

# Bureau of Standards

## Certificate of Analyses

OF

STANDARD SAMPLE No. 12D

### BASIC OPEN-HEARTH STEEL 0.4% CARBON

*Sb, off. no. 0003*  
*Sherris*  
*Bul. 1*

ANALYST*	C	Mn		P		S		Si	COPPER H <sub>2</sub> S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM FeSO <sub>4</sub> -KMnO <sub>4</sub> titration	VANADIUM	MOLYBDENUM Colorimetric	ARSENIC
	CARBON Direct Combustion	MANGANESE 1. Bismuthate (FeSO <sub>4</sub> -KMnO <sub>4</sub> ) 2. Persulphate Arsenite	PHOSPHORUS 1. Alkali-Molybdate <sup>a</sup> 2. Gravimetric (Weighed as Mg <sub>2</sub> P <sub>2</sub> O <sub>7</sub> after removal of arsenic)	SULPHUR 1. Sulphuric acid dehydration 2. Sulphur Evolution with HCl Evolution with H <sub>2</sub> S-Iodine (theoretical sulphur titre) <sup>g</sup>	SILICON Sulphuric acid dehydration									
1	0.420	0.342	0.340	0.014	0.013	0.035	.036	0.018	0.016	0.002	0.015 <sup>o</sup>	0.002 <sup>o</sup>	0.001	0.008 <sup>d</sup>
2	.410	.350	.350	.014 <sup>o</sup>	.013	.036	.035 <sup>f</sup>	.014 <sup>g</sup>	.018	.006	.011			
3	.416	.344	.345	.014		.037	.039	.013	.015		.020			
4	.417	.349	.350	.013 <sup>o</sup>	.013	.037	.035	.016	.010 <sup>h</sup>	.01 <sup>i</sup>	.008			
5	.420	.342	.339	.014	.014	.034	.034 <sup>f</sup>	.018	.018 <sup>j</sup>	.001 <sup>k</sup>	.018			
6	.415	.345		.015	.015	.037	.036	.016	.015					
7	.413	.350		.015 <sup>o</sup>		.036 <sup>m</sup>	.036 <sup>f</sup>	.018 <sup>g</sup>	.012 <sup>j</sup>	.006	.015			
8	.424	.341		.012	.011	.034		.023						
9	.418	.340	.345	.015		.035	.036	.015	.01 <sup>h</sup>	.01 <sup>n</sup>	<.01	<.01	<.001	
10	.415	.333		.011 <sup>o</sup>	.011	.034	.035 <sup>f</sup>	.013	.019 <sup>o</sup>	.007	.013			
11	.425	.345 <sup>p</sup>		.015		.034 <sup>f</sup>	.034 <sup>f</sup>	.015	.019 <sup>h</sup>	.01 <sup>n</sup>	.018	.002	.003 <sup>q</sup>	
Averages	.418	.343	.345	.014	.013	.036	.036	.016	.015	.007	.015	.002	.002	.008
General Averages	.418	.344		.013		.036	.036	.016	.015	.007	.015	.002	.002	.008

*0.006*  
*0.005 (1947)*  
*R. Watson*

<sup>a</sup> Precipitated at 40° C., washed with 1 per cent KNO<sub>3</sub> and titrated with alkali standardized against Bureau of Standards standard acid potassium phthalate using the 28:1 ratio.  
<sup>b</sup> Value obtained by standardization of titrating solution against sodium oxalate through KMnO<sub>4</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>.  
<sup>c</sup> Electrometric titration.  
<sup>d</sup> Distillation as AsCl<sub>3</sub> precipitation as As<sub>2</sub>S<sub>3</sub>, conversion to Ag<sub>3</sub>AsO<sub>4</sub> and titration with KCNS.

<sup>e</sup> Titration solution standardized by means of Bureau of Standards standard steel.  
<sup>f</sup> Absorbed in cadmium chloride.  
<sup>g</sup> Nitro-sulphuric method.  
<sup>h</sup> Thiocyanate precipitation method, "Methods of the Chemists of the United States Steel Corporation" for the Sampling and Analysis of Alloy Steel, pp. 65-66.  
<sup>i</sup> Nickel precipitated with dimethylglyoxime, precipitate dissolved and titrated with KCN.  
<sup>j</sup> Finished by electrolysis.

<sup>k</sup> Iron separated with ether, nickel precipitated with dimethylglyoxime, ignited and weighed as oxide.  
<sup>l</sup> Bismuthate-arsenite.  
<sup>m</sup> Precipitated in FeCl<sub>3</sub> solution.  
<sup>n</sup> Direct KCN titration.  
<sup>o</sup> Precipitated with Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, CuS-CuO, finished by titration with KCN.  
<sup>p</sup> Volhard's method.  
<sup>q</sup> Precipitated with H<sub>2</sub>S, Cu separated, and Mo determined as PbMoO<sub>4</sub>.

#### \*LIST OF ANALYSTS

1. Ferrous Laboratory, Bureau of Standards, H. A. Bright in charge; analysis by R. M. Fowler and J. C. Redmond.
2. W. E. Steiner, Bethlehem Steel Co., Cambria plant, Johnstown, Pa.
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This standard is not recommended for colorimetric carbon determinations, because of uncertainty as to the condition of the carbon.

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Director.