Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 510A

Copper Alloy 510

Copper	95.10	Silicon	<0.003
Tin	4.6	Manganese	<0.002
Lead	0.016	Phosphorus	0.11
Zinc	0.21	Arsenic	0.0008
Iron	0.005	Antimony	(0.003)
Nickel	0.020	Carbon	(0.0006)
Aluminum	<0.002	Sulfur	0.008

(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. REV510A-082097

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

BS 510A Certificate No. 510A-009241

Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al
1	95.04	4.46	0.015	0.19	0.004	0.019	0.0001
2	95.08	4.51	0.0159	0.20	0.0046	0.0191	<0.0001
3	95.17	4.56	0.0167	0.209	0.005	0.020	<0.001
4		4.62	0.017	0.213	0.006	0.020	<0.002
5		4.69	0.018	0.225	0.006	0.022	
6		4.73		0.23			
Average	95.097	4.595	0.0165	0.211	0.0051	0.0200	
Std. Dev.	0.067	0.104	0.0011	0.015	0.0009	0.0012	
Certified	95.10	4.6	0.016	0.21	0.005	0.020	<0.002

Analysis	Si	Mn	P	As	Sb	C	S
1	0.001	0.0001	0.090	0.0008	0.0013	0.0005	0.0065
2	0.001	0.001	0.091	0.0008	0.0021	0.0006	0.0078
3	0.002	<0.001	0.109	0.00083	0.003		0.009
4	<0.001	<0.001	0.112		0.0035		0.009
5		<0.002	0.116		0.005		
6			0.118		0.0053		
Average			0.1060	0.00081	0.0034	0.0006	0.0081
Std. Dev.			0.0124	0.00002	0.0016	0.0001	0.0012
Certified	<0.003	<0.002	0.11	0.0008	(0.003)	(0.0006)	0.008

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 54-80, 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 394, 400, 871, 872; German BAM 227, 228, 361; Brasilian IPT 10a, 15; British BCS 183/4.

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 SRMs 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:

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

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

Certified by _____ on August 20, 1997.
G. R. Brammer