

# Certificate of Analysis

## Standard Reference Material 20g

### AISI 1045 Steel

	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	Al
Analyst	Direct Combustion	Peroxydisulfate-Arsenite	Molybdenum-blue Photometric	Combustion-iodate Titration	Perchloric Acid Dehydration	Photometric	Photometric			Photometric	Total
1	0.457 <sup>a</sup>	0.667	0.011	0.028 <sup>b</sup>	0.308 <sup>c</sup>	{0.034 <sup>d</sup> .033 <sup>e</sup> }	0.034	0.035 <sup>f</sup>	0.002 <sup>g</sup>	0.007	0.040 <sup>f</sup>
2	.461	.662 <sup>h</sup>	.011	.025	.306	.035	.034 <sup>i</sup>	.036 <sup>fj</sup>	.003 <sup>k</sup>	.006	.040 <sup>l</sup>
3	.463 <sup>m</sup>	.666	.012 <sup>n</sup>	.028	.306 <sup>c</sup>	.036 <sup>o</sup>	.034 <sup>p</sup>	.037 <sup>q</sup>	.001 <sup>r</sup>	.008	.042 <sup>s</sup>
4	.466	.665	.012 <sup>n</sup>	.030	.300 <sup>t</sup>	.034 <sup>o</sup>	.033	.037 <sup>u</sup>	.001 <sup>v</sup>	.010	.040 <sup>w</sup>
Average	0.462	0.665	0.012	0.028	0.305	0.034	0.034	0.036	0.002	0.008	0.040

<sup>a</sup> Thermal conductivity.

<sup>b</sup> 1-g sample burned in oxygen at 1450 °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.

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

<sup>d</sup> Diethylthiocarbamate photometric method.

<sup>e</sup> Atomic absorption spectrometry.

<sup>f</sup> Chromium separated from the bulk of the iron by hydrolytic precipitation with NaHCO<sub>3</sub>, oxidized with peroxydisulfate and titrated potentiometrically with ferrous ammonium sulfate solution.

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

<sup>h</sup> Peroxydisulfate photometric method.

<sup>i</sup> Dimethylglyoxime precipitate titrated with NaCN solution.

<sup>j</sup> Same value obtained by atomic absorption spectrometry.

<sup>k</sup> HNO<sub>3</sub> oxidation, potentiometric titration with ferrous ammonium sulfate solution.

<sup>l</sup> Ether-cupferron-NH<sub>4</sub>OH-mercury cathode-NH<sub>4</sub>OH-Al<sub>2</sub>O<sub>3</sub>.

<sup>m</sup> Gasometric method.

<sup>n</sup> Alkalimetric method.

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

<sup>p</sup> Weighed as dimethylglyoxime.

<sup>q</sup> Peroxydisulfate oxidation-FeSO<sub>4</sub>-KMnO<sub>4</sub> titration.

<sup>r</sup> Vanadium separated by electrolysis with a mercury cathode, oxidized and titrated with ferrous ammonium sulfate solution.

<sup>s</sup> Mercury cathode-cupferron-eriochrome cyanine R photometric method.

<sup>t</sup> Sulfuric acid dehydration.

<sup>u</sup> Diphenylcarbazide photometric method.

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

<sup>w</sup> Eriochrome cyanine R photometric method.

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of J. I. Shultz and O. Menis.

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.

Washington, D. C. 20234  
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J. Paul Cali, Acting Chief  
Office of Standard Reference Materials

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### **List of Analysts**

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The material for this standard was produced in a B.O.H. furnace, continuously cast into billets, and hot rolled to rounds by the Bethlehem Steel Corporation, Bethlehem, Pennsylvania.

The material was tested for homogeneity by D. M. Bouchette and J. L. Weber, Jr. and found to be satisfactory.