U.S. Department of Commerce
C. William Verity
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material C1145a

White Cast Iron

(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	2.92	0.02
Manganese	0.187	.004
Phosphorus	.215	.007
Sulfur	.191	.009
Silicon	.271	.009
Copper	.46	.01
Nickel	.62	.01
Chromium	.63	.01
Vanadium	.112	.005
Molybdenum	.48	.02
Titanium	.012	.001
Cobalt	.058	.002
Lead	.0012	.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.)

METALLURGICAL CONDITION: The specimens were chill-cast white by a rapid unidirectional solidification technique with the addition of inoculants, and they were given a stress relief heat treatment at about 590 °C for one hour, which is below the graphitizing temperature.

CERTIFIED PORTION: The certified portion for each sample is that extending upward 9 mm (3/8 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-NBS Research Associate Program.

January 4, 1988
Gaithersburg, MD 20899
(Revision of Certificate
dated 6-26-87)

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(over)

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 W.P. Reed.

PLANNING, PREPARATION, TESTING, ANALYSIS: This white iron standard is one of three (SRM's C1145a, C1146a and C1150a) that have been prepared in a cooperative-Industry-ASTM-NBS program. The compositions have been tailored to provide low, nominal, and high values for the elements normally specified in cast iron materials, including most malleable, ductile, and gray. A concentration range for a number of trace elements also has been provided to enhance the utility of the three standards.

The material for this standard was melted and cast at the American Cast Iron Pipe Company, Birmingham, Alabama, with use of the NBS chill-cast mold assembly. The preparation and homogeneity testing plan 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.

Extensive homogeneity testing was performed at the American Cast Iron Pipe Company, Birmingham, Alabama, W.R. Kennedy, and at the National Bureau of Standards, Gaithersburg, Maryland, J.A. Norris.

Cooperative analyses for certification were performed in the following analytical laboratories:

A.O. Smith Corp., Milwaukee, Wisconsin, R.W. Taylor.
Bethlehem Steel Corp., Sparrows Point, Maryland, F.T. Kowalczyk.
Duriron Co., Inc., Dayton, Ohio, G.W. Jackson.
Ford Motor Co., General Services, Dearborn, Michigan, H.G. Aaron, C.J. Kelly, J. Pinner, C. Holda, L. Lane, and B. Karpslis.
General Motors Research Laboratories, Warren, Michigan, R. Kohn and R. Waldo.

Analyses were performed at the National Bureau of Standards in the laboratories of the Center for Analytical Chemistry by R.K. Bell, ASTM-NBS Assistant Research Associate, and T.S.M. Lee, Visiting Scientist, Instituto de Pesquisas Tecnologicas, Sao Paulo, Brazil.

ADDITIONAL INFORMATION ON THE COMPOSITION: This standard contains additional elements as indicated below. These are not certified, but are provided for information only.

Element	Percent by Weight Not Certified
Aluminum	(0.04)
Antimony	(.04)
Arsenic	(.03)
Bismuth	(<.01)
Boron	(.02)
Tin	(.10)
Zirconium	(.002)

CAUTIONS:

1. Determinations made on other than the chill-cast or test surface are not recommended because of the unidirectional solidification structure.

2. This white iron standard is designed for calibration in the analysis of samples prepared in the same manner; samples prepared by other casting techniques or having other than a white structure may result in considerable measurement bias.

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