

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 863A

Copper Alloy 863

Copper	64.1	Silicon	0.034
Tin	0.013	Manganese	3.00
Lead	0.022	Phosphorus	(0.007)
Zinc	24.8	Arsenic	0.010
Iron	2.41	Antimony	0.003
Nickel	0.29	Carbon	0.003
Aluminum	5.21	Sulfur	<0.0005

(analysis listed as percent by weight)

Some of the co-operating laboratories were:

Brammer Standard Co., Inc., Houston, Texas
Colonial Metals, Columbia, Pennsylvania
J. Dirats and Co., Inc., Westfield, Massachusetts
Metals Analysis Inc., Huntington Park, California
Technical Service Laboratories Inc., Mississauga, Ontario, Canada
VHG Labs, Manchester, New Hampshire

See data on reverse side.

Certificate No. 863A-060591

Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al	Si
1	63.93	0.010	0.016	24.63	2.34	0.27	5.16	0.031
2	63.97	0.011	0.017	24.65	2.38	0.28	5.17	0.033
3	64.12	0.0115	0.020	24.792	2.39	0.28	5.18	0.035
4	64.16	0.012	0.022	24.90	2.40	0.291	5.20	0.0355
5	64.16	0.014	0.025	24.92	2.42	0.298	5.25	
6	64.29	0.014	0.0252	24.98	2.44	0.30	5.32	
7	64.33	0.017	0.026	24.99	2.49	0.311		
8						0.312		
Average	64.137	0.0128	0.0216	24.837	2.409	0.293	5.213	0.0336
Std Dev	0.149	0.0024	0.0041	0.150	0.048	0.015	0.061	0.0021
Certified	64.1	0.013	0.022	24.8	2.41	0.29	5.21	0.034

Analysis	Mn	P	As	Sb	Ag	C	S
1	2.92	0.002	0.008	0.0011	0.010	0.0021	0.0002
2	2.95	0.0022	0.0094	0.002		0.0026	<0.0001
3	2.989	0.007	0.0098	0.002		0.0031	<0.0005
4	3.00	0.0074	0.011	0.0036			
5	3.01	0.010		0.0038			
6	3.02	0.014		0.0039			
7	3.04						
8	3.06						
Average	2.999	0.0071	0.0096	0.0027		0.0026	
Std Dev	0.046	0.0046	0.0012	0.0012		0.0005	
Certified	3.00	(0.007)	0.010	0.003		0.003	<0.0005

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

Chemical analyses were made on millings from cross-sections of the bars. The individual values listed above are the average of each analyst's results.

Methods of analysis used were a combination of ASTM Standard Methods E 54-86a, E 62-89, E 478-89a, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 37e, 158a, 393, 394, 400, 454; BAM 222, 223, 224, 227, 228, 361; IPT 10a, 15; BCS 183/3.

This Reference Material was tested for homogeneity using ASTM Standard Method E 826 and found acceptable. It was also examined by optical emission spectrometry and found to be compatible with NIST Certified Reference Materials SRM 1103, 1104, 1107, C1110, C1111, C1115, C1119.

A Material Safety Data Sheet (MSDS) is not required for this material. This material will not release or otherwise result in exposure to a hazardous chemical, under normal conditions of use. Inquiries concerning this Reference Material should be directed to:

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14603 Benfer Road
Houston, Texas 77069 USA

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Fax: (281) 440-4432

Certified by _____ on June 5, 1991.
G. R. Brammer