



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material 4L

#### Cast Iron

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

This Standard Reference Material (SRM) is in chip form sized between 0.7 mm and 1.2 mm sieve openings (25 and 16 mesh). It is intended for use in chemical methods of analysis.

This standard contains an appreciable amount of graphitic carbon and should be mixed gently before use.

Element	Percent, by weight <sup>1</sup>	Estimated Uncertainty <sup>2</sup>
Total carbon	3.21	0.02
Graphitic carbon	2.66	.03
Manganese	0.82	.01
Phosphorus	.149	.004
Sulfur	.043	.001
Silicon	1.33	.02
Copper	0.240	.003
Nickel	.042	.003
Chromium	.118	.004
Vanadium	.024	.003
Molybdenum	.040	.002

<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.

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 R.E. Michaelis and P.A. Lundberg.

Gaithersburg, MD 20899  
June 18, 1990

William P. Reed, Acting Chief  
Standard Reference Materials Program

(over)

**PLANNING, PREPARATION, TESTING, ANALYSIS:**

The material for this SRM was provided by the American Cast Iron Pipe Co., Birmingham, Alabama.

Preliminary homogeneity testing was performed at the American Cast Iron Pipe Company by spectrochemical analyses on samples before and following casting. No analytically significant differences were observed.

Following processing of the material, final homogeneity testing was performed at the National Institute of Standards and Technology for total carbon only.

Cooperative analyses for certification were performed in the following laboratories:

- American Cast Iron Pipe Co., Birmingham, Alabama, R.N. Smith and W.R. Kennedy.
- Ford Motor Co., Dearborn, Michigan, H.B. Aaron and C.J. Kelly.
- Jones & Laughlin Steel Corp., Pittsburgh, Pennsylvania, M.L. Harmon.
- U.S. Pipe & Foundry Co., Birmingham, Alabama, J.P. Anderson and G.L. Reifsnnyder.
- Youngstown Sheet & Tube Co., Youngstown, Ohio, L.E. Chalker.

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

<b>Element</b>	<b>Percent by Weight</b>
Aluminum	(0.004)
Antimony	(< .001)
Arsenic	(.03)
Lead	(.001)
Nitrogen	(.0017)
Tin	(.004)
Titanium	(.03)
Zinc	(< .001)