

British Chemical Standards

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Certificate of Analyses

B.C.S.* / S.S.† No. 434/1

PLAIN CARBON STEEL

CONTAINING NIOBIUM

Prepared under rigorous laboratory conditions and AFTER STANDARDIZATION BY ANALYSTS IN GREAT BRITAIN AND NORWAY, issued by the Bureau of Analysed Samples, Ltd.

The standard bars were specially prepared by Edgar Allen, Balfour Limited, Sheffield.

ANALYSES

(mean values)

Analyst No.	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Nb %	Mo %	Al %	Cu %
1	0.41	0.32	1.50	0.049	0.028	0.054	0.040	0.081	<i>0.01</i>	<i><0.01</i>	<i>0.05</i>
2	..	..	..	0.050	0.027	0.058	0.042	0.081	..	..	..
3	0.41	0.30	1.49	..	..	..	..	..	..	..	..
4	0.40	0.32	1.52	..	..	0.052	..	..	..	..	..
5	0.41	0.32	1.46	..	..	..	..	..	..	..	..
6	..	..	..	0.049	0.026	..	0.046	0.079	..	..	..
7	..	..	..	0.052	0.026	..	..	..	..	..	..
8	0.41	0.32	1.48	..	0.028	0.053	0.042	..	..	..	..
9	..	..	..	0.048	0.027	0.060	..	0.081	..	..	..
10	..	..	..	0.050	0.029	..	0.046	0.076	..	..	..
11	..	..	..	0.049	0.027	0.051	0.043	0.079	..	..	..
12	..	..	..	0.052	0.028	0.052	..	0.075	..	..	..
13	0.42	0.31	1.50	..	..	..	0.049	..	..	..	..
14	0.41	0.31	1.50	..	..	..	0.044	..	..	..	..
15	..	..	..	..	..	..	0.043	0.075	..	..	..
16	0.42	0.31	1.47	..	..	0.059	0.042	..	..	..	..
Average	0.41	0.31	1.49	0.050	0.027	0.055	0.044	0.078	..	..	..

The above figures are those which each analyst has decided upon after careful verification

Figures in bold type standardized, figures in small italic type only approximate

*Chips for chemical analysis. †Disc sample for spectroscopic analysis.

CO-OPERATING ANALYSTS AND FIRMS

REFEREE ANALYST—INDEPENDENT

1. PICKERING, J. L., *L.R.I.C.*, Ridsdale and Co. Ltd., Middlesbrough.

ANALYSTS representing MAKERS and USERS

2. BORROWDALE, J., *B.Sc.*, BSC Scunthorpe Division, Scunthorpe.
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4. BROWN, J. and SEWELL M., BSC River Don and Associated Works, Sheffield.
5. BURT, H., BSC Dalzell Works, Motherwell.
6. CHAMBERLAIN, B. J., *M.Sc.*, BSC Bilston, Wolverhampton and Birchley Works, Bilston.
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B.C.S./S.S. No. 434/1 PLAIN CARBON STEEL

NOTES ON METHODS USED

CARBON

Analysts Nos. 1, 4, 5 and 16 determined carbon by non aqueous titration according to the British Standard Carbon Method 4*. Nos. 3, 8, 13 and 14 used gravimetric methods, Nos. 8 and 13 according to the British Standard Carbon Method 1*. No. 14 used a high frequency furnace.

Analysts Nos. 8, 13 and 14 also determined carbon by high frequency combustion and infrared measurement and obtained the following values respectively:- 0.41%, 0.42%, 0.42%.

SILICON

All analysts except No. 14 determined silicon gravimetrically after dehydration with perchloric acid (Nos. 1, 4, 5 and 13), hydrochloric acid (No. 3) or sulphuric acid (Nos. 8 and 16). Nos. 1, 4, 5 and 13 followed the procedure of the British Standard Silicon Method 1*. Analyst No. 14 determined silicon colorimetrically as molybdenum blue according to the British Standard Silicon Method 4*.

MANGANESE

Analysts Nos. 1, 8 and 13 determined manganese titrimetrically with arsenite/nitrite (No. 1) or arsenite (Nos. 8 and 13) after oxidation with persulphate/silver nitrate. No. 1 followed the procedure of the Analoid Method No. 53. Nos. 3, 4, 5 and 14 determined manganese colorimetrically after oxidation with persulphate/silver nitrate (No. 3) or periodate (Nos. 4, 5 and 14). Nos. 4, 5 and 14 followed the procedure of the British Standard Manganese Method 2*. Analyst No. 16 used atomic absorption spectroscopy.

Analyst No. 5 also determined manganese titrimetrically with arsenite and found 1.48%.

PHOSPHORUS

Analysts Nos. 1, 2, 7, 9, 10 and 11 determined phosphorus colorimetrically as phosphovanadomolybdate according to the British Standard Phosphorus Method 2*. Nos. 6 and 12 determined phosphorus by titration after precipitation as phosphomolybdate.

Analyst No. 6 also used the British Standard Phosphorus Method 2* and found 0.047%. No. 7 also used a titrimetric method and found 0.050%.

SULPHUR

Analysts Nos. 1, 2, 6, 7, 9 and 11 determined sulphur gravimetrically and all except No. 11 followed the procedure of the British Standard Sulphur Method 1*. No. 11 used a method involving preliminary separation of sulphur as sulphuric acid on an alumina column (Nydahl, Anal. Chem., 1954, 26, 580). The remaining analysts determined sulphur by combustion methods. No. 8 used high frequency combustion/infrared absorption. No. 10 evaluated the evolved gases titrimetrically with iodate after absorption in water and No. 12 with borate after absorption in hydrogen peroxide solution.

Analyst No. 6 also used an iodimetric combustion method and found 0.026%. No. 11 also used high frequency combustion/infrared absorption and found 0.028%.

CHROMIUM

Analysts Nos. 1 and 4 determined chromium titrimetrically with ammonium ferrous sulphate after oxidation with persulphate/silver nitrate. No. 1 followed the procedure of the Analoid Method No. 37 and No. 8 that of the British Standard Chromium Method 1*. Nos. 2, 9 and 16 used atomic absorption spectroscopy. Nos. 8, 11 and 12 used the diphenylcarbazide colorimetric British Standard Chromium Method 2*.

Analysts Nos. 8 and 12 also determined chromium by atomic absorption spectroscopy and found 0.054% and 0.056% respectively. No. 9 also used the British Standard Chromium Method 2* and found 0.057%.

NICKEL

Analysts Nos. 1, 2 and 16 determined nickel by atomic absorption spectroscopy. Nos. 6, 11, 14 and 15 used the British Standard Nickel Method 3* in which nickel is determined colorimetrically with dimethylglyoxime. Nos. 10 and 13 also used dimethylglyoxime colorimetric methods after removing the bulk of the iron by solvent extraction. No. 8 separated nickel by precipitation with dimethylglyoxime and completed by titration with EDTA.

Analysts Nos. 8 and 15 also determined nickel by atomic absorption spectroscopy and found 0.04% and 0.043% respectively.

NIObIUM

Analysts Nos. 1, 2, 10 and 12 determined niobium colorimetrically as the thiocyanate complex extracted into acetone according to the British Standard Niobium Method 1*. The remaining analysts separated niobium with phenylarsonic acid and completed colorimetrically with PAR. A version of this method is currently being investigated by the ECSC WG20 Group.

