

U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 100A

MANGANESE STEEL

(SAE T 1345)

ANALYST*	C	Mn		P	S			Si	COPPER H ₂ S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM FeSO ₄ -KMnO ₄ titration	VANADIUM	MOLYBDENUM Colorimetric	ALUMINUM (total)
	Direct combustion	Bismuthate (FeSO ₄ -KMnO ₄)	Persulfate-Arsenite	Gravimetric (weighed as Mn ₂ P ₂ O ₇ after removal of arsenic)	Alkali-Molybdate ^a	Gravimetric (direct oxidation and precipitation after reduction of iron)	Evolution with HCl (I-J) ZnS-Iodine (theoretical sulfur titre) ^b	Combustion						
1.....	0.445	1.66	1.67	0.021	0.020	0.026	0.025 ^d	0.026 ^e	0.051	0.032 ^f	0.048 ^g	0.003 ^h	0.008 ⁱ	0.039 ^j
2.....	.443	1.66	.....	.020 ^k	.020	.026	.026 ^l	.....	.048 ^m	.031	.048	.....	.....	.040 ⁿ
3.....	.441	.....	ⁿ 1.66	.020 ^o	ⁿ .020	.029 ^p	^o .029 ^q	ⁿ .028 ^r	^e .241	.052	.030	.052	.....	^q .042
4.....	.451	1.64	1.64	.019 ^r	.020	.026 ^s	ⁱ .025 ^t	.....	^e .243	^r .047	^s .032	.053	.....	^t .039
5.....	.451	.....	ⁿ 1.66	.....	ⁿ .020	.....	^u .028 ^v	ⁿ .028 ^w	^v .248	^w .050	.031 ^x	.049	.....	.....
6.....	.449	.....	1.68	.020 ^y	.022	.027 ^z	ⁱ .028 ^{aa}	.....	^e .241	.053	.036	.055	.....	^b .041
Averages.....	0.447	1.65	1.66	0.020	0.020	0.027	0.027	0.027	0.243	0.050	0.032	0.051	0.003	0.008
General average.....	0.447	1.66	.....	0.020	.....	0.027	0.027	.....	0.243	0.050	0.032	0.051	.....	0.040

^a Titrated at 40° C, washed with a 1-percent solution of KNO₃ and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23 NaOH: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 Molybdenum-blue photometric method. See J. Research NBS **26**, 405 (1941) RP1386.

^d 1-g sample burned in oxygen at 1,400° C, and sulfur dioxide absorbed in starch-iodine solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution based on 93 percent of the theoretical factor.

^e Double dehydration with intervening filtration.

^f Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.

^g Vanadium separated from the bulk of iron in a 10-g sample by selective precipitation with sodium bicarbonate, then oxidized with HNO₃ and titrated potentiometrically with ferrous ammonium sulfate.

^h Bicarbonate-H₂S-NaOH-Al₂O₃ method.

ⁱ Weighed as ammoniacal phosphomolybdate.

^j Absorbed in ammoniacal cadmium chloride.

^k Nitric-sulfuric acid dehydration.

^l Copper-ammonia complex photometric method.

^m Bicarbonate-NaOH-S-hydroxyquinoline-bromate titration method.

ⁿ Titrating solution standardized by use of a standard steel.

^o Evolution with concentrated HCl.

^p As in (d), except sample burned at 1,320° C.

^q Bicarbonate-NaOH-H₂S-Al(OH)₃-AlPO₄ method.

^r Finished by electrolysis.

^s Dimethylglyoxime precipitation, cyanide titration method.

^t As in (h), except aluminum finally precipitated and weighed as AlPO₄.

^u Solution with diluted HCl (2:1).

^v Perchloric acid dehydration.

^w Iodide-thiosulfate titration method.

^x Perchloric acid photometric method.

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The steel for the preparation of this standard was furnished by the Carnegie-Illinois Steel Corporation

E. U. CONDON, *Director.*

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