

Brammer Standard Company, Inc.

# Certificate of Analysis

B.S. 314B

Copper Alloy 314

Copper	89.8	Silicon	0.01
Tin	0.001	Manganese	0.001
Lead	1.68	Phosphorus	0.0007
Zinc	8.58	Arsenic	0.002
Iron	0.013	Antimony	0.001
Nickel	0.006	Carbon	0.002
Aluminum	0.001	Sulfur	(0.002)

*(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. 314B-060591

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

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Analysis	Cu	Sn	Pb	Zn	Fe	Ni	Al
1	89.72	0.0010	1.59	8.49	0.008	0.005	0.0007
2	89.76	0.0011	1.63	8.54	0.010	0.005	0.001
3	89.88	0.0013	1.65	8.57	0.013	0.0058	0.0013
4		0.0015	1.66	8.59	0.014	0.006	0.0015
5			1.70	8.61	0.015	0.006	
6			1.725	8.62	0.016	0.0062	
7			1.79	8.65			
Average	89.787	0.0012	1.678	8.581	0.0127	0.0057	0.0011
Std. Dev.	0.083	0.0002	0.066	0.054	0.0031	0.0005	0.0004
Certified	89.8	0.001	1.68	8.58	0.013	0.006	0.001

Analysis	Si	Mn	P	As	Sb	C	S
1	0.007	0.0009	0.0006	0.0021	0.0007	0.002	0.0016
2	0.008	0.001	0.00067	0.0025	0.001	0.002	
3	0.019	0.001	0.0008	0.0028	0.0013	0.0027	
4		0.0012			0.002		
Average	0.0113	0.0010	0.0007	0.0025	0.0013	0.0022	
Std. Dev.	0.0067	0.0001	0.0001	0.0004	0.0006	0.0004	
Certified	0.01	0.001	0.0007	0.002	0.001	0.002	(0.002)

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:

Brammer Standard Co., Inc. Phone: (281) 440-9396  
 14603 Benfer Road Fax: (281) 440-4432  
 Houston, Texas 77069-2895 USA

Certified by: \_\_\_\_\_ on June 5, 1991.

G. R. Brammer