Brammer Standard Company, Inc.

Certificate of Analysis

BS 130/1 to 130/3

Reference Material for High Carbon Ferrochromiun

	BS 130/1 Certified[1] Values	EU[2]	BS 130/2 Certified[1] Values	EU[2]	BS 130/3 Certified[1] Values	EU[2]
Cr	51.60	0.12	52.61	0.15	49.01	0.22
Si	4.46	0.17	2.12	0.07	6.25	0.20
Mn	1.20	0.07	0.45	0.02	0.76	0.02
P	0.016	0.004	0.013	0.002	0.014	0.002
C	7.06	0.10	7.76	0.09	6.54	0.07
S	0.034	0.003	0.045	0.002	0.029	0.003
Mo	(0.005)[3]		(0.005)		(0.005)	
Cu	(0.015)		(0.015)		(0.010)	
Sn	(0.001)		(0.001)		(0.001)	
Pb	(0.0002)		(0.0002)		(0.0003)	
V	(0.41)		(0.41)		(0.39)	
Ti	(0.16)		(0.16)		(0.18)	

[1] The certified value listed is the present best estimate of the true value based on the results of an interlaboratory testing program.

[2] The uncertainties listed are based on value judgments of the material inhomogeneity and the 95% confidence interval. The half-width confidence interval C(95%) is shown on page 2.

[3] Data in parentheses are not certified and are provided for information only.

Revision: This certificate has been revised to show the statistics used to produce the certified values and estimates of uncertainty. Additional digit shown for Cr. Original Mn value for BS 130/3 changed from 0.77% to 0.76% to be consistent with the rounding rule.

Co-operating Laboratories in the 1976 and 1977 testing program:

Allegheny Ludlum Steel, Brackenridge, Pennsylvania
Anderson Laboratories, Milwaukee, Wisconsin
Booth Garrett & Blair, Ambler, Pennsylvania
Carpenter Technology, Reading, Pennsylvania
R. M. Hardy & Associates Ltd., Edmonton, Alberta, Canada
Ledoux & Company, Teaneck, New Jersey
Andrew S. McCreath & Son, Harrisburg, Pennsylvania
Union Carbide, Marietta, Ohio

Certified by: _____ on August 20, 2009
Beau R. Brammer

See the following page for more information.
Previous certificate numbers were CC277 and 130-061587

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Analysis	Cr	Si	Mn	P	C	S	Mo	Cu	Sn	Pb	V	T i
1	51.41	4.34	1.13	0.012	6.92	0.030	0.002	0.018	0.001	0.0002	0.39	0.16
2	51.51	4.43	1.13	0.014	6.99	0.030	0.009	0.012	0.001	0.0002	0.43	
3	51.56	4.45	1.14	0.015	7.02	0.032						
4	51.58	4.60	1.16	0.016	7.06	0.034						
5	51.69		1.23	0.018	7.09	0.034						
6	51.74		1.27	0.022	7.15	0.037						
7	51.74		1.27		7.21	0.038						
8			1.28									
Average	51.604	4.455	1.201	0.0162	7.063	0.0336	0.0055	0.0150	0.0010	0.0002	0.410	
Std Dev	0.125	0.108	0.068	0.0035	0.098	0.0032						
Certified	51.60	4.46	1.20	0.016	7.06	0.034	(0.005)	(0.015)	(0.001)	(0.0002)	(0.41)	(0.16)
t	2.45	3.18	2.36	2.57	2.45	2.45						
C(95%)	0.115	0.172	0.057	0.0037	0.091	0.0029						

BS 130/2

Analysis	Cr	Si	Mn	P	C	S	Mo	Cu	Sn	Pb	V	Ti
1	52.40	2.04	0.42	0.010	7.65	0.044	0.002	0.012	0.001	0.0002	0.39	0.16
2	52.58	2.04	0.44	0.012	7.69	0.044	0.009	0.018	0.001	0.0002	0.43	
3	52.60	2.11	0.45	0.012	7.72	0.046						
4	52.70	2.11	0.46	0.014	7.75	0.046						
5	52.75	2.18	0.46	0.014	7.83	0.047						
6		2.22	0.47	0.016	7.89							
Average	52.606	2.117	0.450	0.0130	7.755	0.0454	0.0055	0.0150	0.0010	0.0002	0.410	
Std Dev	0.135	0.073	0.018	0.0021	0.090	0.0013						
Certified	52.61	2.12	0.45	0.013	7.76	0.045	(0.005)	(0.015)	(0.001)	(0.0002)	(0.41)	(0.16)
t	2.78	2.57	2.57	2.57	2.57	2.78						
C(95%)	0.167	0.076	0.019	0.0022	0.094	0.0017						

BS 130/3

Analysis	Cr	Si	Mn	P	C	S	Mo	Cu	Sn	Pb	V	Ti
1	48.77	6.06	0.74	0.011	6.44	0.025	0.001	0.009	0.001	0.0002	0.36	0.18
2	48.80	6.10	0.75	0.013	6.51	0.026	0.009	0.012	0.001	0.0003	0.41	
3	48.91	6.13	0.75	0.014	6.51	0.028						
4	49.08	6.27	0.78	0.014	6.52	0.029						
5	49.21	6.44	0.78	0.015	6.60	0.031						
6	49.31	6.52	0.79	0.016	6.64	0.032						
7						0.035						
Average	49.013	6.253	0.765	0.0138	6.537	0.0294	0.0050	0.0105	0.0010	0.0003	0.385	
Std Dev	0.222	0.191	0.021	0.0017	0.072	0.0035						
Certified	49.01	6.25	0.76	0.014	6.54	0.029	(0.005)	(0.010)	(0.001)	(0.0003)	(0.39)	(0.18)
t	2.57	2.57	2.57	2.57	2.57	2.45						
C(95%)	0.233	0.200	0.022	0.0018	0.075	0.0032						

Data in parentheses are not certified and are provided for information only.

C(95%) = (t x sd)/√n The half-width confidence interval, where t is the appropriate Student's t value, sd is the interlaboratory standard deviation, and n is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:2006 section 6.

CAUTION: For best results, throughly mix the ferroalloy material immediately before weighing. It is important to use various particle sizes when weighing. “Sampling of the sample” weighing techniques should be used. Pour approximately 5 g. of the material onto glazed paper and take small portions from various areas of the 5 g. sample when weighing for analysis.