National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 853a

Aluminum Alloy 3004

(In cooperation with ASTM International)

This Standard Reference Material (SRM) is intended primarily for use in evaluating chemical and instrumental methods of analysis. A unit of SRM 853a consists of a bottle containing approximately 40 grams of fine millings. Aluminum Alloy 3004 is also available in disk form as SRM 1240c.

The certified values for 10 elements in SRM 853a are listed in Table 1. A reference value for one element is listed in Table 2. Information values for four elements are listed in Table 3. For all elements, values are reported as mass fractions [1]. Value assignment categories are based on the definition of terms and modes used at NIST for chemical reference materials [2] and uncertainties are assessed according to the ISO Guide [3].

Certified Values: A NIST-certified value is a 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. A certified value is the present best estimate of the "true" value based on the results of analyses performed at NIST and collaborating laboratories using the test methods listed in Table 4. The uncertainty listed with the value is an expanded uncertainty based on a 95 % confidence interval [4] and is calculated according to the method in the ISO Guide [3].

Reference Value: Reference values are non-certified values that are the present best estimates of the true values. However, the values do not meet the NIST criteria for certification and are provided with associated uncertainties that may not include all sources of uncertainty. The uncertainty listed with the value is an expanded uncertainty based on a 95 % confidence interval [4] and is calculated according to the method in the ISO Guide [3].

Information Values: Information values for additional constituents of SRM 853a are given in Table 3. These are non-certified values with no uncertainty reported because there is insufficient information with which to make the appropriate assessments.

Expiration of Certification: The certification of this SRM is valid until **01 August 2028**, within the uncertainty specified, provided the SRM is handled and stored in accordance with the instructions given in this certificate. See "Instructions for Use". However, the certification will be nullified if the SRM is damaged or contaminated.

Stability: This material is considered to be stable during the period of certification. NIST will monitor this material and will report any significant changes in certification to the purchaser. Return of the attached registration card will facilitate notification.

Coordination of the technical measurements for certification was accomplished under the direction of J.R. Sieber of the NIST Analytical Chemistry Division.

Analytical measurements for certification of this SRM were performed by M.R. Winchester of the NIST Analytical Chemistry Division.

Statistical consultation for this SRM was provided by S.D. Leigh and D.D. Leber of the NIST Statistical Engineering Division.

Willie E. May, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 09 October 2003

John Rumble, Jr., Chief
Measurement Services Division

The support aspects involved with the certification and issuance of this SRM were coordinated through the NIST Standard Reference Materials Program by J.M. Adams of the NIST Measurement Services Division.

Material Preparation: The material for SRM 853a was obtained in the form of a single casting prepared by the Aluminum Company of America[1]. Titanium was added for grain refinement of the alloy. The casting was chipped, blended and bottled at NIST under the supervision of D.F. Friend of the NIST Measurement Services Division.

INSTRUCTIONS FOR USE

To relate analytical determinations to the certified values on this Certificate of Analysis, a minimum sample quantity of 200 mg is recommended. The millings do not require preparation prior to weighing and dissolution. The material should be stored in its original container in a cool, dry location.

Table 1. Certified Values for SRM 853a Aluminum Alloy 3004

Constituent	Value (mass fraction %)	Expanded Uncertainty (mass fraction %)	Expansion Factor, *k*
Si	0.1810	0.0046	4.3
Fe	0.504	0.015	2.1
Cu	0.1504	0.0045	2.0
Mn	1.251	0.011	2.0
Mg	1.092	0.027	2.0
Ni	0.00429	0.00085	2.0
Zn	0.0514	0.0014	4.3
Ti	0.0205	0.0012	2.0
V	0.01842	0.00061	2.1
Ga	0.0176	0.0032	13

Table 2. Reference Value for SRM 853a Aluminum Alloy 3004

Constituent	Value (mass fraction %)	Expanded Uncertainty (mass fraction %)	Expansion Factor, *k*
Zr	0.0023	0.0005	2.1

Table 3. Information Values for SRM 853a Aluminum Alloy 3004

Constituent	Mass Fraction (%)
Cr	<0.0005
Sr	<0.0001
Sn	0.0003
Pb	<0.003

[1]Certain commercial equipment, instruments, or materials are identified in this certificate in order to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.

Cooperating Laboratories: Analytical determinations for certification of this SRM were performed by the following laboratories:

Alcan International Limited, Arvida Research and Development Centre, Jonquière, Québec, Canada. Coordinated by H. Hamouche.

Aluminum Company of America, Alcoa Technical Center, Alcoa Center, Pennsylvania, USA. Coordinated by M. Ruschak.

Table 4. Analytical Methods

Element	Methods[a]
Si	GD-OES, ICP-OES
Fe	GD-OES, ICP-OES
Cu	GD-OES, ICP-OES
Mn	GD-OES, ICP-OES, Colorimetry
Mg	GD-OES, ICP-OES, FAAS
Ni	GD-OES, ICP-OES
Zn	GD-OES, ICP-OES
Ti	GD-OES, ICP-OES
V	GD-OES, ICP-OES
Ga	GD-OES, ICP-OES
Zr	GD-OES, ICP-OES
Cr	GD-OES
Sr	GD-OES
Sn	ICP-OES
Pb	GD-OES

[a]Key: GD-OES = Glow Discharge Optical Emission Spectrometry at NIST
ICP-OES = Inductively-Coupled Plasma Optical Emission Spectrometry
Colorimetry = Oxidation by KIO_4 followed by absorbance measurements at 545 nm.
FAAS = Flame Atomic Absorption Spectrophotometry

REFERENCES

[1] Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*, NIST Special Publication 811, 1995 Ed. (1995).

[2] May, W.E.; Parris, R.M.; Beck II, C.M.; Fassett, J.D.; Greenberg, R.R.; Guenther, F.R.; Kramer, G.W.; Wise, S.A.; Gills, T.E.; Colbert, J.C.; Gettings, R.J.; MacDonald, B.S.; *Definitions of Terms and Modes Used at NIST for Value-Assignment of Reference Materials for Chemical Measurements*; NIST Spec. Pub. 260-136, U.S. Government Printing Office: Washington, DC, p. 16 (2000).

[3] *Guide to the Expression of Uncertainty in Measurement*, ISBN 92-67-10188-9, 1st Ed., ISO, Geneva, Switzerland (1993); see also 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); available at http://physics.nist.gov/Pubs/.

[4] Hahn, G.J., and Meeker, W.Q.; *Statistical Intervals: A Guide for Practitioners*, John Wiley & Sons, Inc: New York (1991).

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; email srminfo@nist.gov; or via the Internet http://www.nist.gov/srm.