BCIRA
and
BUREAU OF ANALYSED SAMPLES LTD

SPECTROSCOPIC REFERENCE MATERIAL

ANALYSIS REPORT
NCRM No. 5
NICKEL CHROMIUM CAST IRON

The material for this sample was prepared at the laboratories of the BCIRA/Cast Metals Development Ltd., Alvechurch, Birmingham, U.K., using a special method of casting known to provide material of uniform composition in a form suitable for use as calibration reference materials in optical emission spectroscopic and XRF analysis. Using X-ray fluorescence spectrometry, the samples have been shown, by statistically designed procedures, to give reproducible results.

The chemical analysis of representative drillings was carried out independently by both BAS Ltd and the BCIRA/Cast Metals Development Ltd. The values reported are the overall means of the results obtained in both laboratories.

ANALYSIS

mass content in %.

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu
Mean	**3.70**	**1.15**	**0.27**	**0.025**	**0.015**	**10.44**	**0.10**	**6.74**	**0.204**
SD	0.02	0.03	0.01	0.002	0.001	0.06	0.01	0.03	0.003

SD: standard deviation of all individual determinations

Using vacuum direct reading optical emission spectrometers it has been established that materials of similar composition from different sources may respond differently. This NCRM, together with the four others in the series (NCRM 1 – NCRM 5), are primarily intended for the construction of basic response curves which should be related to the response curves obtained from an identical examination of the user's own material.

NCRM 5 has been carefully analysed by both BAS Ltd and another experienced laboratory, using the methods detailed overleaf, however, in order to distinguish it from the Spectroscopic Certified Reference Materials (SCRMs) of Cast Iron which are normally analysed by at least five laboratories, NCRM 5 is classified as Reference Material (RM) and **NOT** a Certified Reference Material (CRM). The International Organisation for Standardisation (ISO) Guide 30 defines these as follows:-

Reference Material: Material, sufficiently homogeneous and stable with respect to one or more specified properties, which has been established to be fit for its intended use in a measurement process.

Certified Reference Material: Reference Material characterised by a metrologically valid procedure for one or more specific properties, accompanied by a Certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability.

Date of this edition: July 2018.
(The current edition is available at www.basrid.co.uk)

NCRM 5 NICKEL CHROMIUM CAST IRON

NOTES ON METHODS USED

ELEMENT	METHODS USED
Carbon	High frequency combustion, infrared absorption Combustion, non-aqueous titration
Silicon	Gravimetric, double dehydration with perchloric acid
Manganese	Photometric, persulphate oxidation Photometric, periodate oxidation
Phosphorus	Acidimetric titration of ammonium phosphomolybdate Photometric as phosphovanadomolybdate
Sulphur	High frequency combustion, infrared absorption Combustion, acidimetric titration
Chromium	Titrimetric with Fe (II), persulphate oxidation
Molybdenum	Inductively Coupled Plasma - Optical Emission Spectrometry Photometric with thiocyanate in presence of $SnCl_2$, with extraction
Nickel	Flame Atomic Absorption Spectrometry Titrimetric with dichromate after separation of nickel with dimethylglyoxime (Analoid Method No. 62)
Copper	Flame Atomic Absorption Spectrometry

DESCRIPTION OF SAMPLE

The material for this NCRM was prepared at the laboratories of the BCIRA, Alvechurch, Birmingham, U.K. using a special method of casting known to provide material of uniform composition in a form suitable for use as a Reference Material (RM) for optical emission spectrometric analysis. Blocks from this cast have been shown, by statistically designed procedures, to provide reproducible results using optical emission spectrometry.

NCRM 5 is sold as a chill cast rectangular block, approximately 40mm x 37mm x 10mm thick with a single chilled working face. Spectroscopic reproducibility has been shown to be reliable to a depth of 5mm below the original working surface of the block. Analysis must be made on the fully ground surface only and the sample should be discarded when the face has been ground back as far as the small shoulder around the edge of the sample.

INTENDED USE

NCRM 5 is intended for establishing and checking the calibration of Optical Emission and X-Ray Spectrometers for the analysis of similar materials.

STABILITY

NCRM 5 will remain stable provided that the block is stored in a dry atmosphere and is not subjected to excessive heat (e.g. during preparation of the working surface).

COMMUTABILITY

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 RM 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

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