

UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON

National Bureau of Standards
Certificate of Analyses

Standard Sample 8H
Bessemer Steel, 0.1% Carbon

ANALYST	C	Mn		P		S			Si	Cu	Ni	Cr	V	Mo	N	Sn
	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 precipitation after reduction of iron)	Combustion Iodate titration	Evolution with HCl (I-I) (ZnS-Iodine (theoretical sulphur titer) ^b)	Sulfuric acid dehydration	H ₂ S-CuS-CuO	Weighed as nickel dimethylglyoxime	FeSO ₄ -KMnO ₄ titration		Colorimetric	Distillation-titration	
1.....	0.116	0.454	0.094	0.092	0.050	0.050	0.052	0.031	0.054	0.019	0.021	0.018	0.003	0.017	0.003	
2.....	.119	1.453	.095	.095	.049		.050	0.026	.054	0.021	0.019	0.018	.003	0.017		
3.....	.113	1.460	.094	.094	.051	0.052	.050	0.028	.056	.020	0.021	0.012	.003	0.017		
4.....	.113	1.461		.094			.051	.027	0.048	0.019	0.022	0.016	.005	.014		
5.....	.117	1.448		0.093			0.051	0.028	0.057	0.018	.025	0.015	.005			
	.119	.449	1.453	.095	.095	.050	.050	0.026	0.053	0.023	{ 0.022 0.023 }	{ 0.012 0.013 }	.003	.017		
7.....	.123	.450	1.460		.096		.051	0.027	0.054	.017	.020	.017	.005	.019		
8.....	.115		.456	.093	.093	.050	.050	0.024	.054		.025	.017	.003	0.019		
Average.....	0.117	0.449	0.456	0.094	0.094	0.050	0.050	0.027	0.054	0.019	0.022	0.015	0.004	0.017		
General average.....	0.117	0.454		0.094		0.050		0.027	0.054	0.019	0.022	0.015	0.004	0.017		

^a Precipitated 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 23NaOH:1P.
^b Value obtained by standardizing the titrating solution with sodium oxalate through KMnO₄ and Na₂S₂O₈ and the use of the ratio 2I:1S.
^c Potentiometric titration.
^d Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.
^e 1-g sample burned in oxygen at 1,425° C and sulfur dioxide absorbed in starch-iodine solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution. Titer based on 93 percent of the theoretical factor.
^f Double dehydration with intervening filtration.
^g Diethyldithiocarbamate photometric method. See J.

Research NBS 47, 380 (1951) RP2265.
^h Chromium separated from the bulk of the iron in a 10-g sample by NaHCO₃ hydrolysis, oxidized with persulfate, and titrated potentiometrically with ferrous ammonium sulfate.
ⁱ Vanadium separated as in (h), oxidized with HNO₃ and titrated potentiometrically with ferrous ammonium sulfate.
^j Sulfuric acid digestion for 4 hours of a 0.5-g sample. See J. Research NBS 43, 201 (1949) RP2021.
^k Sulfide-iodine method. See BS J. Research 8, 309 (1932) RP415.
^l Titrating solution standardized with a standard steel.
^m Dimethylglyoxime-photometric method.
ⁿ Bicarbonate hydrolysis of a 10-g sample and vanadium determined by FeSO₄-(NH₄)₂S₂O₈-KMnO₄ method.

^o Finished photometrically with Nessler's reagent.
^p 5-g sample as in (h).
^q 5-g sample as in (i).
^r Finished by electrolysis.
^s Photometric method.
^t Vanadium separated by NaHCO₃ hydrolysis and determined photometrically with H₂O₂.
^u Copper-ammonia complex photometric method.
^v Diphenylcarbazide photometric method.
^w Perchloric acid oxidation.
^x Vanadium separated with cupferron and determined by the FeSO₄-(NH₄)₂S₂O₈-KMnO₄ method.
^y Perchloric acid dehydration.
^z Semi-micro distillation-Nessler photometric method. See Ind. Eng. Chem. Anal. Ed., 14, 137 (1942).

List of Analysts

1. Ferrous Laboratory, National Bureau of Standards. Analysis by J. I. Shultz, H. Jacobson, E. D. Brown, R. K. Bell, and L. A. Machlan.
2. D. J. Hallisey, Jones and Laughlin Steel Corporation, Aliquippa Works, Aliquippa, Pa.
3. C. A. Trathowen, Jones and Laughlin Steel Corporation, Pittsburgh Works, Pittsburgh, Pa.
4. H. V. Reddinger, Bethlehem Steel Co., Johnstown Plant, Johnstown, Pa.
5. W. P. Robertson, Weirton Steel Co., Weirton, W. Va.
6. G. W. Madsen and C. V. Rooney, Columbia-Geneva Steel Corporation, Utah Operations, Geneva, Utah.
7. S. Partington, The Detroit Testing Laboratory, Inc., Detroit, Mich.
8. A. C. Parsons and C. L. Abbott, Bethlehem Steel Co., Lackawanna Plant, Lackawanna, N. Y.

The steel for the preparation of this standard was furnished by the Jones and Laughlin Steel Corporation.

WASHINGTON, D. C., March 31, 1955. 1/23

P.C. 1/19/54

A. V. ASTIN, Director.