MAIN EDITION

BUREAU OF ANALYSED SAMPLES LTD

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF ANALYSIS
BCS/SS-CRM No. 424
LOW-TUNGSTEN STEEL

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

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ANALYSES

Mean of 4 values - mass content in %.

Analyst No.	W	*C*	*Si*	*Mn*	*P*	*S*	*Mo*	*V*
1	3.02	*0.024*	*0.05*	*0.09*	*0.02*	*0.024*	*0.036*	*<0.02*
2	3.02	...	...	...	...	...	...	...
3	3.02	...	...	...	...	...	...	...
4	2.99	...	...	...	...	...	...	...
5	3.04	...	...	...	...	...	...	...
6	3.05	...	...	...	...	...	...	...
7	2.99	...	...	...	...	...	...	...
8	3.04	...	...	...	...	...	...	...
M_M	**3.02**	...	...	...	...	...	...	...
s_M	0.03	...	...	...	...	...	...	...

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 laboratory mean values. s_M: standard deviation of the laboratory mean values.

CERTIFIED VALUE (Cv)

mass content in %

	W
Cv	**3.02**
C(95%)	0.02

The half width confidence interval **C**(95%) is an expression of the uncertainty of the certified value, where **C**(95%) = $\frac{t \times s_M}{\sqrt{n}}$ and "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.

NB: Although widely accepted within the industry "mass content in %" is neither an SI nor an IUPAC supported quantity.
Multiplication of the certified value (Cv) by 10^4 will yield the value in µg/g.

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(The current edition is available at www.basrid.co.uk)

BCS/SS-CRM 424 LOW TUNGSTEN STEEL

NOTES ON METHODS USED

TUNGSTEN

Analysts Nos. 1, 2 and 4 determined tungsten gravimetrically as tungstic oxide according to the Standard method B.S. 1121: Part 40: 1967. No. 1 modified the method by increasing the sample weight to 5g. No. 4 made a correction for residual tungsten remaining in the filtrate, which was determined photometrically with toluene-3: 4-dithiol. Nos. 3, 5, 6, 7 and 8 used the Standard photometric method B.S. 1121: Part 32: 1954 which depends on formation of tungsten thiocyanate.

Analysts Nos. 2 and 4 also used the British Standard photometric method and found 3.05% and 2.97% respectively. No. 8 also used the British Standard gravimetric method, making a correction for residual tungsten remaining in the filtrate, which was determined photometrically as the thiocyanate; the result of this method was 3.05%.

CARBON

*Non-aqueous titration method (Jones et al., Analyst, 1965, **90**, 623; 1966, **91**, 399).*

SILICON

Gravimetric method with perchloric acid dehydration and final ignition at 800°C.

MANGANESE

Standard photometric method B.S. 1121: Part 23: 1951.

PHOSPHORUS

Analoid titrimetric method No. 21.

SULPHUR

Combustion method in which the sulphur gases were absorbed in water and titrated with iodide/iodate solution.

MOLYBDENUM

Analoid photometric method No. 63.

VANADIUM

Analoid titrimetric method No. 34.

DESCRIPTION OF SAMPLE

British Chemical Standard, BCS-CRM 424, is sold in bottles containing 100g chips graded 1700 - 250µm (10 - 60 mesh) for chemical analysis.

Spectroscopic Standard, SS-CRM 424, is sold as 38 mm diameter x 19 mm thick discs for spectroscopic analysis.

The preparation of representative samples for chemical analysis and certification by co-operative analysis was undertaken by Bureau of Analysed Samples Ltd.

INTENDED USE

BCS-CRM 424 is intended for uses such as the verification of the accuracy and repeatability of analytical methods, such as those used by the participating laboratories, for the calibration of analytical instruments, for establishing values for secondary reference materials and for training purposes. The sample should be mixed thoroughly before each use.

SS-CRM 424 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 should be linished before use to remove any protective coating.

STABILITY

BCS-CRM 424 will remain stable provided that the bottle remains sealed and is stored in a dry atmosphere. When the bottle has been opened the lid should be secured immediately after use.

SS-CRM 424 will remain stable provided that it is not subjected to excessive heat (e.g. during preparation of the working surfaces).

TRACEABILITY

The characterisation of this material has been achieved by chemical analysis involving inter-laboratory study, each laboratory using the method of their choice, details of which are given above.

Most of the analytical methods used in the characterisation of this CRM were either international or national standard methods or methods which are technically equivalent. All laboratories used either stoichiometric analytical techniques or methods which were calibrated predominantly against pure metals or stoichiometric compounds, ensuring traceability of the individual results to the SI.

MEASUREMENT UNCERTAINTY

The uncertainty of the certified value of BCS/SS-CRM 424 has been established by multiplying the standard error arising from the chemical analysis by the appropriate two sided Student’s t value at the 95% confidence level for the number of results.

COMMUTABILITY

BCS-CRM 424 is intended to be used in the same physical form as that used by the participating Analysts and therefore commutability is not of relevance in respect of this BCS-CRM.

In the case of SS-CRM 424 it has been established that, when using optical emission spectrometers, materials of similar composition from different sources may respond differently. The user should be aware that the metallurgical history of this SS-CRM may not accurately reflect the metallurgical history of the user’s own materials.

Further information and advice on this or other Certified Reference Materials or Reference Materials produced by Bureau of Analysed Samples Ltd may be obtained from the address below.

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For BUREAU OF ANALYSED SAMPLES LTD

R.P. MEERES,
Managing Director

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