Department of Commerce
Malcolm Baldrige
Secretary
National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards Certificate of Analysis

Optical Emission and X-ray Spectroscopic Analysis

NBS No.[1]	[2] C1100	1101 [3]	[3] C1101	1102 C1102
Element		Percent		
Copper	67.4_3	69.6_0	69.5_0	72.8_5
Zinc	32.2_0	30.2_6	30.3_4	27.1_0
Lead	0.106	0.05	0.05	0.020
Iron	.072	.037	.037	.011
Tin	.055	.016	.016	.006
Nickel	.052	.013	.013	.005
Aluminum	.008	.0006	.0006	.0007
Antimony	.018	.012	.012	.005
Arsenic	.019	.009	.009	.004
Beryllium	$.001_5$	$.0005_5$	$.0005_5$	$.0000_3$
Bismuth	.0010	$.000_4$	$.000_4$	$.000_5$
Cadmium	.013	$.005_5$	$.005_5$	$.004_5$
Manganese	.003	$.005_5$	$.005_5$	$.004_5$
Phosphorus	.010	$.002_0$	$.002_0$	$.004_8$
Silicon	(.010)[4]	(.005)	(.005)	(.002)
Silver	.019	.003	.003	.0010
Tellurium	$.003_5$	$.001_5$	$.001_5$	$.000_3$

The value listed for a certified element is the present best estimate of the "true" value based on the results of the analytical program. The value listed is not expected to deviate from the "true" value by more than ± 1 in the last significant figure reported; for a subscript figure, the deviation is not expected to be more than ± 5. Based on the results of homogeneity testing, maximum variations within and among samples are estimated to be less than the uncertainty figures given above.

1/ Size and metallurgical condition: 1100 series are wrought samples 1 1/4 in. in diameter, 3/4 in. thick, C1100 series are chill-cast samples 1 1/4 in. square, 3/4 in. thick.
2/ The wrought material for this standard is not available.
3/ Small differences in the copper and zinc contents made necessary the separate analysis of the wrought and chill-cast material for this standard.
4/ Values in parentheses are not certified, but are given for information on the composition.

November 9, 1981
Washington, D. C. 20234
Revision of Certificates dated
8-20-62, 7-31-64 and 8-1-79.

George A. Uriano, Chief
Office of Standard Reference Materials

(Over)

The material for each standard was melted and cast at the Naval Research Laboratory, Washington, D. C. High-purity metals were used either directly or in the preparation of master alloys. Approximately 650-pound heats were melted under a charcoal cover in a high-frequency induction furnace and the molten metal cast on a massive water-cooled plate to provide rapid unidirectional solidification. The casting for each standard was about 27 in. in diameter and 3 1/2 in. thick.

The material for the chill-cast samples was obtained from the area of the casting nearest the chill-cast face. Samples were finished to a size 1 1/4 in. square, 3/4 in. thick, and each has the NBS number marked on the face opposite to the chill-cast or test surface. (In addition, a specimen serial number has been placed on one side face.)

The material for the wrought samples was obtained after removal of the chill-cast material and discard of about 3/4 in. thickness from the slab top. Strips of this material were forged, fully annealed, and finished to samples 1 1/4 in. in diameter, 3/4 in. thick.

The homogeneity of the standards material was investigated by metallographic studies and by optical emission and chemical analyses at the National Bureau of Standards; and by optical emission and chemical analyses by Task Group 3; Subcommittee V of ASTM Committee E-2. The homogeneity was found to be satisfactory.

Samples for chemical analysis were prepared in the form of millings taken from the cross section of the finished samples of both the chill-cast and wrought material. Chemical analyses were made by Robert Alvarez, R. K. Bell, Robert W. Burke, A. R. Landgrebe, E. E. Maczkowske, E. June Maienthal, Gilbert W. Smith, and R. K. Wolford, Division of Analytical Chemistry, National Bureau of Standards, Washington, D. C.; O. P. Case and Mrs. Kathleen M. O'Brien, Anaconda American Brass Co., Waterbury, Conn.; A. E. LaRochelle, E. M. Penner, C. H. McMaster, and W. R. Inman, Department of Mines and Technical Surveys, Mines Branch, Ottawa, Ontario, Canada; S. C. Richards, Ray Stevens, and Albert Stuever, Mueller Brass Company, Port Huron, Mich.

Caution should be observed in the use of the chill-cast samples in that determinations made on other than the chill-cast or test surface are not recommended because of the unidirectional solidification. Moreover, the chill-cast standards are designed for calibration in the analysis of samples prepared in the same manner. Samples prepared by other casting techniques may result in considerable bias.