

# National Bureau of Standards

## Certificate of Analysis

### Standard Reference Material 14f

### Carbon Steel - (AISI 1078)

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

This Standard is in the form of chips sized between 0.50 and 1.18 mm sieve openings (35 and 16 mesh). It is intended for use primarily in chemical methods of analysis.<sup>1</sup>

Constituent	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	Total Al
Certified Value, % by wt. <sup>2</sup>	0.753	0.410	0.009	0.039	0.172	0.072	0.053	0.070	0.002	0.013	0.060
Estimated Uncertainty <sup>3</sup>	0.007	0.003	0.001	0.002	0.003	0.002	0.003	0.004	0.001	0.001	0.002
Method Lab	Combustion-Infrared	Peroxydisulfate-Arsenite	Photometric	Combustion-Infrared	Perchloric Acid Dehydration	Photometric	Atomic Absorption	Atomic Absorption		Photometric	Atomic Absorption
A	0.751	0.412	<sup>a</sup> 0.009	0.038	<sup>b</sup> 0.172	—	<sup>c</sup> 0.054	<sup>d</sup> 0.074	<sup>e</sup> 0.001	0.013	—
B	<sup>f</sup> .755 .759	<sup>g</sup> .409 .407	<sup>h</sup> .008	.039	.172	<sup>i</sup> 0.072	<sup>c</sup> .052	<sup>j</sup> .067	<sup>k</sup> .002	.013	<sup>l</sup> 0.060
C	<sup>m</sup> .746	<sup>n</sup> .411	<sup>o</sup> .010	.041	<sup>n</sup> .171	<sup>n</sup> .071	.060	.070	<sup>n</sup> .002	<sup>n</sup> .014	.060
D	.754	.412	<sup>o</sup> .008	<sup>p</sup> .040	.174	<sup>n</sup> .072	.054	.070	<sup>q</sup> .002	<sup>n</sup> .013	.060

<sup>1</sup>This material is also available in the form of disks, SRM 1224, 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick for optical emission and x-ray spectrometric 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 for samples 0.5 g or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

<sup>a</sup> Molybdenum blue photometric.

<sup>b</sup> Double dehydration.

<sup>c</sup> Weighed as nickel dimethylglyoxime.

<sup>d</sup> Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO<sub>3</sub>, oxidized with peroxydisulfate, and titrated potentiometrically with ferrous ammonium sulfate solution.

<sup>e</sup> Vanadium separated as in (d), oxidized with HNO<sub>3</sub>, and titrated potentiometrically with ferrous ammonium sulfate solution.

<sup>f</sup> Combustion-thermal conductivity.

<sup>g</sup> Sodium bismuthate oxidation, titration with sodium arsenite.

<sup>h</sup> Same value obtained by alkali-molybdate method.

<sup>i</sup> Neocuproine photometric.

<sup>j</sup> Perchloric acid oxidation-FeSO<sub>4</sub>-KMnO<sub>4</sub> titration.

<sup>k</sup> Mercury cathode-HNO<sub>3</sub> oxidation-Fe(NH<sub>4</sub>)<sub>2</sub>(SO<sub>4</sub>)<sub>2</sub>-KMnO<sub>4</sub> titration.

<sup>l</sup> Mercury cathode-8 Hydroxyquinoline.

<sup>m</sup> Combustion-gravimetric.

<sup>n</sup> Atomic absorption.

<sup>o</sup> Alkali-molybdate.

<sup>p</sup> Combustion-iodate titration.

<sup>q</sup> H<sub>2</sub>O<sub>2</sub> photometric.

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. Homogeneity testing was performed at NBS by B. I. Diamondstone. The material variability was within the method imprecision.

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.