



BUREAU OF ANALYSED SAMPLES LTD

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BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS BCS[†]/SS[‡]-CRM No. 470 FERRITIC STAINLESS STEEL

Prepared under rigorous laboratory conditions and, AFTER CERTIFICATION ANALYSIS IN GREAT BRITAIN,
issued by the Bureau of Analysed Samples Ltd.

CO-OPERATING ANALYSTS

INDEPENDENT ANALYSTS

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GOVERNMENT DEPARTMENTS

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10 DYSON, R., BSC Sheffield Laboratories, Sheffield.
11 HAMILTON, R.F., Babcock Power Ltd., Renfrew.
12 HYND, D., Cameron Iron Works Ltd., Livingston.
13 KIRKBY, C.I., BSC Stocksbridge and Tinsley Park Works, Sheffield.
14 WISE, R.A., Bonar Langley Alloys Ltd., Slough.

ANALYSES

Mean of 4 values - mass content in %.

Analyst No.	C	Si	Mn	P	S	Cr	Ni	Co	Cu	V
1	0.154	...	...	...	0.035	...	0.375	...	...	...
2	0.153	0.333	0.228	0.024	0.036	17.77	0.358	...	...	...
3	0.153	0.335	0.238	0.024	0.036	17.66	0.372	...	...	...
4	0.150	...	0.228	0.024	...	...	...	...	...	...
5	0.150	0.328	0.240	0.024	...	...	...	...	...	...
6	0.154	0.342	0.234	0.024	0.036	...	...	...	...	...
7	...	0.335	0.230	...	...	17.73	0.366	0.02	0.02	0.02
8	0.155	0.334	...	0.026	0.035	...	...	...	...	...
9	...	0.336	0.228	...	...	17.80	0.368	...	...	...
10	0.155	...	...	...	0.034	...	...	...	...	...
11	...	...	...	...	0.035	17.60	0.372	...	...	...
12	...	...	0.252	0.026	...	17.59	...	...	...	...
13	...	...	...	0.023	...	17.65	0.372	...	...	...
14	...	0.336	...	...	...	17.66	0.364	...	...	...
M_M	0.153	0.335	0.235	0.024	0.035	17.68	0.369	...	...	...
<i>s_M</i>	0.002	0.004	0.009	0.001	0.001	0.08	0.006	...	...	...

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

Figures in bold type certified, figures in small italic type only approximate.

M_M: Mean of the intralaboratory means. *s_M*: standard deviation of the intralaboratory means.

CERTIFIED VALUES (C_v)

mass content in %

	C	Si	Mn	P	S	Cr	Ni
C_v	0.153	0.335	0.235	0.024	0.035	17.68	0.369
C(95%)	0.002	0.004	0.008	0.001	0.001	0.07	0.005

The half width confidence interval $C(95\%) = \frac{t \times s_M}{\sqrt{n}}$ where "t" is the appropriate two sided Student's t value at the 95% confidence level for "n" acceptable mean values.

For further information regarding the confidence interval for the certified value see ISO Guide 35:2006 sections 6.1 and 10.5.2.

N.B. Due to slight segregation of certain elements an area 6mm in diameter in the centre of the disc samples should be avoided for emission spectroscopy.

BCS/SS-CRM No. 470 FERRITIC STAINLESS STEEL

NOTES ON METHODS USED

CARBON

Analysts Nos. 1, 2, 6, 8 and 10 determined carbon using high frequency combustion/infrared absorption. Nos. 3, 4 and 5 used non-aqueous titration according to the British Standard Method 4*.

SILICON

All analysts determined silicon gravimetrically after dehydration with perchloric acid, according to the British Standard Silicon Method 1*.

MANGANESE

Analysts Nos. 2 and 4 determined manganese by flame atomic absorption spectrometry. The remaining analysts determined manganese photometrically; all except No. 9, after oxidation with periodate according to the British Standard Manganese Method 2*. No. 9 oxidized with persulphate/silver nitrate.

PHOSPHORUS

All analysts determined phosphorus photometrically as phosphovanadomolybdate according to the British Standard Phosphorus Method 2*.

SULPHUR

All analysts, except No. 3, determined sulphur using high frequency combustion/infrared absorption. No. 3 determined sulphur gravimetrically according to the British Standard Sulphur Method 1*.

CHROMIUM

All analysts determined chromium by titration with ammonium ferrous sulphate; all except No. 12, after oxidation with persulphate/silver nitrate according to the British Standard Chromium Method 1*. No. 12 oxidized with perchloric acid.

NICKEL

Analysts Nos. 1, 9, 11 and 13 determined nickel photometrically with dimethylglyoxime according to the British Standard Nickel Method 3*. Nos. 2 and 7 used flame atomic absorption spectrometry. Nos. 3 and 14 separated nickel with dimethylglyoxime. No. 3 dissolved the precipitate in dilute sulphuric acid, boiled with excess ferric sulphate and titrated with dichromate (Analoid Method No. 62). No. 14 determined nickel gravimetrically as the oxime.

Analyst No. 1 also determined nickel cyanometrically after separation with dimethylglyoxime and obtained a value of 0.37%.

Analyst No. 7 also determined nickel using Analoid Method No. 62 and obtained a value of 0.37%.

Analyst No. 11 also determined nickel by flame atomic absorption spectrometry and obtained a value of 0.37%.

COBALT

Analyst No. 7 determined cobalt by flame atomic absorption spectrometry.

COPPER

Analyst No. 7 determined copper by flame atomic absorption spectrometry.

VANADIUM

Analyst No. 7 determined vanadium by flame atomic absorption spectrometry.

*Methods for Sampling and Analysis of Iron, Steel and Other Ferrous Metals, B.S. Handbook No. 19, first published in 1970 by the BSI, 389 Chiswick High Road, London. W4 4AL.

DESCRIPTION OF SAMPLE

† British Chemical Standard – bottles of 100g chips graded 1700 - 250µm (10 - 60 mesh) for chemical analysis.

‡ Spectroscopic Standard – 38 mm diameter x 19 mm thick discs for spectroscopic analysis.

INTENDED USE & STABILITY

The chip sample, BCS-CRM 470, is intended for the verification of analytical methods, such as those used by the participating laboratories, for the calibration of analytical instruments in cases where the calibration with primary substances (pure metals or stoichiometric compounds) is not possible and for establishing values for secondary reference materials.

It will remain stable provided that the bottle remains sealed and is stored in a cool, dry atmosphere. When the bottle has been opened the lid should be secured immediately after use. If the contents should become discoloured (e.g. oxidised) by atmospheric contamination they should be discarded.

The disc sample, SS-CRM 470, is intended for establishing and checking the calibration of Optical Emission and X-Ray Spectrometers for the analysis of similar materials. The "as received" working surface of the sample should be finished before use to remove any protective coating. It will remain stable provided that it is not subject to excessive heat (e.g., during preparation of the working surface). An area 6mm in diameter in the centre of the disc should be avoided for optical emission spectrometry.

This Certified Reference Material has been prepared in accordance with the recommendations specified in ISO Guides 30 to 35, available from the International Standards Organisation in Geneva.

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For BUREAU OF ANALYSED SAMPLES LTD

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