

UNITED STATES DEPARTMENT OF COMMERCE  
WASHINGTON 25, D.C.

National Bureau of Standards  
Certificate of Analyses

Standard Sample 107 B  
Nickel-Chromium-Molybdenum Cast Iron

ANALYST	C	Mn	P		S		Si	Cu	Ni	Cr	V	Mo	Ti	N	
	Total	Graphitic	Persulfate-Arsenite	Gravimetric (weighed as Mg <sub>2</sub> P <sub>2</sub> O <sub>7</sub> after removal of arsenic)	Alkali-Molybdate <sup>a</sup>	Gravimetric (direct oxidation and precipitation after reduction of iron)	Combustion Iodate titration	Perchloric acid dehydration		Weighed as nickel dimethylglyoxime	FeSO <sub>4</sub> -KMnO <sub>4</sub> titration		Colorimetric	H <sub>2</sub> O <sub>2</sub> -photometric	Distillation-titration
1.....	2.73	1.86	<sup>b</sup> 0.511	0.057	<sup>c</sup> 0.059	0.068	<sup>d</sup> 0.068	<sup>e</sup> 1.36	<sup>f</sup> 0.239	2.12	<sup>g</sup> 0.558	<sup>h</sup> 0.007	{ <sup>i</sup> 0.748 <sup>j</sup> 1.746}	<sup>k</sup> 0.016	<sup>l</sup> 0.008
2.....	<sup>1</sup> 2.73	1.89	<sup>m</sup> .507	.059		<sup>n</sup> .067	.068	<sup>e</sup> 1.36	<sup>o</sup> .231	2.12	<sup>p</sup> .558	<sup>q</sup> .008	<sup>r</sup> .751	<sup>s</sup> .017	
3.....	{ <sup>1</sup> 2.78 <sup>2</sup> 2.77}	1.86	<sup>t</sup> .518		.059	.068	<sup>u</sup> .067	1.35	<sup>v</sup> .236	2.13	<sup>w</sup> .559	<sup>x</sup> .007	<sup>y</sup> .750	<sup>z</sup> .017	
4.....	2.75	1.87	<sup>v, b</sup> .517		.057		.071	1.35		<sup>a</sup> 2.12	<sup>a'</sup> .561	<sup>b'</sup> .010	.752	.014	
5.....	2.78	1.86	<sup>m</sup> .505	<sup>c'</sup> .056	.055	.069	.064	1.35	<sup>d'</sup> .231	2.13	.560	<sup>q</sup> .009	{ <sup>i</sup> .752 <sup>j</sup> .74}	.017	
6.....	2.74	1.90	<sup>s</sup> .501	.059	.059	.065	.064	<sup>e'</sup> 1.35	<sup>d'</sup> .236	2.11	.565	<sup>q</sup> .008	<sup>i</sup> .759	<sup>z</sup> .016	
Average.....	2.75	1.87	0.510	0.058	0.058	0.067	0.067	1.35	0.235	2.12	0.560	0.008	0.750	0.016	
General average.....	2.75	1.87	0.510	0.058	0.058	0.067	0.067	1.35	0.235	2.12	0.560	0.008	0.750	0.016	

<sup>a</sup> Precipitated at 40 °C, washed with a 1-percent solution of KNO<sub>3</sub> and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23 NaOH:1P.  
<sup>b</sup> Potentiometric titration.  
<sup>c</sup> Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.  
<sup>d</sup> 1-g sample burned in oxygen at 1,450 °C, and sulfur dioxide absorbed in starch-iodide solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO<sub>3</sub> solution. Titer based on 93 percent of the theoretical factor.  
<sup>e</sup> Double dehydration with intervening filtration.  
<sup>f</sup> Diethyldithiocarbamate photometric method. See J. Research NBS 47, 380 (1951) RP2265.  
<sup>g</sup> Chromium separated from the bulk of the iron in a 5-g sample by hydrolytic precipitation with NaHCO<sub>3</sub>, oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.

<sup>h</sup> Vanadium separated as in (g), oxidized with HNO<sub>3</sub>, and titrated potentiometrically with ferrous ammonium sulfate.  
<sup>i</sup> Alpha-benzoinoxime method. See BS J. Research 9, 1 (1932) RP453.  
<sup>j</sup> Cupferron separation after solution of the sample in diluted HCl (1+2). Vanadium separated by treatment with NaOH.  
<sup>k</sup> Sulfuric acid digestion for 3 hr of a 1-g sample. See J. Research NBS 43, 201 (1949) RP2021.  
<sup>l</sup> Volumetric method.  
<sup>m</sup> Cr<sub>2</sub>O<sub>3</sub>-Bismuthate-FeSO<sub>4</sub>-KMnO<sub>4</sub>.  
<sup>n</sup> Molybdenum removed by precipitation with alpha-benzoinoxime.  
<sup>o</sup> CuCNS precipitation, KI-Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> titration.  
<sup>p</sup> Persulfate oxidation.  
<sup>q</sup> NaHCO<sub>3</sub>-FeSO<sub>4</sub>-(NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub>-KMnO<sub>4</sub> method.

<sup>r</sup> Hydroquinone photometric method.  
<sup>s</sup> Titrating solution standardized by use of a standard iron.  
<sup>t</sup> Combustion gases absorbed in NaOH-H<sub>2</sub>O<sub>2</sub>, and excess NaOH titrated with H<sub>2</sub>SO<sub>4</sub>.  
<sup>u</sup> H<sub>2</sub>S-CuS-CuO.  
<sup>v</sup> Perchloric acid oxidation.  
<sup>w</sup> Alpha-benzoinoxime-PbMoO<sub>4</sub> method.  
<sup>x</sup> Vanadium separated by Na<sub>2</sub>CO<sub>3</sub> fusion.  
<sup>y</sup> Bismuthate-HgNO<sub>3</sub> titration.  
<sup>z</sup> Dimethylglyoxime precipitate titrated with cyanide.  
<sup>a'</sup> Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.  
<sup>b'</sup> Nitric acid oxidation, potentiometric titration with ferrous ammonium sulfate.  
<sup>c'</sup> Weighed as ammonium phosphomolybdate.  
<sup>d'</sup> Electrolytic method.  
<sup>e'</sup> Sulfuric acid dehydration.

List of Analysts

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| 2. A. G. Boyes, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.  | 5. B. E. Sockman, American Brake Shoe Co., Mahwah, N.J.                |
| 3. R. H. Elder and R. E. Deas, American Cast Iron Pipe Co., Birmingham, Ala.   | 6. E. F. O'Neill, Bethlehem Steel Co., Johnstown Plant, Johnstown, Pa. |

The iron for the preparation of this standard was furnished by The International Nickel Co.

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A. V. ASTIN, Director.