



Certificate of Analysis

Standard Reference Material 1103

Free-Cutting Brass

(Wrought)

ANALYST	COPPER Electrolytic	ZINC ZnS-ZnO	LEAD Weighted as PbO ₂	IRON Photometric	TIN SnCl ₂ -KIO ₃	NICKEL Photometric	PHOSPHORUS Photometric
1.....	59.28	35.75	{ ^a 3.65 3.74 }	^b 0.26	^c 0.88	^d 0.16	^e 0.003
2.....	59.26	35.72	{ 3.73 ^a 3.67 }	^b .26	1.89	1.15	^e .003
3.....	59.24	35.69	3.79	^m .23	ⁿ .88	^o .14	
4.....	59.29		3.79	.28	{ ^p .89 ^q .86 }	^o .15	^r .003
Average.....	59.27	35.72	3.73	0.26	0.88	0.15	0.003

^a Weighed as PbMoO₄.
^b Orthophenanthroline method.
^c Tin reduced with test lead and titrated with KIO₃ 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 KIO₃. See ASTM Method E 36-45.
^j Copper separated by electrolysis. Nickel dimethylglyoxime complex extracted in CHCl₃ and photometered.
^k Molybdivanadophosphoric acid method. See ASTM Method E 62-56.

^l Sodium ethylenediaminetetraacetate titration.
^m Dipyriddy method.
ⁿ Tin separated as meta-stannic acid, ignited, and SnO₂ volatilized with NH₄l.
^o Dimethylglyoxime-gravimetric method.
^p SnO₂-gravimetric method.
^q Tin titrated with iodine.
^r Ammonium phosphomolybdate-gravimetric method.

SAMPLE CONDITION.—The wrought sample was prepared from material above the chill-cast samples. Strips of this material were forged, fully annealed, and finished to the sample size of 1¼ in. disk ¾ in. thick.

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 de-

signed 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.