MAIN EDITION

British Chemical Standards

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Bureau of Analysed Samples, Ltd.

Certificate of Analyses

B.C.S.*/S.S.† No. 407
LOW ALLOY STEEL

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

The standard bars were specially prepared by Edgar Allen Steels Ltd., Sheffield.

ANALYSES

Analyst No.	C %	Si %	S %	P %	Mn %	Ni %	Cr %	Mo %	V %	Cu %
1	0·50	0·70	0·013	0·032	0·12	0·61	3·03	0·80	0·25	0·45
2	0·49	0·68	0·011	0·032	0·13	0·62	2·99	0·80	0·24	0·42
3	0·51	0·68	0·011	0·033	0·14	..	..	..	..	..
4	..	..	..	..	..	0·61	3·00	0·82	0·21	0·43
5	0·50	..	..	0·034	..	0·60	3·00	0·82	..	0·43
6	..	..	..	..	..	0·62	2·98	0·82	0·23	0·45
7	0·49	0·69	0·011	0·032	0·12	..	..	..	..	..
8	0·50	0·69	0·014	0·033	0·12	..	..	..	..	..
9	..	..	..	..	..	0·60	2·98	0·84	0·23	0·42
10	0·50	0·68	0·012	0·031	0·14	0·62	2·96	0·81	0·21	0·43
11	0·50	0·70	0·013	0·034	0·13	..	..	..	..	..
12	..	..	..	..	..	0·60	3·01	0·82	0·22	0·44
13	0·50	0·68	0·011	0·033	0·14	0·62	3·02	0·82	0·22	0·42
Average	**0·50**	**0·69**	**0·012**	**0·033**	**0·13**	**0·61**	**3·00**	**0·82**	**0·23**	**0·43**

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

*Chips for chemical analysis †Disc sample for spectroscopic analysis

[P.T.O.

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NOTES ON METHODS USED

CARBON

Analyst No. 1 determined carbon volumetrically using the Ströhlein apparatus. Nos. 2, 7 and 13 determined carbon gravimetrically. Nos. 3, 8 and 10 used infrared absorption methods. No. 5 used a low-pressure method (Cook and Speight, Analyst, 1956, **81**, 144). No. 11 used a non-aqueous titration method (Jones et al., Analyst, 1965, **90**, 623; 1966, **91**, 399).

Analyst No. 3 also used an electrical conductivity method and found 0·51%. No. 5 also determined carbon by non-aqueous titration and by infrared absorption; both methods gave results of 0·50%. No. 11 also determined carbon gravimetrically and found 0·50%.

SILICON

All analysts determined silicon gravimetrically by double dehydration with perchloric acid; Nos. 2, 3, 7, 10, 11 and 13 used the Standard method B.S. 1121: Part 10: 1967.

Analyst No. 1 also used a gravimetric method involving evaporation of a hydrochloric-nitric acid solution of the alloy and found 0·69%. Nos. 3 and 11 also determined silicon colorimetrically as molybdenum-blue, No. 3 using an automatic method (Scholes and Thulbourne, Analyst, 1964, **89**, 466); the results were 0·68% and 0·70% respectively

SULPHUR

Analysts Nos. 1, 2, 7, 11 and 13 determined sulphur gravimetrically; Nos. 2, 7, 11 and 13 used the Standard method B.S. 1121: Part 1: 1966. Nos. 3, 8 and 10 determined sulphur by combustion; No. 3 completed conductimetrically whereas Nos. 8 and 10 completed volumetrically.

Analysts Nos. 1 and 11 also determined sulphur by combustion and found 0·015% and 0·014% respectively.

PHOSPHORUS

Analysts Nos. 1 and 8 determined phosphorus gravimetrically by precipitation as phosphomolybdate and conversion to lead molybdate. Nos. 2, 3, 5, 10, 11 and 13 determined phosphorus colorimetrically as phosphovanado-molybdic acid according to the Standard method B.S. 1121: Part 45: 1966. No. 7 determined phosphorus volumetrically after precipitation of ammonium phosphomolybdate according to the Standard gravimetric method B.S. 1121: Part 9: 1948.

Analyst No. 1 also determined phosphorus colorimetrically as phosphovanadomolybdate and found 0·032%. No. 11 also used the British Standard gravimetric method and found 0·034%.

MANGANESE

All analysts except No. 7 determined manganese colorimetrically after oxidation with periodate; Nos. 2, 3, 10, 11 and 13 used the Standard method B.S. 1121: Part 23: 1951. No. 7 determined manganese volumetrically according to the Standard method B.S. 1121: Part 16: 1949 which includes a zinc oxide separation.

Analyst No. 1 also used a direct volumetric method and found 0·12%. No. 8 also used a volumetric method after a zinc oxide separation and found 0·11%. No. 11 also used the British Standard volumetric method and found 0·12%.

NICKEL

Analyst No. 1 determined nickel gravimetrically after precipitation with dimethylglyoxime. No. 2 precipitated with dimethylglyoxime, dissolved the precipitate in dilute sulphuric acid and boiled with excess of ferric sulphate; the ferrous salt thus formed was titrated with dichromate solution (Analoid Method No. 62). Nos. 4 and 6 determined nickel colorimetrically according to the Standard method B.S. 1121: Part 6: 1966. Nos. 5, 9, 10 and 12 used the Standard volumetric method B.S. 1121: Part 37: 1961 in which the nickel is precipitated with dimethylglyoxime and determined cyanometrically. No. 13 precipitated with dimethylglyoxime and completed by titration with EDTA.

Analyst No. 1 also determined nickel colorimetrically with dimethylglyoxime and found 0·62%.

CHROMIUM

All analysts determined chromium volumetrically after oxidation with persulphate/silver nitrate. No. 2 used the Analoid method No. 37. Nos. 4, 5, 6, 9, 10, 12 and 13 used the Standard method B.S. 1121: Part 13: 1954.

Analyst No. 1 also determined chromium colorimetrically with diphenylcarbazide and found 3·02%.

MOLYBDENUM

All analysts except No. 5 determined molybdenum colorimetrically as oxythiocyanate. Nos. 1, 2, 6 and 9 developed and measured the colour in aqueous solution whereas Nos. 4, 10, 12 and 13 extracted with *n*-butyl acetate according to the Standard method B.S. 1121: Part 48: 1966. No. 5 determined molybdenum colorimetrically with toluene 3-4-dithiol (Wells and Pemberton, Analyst, 1947, **72**, 185).

VANADIUM

Analysts Nos. 1, 2, 4, 6, 9 and 13 determined vanadium volumetrically. No. 1 titrated potentiometrically with permanganate. No. 2 used the Analoid method No. 34. Nos. 4, 6, 9 and 13 used the Standard method B.S. 1121: Part 25: 1956. Nos. 10 and 12 determined vanadium colorimetrically as phosphovanadotungstate (Scholes, Analyst, 1957, **82**, 525).

Analyst No. 1 also determined vanadium colorimetrically as phosphovanadotungstate and found 0·24%. No. 12 also used the British Standard volumetric method and found 0·22%.

COPPER

Analysts Nos. 1, 2, 4, 10 and 12 determined copper colorimetrically. No. 1 used tetraethylthiuram disulphide. Nos. 2, 4 and 12 used *bis*-cyclohexanone oxalyldihydrazone (Haywood and Sutcliffe, Analyst, 1956, **81**, 651). No. 10 used 2-2'diquinolyl according to the Standard method B.S. 1121: Part 36: 1956. Nos. 5, 6, 9 and 13 determined copper volumetrically by iodometric titration using the Standard method B.S. 1121: Part 14: 1956.

Analysts Nos. 5 and 6 also used the British Standard colorimetric method and found 0·45% and 0·46% respectively. No. 12 also used the British Standard volumetric method and found 0·44%.

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