

# National Bureau of Standards

## Certificate of Analysis

### Standard Reference Material 1224

#### Carbon Steel - (AISI 1078)

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

This standard is in the form of disks 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.<sup>1</sup>

Element	Certified Value <sup>2</sup> Percent by Weight	Estimated Uncertainty <sup>3</sup>
Carbon	0.75	0.02
Manganese	.41	.01
Phosphorus	.009	.001
Sulfur	.039	.005
Silicon	.173	.002
Copper	.072	.001
Nickel	.054	.001
Chromium	.071	.001
Vanadium	.002	.001
Molybdenum	.013	.001
Aluminum (Total)	.060	.002

<sup>1</sup>This material also is available in the form of chips, SRM 14f, sized between 0.50 and 1.18 mm sieve openings for use in chemical methods of analysis.

<sup>2</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>3</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.)

**METALLURGICAL CONDITION:** The structure of the specimens is that resulting from hot working followed by annealing.

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.

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 R. E. Michaelis.

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

The material for this standard was provided by the Bethlehem Steel Corporation, Bethlehem, Pa. Three billets were fabricated at the Puget Sound Naval Shipyard, Bremerton, Washington, where the billets were forged to slabs and portions of doubtful homogeneity were cut and discarded. The remaining slab sections were forged and swaged to rods (oversize 32 mm in diameter). The rods were given a sub-critical anneal, and were centerless ground to the final size of 32 mm in diameter. Extensive homogeneity testing was performed at NBS by optical emission spectrometric analysis - J. A. Norris, and by a rapid carbon/sulfur analyzer - B. I. Diamondstone. Only that material exhibiting satisfactory homogeneity was accepted.

Cooperative analyses for certification were performed in the following laboratories:

Great Lakes Steel, Division of National Steel Corp., Ecorse, Detroit, Michigan, W. L. Wright.

Jones and Laughlin Steel Corp., Campbell Works, Youngstown, Ohio, L. E. Chalker; and Cleveland Works Division, Cleveland, Ohio, C. R. Vinyard.

National Bureau of Standards, Inorganic Analytical Research Division, B. I. Diamondstone and R. K. Bell, ASTM-NBS Assistant Research Associate.

The Timken Co., Canton, Ohio, V. M. Chapman.