ± 0.02	57.7 ± 0.4	…	0.0040 ± 0.0005	0.180 ± 0.005

Scrubber Alumina

Percentage by Weight (Dry Basis)
Determined by Wet Chemistry

Scrubber Alumina	F
CAD	2.30 ± 0.05
CAE	0.75 ± 0.05
CAF	1.95 ± 0.05
CDH$^{\delta}$	0.074 ± 0.004

$^{\delta}$ *Metallurgical Alumina*

Cryolite

Percentage by Weight (Dry Basis) — Determined by Wet Chemistry, ICP and XRF

Cryolite	Fe	Si	Al	S	Na	F
CAA	0.053 ± 0.007	0.26 ± 0.05	13.5 ± 0.3	1.71 ± 0.07	30.6 ± 0.4	40.5 ± 1.1
CAB	0.067 ± 0.01	0.16 ± 0.03	11.9 ± 0.3	2.59 ± 0.07	30.1 ± 0.4	44.3 ± 0.9
CAC	0.039 ± 0.007	0.24 ± 0.03	11.9 ± 0.3	2.16 ± 0.07	32.9 ± 0.4	44.7 ± 0.9
CAG	0.013 ± 0.001	0.035 ± 0.002	12.2 ± 0.3	1.28 ± 0.09	31.9 ± 0.4	47.7 ± 0.6

Pitch Physical Properties

	expressed as percentage					g / ml	°C		
Pitch	Ash (700°C)	Ash (900°C)	Coking Value	Quinoline Insoluble	Toluene Insoluble	Real Density	Softening Point	EVT_1	EVT_{100}
PITCH-02	0.37 ± 0.3	…	…	…	…	…	…	…	…
PITCH-08	0.17 ± 0.01	1.16 ± 0.01	60.9 ± 0.7	14.4 ± 0.3	28.5$^{\delta}$	1.34 ± 0.01	111.6 ± 0.4	167 ± 1	121 ± 2

$^{\delta}$ *Certification in Progress*