Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 932A

Alloyed Copper

Copper	82.9	Silicon	<0.01
Tin	6.26	Manganese	<0.002
Lead	7.09	Phosphorus	0.005
Zinc	3.35	Arsenic	0.014
Iron	0.068	Antimony	0.097
Nickel	0.12	Sulfur	(0.05)
Aluminum	<0.01	Carbon	(0.006)

(analysis listed as percent by weight)

Some of the co-operating laboratories were:

Brammer Standard Co., 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. 932A-110190A

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069-2895
Telephone (281) 440-9396 Fax (281) 440-4432

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Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al
1	82.84	6.19	7.02	3.31	0.063	0.105	0.003
2	82.94	6.22	7.08	3.31	0.065	0.109	0.0032
3	82.97	6.27	7.09	3.35	0.0656	0.12	<0.001
4	83.02	6.28	7.10	3.35	0.070	0.12	<0.001
5		6.28	7.11	3.36	0.071	0.12	<0.01
6		6.29	7.12	3.37	0.072	0.123	
7				3.39			
Average	82.943	6.255	7.087	3.349	0.0678	0.116	
Std Dev	0.076	0.040	0.036	0.030	0.0037	0.007	
Certified	82.9	6.26	7.09	3.35	0.068	0.12	<0.01

Analysis	Si	Mn	P	As	Sb	C	S
1	0.00092	0.0002	0.0048	0.011	0.094	0.0027	0.045
2	0.001	0.001	0.0049	0.014	0.095	0.0043	0.046
3	<0.001	<0.0001	0.005	0.014	0.096	0.0068	0.054
4	<0.01	<0.002	0.0058	0.014	0.0976	0.0087	
5			0.006	0.0153	0.098		
6					0.10		
Average			0.0053	0.0137	0.0968	0.0056	0.0483
Std Dev			0.0006	0.0016	0.0022	0.0027	0.0049
Certified	<0.01	<0.002	0.005	0.014	0.097	(0.006)	(0.05)

This material was produced by continuous casting into bar form. Chemical analyses were made on millings from cross-sections of the bars. The values listed above are individual laboratory analytical results. Data in parentheses are not certified but provided for information only.

Methods of analysis used were a combination of ASTM Standard Methods E 53-86a, E 478, plus additional ICP, and AA spectrometric methods. The following Certified Reference Materials were used to validate the analytical data listed above: NIST SRM 872, BAM 227, BAM 228, BCS 183/4, and IPT 10A.

This Reference Material was tested for homogeneity by optical emission spectrometry using ASTM Standard Method E 826 and found acceptable. NIST had no similar Certified Reference Materials procurable in solid form for spectrometric comparison during the testing of this material.

Inquiries concerning this Reference Material should be directed to:

Brammer Standard Co., Inc.
14603 Benfer Road
Houston, Texas 77069-2895
USA

Phone: (281) 440-9396
Fax: (281) 440-4432

Certified by: G. R. Brammer _____
on November 1, 1990