BUREAU OF ANALYSED SAMPLES LTD

Certified Reference Materials

Catalogue No. 872

MARCH 2019

4004 Certificate GB94/3993

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INTRODUCTION

The Certified Reference Materials have been prepared under rigorous laboratory conditions and are issued by Bureau of Analysed Samples Ltd. under the auspices of an Honorary Advisory Committee and a body of approximately 150 Co-operating Analysts representing Independent Laboratories and Manufacturers and Users of the materials concerned.

(a) **CERTIFIED REFERENCE MATERIALS (CRMs)**

British Chemical Standard Certified Reference Materials (BCS-CRMs) are normally analysed by at least five Analysts, and a certificate showing the individual mean values obtained by each Analyst and a summary of the methods used is supplied with each sample. Certificates issued since 1984 also give the standard deviation of the intralaboratory means, and those issued since 1994 express the level of confidence of the certified value as the 95% half width confidence interval.

EURONORM Certified Reference Materials (ECRMs) are prepared under the auspices of the European Committee for Iron and Steel Standardization (ECISS) and are issued with a certificate giving the names of the participating laboratories, the mean values obtained by each laboratory for each element and a statistical evaluation of the laboratory means. The certificate also includes a summary of the methods of analysis used. Before publication each certificate has been approved by the Producing Organisations, namely Bureau of Analysed Samples Ltd. (BAS) in the UK, Institut de Recherches de la Siderurgie Française (IRSID) / Centre Technique des Industries de la Fonderie (CTIF) in France, Stahlinstitut VDEh (VDEh), BAM Bundesanstalt für Materialforschung und prüfung and Max-Planck-Institut für Eisenforschung (MPI) in Germany and the Nordic CRM Working Group (NCRMWG) in the Nordic countries. Although BAS is no longer part of the ECRM Producers Group , there are still over 50 BAS ECRMs which will be available until their exhaustion, when they will be replaced by BCS-CRMs and/or SS-CRMs

There are also some existing BCS-CRMs which have been accepted as interim ECRMs after examination by laboratories in the EU. These are indicated with an ECRM number alongside the existing BCS-CRM number.

Bureau of Analysed Samples Ltd. act as UK distributors for ECRMs prepared by IRSID/CTIF in France, BAM in Germany and Jernkontoret in Sweden, and details of these samples, most of which are held in UK stock, are given in a separate BAS 'Outside Source' Reference Materials Catalogue, copies of which will be supplied on request. Further information regarding the preparation, certification and supply of ECRMs, and the use of the statistical information given on their certificates is given in Technical Reports **CEN/TR 10317:2014** (formerly **ECISS Information Circular No. 1**) and **CEN/TR 10350:2013** (formerly **ECISS Information Circular No. 5**) which are available in the UK from the BSI, 389 Chiswick High Road, London W4 4AL.

All BCS-CRM and ECRM samples are supplied in the finely divided form and many of them are also available in disc form for optical emission and X-ray fluorescence spectrometry.

Spectroscopic Standard Certified Reference Materials (SS-CRMs) have been specially prepared to provide samples of uniform composition in a form suitable for use with optical emission and X-ray fluorescence spectrometers. Each sample has been analysed by at least five laboratories, and a certificate showing the individual mean values obtained by each laboratory and a summary of the methods used is supplied with each sample or set of samples.

Steel samples are usually in the form of discs cut from round bar. Cast iron samples, which are prepared in conjunction with Replicast Ltd./Castings Technology International (formerly BCIRA), are in the form of chill cast rectangular blocks.

(b) **REFERENCE MATERIALS (RMs)**

British Chemical Standard Reference Materials (BCS-RMs) and Spectroscopic Reference Materials, e.g. high purity metals and ceramic materials (p.16), low alloy cast irons, high chromium irons, nickel chromium irons and austenitic (Ni-resist) irons (p. 22) and copper base alloys (p. 23) are normally analysed by only two laboratories and are not given certified status.

(c) **SPECTROSCOPIC SETTING-UP SAMPLES (SUS)**

These Setting-up Samples (SUS) have been specially prepared to meet the day to day setting-up requirements of laboratories using direct reading spectrometers for production control analysis. Their use will conserve supplies of Spectroscopic Standard CRMs for calibration purposes only and will relieve spectrographers of the problem of finding suitable samples within their works for their daily setting-up requirements.

The steel samples are in the form of round bar. The cast iron samples, prepared in conjunction with Replicast Ltd./Castings Technology International (formerly BCIRA), are in the form of chill cast rectangular blocks.

GENERAL INFORMATION

Our website, at www.basrid.co.uk, has recently been improved and now includes a database of our more popular CRMs which is simultaneously searchable for up to six constituents. A large and ever growing selection of downloadable certificates for BAS products can also be found on the website.

Every endeavour is made to maintain a continuous supply of all samples in this catalogue by completing the preparation of an appropriate replacement by the time each sample becomes exhausted. When orders are received for obsolete samples the relevant replacements will normally be supplied. If for any reason such a sample is not acceptable, full credit will be allowed if it is returned carriage paid provided that the seal on the carton containing finely divided samples is unbroken.

Information regarding new samples in course of preparation will be supplied on request. When these are available for distribution a notice to this effect will be made on our website.

QUALITY ASSURANCE

Bureau of Analysed Samples Ltd. is very pleased to advise that in November 1994 its Quality System was formally approved and recognised by the award of a Certificate of Registration to the Quality Standard BS EN ISO 9002:1994 for the production and supply of CRMs, RMs and SUS. This certificate has now been revalidated to the new Standard BS EN ISO 9001:2015. Furthermore, BAS was accredited, in June 2006, to the International Guide, **ISO Guide 34** and the accreditation has since been updated to the full Standard **ISO 17034**.

BUREAU OF ANALYSED SAMPLES LTD.

REG. No. 307549 (ENGLAND)

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BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - High Purity Irons and Unalloyed Steels

The figures are listed primarily as a guide to purchasers. In some cases provisional figures are given which may differ slightly from those given on the Certificate. **Always consult the Certificate issued with the sample to obtain the accurate analysis.**

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

High Purity Irons (Finely divided material - units of 100g: 097-1 and 097-2 also available as 38mm dia. x 30, 25 or 3mm discs - see page 17)

ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	B	Co	Cu	N	Nb
088-2	High Purity Iron	**0.0006**	**0.0052**	**0.0809**	**0.0048**	**0.0070**	**0.0244**	*0.0025*	**0.0275**	*0.0005*	...	...	**0.0061**	**0.0163**	*0.001*	...
097-1(C)	High Purity Iron	*<0.0005*	*<0.01*	**0.0064**	**0.0016**	**0.0022**	**0.0016**	*<0.001*	**0.0025**	...	**0.0051**	**0.0003**	**0.0037**	**0.0020**	**0.0007**	*<0.001*
097-2(C)	High Purity Iron	*<0.002*	**0.00285**	**0.0120**	**0.00538**	**0.00181**	**0.0213**	**0.00370**	**0.0241**	*<0.002*	**0.00281**	**0.00012**	**0.0139**	**0.00793**	**0.00294**	*0.0011*

ECRM No.	Description	Pb	Sn	Ti	V	W	Zr	Bi	Ca	Ga	Mg	O	Sb	Ta	Zn
088-2	High Purity Iron (cont.)	...	...	...	**0.00029**	...	...	...	**0.00072**	...	...	...	...	...	...
097-1(C)	High Purity Iron (cont.)	*<0.0005*	*<0.0025*	*<0.0015*	*<0.001*	*≤0.001*	*<0.001*	*<0.0005*	*<0.0005*	...	*<0.0005*	*0.05*	*≤0.001*	*<0.0005*	*<0.0001*
097-2(C)	High Purity Iron (cont.)	*<0.001*	**0.00043**	*0.0008*	**0.00011**	**0.00386**	*<0.002*	*<0.0002*	*<0.001*	*0.0003*	*<0.0005*	*0.005*	**0.00012**	**0.00015**	**0.00014**

ECRM 097-2(C) also has the additional information: *Ag: <0.0001%, Al(sol.): <0.0004% & 0.0010%, Cd: <0.0001%, Ge: 0.00043% & 0.00066%, Se: <0.0001%, Te: <0.0001%.*

Unalloyed Steels (Finely divided material - units of 100g; 111/1, 115 and 116 also available as 44mm dia. x 19mm discs/055-2, 057-2, 058-2, 059-2, 084-1, 085-1, 086-1, 087-1 and 090-1 also available as 38mm dia. x 30 or 25mm discs/056-2 also available as 44mm dia. x 30 or 25mm discs - see page 17)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Acid Sol.)	Al (Total)	As	Co	Cu	N	Nb	Pb	Sn	Ti	V	Sb	Ca	Zn
111	...	Low Carbon Steel	**0.0258**	**0.0253**	**0.155**	**0.0033**	**0.0054**	**0.0197**	**0.0008**	**0.0387**	...	**0.0348**	**0.0017**	**0.0144**	**0.0171**	**0.0034**	*0.0005*	*<0.001*	**0.0015**	**0.0004**	**0.0009**	*<0.001*	*<0.0005*	...
111/1	...	Low Carbon Steel	**0.0070**	**0.0039**	**0.1623**	**0.0045**	**0.0049**	**0.0055**	**0.0005**	**0.0161**	...	*<0.002*	**0.0011**	**0.0053**	**0.0089**	**0.0025**	...	...	**0.0006**	**0.0004**	**0.0002**	...	...	...
115	...	Calcium Treated Steel	**0.6224**	**0.2078**	**0.682**	**0.0123**	**0.00093**	**0.0198**	*0.003*	**0.0196**	...	**0.0527**	...	*0.006*	*0.009*	**0.0067**	...	*0.0002*	*0.002*	**0.0027**	*0.001*	...	**0.0058**	*0.0006*
116	...	Calcium Treated Steel	**0.617**	**0.201**	**0.6756**	**0.0092**	**0.00176**	**0.0141**	*<0.001*	**0.0155**	...	**0.0587**	...	...	*0.014*	**0.0069**	...	**0.00012**	*0.005*	**0.00171**	...	...	**0.0036**	...
161/4	...	0.8% Carbon Steel	**0.817**	**0.202**	**0.504**	**0.0105**	**0.0096**	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
232/2	**051-1**	0.1% Sulphur Steel	**0.181**	*0.11*	**1.18**	*0.025*	**0.126**	*0.05*	...	*0.14*	...	...	...	...	*0.15*	...	...	...	...	...	...	...	...	...
237/2	**060-1**	0.1% Carbon Steel	**0.122**	*0.17*	**0.45**	*0.024*	*0.031*	*0.028*	*<0.005*	*0.039*	...	*0.004*	...	...	*0.060*	**0.004**	...	...	*0.005*	...	...	...	...	...
238/2	**061-1**	0.2% Carbon Steel	**0.21**	**0.12**	*0.61*	*0.019*	*0.034*	...	...	*0.21*	...	...	...	...	*0.10*	...	...	...	...	...	...	...	...	...
270	**054-1**	0.09% Phosphorus Steel	**0.22**	*0.05*	*0.88*	**0.092**	*0.11*	*0.17*	*0.02*	*0.14*	...	...	*0.03*	...	*0.21*	...	...	...	...	...	*<0.01*	...	...	...
...	**055-2(C)**	0.5% Carbon Steel	**0.5199**	**0.3094**	**0.687**	**0.0102**	**0.0205**	**0.3127**	**0.0960**	**0.3121**	...	*<0.01*	**0.0187**	**0.0257**	**0.2089**	**0.01069**	*<0.0005*	*<0.001*	**0.0162**	**0.00104**	**0.00245**	**0.00376**	*<0.005*	*0.0011*
...	**056-2(C)**	0.8% Carbon Steel	**0.8181**	**0.2006**	**0.5073**	**0.0103**	**0.0093**	**0.0146**	*0.0015*	**0.0218**	**0.00024**	*<0.001*	...	*0.0035*	**0.0129**	*0.0045*	...	...	...	...	...	...	...	...
...	**057-2(C)**	0.05% Carbon Steel	**0.0507**	*0.003*	**0.246**	**0.0120**	**0.0127**	**0.0114**	...	**0.0096**	*0.055*	**0.059**	...	...	**0.0146**	**0.00230**	...	...	...	...	...	...	...	...
...	**058-2(C)**	0.15% Sulphur Steel	**0.424**	**0.1080**	**1.186**	**0.0098**	**0.1712**	**0.1211**	**0.0589**	**0.199**	...	...	**0.0095**	...	**0.261**	**0.0107**	...	...	...	...	...	...	...	...
...	**059-2(C)**	0.7% Carbon Steel	**0.721**	**0.188**	**0.495**	**0.0046**	**0.0084**	**0.0090**	**0.0018**	**0.0198**	**0.00020**	**0.00045**	...	...	**0.0074**	**0.0051**	...	...	...	...	...	...	...	...
...	**064-1(C)**	Nb/Ti Interstitial Free Steel	**0.0026**	**0.0065**	**0.1641**	**0.0091**	**0.0104**	**0.0184**	**0.00077**	**0.0115**	**0.0302**	**0.0330**	**0.0036**	**0.0027**	**0.0077**	**0.0026**	**0.0146**	**0.00018**	**0.00051**	**0.0189**	**0.00015**	...	...	...
...	**084-1(C)**	0.4% Carbon Steel	**0.391**	**0.265**	**0.860**	**0.018**	**0.029**	...	**0.033**	**0.154**	...	...	...	...	**0.267**	...	...	...	**0.023**	...	...	...	...	...
...	**085-1(C)**	0.3% Sulphur Steel	**0.067**	**0.008**	**0.977**	**0.062**	**0.336**	...	...	...	...	...	...	**0.019**	**0.291**	...	...	**0.0010**	...	...	**0.0021**	**0.0073**	...	**0.0025**
...	**086-1(C)**	0.3% Carbon Steel	**0.297**	**0.206**	**0.879**	**0.0238**	**0.0371**	**0.150**	...	**0.168**	...	...	**0.0230**	...	**0.320**	...	...	...	**0.0263**	...	...	...	...	...
...	**087-1(C)**	0.15% Carbon Steel	**0.1740**	**0.2631**	**0.6711**	**0.0103**	**0.0461**	**0.0781**	**0.0206**	**0.1177**	...	...	**0.0243**	**0.0148**	**0.1707**	...	...	...	**0.0171**	...	...	**0.0046**	...	...
...	**090-1(C)**	1% Carbon Steel	**1.054**	**0.281**	**0.226**	**0.0128**	**0.0095**	**0.121**	**0.0089**	**0.053**	...	...	...	...	...	**0.0146**	**0.00043**	**0.00239**	...	...	**0.204**	**0.00090**	...	**0.00209**
...	**091-1**	0.5% Carbon Steel	**0.518**	...	...	...	...	**0.312**	**0.098**	**0.310**	...	...	...	...	...	**0.0111**	...	...	...	...	...	...	...	...
...	**096-2(C)**	Low S, Ca-Treated Steel	**0.1050**	**0.262**	**1.320**	**0.0128**	**0.0016**	**0.0243**	**0.0020**	**0.0253**	...	**0.0460**	...	...	**0.0170**	...	**0.0252**	...	...	...	...	...	**0.0020**	...

Unalloyed Steels (continued)

BCS-CRM No.	ECRM No.	Description	B	Bi	Cd	Ga	Hg	Se	Te	Tl	W	Zr
...	**055-2(C)**	0.5% Carbon Steel (cont.)	*0.0003*	*<0.005*	...	...	...	...	...	...	**0.0166**	*<0.005*
...	**090-1(C)**	1% Carbon Steel (cont.)	...	**<0.00002**	**<0.00002**	**0.00228**	*<0.00001*	*<0.0002*	**<0.0002**	**<0.0001**	...	...

BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - Unalloyed Steels and High Speed Tool Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Unalloyed Steels (continued) (Finely divided material - units of 100g; 431/2-435/2 and 456/2-460/2, also available as 38mm dia. x 19mm discs - see page 17)

BCS-CRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Acid Sol.)	Al (Total)	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	W	Zr	Sb
431/2	Plain Carbon Steels	**0.0249**	**0.015**	**0.902**	**0.121**	**0.0065**	**0.049**	*0.004*	**0.040**	...	*0.01*	*0.005*	...	*0.006*	*0.015*	**0.0052**	**0.0040**	...	*<0.001*	*0.005*	*0.003*	*0.004*	...	...
432/2		**0.0065**	**0.0822**	**0.712**	**0.0171**	**0.036**	**0.0166**	*0.002*	**0.0196**	...	*<0.002*	...	...	*0.006*	*0.015*	**0.0066**	**0.0174**	...	...	...	*<0.001*	*0.003*	...	...
433/2		**0.096**	**0.0071**	**1.188**	**0.011**	**0.0083**	**0.0262**	*0.004*	**0.037**	...	...	...	...	*0.006*	*0.025*	...	**0.0590**	...	...	...	*0.001*	*0.003*	...	...
434/2		**0.275**	**0.510**	**1.546**	**0.0611**	**0.0141**	**0.238**	*0.014*	**0.037**	...	...	...	...	*0.006*	*0.025*	**0.0104**	**0.038**	...	...	...	*0.04*	*0.04*	...	...
435/2		**0.489**	**0.328**	**0.390**	**0.0373**	**0.0424**	**0.184**	*0.018*	**0.133**	...	...	...	...	**0.0116**	*0.05*	...	**0.134**	...	...	...	*0.005*	*0.015*	...	...
452/1	Carbon Steel Residual Series (Group A)	**0.323**	**0.055**	**1.30**	**0.035**	**0.017**	**0.067**	**0.054**	**0.19**	...	...	**0.015**	...	...	**0.22**	...	...	*0.0002*	**0.094**	**0.031**	...	**0.054**	...	...
453/1		**0.160**	**0.34**	**1.38**	**0.044**	**0.026**	**0.26**	**0.081**	**0.11**	...	...	**0.052**	...	...	**0.099**	...	...	*0.0001*	**0.022**	**0.073**	...	**0.30**	...	...
456/2	Carbon Steel Residual Series (Group B)	**0.112**	**0.297**	**0.220**	**0.0212**	**0.0221**	...	...	...	*<0.002*	**0.0018**	...	**0.0015**	**0.0504**	...	...	**0.0057**	**0.0189**	...	...	**0.0221**	...	*0.013*	**0.0172**
457/2		**0.307**	**0.105**	**0.327**	**0.0098**	**0.0448**	...	...	...	**0.082**	**0.087**	...	**0.0046**	**0.0217**	...	...	**0.0174**	**0.0098**	...	...	**0.153**	...	**0.025**	**0.050**
458/2		**0.198**	**0.504**	**0.479**	**0.0281**	**0.0314**	...	...	...	**0.052**	**0.055**	...	**0.0069**	**0.198**	...	...	**0.0510**	**0.0140**	...	...	**0.105**	...	*0.062*	**0.089**
460/2		**0.383**	**0.126**	**0.616**	**0.0374**	**0.0099**	...	...	...	**0.0193**	**0.0240**	...	**0.0027**	**0.0106**	...	...	**0.068**	**0.0005**	...	...	**0.0322**	...	*<0.0005*	**0.0006**

Unalloyed Steels (continued) (Rod material – BCS-CRM 318A is a pair of 6.35mm dia. x 95mm rods, BCS-CRM 318B is a single 12.7mm dia. x 127mm rod)

BCS-CRM No.	Description	Form	C	Si	Mn	P	S	Al	O
318A	0.01% Oxygen Steel	6.35mm dia. x 95mm rod	*0.083*	*0.12*	*0.39*	*0.018*	*0.035*	*<0.002*	**0.0096**
318B	0.01% Oxygen Steel	12.7mm dia. x 127mm rod	*0.083*	*0.12*	*0.39*	*0.018*	*0.035*	*<0.002*	**0.0103**

High-Speed Steels (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Cu	Sn	V	W
220/2	**254-1**	High-Speed Steels	**0.88**	**0.19**	**0.30**	**0.023**	**0.029**	**5.12**	**4.92**	**0.12**	...	**0.32**	**0.09**	**0.019**	**1.94**	**6.97**
241/2	**251-1**		**0.84**	**0.21**	**0.27**	**0.024**	**0.025**	**5.35**	**0.53**	**0.15**	*0.009*	**5.70**	**0.08**	**0.025**	**1.59**	**19.9**
481	...		**0.69**	**0.14**	**0.29**	**0.021**	**0.027**	**3.56**	**0.22**	...	...	**0.21**	...	...	**0.52**	**14.2**
482	...		**0.70**	**0.13**	**0.28**	**0.021**	**0.025**	**4.09**	**0.27**	...	...	**0.24**	...	...	**0.98**	**18.1**
483	...		**0.67**	**0.11**	**0.29**	**0.019**	**0.025**	**3.21**	**0.17**	...	...	**1.94**	...	...	**0.54**	**10.8**
484	...		**0.85**	**0.20**	**0.21**	**0.030**	**0.024**	**5.17**	**1.07**	...	...	**10.2**	...	...	**0.93**	**22.4**

BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - Alloy Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Low Alloy Steels (Finely divided material - units of 100g; 112-114 also available as 44mm dia. x 19mm discs; 186-1, 195-1, 219/4, 222/1, 225/2, 401/2-405/2, 407/2 and 421-424 also available in disc form for spectroscopic analysis - see page 18)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	W	Zr	Ca	Zn
112	**...**	Low Alloy Steel	**0.394**	**0.289**	**0.436**	**0.0043**	**0.0026**	**1.236**	**0.190**	**1.461**	**0.0148**	**0.0021**	**0.0007**	**0.0175**	**0.149**	**0.0024**	**0.0065**	*<0.001*	**0.0086**	**0.0100**	**0.0088**	...	*<0.001*	*<0.0005*	...
113	**...**	Low Alloy Steel	**0.837**	**0.931**	**1.207**	**0.0595**	**0.0294**	**1.248**	**0.056**	**0.0784**	**0.0151**	**0.0020**	**0.0066**	**0.0415**	**0.179**	**0.0109**	**0.0487**	*<0.001*	**0.0067**	**0.0390**	**0.201**	**0.012**	**0.0029**	*<0.001*	...
114	**...**	Low Alloy Steel	**0.403**	**0.295**	**0.416**	**0.0044**	**0.0046**	**0.187**	**0.184**	**1.502**	**0.078**	**0.0025**	**0.0008**	**0.0171**	**0.360**	**0.0043**	**0.0042**	*<0.001*	**0.041**	**0.0096**	**0.0086**	*<0.001*	**0.0051**	*<0.001*	...
214/2	**152-1**	Mn-Mo Steel	**0.39**	**0.18**	**1.61**	**0.032**	**0.043**	**0.09**	**0.26**	**0.15**	...	...	...	...	**0.21**	...	...	...	...	...	*<0.01*	...	...	...	...
219/4	**153-1**	Ni-Cr-Mo Steel	**0.314**	**0.079**	**0.81**	**0.011**	**0.027**	**0.66**	**0.58**	**2.55**	*0.003*	...	...	...	**0.088**	...	...	...	**0.011**	...	...	...	...	...	...
222/1	**...**	3.5% Ni Steel	**0.3095**	**0.227**	**0.618**	**0.0175**	**0.0089**	**0.0535**	**0.0287**	**3.536**	...	...	*<0.005*	**0.0379**	**0.150**	**0.0100**	...	...	...	...	*0.020*	...	...	...	...
225/2	**155-1**	Ni-Cr-Mo Steel	**0.40**	**0.23**	**0.56**	**0.019**	**0.012**	**1.08**	**0.34**	**1.43**	*0.009*	*0.035*	*0.0007*	*0.018*	*0.17*	*0.012*	*0.003*	...	*0.017*	...	*<0.01*	...	*<0.01*	...	...
317	**151-1**	Low C, High Si Steel	**0.028**	**3.49**	**0.085**	**0.015**	**0.023**	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	**186-1(C)**	Silico Manganese Steel	**0.6104**	**1.719**	**0.870**	**0.0223**	**0.0354**	**0.218**	**0.0482**	**0.190**	**0.0143**	...	...	...	**0.281**	...	...	...	...	...	...	...	...	...	...
...	**195-1(C)**	Cr-Mo-Ni Steel	**0.756**	**0.466**	**0.571**	**0.0160**	**0.0121**	**1.566**	**0.768**	**0.327**	...	...	...	...	**0.0355**	**0.0100**	...	**0.0010**	*0.002*	...	**0.312**	...	...	**0.0017**	**0.0046**
405	**...**	Low Alloy Steels	**0.058**	**1.38**	**1.28**	**0.017**	**0.060**	**0.21**	**0.017**	**0.12**	...	...	...	...	**0.015**	...	...	...	...	...	**0.32**	...	...	...	...
408	**...**		**0.28**	**0.24**	**0.64**	**0.043**	**0.030**	**0.090**	**0.14**	**4.58**	...	...	...	...	**0.73**	...	...	...	...	...	**0.063**	...	...	...	...
404/1	**...**	Low Alloy Steels	**0.74**	**0.87**	**0.31**	**0.057**	**0.024**	**0.48**	**0.31**	**0.40**	...	...	...	...	**0.34**	...	...	...	...	...	**0.11**	...	...	...	...
405/1	**...**		**0.032**	**1.71**	**1.28**	**0.018**	**0.069**	**0.15**	**0.002**	**0.22**	...	...	...	...	**0.013**	...	...	...	...	...	**0.28**	...	...	...	...
407/1	**...**		**0.47**	**0.59**	**0.047**	**0.030**	**0.010**	**2.95**	**0.78**	**0.59**	...	...	...	...	**0.57**	...	...	...	...	...	**0.18**	...	...	...	...
408/1	**...**		**0.285**	**0.23**	**0.51**	**0.037**	**0.028**	**0.102**	**0.09**	**4.45**	...	...	...	...	**0.66**	...	...	...	...	...	**0.031**	...	...	...	...
409/1	**...**		**0.082**	**1.46**	**0.44**	**0.025**	**0.021**	**0.94**	**0.65**	**3.06**	...	...	...	**0.014**	**0.048**	...	...	...	...	...	**0.09**	...	...	...	...
401/2	**...**	Low Alloy Steels	**0.935**	**0.602**	**1.197**	**0.0265**	**0.0078**	**0.138**	**0.495**	**0.019**	**0.074**	...	...	**0.0042**	**0.101**	**0.0159**	...	...	...	...	**0.496**	...	...	...	...
402/2	**...**		**1.311**	**0.111**	**0.228**	**0.0161**	**0.0138**	**0.652**	**0.140**	**0.808**	**0.161**	...	...	...	**0.302**	**0.0069**	...	...	...	...	**0.194**	...	...	...	...
403/2	**...**		**0.750**	**0.209**	**1.677**	**0.055**	**0.0381**	**0.463**	**0.088**	**0.223**	**0.0485**	...	...	...	**0.221**	*0.010*	...	...	...	...	**0.341**	...	...	...	...
404/2	**...**		**0.696**	**1.121**	**0.532**	**0.0479**	**0.0228**	**0.774**	**0.307**	**0.393**	**0.017**	...	...	...	**0.427**	**0.0089**	...	...	...	...	**0.107**	...	...	...	...
405/2	**...**		**0.044**	**0.947**	**0.903**	**0.0095**	**0.058**	**0.206**	**0.025**	**0.102**	**0.330**	...	...	*0.009*	**0.022**	*0.011*	...	...	...	...	**0.411**	...	...	...	...
407/2	**...**		**0.490**	**0.66**	**0.195**	**0.038**	**0.0105**	**3.03**	**0.83**	**0.527**	**0.040**	...	...	**0.0068**	**0.397**	*0.011*	...	...	...	...	**0.19**	...	...	...	...
409/2	**...**		**0.086**	**1.18**	**0.559**	**0.0141**	**0.0179**	**1.318**	**0.599**	**3.02**	**0.094**	...	...	...	**0.205**	**0.0108**	...	...	...	...	**0.008**	...	...	...	...
421	**...**	Low Tungsten Steels	*0.049*	*0.07*	*0.11*	*0.012*	*0.027*	...	*0.028*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**0.52**	...	...	...
422	**...**		*0.036*	*0.06*	*0.09*	*0.015*	*0.025*	...	*0.033*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**1.28**	...	...	...
423	**...**		*0.030*	*0.05*	*0.07*	*0.017*	*0.027*	...	*0.027*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**2.06**	...	...	...
424	**...**		*0.024*	*0.05*	*0.09*	*0.02*	*0.024*	...	*0.036*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**3.02**	...	...	...

BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - Highly Alloyed Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Highly Alloyed Steels (Finely divided material - units of 100g; 272-1, 276-2, 285-2, 287-1, 292-1, 295-1, 296-1, 340 (SS70), 461/1-468/1, 466/2, 469-473, 475 and 479 also available in disc form for spectroscopic analysis - see pages 19 & 20)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	Mg	Sb	Others
...	**272-1(C)**	12% Chromium Steel	**0.2815**	**0.420**	**0.600**	**0.0156**	**0.0197**	**11.927**	**0.0030**	**0.244**	**0.0046**	**0.0116**	**0.0018**	**0.0145**	**0.0192**	**0.0508**	**0.0028**	*0.0004*	*0.0008*	**0.00096**	**0.0167**	*0.0002*	**0.0007**	**0.00090 Ca 0.0031 Zn**
...	**276-2(C)**	5% Cr-Mo-V Steel	**0.399**	**1.034**	**0.365**	**0.0093**	**0.0189**	**4.975**	**1.134**	**0.203**	...	...	...	...	**0.183**	**0.0116**	...	...	**0.0133**	...	**0.296**	...	...	...
...	**281-1**	18/9 Stainless Steel & Ti	**0.048**	**0.929**	**0.786**	**0.012**	**0.016**	**18.17**	...	**9.37**	**0.015**	*0.015*	**0.0012**	**0.023**	**0.076**	**0.023**	...	**0.0005**	**0.009**	**0.216**	...	...	...	...
...	**285-2(C)**	Maraging Steel	**0.0018**	**0.0117**	**0.0168**	**0.0053**	**0.0025**	**0.0236**	**4.99**	**18.07**	**0.1067**	...	**0.0009**	**7.76**	**0.0094**	**0.0007**	...	...	*0.001*	**0.520**	...	...	...	**0.0050 Zr**
...	**287-1(C)**	High B Stainless Steel	**0.0164**	**0.569**	**1.478**	**0.0267**	**0.0014**	**18.61**	**0.247**	**10.35**	...	...	**0.924**	**0.148**	**0.203**	**0.0194**	...	...	...	...	...	...	...	...
...	**292-1(C)**	Nb-Stabilised Stainless Steel	**0.0367**	**0.402**	**1.744**	**0.0175**	**0.0055**	**18.00**	**0.0464**	**10.09**	*0.002*	*0.008*	*0.0003*	**0.0255**	**0.0391**	**0.0640**	**0.571**	...	...	...	...	...	...	*0.001* **Ta**
...	**295-1(C)**	4% Mo-Cr-Ni Steel	**0.0166**	**0.418**	**1.758**	**0.0167**	**0.0003**	**19.51**	**3.996**	**24.40**	**0.0203**	**0.0041**	**0.0018**	**0.0450**	**1.481**	**0.0615**	...	...	**0.0025**	...	**0.0456**	*0.0003*	**0.0007**	**48.36 Fe**
...	**296-1(C)**	Jethete Steel	**0.1166**	**0.242**	**0.676**	**0.0178**	**0.0026**	**11.82**	**1.700**	**2.790**	**0.0275**	**0.0139**	*0.0003*	**0.0218**	**0.1498**	**0.0214**	...	**0.00016**	**0.0131**	...	**0.363**	...	...	...
332	...	Austenitic Stainless Steel	**0.063**	**0.44**	**0.80**	**0.015**	**0.020**	**12.78**	...	**12.47**	...	...	...	*0.037*	*0.10*	...	...	...	...	...	*0.02*	...	...	...
339	...	Ferritic Stainless Steels	**0.29**	**0.36**	**0.41**	**0.022**	**0.022**	**12.39**	...	**0.37**	...	...	...	...	*0.08*	...	...	...	...	...	...	...	...	...
340	...		**0.18**	**0.35**	**0.38**	**0.024**	**0.020**	**16.36**	...	**0.40**	...	...	...	...	*0.06*	...	...	...	...	...	...	...	...	...
341	...		**0.103**	**0.31**	**0.43**	**0.016**	**0.024**	**24.01**	...	**0.56**	...	...	...	...	*0.10*	...	...	...	...	...	...	...	...	...
342	...		**0.18**	**0.92**	**0.91**	**0.030**	**0.026**	**16.13**	**0.69**	**2.16**	...	...	...	...	*0.08*	...	...	...	...	...	...	...	...	...
463	...	Austenitic Stainless Steels	**0.088**	**0.51**	**0.77**	**0.015**	**0.017**	**18.29**	...	**9.65**	...	...	*0.0004*	...	...	...	...	...	...	...	...	...	...	...
461/1	...		**0.0103**	**0.374**	**0.686**	**0.0053**	**0.0051**	**14.727**	**0.0138**	**6.124**	*0.002*	*0.004*	...	*0.004*	**0.0091**	...	...	*0.005*	...	...	...	...	...	...
462/1	...		**0.0345**	**0.463**	**0.722**	**0.0053**	**0.0041**	**11.888**	**0.0304**	**12.85**	...	...	...	...	**0.0112**	...	...	...	...	...	...	...	...	...
463/1	...		**0.019**	**0.270**	**1.400**	**0.025**	**0.019**	**18.46**	**0.265**	**10.20**	...	...	**0.0022**	**0.116**	**0.276**	**0.063**	...	...	...	*<0.005*	*0.04*	...	...	...
464/1	...		**0.086**	**0.57**	**0.791**	**0.020**	**0.028**	**25.39**	...	**20.05**	...	*0.003*	...	**0.054**	...	...	...	**0.0004**	...	...	...	...	...	...
465/1	...		**0.066**	**0.405**	**1.380**	**0.021**	**0.012**	**17.31**	**0.092**	**9.24**	**0.026**	...	**0.0006**	**0.053**	**0.098**	**0.010**	...	*<0.001*	...	**0.40**	**0.102**	...	...	...
466/2	...		**0.0141**	**0.480**	**1.311**	**0.0105**	**0.0069**	**17.84**	**2.776**	**10.20**	*0.002*	**0.0020**	**0.0039**	**0.0184**	**0.0278**	**0.0508**	*0.001*	*<0.0001*	*<0.001*	*0.002*	**0.0346**	...	...	...
467/1	...		**0.082**	**0.52**	**0.788**	**0.018**	**0.019**	**18.09**	...	**9.21**	...	**0.004**	...	...	...	...	**0.99**	**0.004**	...	...	...	...	...	**0.0017 Ta**
468/1	...		**0.143**	**1.41**	**1.70**	**0.014**	**0.020**	**17.96**	...	**8.90**	...	...	...	**0.018**	...	...	...	...	...	...	...	...	...	...
469	...	Ferritic Stainless Steels	**0.279**	**0.421**	**0.598**	**0.015**	**0.020**	**11.93**	...	**0.246**	...	...	...	*0.01*	*0.02*	...	...	...	...	...	*0.02*	...	...	...
470	...		**0.153**	**0.335**	**0.235**	**0.024**	**0.035**	**17.68**	...	**0.369**	...	...	...	*0.02*	*0.02*	...	...	...	...	...	*0.02*	...	...	...
471	...		**0.095**	**0.326**	**0.417**	**0.018**	**0.023**	**23.85**	...	**0.96**	...	...	...	*0.02*	*0.02*	...	...	...	...	...	*0.03*	...	...	...
472	...		**0.227**	**1.05**	**1.02**	**0.032**	**0.029**	**15.82**	**0.661**	**1.95**	...	...	...	*0.02*	*0.02*	...	...	...	...	...	*0.02*	...	...	...
473	...		**0.172**	**0.604**	**0.494**	**0.019**	**0.030**	**9.06**	**0.95**	*0.06*	...	...	...	*0.01*	*0.03*	...	...	...	...	...	*0.02*	...	...	...
474	...	Stainless Steels	**0.022**	**0.17**	**1.70**	**0.008**	**0.020**	**19.06**	**3.55**	**14.74**	*0.006*	**0.030**	...	*0.02*	**0.35**	...	...	...	...	...	**0.30**	...	...	...
475	...		**0.050**	**0.21**	**0.89**	**0.037**	**0.008**	**14.14**	**1.59**	**5.66**	**0.013**	...	...	**0.22**	**1.94**	...	**0.22**	...	**0.015**	...	...	...	...	...
476	...	Mo-Stabilised Stainless Steel	**0.0171**	**0.323**	**1.755**	**0.0302**	**0.0234**	**16.88**	**2.049**	**10.17**	*<0.005*	**0.0053**	...	**0.1628**	**0.3026**	**0.0794**	**0.0107**	*<0.002*	**0.0059**	*<0.005*	**0.0663**	...	*0.001*	**0.0419 W 0.0028 Ca**
479	...	Nb-Stabilised Stainless Steel	**0.0529**	**0.553**	**0.680**	**0.0029**	**0.0030**	**19.922**	*0.003*	**24.87**	*0.013*	*0.002*	*<0.0005*	*0.002*	**0.0052**	**0.0057**	**0.625**	*<0.001*	*<0.002*	**0.0306**	**0.0052**	...	...	*<0.005* **Ta**
290/2	**253-1**	High Manganese Steels	**1.15**	**0.34**	**12.5**	**0.042**	**0.019**	**0.16**	*0.031*	**0.29**	...	...	...	*0.35*	*0.17*	*0.013*	...	...	...	...	*0.02*	...	...	...
491	...		**0.92**	**0.90**	**16.10**	**0.026**	**0.012**	**1.45**	**0.60**	**0.046**	**0.042**	...	...	...	*0.04*	...	...	...	...	...	*0.06*	...	...	...
494	...		**1.24**	**0.26**	**13.56**	**0.040**	**0.005**	**0.56**	**0.079**	**0.69**	**0.004**	...	...	*0.43*	*0.19*	...	...	...	...	...	*0.02*	...	...	...
495	...		**0.82**	**0.46**	**13.56**	**0.036**	**0.014**	**1.93**	**0.035**	**1.05**	**0.103**	...	...	...	*0.09*	...	...	...	...	...	*0.02*	...	...	...
495/1	...		**0.81**	**0.58**	**13.13**	**0.054**	**0.026**	**1.93**	**0.109**	**1.13**	**0.170**	...	...	...	...	...	...	...	...	...	*0.02*	...	...	...

BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - Special Alloys, Cast Irons and Ferro-Alloys

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Special Alloys (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	S	Ni	Al	Co	Cu	Nb	Ti	Ta
383	**...**	Alcomax III	**0.025**	...	*0.07*	**0.202**	*13.2*	*7.7*	*24.4*	*2.63*	*0.51*	...	...
398	**...**	Alnico HC	**0.025**	**0.11**	**0.065**	**0.19**	**16.59**	**9.98**	**14.92**	**6.09**	**0.13**	**0.765**	...
...	**376-1**	24% Cobalt Magnet Alloy	**0.0256**	**0.313**	**0.046**	**0.0040**	**13.37**	**8.12**	**23.70**	**2.94**	**0.309**	**0.158**	*0.016*

Cast Irons (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	C	Graphite	Si	Mn	P	S	Cr	Mo	Ni	Al	As	Cu	N	Sn	Ti	V	Mg
...	**451-2**	Austenitic Cast Iron	**2.059**	...	**2.092**	**1.079**	**0.0593**	**0.0315**	**1.097**	...	**14.01**	...	...	**6.26**	...	...	...	...	...
206/3	**453-1**	High Si and P Iron	*2.44*	*2.37*	**3.17**	**0.72**	**1.63**	**0.049**	**0.053**	...	**0.068**	...	**0.019**	**0.10**	...	...	*0.040*	**0.050**	...
236/3	**454-1**	Hematite Iron	*2.53*	*1.96*	**2.00**	**1.16**	**0.046**	**0.068**	...	...	*0.21*	...	*0.025*	*0.07*	...	...	**0.052**	...	...
...	**481-1**	Nodular Iron	**3.907**	...	**2.288**	**0.448**	**0.0192**	**0.0040**	**0.063**	**0.0110**	**1.190**	**0.0229**	**0.0096**	**0.150**	...	...	...	...	**0.0507**
...	**482-2**	Low Alloy Cast Iron	**2.599**	...	**1.815**	**0.728**	**0.0974**	**0.0491**	**0.675**	**0.454**	**2.284**	...	...	**1.231**	...	...	...	...	...
...	**483-1**	High Duty Iron	**2.463**	**1.65**	**1.755**	**0.596**	**0.615**	**0.103**	**0.039**	...	...	...	...	...	...	**0.130**	...	...	...
...	**484-1**	Whiteheart Malleable Iron	**3.203**	...	**0.717**	**0.395**	**0.121**	**0.230**	**0.155**	...	...	...	...	...	...	...	...	...	...
...	**486-1**	Foundry Iron	**2.212**	...	**2.429**	**0.841**	**0.996**	**0.0233**	**0.104**	...	**0.0571**	...	...	**0.548**	...	**0.074**	...	**0.0197**	...
...	**489-1**	White Iron	**2.860**	...	**1.524**	*0.510*	**0.815**	**0.155**	...	...	...	...	...	**0.274**	*0.0056*	...	...	...	...
527	**...**	Blast Furnace Iron	**3.873**	...	**1.000**	**0.316**	**0.1269**	**0.0366**	*0.087*	*0.006*	**0.0229**	...	...	**0.0104**	...	...	**0.0187**	*0.010*	...

Ferro-Alloys (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Acid Sol.)	Al (Total)	B	Co	Cu	N	Nb	Sn	Ti	V	W	Ta	Fe
203/6	**...**	Low C Ferro-Chromium	**0.0270**	**0.381**	**0.153**	**0.0195**	**0.004**	**71.01**	...	**0.218**	...	...	...	**0.0442**	...	*0.029*	...	...	*0.003*	**0.0729**	...	...	...
204/6	**...**	High C Ferro-Chromium	**8.57**	**0.715**	**0.225**	**0.0164**	**0.0190**	**68.77**	...	**0.289**	...	...	...	**0.0359**	...	*0.023*	...	...	**0.0565**	**0.094**	...	...	...
231/5	**...**	Ferro-Molybdenum	*0.209*	**1.663**	*0.84*	**0.0289**	*0.043*	*0.78*	**61.70**	...	...	...	*0.19*	...	**0.270**	...	*0.83*	*0.004*	...	...	...	...	*32.0*
231/6	**...**	Ferro-Molybdenum	*0.058*	**0.722**	*0.21*	**0.0211**	*0.031*	*0.21*	**71.41**	...	...	...	...	...	**0.2230**	...	*0.14*	*0.003*	...	...	...	...	*26.3*
242/2	**555-1**	Ferro-Tungsten	**0.025**	**1.75**	...	*0.02*	*0.018*	...	...	...	...	**0.14**	...	...	...	...	...	**0.034**	...	...	**79.9**	...	*15.2*
...	**576-1**	Ferro-Niobium (40% Nb)	**0.201**	**1.79**	...	...	...	...	...	...	...	**2.53**	...	...	...	...	**43.90**	**0.195**	**1.32**	...	...	**0.306**	...
...	**577-1**	Ferro-Vanadium	**0.089**	**1.79**	**0.158**	**0.035**	**0.034**	...	...	**0.053**	*0.21*	**0.414**	...	...	**0.054**	...	...	...	...	**50.16**	...	...	...
...	**578-1**	Ferro-Molybdenum	**0.016**	**0.208**	...	**0.024**	**0.065**	...	**72.23**	...	...	...	...	...	**0.136**	...	...	...	...	...	...	...	...
...	**579-1**	Ferro-Niobium (60% Nb)	**0.037**	**1.03**	...	**0.064**	**0.021**	...	...	...	...	**1.86**	...	**0.0051**	...	...	**62.87**	**0.344**	**0.567**	...	...	**3.85**	...
...	**580-1**	Low C Ferro-Chromium	**0.019**	**0.306**	...	**0.011**	...	**72.18**	...	...	...	...	...	**0.047**	...	**0.035**	...	...	...	**0.083**	...	...	...
...	**583-1**	Ferro-Manganese	**0.333**	**0.396**	**86.42**	**0.146**	*0.007*	...	...	...	...	...	...	...	...	*0.041*	...	...	...	...	...	...	*12.3*
...	**584-1**	Ferro-Titanium	**0.044**	**1.80**	**1.13**	**0.032**	**0.030**	...	...	...	*6.0*	**7.19**	...	...	...	...	...	...	**37.17**	...	...	...	...
...	**587-1**	Ferro-Boron	**0.738**	*0.129*	**0.272**	*0.020*	*0.001*	*0.10*	*0.005*	...	...	**0.047**	**18.7**	*0.010*	...	...	...	...	*0.04*	*0.004*	...	...	...
...	**590-1**	Ferro-Tungsten	**0.0250**	**1.05**	**0.136**	...	*0.07*	...	**0.101**	...	...	*0.37*	...	...	**0.0484**	...	...	**0.045**	...	...	**79.55**	...	*17.9*

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIALS - Aluminium, Magnesium, Copper, Lead & Tin Base Alloys

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Aluminium and Magnesium Base Alloys (Finely divided material - units of 100g)

BCS-CRM No.	Description	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Sn	Ni	Sb	Zr	Be	Total Rare Earths	Al
181/3	2.5% Cu Aluminium Alloy	**0.30**	**0.72**	**2.48**	**1.10**	**1.57**	**0.04**	**2.52**	**0.058**	**0.101**	...	**2.00**	...	...	...	...	Bal.
182/3	11% Si Aluminium Alloy	**11.03**	**0.51**	**0.037**	**0.26**	**0.068**	...	**0.128**	**0.107**	**0.056**	**0.027**	**0.047**	...	...	...	...	Bal.
216/3	5% Cu Aluminium Alloy	**0.74**	**0.77**	**5.45**	**0.76**	**0.76**	**0.108**	**0.214**	**0.20**	**0.052**	**0.052**	**0.24**	*0.01*	**0.084**	...	...	Bal.
262/1	10% Mg Aluminium Alloy	**0.16**	**0.20**	**0.039**	**0.084**	**10.74**	*0.002*	**0.084**	**0.005**	*0.05*	*0.04*	**0.071**	...	...	*<0.01*	...	Bal.
263/2	5% Mg Aluminium Alloy	**0.14**	**0.26**	**0.019**	**0.36**	**4.67**	**0.074**	**0.056**	**0.022**	...	...	...	...	...	*<0.001*	...	Bal.
268/1	5% Si Aluminium Alloy	**5.49**	**0.47**	**1.35**	**0.24**	**0.49**	...	**0.028**	*0.008*	**0.028**	**0.031**	**0.16**	...	...	...	...	Bal.
300/1	6% Zn Aluminium Alloy	**0.14**	**0.24**	**1.27**	**0.33**	**2.74**	**0.13**	**5.87**	**0.09**	...	...	...	...	**0.18**	...	...	Bal.
343	Wrought Aluminium Alloy	**0.52**	**0.39**	**0.28**	**0.69**	**0.70**	**0.14**	**0.028**	**0.024**	...	...	...	...	...	...	...	Bal.
349	3.5% Cu Aluminium Alloy	**1.19**	**0.154**	**3.40**	**0.111**	**0.024**	*<0.001*	**0.298**	**0.034**	**0.077**	**0.074**	...	...	...	*<0.001*	...	Bal.
380/1	2% Si Aluminium Alloy	**1.93**	**1.24**	**0.91**	**0.094**	**0.24**	*<0.001*	**0.025**	**0.024**	*0.014*	...	**0.94**	...	...	...	...	Bal.
307	Magnesium Alloy (ZRE 1)	*<0.001*	**0.002**	**0.005**	**0.006**	Bal.	...	**2.08**	...	...	*<0.001*	*<0.001*	...	**0.56**	...	**2.84**	*0.008*
316	8% Al Magnesium Alloy	**0.054**	**0.009**	**0.040**	**0.28**	Bal.	...	**0.68**	...	**0.024**	**0.005**	**0.004**	...	...	...	...	**8.01**
505	Aluminium-Silicon Alloy	**12.8**	**0.30**	**0.05**	**0.52**	**0.05**	...	**0.24**	**0.03**	**0.09**	**0.17**	**0.20**	...	...	...	...	Bal.

Copper Base Alloys (Finely divided material - units of 100g)

BCS-CRM No.	Description	Cu	Sn	Zn	Pb	P	Ni	Fe	Al	Mn	Sb	As	Si	Bi	Mg	S	C	Cd
179/2	High Tensile Brass (Cast)	**58.5**	**0.70**	**35.8**	**0.35**	...	**0.56**	**1.02**	**2.22**	**0.86**	...	*0.008*	**0.044**	...	...	...	...	*0.003*
180/2	Copper Nickel	**68.12**	...	...	*0.003*	...	**30.35**	**0.68**	...	**0.75**	...	...	*0.018*	...	...	**0.006**	**0.04**	...
183/4	Leaded Gunmetal	**84.08**	**7.27**	**3.47**	**3.15**	**0.090**	**1.30**	**0.056**	*<0.002*	*0.01*	**0.23**	**0.13**	*0.01*	**0.005**	...	**0.11**	...	...
207/2	Gunmetal	**87.35**	**9.74**	**1.60**	**0.70**	*0.018*	**0.28**	**0.029**	**0.013**	...	**0.10**	**0.066**	**0.016**	**0.04**	...	...	...	...
304/1	Copper-Aluminium	**80.23**	**0.03**	**0.31**	**0.010**	...	**4.82**	**4.64**	**9.71**	**0.12**	...	...	**0.08**	...	*<0.01*	...	...	...
344	70/30 Brass	**68.98**	...	**30.98**	...	...	...	...	...	...	...	...	...	...	...	...	...	...
364	Leaded Bronze	**80.7**	**9.36**	**0.13**	**9.24**	**0.057**	**0.28**	*<0.005*	*<0.002*	...	**0.18**	*0.07*	*<0.005*	*<0.01*	...	*0.06*	...	...
374	Phosphor Bronze	**89.5**	**9.80**	**0.006**	**0.064**	**0.59**	**0.014**	*<0.005*	*<0.005*	...	*0.01*	...	*<0.005*	*0.007*	...	**0.012**	...	...
385	Leaded Brass	**58.7**	**0.27**	**38.5**	**2.24**	...	**0.13**	**0.15**	*<0.005*	*<0.005*	*<0.01*	...	...	...	...	...	...	...
390	High Tensile Brass (Wrought)	**57.1**	**0.34**	**38.6**	**1.04**	...	**0.033**	**0.83**	**0.83**	**1.30**	...	...	*0.023*	...	...	...	...	*0.011*
399	Phos. Deoxidised Copper	*99.93*	*0.003*	*0.003*	*0.002*	**0.045**	*0.002*	*0.006*	...	...	*<0.001*	*<0.001*	...	*0.001*	...	...	...	*0.003*

Lead and Tin Base Alloys (Finely divided material - units of 100g)

BCS-CRM No.	Description	Pb	Sn	Sb	Cu	As	Bi	Cd	Fe	Ni	Zn	Al	Ag	Au	In
177/2	Lead Base White Metal	**84.5**	**5.07**	**10.1**	**0.12**	**0.05**	**0.028**	...	...	**0.007**	...	...	*0.008*	...	...
178/2	Tin Base White Metal	**3.18**	**82.2**	**9.45**	**4.58**	**0.15**	**0.11**	**0.14**	**0.024**	**0.17**	**0.040**	*0.005*	*0.02*	...	...
347	Electronic Flowsolder	Bal.	**62.6**	**0.191**	**0.169**	*0.02*	**0.080**	**0.0040**	*0.002*	**0.0072**	**0.0015**	*<0.001*	**0.099**	**0.037**	*0.006*

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIALS - Nickel & Titanium Base Alloys, Chromium Metal, Cements, Fluorspar & Bauxites

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

Nickel Base Alloys (Finely divided material - units of 100g - 345, 346 (346A), 350, 351/1, 363/1 & 387/1 also available in disc form for spectroscopic analysis - see page 21)

MAJOR ELEMENTS - nominal mass content in %

BCS-CRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	N	Nb	Ti	V	W	Zr	Fe
310/1	Nimonic '90' Alloy	**0.068**	**0.46**	**0.35**	...	...	**19.43**	...	**58.6**	**1.06**	...	**17.0**	...	...	...	**2.43**	...	...	...	**0.25**
345	IN 100 Alloy	**0.153**	...	...	...	...	**9.95**	**3.01**	Bal.	**5.58**	**0.019**	**14.71**	...	...	...	**4.74**	**1.00**	...	**0.044**	...
346	IN 100 Alloy	*0.15*	...	...	...	...	*10*	*3*	Bal.	*5.5*	...	*15*	...	...	...	*5*	*1*	...	...	...
350	IN 713 Alloy	**0.138**	**0.110**	**0.019**	...	...	**13.43**	**4.29**	**70.8**	**5.97**	**0.013**	**0.338**	...	...	**2.17**	**0.87**	...	**0.094**	**0.072**	**1.50**
351/1	IN 718 Alloy	**0.0255**	**0.080**	**0.0562**	**0.0045**	**0.00037**	**19.14**	**3.04**	**53.35**	**0.554**	**0.0035**	**0.145**	**0.0222**	**0.0077**	**5.31**	**0.938**	**0.0181**	**0.0209**	**0.0017**	**17.20**
363/1	Monel Alloy 400	**0.140**	**0.028**	**1.26**	...	*0.002*	*0.05*	...	**64.7**	**0.027**	...	**0.032**	**31.90**	...	...	*0.03*	...	...	...	**1.86**
371	Commercial Nickel	**0.30**	**0.34**	...	...	**0.013**	...	...	Bal.	...	...	**0.39**	...	...	...	...	...	...	...	...
387/1	Nimonic 901 Alloy	**0.033**	**0.06**	**0.025**	**0.0033**	**0.0028**	**11.35**	**5.83**	**41.2**	**0.24**	**0.017**	**0.020**	**0.0076**	...	*0.006*	**3.00**	...	...	...	**38.4**

Nickel Base Alloys (continued)

TRACE ELEMENTS - nominal mass content in µg/g

BCS-CRM No.	Description	Pb	Bi	Ag	Se	Te	Tl	Sb	Ta	As	Cd	Ga	Sn	Zn	Mg	Ca	In
345	IN 100 Alloy	**0.21**	**<0.2**	**<0.2**	**<0.5**	**<0.2**	**<0.2**	**<2**	...	*2*	**<0.1**	**8.2**	**5.6**	**<0.5**	**5.5**	*<5*	...
346	IN 100 Alloy	**21.0**	**10.4**	**35.0**	**9.1**	**11.7**	**1.8**	**47**	...	**50.3**	**0.42**	**50.6**	**91**	**28.9**	**147**	*36*	*19*
351/1	IN 718 Alloy	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	**2.4**	**33**	*<10*	*<0.1*	*<20*	**3.3**	*<10*	**16**	*<10*	...
371	Commercial Nickel	...	...	...	...	...	...	...	...	...	...	...	...	...	**600**	...	...
387/1	Nimonic 901 Alloy	*0.3*	*<1.0*	*≤0.2*	...	...	...	**3**	...	...	...	...	...	...	...	...	...

Titanium Base Alloys (Finely divided material - units of 50g)

nominal mass content in %

BCS-CRM No.	Description	Al	V	Fe	Cu	Ni	Cr	Mo	N	Sn	Si	W	C	H	O	B	Zr	Y
356	Titanium Alloy	**6.25**	**4.05**	**0.124**	**0.0055**	**0.0070**	**0.0112**	**0.0020**	**0.0103**	*0.0155*	*0.0200*	*0.0010*	*0.0085*	*0.0019*	*0.2000*	*<0.0005*	*<0.0005*	...
357	Titanium Alloy	**5.46**	**3.53**	**0.202**	**0.0537**	**0.0511**	**0.0521**	**0.053**	**0.0148**	*0.0620*	*0.0500*	*<0.001*	*0.0072*	*0.0012*	*0.2500*	*0.0013*	*0.0455*	*0.0046*

Chromium Metal (Finely divided material - units of 100g)

nominal mass content in %

BCS-CRM No.	Description	C	Si	S	N	Fe	O	Al (Total)
361	Chromium Metal	**0.0039**	**0.0449**	**0.0043**	**0.0079**	**0.092**	**0.101**	*0.083*

Chrome Ore (Finely divided material - units of 100g)

BCS-CRM No.	Description	FeO*	SiO_2	Al_2O_3	Cr_2O_3	TiO_2	CaO	MgO	MnO	P	Na_2O	K_2O	Cr (VI)
308/1	Chrome Ore	**26.58**	**1.194**	**15.10**	**44.91**	**0.74**	**0.65**	**9.15**	**0.230**	*<0.006*	*<0.015*	*<0.0054*	*0.0006*

*Total Iron expressed as FeO

Cements (Finely divided material - units of 100g)

nominal mass content in %

BCS-CRM No.	Description	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	Cr_2O_3	Mn_2O_3	CaO	MgO	Na_2O (Acid Sol)	K_2O (Acid Sol)	P_2O_5	SO_3	SrO	Cl
353	Sulphate Resisting Portland Cement	**20.5**	**3.77**	**0.16**	**4.82**	*0.02*	**0.23**	**64.8**	**2.42**	**0.10**	**0.49**	**0.077**	**2.25**	**0.23**	*0.01*
354	White Portland Cement	**21.8**	**4.85**	*0.04*	**0.30**	*0.003*	**0.057**	**70.0**	**0.42**	**0.10**	**0.11**	**0.12**	**2.25**	**0.11**	*0.005*

Fluorspar & Bauxites (Finely divided material - units of 100g)

nominal mass content in %

BCS-CRM No.	Description	Fe_2O_3	SiO_2	Al_2O_3	CaF_2	TiO_2	CaO	MgO	P_2O_5	BaO	Na_2O	K_2O	S	CO_2	Cr	Cu	Mn	Ni	Pb	Sr	Zn	L.O.I.
392	Fluorspar	...	**0.67**	...	**97.2**	...	**0.52**	...	...	**0.37**	...	...	**0.12**	**0.48**	...	...	...	...	**0.18**	...	...	...
394/1	Calcined Bauxite	**1.372**	**6.47**	**88.88**	...	**2.967**	**0.0173**	**0.0047**	**0.0574**	...	*<0.01*	*<0.01*	...	...	...	...	...	...	...	...	...	*0.05*
395	Bauxite	**16.3**	**1.24**	**52.4**	...	**1.93**	**0.05**	**0.02**	...	...	*0.02*	*0.02*	...	...	*0.0453*	*0.0021*	*0.0042*	*0.0034*	*0.0028*	*0.0023*	*0.0043*	**27.8**

BRITISH CHEMICAL STANDARD AND EURONORM CERTIFIED REFERENCE MATERIALS - Non-Metallic Materials

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Tin Ore (Finely divided material - units of 100g)

BCS-CRM No.	Description	Sn	Fe	Cu	As	Bi	Zn	Pb	S	W	Ni	Si	Ti	Al	Ca	F
355	Tin Ore	31.42	17.08	0.085	0.14	0.015	0.059	0.012	0.50	0.35	0.0040	7.14	0.37	4.12	2.63	2.07

Iron Ores & Furnace Dust (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	Fe	Si	Ca	Mg	Al	Ti	Mn	P	S	Na	K	F	V	Cr	Zn	LOI
301/1	651-1	Lincolnshire Iron Ore	23.85	3.46	16.1	1.04	2.25	0.10	0.97	0.35	0.40	0.05	0.26	...	...	...	...	*25.8*
377/6	...	Iron Ore Sinter	54.78	2.982	5.74	0.907	0.783	0.1001	0.604	0.0586	*0.04*	*0.10*	*0.57*	*0.30*	0.0178	0.0154	1.002	...
517	...	Brazilian Iron Ore	66.30	0.519	0.033	0.0311	0.508	0.0332	0.679	0.0408	0.0090	0.0097	0.0105	...	0.0040	...	0.0047	1.898
...	676-1	Iron Ore Sinter	39.76	6.40	12.78	1.16	3.40	0.19	0.83	0.59	0.12	0.095	0.43	0.10	0.070	...	...	...
...	682-2	Iron Ore	66.12	0.833	*0.007*	0.0133	0.325	0.0441	0.0311	0.0529	0.0140	*0.002*	...	...	0.0015	*0.0015*	*0.0014*	*3.01*
...	690-1	Haematite Iron Ore	66.70	0.881	0.269	0.815	0.198	0.229	0.0337	0.0085	*0.001*	0.0312	0.0158	...	0.1417	0.0113	*0.002*	...
...	884-1	Furnace Dust	31.67	2.101	5.22	1.848	0.379	0.0230	5.85	0.079	*0.49*	0.585	0.979	0.411	0.0303	1.86	17.50	*2.94*

Iron Ores & Furnace Dust (continued)

BCS-CRM No.	ECRM No.	Description	Ni	Pb	C	Co	Cu	Ag	As	Ba	Bi	Cd	Mo	Sn	$Cl_{(sol)}$	Cl	Hg	H_2O
301/1	651-1	Lincolnshire Iron Ore (cont.)	...	...	*6.0*	...	...	...	...	...	...	...	...	...	...	...	...	*5.3*
377/6	...	Iron Ore Sinter (cont.)	*0.009*	0.1485	...	*<0.002*	*0.08*	...	...	*0.01*	...	...	...	...	...	...	...	...
517	...	Brazilian Iron Ore (cont.)	*0.0003*	0.0028	0.061	*0.0003*	0.0088	...	*0.0004*	*0.015*	...	*≤0.0001*	...	...	0.00075	...	...	...
...	682-2	Iron Ore (cont.)	...	0.0004	...	*0.0006*	0.0005	...	...	...	...	...	...	...	...	...	*<0.0001*	...
...	690-1	Haematite Iron Ore (cont.)	0.0200	*<0.002*	...	0.0089	0.0006	...	...	...	...	...	...	*0.001*	...	*0.001*	...	...
...	884-1	Furnace Dust (cont.)	0.197	0.442	*0.82*	0.0046	0.1569	0.0028	0.0054	...	0.0280	0.0045	0.208	0.0186	...	0.991	*0.0002*	*0.30*

Manganese Ores (Finely divided material - units of 100g)

BCS-CRM No.	Description	Mn	Fe	SiO_2	Al_2O_3	TiO_2	CaO	MgO	P	Na_2O	K_2O	BaO	Co	Cu	S	As_2O_3	B
176/3	Manganese Ore	27.69	0.976	14.31	2.504	0.0972	6.83	4.72	0.0602	0.285	0.363	0.0157	0.0056	0.0054	*0.235*	*0.049*	*0.009*
176/4	Manganese Ore	29.13	0.839	13.09	2.236	0.0854	5.59	5.36	0.0582	0.321	0.261	0.0135	0.0050	0.0041	*0.160*	*0.051*	*0.011*

Copper Concentrate / Zinc Concentrate (Finely divided material - units of 100g)

BCS-CRM No.	Description	SiO_2	MgO	CaO	Cu	Zn	Pb	S	Fe	Ag	Au	Cd	Mn	Ni	Al_2O_3	Na_2O	K_2O	As	Bi
514	Copper Concentrate	2.97	0.184	0.263	25.24	0.268	0.010	35.89	31.41	0.0034	0.00193	0.0043	0.0027	0.0021	*0.59*	*0.074*	*0.070*	*<0.005*	*<0.005*
520	Zinc Concentrate	1.78	0.266	0.125	0.568	52.50	0.820	31.78	9.88	0.0036	...	0.0735	...	...	0.334	...	...	0.0228	...

BCS-CRM No.	Description	C	Mo	Cl	Co	Cr	F	Hg	In	P	Sb	Se	Te	Ti	Ba	Be	Ge	Sn	Tl
514	Copper Concentrate (cont.)	*0.064*	*0.058*	*<0.005*	*0.010*	*<0.005*	*0.005*	*<0.0005*	*<0.003*	*0.006*	*<0.01*	*0.021*	*<0.005*	*0.017*	*<0.005*	*<0.0005*	*<0.002*	*<0.01*	*<0.002*

Slags (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	SiO_2	TiO_2	Al_2O_3	Fe	FeO	CaO	MgO	Cr_2O_3	MnO	V_2O_5	P_2O_5 (Cit. Sol.)	P_2O_5 (Form. Sol.)	P_2O_5 (Total)	S	F
381	...	Basic Slag	8.78	0.35	0.67	13.3	3.69	49.0	1.03	0.33	3.16	0.94	15.2	...	15.7	0.19	...
...	879-1	Basic Slag	8.82	0.535	0.803	18.97	...	43.70	2.19	0.477	4.45	0.738	7.59	*5.73*	8.46	0.102	0.368

Tungsten Carbide and Silicon Carbide Refractories (Finely divided material - units of 100g)

BCS-CRM No.	ECRM No.	Description	C (Total)	Si (Total)	Al (Total)	C (Free)	Si (Free)	Fe (Total)	Mn	P	Cr	Mo	Ni	B	O	N	Ti	V	Ca	Mg	Na	K
...	783-1	Tungsten Carbide	6.188	...	...	*0.04*	...	0.0022	...	...	...	...	...	...	*0.01*	...	...	...	...	...	...	...
...	781-1	Silicon Carbide Refractory	48.25	35.56	4.39	*37.22*	*4.646*	*0.8061*	*0.0274*	*0.0117*	*0.0240*	*0.0264*	*0.0210*	*0.0149*	*10.5*	*0.0282*	*0.0320*	*0.0216*	*0.0433*	*0.0421*	*0.0308*	*0.3765*
359	...	Nitrogen Bearing Silicon Carbide	23.46	67.6	0.118	*0.061*	*0.325*	0.175	*<0.01*	...	...	...	*0.014*	...	*0.532*	*7.84*	0.022	*0.027*	0.108	*<0.01*	*<0.01*	*<0.01*
360	...	Sialon Bonded Silicon Carbide	23.53	60.8	6.52	*0.085*	*0.538*	*0.19*	*<0.01*	...	*<0.01*	...	*0.013*	...	*4.03*	*4.77*	0.025	...	0.115	*<0.02*	*<0.01*	*<0.01*

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE MATERIALS - Ceramic Materials and Minerals

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Ceramic Materials, Minerals & Glass Sands (All finely divided material - units of 100g, except BCS-CRM 525 – units of 25g)

BCS-CRM No.	ECRM No.	Description	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	MnO	Mn_3O_4	CaO	MgO	Na_2O	K_2O	BaO	Cr_2O_3	PbO	ZnO
309	...	Sillimanite	**34.1**	**61.1**	**1.92**	**1.51**	*0.03*	...	**0.22**	**0.17**	**0.34**	**0.46**	*0.006*	...	...	...
313/2	...	High Purity Silica	**99.73**	**0.068**	**0.0243**	**0.0229**	**0.00032**	...	**0.0160**	**0.0038**	**0.0057**	**0.0108**	**0.00067**	...	...	*0.0014*
319/1	...	Magnesia	**1.093**	**0.109**	**0.0070**	**0.291**	**0.108**	...	**3.00**	**95.38**	...	...	*0.0038*	**0.0035**	...	...
348	...	Ball Clay	**51.1**	**31.6**	**1.08**	**1.04**	...	...	**0.17**	**0.30**	**0.34**	**2.23**	*0.04*	**0.016**	...	...
358	...	Zirconia	**0.21**	**0.08**	**0.20**	**0.065**	...	...	**1.50**	**3.42**	*<0.01*	*<0.01*	**0.10**	...	...	...
362*	...	Mine Tailings Sample	**9.03**	**0.667**	**0.047**	**0.483**	...	**0.829**	**44.21**	**0.068**	**0.084**	**0.14**	*2.02*	*0.003*	**2.63**	**2.59**
369	...	Magnesite-Chrome	**2.59**	**14.7**	**0.14**	**10.3**	**0.11**	...	**1.17**	**53.5**	**0.05**	**0.03**	*<0.01*	**17.2**	...	...
370	...	Magnesite-Chrome	**3.01**	**12.3**	**0.13**	**7.23**	**0.11**	...	**1.54**	**61.8**	**0.06**	**0.03**	*<0.01*	**13.4**	...	...
375/1	...	Soda Feldspar	**69.26**	**17.89**	**0.313**	**0.291**	...	**Mn_2O_3**	**0.78**	**0.180**	**8.89**	**1.47**	*0.0106*	*0.0018*	*0.0004*	*0.0005*
376/1	...	Potash Feldspar (SGT Feldspar 1)	**65.77**	**18.63**	*<0.01*	**0.085**	...	*0.004*	**0.421**	*0.03*	**3.00**	**11.59**	**0.0210**	*0.001*	**0.0090**	...
388	...	Zircon	**32.7**	**0.291**	**0.232**	**0.049**	...	...	*0.04*	*<0.05*	*<0.02*	*<0.03*	...	...	...	...
389/1	...	High Purity Magnesia	**0.274**	**0.104**	**0.0051**	**0.607**	**0.100**	...	**0.880**	**97.89**	...	...	*0.0015*	*0.004*	...	*0.0029*
393	**752-1**	Limestone	**0.70**	**0.12**	**0.009**	**0.045**	**0.010**	...	**55.4**	**0.15**	*0.02*	**0.02**	**0.006**	...	...	...
396	...	Low Silica Magnesite Chrome	**1.37**	**5.73**	**0.26**	**10.9**	**0.17**	...	**1.12**	**64.6**	*0.06*	*0.03*	...	**15.6**	...	...
512	...	Dolomite (SGT Dolomite 1)	**0.379**	**0.055**	**0.0020**	**0.030**	**0.0036**	...	**30.61**	**21.59**	*0.1*	*<0.02*	*<0.02*	*<0.001*	*<0.001*	*<0.01*
513	...	Limestone (SGT Limestone 1)	**0.228**	**0.108**	*0.004*	**0.0275**	**0.0095**	...	**55.59**	**0.182**	*<0.3*	**0.0150**	*0.01*	**0.0012**	**0.0009 Pb**	**0.0014 Zn**
516	...	Standard Glass Sand (SGT Glass Sand 10)	**98.73**	**0.513**	**0.172**	**0.0596**	...	**0.0012**	**0.0243**	**0.0387**	**0.0195**	**0.127**	**0.0040**	**0.0081**	**0.0127**	*<0.01*
525	...	Low Iron Float Glass	**72.55**	**0.167**	*0.021*	**0.0166**	...	**0.0012**	**8.91**	**4.28**	**13.43**	**0.087**	**0.0041**	*0.0003*	*0.0004*	...
528	...	Standard Glass Sand (SGT Glass Sand 11)	**95.62**	**2.447**	**0.0486**	**0.1111**	...	...	**0.237**	**0.0887**	**0.101**	**0.875**	**0.0298**	**0.0008**	**0.0006**	*0.001*
529	...	Anorthic Feldspar	**56.24**	**26.84**	*0.087*	**0.273**	...	...	**9.58**	**0.045**	**5.58**	**0.42**	*0.093*	**0.002**	...	...
531	...	Low Iron Sand	**99.74**	**0.0327**	**0.0160**	**0.00636**	**0.00014**	...	**0.0040**	**0.00132**	*0.003*	**0.0039**	**0.00112**	*<0.0002*	*<0.001*	...
532	...	Swedish Feldspar	**77.07**	**13.46**	*0.019*	**0.1813**	...	...	**0.212**	**0.159**	**4.35**	**3.80**	*0.015*	*0.004*	...	...
...	**776-1**	Firebrick	**62.76**	**29.28**	**1.62**	**1.43**	...	...	**0.310**	**0.476**	**0.488**	**2.92**	**0.122**	**0.022**	...	...
...	**782-1**	Dolomite	**0.266**	**0.104**	**0.0042**	**0.450**	**0.081**	...	**30.34**	**21.29**	...	**0.0260**	*0.0008*	**0.0009**	**0.0029**	**0.0082**

*Additional certified values available for Aqua Regia soluble content and pH in BCS-CRM 362: **As=0.0030%, Cd=0.0200%, Cr=0.0011%, Cu=0.0056%, Ni=0.0012%, Pb=2.30%, Zn=2.03%** and **pH=8.14**

Ceramic Materials, Minerals & Glass Sands (continued)

BCS-CRM No.	ECRM No.	P_2O_5	ZrO_2	S	L.O.I.	B_2O_3	HfO_2	Li_2O	SrO	ThO_2	U_3O_8	Y_2O_3	As	C	Cd	F	Mn	Ni	Sn
309	...	...	...	...	*0.1*	...	...	*0.01*	*0.003*	...	...	...	...	...	...	...	...	...	...
313/2	...	*0.0022*	...	...	*0.14*	...	...	...	**0.00024**	...	...	...	...	...	...	...	...	...	...
319/1	...	*0.007*	*0.0008*	...	...	*0.002*	...	...	*0.0060*	...	...	*0.0014*	...	...	...	...	...	*0.0075*	...
348	...	**0.071**	*0.03*	*0.1*	**11.8**	...	...	...	...	...	...	...	...	*1.64*	...	...	...	...	...
358	...	...	**92.70**	...	**0.08**	...	**1.63**	...	**0.07**	*0.0007*	*0.08*	...	...	...	...	...	...	...	...
362*	...	*0.014*	...	**1.48**	**32.81**	...	...	...	**0.034**	...	...	...	...	*9.9*	**0.020**	...	...	*0.001*	...
369	...	...	...	...	...	...	...	**0.03**	*<0.01*	...	...	...	...	...	...	...	...	*0.15*	...
370	...	...	...	...	...	...	...	**0.03**	*<0.01*	...	...	...	...	...	...	...	...	*0.08*	...
375/1	...	**0.226**	*0.0107*	...	**0.72**	...	*0.0004*	...	*0.012*	*0.0011*	*0.0002*	*0.0023*	...	...	...	...	...	...	...
376/1	...	*0.02*	*<0.01*	...	**0.203**	...	...	...	...	...	...	...	...	...	...	...	...	...	...
388	...	**0.122**	**64.9**	...	*0.20*	...	**1.28**	...	...	**0.019**	**0.034**	**0.136**	...	...	...	...	...	...	...
389/1	...	**0.0295**	*0.0008*	...	...	*0.015*	...	...	*0.0007*	...	...	*0.0029*	...	...	...	...	...	*0.0012*	...
393	**752-1**	*0.005*	...	**0.007**	**43.4**	...	...	...	**0.019**	...	...	...	...	...	...	*<0.01*	...	...	...
396	...	...	...	...	*0.04*	**0.09**	...	*0.05*	...	...	...	...	...	...	...	...	...	...	...
512	...	*<0.02*	...	*<0.05*	**46.80**	...	...	...	**0.024**	...	...	...	*<0.003*	*12.4*	*<0.001*	*0.01*	...	*<0.001*	...
513	...	*0.005*	...	**0.0097**	**43.61**	...	...	...	**0.0176**	...	...	...	*<0.001*	*11.9*	*<0.001*	*<0.005*	...	*<0.001*	...
516	...	*0.013*	*0.075*	**SO_3**	**0.24**	...	*<0.01*	...	*<0.01*	...	...	...	...	...	...	...	...	...	...
525	...	*0.004*	**0.0045**	**0.284**	*0.43*	...	...	...	**0.0038**	...	...	...	...	...	...	...	...	...	...
528	...	*0.20*	*0.014*	...	**0.271**	...	...	...	...	...	...	...	...	...	...	...	*<0.002*	...	*0.0016*
529	...	*0.047*	...	*0.135*	**0.550**	...	...	...	*0.323*	...	...	...	...	...	...	...	...	*0.15*	...
531	...	**0.00082**	*0.002*	*0.0009*	*0.12*	...	...	...	**0.00017**	...	...	...	...	...	...	...	...	...	*<0.001*
532	...	...	...	...	**0.56**	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	**776-1**	**0.062**	*0.04*	...	*0.3*	...	...	**0.019**	...	...	...	...	...	...	...	...	...	...	...
...	**782-1**	**0.0128**	...	*0.016*	**47.25**	*0.0039*	...	...	...	...	...	...	...	...	...	...	...	*0.0004*	...

BRITISH CHEMICAL STANDARD CERTIFIED REFERENCE AND REFERENCE MATERIALS - Soda Ash, High Purity Metals, Ceramic Materials and Benzoic Acids

Although the High Purity Metals, Ceramic Materials and Benzoic Acid samples below have been carefully analysed by both BAS Ltd. and an independent laboratory, they have been classified as RMs and not CRMs in order to distinguish them from BAS CRMs which are normally analysed by at least five laboratories.

CHEMICAL COMPOSITION (nominal mass content in %)

Soda Ash Certified Reference Material (Finely divided material - units of 100g)

BCS-CRM No.	Description	Na_2CO_3	NaCl	Fe_2O_3	Na_2SO_4	Insoluble Residue
526	Soda Ash (SGT Soda Ash 1)	**99.74**	**0.126**	**0.0005**	**0.008**	*<0.02*

High Purity Metal Reference Materials (Finely divided material or blocks/bars - see below)

BCS-RM No.	Description		Ag	As	Bi	C	Cd	Co	Cu	Fe	Ga	In	Mn	Ni
192j	High Purity Tin	(100g millings or 300g blocks)	...	*<0.0001*	*<0.0001*	*0.001*	*<0.0001*	...	*<0.0001*	*<0.0005*	...	*<0.0001*	...	*<0.0001*
194e	High Purity Zinc	(300g blocks)	...	*<0.00005*	...	...	*<0.0005*	...	*<0.0005*	*0.001*	...	*<0.0005*	...	...
195g	High Purity Aluminium	(100g millings or 300g blocks)	...	...	...	...	...	...	*0.001*	*0.080*	*0.009*	...	*0.001*	...
198f	Super Pure Aluminium	(100g blocks)	...	...	...	...	...	...	*0.005*	*0.001*	...	...	...	...
210e	High Purity Lead	(500g bars)	*0.0001*	*<0.002*	*0.0008*	...	*<0.0001*	*<0.005*	*0.0006*	*0.0005*	...	...	*<0.001*	*<0.001*

High Purity Metal Reference Materials (continued)

BCS-RM No.	Description		S	Sb	Si	Ti	Tl	V	Al	Pb	Sn	Zn	Melting Point
192j	High Purity Tin	(continued)	*0.0002*	*<0.001*	...	...	...	...	...	*<0.001*	*99.996*	*<0.0001*	*231.9°C*
194e	High Purity Zinc	(continued)	...	...	...	...	*<0.0005*	...	...	*0.002*	*<0.001*	*99.99*	*419.5°C*
195g	High Purity Aluminium	(continued)	...	...	*0.035*	*0.002*	...	*0.004*	*99.85*	...	...	*0.015*	*659.2°C*
198f	Super Pure Aluminium	(continued)	...	...	*0.002*	...	...	...	*99.99*	...	...	...	...
210e	High Purity Lead	(continued)	...	*<0.002*	...	...	*0.001*	...	*<0.001*	*99.996*	*<0.002*	*<0.005*	*327.3°C*

Ceramic Reference Materials (Finely divided material - units of 100g). These samples have been prepared jointly by Ceram Research Limited (now Lucideon) and BAS.

BCS-RM No.	Description	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	CaO	MgO	Na_2O	K_2O	P_2O_5	BaO	Mn_2O_3	SnO_2	SrO	SO_3	ZrO_2 +HfO_2	L.O.I.
201a	Nepheline Syenite	*57.3*	*23.54*	*0.05*	*0.12*	*1.07*	*0.025*	*7.53*	*8.90*	*0.025*	*0.37*	*0.007*	...	*0.43*	...	...	*0.76*
202a	Plaster (Gypsum)	*1.38*	*0.33*	*0.03*	*0.10*	*37.4*	*0.39*	*<0.03*	*0.10*	*<0.01*	...	...	...	*0.33*	*53*	...	*7.0*
203a	Talc	*59.7*	*0.30*	*<0.01*	*0.22*	*0.25*	*32.08*	*0.02*	*0.005*	*0.13*	...	...	...	...	...	...	*6.78*
204a	Zircon	*37.6*	*0.74*	*2.22*	*0.18*	*0.15*	*0.012*	*0.014*	*0.017*	*0.77*	...	...	*1.69*	...	...	*53.8*	*0.50*
205a	Borax Frit	*52.16*	*5.38*	*0.04*	*0.15*	*12.58*	*0.62*	*8.53*	*1.04*	...	*0.03*	...	...	*0.01*	...	...	*0.24*

Ceramic Reference Materials (continued)

BCS-RM No.	Description	B_2O_3	ZrO_2	PbO	ZnO	Li_2O
205a	Borax Frit (cont.)	*18.46*	*0.34*	*0.05*	*0.16*	*<0.01*

Benzoic Acid Reference Materials (BCS-RM 190t supplied in units of 100 x 0.2g tablets; BCS-RM 190v supplied in units of 100g of crystals or 100 x 1.0g tablets)

BCS-RM No.	Description	
190t	Benzoic Acid	Purity 100.0±0.05%, Calorific Value, 26,439.7±12.2 joules per gramme based on mass (Certified by Pattinson and Stead, Middlesbrough, UK)
190v	Benzoic Acid	Purity 100.0±0.06%, Calorific Value, 26,443.2±6.6 joules per gramme based on mass (Certified by Pattinson and Stead, Middlesbrough, UK)

SPECTROSCOPIC STANDARD CERTIFIED REFERENCE MATERIALS - Unalloyed Steels

The figures are listed primarily as a guide to purchasers. In some cases provisional figures are given which may differ slightly from those given on the Certificate**. Always consult the Certificate issued with the sample to obtain the accurate analysis.**

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Plain Carbon Steels (Wrought) (SS-CRM: 38mm dia. x 19mm discs, ECRM: 38mm dia. x 30 or 25mm discs except 056-2(D): 44mm dia. x 30 or 25mm discs)

Ref No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Acid Sol.)	Al (Total)	As	Co	Cu	N	Nb	Pb	Sn	V	W	Sb	Others
SS-CRM 432/1	Plain Carbon Steels	**0.102**	**0.043**	**1.34**	**0.024**	**0.039**	**0.31**	*0.02*	**0.14**	...	*0.01*	...	...	*0.04*	...	**<0.002**	...	...	...	...	...	...
SS-CRM 434/1		**0.41**	**0.31**	**1.49**	**0.050**	**0.027**	**0.055**	*0.01*	**0.044**	...	*<0.01*	...	...	*0.05*	...	**0.078**	...	...	...	...	...	...
SS-CRM 435/1		**0.52**	**0.54**	**0.41**	**0.033**	**0.031**	**0.14**	*<0.01*	**0.060**	...	*<0.01*	...	...	*0.05*	...	**0.039**	...	...	...	...	...	...
SS-CRM 431/2	Plain Carbon Steels	**0.0249**	**0.015**	**0.902**	**0.121**	**0.0065**	**0.049**	*0.004*	**0.040**	...	*0.01*	*0.005*	*0.006*	*0.015*	**0.0052**	**0.0040**	...	*<0.001*	*0.003*	*0.004*	...	...
SS-CRM 432/2		**0.0065**	**0.0822**	**0.712**	**0.0171**	**0.036**	**0.0166**	*0.002*	**0.0196**	...	*<0.002*	...	*0.006*	*0.015*	**0.0066**	**0.0174**	...	...	*<0.001*	*0.003*	...	...
SS-CRM 433/2		**0.096**	**0.0071**	**1.188**	**0.011**	**0.0083**	**0.0262**	*0.004*	**0.037**	...	...	...	*0.006*	*0.025*	...	**0.0590**	...	...	*0.001*	*0.003*	...	...
SS-CRM 434/2		**0.275**	**0.510**	**1.546**	**0.0611**	**0.0141**	**0.238**	*0.014*	**0.037**	...	...	...	*0.006*	*0.025*	**0.0104**	**0.038**	...	...	*0.04*	*0.04*	...	...
SS-CRM 435/2		**0.489**	**0.328**	**0.390**	**0.0373**	**0.0424**	**0.184**	*0.018*	**0.133**	...	...	...	**0.0116**	*0.05*	...	**0.134**	...	...	*0.005*	*0.015*	...	...
ECRM 055-2(D)	0.5% Carbon Steel	**0.5199**	**0.3094**	**0.687**	**0.0102**	**0.0205**	**0.3127**	**0.0960**	**0.3121**	...	*<0.01*	**0.0187**	**0.0257**	**0.2089**	**0.01069**	*<0.0002*	*<0.001*	**0.0162**	**0.00245**	**0.0166**	**0.00376**	*<0.005* **Ca**
ECRM 056-2(D)	0.8% Carbon Steel	**0.8181**	**0.2006**	**0.5073**	**0.0103**	**0.0093**	**0.0146**	*0.0015*	**0.0218**	**0.00024**	*<0.001*	...	*0.0035*	**0.0129**	*0.0045*	...	...	...	...	...	...	...
ECRM 057-2(D)	0.05% Carbon Steel	**0.0507**	*0.003*	**0.246**	**0.0120**	**0.0127**	**0.0114**	...	**0.0096**	*0.055*	**0.059**	...	...	**0.0146**	**0.0023**	...	...	...	...	...	...	...
ECRM 058-2(D)	0.15% Sulphur Steel	**0.424**	**0.1080**	**1.186***	**0.0098**	**0.1712***	**0.1211**	**0.0589**	**0.199**	...	...	**0.0095**	...	**0.261**	**0.0107**	...	...	...	...	...	...	...
ECRM 059-2(D)	0.7% Carbon Steel	**0.721**	**0.188**	**0.495**	**0.0046**	**0.0084**	**0.0090**	**0.0018**	**0.0198**	**0.00020**	**0.00045**	...	...	**0.0074**	**0.0051**	...	...	...	...	...	...	...
ECRM 064-2(D)	Nb/Ti Interstitial Free Steel	**0.0026**	**0.0065**	**0.1641**	*0.011*	*0.012*	*0.024*	**0.00077**	**0.0115**	...	*0.05*	**0.0036**	**0.0027**	**0.0077**	**0.0026**	**0.0146**	**0.00018**	**0.00051**	**0.00015**	*0.0002*	...	...
ECRM 084-1(D)	0.4% Carbon Steel	**0.391**	**0.265**	**0.860**	**0.018**	**0.029**	...	**0.033**	**0.154**	...	...	...	...	**0.267**	...	...	...	**0.023**	...	...	...	...
ECRM 085-1(D)	0.3% Sulphur Steel	**0.067**	**0.008**	**0.977***	**0.062**	**0.336***	...	...	...	...	...	...	**0.019**	**0.291**	...	...	**0.0010**	...	**0.0021**	...	**0.0073**	**0.0025 Zn**
ECRM 086-1(D)	0.3% Carbon Steel	**0.297**	**0.206**	**0.879**	**0.0238**	**0.0371**	**0.150**	...	**0.168**	...	...	**0.0230**	...	**0.320**	...	...	...	**0.0263**	...	...	...	...
ECRM 087-1(D)	0.15% Carbon Steel	**0.1740**	**0.2631**	**0.6711**	**0.0103**	**0.0461**	**0.0781**	**0.0206**	**0.1177**	...	...	**0.0243**	**0.0148**	**0.1707**	...	...	...	**0.0171**	...	...	**0.0046**	...
ECRM 090-1(D)	1% Carbon Steel	**1.054**	**0.281**	**0.226**	**0.0128**	**0.0095**	**0.121**	**0.0089**	**0.053**	...	...	...	...	...	**0.0146**	**0.00043**	**0.00239**	...	**0.204**	...	**0.00090**	...

*The metallurgical conditions of **ECRMs 058-2(D) and 085-1(D)** render them unsuitable for the determination of Mn and S by Optical Emission Spectrometry.

Plain Carbon Steels (Wrought) (continued)

Ref No.	Description	Bi	Cd	Ga	Hg	Se	Te	Ti	Tl	Zn
ECRM 055-2(D)	0.5% Carbon Steel (cont.)	*<0.005*	...	...	...	...	...	**0.00104**	...	*0.0011*
ECRM 090-1(D)	1% Carbon Steel (cont.)	**<0.0000**	**<0.0000**	**0.00228**	*<0.00001*	*<0.0002*	**<0.0002**	...	**<0.0001**	**0.00209**

Carbon Steels Residual Series (Wrought) (38mm dia. x 19mm discs)

Ref No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	Cu	Pb	Sn	Ti	W	Sb
SS-CRM 53	Carbon Steel	*0.25*	*0.37*	*0.29*	*0.020*	*0.009*	**0.22**	**0.100**	**0.172**	...	**0.058**	...	...	**0.025**	**0.018**	**0.25**	*0.004*
SS-CRM 55	Residual Series	*0.19*	*0.25*	*0.42*	*0.018*	*0.010*	**0.22**	**0.16**	**0.23**	**0.028**	**0.013**	...	...	**0.046**	**0.013**	**0.12**	**0.002**

Ref No.	Description	C	Si	Mn	P	S	Al (Acid Sol.)	Al (Total)	B	Co	Cu	Nb	Pb	V	Zr	Sb
SS-CRM 56	Carbon Steel Residual Series	*0.23*	*0.36*	**0.32**	*0.019*	*0.009*	*0.003*	**0.005**	**0.001**	**0.023**	**0.36**	...	**0.014**	**0.057**	...	**0.005**
SS-CRM 456/2		**0.112**	**0.297**	**0.220**	**0.0212**	**0.0221**	*<0.002*	**0.0018**	**0.0015**	**0.0504**	...	**0.0057**	**0.0189**	**0.0221**	*0.013*	**0.0172**
SS-CRM 457/2		**0.307**	**0.105**	**0.327**	**0.0098**	**0.0448**	**0.082**	**0.087**	**0.0046**	**0.0217**	...	**0.0174**	**0.0098**	**0.153**	**0.025**	**0.050**
SS-CRM 458/2		**0.198**	**0.504**	**0.479**	**0.0281**	**0.0314**	**0.052**	**0.055**	**0.0069**	**0.198**	...	**0.0510**	**0.0140**	**0.105**	*0.062*	**0.089**
SS-CRM 459/2		**0.467**	**0.640**	**0.909**	**0.0482**	**0.0481**	**0.0134**	**0.0154**	**0.0110**	**0.0890**	...	**0.0102**	**0.0044**	**0.0585**	**0.074**	**0.0121**
SS-CRM 460/2		**0.383**	**0.126**	**0.616**	**0.0374**	**0.0099**	**0.0193**	**0.0240**	**0.0027**	**0.0106**	...	**0.068**	**0.0005**	**0.0322**	*<0.0005*	**0.0006**

Many of the above samples are also available in the finely divided form - see pages 7 and 8.

SPECTROSCOPIC STANDARD CERTIFIED REFERENCE MATERIALS - High Purity Iron, Unalloyed and Low Alloy Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

High Purity Irons (Wrought) (38mm dia. x 30, 25 or 3mm discs)

ECRM No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	B	Co	Cu	N	Nb
097-1(D)	High Purity Iron	**0.00025**	*<0.01*	**0.0064**	**0.0016**	**0.0022**	**0.0016**	*<0.001*	**0.0025**	...	**0.0051**	**0.0003**	**0.0037**	**0.0020**	**0.0007**	*<0.001*
097-2(D)	High Purity Iron	*<0.002*	**0.00285**	**0.0120**	**0.00538**	**0.00181**	**0.0213**	**0.00370**	**0.0241**	*<0.002*	**0.00281**	**0.00012**	**0.0139**	**0.00793**	**0.00294**	*0.0011*

ECRM No.	Description	Pb	Sn	Ti	V	W	Zr	Bi	Ca	Ga	Mg	O	Sb	Ta	Zn
097-1(D)	High Purity Iron (cont.)	*<0.0005*	*<0.0025*	*<0.0015*	*<0.001*	*≤0.001*	*<0.001*	*<0.0005*	*<0.0005*	...	*<0.0005*	*0.05*	*≤0.001*	*<0.0005*	*<0.0001*
097-2(D)	High Purity Iron (cont.)	*<0.001*	**0.00043**	*0.0008*	**0.00011**	**0.00386**	*<0.002*	*<0.0002*	*<0.001*	*0.0003*	*<0.0005*	*0.005*	**0.00012**	**0.00015**	**0.00014**

ECRM 097-2(D) also has the additional information: *Ag: <0.0001%, Al(sol.): <0.0004% & 0.0010%, Cd: <0.0001%, Ge: 0.00043% & 0.00066%, Se: <0.0001%, Te: <0.0001%.*

Low Alloy Steels (Wrought) (SS-CRM 111/1-116: 44mm dia. x 19mm discs. Other SS-CRM: 38mm dia. x 19mm discs. ECRM: 38mm dia. x 30 or 25mm discs)

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	W	Zr	Ca	Zn
SS-CRM 111/1	Low Carbon Steel	**0.0070**	**0.0039**	**0.1623**	**0.0045**	**0.0049**	**0.0055**	**0.0005**	**0.0161**	*<0.002*	**0.0011**	...	**0.0053**	**0.0089**	**0.0025**	...	...	**0.0006**	**0.0004**	**0.0002**	...	...	...	...
SS-CRM 112	Low Alloy Steels	**0.394**	**0.289**	**0.436**	**0.0043**	**0.0026**	**1.236**	**0.190**	**1.461**	**0.0148**	**0.0021**	**0.0007**	**0.0175**	**0.149**	**0.0024**	**0.0065**	*<0.001*	**0.0086**	**0.0100**	**0.0088**	...	*<0.001*	*<0.0005*	...
SS-CRM 113		**0.837**	**0.931**	**1.207**	**0.0595**	**0.0294**	**1.248**	**0.056**	**0.0784**	**0.0151**	**0.0020**	**0.0066**	**0.0415**	**0.179**	**0.0109**	**0.0487**	*<0.001*	**0.0067**	**0.0390**	**0.201**	**0.012**	**0.0029**	*<0.001*	...
SS-CRM 114		**0.403**	**0.295**	**0.416**	**0.0044**	**0.0046**	**0.187**	**0.184**	**1.502**	**0.078**	**0.0025**	**0.0008**	**0.0171**	**0.360**	**0.0043**	**0.0042**	*<0.001*	**0.041**	**0.0096**	**0.0086**	*<0.001*	**0.0051**	*<0.001*	...
SS-CRM 115	Calcium Treated Steels	**0.6224**	**0.2078**	**0.682**	**0.0123**	**0.00093**	**0.0198**	*0.003*	**0.0196**	**0.0527**	...	*<0.0001*	*0.006*	*0.009*	**0.0067**	...	*0.0002*	*0.002*	**0.0027**	*0.001*	...	...	**0.0058**	*0.0006*
SS-CRM 116		**0.617**	**0.201**	**0.6756**	**0.0092**	**0.00176**	**0.0141**	*<0.001*	**0.0155**	**0.0587**	...	...	...	*0.014*	**0.0069**	...	**0.00012**	*0.005*	**0.00171**	...	...	...	**0.0036**	...
...																								
SS-CRM 219/4	Ni-Cr-Mo Steel	**0.314**	**0.079**	**0.81**	**0.011**	**0.027**	**0.66**	**0.58**	**2.55**	*0.003*	...	...	...	**0.088**	...	...	...	**0.011**	...	...	...	...	...	...
SS-CRM 222/1	3.5% Ni Steel	**0.3095**	**0.227**	**0.618**	**0.0175**	**0.0089**	**0.0535**	**0.0287**	**3.536**	...	...	*<0.005*	**0.0379**	**0.150**	**0.0100**	...	...	...	...	*0.020*	...	...	...	...
SS-CRM 225/2	Ni-Cr-Mo Steel	**0.40**	**0.23**	**0.56**	**0.019**	**0.012**	**1.08**	**0.34**	**1.43**	*0.009*	*0.035*	*0.0007*	*0.018*	*0.17*	*0.012*	*0.003*	...	*0.017*	...	*<0.01*	...	*<0.01*	...	...
SS-CRM 401/2	Low Alloy Steels	**0.935**	**0.602**	**1.197**	**0.0265**	**0.0078**	**0.138**	**0.495**	**0.019**	**0.074**	...	...	**0.0042**	**0.101**	**0.0159**	...	...	...	...	**0.496**	...	...	...	...
SS-CRM 402/2		**1.311**	**0.111**	**0.228**	**0.0161**	**0.0138**	**0.652**	**0.140**	**0.808**	**0.161**	...	...	...	**0.302**	**0.0069**	...	...	...	...	**0.194**	...	...	...	...
SS-CRM 403/2		**0.750**	**0.209**	**1.677**	**0.055**	**0.0381**	**0.463**	**0.088**	**0.223**	**0.0485**	...	...	...	**0.221**	*0.010*	...	...	...	...	**0.341**	...	...	...	...
SS-CRM 404/2		**0.696**	**1.121**	**0.532**	**0.0479**	**0.0228**	**0.774**	**0.307**	**0.393**	**0.017**	...	...	...	**0.427**	**0.0089**	...	...	...	...	**0.107**	...	...	...	...
SS-CRM 405/2		**0.044**	**0.947**	**0.903**	**0.0095**	**0.058**	**0.206**	**0.025**	**0.102**	**0.330**	...	...	*0.009*	**0.022**	*0.011*	...	...	...	...	**0.411**	...	...	...	...
SS-CRM 407/2		**0.490**	**0.66**	**0.195**	**0.038**	**0.0105**	**3.03**	**0.83**	**0.527**	**0.040**	...	...	**0.0068**	**0.397**	*0.011*	...	...	...	...	**0.19**	...	...	...	...
SS-CRM 421	Low Tungsten Steels	*0.049*	*0.07*	*0.11*	*0.012*	*0.027*	...	*0.028*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**0.52**	...	...	...
SS-CRM 422		*0.036*	*0.06*	*0.09*	*0.015*	*0.025*	...	*0.033*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**1.28**	...	...	...
SS-CRM 423		*0.030*	*0.05*	*0.07*	*0.017*	*0.027*	...	*0.027*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**2.06**	...	...	...
SS-CRM 424		*0.024*	*0.05*	*0.09*	*0.02*	*0.024*	...	*0.036*	...	...	...	...	...	...	...	...	...	...	...	*<0.02*	**3.02**	...	...	...
ECRM 186-1(D)	Silico-Manganese Steel	**0.6104**	**1.719**	**0.870**	**0.0223**	**0.0354**	**0.218**	**0.0482**	**0.190**	**0.0143**	...	...	...	**0.281**	...	...	...	...	...	...	...	...	...	...
ECRM 195-1(D)	Cr-Mo-Ni Steel	*0.73*	**0.466**	**0.571**	**0.0160**	**0.0121**	**1.566**	**0.768**	**0.327**	...	...	...	...	**0.0355**	**0.0100**	...	**0.0010**	*0.002*	...	**0.312**	...	...	**0.0017**	**0.0046**

Most of these samples are also available in the finely divided form - see page 7 and 9

SPECTROSCOPIC STANDARD CERTIFIED REFERENCE MATERIALS - Highly Alloyed Steels and Plain Carbon and Low Alloy Cast Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Highly Alloyed Steels (Wrought) (38mm dia. x 30 or 25mm discs)

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	Zr	Sb	Fe	Others
ECRM 272-1(D)	12% Chromium Steel	**0.2815**	**0.420**	**0.600**	**0.0156**	**0.0197**	**11.927**	**0.0030**	**0.244**	**0.0046**	**0.0116**	**0.0018**	**0.0145**	**0.0192**	**0.0508**	**0.0028**	*0.0004*	*0.0008*	**0.00096**	**0.0167**	...	**0.00070**	...	**0.00090 Ca** **0.0031 Zn**
ECRM 276-2(D)	5%Cr-Mo-V Steel	**0.399**	**1.034**	**0.365**	**0.0093**	**0.0189**	**4.975**	**1.134**	**0.203**	...	...	...	...	**0.183**	**0.0116**	...	...	**0.0133**	...	**0.296**	...	...	...	...
ECRM 285-2(D)	Maraging Steel	**0.0018**	**0.0117**	**0.0168**	**0.0053**	**0.0025**	**0.0236**	**4.99**	**18.07**	**0.1067**	...	**0.0009**	**7.76**	**0.0094**	**0.0007**	...	...	*0.0011*	**0.520**	...	**0.0050**	...	...	...
ECRM 287-1(D)	High B Stainless Steel	**0.0164**	**0.569**	**1.478**	**0.0267**	**0.0014**	**18.61**	**0.247**	**10.35**	...	...	**0.924**	**0.148**	**0.203**	**0.0194**	...	...	...	...	...	...	...	...	...
ECRM 292-1(D)	Nb-Stabilised Stainless Steel	**0.0367**	**0.402**	**1.744**	**0.0175**	**0.0055**	**18.00**	**0.0464**	**10.09**	*0.002*	*0.008*	*0.0003*	**0.0255**	**0.0391**	**0.0640**	**0.571**	...	...	...	...	...	...	...	{ *0.001* **Ta** *0.0006* **Ca**
ECRM 295-1(D)	4% Mo-Cr-Ni Steel	**0.0166**	**0.418**	**1.758**	**0.0167**	**0.0003**	**19.51**	**3.996**	**24.40**	**0.0203**	**0.0041**	**0.0018**	**0.0450**	**1.481**	**0.0615**	...	...	**0.0025**	...	**0.0456**	...	**0.0007**	**48.36**	*0.0003* **Mg**
ECRM 296-1(D)	Jethete Steel	**0.1166**	**0.242**	**0.676**	**0.0178**	**0.0026**	**11.82**	**1.700**	**2.790**	**0.0275**	**0.0139**	*0.0003*	**0.0218**	**0.1498**	**0.0214**	...	**0.00016**	**0.0131**	...	**0.363**	...	...	...	...

These samples are also available in the finely divided form - see page 10

Austenitic Stainless Steels (Wrought) (38mm dia. x 19mm discs)

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	W	Ta	Ca	Zr
SS-CRM 462	Austenitic Stainless Steels	**0.092**	**0.46**	**0.74**	**0.010**	**0.018**	**12.37**	...	**12.53**	...	**0.007**	...	...	...	...	...	**0.0005**	...	...	...	...	...	...	...
SS-CRM 461/1		**0.0103**	**0.374**	**0.686**	**0.0053**	**0.0051**	**14.727**	**0.0138**	**6.124**	*0.002*	*0.004*	...	*0.004*	**0.0091**	...	...	*0.0005*	...	...	...	...	...	...	...
SS-CRM 462/1		**0.0345**	**0.463**	**0.722**	**0.0053**	**0.0041**	**11.888**	**0.0304**	**12.85**	...	...	...	...	**0.0112**	...	...	...	...	...	...	...	...	...	...
SS-CRM 463/1		**0.019**	**0.270**	**1.400**	**0.025**	**0.019**	**18.46**	**0.265**	**10.20**	...	...	**0.0022**	**0.116**	**0.276**	**0.063**	...	...	...	*<0.005*	*0.04*	...	...	...	...
SS-CRM 464/1		**0.086**	**0.57**	**0.791**	**0.020**	**0.028**	**25.39**	...	**20.05**	...	*0.003*	...	**0.054**	...	...	...	**0.0004**	...	...	...	...	...	...	...
SS-CRM 465/1		**0.066**	**0.405**	**1.380**	**0.021**	**0.012**	**17.31**	**0.092**	**9.24**	**0.026**	...	**0.0006**	**0.053**	**0.098**	**0.010**	...	*<0.001*	...	**0.40**	**0.102**	...	...	...	...
SS-CRM 466/2		**0.0141**	**0.480**	**1.311**	**0.0105**	**0.0069**	**17.84**	**2.776**	**10.20**	*0.002*	**0.0020**	**0.0039**	**0.0184**	**0.0278**	**0.0508**	*0.001*	*<0.0001*	*<0.001*	*0.002*	**0.0346**	...	...	...	...
SS-CRM 467/1		**0.082**	**0.52**	**0.788**	**0.018**	**0.019**	**18.09**	...	**9.21**	...	**0.004**	...	...	...	...	**0.99**	**0.004**	...	...	...	...	**0.0017**	...	...
SS-CRM 468/1		**0.143**	**1.41**	**1.70**	**0.014**	**0.020**	**17.96**	...	**8.90**	...	...	...	**0.018**	...	...	...	...	...	...	...	...	...	...	...
SS-CRM 475		**0.050**	**0.21**	**0.89**	**0.037**	**0.008**	**14.14**	**1.59**	**5.66**	**0.013**	...	...	**0.22**	**1.94**	...	**0.22**	...	**0.015**	...	...	...	...	...	...
SS-CRM 476		**0.0171**	**0.323**	**1.755**	**0.0302**	**0.0234**	**16.88**	**2.049**	**10.17**	*<0.005*	**0.0053**	...	**0.1628**	**0.3026**	**0.0794**	**0.0107**	*<0.002*	**0.0059**	*<0.005*	**0.0663**	**0.0419**	*<0.001*	**0.0028**	*<0.003*
SS-CRM 479		**0.0529**	**0.553**	**0.680**	**0.0029**	**0.0030**	**19.922**	*0.003*	**24.87**	*0.013*	*0.002*	*<0.0005*	*0.002*	**0.0052**	**0.0057**	**0.625**	*<0.001*	*<0.002*	**0.0306**	**0.0052**	...	*<0.005*	...	...

These samples are also available in the finely divided form - see page 10

Low Alloy Cast Steel (44mm dia. x 12mm discs)

Ref. No.	Description	C	Si	Mn	S	Cr	Mo	Ni	Cu	V
SS-CRM 615/1	Low Alloy Cast Steel	**0.30**	**0.17**	**1.68**	*0.02*	**0.49**	**0.21**	**4.01**	*0.05*	**0.10**

Plain Carbon Cast Steels (44mm dia. x 19mm discs)

Ref No.	Description	C	Si	Mn	P	S	Al (Total)	Al (Acid Sol.)	Cr	Mo	Ni	Co	Cu	V	Zr
SS-CRM 601/2	Plain Carbon Cast Steels	**0.102**	**0.263**	**1.30**	**0.034**	**0.024**	**0.033**	*0.030*	*0.14*	*0.006*	*0.03*	*0.09*	*0.04*	*0.002*	*<0.005*
SS-CRM 602/2		**0.94**	**0.057**	**0.66**	**0.023**	**0.031**	**0.096**	*0.094*	*0.03*	*0.004*	*0.02*	*0.007*	*0.06*	*0.001*	*<0.005*
SS-CRM 603/2		**0.79**	**0.97**	**0.236**	**0.020**	**0.056**	**0.076**	*0.075*	*0.04*	*0.004*	*0.03*	*0.01*	*0.05*	*0.001*	*<0.005*
SS-CRM 604/2		**0.199**	**0.75**	**1.91**	**0.016**	**0.072**	**0.008**	*0.005*	*0.06*	*0.02*	*0.09*	*0.01*	*0.07*	*0.001*	*<0.005*
SS-CRM 605/2		**0.400**	**0.54**	**0.345**	**0.054**	**0.015**	**0.027**	*0.026*	*0.06*	*0.01*	*0.05*	*0.008*	*0.06*	*0.001*	*0.12*

SPECTROSCOPIC STANDARD CERTIFIED REFERENCE MATERIALS - Highly Alloyed Steels

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in small italic type only approximate.

Ferritic Stainless Steels (Wrought) (SS-CRM 469-473: 38mm dia. x 19mm discs, SS-CRM 70: 44m dia. x 13mm disc)

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Co	Cu	V
SS-CRM 70	Ferritic Stainless Steels	**0.18**	**0.35**	**0.38**	**0.024**	**0.020**	**16.36**	...	**0.40**	...	*0.02*	...
SS-CRM 469		**0.279**	**0.421**	**0.598**	**0.015**	**0.020**	**11.93**	...	**0.246**	*0.01*	*0.02*	*0.02*
SS-CRM 470		**0.153**	**0.335**	**0.235**	**0.024**	**0.035**	**17.68**	...	**0.369**	*0.02*	*0.02*	*0.02*
SS-CRM 471		**0.095**	**0.326**	**0.417**	**0.018**	**0.023**	**23.85**	...	**0.96**	*0.02*	*0.02*	*0.03*
SS-CRM 472		**0.227**	**1.05**	**1.02**	**0.032**	**0.029**	**15.82**	**0.661**	**1.95**	*0.02*	*0.02*	*0.02*
SS-CRM 473		**0.172**	**0.604**	**0.494**	**0.019**	**0.030**	**9.06**	**0.95**	*0.06*	*0.01*	*0.03*	*0.02*

Samples 469 to 473 are also available in the finely divided form - see page 10

High-Speed Steels (Wrought) (38mm dia. x 19mm discs)

Ref No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	Co	Sn	V	W
SS-CRM 482/1	High-Speed Steels	**0.675**	**0.14**	**0.26**	**0.027**	**0.027**	**3.95**	**0.40**	*0.16*	...	...	**0.29**	...	**1.04**	**17.83**
SS-CRM 483/1		**0.650**	**0.16**	**0.22**	**0.023**	**0.023**	**2.90**	**0.18**	*0.08*	...	...	**2.06**	...	**0.22**	**9.28**
SS-CRM 485/1		**0.94**	**0.30**	**0.41**	**0.043**	**0.039**	**4.02**	**0.66**	*0.14*	*0.006*	*0.022*	**4.97**	**0.019**	**1.02**	**17.79**
SS-CRM 486/1		**0.74**	**0.27**	**0.21**	**0.029**	**0.021**	**4.54**	**5.20**	*0.06*	*<0.005*	*0.016*	**0.08**	**0.014**	**1.82**	**5.80**
SS-CRM 487/1		**1.02**	**0.18**	**0.26**	**0.022**	**0.029**	**3.91**	**9.41**	*0.14*	**0.006**	*0.012*	**7.95**	*0.006*	**1.14**	**1.80**

High Manganese Steels (Cast) (48mm x 42mm x 12mm blocks). These samples have been prepared jointly by Replicast Ltd./Castings Technology International (formerly BCIRA) and BAS.

Ref Nos.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	Co	Cu	N	V	As	Ti
SS-CRM 492/3	High Manganese Steels	**1.18**	**0.299**	**8.33**	**0.0318**	**0.0093**	**1.076**	**1.318**	**4.17**	**0.131**	**0.0048**	**0.0211**	**0.0225**	*0.004*	*0.002*	**0.0024**
SS-CRM 493/3		**0.819**	**0.861**	**11.15**	**0.12**	**0.009**	**0.259**	**1.04**	**3.24**	**0.035**	...	**0.017**	**0.025**	**0.025**	...	...

SPECTROSCOPIC STANDARD CERTIFIED REFERENCE MATERIALS - Cast Irons and Nickel Base Alloys

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

Cast Irons (All are 48mm x 42mm x 12mm chill cast blocks except SCRM 675 which is a 40mm x 37mm x 10mm chill cast block.)
These samples are prepared jointly by Replicast Ltd./Castings Technology International (formerly BCIRA) and BAS. nominal mass content in %

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	Co	Cu	Sn	Ti	V	Ce	Mg	Zn
SCRM 652/4	Malleable Irons	**2.34**	**0.878**	**1.19**	**0.071**	**0.129**	*1*	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 655/4		**1.90**	**2.110**	**0.44**	**0.180**	**0.076**	*1*	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 656/9	Low Phosphorus Engineering Irons	**2.537**	**2.504**	**0.820**	**0.060**	**0.108**	*0.03*	...	*0.03*	...	...	...	...	...	...	...	...	...	...
SCRM 657/9		**3.157**	**3.209**	**0.112**	**0.101**	**0.0401**	...	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 658/11		**3.278**	**1.933**	**0.502**	**0.177**	**0.067**	...	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 659/9		**4.174**	**1.361**	**1.010**	**0.0215**	**0.0372**	...	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 660/10		**3.522**	**1.719**	**0.398**	**0.143**	**0.1089**	...	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 661/4	High Phosphorus Engineering Irons	**2.56**	**2.96**	**0.30**	**0.84**	**0.068**	*1*	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 662/4		**2.95**	**2.33**	**0.76**	**0.30**	**0.087**	*1*	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 665/4		**3.25**	**1.66**	**0.24**	**1.09**	**0.053**	*1*	...	...	...	...	...	...	...	...	...	...	...	...
SCRM 666/12	Ductile (Nodular) Irons	**3.599**	**1.763**	**0.106**	...	...	**0.102**	**0.0979**	**1.709**	...	...	...	**0.0581**	...	**0.1069**	**0.0486**	*0.006*	**0.0838**	...
SCRM 667/13		**3.04**	**2.866**	**0.222**	...	...	**0.294**	*0.006*	**1.303**	...	...	...	**0.497**	...	*0.007*	**0.103**	**0.110**	**0.070**	...
SCRM 668/13		**3.724**	**1.400**	**0.712**	...	...	**0.962**	**0.0193**	**0.097**	...	...	...	**0.751**	...	**0.091**	**0.193**	**0.0245**	**0.0116**	...
SCRM 669/14		**2.955**	**2.201**	**0.523**	...	...	**0.214**	**0.0550**	**0.473**	...	...	...	**0.194**	...	**0.0499**	**0.532**	**0.0415**	**0.0224**	...
SCRM 670/20		**3.576**	**2.261**	**0.367**	...	**0.0110**	**0.505**	**0.0198**	**0.892**	...	...	...	**0.959**	...	**0.110**	**0.0261**	**0.0105**	**0.0454**	...
SCRM 671/1	Blast Furnace Irons	**3.165**	**0.868**	**0.811**	**0.108**	**0.0503**	**0.0609**	**0.0259**	**0.0627**	**0.030**	...	**0.098**	...	**0.0103**	**0.0407**	**0.0122**	...	...	*<0.002*
SCRM 672/1		**4.322**	**0.143**	**0.474**	**0.198**	**0.036**	**0.0186**	**0.117**	**0.083**	**0.0102**	**0.0079**	**0.139**	**0.100**	**0.0047**	**0.0373**	**0.0988**	...	...	*0.008*
SCRM 673/1		**2.455**	**1.702**	**0.123**	**0.317**	**0.0112**	**0.0423**	**0.0092**	**0.103**	**0.0287**	...	**0.053**	...	**0.0206**	**0.0718**	**0.052**	...	...	*<0.001*
SCRM 674/1		**3.71**	**0.484**	**1.437**	**0.0180**	**0.078**	**0.0296**	**0.0497**	**0.161**	**0.0061**	...	**0.0066**	...	**0.0164**	**0.0131**	**0.0125**	...	...	...
SCRM 675		**1.916**	**1.300**	**1.798**	**0.0453**	**0.0724**	**0.0794**	**0.0342**	**0.205**	**0.0072**	**0.0342**	**0.0230**	**0.0117**	**0.0062**	**0.0070**	**0.179**	...	...	**0.0006**

Nickel Base Alloys (38, 41 or 50mm dia. x 13 or 19mm discs) MAJOR ELEMENTS - nominal mass content in %

Ref. No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	N	Nb	Ti	V	W	Zr	Fe
SS-CRM 345	IN 100 Alloy (cast)	**0.153**	...	...	...	...	**9.95**	**3.01**	Bal.	**5.58**	**0.019**	**14.71**	...	...	...	*5*	**1.00**	...	**0.044**	...
SS-CRM 346A	IN 100 Alloy (cast)	*0.15*	...	...	...	...	*10*	*3*	Bal.	*5.5*	...	*15*	...	...	...	*5*	*1*	...	...	...
SS-CRM 350	IN 713 Alloy (cast)	**0.138**	**0.110**	**0.019**	...	...	**13.43**	**4.29**	**70.8**	**5.97**	**0.013**	**0.338**	...	...	**2.17**	**0.87**	...	**0.094**	**0.072**	**1.50**
SS-CRM 351	IN 718 Alloy (wrought)	*0.025*	**0.14**	**0.037**	*0.006*	**0.0006**	**18.12**	**3.06**	**53.1**	**0.55**	**0.0051**	**0.136**	**0.016**	...	**5.20**	**1.06**	...	...	...	**18.26**
SS-CRM 351/1	IN 718 Alloy (wrought)	**0.0255**	**0.080**	**0.0562**	**0.0045**	**0.00037**	**19.14**	**3.04**	**53.35**	**0.554**	**0.0035**	**0.145**	**0.0222**	**0.0077**	**5.31**	**0.938**	**0.0181**	**0.0209**	**0.0017**	**17.20**
SS-CRM 363/1	Monel Alloy 400 (wrought)	**0.140**	**0.028**	**1.26**	...	*0.002*	*0.05*	...	**64.7**	**0.027**	...	**0.032**	**31.90**	...	...	*0.03*	...	...	...	**1.86**
SS-CRM 387/1	Nimonic 901 Alloy (wrought)	**0.033**	**0.06**	**0.025**	**0.0033**	**0.0028**	**11.35**	**5.83**	**41.2**	**0.24**	**0.017**	**0.020**	**0.0076**	...	*0.006*	**3.00**	...	...	...	**38.4**

Nickel Base Alloys (continued) TRACE ELEMENTS-nominal mass content in µg/g

Ref. No.	Description		Pb	Bi	Ag	Se	Te	Tl	Sb	Ta	As	Cd	Ga	Sn	Zn	Mg	Ca	In
SS-CRM 345	IN 100 Alloy	(cont.)	**0.21**	**<0.2**	**<0.2**	**<0.5**	**<0.2**	**<0.2**	**<2**	...	*2*	**<0.1**	**8.2**	**5.6**	**<0.5**	**5.5**	*<5*	...
SS-CRM 346A	IN 100 Alloy	(cont.)	**22.2**	**10.3**	**42.5**	**5.7**	**9.3**	**1.9**	**45**	...	**50.4**	**0.37**	**49.6**	**93**	**28.8**	**130**	*20*	*20*
SS-CRM 351/1	IN 718 Alloy (wrought)	(cont.)	*<1*	*<1*	*<1*	*<1*	*<1*	*<1*	**2.4**	**33**	*<10*	*<0.1*	*<20*	**3.3**	*<10*	**16**	*<10*	...
SS-CRM 387/1	Nimonic 901 Alloy	(cont.)	*0.3*	*<1.0*	*≤0.2*	...	...	...	**3**	...	...	...	...	...	...	...	...	...

SPECTROSCOPIC REFERENCE MATERIALS - Cast Irons

These samples are intended for the calibration of optical emission and XRF instruments with respect to the alloying and trace elements below. Although they have been carefully analysed by both BAS Ltd. and an independent laboratory, they have been classified as RMs and not CRMs in order to distinguish them from BAS CRMs which are normally analysed by at least five laboratories.

CHEMICAL COMPOSITION (nominal mass content in %)

Cast Iron Reference Materials (All are 40mm x 37mm x 10mm chill cast blocks except LARM 5/1, CRRM 3/2, CRRM 4/2, CRRM 5/2, NIRM 2/1, NIRM 5/1, NIRM 6/1, NIRM 8/2, SIMO 1/5 and SIMO 2/3 which are 48mm x 42mm x 12mm chill cast blocks).

These samples have been prepared jointly by Replicast Ltd./Castings Technology International (formerly BCIRA) and BAS

Ref No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	B	Co	Cu	Nb	Pb	Sn	Ti	V	Bi	Ce	Mg
LARM 1	Low Alloy Cast Irons	*(3.0)*	*(2.0)*	*(0.3)*	*(0.05)*	*(<0.01)*	*0.50*	*0.002*	*0.49*	*0.002*	...	*0.006*	...	*2.49*	...	*0.0003*	...	*0.14*	*0.11*	*0.011*	*0.005*	...
LARM 2		*(3.0)*	*(2.0)*	*(0.3)*	*(0.05)*	*(<0.01)*	*2.50*	*0.22*	*0.30*	*0.066*	*0.044*	...	...	*0.021*	...	*0.007*	*0.22*	*0.33*	*0.0028*	*<0.001*	*0.008*	...
LARM 3		*(3.0)*	*(2.0)*	*(0.3)*	*(0.05)*	*(<0.01)*	*0.045*	*0.008*	*1.80*	*0.042*	*0.092*	*0.003*	...	*1.20*	...	*0.0006*	...	*0.015*	*0.55*	*0.022*	*<0.008*	...
LARM 4		*(3.0)*	*(2.0)*	*(0.3)*	*(0.05)*	*(<0.01)*	*1.19*	*1.00*	*0.028*	*0.014*	...	...	...	*0.26*	...	*0.018*	*0.11*	*0.17*	*0.014*	*<0.001*	*0.008*	...
LARM 5/1		*2.98*	*2.02*	*0.33*	*0.049*	*0.012*	...	*0.58*	*2.56*	...	...	*0.0016*	...	...	...	*<0.001*	*0.023*	...	*0.23*	*0.0012*	...	...
CRRM 1/1	High Chromium Cast Irons	*1.83*	*1.53*	*1.45*	*0.132*	*0.099*	*11.18*	*3.05*	*2.03*	*0.117*	...	...	...	*2.01*	...	...	...	*0.096*	*0.040*	...	...	...
CRRM 2/1		*1.92*	*1.18*	*1.11*	*0.097*	*0.079*	*14.13*	*2.44*	*1.61*	*0.054*	...	...	...	*1.59*	...	...	...	*0.070*	*0.063*	...	...	...
CRRM 3/2		*2.37*	*1.21*	*0.92*	*0.073*	*0.087*	*18.78*	*1.58*	*1.35*	*0.102*	...	...	...	*1.09*	...	...	...	*0.015*	*0.042*	...	...	...
CRRM 4/2		*2.93*	*0.45*	*0.58*	*0.049*	*0.042*	*21.93*	*1.15*	*0.58*	*<0.005*	...	...	...	*0.53*	...	...	...	*0.008*	*0.11*	...	...	...
CRRM 5/2		*3.43*	*0.20*	*0.30*	*0.029*	*0.018*	*30.35*	*0.63*	*0.36*	*0.15*	...	...	...	*0.22*	...	...	...	*0.009*	*0.11*	...	...	...
NCRM 1	Nickel Chromium Cast Irons	*3.05*	*0.95*	*1.21*	*0.300*	*0.156*	*0.55*	*1.02*	*0.57*	...	...	...	...	*2.17*	...	...	...	...	...	...	...	...
NCRM 2		*2.97*	*1.82*	*0.95*	*0.068*	*0.119*	*1.99*	*0.36*	*2.10*	...	...	...	...	*1.67*	...	...	...	...	...	...	...	...
NCRM 3		*3.24*	*0.29*	*0.67*	*0.125*	*0.090*	*3.95*	*0.78*	*3.64*	...	...	...	...	*1.21*	...	...	...	...	...	...	...	...
NCRM 4		*2.66*	*2.13*	*0.40*	*0.203*	*0.012*	*7.94*	*0.57*	*5.34*	...	...	...	...	*0.68*	...	...	...	...	...	...	...	...
NCRM 5		*3.70*	*1.15*	*0.27*	*0.025*	*0.015*	*10.44*	*0.10*	*6.74*	...	...	...	...	*0.204*	...	...	...	...	...	...	...	...
NIRM 1	Austenitic (Ni-Resist) Cast Irons	*2.05*	*3.15*	*6.72*	*0.055*	*0.005*	*0.246*	...	*11.80*	...	...	...	...	*0.20*	...	...	...	...	...	...	*0.018*	*0.021*
NIRM 2/1		*2.81*	*1.50*	*2.08*	*0.129*	*0.010*	*1.48*	...	*13.95*	...	...	...	...	*5.98*	...	...	...	...	...	...	*0.015*	*0.050*
NIRM 3		*2.51*	*2.21*	*0.51*	*0.208*	*0.096*	*2.43*	...	*17.8*	...	...	...	...	*1.00*	*0.09*	...	...	...	...	...	*0.007*	...
NIRM 4		*1.97*	*3.03*	*2.37*	*0.051*	*0.008*	*3.56*	...	*20.2*	...	...	...	...	*0.52*	*0.37*	...	...	...	...	...	*0.011*	*0.014*
NIRM 5/1		*2.95*	*1.50*	*1.01*	*0.103*	*0.005*	*0.51*	...	*21.7*	...	...	...	...	*0.21*	*0.15*	...	...	...	...	...	*0.016*	*0.055*
NIRM 6/1		*2.53*	*2.68*	*4.07*	*0.225*	*0.049*	*1.02*	*0.51*	*26.9*	...	...	...	...	*0.11*	...	...	...	...	...	...	*0.006*	...
NIRM 7		*2.05*	*3.05*	*0.71*	*0.058*	*0.020*	*3.53*	*0.99*	*32.9*	...	...	...	...	*0.52*	...	...	...	...	...	...	*0.005*	*0.019*
NIRM 8/2		*1.45*	*5.61*	*1.58*	*0.105*	*0.014*	*2.47*	*0.77*	*35.3*	...	...	...	...	*0.23*	...	...	...	...	...	...	*0.013*	*0.033*
SIMO 1/5	Silicon Molybdenum Cast Irons	*2.72*	*3.94*	*0.330*	*0.031*	*0.014*	*0.889*	*0.738*	*0.035*	*0.029*	*0.001*	...	*0.004*	*0.005*	...	...	*0.052*	*0.008*	*0.004*	...	...	*0.034*
SIMO 2/3		*2.20*	*4.78*	*0.463*	*0.035*	*0.010*	*0.903*	*0.486*	*0.011*	*0.026*	*0.001*	...	*0.005*	*0.007*	...	...	*0.052*	*0.010*	*0.005*	...	*0.001*	*0.024*

SPECTROSCOPIC STANDARD REFERENCE MATERIALS - Copper Base Alloys

These samples are intended for the calibration of optical emission and XRF instruments with respect to the alloying and trace elements below. Although they have been carefully analysed by both BAS Ltd. and an independent laboratory, they have been classified as RMs and not CRMs in order to distinguish them from BAS CRMs which are normally analysed by at least five laboratories.

Note that most CURM samples are now available in the finely divided (chip) form as well as in disc form

CHEMICAL COMPOSITION (nominal mass content in %)

Copper Base Alloy Reference Materials (Approx. 50mm dia. x 12 or 10mm discs, except CURM H30.24 which is approx. 35mm dia. x 12mm)

Ref. No.	Description	Cu	Sn	Pb	Zn	Ni	P	Fe	Si	Mn	As	Sb	Bi	Al	S	Mg	Cr	Cd	Co	Ag	Te
CURM 09.01-4	Phosphorus Deoxidised Coppers	*99.82*	*<0.001*	*<0.0005*	*0.0008*	*<0.0005*	*0.151*	*0.0019*	*<0.001*	*<0.0005*	*<0.001*	*<0.0005*	*<0.0005*	*<0.0005*	...	...	...	...	*<0.0005*	*0.011*	*<0.001*
CURM 09.02-4		*99.90*	*<0.001*	*<0.001*	*<0.001*	*<0.0005*	*0.078*	*0.0042*	*<0.002*	*<0.0005*	*<0.001*	*<0.0005*	*<0.0005*	*<0.0005*	...	...	...	...	*<0.0005*	*0.0055*	*<0.001*
CURM 09.03-4		*99.92*	*<0.001*	*<0.0005*	*<0.001*	*<0.0005*	*0.056*	*0.0033*	*<0.001*	*<0.0005*	*<0.001*	*<0.0005*	*<0.0005*	*<0.0005*	...	...	...	...	*<0.0005*	*0.012*	*<0.001*
CURM 30.04-4	Main Elements in Brasses	*64.34*	*0.009*	*0.003*	*35.62*	*<0.001*	...	*0.009*	*0.016*	*<0.001*	*<0.001*	*<0.005*	*<0.003*	*<0.001*	...	...	...	...	...	...	...
CURM 30.05-4		*69.48*	*<0.001*	*<0.002*	*30.53*	*<0.0005*	...	*<0.003*	*<0.001*	*<0.0005*	*<0.001*	*<0.005*	*<0.003*	*<0.001*	...	...	...	...	...	...	...
CURM 30.09-4		*89.53*	*<0.001*	*<0.001*	*10.45*	*<0.0003*	...	*0.0005*	*<0.001*	*<0.0003*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	...	...	...	...	...	...	...
CURM 30.11-4		*59.86*	*<0.002*	*0.005*	*38.17*	*1.70*	...	*0.002*	*<0.001*	*0.23*	*<0.001*	*<0.001*	*<0.002*	*<0.001*	...	...	...	...	...	...	...
CURM 30.15-4		*60.66*	*<0.002*	*<0.005*	*38.88*	*<0.001*	...	*0.50*	*<0.005*	*<0.001*	*<0.005*	*<0.001*	*<0.001*	*<0.001*	...	...	...	...	...	...	...
CURM 30.16-4		*60.53*	*<0.002*	*<0.005*	*38.33*	*<0.001*	...	*1.14*	*<0.005*	*<0.001*	*<0.005*	*<0.001*	*<0.001*	*<0.001*	...	...	...	...	...	...	...
CURM 30.18-4		*63.66*	*0.58*	*<0.005*	*32.33*	*<0.001*	...	*0.006*	*0.13*	*<0.001*	*<0.005*	*<0.001*	*<0.001*	*3.28*	...	...	...	...	...	...	...
CURM 30.20-4		*61.46*	*0.40*	*<0.002*	*35.71*	*<0.001*	...	*<0.005*	*0.17*	*<0.001*	*<0.001*	*<0.002*	*<0.002*	*2.32*	...	...	...	...	...	...	...
CURM 30.21-4		*56.23*	*2.01*	*0.004*	*40.08*	*<0.001*	...	*0.003*	*0.213*	*<0.001*	*<0.001*	*<0.002*	...	*1.44*	...	...	...	...	...	...	...
CURM H 30.24		*58.87*	*<0.001*	*3.02*	*37.92*	*<0.001*	...	*0.005*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	...	...	...	...	...	...	...
CURM 42.21-2	Admiralty & Naval Brasses	*66.78*	*0.60*	*0.259*	*31.61*	*0.120*	*0.087*	*0.119*	*0.15*	*<0.001*	*<0.003*	*0.25*	*0.013*	*0.003*	*0.034*	...	...	...	...	...	...
CURM 42.23-2		*74.36*	*1.63*	*0.575*	*22.13*	*0.168*	*0.128*	*0.354*	*0.015*	*0.019*	*0.168*	*0.356*	*0.034*	*0.008*	*0.045*	...	...	...	...	...	...
CURM 42.24-2		*62.45*	*2.25*	*0.91*	*33.75*	*0.025*	*0.226*	*0.066*	*0.093*	*0.065*	*0.065*	*0.060*	*0.054*	*0.067*	*0.012*	...	...	...	...	...	...
CURM 42.25-2		*57.78*	*2.72*	*0.0023*	*39.20*	*<0.001*	*0.050*	*0.003*	*<0.001*	*0.169*	*0.118*	*<0.001*	*<0.001*	*0.021*	*0.005*	...	...	...	...	...	...
CURM 43.01-4	Aluminium Brasses	*74.36*	*0.116*	*<0.002*	*22.44*	*0.121*	...	*0.008*	*0.063*	*0.064*	*0.118*	*<0.001*	*<0.002*	*2.75*	...	...	...	...	...	...	...
CURM 43.02-4		*76.21*	*0.060*	*0.064*	*20.82*	*0.068*	...	*0.128*	*0.038*	*0.035*	*0.083*	*<0.001*	*<0.001*	*2.40*	...	...	...	...	...	...	...
CURM 48.01-1	Cartridge Brasses	*66.98*	*<0.002*	*0.106*	*32.6*	*0.134*	*0.016*	*0.049*	*0.041*	*<0.001*	*0.067*	*0.047*	*0.038*	*<0.001*	*<0.001*	*0.0008*	*<0.0005*	*<0.0003*	...	...	...
CURM 48.02-1		*67.16*	*0.035*	*0.084*	*32.58*	*<0.001*	*0.012*	*0.053*	*0.010*	*0.067*	*0.025*	*0.037*	*0.004*	*0.013*	*0.007*	*<0.0005*	*0.004*	*<0.0005*	...	...	...
CURM 48.04-1		*72.68*	*0.018*	*0.043*	*26.99*	*0.096*	*0.006*	*0.008*	*0.004*	*0.012*	*0.034*	*0.026*	*0.014*	*<0.001*	*0.011*	*0.0005*	*<0.002*	*<0.0003*	...	...	...
CURM 48.05-1		*68.69*	*0.083*	*<0.003*	*31.0*	*0.117*	*0.007*	*0.066*	*0.026*	*0.016*	*<0.001*	*<0.0005*	*<0.0005*	*<0.002*	*0.013*	*<0.0005*	*<0.0005*	*<0.0003*	...	...	...
CURM 50.01-5	Leaded Bronzes	*75.38*	*9.01*	*11.13*	*0.91*	*1.93*	*0.069*	*0.074*	*<0.001*	*<0.001*	*0.19*	*0.50*	*0.024*	*<0.0005*	*0.188*	...	...	...	...	...	...
CURM 50.02-4		*78.84*	*10.34*	*10.67*	*0.006*	*<0.0005*	*0.046*	*<0.001*	*<0.002*	*<0.0005*	*<0.002*	*<0.0005*	*<0.0005*	*<0.001*	*<0.001*	...	...	...	...	...	...
CURM 50.02-5		*77.89*	*10.31*	*11.28*	*0.128*	*0.005*	*0.041*	*0.055*	*0.021*	*0.003*	*<0.001*	*<0.005*	*<0.0005*	*<0.001*	*<0.001*	...	...	...	...	...	...
CURM 50.03-4		*77.42*	*8.41*	*8.86*	*1.72*	*2.89*	*0.159*	*0.018*	*0.005*	*0.037*	*0.11*	*0.24*	*0.051*	*0.005*	*0.064*	...	...	...	...	...	...
CURM 50.04-4		*76.11*	*11.30*	*9.94*	*0.66*	*1.10*	*0.032*	*0.10*	*0.011*	*0.028*	*0.06*	*0.50*	*0.10*	*0.014*	*0.14*	...	...	...	...	...	...
CURM 51.11-4	Aluminium Bronzes	*93.95*	*0.027*	*0.33*	*0.111*	*0.012*	*0.035*	*0.060*	*0.159*	*<0.001*	*<0.001*	...	...	*5.27*	...	...	...	...	...	...	...
CURM 51.12-4		*88.29*	*0.196*	*0.219*	*0.45*	*0.112*	*<0.001*	*2.87*	*0.005*	*1.33*	*0.111*	...	...	*6.36*	...	...	...	...	...	...	...
CURM 51.13-4		*88.79*	*0.270*	*0.104*	*0.335*	*0.057*	*0.022*	*1.81*	*0.174*	*0.898*	*0.215*	...	...	*7.30*	...	...	...	...	...	...	...
CURM 51.14-4		*88.57*	*0.113*	*0.003*	*0.656*	*0.219*	*0.012*	*0.72*	*0.286*	*0.55*	*0.44*	...	...	*8.42*	...	...	...	...	...	...	...
CURM 52.52-5		*79.26*	*0.044*	*0.074*	*0.094*	*3.56*	...	*6.02*	*0.011*	*0.145*	...	...	...	*10.69*	...	*0.007*	*0.004*	...	...	...	...
CURM 52.54-4		*81.59*	*0.135*	*0.086*	*0.39*	*5.40*	...	*3.31*	*0.022*	*1.20*	...	...	...	*7.85*	...	*<0.005*	*<0.005*	...	...	...	...
CURM 54.01-4	Phosphor Bronzes	*95.42*	*3.17*	*0.307*	*0.346*	*0.348*	*0.053*	*0.028*	*0.039*	*0.158*	*0.044*	*0.070*	...	*0.040*	*0.023*	*0.008*	...	...	...	...	...
CURM 54.02-4		*92.87*	*5.53*	*0.663*	*0.410*	*0.109*	*0.107*	*0.102*	*0.012*	*0.101*	*0.023*	*0.026*	...	*0.020*	*0.030*	*0.0020*	...	...	...	...	...
CURM 62.12-4	Cupro-Nickel	*89.42*	*0.111*	*0.053*	*0.180*	*7.94*	...	*0.45*	*0.109*	*1.59*	...	...	...	...	*0.034*	*0.002*	...	...	*0.081*	...	...
CURM 71.31-5	Leaded Gunmetals	*83.00*	*4.06*	*6.07*	*3.98*	*1.98*	*0.060*	*0.118*	*0.020*	*0.037*	*0.110*	*0.128*	*0.030*	*0.023*	*0.059*	...	*0.039*	...	...	*0.046*	...
CURM 71.32-5		*82.69*	*6.07*	*4.14*	*6.02*	*0.570*	*<0.001*	*0.056*	*<0.001*	*<0.0005*	*0.213*	*<0.002*	*<0.002*	*<0.001*	*0.082*	...	*<0.0005*	...	...	*0.029*	...
CURM 71.33-8		*83.60*	*4.96*	*6.84*	*3.60*	*0.938*	*<0.001*	*0.018*	*<0.005*	*<0.0005*	*<0.001*	*<0.002*	*<0.002*	*<0.001*	*<0.001*	...	*<0.0005*	...	...	*<0.002*	

SPECTROSCOPIC REFERENCE MATERIALS – Lead Base Alloys

These samples are intended for the calibration of optical emission and XRF instruments with respect to the alloying and trace elements below. Although they have been carefully analysed by both BAS Ltd. and an independent laboratory, they have been classified as RMs and not CRMs in order to distinguish them from BAS CRMs which are normally analysed by at least five laboratories.

CHEMICAL COMPOSITION (nominal mass content in %)

Lead Base Alloy Reference Materials (Approx. 50mm x 50mm x 20mm chill cast blocks, also available as finely divided material – units of 100g). These samples have been prepared jointly by Castings Technology International (formerly BCIRA) and BAS

Ref No.	Description	Cu	Sn	Zn	Ni	Cd	As	Sb	Bi	Ca	Ag	Al	Pb
PBRM L21.01-2	Battery Alloys	*0.0003*	*0.11*	*0.002*	*<0.0005*	*0.0003*	*<0.0005*	*0.0006*	*<0.001*	*0.051*	*<0.001*	*0.012*	*Bal*
PBRM L21.02-2		*0.002*	*0.28*	*0.004*	*<0.0005*	*0.0010*	*0.0003*	*0.0013*	*0.013*	*0.020*	*0.007*	*0.004*	*Bal*
PBRM L21.03-2		*<0.0005*	*0.38*	*0.002*	*<0.0005*	*0.003*	*<0.0005*	*<0.0005*	*0.023*	*0.089*	*0.010*	*0.011*	*Bal*
PBRM L21.04-2		*0.005*	*0.47*	*0.007*	*<0.0005*	*0.003*	*0.0002*	*0.0003*	*0.027*	*0.084*	*0.017*	*<0.001*	*Bal*

SETTING-UP SAMPLES FOR DIRECT READING SPECTROGRAPHS

These samples have been thoroughly examined both spectrographically and chemically to confirm the homogeneity of the bulk samples.
Their compositions have NOT, however, been accurately determined since it is not intended that they should be used as Spectroscopic Standard CRMs or as RMs.
An Information Sheet is supplied with each sample giving the approximate composition.

Carbon, Low Alloy and Stainless Steels (Wrought) (Approx. 44mm dia. x 25, 75 or 150mm lengths)

Ref. No.	Description	Approximate Chemical Compositions (mass content in %)																				
		C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Sn	Ti	V	W	Zr	Ca	Others
SUS A/11	Low Carbon Steel	*0.02*	*0.01*	*0.15*	*<0.005*	*0.005*	*0.02*	*0.01*	*0.05*	*0.07*	*...*	*...*	*0.01*	*0.01*	*...*	*<0.005*	*<0.005*	*<0.001*	*<0.005*	*<0.005*	*...*	*...*	*...*
SUS D/11	Low Alloy Steel	*0.80*	*0.80*	*0.40*	*0.01*	*0.03*	*3.0*	*1.3*	*0.10*	*0.19*	*...*	*<0.001*	*0.29*	*0.11*	*0.01*	*0.05*	*0.01*	*0.10*	*0.12*	*0.16*	*...*	*...*	*...*
SUS F/6	Duplex Stainless Steel	*0.02*	*0.53*	*0.61*	*0.02*	*<0.005*	*25.8*	*3.4*	*7.2*	*0.005*	*0.005*	*0.002*	*0.05*	*0.63*	*0.25*	*0.005*	*<0.005*	*<0.005*	*0.06*	*0.63*	*...*	*...*	*60.7* **Fe**
SUS G/8	Stainless Steel	*0.02*	*0.32*	*1.7*	*0.03*	*0.02*	*16.8*	*2.1*	*10.0*	*0.003*	*...*	*...*	*0.15*	*0.30*	*0.08*	*0.01*	*0.006*	*<0.005*	*0.08*	*0.04*	*<0.005*	*0.003*	*<0.001* **Ta**

Cast Irons (Approx. 60mm x 35mm x 18mm chill cast blocks.) These samples have been prepared jointly by Replicast Ltd./Castings Technology International (formerly BCIRA) and BAS

Ref. No.	Description	Approximate Chemical Compositions (mass content in %)																	
		C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Cu	Sn	Ti	V	Bi	Mg	Sb	Ce
SUS 1/19	Low Phosphorus Iron	*3.1*	*2.8*	*0.44*	*0.05*	*0.07*	*0.50*	*0.33*	*0.19*	*0.02*	*...*	*...*	*0.47*	*0.05*	*<0.005*	*0.04*	*...*	*...*	*...*	*...*
SUS 2/48	Medium Phosphorus Iron	*3.6*	*1.8*	*0.73*	*0.17*	*0.12*	*0.07*	*0.11*	*0.49*	*0.01*	*...*	*...*	*0.23*	*0.10*	*0.06*	*0.53*	*...*	*...*	*...*	*...*
SUS 3/21	High Phosphorus Iron	*3.4*	*2.2*	*0.90*	*1.0*	*0.10*	*0.25*	*<0.005*	*0.01*	*<0.005*	*...*	*...*	*0.01*	*<0.005*	*0.11*	*0.27*	*...*	*...*	*...*	*...*
SUS 4/28	Ductile (Nodular) Iron	*3.2*	*2.7*	*0.15*	*...*	*0.02*	*0.08*	*...*	*0.11*	*0.02*	*<0.005*	*...*	*0.79*	*<0.005*	*0.06*	*0.50*	*...*	*0.03*	*<0.005*	*...*
SUS 5/56	Ductile (Nodular) Iron	*3.8*	*2.0*	*0.59*	*...*	*0.018*	*0.01*	*...*	*1.00*	*0.04*	*0.001*	*...*	*0.003*	*0.07*	*0.009*	*0.52*	*...*	*0.10*	*0.02*	*0.03*
SUS 6/6	Malleable Iron	*2.5*	*1.8*	*0.65*	*0.05*	*0.12*	*0.10*	*...*	*...*	*<0.005*	*...*	*<0.001*	*0.02*	*0.05*	*0.02*	*0.02*	*0.01*	*...*	*...*	*...*
SUS 7/8	Malleable Iron	*2.8*	*0.94*	*0.29*	*0.09*	*0.18*	*0.07*	*...*	*...*	*0.02*	*...*	*0.004*	*0.21*	*<0.01*	*...*	*0.06*	*<0.001*	*...*	*...*	*...*

NUMERICAL INDEX (Including Certification Dates)

Certificates may be reprinted from time to time to accommodate updated text or statistical treatment. In certain cases, where chemical analyses carried out after issuance of the original certificate lead to additional or revised certified data, the "Date of Latest Certificate" below is stated in bold. If the certificate in your possession is not the current one, we shall gladly supply this to you on request.

BRITISH CHEMICAL STANDARD CRMs Ref. No.	Description	Date of Latest Certificate	Page
BCS-CRM 111	Low Carbon Steel	**Mar 14**	7
BCS-CRM 111/1	Low Carbon Steel	Jan 18	7
BCS-CRM 112	Low Alloy Steel	Mar 14	9
BCS-CRM 113	Low Alloy Steel	Mar 14	9
BCS-CRM 114	Low Alloy Steel	Mar 14	9
BCS-CRM 115	Calcium Treated Steel	Jun 16	7
BCS-CRM 116	Calcium Treated Steel	Sep 17	7
BCS-CRM 161/4	0.8% Carbon Steel	Sep 15	7
BCS-CRM 176/3	Manganese Ore	Sep 15	14
BCS-CRM 176/4	Manganese Ore	Sep 15	14
BCS-CRM 177/2	Lead Base White Metal	Aug 12	12
BCS-CRM 178/2	Tin Base White Metal	Aug 12	12
BCS-CRM 179/2	High Tensile Brass	Aug 12	12
BCS-CRM 180/2	Copper-Nickel	Aug 12	12
BCS-CRM 181/3	2.5% Cu Aluminium Alloy	Jun 13	12
BCS-CRM 182/3	11% Si Aluminium Alloy	**Aug 15**	12
BCS-CRM 183/4	Leaded Gunmetal	Jun 13	12
BCS-CRM 203/6	Low C Ferro-Chromium	Feb 19	11
BCS-CRM 204/6	High C Ferro-Chromium	Sep 17	11
BCS-CRM 206/3 (ECRM 453-1)	High Si and P Cast Iron	May 11	11
BCS-CRM 207/2	Gunmetal	Sep 12	12
BCS-CRM 214/2 (ECRM 152-1)	Mn-Mo Steel	Sep 04	9
BCS-CRM 216/3	5% Cu Aluminium Alloy	**Oct 12**	12
BCS-CRM 219/4 (ECRM 153-1)	Ni-Cr-Mo Steel	**Feb 03**	9
BCS-CRM 220/2 (ECRM 254-1)	High Speed Steel	Sep 10	8
BCS-CRM 222/1	3.5% Ni Steel	**Dec 16**	9
BCS-CRM 225/2 (ECRM 155-1)	Ni-Cr-Mo Steel	Dec 10	9
BCS-CRM 231/5	Ferro-Molybdenum	Jan 16	11
BCS-CRM 231/6	Ferro-Molybdenum	Jan 16	11
BCS-CRM 232/2 (ECRM 051-1)	0.1% Sulphur Steel	Oct 10	7
BCS-CRM 236/3 (ECRM 454-1)	Hematite Iron	May 11	11
BCS-CRM 237/2 (ECRM 060-1)	0.1% Carbon Steel	Oct 10	7
BCS-CRM 238/2 (ECRM 061-1)	0.2% Carbon Steel	Oct 10	7
BCS-CRM 241/2 (ECRM 251-1)	High Speed Steel	**Nov 10**	8
BCS-CRM 242/2 (ECRM 555-1)	Ferro-Tungsten	**Jun 11**	11
BCS-CRM 262/1	10% Mg Aluminium Alloy	**Jul 13**	12
BCS-CRM 263/2	5% Mg Aluminium Alloy	Jul 13	12
BCS-CRM 268/1	5% Si Aluminium Alloy	Jul 13	12
BCS-CRM 270 (ECRM 054-1)	0.09% Phosphorus Steel	**Nov 10**	7
BCS-CRM 290/2 (ECRM 253-1)	13% Manganese Steel	Jun 11	10
BCS-CRM 300/1	6% Zn Aluminium Alloy	Jul 13	12
BCS-CRM 301/1 (ECRM 651-1)	Lincolnshire Iron Ore	Aug 11	14
BCS-CRM 304/1	Copper Aluminium	Dec 08	12
BCS-CRM 307	Ce-Zn-Zr Magnesium Alloy	Apr 13	12
BCS-CRM 308/1	Chrome Ore	Sep 15	13
BCS-CRM 309	Sillimanite	**May 12**	15
BCS-CRM 310/1	Nimonic 90	**Aug 15**	13
BCS-CRM 313/2	High Purity Silica	**Sep 13**	15
BCS-CRM 316	8% Al Magnesium Alloy	Jun 12	12
BCS-CRM 317 (ECRM 151-1)	Low C High Si Steel	Sep 11	9
BCS-CRM 318A	0.01% O Steel	Jul 18	8
BCS-CRM 318B	0.01% O Steel	Jul 18	8
BCS-CRM 319/1	Magnesia	Mar 09	15
BCS-CRM 332	Austenitic Stainless Steel	May 13	10
BCS-CRM 339	Ferritic Stainless Steel	Aug 13	10
BCS-CRM 340	Ferritic Stainless Steel	Aug 13	10
BCS-CRM 341	Ferritic Stainless Steel	Aug 13	10
BCS-CRM 342	Ferritic Stainless Steel	Aug 13	10
BCS-CRM 343	Wrought Aluminium Alloy	Jul 13	12
BCS-CRM 344	70/30 Brass	Jan 16	12
BCS-CRM 345	Nickel Alloy IN100	**May 12**	13
BCS-CRM 346	Nickel Alloy IN100	Jun 03	13
BCS-CRM 347	Electronic Flowsolder	Aug 15	12
BCS-CRM 348	Ball Clay	Jun 11	15
BCS-CRM 349	3.5% Cu Aluminium	Jan 16	12
BCS-CRM 350	Nickel Alloy IN713	Nov 05	13
BCS-CRM 351/1	Nickel Alloy IN718	May 15	13
BCS-CRM 353	Sulphate Resisting Portland Cement	Oct 11	13
BCS-CRM 354	White Portland Cement	**Oct 11**	13
BCS-CRM 355	Tin Ore	May 12	14
BCS-CRM 356	Titanium Alloy	Jan 94	13
BCS-CRM 357	Titanium Alloy	Jan 94	13
BCS-CRM 358	Zirconia	**Aug 15**	15
BCS-CRM 359	Nitrogen Bearing Silicon Carbide	Nov 18	14
BCS-CRM 360	Sialon Bonded Silicon Carbide	Nov 18	14
BCS-CRM 361	Chromium Metal	**May 09**	13
BCS-CRM 362	Mine Tailings Sample	**Sep 10**	15
BCS-CRM 363/1	Monel Alloy 400	Apr 16	13
BCS-CRM 364	Leaded Bronze	**Aug 15**	12
BCS-CRM 369	Magnesite Chrome	Aug 15	15
BCS-CRM 370	Magnesite Chrome	Aug 15	15
BCS-CRM 371	Commercial Nickel	Aug 15	13
BCS-CRM 374	Phosphor Bronze	Aug 15	12
BCS-CRM 375/1	Soda Feldspar	Nov 04	15
BCS-CRM 376/1	Potash Feldspar	**May 09**	15
BCS-CRM 377/6	Iron Ore Sinter	**Sep 15**	14
BCS-CRM 380/1	2% Si Aluminium Alloy	Jan 16	12
BCS-CRM 381	Basic Slag	**Oct 12**	14

BCS-CRM 383	Alcomax III	Jan 16	11
BCS-CRM 385	Leaded Brass	Oct 14	12
BCS-CRM 387/1	Nimonic 901 Alloy	Apr 16	13
BCS-CRM 388	Zircon	**Aug 15**	15
BCS-CRM 389/1	High Purity Magnesia	Jun 13	15
BCS-CRM 390	High Tensile Brass	Oct 14	12
BCS-CRM 392	Fluorspar	May 12	13
BCS-CRM 393 (ECRM 752-1)	Limestone	Dec 10	15
BCS-CRM 394/1	Calcined Bauxite	Sep 15	13
BCS-CRM 395	Bauxite	May 12	13
BCS-CRM 396	Low Silica Magnesite Chrome	Jun 13	15
BCS-CRM 398	Alnico H C	**Sep 17**	11
BCS-CRM 399	Phosphorus Deoxidised Copper	Jan 16	12
BCS-CRM 405, 408	Low Alloy Steels	Jan 10	9
BCS-CRM 404/1, 405/1	Low Alloy Steels	Dec 09	9
BCS-CRM 401/2	Low Alloy Steel	**Feb 19**	9
BCS-CRM 402/2, 404/2, 405/2	Low Alloy Steels	Dec 05	9
BCS-CRM 403/2	Low Alloy Steel	**Jun 15**	9
BCS-CRM 407/1-409/1	Low Alloy Steels	Dec 09	9
BCS-CRM 407/2, 409/2	Low Alloy Steels	Feb 06	9
BCS-CRM 421-424	Low Tungsten Steels	Jul 16	9
BCS-CRM 431/2-435/2	Plain Carbon Steels	Sep 18	8
BCS-CRM 452/1, 453/1	Carbon Steels - Residual Series (Gp A)	Aug 10	8
BCS-CRM 456/2, 457/2, 458/2, 460/2	Carbon Steels - Residual Series (Gp B)	May 01	8
BCS-CRM 463	Austenitic Stainless Steels	**May 16**	10
BCS-CRM 461/1, 462/1	Austenitic Stainless Steels	Jul 96	10
BCS-CRM 463/1-465/1	Austenitic Stainless Steels	Jun 10	10
BCS-CRM 466/2	Austenitic Stainless Steel	Dec 04	10
BCS-CRM 467/1, 468/1	Austenitic Stainless Steels	Jun 10	10
BCS-CRM 469-473	Ferritic Stainless Steels	Sep 10	10
BCS-CRM 474, 475	Stainless Steels	Sep 10	10
BCS-CRM 476	Mo-stabilized Stainless Steel	Feb 19	10
BCS-CRM 479	Nb-stabilized Stainless Steel	May 15	10
BCS-CRM 481-484	High Speed Steels	**Sep 17**	8
BCS-CRM 491, 494, 495	High Manganese Steels	**Nov 16**	10
BCS-CRM 495/1	High Manganese Steel	**Nov 16**	10
BCS-CRM 505	Aluminium-Silicon Alloy	Jun 18	12
BCS-CRM 512	Dolomite	Jul 15	15
BCS-CRM 513	Limestone	Jun 15	15
BCS-CRM 514	Copper Concentrate	**Sep 15**	14
BCS-CRM 516	Standard Glass Sand	May 09	15
BCS-CRM 517	Brazilian Iron Ore	**Dec 09**	14
BCS-CRM 520	Zinc Concentrate	Feb 19	14
BCS-CRM 525	Low Iron Float Glass	**Jul 17**	15
BCS-CRM 526	Soda Ash	Sep 15	16
BCS-CRM 527	Blast Furnace Iron	**Sep 15**	11
BCS-CRM 528	Standard Glass Sand	Sep 15	15
BCS-CRM 529	Anorthic Feldspar	Jan 19	15
BCS-CRM 531	Low Iron Sand	Oct 15	15
BCS-CRM 532	Swedish Feldspar	Jan 19	15

EURONORM CRMs			
Ref No.	Description	Date of Latest Certificate	Page
ECRM 055-2(C)	0.5% Carbon Steel	Sep 13	7
ECRM 056-2(C)	0.8% Carbon Steel	May 09	7
ECRM 057-2(C)	0.05% Carbon Steel	Mar 99	7
ECRM 058-2(C)	0.15% Sulphur Steel	Aug 02	7
ECRM 059-2(C)	0.7% Carbon Steel	Nov 02	7
ECRM 064-1(C)	Nb/Ti Interstitial Free Steel	Nov 02	7
ECRM 084-1(C)	0.4% Carbon Steel	**Feb 00**	7
ECRM 085-1(C)	0.3% Sulphur Steel	Feb 03	7
ECRM 086-1(C)	0.3% Carbon Steel	Jan 01	7
ECRM 087-1(C)	0.15%Carbon Steel	Aug 07	7
ECRM 088-2	High Purity Iron	Jan 01	7
ECRM 090-1(C)	1% Carbon Steel	**May 00**	7
ECRM 091-1	0.5% Carbon Steel	Feb 05	7
ECRM 096-2(C)	Low S, Ca-Treated Steel	Mar 99	7
ECRM 097-1(C)	High Purity Iron	**Feb 98**	7
ECRM 097-2(C)	High Purity Iron	Jan 13	7
ECRM 186-1(C)	Silico Manganese Steel	**Jul 08**	9
ECRM 195-1(C)	Cr-Mo-Ni Steel	**Mar 92**	9
ECRM 272-1(C)	12% Chromium Steel	Jul 05	10
ECRM 276-2(C)	5% Cr-Mo-V Steel	Feb 93	10
ECRM 281-1	18/9 Stainless Steel + Ti	**Oct 16**	10
ECRM 285-2(C)	Maraging Steel	May 97	10
ECRM 287-1(C)	High Boron Stainless Steel	**Jul 04**	10
ECRM 292-1(C)	Nb Stabilized Stainless Steel	Nov 90	10
ECRM 295-1(C)	4% Mo-Cr-Ni Steel	Mar 95	10
ECRM 296-1(C)	Jethete Steel	Mar 97	10
ECRM 376-1	24% Co Magnet Alloy	**Nov 90**	11
ECRM 451-2	Austenitic Cast Iron	Jan 99	11
ECRM 481-1	Nodular Iron	**Sep 10**	11
ECRM 482-2	Low Alloy Cast Iron	Jul 94	11
ECRM 483-1	High Duty Cast Iron	**Sep 03**	11
ECRM 484-1	Whiteheart Malleable Iron	Mar 14	11
ECRM 486-1	Foundry Iron	Mar 04	11
ECRM 489-1	White Iron	Dec 91	11
ECRM 576-1	Ferro-Niobium	Jul 14	11
ECRM 577-1	Ferro-Vanadium	**Jul 14**	11
ECRM 578-1	Ferro-Molybdenum	Mar 16	11
ECRM 579-1	Ferro-Niobium	**Jul 14**	11
ECRM 580-1	Ferro-Chromium	Mar 16	11
ECRM 583-1	Ferro-Manganese	Mar 16	11
ECRM 584-1	Ferro-Titanium	Mar 16	11
ECRM 587-1	Ferro-Boron	Mar 16	11

ECRM 590-1	Ferro-Tungsten	Mar 91	11
ECRM 676-1	Iron Ore Sinter	Mar 16	14
ECRM 682-2	Iron Ore	Apr 09	14
ECRM 690-1	Haematite Iron Ore	Feb 13	14
ECRM 776-1	Firebrick	Aug 16	15
ECRM 781-1	Silicon Carbide Refractory	Mar 93	14
ECRM 782-1	Dolomite	Jul 96	15
ECRM 783-1	Tungsten Carbide	Jul 05	14
ECRM 879-1	Basic Slag	Aug 16	14
ECRM 884-1	Furnace Dust	Mar 11	14

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SS-CRM 53,55,56	Carbon Steels – Residual Series	Jan 10	17
SS-CRM 70	Ferritic Stainless Steel	Aug 13	20
SS-CRM 111/1	Low Carbon Steel	Jan 18	18
SS-CRM 112-114	Low Alloy Steels	Mar 14	18
SS-CRM 115	Calcium Treated Steel	Jun 16	18
SS-CRM 116	Calcium Treated Steel	Sep 17	18
SS-CRM 219/4	Ni-Cr-Mo Steel	Apr 14	18
SS-CRM 222/1	3.5% Ni Steel	Dec 16	18
SS-CRM 225/2	Ni-Cr-Mo Steel	Mar 14	18
SS-CRM 345	Nickel Alloy IN100	May 12	21
SS-CRM 346A	Nickel Alloy IN100	Jun 03	21
SS-CRM 350	Nickel Alloy IN713	Nov 05	21
SS-CRM 351	Nickel Alloy IN718	Nov 05	21
SS-CRM 351/1	Nickel Alloy IN718	Mar 12	21
SS-CRM 363/1	Monel Alloy 400	Apr 16	21
SS-CRM 387/1	Nimonic 901 Alloy	Apr 16	21
SS-CRM 401/2	Low Alloy Steel	**Feb 19**	18
SS-CRM 402/2, 404/2, 405/2	Low Alloy Steels	Dec 05	18
SS-CRM 403/2	Low Alloy Steel	Jun 15	18
SS-CRM 407/2	Low Alloy Steel	Feb 06	18
SS-CRM 421-424	Low Tungsten Steels	Jul 16	18
SS-CRM 432/1,434/1,435/1	Plain Carbon Steels	Apr 16	17
SS-CRM 431/2-435/2	Plain Carbon Steels	Sep 18	17
SS-CRM 456/2-460/2	Carbon Steels - Residual Series (Gp B)	May 01	17
SS-CRM 462	Austenitic Stainless Steel	**May 16**	19
SS-CRM 461/1, 462/1	Austenitic Stainless Steels	Jul 96	19
SS-CRM 463/1-465/1	Austenitic Stainless Steels	Jun 10	19
SS-CRM 466/2	Austenitic Stainless Steel	Dec 04	19
SS-CRM 467/1, 468/1	Austenitic Stainless Steels	Jun 10	19
SS-CRM 469-473	Ferritic Stainless Steels	Sep 10	20
SS-CRM 475	Stainless Steel	Sep 10	19
SS-CRM 476	Mo-stabilized Stainless Steel	Feb 19	19
SS-CRM 479	Nb-stabilized Stainless Steel	May 15	19
SS-CRM 482/1-487/1 (less 484/1)	High-Speed Steels	Nov 13	20
SS-CRM 492/3, 493/3	High Manganese Steel (Cast)	Jul 15	20
SS-CRM 601/2-605/2	Plain Carbon Cast Steels	**Jul 16**	19
SS-CRM 615/1	Low Alloy Cast Steel	May 16	19
ECRM 055-2(D)	0.5% Carbon Steel	Sep 13	17
ECRM 056-2(D)	0.8% Carbon Steel	Mar 09	17
ECRM 057-2(D)	0.05% Carbon Steel	Mar 99	17
ECRM 058-2(D)	0.15% Sulphur Steel	Aug 02	17
ECRM 059-2(D)	0.7% Carbon Steel	Nov 02	17
ECRM 064-2(D)	Nb/Ti Interstitial Free Steel	Jul 13	17
ECRM 084-1(D)	0.4% Carbon Steel	**Feb 00**	17
ECRM 085-1(D)	0.3% Sulphur Steel	Feb 03	17
ECRM 086-1(D)	0.7% Carbon Steel	Jan 01	17
ECRM 087-1(D)	0.15% Carbon Steel	Aug 07	17
ECRM 090-1(D)	1% Carbon Steel	**May 00**	17
ECRM 097-1(D)	High Purity Iron	**Feb 98**	18
ECRM 097-2(D)	High Purity Iron	Jan 13	18
ECRM 186-1(D)	Silico Manganese Steel	**Jul 08**	18
ECRM 195-1(D)	Cr-Mo-Ni Steel	**Mar 92**	18
ECRM 272-1(D)	12% Chromium Steel	Jul 05	19
ECRM 276-2(D)	5% Cr-Mo-V Steel	Feb 93	19
ECRM 285-2(D)	Maraging Steel	May 97	19
ECRM 287-1(D)	High Boron Stainless Steel	**Jul 04**	19
ECRM 292-1(D)	Nb-Stabilized Stainless Steel	Nov 90	19
ECRM 295-1(D)	4% Mo-Cr-Ni Steel	Mar 95	19
ECRM 296-1(D)	Jethete Steel	Mar 97	19
SCRM 652/4, 655/4	Malleable Irons	Oct 17	21
SCRM 656/9	Low Phosphorus Engineering Iron	Oct 16	21
SCRM 657/9	Low Phosphorus Engineering Iron	Feb 19	21
SCRM 658/11	Low Phosphorus Engineering Iron	Nov 14	21
SCRM 659/9	Low Phosphorus Engineering Iron	Jun 14	21
SCRM 660/10	Low Phosphorus Engineering Iron	Nov 14	21
SCRM 661/4, 662/4, 665/4	High Phosphorus Engineering Irons	Oct 17	21
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SCRM 667/13	Ductile (Nodular) Iron	Jan 14	21
SCRM 668/13	Ductile (Nodular) Iron	Dec 15	21
SCRM 669/14	Ductile (Nodular) Iron	Aug 15	21
SCRM 670/20	Ductile (Nodular) Iron	Mar 18	21
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BCS-RM 194e	High Purity Zinc (300g blocks)	Jun 18	16
BCS-RM 195g	High Purity Aluminium (300g blocks)	Jun 18	16
BCS-RM 195g	High Purity Aluminium (millings)	Jun 18	16
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