National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1739

Zinc-Aluminum Alloy

(In cooperation with the ASTM International)

This Standard Reference Material (SRM) is in the form of a disk, approximately 50.8 mm (2 in) in diameter and 12.7 mm (0.5 in) thick intended for use with optical emission and X-ray fluorescence spectrometric methods of analysis. This material is one in a series of seven zinc base alloys prepared to cover a range of aluminum and lead compositions of interest to the zinc and galvanizing industries. The other zinc alloys in this series are SRMs 1736, 1737, 1738, 1740, 1741, and 1742, all in disk form; SRM 2139 is the same material as SRM 1739 but supplied in chip form.

The certified values for aluminum and lead are given in Table 1. The analytical methods used for the characterization of this SRM were flame atomic absorption spectrometry (FAAS) and inductively coupled plasma optical emission spectrometry (ICP-OES). All values are reported as mass fractions [1].

Certified Values and Uncertainties: A NIST-certified value is the present best estimate of the true value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been investigated or accounted for by NIST. Each certified value is the mean of the laboratory means. The uncertainty in each certified value is expressed as the expanded uncertainty, U, at the 95 % level of confidence, and is calculated according to the method described in the ISO Guide [2]. The expanded uncertainty is calculated as $U = ku_c$, where u_c is intended to represent, at the level of one standard deviation, the combined effects of material inhomogeneity, and between-laboratory and within-laboratory components of uncertainty. The coverage factors, $k = 2.57$ for Al and $k = 2.37$ for Pb are determined from the Student's t-distribution corresponding to five and seven degrees of freedom, respectively, and 95 % confidence for each analyte.

Expiration of Certification: The certification of **SRM 1739** is valid indefinitely, within the measurement uncertainties specified, provided the SRM is handled in accordance with instructions given in this certificate (see "Instructions for Use"). This certification is nullified if the SRM is damaged, contaminated, or modified.

Analytical consultation was provided by J.R. Sieber of the NIST Analytical Chemistry Division.

Statistical analysis of the homogeneity and certification data were provided by S.B. Schiller and N.-F. Zhang of the NIST Statistical Engineering Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

Stephen A. Wise, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 14 July 2008
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Chief
Standard Reference Materials Program

INSTRUCTIONS FOR USE

The test surface is the side opposite to the labeled surface, which includes the SRM number. The entire thickness of the unit is certified by NIST on the basis of the design and results of homogeneity testing carried out using arc spark optical emission spectrometry. However, the user is cautioned not to measure disks less than 2 mm thick when using X-ray fluorescence spectrometry. Each packaged disk has been prepared by finishing the test surface using a milling machine. The user must determine the correct surface preparation procedure for each analytical technique. The user is cautioned to use care when either resurfacing the disk or performing additional polishing as these processes may contaminate the surface. For arc spark optical emission spectrometric methods, it is recommended that a single determination be based on the average value from multiple "burns" taken at different locations on the prepared test surface. Specimens prepared for chemical methods of test should consist of large chips taken from across the entire surface using a milling machine. On the basis of the test methods used for value assignment, it is recommended to use a minimum sample size of 1.0 g to obtain results representative of the values and uncertainty estimates given on this certificate. When not in use, the material should be stored in its original container in a cool, dry location.

Table 1. Certified Values for SRM 1739 Zinc-Aluminum Alloy

Element	Mass Fraction, in %
Aluminum	0.2049 ± 0.0104
Lead	0.0302 ± 0.0009

Overall coordination of the material preparation, development of the analytical procedures to be used to produce certification data, and identification of the laboratories to participate in this study was provided by S. Bélisle of the Centre de Technologie Noranda, Pointe-Claire, Québec, Canada and T. Beckwith of the Zinc Corporation of America, Monaca, PA, USA.

Alloy Preparation: Each alloy, using Special High Grade (SHG) zinc ingots as the base material, was continuously cast (concast) into bars 3 m in length, then cut into 1.5 m sections for shipment. The material was cast, under contract, by Zincaloy Inc.[1], Mississauga, Ontario, Canada. Homogeneity testing of each cast material was performed under the direction of T. Beckwith by the Zinc Corporation of America, Monaca, PA, USA. At NIST, samples for homogeneity testing were cut from the Start (S) and Finish (F) ends of each rod. Following NIST evaluation of the homogeneity data, all the rods for SRMs 1736, 1737, 1738, 1740, 1741, and 1742 were cut into disks. For SRM 1739, half of the rods were made into disks while the remaining rods were milled to produce chips and designated SRM 2139. Disks from each SRM were then selected in accordance with the NIST statistical plan, milled into chips, and samples were sent to the laboratories participating in the study.

Collaborating Laboratories:
Zinc Corporation of America, Monaca, PA, USA; T. Beckwith and M. Shiring
Centre de Technologie Noranda, Pointe-Claire, Québec, Canada; S. Bélisle and M. Habib
Big River Zinc Corporation, Sauget, IL, USA, G. Fogleman
Hudson Bay Mining and Smelting Co., Ltd., Flin Flon, Manitoba, Canada; W. Friesen
Falconbridge Ltd., Kidd Creek Division, Timmins, Ontario, Canada; D. McGuire
Asturiana de Zinc, S.A., Avilés (Asturias), Spain; C. Muruzábal
Industrial Minera Mexico, S.A. de C.V., San Luis Potosi, S.L.P., Mexico; M. Nolan
Union Miniere, BU Zinkraffinage, Balen, Belgium; R. Pankert
Met-Mex Penoles, S.A. de C.V., Torreon, Coah, Mexico; A. Trevino and M. Ramirez O.
Norzink AS, Odda, Norway; V. Vetti and J. Preim
Outokumpu Zinc Oy, Kokkola, Finland; T. Witting and J. Urpinen

[1] Certain commercial equipment, instrumentation, or materials are identified in this certificate to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

REFERENCES

[1] Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*, NIST Special Publication 811, U.S. Government Printing Office: Washington, DC (1995).

[2] ISO; *Guide to the Expression of Uncertainty in Measurement*; ISBN 92-67-10188-9, 1st ed., International Organization for Standardization: Geneva, Switzerland (1993); see Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office: Washington, DC (1994).

Certificate Revision History: 14 July 2008 (Removal of expiration date and editorial changes); 26 October 1998 (Original certificate date).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; Fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.