

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 30D

CHROMIUM-VANADIUM STEEL

ANALYST*	C	Mn		P		S			Si	COPPER H ₂ S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	Cr		V		MOLYBDENUM Colorimetric
	Direct combustion	Bismuthate (FeSO ₄ -KMnO ₄)	Persulfate-Arsenite	Gravimetric (weighed as Mg ₂ P ₂ O ₇ after removal of arsenic)	Alkali-Molybdate ^a	Gravimetric (direct oxidation and final precipitation in reduced solution)	Evolution with HCl (1-1) ZnS-filtrate (theoretical sulfur titre) ^b	Combustion	Sulfuric acid dehydration			FeSO ₄ -KMnO ₄ titration	HNO ₃ oxidation, potentiometric titration	Other methods		
1	0.360	^e 0.784	0.785	0.029	^d 0.030	0.031	0.029		^e 0.287	0.089	0.154	^f 1.15	0.188	^g 0.187	0.033	
2	.362		^h 0.789	.031	^h 0.033		^h 0.032	.031	ⁱ 0.283	.090	.145	^j 1.13	.190		^k 0.033	
	.360	.782	^h 0.785	.031	.032	.032	.033		^e 0.29	^l 0.085	^m 0.155	^j 1.15		ⁿ 0.19	.034	
	.361	.782	.785		.031		.032		^{ei} 0.280	.094	^o 0.144	^j 1.15		^p 0.19	.035	
	.365	.78		.030	.029	.034	.033		.290	.092	.150	^q 1.13		^r 0.192	.036	
6	.355		.786		^h 0.032		^h 0.029		ⁱ 0.295	ⁿ 0.092	.147	1.16		^r 0.192	.029	
7	.36	.792	.793		.031	.029	.029	.030	ⁱ 0.286		^m 0.158	1.10		^r 0.191		
8	.367		^s 0.784		.028	.028	.029		.282	^t 0.107		^f 1.15	.189			
9	.374	^e 0.793	^u 0.793	.031	.030	^v 0.031	.029	.033	^{ei} 0.284	^l 0.089	.151	1.15		^{sp} 0.184	.032	
10	.363	^e 0.781		.032	.033	.032	^h 0.032		^e 0.282	ⁿ 0.088	.150	^f 1.15	.193		.036	
11	.364		.785		.030		.029		.285			1.15		.20		
Averages	0.363	0.785	0.787	0.031	0.031	0.031	0.031	0.031	0.286	0.092	0.150	1.15	0.190	0.190	0.034	
General average	0.363	0.786		0.031		0.031			0.286	0.092	0.150	1.15	0.190		0.034	

^a Precipitated at 15° C after reduction of vanadium, washed with a 1-percent solution of KNO₃, and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23NaOH:1P.

^b Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and Na₂S₂O₃, and use of the ratio 2I:1S.

^c Chromium removed by precipitation with ZnO.

^d Colorimetric method. See J. Research NBS 26, 405 (1941) RP1386.

^e Double dehydration.

^f Persulfate oxidation, potentiometric titration with

ferrous ammonium sulfate solution standardized with recrystallized potassium dichromate.

^g Vanadium separated by precipitation with NaHCO₃ and electrolysis over a mercury cathode. Titrated with standard KMnO₄ after reduction by SO₂.

^h Titrating solution standardized by the use of a standard steel.

ⁱ Perchloric acid dehydration.

^j Perchloric acid oxidation.

^k Weighed as PbMoO₄.

^l KI-Na₂S₂O₃ titration.

^m Weighed as NiO.

ⁿ Colorimetric method.

^o Glyoxime precipitate titrated with KCN and AgNO₃.

^p Vanadium determined by differential titration with FeSO₄-KMnO₄, using o-phenanthroline indicator.

^q Oxidation by KMnO₄.

^r Ferrous sulfate-persulfate method.

^s Chromium removed by precipitation with NaHCO₃.

^t Finished by electrolysis.

^u Chromium volatilized as CrO₂Cl₂. Titration with sodium arsenite-sodium nitrite solution.

^v Meinel method.

*LIST OF ANALYSTS

1. Ferrous Laboratory, National Bureau of Standards. Analysis by John L. Hague and J. P. Hewlett, Jr.
2. M. A. Frost, Vanadium Alloys Steel Co., Latrobe, Pa.
3. H. Berg, Carnegie-Illinois Steel Corporation, Clairton Steel Works, Clairton, Pa.
4. W. D. Brown, Carnegie-Illinois Steel Corporation, Duquesne Works, Duquesne, Pa.
5. U. S. Navy Yard, Washington, D. C.
6. F. C. Young, The Ford Motor Co., Dearborn, Mich.

7. E. R. Vance, The Timken Roller Bearing Co., Canton, Ohio.
8. C. K. Mitchell, W. B. Coleman & Co., Philadelphia, Pa.
9. Armco Research Laboratories, Arba Thomas, chief chemist. Analysis by C. S. Mills, J. F. Woodruff, L. Ikenberry, and E. Scherrer.
10. F. W. Dillon and Allen L. Sloan, The Carpenter Steel Co., Reading, Pa.
11. C. M. Johnson, Crucible Steel Co. of America, Park Works, Pittsburgh, Pa.

The steel for the preparation of this standard was furnished by the Crucible Steel Company of America.

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LYMAN J. BRIGGS, *Director*.