National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1264a

High-Carbon Steel (Modified)

This Standard Reference Material (SRM) is intended for use in optical emission and X-ray spectrometric methods of analysis.[b]. A unit of SRM 1264a consists of a disk 31 mm in diameter and 19 mm thick. This material also is available in the form of chips, SRM 364, for use in chemical methods of analysis; rods, SRM 1098, 6.4 mm in diameter and 102 mm long for the determination of gases in metals by vacuum fusion and neutron activation methods of analysis.

Table 1. Certified Mass Fractions

Element	(%)	Element	(%)
Carbon	0.87_1	Niobium	0.15_7
Manganese	0.25_8	Tantalum	0.11
Phosphorus	0.010	Boron	(0.011)[b]
Sulfur	0.025	Lead	0.024
Silicon	0.067	Zirconium	0.069
Copper	0.25_0	Antimony	0.034
Nickel	0.14_2	Gold	0.0001
Chromium	0.06_6	Calcium	0.00004
Vanadium	0.10_6	Magnesium	0.00015
Molybdenum	0.49	Tellurium	0.00018
Tungsten	0.10_2	Cerium	0.0002_2
Cobalt	0.15	Lanthanum	0.00007
Titanium [a]	0.24	Neodymium	0.00007
Arsenic	0.05_2	Tin	(0.008) [b]

[a] This SRM is not certified for use in establishing calibration curves for titanium by X-ray spectrometric procedures because of the presence of titanium/niobium inclusions.
[b] Boron and tin are present in this material, but are not certified due to piece to piece variability.

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

Analyses were performed in the Analytical Chemistry Division of the National Institute of Standards and Technology formerly (National Bureau of Standards) by the following: J.R. Baldwin, R.K. Bell, R.W. Burke, D.M. Bouchette, B.S. Carpenter, T.E. Gills, GJ. Lutz, L.A. Machlan, E.J. Maienthal, L.T. McClendon, J. McKay, L.J. Moore, TJ. Murphy, P.J. Paulsen, T.C. Rains, S.D. Rasberry, BA. Thompson, J.L. Weber, Jr., and S.A. Wicks.

The support aspects involved in the issuance of this SRM were coordinated through the Measurement Services Division.

Stephen A. Wise, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Issue Date: 20 September 2006
See Certificate Revision History on Last Page

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

Certification: 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 (see "Caution"). This material is stable indefinitely.

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, PA. Pella and J.R. Sieber; combustion-infrared, B.I. Diamondstone.

CAUTION: This Standard Reference Material is not certified for use in calibration of titanium by X-ray spectrometric methods due to the formation of titanium/niobium inclusions.

PREPARATION[1]

This standard is one of five replacements for the original eight 1100 series iron and steel SRM's. 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 Bureau of Standards. The contract was made possible by a grant from the American Iron and Steel Institute (Washington, DC).

The ingots were processed by Carpenter Technology Corporation to provide material of the highest possible homogeneity. Following acceptance of the composition based on NBS analyses, selected portions of the ingot material were extensively tested for homogeneity at NBS by 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 Ford Motor Co., (Dearborn, MI) G.A. Nahstoll; Kawecki Berylco Industries, Inc., (Boyertown, PA) F.T. Coyle; and Lukens Steel Co., (Coatesville, PA) J.H. Morris and J. Scott.

[1] Certain commercial equipment, instruments, or materials are identified in this certificate to adequately specify 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.

ADDITIONAL INFORMATION ON THE COMPOSITION

The five replacements contain a graded series for 40 elements and information on the elements not certified may be of importance in the use of the material. Although these are not certified, values are presented in the following table for the remaining elements.

Table 2. Information Values Mass Fractions

Value from a single method of analysis:

Element	(%)	Element	(%)
Aluminum (total)	(0.008)	Hafnium	(0.0013)
Bismuth	(0.0009)	Nitrogen	(0.0032)
Silver	(0.00002)	Oxygen	(0.0010)
Selenium	(0.00021)	Hydrogen	(<0.0005)
Praseodymium	(0.00003)	Strontium	(0.0005)
Iron (by difference)	(96.7)		

Approximate value from heat analysis:

Zinc	(0.001)
Germanium	(0.003)

Certificate Revision History: 20 September 2006 (This revision corrects the certified values for S, Si, and V); 07 April 2006 (This revision reflects a change in the note "a" of Table 1 and other editorial changes); 20 January 1988 (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; *email srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.*