Brammer Standard Company, Inc.

Certificate of Analysis

B.S. 857B-1

Reference Material for Brass CDA Grade 857

	Certified Value[1]	Estimate of Uncertainty[2]		Uncertified Value[3]
		Analysis listed as percent by weight		
Cu	**61.3**	0.15	Sb	(0.002)
Sn	**1.14**	0.04	As	(0.001)
Pb	**1.22**	0.03	Ag	(0.002)
Zn	**34.91**	0.10		
P	**0.004**	0.001		
Ni	**0.61**	0.02		
Fe	**0.30**	0.01		
Si	**0.004**	0.001		
Al	**0.35**	0.02		
Mn	**0.003**	0.001		

[1] The certified value listed is the present best estimate of the true value based on the results of an interlaboratory testing program.

[2] The uncertainties listed are based on value judgments of the material inhomogeneity and the 95% confidence interval. The half-width confidence interval C(95%) is shown on page 2.

[3] Data in parentheses are not certified and are provided for information only.

See reverse side for more information.

Certificate Number 857B-1-021099p1

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

Analysis	Sn	Pb	Zn	P	Ni	Fe	Si	Al	Mn	Cu
1	1.08	1.184	34.83	0.0028	0.5706	0.29	0.0032	0.333	0.0017	61.18
2	1.11	1.195	34.85	0.0029	0.597	0.291	0.0034	0.336	0.002	61.191
3	1.12	1.203	34.8561	0.003	0.604	0.292	0.0035	0.342	0.0024	61.314
4	1.12	1.21	34.91	0.0036	0.611	0.30	0.0038	0.345	0.0025	61.34
5	1.13	1.22	34.91	0.004	0.618	0.3020	0.0038	0.356	0.0033	61.4
6	1.13	1.24	34.92	0.0047	0.622	0.302	0.004	0.3615	0.005	61.43
7	1.14	1.24	35.0012		0.622	0.3028	0.0043	0.362		
8	1.154	1.24	35.01		0.632	0.303		0.3625		
9	1.17	1.253			0.633	0.305		0.365		
10	1.22	1.26				0.314		0.367		
11	1.22									
Average	1.145	1.225	34.911	0.0035	0.6122	0.3002	0.0037	0.3530	0.0028	61.309
Std Dev	0.044	0.026	0.067	0.0007	0.0196	0.0074	0.0004	0.0128	0.0012	0.104
Certified	1.14	1.22	34.91	0.004	0.61	0.30	0.004	0.35	0.003	61.3
t	2.2281	2.2622	2.3646	2.5706	2.306	2.2622	2.4469	2.2622	2.5706	2.5706
C(95%)	0.029	0.018	0.056	0.0008	0.0151	0.0053	0.0003	0.0091	0.0013	0.110

continued from above

Analysis	Sb	As	Ag
1	0.00058	0.00014	0.0018
2	0.0007	0.0003	0.0019
3	0.0017	0.0007	0.0023
4	0.0031	0.0009	
5	0.0040	0.001	
Average	0.0020	0.0006	0.00200
Std Dev	0.0015	0.0004	0.00026
Certified	(0.002)	(0.001)	(0.002)
t	2.7764	2.7764	4.3027
C(95%)	0.0019	0.0005	0.00066

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

$C_{(95\%)} = (t \times sd)/\sqrt{n}$ *The half-width confidence interval, where t is the appropriate Student's t value, sd is the interlaboratory standard deviation, and n is the number of acceptable mean values. For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.*

Certification Process: The requirements of ISO Guide 31, ISO Guide 34, ISO Guide 35, and ASTM Standard Guides E 1724 and E 1831 were followed for the preparation of this reference material and certificate of analysis. This is a reference material as defined by ISO Guide 30.

Analysis: Chemical analyses were made on chips prepared by a lathe from the certified portion of the bars. The laboratories participating in the testing normally followed the requirements of ISO Guide 25. The individual values listed above 2 are the average of each analyst's results. Methods of analysis used were a combination of ICP, OES, GFAA and AA spectrometric methods plus classical wet methods.

Co-operating Laboratories: The co-operating laboratories were:

Anarem, Praha, Czech Republic
Brammer Standard Co., Inc., Houston, Texas
China National Analysis Center for Iron and Steel, Beijing, China
J. Dirats and Co., Inc., Westfield, Massachusetts
Laboratory Testing Inc., Dublin, Pennsylvania
Leco Corporation, St. Joseph, Michigan
Shiva Analyticals (India) Ltd., Bangalore, India
VHG Laboratories, Inc., Manchester, New Hampshire

Homogeneity: This Reference Material was tested for homogeneity using ASTM Standard Practice E 826 and found acceptable.

Traceability: This Reference Material was also examined by optical emission spectrometry and found to be compatible with the following Certified Reference Materials: NIST 1107, 1108; CTIF L3, UZ30, 9862, 9863. Materials used to validate the analytical data listed on page 2 were: NIST 37e, 52c, 398, 494, 498, 879; BAM 224-1; BCS 183/3, 364.

Source: This material was produced by Western Reserve Manufacturing Company, Inc., Lorain, Ohio. The material was produced by continuous casting.

Available Form: This Reference Material is available in the form of a disc, approximately 39 mm in diameter and 12 mm thick.

Use: This Reference Material is intended for use in optical emission and x-ray spectrometric methods of analysis.

Sample Preparation: For best analytical results, use the same method for preparing the analytical surface on all reference materials as you use for production specimens. Avoid overheating the disc during surface preparation.

Safety Notice: 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 77069-2895 USA

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

Certified by: _____ on February 10, 1999
G. R. Brammer

By Certificate Number R-021, the Quality System of Brammer Standard Company, Inc., is registered to ISO 9002 by the American Association for Laboratory Accreditation (A2LA).

Brammer Standard Company's Chemical Laboratory is accredited to ISO Guide 25 by A2LA. (Certificate Number 656.01)

References:

ASTM documents available from ASTM, 1916 Race Street, Philadelphia, PA, 19103.

E 826 - 85 (Reapproved 1990) Standard Practice for Testing Homogeneity of Materials for the Development of Reference Materials

E 1724 - 95 Standard Guide for Testing and Certification of Metal and Metal-Related Reference Materials

E 1831 - 96 Standard Guide for Preparing Certificates for Reference Materials Relating to Chemical Composition of Metals, Ores, and Related Materials.

ISO Guides available from American National Standards Institute, 11 West 42nd St., 13th Floor, New York, NY 10036.

ISO Guide 25 (Third edition, 1990), General requirements for the competence of calibration and testing laboratories.

ISO Guide 30 (Second edition, 1991), Terms and definitions used in connection with reference materials.

ISO Guide 31 (First edition, 1981), Contents of certificates of reference materials.

ISO Guide 33 (First edition, 1989), Uses of certified reference materials.

ISO Guide 34 (First edition, 1996), Quality system guidelines for the production of reference materials.

ISO Guide 35 (Second edition, 1989), Certification of reference materials - General and statistical principles.

Other useful documents available from NIST, U.S. Department of Commerce, Gaithersburg, MD 20899.

NIST Special Publication 260-100, Handbook for SRM Users

NIST Special Publication 829, Use of NIST Standard Reference Materials for Decisions on Performance of Analytical Chemical Methods and Laboratories