National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 16f

Basic Open-Hearth Steel, 1 % Carbon

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

This Standard Reference Material (SRM) is intended primarily for use in evaluating chemical and instrumental methods of analysis. A unit of SRM 16f consists of approximately 150 g of chips sized between 0.50 mm and 1.18 mm sieve openings (35 and 16 mesh). This material is also available in the form of disks, SRM 1227, 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick for optical emission and X-ray spectrometric analysis.

Element	Certified Value[a] Mass Fraction (%)	Estimated Uncertainty[b]
Carbon	0.97	0.01
Manganese	0.404	0.009
Phosphorus	0.014	0.003
Sulfur	0.026	0.001
Silicon	0.214	0.004
Copper	0.006	0.001
Nickel	0.008	0.002
Chromium	0.020	0.002
Vanadium	0.002	0.001
Molybdenum	0.003	0.001
Cobalt	0.003	0.001

[a] 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.

[b] 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).

Expiration of Certification: The certification of this SRM is valid until **01 May 2024**, within the uncertainty specified, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Instructions for Use"). However, the certification will be nullified if the SRM is damaged or contaminated.

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 SRM were coordinated through the NIST Standard Reference Materials Program by R.E. Michaelis. Revision of this certificate was coordinated through the NIST Standard Reference Materials Program by B.S. MacDonald of the NIST Measurement Services Division.

Willie E. May, Chief
Analytical Chemistry Division

Gaithersburg, MD 20899
Certificate Revision Date: 30 April 2004
See Certificate Revision History on Last Page

Robert L. Watters, Jr., Acting Chief
Measurement Services Division

Additional technical and analytical support was provided by J.R. Sieber of the NIST Analytical Chemistry Division.

INSTRUCTIONS FOR USE

To relate analytical determinations to the certified values on this Certificate of Analysis, a minimum sample quantity of 200 mg is recommended. The millings do not require preparation prior to weighing and dissolution. The material should be stored in its original container in a cool, dry location.

PLANNING, PREPARATION, TESTING, AND ANALYSIS[1]

The material for this standard was provided by the U.S. Steel Corporation, Gary Works, Gary, IN.

Homogeneity testing was performed at NIST by B.I. Diamondstone and by R.K. Bell, Assistant Research Associate, ASTM/NIST Research Associate Program. The material variability was within the imprecision of the methods imprecision.

Cooperative analyses for certification were performed in the following laboratories:

F.T. Kowalczyk; Bethlehem Steel Corp., Sparrows Point Plant, Sparrows Point, MD
D.H. Craig, J. Pinner, and C. Holda; Ford Motor Co., Central Laboratory Services, Northville, MI
B.I. Diamondstone and by R.K. Bell; National Institute of Standards and Technology (NIST), Inorganic Analytical Research Division, (ASTM/NIST Research Associate Program)
J.A. Crawley; Phoenix Steel Corp., Claymont, DE
N.J. Williams; Sharon Steel Corp., Sharon, PA

Stability testing was carried out August 2003 by Laboratory Testing Inc.; Hatfield, PA; L. Dilks

Certificate Revision History: 30 April 2004 (This certificate has undergone revision to change the uncertainty for manganese following stability testing); 16 July 1993 (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); 09 March 1983 (Original certificate date).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751, email srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

[1] Certain commercial equipment, instrumentation, or materials are identified in this certificate to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.