

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 655A

Copper Alloy 655

Copper	95.74	Silicon	3.14
Tin	0.07	Manganese	0.91
Lead	0.008	Phosphorus	(0.004)
Zinc	0.02	Arsenic	<0.002
Iron	0.075	Antimony	<0.002
Nickel	0.008	Carbon	(0.0006)
Aluminum	(0.002)	Sulfur	(0.0003)

(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. REV655A-062791

Brammer Standard Company, Inc., 14603 Benfer Road, Houston, TX 77069
Telephone (281) 440-9396 Telex 775376 Fax (281) 440-4432

Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al
1	95.69	0.067	0.0077	0.014	0.071	0.007	0.001
2	95.72	0.067	0.0079	0.016	0.0719	0.0071	0.0013
3	95.72	0.0683	0.008	0.0166	0.072	0.0075	0.003
4	95.79	0.077	0.0083	0.020	0.0747	0.0076	0.004
5	95.799	0.082	0.009	0.023	0.075	0.008	
6		0.085		0.035	0.078	0.009	
7					0.080		
Average	95.744	0.0744	0.0082	0.0208	0.0747	0.0077	0.0023
Std. Dev.	0.048	0.0080	0.0005	0.0077	0.0034	0.0007	0.0014
Certified	95.74	0.07	0.008	0.02	0.075	0.008	(0.002)

Analysis	Si	Mn	P	As	Sb	C	S
1	3.11	0.898	0.001	0.00063	0.00014	0.0005	0.0003
2	3.13	0.899	0.002	0.001	0.00051	0.0006	
3	3.14	0.904	0.0034	0.0013	<0.002		
4	3.16	0.909	0.006	<0.002			
5	3.16	0.91	0.0071				
6		0.93					
Average	3.140	0.908	0.0039			0.0006	
Std. Dev.	0.021	0.012	0.0026			0.0001	
Certified	3.14	0.91	(0.004)	<0.002	<0.002	(0.0006)	(0.0003)

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

Chemical analyses were made on millings from cross-sections of the bars. The values listed above are individual laboratory analytical results.

Methods of analysis used were a combination of ASTM Standard Methods E 54-80, 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 871, SRM 872; German BAM 227, BAM 228, BAM 361; British BCS 183/4, and Brazilian IPT 10A, IPT 15.

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 the following NIST Certified Reference Materials: NIST SRM 1111 through 1117.

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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Houston, Texas 77069-2895 USA

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Fax: (281) 440-4432

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