

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 1261

AISI 4340 Steel

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	0.39 ₁	Aluminum (total)	0.02 ₁
Manganese	.66	Niobium	.022
Phosphorus	.015	Tantalum	.020
Sulfur	.015*	Boron	.0005
Silicon	.223	Lead	.00002 ₅
Copper	.042	Zirconium	.009
Nickel	1.99	Antimony	.0042
Chromium	0.69 ₀	Bismuth	.0004
Vanadium	.011	Silver	.0004
Molybdenum	.19	Calcium	.00002 ₈
Tungsten	.017	Magnesium	.00018
Cobalt	.032	Selenium	.004
Titanium	.020	Tellurium	.0006
Arsenic	.017	Cerium	.0014
Tin	.010	Lanthanum	.0004
		Neodymium	.0002 ₉

^a This material also is available in the form of chips, SRM 361, for use in chemical methods of analysis; rods, SRM 1095, 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; and rods, SRM 661, 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.

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. *Sulfur certification is based on comparison determinations at NBS of SRM 1261 with SRM 361 by combustion infrared - B. I. Diamondstone.

The overall direction and coordination of the technical measurements at NBS 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.

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.

Washington, D. C. 20234
 February 24, 1981⁴
 (Revision of Certificates
 dated 7-26-70, 8-16-72,
 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 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 Corporation, Sparrows Point Plant, Maryland, R. H. Rouse; Carpenter Technology Corporation, Research and Development Center, Reading, Pennsylvania, E. J. Cramer; The Timken Roller Bearing Company, Steel & Tube Division, Canton, Ohio, R. G. Cover; United States Steel Corporation, Applied Research Laboratory, Monroeville, Pennsylvania, L. Melnick; and Gary Steel Works, Gary, Indiana, E. H. Shipley.

Analyses were performed in the Analytical Chemistry Division of the National Bureau of Standards by the following: R. Alvarez, J. R. Baldwin, D. A. Becker, R. K. Bell, R. W. Burke, B. S. Carpenter, E. L. Garner, T. E. Gills, G. J. Lutz, L. A. Machlan, E. J. Maienthal, J. 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.

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:

<u>Element</u>	<u>Percent, by weight</u>	<u>Element</u>	<u>Percent, by weight</u>
Gold	(<0.00005)	Oxygen	(0.0009)
Zinc	(.0001)	Hydrogen	(<.0005)
Praseodymium	(.00014)	Strontium	^a -(<.0005)
Hafnium	(.0002)	Iron (by difference)	(95.6)
Nitrogen	(.0037)		

^aDash indicates "not detected." Value in parenthesis following the dash is the conservative "upper limit" of detection.

Approximate value from heat analysis:

Germanium [0.006]