

U. S. DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

National Bureau of Standards

Certificate of Analyses

Standard Sample 129B

Bessemer Steel, 0.1% Carbon
(High Sulfur)

ANALYST	C	Mn		P		S		Si	Cu	Ni	Cr	V	Mo	N
	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	Perchloric acid dehydration		Weighed as nickel dimethylglyoxime	Persulfate oxidation (FeSO ₄ -KMnO ₄ titration)		Photometric	
1.....	0.090		^b 0.763	0.085	^c 0.084	0.220	^d 0.222	^e 0.022	^f 0.014	0.011	^g 0.016	^h 0.005	0.003	ⁱ 0.013
2.....	.094		^j .760	.084	.085	.216	.227	^e .023	^k .019	.015	.014		.002	^l .013
3.....	.096	.753	.76	.086	.086	.225	.232	^e .019	^m { n.013 n.014}	.012	.016	^o { o.003 p.004}	.004	^l .019
4.....	.094		^j .764		.087	.221	ⁱ .227	.020	^m .022	.019	.018	^q .006	.003	^r .014
5.....	.096		^j .77		ⁱ .085	.232	ⁱ .233	^s .024	^t .012	^u .012	.015	^o .003	.004	
6.....	^v .093	.77	^j .76	.086	.087	.215	ⁱ .220	.018	^f .012	.012	.018	^h .004	.002	^l .014
7.....	.093		^j .765	.085	.087	.221	ⁱ .223	^e .021	^t .016	.012	^w .019	^x .004	.002	^l .013
Average.....	0.094	0.762	0.763	0.085	0.086	0.221	0.226	0.021	0.015	0.013	0.016	0.004	0.003	0.014
General average.....	0.094	0.763		0.085		^y 0.224		0.021	0.015	0.013	0.016	0.004	0.003	0.014

^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 23 NaOH:1P.
^b Potentiometric titration.
^c Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.
^d 1-g sample burned in oxygen at 1,425° C, and sulfur dioxide absorbed in starch-iodide solution. Iodine liberated from iodide by titration, during the combustion, with standard KIO₃ solution. Titer based on 93 percent of the theoretical factor.
^e Double dehydration.
^f Diethyldithiocarbamate photometric method. See J. Research NBS 47, 330 (1951) RP2265.

^g Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO₃, oxidized with persulfate and titrated potentiometrically with ferrous ammonium sulfate.
^h Vanadium separated as in (g), oxidized with HNO₃, and titrated potentiometrically with ferrous ammonium sulfate.
ⁱ Sulfuric acid digestion for 4 hr of a 0.5-g sample. Distillation-titration. See J. Research NBS 43, 201 (1949) RP2021.
^j Titrating solution standardized with a standard steel.
^k H₂S-CuS-CuO.
^l Distillation-photometric with Nessler's reagent.
^m H₂S-electrolysis method.
ⁿ KI-Na₂S₂O₈ titration.

^o H₂O₂-photometric method.
^p FeSO₄-(NH₄)₂S₂O₈-KMnO₄ method.
^q Nitric acid oxidation, titration with ferrous ammonium sulfate.
^r Distillation-titration, 5-g sample.
^s H₂SO₄ dehydration.
^t Copper-ammonia complex-photometric method.
^u Photometric method.
^v Conductometric method.
^w HClO₄ oxidation.
^x NaHCO₃ hydrolysis followed by mercury cathode separation. Vanadium titrated with KMnO₄.
^y This steel is not recommended for evolution sulfur determinations, because the amount of sulfur evolved decreases slowly under ordinary conditions of storage.

List of Analysts

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| <p>1. Ferrous Laboratory, National Bureau of Standards, J. I. Shultz in charge. Analysis by E. June Maienthal, J. R. Spann, R. E. McIntyre, A. Skapars.</p> <p>2. E. W. Polley, The Youngstown Sheet and Tube Co., Youngstown, Ohio.</p> <p>3. B. E. Sockman, American Brake Shoe Co., Mahwah, N. J.
W. A. Richardson, Kaiser Steel Corporation, Iron and Steel Division, Fontana Works, Fontana, Calif.</p> | <p>5. E. C. Suhrie, Republic Steel Corporation, Youngstown, Ohio.</p> <p>6. W. F. Zollinger, Bethlehem Steel Company, Bethlehem, Pa.</p> <p>7. R. J. Ruff and A. L. Cheney, United States Steel Corporation, American Steel and Wire Division, Donora Steel and Wire Works Laboratory, Donora, Pa.</p> |
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The steel for the preparation of this standard was furnished by The Youngstown Sheet and Tube Company.

WASHINGTON, D. C., December 30, 1957.

A. V. ASTIN, *Director*.