

# Certificate of Analysis

## Standard Reference Material 12H

### Basic Open-Hearth Steel 0.4% Carbon

ANALYST	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	N
	Direct combustion	Persulfate-Arsenite	Photometric	Combustion Iodate titration	Perchloric acid dehydration	Photometric	Photometric	FeSO <sub>4</sub> -KMnO <sub>4</sub> titration		Photometric	Distillation-Photometric
1.....	0.411	<sup>a</sup> 0.839	<sup>b</sup> 0.018	<sup>c</sup> 0.027	<sup>d</sup> 0.238	<sup>e</sup> 0.074	0.034	<sup>f</sup> 0.077	<sup>g</sup> 0.002	0.005	0.006
2.....	<sup>h</sup> .405	<sup>i</sup> .844	<sup>j</sup> .018	<sup>k</sup> .027	<sup>l</sup> .237	<sup>m</sup> .072	.032	.074	<sup>n</sup> .002	.006	.005
3.....	.406	<sup>i</sup> .840	.017	<sup>i</sup> .028	.237	<sup>m</sup> .072	.033	.070	{ <sup>n</sup> .004 <sup>o</sup> .003 }	.005	.006
4.....	.406	<sup>p</sup> .845	<sup>j</sup> .017	.026	.232	.073	.031		<.005	.007	.007
5.....	<sup>q</sup> .409	<sup>r</sup> .840	.018	.027	{ .234 <sup>s</sup> .233 }	.072	<sup>t</sup> .032	<sup>f</sup> .077	<sup>g</sup> .033	{ .005 <sup>u</sup> .006 }	.006
Average.....	0.407	0.842	0.018	0.027	0.235	0.073	0.032	0.074	0.003	0.006	0.006

<sup>a</sup> Potentiometric titration.

<sup>b</sup> Molybdenum blue photometric method. See J. Res. NBS 26, 405 (1941)RP1386.

<sup>c</sup> 1-g sample burned in oxygen at 1,425 °C and sulfur dioxide absorbed in starch-iodide solution. Iodine is liberated from iodide by titration, during the combustion, with standard KIO<sub>3</sub> solution. Titer is based on 93 percent of the theoretical factor.

<sup>d</sup> Double dehydration with intervening filtration.

<sup>e</sup> Diethyldithiocarbamate photometric method. See J. Res. NBS 47, 380 (1951)RP2265.

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

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

<sup>h</sup> Differential gasometric method.

<sup>i</sup> Titrating solution standardized with a standard steel.

<sup>j</sup> Alkali-molybdate method.

<sup>k</sup> Neocuproine photometric method.

<sup>l</sup> Mercury cathode separation. Vanadium oxidized with HNO<sub>3</sub>, and titrated with ferrous ammonium sulfate.

<sup>m</sup> Diethyldithiocarbamate photometric method.

<sup>n</sup> H<sub>2</sub>O<sub>2</sub> photometric method.

<sup>o</sup> Phosphotungstovanadate photometric method

<sup>p</sup> KIO<sub>4</sub> photometric method.

<sup>q</sup> Conductometric method.

<sup>r</sup> Sodium pyrophosphate method.

<sup>s</sup> Volumetric method.

<sup>t</sup> Spectrographic method.

A value of 0.038 percent aluminum was obtained by spectrochemical analysis by D. M. Bouchette at NBS. This is not a certified value, but is given as additional information.

### List of Analysts

1. B. B. Bendigo, J. R. Baldwin and J. I. Shultz, Division of Analytical Chemistry, Institute for Materials Research, National Bureau of Standards.
2. W. F. Horscroft, Bethlehem Steel Corp., Bethlehem, Pa.

3. R. D. O'Mara, Great Lakes Steel Corp., Ecorse, Detroit, Mich.
4. L. E. Finch, Esco Corp., Portland, Ore.
5. J. C. Cline and R. A. Pontello, Interlake Steel Corp., Beverly, Ohio.

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W. Wayne Meinke, Chief  
Office of Standard Reference Materials