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

National Bureau of Standards

Certificate of Analysis

Standard Reference Materials 1121,C1121, 1122,C1122,1123,C1123

Beryllium–Copper Standards

SRM No.[a]	1121[b]	C1121[b]	1122 C1122	1123 C1123
Element		Percent		
Beryllium	1.89	1.92	1.75	0.46
Iron	0.08_5	0.08_5	0.16	.04
Silicon	.11	.11	.17	.03
Aluminum	.07	.07	.17	.02
Cobalt	$.29_5$	$.29_5$	$.22_0$	2.3_5
Tin	.01	.01	(.01)	(.01)
Lead	$(.002)_c$	(.002)	(.003)	(.001)
Zinc	(.01)	(.01)	(.01)	.01
Nickel	.012	.012	(.01)	(.01)
Chromium	(.002)	(.002)	(.002)	(.001)
Manganese	$(.00_4)$	$(.00_4)$	$(.00_4)$	$(.00_2)$
Silver	(.005)	(.005)	(.005)	(.009)
Phosphorus	(.005)	(.005)	(.004)	(.002)
Copper	97.4_9	97.4_6	97.4_5	97.1_0

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" values 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.

[a] 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.

[b] Small differences in the copper and beryllium contents make necessary the separate analysis of the wrought and chill-cast material for this standard.

[c] Values in parenthesis are *not* certified, but are given for information on the composition.

Washington, D.C. 20234
December 11, 1981
(Revision of Certificate
dated 12/19/66)

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

The material for each standard was melted and cast at The Beryllium Corporation, Reading, Pa. 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 SRM 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 hot-extruded and finished to samples 1 1/4 in. in diamter, 3/4 in. thick.

The homogeneity of the standards material was investigated by metallographic studies, by optical emission spectrochemical analyses, and by chemical analyses at the National Bureau of Standards; and by optical emission and chemical analyses at The Beryllium Corporation, Reading, Pa.; The Brush Beryllium Company (Alloy Products Division), Elmore, Ohio; and IBM (Systems Manufacturing Division, Endicott, N.Y.

Samples for chemical analysis were prepared in the form of millings taken from the cross section of both the chill-cast and wrought material. Analyses for certification were made by the same laboratories that provided the homogeneity testing and by the Bell Telephone Laboratories, Inc., Murray Hill, N.J. and Micro Switch (a division of Honeywell, Inc.), Freeport, Ill.

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.

Microscopic examination of the extruded material revealed mixed grain size with some nonworked areas. Because of the nonuniform metallurgical structure, deviations larger than normal may be encountered in calibration by optical emission spectrochemical analysis.