National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1261a

AISI 4340 Steel

This Standard Reference Material (SRM) is in the form of disks 31 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick, generally for use in optical emission and X-ray spectrometric analysis.

Certified Values: A NIST certified value is a value for which NIST has the highest confidence in its accuracy and that all known or suspected sources of bias have been investigated or accounted for by NIST. Certified values are listed in Table 1. 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" value 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.

Table 1. Certified Values for SRM 1261a

Element	Weight[(a)] (%)	Element	Weight[(a)] (%)
Carbon	0.39_1	Aluminum (total)	0.02_1
Manganese	0.67	Niobium	0.022
Phosphorus	0.016	Tantalum	0.020
Sulfur	0.015	Boron	0.0005
Silicon	0.228	Lead	0.00002_5
Copper	0.042	Zirconium	0.009
Nickel	2.00	Antimony	0.0042
Chromium	0.69_3	Bismuth	0.0004
Vanadium	0.011	Silver	0.0004
Molybdenum	0.19	Calcium	0.00002_8
Tungsten	0.017	Magnesium	0.00018
Cobalt	0.032	Selenium	0.004
Titanium	0.020	Tellurium	0.0006
Arsenic	0.017	Cerium	0.0014
Tin	0.010	Lanthanum	0.0004
		Neodymium	0.0002_9

[(a)] Weight % = mg/kg × 10^{-4}

Renewals of the "1200 series", 1261a-1265a, were prepared from the same ingots used for the original series, but from adjacent positions within the ingots. Little or no change in elemental composition was observed by comparison analysis utilizing several analytical techniques: optical emission spectrometric analysis, J.A. Norris and D.E. Brown; X-ray fluorescence analysis, P.A. Pella and J.R. Sieber; combustion-infrared, B.I. Diamondstone.

The overall direction and coordination of the technical measurements at NIST leading to certification were performed under the direction of K.F.J. Heinrich, O. Menis, B.F. Scribner, J.I. Shultz, and J.L. Weber, Jr.

This Certificate of Analysis has undergone editorial revision to reflect program and organizational changes at NIST and at the Department of Commerce. No attempt was made to reevaluate the certificate values or any technical data presented on this certificate.

Stephen A. Wise, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 25 August 2008

Robert L. Watters, Jr., Chief
Measurement Services Division

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

PLANNING, PREPARATION, TESTING, ANALYSIS[1]: This standard is one of five replacements for the original eight 1100 series iron and steel SRMs. Material from the same melt is available in a variety of forms to serve in checking methods of analysis and in calibrating instrumental techniques.

The material for this standard was vacuum melted and cast at the Carpenter Technology Corporation (Reading, PA), under a contract with the National Institute of Standards & Technology. The contract was made possible by a grant from the American Iron and Steel Institute.

The ingots were processed by Carpenter Technology Corporation to provide material of the highest possible homogeneity. Following acceptance of the composition based on NIST analyses, selected portions of the ingot material were extensively tested for homogeneity at NIST by J.R. Baldwin, D.M. Bouchette, S.D. Rasberry, and J.L. Weber, Jr. Only that material meeting a critical evaluation was processed to the final sizes.

Chemical analyses for certification were made on composite samples representative of the accepted lot of material.

Cooperative analyses for certification were performed in the analytical laboratories of Bethlehem Steel Corp., (Sparrows Point Plant, MD), R.H. Rome; Carpenter Technology Corp., Research and Development Center (Reading, PA), E.l. Cramer; The Timlcen Roller Bearing Company, Steel & Tube Division (Canton, OH) R.G. Cover; United States Steel Corp., Applied Research Laboratory (Monroeville, PA), L. Melnick; and Gary Steel Works (Gary, IN), E.H. Shipley.

Analyses were performed in the Analytical Chemistry Division of the National Institute of Standards & Technology by the following: R. Alvarez, J.R. Baldwin, D.A. Becker, R.K. Bell, R.W. Burke, B.S. Carpenter, E.L. Gamer, T.E. Gills, GJ. Lutz, L.A. Machlan, E.J. Maienthal, I. McKay, L.J. Moore, C.W. Mueller, T.J. Murphy, P.J. Paulsen, T.C. Rains, S.D. Rasberry, T.A. Rush, K.M. Sappenfield, B.A. Thompson, S.A. Wicks, and J. Wing.

Information Values: A NIST information value is considered to be a value that will be of interest and use to the SRM user, but insufficient information is available to assess adequately the uncertainty associated with the value. Information values are provided in Table 2. These values are NOT CERTIFIED.

Table 2. Information Values for SRM 1261a

Element	Weight (%)	Element	Weight (%)
Gold	< 0.00005	Oxygen	0.0009
Zinc	0.0001	Hydrogen	< 0.0005
Praseodymium	0.00014	Strontium	< 0.0005
Hafnium	0.0002	Iron (by difference)	95.6
Nitrogen	0.0037	Germanium	0.006

Certificate Revision History: 25 August 2008 (This revision corrects typographical errors in the values for V, Al, Ta, C and Sr); 12 January 2004 (Clarification of the certification statement); 18 May 1993 (Updated certificate); 24 February 1981 (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 http://www.nist.gov/srm.

[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.