

Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 360A

Copper Alloy 360

Copper	61.42	Silicon	<0.005
Tin	0.13	Manganese	0.0007
Lead	2.51	Phosphorus	0.001
Zinc	35.63	Arsenic	0.002
Iron	0.151	Antimony	0.008
Nickel	0.058	Carbon	(0.0032)
Aluminum	<0.001	Sulfur	(0.0003)

(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. 360A-060591

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

BS 360A

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Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al
1	61.40	0.118	2.45	35.53	0.144	0.056	0.0008
2	61.41	0.12	2.473	35.58	0.149	0.057	0.00092
3	61.413	0.126	2.51	35.62	0.151	0.057	<0.001
4	61.44	0.129	2.53	35.65	0.152	0.058	
5		0.13	2.54	35.752	0.154	0.0587	
6		0.132	2.55		0.156	0.059	
7		0.137				0.063	
Average	61.416	0.127	2.509	35.626	0.1510	0.0584	
Std. Dev.	0.017	0.007	0.040	0.083	0.0042	0.0023	
Certified	61.42	0.13	2.51	35.63	0.151	0.058	<0.001

Analysis	Si	Mn	P	As	Sb	C	S	Ag
1	0.001	0.0006	0.00098	0.00092	0.0063	0.0032	0.0003	0.0045
2	0.0013	0.0007	0.001	0.0016	0.007			
3	0.003	0.0007	0.001	0.0019	0.0091			
4	<0.005	0.0008		0.0021	0.0093			
5		0.0008		0.0025				
Average		0.00072	0.0010	0.0018	0.0079			
Std. Dev.		0.00008		0.0006	0.0015			
Certified	<0.005	0.0007	0.001	0.002	0.008	(0.0032)	(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 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:

Brammer Standard Co., Inc.
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Houston, Texas 77069 USA

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

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