National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material C1151a

Stainless Steel, 23 Cr - 7 Ni

(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.

Element	Certified Value,[1] % by wt.	Estimated Uncertainty[2]
Carbon	0.034	0.003
Manganese	2.37	0.05
Phosphorus	0.017	0.003
Sulfur	0.038	0.003
Silicon	0.29	0.02
Copper	0.385	0.008
Nickel	7.25	0.05
Chromium	22.59	0.06
Vanadium	0.040	0.003
Molybdenum	0.79	0.01
Cobalt	0.033	0.002
Lead	0.0039	0.0002

[1] 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.

[2] 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.

Gaithersburg, MD 20899
December 30, 1992

William P. Reed, Chief
Standard Reference Materials Program

(over)

METALLURGICAL CONDITION: The specimens were chill cast by a rapid unidirectional solidification technique.

CERTIFIED PORTION: The certified portion for each specimen is that extending upward 16 mm (5/8 in) from the chill cast or test surface (the largest surface opposite the numbered surface). This portion only was analyzed in the cooperative program for certification.

The overall coordination of the technical measurements leading to certification was 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.

PLANNING, PREPARATION, TESTING, ANALYSIS: This stainless steel SRM is one of a set of four that has been prepared in a cooperative Industry-NIST program. The compositions have been tailored to provide concentration ranges for the elements normally specified in most austenitic stainless steels of the typical 18 Cr - 8 Ni type. A concentration range for a number of trace elements also has been provided to enhance the utility of the four standards.

The material for this standard was melted and cast at Esco Corporation, Portland, Oregon, L.E. Finch, under a NIST contract with the Steel Founders' Society of America (SFSA). A massive water-cooled, copper-plate mold assembly made by Esco for the SFSA was used in the preparation of the chill-castings. The preparation and plan for homogeneity testing was similar to that described in NBS Misc. Publ. 260-1, Standard Reference Materials: Preparation of NBS White Cast Iron Spectrochemical Standards, Robert E. Michaelis and LeRoy L. Wyman, June 19, 1964.

Homogeneity testing was carried out at the National Institute of Standards and Technology (NIST) by metallographic studies, C.H. Brady; by optical emission analysis, J.A. Norris, and by x-ray fluorescence analysis, P.A. Pella.

Composite samples for chemical analyses were prepared in the form of millings cut from the certified portion of representative specimens of the lot of chill castings.

Cooperative analyses for certification, carried out under the auspices of the ASTM/NIST Research Associate Program, were performed in the following analytical laboratories.

-Allegheny Ludlum Steel Corporation, Flat Rolled Products Division, Brackenridge, PA, A.I. Fulton and C.W. Hartig.

-Allegheny Ludlum Steel Corporation, Research Center, Brackenridge, PA, M.A. McMahon.

-Bethlehem Steel Corporation, Sparrows Point Plant, Sparrows Point, MD, F.T. Kowalczyk.

-Cyclops Corporation, Universal Cyclops Specialty Steel Division, Titusville, PA, A.V. Mirarchi and R.A. Hall.

National Institute of Standards and Technology (NIST), Inorganic Analytical Research Division, B.I. Diamondstone, J.D. Fassett, H.M. Kingston, L.A. Machlan, E.J. Maienthal, L.J. Moore, J.A. Norris, and P.J. Paulsen.

Additional Information on the Composition: Certification is made only for the elements indicated. This SRM, however, contains additional elements as indicated below. These are not certified, but are given as additional information on the composition.