U. S. Department of Commerce
John T. Connor, Secretary
National Bureau of Standards
A. V. Astin, Director

Certificate of Analysis

Standard Reference Material C1103
Free-Cutting Brass

(Cast)

ANALYST	COPPER Electrolytic	ZINC ZnS-ZnO	LEAD Weighed as PbO_2	IRON Photometric	TIN $SnCl_2$-KIO_3	NICKEL Photometric	PHOSPHORUS Photometric
1	59.21	35.71	[a]3.71 3.82	[b]0.26	[c]0.88	[d]0.16	[e]0.003
2	59.17	[f]35.75	3.83 [g]3.82	[h].26	[i].89	[j].15	[k].003
3	59.16	[l]35.72	3.84	[m].24	[n].92	[o].17	
4	59.19		3.88 [p]3.82	.28	[q].87 [r].82	[o].17	[s].003
Average	59.18	35.73	3.82	0.26	0.88	0.16	0.003

[a] Weighed as $PbMoO_4$.
[b] Orthophenanthroline method.
[c] Tin reduced with test lead and titrated with KIO_3 standardized with high-purity tin.
[d] Dimethylglyoxime method.
[e] Phosphomolybdenum blue method.
[f] See ASTM Method E 36-45.
[g] Polarographic method.
[h] Iron as chloride extracted with isopropyl ether and determined photometrically with thiocyanate.
[i] Tin reduced with iron and titrated with KIO_3. See ASTM Method E 36-45.
[j] Copper separated by electrolysis. Nickel dimethylglyoxime complex extracted in $CHCl_3$ and photometered.
[k] Molybdivanadophosphoric acid method. See ASTM Method E 62-56.
[l] Sodium ethylenediaminetetraacetate titration.
[m] Dipyridyl method.
[n] Tin separated as metastannic acid, ignited, and SnO_2 volatilized with NH_4I.
[o] Dimethylglyoxime-gravimetric method.
[p] $PbSO_4$-gravimetric method.
[q] SnO_2-gravimetric method.
[r] Tin titrated with iodine.
[s] Ammonium phosphomolybdate-gravimetric method.

SAMPLE CONDITION.—The chill-cast sample was obtained from the area nearest the chill-cast face, and is furnished as a 1¼ in. square block ¾ in. thick. Each block has the NBS number marked on the face opposite the chill-cast test surface.

HOMOGENEITY.—Lead was found to be segregated in the alloy, with deviations of ±0.10 percent from the average value. Metallographic studies, and optical-emission and chemical analyses indicate the homogeneity to be satisfactory for the other elements.

INTENDED USE.—The sample is one of three compositions in a graded series for free-cutting brass in wrought and cast form for application in optical-emission and x-ray spectroscopic analysis. The chill-cast standards are designed for calibration in the analysis of samples prepared in the same manner. Because of the unidirectional solidification, samples prepared by other casting techniques may result in considerable bias.

Details on the preparation and use of the materials can be found in National Bureau of Standards Miscellaneous Publication 260-2, Preparation of NBS Copper-Base Spectrochemical Standards by R. E. Michaelis, LeRoy L. Wyman, and Richard Flitsch. Details on the methods of chemical analysis can be found in National Bureau of Standards Miscellaneous Publication 260-7, Methods for the Chemical Analysis of NBS Copper-Base Spectrochemical Standards by R. K. Bell.

List of Analysts

1. R. K. Bell and E. E. Maczkowske, Division of Analytical Chemistry, National Bureau of Standards.
2. A. E. LaRochelle, Elsie M. Penner, C. H. McMaster and W. R. Inman, Department of Mines and Technical Surveys, Mines Branch, Ottawa, Ontario, Canada.
3. Albert C. Holler, Twin City Testing and Engineering Laboratory, Inc., St. Paul, Minn.
4. Frederick V. Schatz and R. E. Hahn, Metal Physics Department, Revere Copper and Brass, Inc., Rome, N. Y.

WASHINGTON, D. C.
August 13, 1965

W. Wayne Meinke, Chief,
Office of Standard Reference Materials.