U. S. Department of Commerce
Philip M. Klutznick
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards
Certificate of Analysis
Standard Reference Material 1264
High-Carbon Steel (Modified)

This standard 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.[a]

Element	Percent, by weight	Element	Percent, by weight
Carbon	0.87_0	Niobium	0.15_7
Manganese	$.25_5$	Tantalum	.11
Phosphorus	.01	Boron	.011
Sulfur	.025*	Lead	.024
Silicon	.067	Zirconium	.068
Copper	$.24_9$	Antimony	.034
Nickel	$.14_2$	Gold	.0001
Chromium	$.06_5$	Calcium	.00004
Vanadium	$.10_5$	Magnesium	.00015
Molybdenum	.49	Tellurium	.00018
Tungsten	$.10_2$	Cerium	$.0002_2$
Cobalt	.15	Lanthanum	.00007
Titanium	.24	Neodymium	.00007
Arsenic	$.05_2$		
Tin	.008		

[a] This material also is available in the form of chips, SRM 364, for use in chemical methods of analysis; rods, SRM 664, 3.2 mm (1/8 in) in diameter and 51 mm (2 in) long for application in microchemical methods of analysis such as electron probe microanalysis, spark source mass spectrometric analysis, and laser probe analysis; rods, SRM 1098, 6.4 mm (1/4 in) in diameter and 102 mm (4 in) long for the determination of gases in metals by vacuum fusion and neutron activation methods of analysis.

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 below.)* *Sulfur certification is based on comparision determinations at NBS of SRM 1264 with SRM 364 by combustion infrared–B. I. Diamondstone.

CAUTION: This standard has been found satisfactory for application in x-ray spectrometric methods of analysis, however, in application testing for optical emission spectrometric analysis some biases were observed - particularly for the carbide-forming elements (Ti, Nb, Zr). This is due to metallurgical structure differences in this particular standard. Reference: Michaelis, R. E., "Homogeneity of SRM's", NBS Spec. Publ. 408, pp 557-571 (U. S. Government Printing Office, 1975). This SRM does not pose a problem for the determination of the elements normally specified in a steel when optical emission methods of analysis are used. However, the user is cautioned that inaccuracies and imprecisions may occur in the determination of the carbide-forming elements, the magnitude of which will depend on the excitation source parameters employed.

Washington, D. C. 20234
February 24, 1981
(Revision of Certificates
dated 8-16-72, 2-12-73,
2-24-75 and 1-8-76)

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS: 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, Pennsylvania, under a contract with the National Bureau of Standards. 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 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, Michigan, G. A. Nahstoll; Kawecki Berylco Industries, Inc., Boyertown, Pennsylvania, F. T. Coyle; and Lukens Steel Co., Coatesville, Pennsylvania, J. H. Morris and J. Scott.

Analyses were performed in the Analytical Chemistry Division of the 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, G. J. Lutz, L. A. Machlan, E. J. Maienthal, L. T. McClendon, J. McKay, L. J. Moore, T. J. Murphy, P. J. Paulsen, T. C. Rains, S. D. Rasberry, B. A. Thompson, J. L. Weber, Jr., and S. A. Wicks.

The overall direction and coordination of the technical measurements at 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.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

ADDITIONAL INFORMATION ON THE COMPOSITION: Certification is made only for the elements indicated. The five replacements, however, 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.

Value from a single method of analysis:

Element	Percent, by weight	Element	Percent, by weight
Aluminum (total)	(0.0080)	Hafnium	(0.0013)
Bismuth	(.0009)	Nitrogen	(.0032)
Silver	(.00002)	Oxygen	(.0010)
Selenium	(.00021)	Hydrogen	(<.0005)
Praseodymium	(.00003)	Strontium	(.0005)
Iron (by difference)	(96.7)		

Approximate value from heat analysis:

Zinc	[0.001]
Germanium	[.003]