



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material[®] 367

Stainless Steel (AISI 446)

(In Cooperation with the American Society for Testing and Materials)

This Standard Reference Material (SRM) is in the form of chips sized between 0.50 and 1.18 mm sieve openings (35 and 16 mesh). It is intended primarily for use in chemical methods of analysis.

Element	Analysts					Certified Value (Wt %) ¹	Estimated Uncertainty ²
	1	2	3	4	5		
Carbon	0.094	0.091	0.092	0.092	0.94	0.093	0.001
Manganese	0.317	0.319 ^a	0.31	0.313 ^b		0.315	0.003
Phosphorus	0.018	0.019	0.016 ^c	0.019		0.018	0.001
Sulfur	0.015	0.016	0.018	0.015	0.015	0.016	0.001
Silicon	0.59 ^d	0.59	0.56	0.58 ^d		0.58	0.01
Chromium	24.18 ^e	24.14 ^f	24.21 ^g	24.25	24.17 ^b	24.19	0.05
Vanadium	0.08 ⁱ				0.08 ⁱ	0.08	0.01
Nitrogen	0.173 ^h	0.166 ^h	0.172 ^h	0.162 ⁱ		0.168	0.005
Nickel	0.30	0.28 ^m			0.28	0.29	0.01

¹The certified value listed for a constituent is the *present best estimate* of the "true" value based on the results of the cooperative program for certification.

²The estimated uncertainty includes methods imprecision, bias among methods, and material variability for samples 1.0 g or more.

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.

The overall coordination of the technical measurements leading to certification were performed under the direction of J.I. Shultz, Research Associate, ASTM-NIST Research Associate Program.

The technical and support aspects involved in the original preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by R.E. Michaelis. Revision of this certificate was coordinated through the Standard Reference Materials Program by P.A. Lundberg.

Gaithersburg, MD 20899
March 15, 1995
(Revision of certificate dated 7-21-77)

Thomas E. Gills, Chief
Standard Reference Materials Program

(over)

METHODS/TECHNIQUES

Combustion Infrared - Carbon, Sulfur
Persulfate - Arsenite
Photometric - Phosphorus
Perchloric Acid Dehydration - Silicon
Gravimetric - Nickel

^aKIO₄ photometric method

^bChromium separated with ZnO

^cColor complex extracted with isobutyl alcohol

^dDouble dehydration

^ePerchloric acid oxidation, potentiometric titration with standard Fe(NH₄)₂(SO₄)₂

^fPeroxydisulfate oxidation, titration with FeSO₄-K₂Cr₂O₇

^gPerchloric acid oxidation, titration with FeSO₄-KMnO₄

^hPeroxydisulfate oxidation, potentiometric titration with standard Fe(NH₄)₂(SO₄)₂

ⁱSpectrochemical

^jNitric acid oxidation, potentiometric titration with standard Fe(NH₄)₂(SO₄)₂

^kInert gas fusion-chromatographic

^lInert gas fusion-thermal conductivity

^mPhotometric

PLANNING, PREPARATION, TESTING, ANALYSIS

The material for this standard was provided by the ARMCO Steel Corporation, Middletown, OH, through the courtesy of J.F. Woodruff.

Homogeneity testing was performed at NIST by S.A. Wicks. The material variability was determined to be within the method imprecision.

Cooperative analyses for certification were performed in the following laboratories.

Lukens Steel Company, Coatesville, PA, J.H. Morris.

National Institute of Standards and Technology, Analytical Chemistry Division, Washington, DC, S.A. Wicks, Tsai S.M. Lee, Visiting Scientist, Instituto de Pesquisas Tecnológicas, Sao Paulo, Brazil and R.K. Bell, ASTM/NIST Assistant Research Associate.

Standard Steel, Burnham, PA, J.E. Metzger.

United States Steel Corporation, Research Laboratory, Monroeville, PA, J.D. Selvaggio, R.W. Cline, F.J. Campbell, J.B. Ferons, H.R. Frisbie, D.T. Glaser, W.T. Harter, and H.S. Karp.

Universal-Cyclops Specialty Steel Division, Cyclops Corporation, Titusville, PA, A.J. Mirarchi.