



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material C1296

#### Stainless Steel

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

This Standard Reference Material (SRM) is in the form of a disk approximately 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick, intended for use in optical emission and x-ray spectrometric methods of analysis.

<u>Element</u>	<u>Certified Value,<sup>1</sup> % by wt.</u>	<u>Estimated Uncertainty<sup>2</sup></u>
Carbon <sup>a</sup>	0.038	0.001
Manganese <sup>b,c,d,e</sup>	0.256	0.005
Phosphorus <sup>b,c,f</sup>	0.024	0.001
Sulfur <sup>a</sup>	0.013	0.002
Silicon <sup>b,c,d,e,g</sup>	0.66	0.01
Copper <sup>b,c,d,e</sup>	0.056	0.004
Nickel <sup>b,c,d,e</sup>	0.373	0.008
Chromium <sup>c,e,h</sup>	27.90	0.05
Vanadium <sup>b,c,d,e</sup>	0.134	0.004
Molybdenum <sup>b,c,d,e</sup>	3.43	0.02
Cobalt <sup>b,c,e</sup>	0.026	0.003
Titanium <sup>b,c,d,e</sup>	0.23	0.02
Aluminum <sup>b,c</sup>	0.035	0.004
Niobium <sup>b,c,e</sup>	0.20	0.02

<sup>1</sup>The 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.

<sup>2</sup>The estimated uncertainty listed for a constituent is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.

#### Methods/Techniques

- |  |                                    |
|--|------------------------------------|
| a. Combustion-Infrared Detection           | e. X-ray Fluorescence Spectrometry |
| b. DC Plasma Spectrometry                  | f. Spectrophotometry               |
| c. Inductively Coupled Plasma Spectrometry | g. Gravimetry                      |
| d. Atomic Absorption Spectrometry          | h. Titrimetry                      |

The overall direction and 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 preparation, certification, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by P.A. Lundberg.

Gaithersburg, MD 20899  
December 6, 1991

William P. Reed, Chief  
Standard Reference Materials Program

(over)

## PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this SRM was provided by Allegheny Ludlum Steel Corporation, Brackenridge, Pennsylvania.

Homogeneity testing was performed at NIST by J.A. Norris, R. Fang, P.A. Pella, and A.F. Marlow.

Cooperative analyses for certification were performed in the following laboratories:

-Allegheny Ludlum Steel Corp., Brackenridge, Pennsylvania, R. M. Crain, G.L. Bergstrom, S.A. Bissell-Seymour, J.L. Fleeger and T.W. Westerman.

-Cytemp Specialty Steel, Cyclops Corp., Titusville, Pennsylvania, R. Gardiner, L. Carter, R. Ewing, C. Slater, B. Bronson, J. Reynolds, D. Lorenz, and J. Guerra.

-General Motors Research Laboratories, Warren, Michigan, N.M. Potter.

-Ledoux and Co., Inc., Teaneck, New Jersey, C.L. Maul, E.W. Hobart and J. Paez.

-National Institute of Standards and Technology, Gaithersburg, Maryland, T.W. Vetter, P.A. Pella, and A.F. Marlow.

Elements other than those certified may be present in this material as indicated below. They are not certified, but are given as additional information on the composition.

<u>Element</u>	<u>Percent. by Weight</u>
Antimony	(< 0.001)
Arsenic	(< 0.01)
Bismuth	(< 0.001)
Boron	(< 0.001)
Lead	(< 0.001)
Selenium	(< 0.001)
Tantalum	(< 0.001)
Tellurium	(< 0.01)
Tin	(< 0.01)
Tungsten	(< 0.01)