OUTSIDE-SOURCE REFERENCE MATERIALS

Distributed by

BUREAU OF ANALYSED SAMPLES LTD

CATALOGUE NO. 796 MARCH 2011

UKAS REFERENCE MATERIALS 4004 Certificate GB94/3993

PRODUCT INDEX

INTRODUCTION

For over seventy years Bureau of Analysed Samples Ltd (BAS) have been preparing British Chemical Samples, now known as BCS Certified Reference Materials (CRMs) for the metallurgical industries. **Full particulars of all BAS-produced materials are given in a separate catalogue.**

When the UK joined the EEC in 1973 BAS were invited to co-operate with BAM in Germany and IRSID in France in the production of CRMs for the iron and steel industry on a European basis and this European Producers Group has recently been augmented by the inclusion of the Nordic CRM Working Group: this work is now under the auspices of the European Committee for Iron and Steel Standardization (ECISS). These EURONORM Certified Reference Materials (ECRMs) are normally analysed by approximately twenty laboratories from countries in the European Economic Area (EEA) and are issued with a Certificate of Analysis approved by the participating laboratories and all four producing organizations. These ECRMs are indicated by an asterisk in this list.

Pending their eventual replacement by ECRMs analysed on a European basis, a number of National CRMs prepared by BAM, BAS & IRSID have been accepted as interim ECRMs following examination by laboratories within the EU.

All ECRMs are available from BAS. Data regarding the BAS-produced ECRMs is given in the BAS Certified Reference Materials Catalogue, whilst the data re BAM, IRSID/CTIF- and Jernkontoret (JK)-produced ECRMs are given in this catalogue.

Further details of ECRMs, including their method of preparation, certification and supply of ECRMs, and the use of the statistical information given on ECRM certificates are given in Technical Reports **CEN/TR 10317:2009** (formerly **ECISS Information Circular No. 1**) and **CEN/TR 10350:2009** (formerly **ECISS Information Circular No. 5**) which are available in the UK from the BSI, 389 Chiswick High Road, London W4 4AL.

In September 1992, the BNF – Fulmer organisation was closed down. BAS purchased their Reference Materials business, including the considerable stock of BNF samples, and are continuing the business as before. Thus, BAS are now the primary source of BNF copper, nickel and lead base Reference Materials. Replacement samples are being produced by BAS in order to maintain continuity of supply of these samples: (see the latest BAS Catalogue for details of such samples already produced by BAS).

In order to assist our customers to obtain complementary Reference Materials from other reputable producers, BAS are now holding a stock, and most of the Reference Materials detailed in this catalogue are immediately available, with delivery of non-stock items usually achieved within two to three weeks.

In this catalogue Reference Materials which are supplied with a Certificate of Analysis giving the information specified in ISO Guide 31 "Contents of Certificates of Reference Materials" are referred to as "Certified Reference Materials" and the remainder as "Reference Materials", in accordance with the definitions given in ISO Guide 30 "Terms and definitions used in connection with Reference Materials". (ISO Guides are available from Case Postale 56, CH-1211 Geneva 20, Switzerland).

The Certificate accompanying each CRM, or Analysis Report/Information Sheet accompanying each RM, should be consulted to obtain the accurate analysis of each sample, since in some cases the figures shown in this catalogue may differ slightly from those given on the Certificate or Analysis Report/Information Sheet.

QUALITY ASSURANCE

Bureau of Analysed Samples Ltd, are very pleased to advise customers that in November 1994 their 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 recently been revalidated to the new standard BS EN ISO 9001:2008. Furthermore, they were accredited, in June 2006, to the International Guide, ISO Guide 34:2000.

ALCAN INTERNATIONAL LTD., ARVIDA LABORATORIES, (ALCAN), Canada

CHEMICAL COMPOSITION (nominal mass content in %) - figures in brackets are for information only.

Wrought Aluminium Alloy Spectroscopic Reference Materials (57mm dia. x 25mm discs)

ALCAN No.	Cu	Fe	Mg	Mn	Ni	Si	Ti	Zn	Bi	Cr	Pb	Sn	Ga	V	Be	Ca	Li	Na	Others
HP FD	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*	*0.0001* **P**
2014 AD	*4.6*	*0.46*	*0.45*	*0.81*	*0.03*	*0.88*	*0.03*	*0.03*	*0.03*	*0.02*	*0.02*	*0.04*	*0.03*	*0.03*	*0.001*	*0.003*	*0.002*	*0.002*	*0.004* **P**
2219 AA	*6.5*	*0.20*	*0.02*	*0.28*	*0.03*	*0.15*	*0.05*	*0.10*	*0.03*	*0.02*	*0.02*	*0.02*	*0.02*	*0.06*	…	…	…	…	*0.004* **P**
5056 AD	*0.05*	*0.27*	*5.0*	*0.13*	*0.03*	*0.12*	*0.03*	*0.04*	*0.01*	*0.09*	*0.01*	*0.01*	*0.02*	*0.02*	*0.001*	*0.002*	*0.003*	*0.003*	*0.002* **Zr**
5083 AF	*0.078*	*0.34*	*4.85*	*0.74*	*0.03*	*0.17*	*0.03*	*0.05*	*0.008*	*0.15*	*0.008*	*0.02*	*0.02*	*0.02*	*0.03*	*0.003*	*(0.004)*	*(0.004)*	*0.004* **Zr**
6063 BA	*0.090*	*0.22*	*0.59*	*0.080*	*0.030*	*0.51*	*0.032*	*0.029*	*0.0082*	*0.015*	*0.0080*	*0.014*	*0.020*	*0.021*	*0.00112*	*0.0029*	*(0.0018)*	*(0.0019)*	*0.0029* **Zr**
6111 AE	*0.75*	*0.24*	*0.77*	*0.20*	*0.028*	*0.60*	*0.065*	*0.027*	*0.025*	*0.072*	*0.016*	*0.018*	*0.019*	*0.023*	*0.0013*	*(0.0023)*	*(0.0025)*	*(0.0019)*	*0.0031* **Zr**
6351 AK	*0.06*	*0.23*	*0.65*	*0.56*	*0.03*	*1.08*	*0.05*	*0.05*	*0.007*	*0.03*	*0.008*	*0.02*	*0.02*	*0.02*	*0.001*	*0.003*	*0.003*	*0.004*	*0.003* **Zr**
7075 AF	*1.75*	*0.17*	*2.66*	*0.031*	*0.027*	*0.19*	*0.092*	*5.75*	*0.007*	*0.22*	*0.007*	*0.014*	*0.019*	*0.020*	*0.001*	*0.0034*	*0.003*	*0.003*	*0.002* **Zr**
42S AA	*2.3*	*1.1*	*1.5*	*0.05*	*1.3*	*0.78*	*0.08*	*0.06*	*0.03*	*0.02*	*0.03*	*0.03*	*0.02*	*0.02*	…	…	…	…	…
C57S AB	*0.06*	*0.10*	*2.4*	*0.04*	*0.03*	*0.10*	*0.03*	*0.03*	*0.01*	*0.03*	*0.03*	*0.03*	*0.02*	*0.01*	*0.001*	…	…	*0.003*	…

Foundry and Casting Aluminium Alloy Spectroscopic Reference Materials (57mm dia. x 25mm discs)

ALCAN No.	Cu	Fe	Mg	Mn	Ni	Si	Ti	Zn	Bi	Cr	Pb	Sn	Ga	V	Ca	Na	Be	Zr	Others
125 AQ	*1.2*	*0.24*	*0.04*	*0.04*	*0.03*	*5.5*	*0.15*	*0.03*	*0.02*	*0.03*	*0.02*	*0.03*	*0.01*	*0.02*	…	…	…	…	…
160 DP	*0.05*	*0.30*	*0.02*	*0.03*	*0.03*	*11.8*	*0.05*	*0.04*	*0.02*	*0.02*	*0.03*	*0.03*	*0.01*	*0.01*	…	*0.004*	…	…	…
161 AF	*0.06*	*0.91*	*0.50*	*0.05*	*0.05*	*10.1*	*0.05*	*0.05*	*0.05*	*0.03*	*0.05*	*0.05*	*0.01*	*0.01*	…	…	…	…	…
340 AB	*0.05*	*0.37*	*8.1*	*0.06*	*0.05*	*0.2*	*0.04*	*0.06*	*0.04*	*0.04*	*0.04*	*0.03*	*0.01*	*0.01*	…	…	…	…	…
A143 AW	*3.03*	*0.73*	*0.91*	*0.3*	*0.89*	*10.0*	*0.11*	*0.03*	*0.03*	*0.04*	*0.04*	*0.03*	*0.01*	*0.02*	*0.006*	*0.0004*	*0.002*	…	*0.0005* **Li**
A333.0 AE	*3.5*	*0.78*	*0.08*	*0.32*	*0.13*	*9.1*	*0.03*	*2.4*	*0.02*	*0.02*	*0.02*	*0.03*	*0.03*	*0.02*	*0.002*	…	*<0.0001*	*0.02*	*0.006* **Sb**
B319.1 AF	*3.1*	*0.64*	*0.33*	*0.43*	*0.05*	*6.1*	*0.06*	*0.72*	*0.02*	*0.02*	*0.13*	*0.01*	*0.02*	*0.02*	*0.004*	…	*0.002*	*0.003*	*0.002* **P**

APPROXIMATE CHEMICAL COMPOSITION (nominal mass content in %)

Aluminium Alloy Setting-up Samples (57mm dia. x 50mm discs)

ALCAN No.	Cu	Fe	Mg	Mn	Ni	Si	Ti	Zn	Cr
SSLA-1	*(4.7)*	*(0.5)*	*(1.2)*	*(0.1)*	*(2.3)*	*(1.1)*	*(0.15)*	*(0.2)*	…
SSLC	*(0.1)*	…	*(5.1)*	*(1.1)*	…	*(0.3)*	…	…	*(0.2)*
SSLD	…	*(1.2)*	…	…	…	*(5.7)*	…	*(5.6)*	…

The above constitutes a selection of ALCAN samples normally held in stock by BAS. Additional ALCAN aluminium alloy spectroscopic reference materials are available, and information on these will be provided on request.

BUNDESANSTALT FÜR MATERIALFORSCHUNG UND -PRÜFUNG (BAM), Germany

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

Unalloyed Steel Certified Reference Materials

(All finely divided material - units of 100g, except 026-1, 026-2, 027-1, 028-1, and 029-1 which are 8mm dia. x 80mm rods, 098-1 which is in solid block form 36-39mm dia x 26mm and 099-1 which is supplied in the form of gold plated balls: ECRM 035-2 also available as 35mm dia. x 30mm discs)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Acid Sol.)	Al (Total)	As	Cu	N	Nb	Pb	Sn	Ti	V	O	Te
ECRM 026-1	**1969**	*0.44*	…	…	…	…	…	…	…	…	…	…	…	**0.0053**	…	…	…	…	…	**0.0031**	…
ECRM 026-2	**1973**	…	…	…	…	…	…	…	…	…	…	…	…	**0.0042**	…	…	…	…	…	**0.0025**	…
ECRM 027-1	**1970**	*0.05*	*0.003*	*0.4*	*0.03*	*0.03*	…	…	…	…	*0.001*	…	…	**0.0157**	…	…	…	…	…	**0.0084**	…
ECRM 028-1	**1970**	*0.1*	*0.002*	*0.3*	*0.06*	*0.03*	…	…	…	…	*0.001*	…	…	**0.0029**	…	…	…	…	…	**0.0113**	…
ECRM 029-1	**1970**	*0.05*	*0.003*	*0.3*	*0.03*	*0.03*	…	…	…	…	*0.001*	…	…	**0.0083**	…	…	…	…	…	**0.0312**	…
ECRM 030-4	**1973**	**0.456**	**0.318**	**0.603**	**0.018**	**0.021**	**0.117**	…	**0.042**	…	**0.042**	**0.012**	**0.061**	**0.0051**	…	…	**0.0055**	…	…	…	…
ECRM 031-3	**1972**	**0.055**	**0.037**	**0.329**	**0.014**	**0.021**	…	…	…	…	**0.054**	**0.013**	**0.020**	**0.0050**	…	…	…	…	…	…	…
ECRM 032-2	**1968**	**0.271**	**0.282**	**0.556**	**0.0129**	**0.0254**	*0.088*	…	*0.040*	…	…	**0.020**	**0.085**	**0.0044**	…	…	…	…	…	…	…
***ECRM 035-2**	**1998**	**1.277**	**0.216**	**0.305**	**0.0038**	**0.0111**	**0.0104**	**0.0056**	**0.0190**	**0.0177**	**0.0193**	**0.0017**	**0.0085**	**0.0230**	…	…	…	**0.0030**	…	…	…
ECRM 036-1	**1968**	**0.858**	**0.194**	**0.327**	**0.0074**	**0.0095**	0.091	…	*0.058*	…	*0.015*	**0.023**	**0.065**	**0.0100**	…	…	*0.006*	…	*0.019*	…	…
ECRM 039-2	**1971**	**0.107**	**0.011**	**1.274**	**0.083**	**0.310**	**0.048**	…	**0.051**	…	…	**0.018**	**0.117**	**0.0113**	…	**0.207**	**0.016**	…	…	…	…
ECRM 042-1	**1972**	**0.108**	**0.037**	**0.666**	**0.0057**	**0.024**	**0.016**	…	**0.029**	…	**0.010**	…	**0.041**	**0.0078**	**0.0054**	…	…	…	…	…	…
***ECRM 077-2**	**1976**	**0.151**	**0.293**	**1.28**	**0.022**	**0.014**	*0.016*	*0.003*	*0.021*	…	**0.034**	**0.007**	*0.029*	**0.0054**	…	…	*0.0025*	…	**0.058**	…	…
***ECRM 079-2**	**1989**	**0.596**	**0.247**	**0.743**	**0.0234**	**0.192**	**0.0382**	…	**0.022**	…	**0.021**	**0.004**	**0.046**	**0.0074**	…	…	**0.0037**	…	…	…	…
***ECRM 082-1**	**1976**	**0.415**	**0.235**	**0.769**	**0.013**	**0.030**	**0.018**	…	**0.027**	…	**0.032**	*0.029*	**0.025**	*0.0047*	…	**0.149**	…	…	…	…	**0.030**
***ECRM 083-1**	**2009**	**0.0262**	…	**0.289**	**0.0076**	**0.0100**	*0.013*	…	**0.014**	…	*0.004*	*0.004*	**0.016**	**0.00189**	…	…	…	…	…	…	…
***ECRM 098-1**	**1993**	**0.00051**	**0.00008**	**0.00048**	*0.00006*	**0.00031**	**0.00571**	**0.00085**	…	…	…	…	…	**0.00024**	…	…	…	…	…	…	…
***ECRM 099-1**	**1987**	…	…	…	…	…	…	…	…	…	…	…	…	**0.0078**	…	…	…	…	…	**0.0008**	…

Alloy Steel Certified Reference Materials

(Finely divided material - units of 100g; 129-3, 179-2, 187-2, 191-2, 192-1, 193-1 and 194-1 also available as 35mm dia. x 30mm discs)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	B	Co	Cu	N	Sn	Ti	V	Others
ECRM 126-1	**1963**	**0.841**	*0.24*	**1.817**	**0.009**	**0.005**	**0.317**	…	*0.038*	…	…	…	…	*0.098*	…	…	…	**0.143**	…
ECRM 128-1	**1972**	**0.085**	**0.949**	**0.839**	**0.007**	**0.007**	**0.108**	…	**0.046**	**0.286**	…	…	…	**0.055**	*0.0024*	…	**0.890**	*0.008*	…
***ECRM 129-3**	**2008**	**0.3684**	**0.2087**	**0.371**	**0.0110**	**0.0165**	**1.702**	**0.206**	**1.022**	**1.016**	**0.0049**	*0.00014*	**0.0148**	**0.0804**	**0.0046**	**0.0067**	**0.030**	*0.0045*	**0.00059 Sb**
ECRM 130-1	**1968**	**0.546**	**0.313**	**1.593**	**0.0209**	**0.0158**	*0.032*	…	*0.031*	**0.0037**	**0.0167**	…	…	**0.072**	**0.0093**	…	…	*0.003*	**0.0019 Al (Acid Sol.)**
***ECRM 179-2**	**1990**	**0.598**	**0.579**	**0.539**	**0.0267**	0.0006	**1.08**	**0.070**	**0.078**	…	…	…	*0.0153*	**0.111**	**0.0068**	…	*0.0014*	**0.188**	**1.87 W, <0.00003 Bi, <0.00003 Cd, 0.00129 Ga, 0.00144 Nb, 0.00013 Pb, 0.00175 Sb, <0.0002 Te, 0.00023 Zn**
***ECRM 180-1**	**1973**	**0.197**	**0.362**	**1.286**	**0.0174**	**0.0249**	**1.250**	…	**0.096**	…	**0.030**	…	…	**0.115**	**0.0068**	…	…	…	…
***ECRM 181-1**	**1973**	**0.590**	**1.054**	**1.047**	**0.018**	**0.035**	**0.126**	…	**0.070**	**0.022**	*0.026*	…	…	**0.174**	**0.0068**	*0.015*	…	…	…
***ECRM 182-1**	**1993**	**0.790**	**0.368**	**0.389**	**0.0076**	**0.011**	**0.591**	…	**0.152**	**0.020**	…	…	…	**0.141**	**0.0102**	…	…	**0.177**	**0.0039 Pb, 0.0042 Sb, 0.0015 Zn**
***ECRM 183-1**	**1973**	**0.083**	**0.421**	**0.354**	**0.089**	**0.031**	**0.670**	…	**0.073**	**0.027**	…	…	…	**0.445**	**0.0064**	…	…	…	…
***ECRM 184-1**	**1988**	**0.333**	**0.218**	**0.528**	**0.0047**	**0.0032**	**1.287**	**0.457**	**3.318**	**0.0052**	**0.0180**	…	**0.0560**	**0.060**	**0.0051**	**0.0044**	…	**0.108**	…
***ECRM 187-1**	**1986**	**0.195**	**0.026**	**1.354**	**0.014**	**0.025**	**1.186**	**0.035**	**0.096**	**0.046**	**0.018**	**0.0004**	**0.014**	**0.161**	**0.014**	**0.011**	…	…	…
***ECRM 187-2**	**2011**	**0.2038**	**0.2111**	**1.257**	**0.0066**	**0.0300**	**1.132**	*0.0623*	**0.1755**	**0.0223**	**0.0057**	**0.00048**	**0.0112**	**0.1288**	**0.0105**	**0.0237**	…	**0.0122**	*0.0018* **Sb**
***ECRM 191-2**	**2006**	**0.0043**	**3.267**	**0.1334**	**0.0087**	**0.0029**	**0.0314**	**0.0020**	**0.0224**	**0.985**	**0.0018**	…	…	**0.0165**	**0.00105**	**0.0050**	**0.0024**	…	…
***ECRM 192-1**	**1995**	**0.188**	**0.219**	**1.377**	**0.0029**	**0.0010**	**0.072**	**0.482**	**0.755**	**0.0308**	*0.003*	*0.0002*	**0.0055**	**0.045**	**0.0118**	*0.003*	*0.001*	*0.003*	**0.029 Al (Acid Sol.)**
***ECRM 193-1**	**1990**	**0.139**	**0.404**	**0.972**	**0.0063**	**0.0086**	**0.182**	**0.347**	**1.178**	**0.0257**	**0.0062**	*0.0002*	**0.0073**	**0.598**	**0.0108**	…	*0.0013*	*0.0019*	**0.0232 Nb**
***ECRM 194-1**	**1993**	**0.153**	**0.431**	**1.188**	**0.0097**	**0.00059**	**0.733**	**0.286**	**0.342**	**0.0837**	**0.0042**	**0.0020**	…	**0.075**	**0.0115**	…	…	**0.0243**	**0.0026 Ca**

* Denotes Full EURONORM-Certified Reference Materials

BUNDESANSTALT FÜR MATERIALFORSCHUNG UND -PRÜFUNG (BAM), Germany

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

Highly Alloyed Steel Certified Reference Materials

(Finely divided material – units of 100g; 284-2, 288-1, 289-1, 290-1 and 291-1 also available as 35mm dia. x 30mm discs; 271-1 as a 37mm dia. x 25mm disc , 294-1 as a 40mm dia. x20mm disc and both 297-1 and 299-1 as a 36mm dia. x 25mm disc)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Sn	Ti	V	Ca	W	O	Sb	Zr
ECRM 226-1	**1967**	**0.416**	**0.514**	**0.434**	**0.0207**	**0.0094**	**13.67**	**0.024**	**0.139**	…	*0.026*	…	*0.025*	…	**0.0362**	…	…	…	**0.022**	…	…	…	…	…
ECRM 227-1	**1994**	**0.950**	**0.272**	**0.236**	**0.016**	**0.022**	**4.25**	**2.64**	**0.114**	…	…	…	…	**0.124**	**0.040**	…	**0.0251**	…	**2.44**	…	**3.03**	…	**0.0035**	…
***ECRM 231-2**	**2002**	**0.0140**	**0.368**	**1.263**	**0.0179**	**0.0250**	**18.07**	**0.301**	**10.105**	**0.0032**	**0.0048**	**0.0020**	**0.0402**	**0.0941**	**0.0444**	…	**0.0043**	**0.0007**	**0.0708**	**0.00074**	**0.0141**	…	**0.0011**	…
ECRM 235-1	**1972**	**0.912**	**0.094**	**12.73**	**0.045**	**0.0072**	**0.354**	**0.032**	…	…	…	…	…	**0.073**	**0.020**	…	…	…	…	…	…	…	…	…
ECRM 237-1	**1973**	**0.068**	**0.482**	**1.443**	**0.032**	**0.012**	**17.24**	**0.306**	**10.32**	…	…	…	**0.221**	**0.123**	**0.035**	**0.660**	…	…	**0.057**	…	…	…	…	…
***ECRM 271-1**	**2007**	**0.3698**	**0.923**	**0.437**	**0.0120**	**0.00045**	**5.002**	**1.247**	**0.1552**	**0.0234**	**0.0057**	…	**0.0139**	**0.1371**	**0.0137**	…	**0.0084**	**0.0020**	**0.850**	**0.0009**	**0.0054**	**0.0020**	…	…
***ECRM 278-1**	**1973**	**0.903**	**0.336**	**0.405**	**0.0154**	**0.0052**	**18.11**	**1.040**	**0.236**	…	…	…	…	**0.077**	…	…	…	…	**0.077**	…	…	…	…	…
***ECRM 283-1**	**1985**	**1.219**	**0.345**	**0.217**	**0.022**	**0.029**	**4.15**	**3.41**	…	**0.010**	…	**0.0003**	**10.27**	…	**0.033**	…	…	…	**3.28**	…	**9.66**	…	…	…
***ECRM 284-2**	**2000**	**0.0201**	**0.537**	**1.745**	**0.0258**	**0.0237**	**16.811**	**2.111**	**10.72**	**0.0027**	**0.0063**	**0.0026**	**0.0525**	**0.1831**	**0.0151**	…	**0.0047**	**0.191**	**0.0425**	…	…	**0.0099**	…	…
***ECRM 286-1**	**1985**	**0.100**	…	**1.92**	**0.026**	**0.280**	**18.13**	**0.329**	**8.54**	*0.0023*	…	*0.0003*	**0.150**	…	**0.043**	…	**0.0084**	…	…	…	…	*0.0315*	**0.0014**	…
***ECRM 288-1**	**1986**	**2.08**	**0.260**	**0.292**	**0.024**	*0.0012*	**12.00**	**0.103**	**0.298**	**0.012**	*0.006*	…	**0.018**	**0.060**	**0.0151**	…	*0.0043*	**0.020**	**0.055**	…	*0.68*	…	*0.0014*	…
***ECRM 289-1**	**1990**	**0.0489**	**0.531**	**1.016**	**0.0114**	**0.0027**	**14.63**	**1.102**	**24.68**	**0.199**	*0.006*	**0.0044**	**0.065**	…	…	…	**0.111**	**2.01**	**0.260**	…	…	…	*0.0013*	…
***ECRM 290-1**	**1990**	**0.911**	**0.072**	**0.244**	**0.0160**	**0.0160**	**4.18**	**4.83**	**0.329**	…	…	…	**5.12**	**0.081**	**0.0325**	…	…	…	**1.91**	…	**6.27**	…	…	…
***ECRM 291-1**	**1990**	**0.903**	**0.907**	**0.808**	**0.0168**	**0.0087**	**17.10**	**2.10**	**0.563**	**0.0030**	…	…	**0.0233**	**0.0711**	**0.1142**	*0.006*	…	…	**0.388**	…	…	…	…	…
***ECRM 294-1**	**2005**	**0.0657**	**0.283**	**18.68**	**0.0271**	**0.00031**	**17.98**	**0.0861**	**0.429**	*0.001*	**0.0037**	*<0.0005*	**0.0288**	**0.0242**	**0.566**	*<0.004*	*0.001*	*<0.002*	**0.0694**	*<0.0006*	*<0.004*	…	*<0.0007*	…
***ECRM 297-1**	**2005**	**0.0223**	**0.344**	**0.897**	**0.0135**	**0.0101**	**18.37**	**0.290**	**12.33**	**0.0195**	**0.0040**	**1.146**	**0.0413**	**0.204**	**0.0152**	*0.009*	…	**0.0072**	**0.535**	*<0.0005*	*0.006*	…	…	…
***ECRM 299-1**	**2009**	**0.0154**	**0.299**	**0.2678**	**0.0152**	**0.00022**	**22.32**	**0.0186**	**0.172**	**5.33**	**0.0054**	**0.0002**	**0.0187**	**0.0382**	**0.0198**	*0.004*	*0.008*	**0.1289**	**0.0329**	*0.0004*	*0.0002*	…	*0.0005*	**0.1775**

Special Alloy Certified Reference Materials

(Finely divided material – units of 100g)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Cu	N	Nb	V	W	Zr	Ta	Fe
ECRM 326-1	**1972**	**0.092**	**1.46**	**0.406**	**0.0093**	**0.0028**	**16.37**	*0.025*	**61.16**	*0.79*	**0.223**	*0.027*	*0.036*	…	0.*024*	…	**0.129**	…	…
ECRM 327-2	**1972**	**0.152**	**2.052**	**1.289**	**0.0228**	**0.0046**	**24.35**	**0.174**	**19.72**	**0.070**	**0.159**	**0.060**	**0.059**	…	**0.044**	…	…	…	…
ECRM 328-1	**1973**	**0.390**	**0.629**	**1.395**	**0.005**	**0.003**	**20.54**	**4.41**	**20.38**	**0.070**	**41.65**	**0.013**	**0.027**	**3.61**	…	**4.16**	…	**0.18**	**2.40**

Cast Iron Certified Reference Materials

(Finely divided material – units of 100g)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	Cu	N	Ti	V	Mg
***ECRM 428-2**	**1998**	**2.747**	**1.752**	**0.750**	**0.0691**	**0.1105**	**0.0366**	*0.0014*	**0.0358**	…	**0.0156**	**0.0996**	…	**0.0311**	**0.0120**	…
***ECRM 476-3**	**1996**	**3.390**	**1.813**	**0.987**	**0.0908**	**0.0493**	**0.0648**	…	**0.0549**	…	**0.0145**	**0.2445**	**0.0038**	**0.0222**	**0.0115**	…
***ECRM 478-2**	**1996**	**4.003**	**2.411**	**0.321**	**0.202**	**0.0460**	**0.251**	…	**0.151**	…	*0.0018*	**0.1276**	**0.0023**	**0.0328**	**0.0113**	…
***ECRM 479-1**	**1978**	**2.86**	**2.02**	**0.136**	**0.076**	**0.089**	**1.00**	**0.196**	**1.012**	**0.014**	…	…	…	…	…	…
***ECRM 480-1**	**1988**	**3.03**	**2.41**	**0.151**	**0.0021**	**0.0086**	…	…	**0.483**	**0.016**	…	…	…	…	…	**0.017**

Ferro-Alloy Certified Reference Materials

(Finely divided material – units of 100g)

BAM No.	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	Pb	N	Sn	Ti	V	Zr	Ca	Mg	Fe
***ECRM 502-2**	**2004**	**6.94**	*0.10*	**77.87**	**0.148**	*0.002*	**0.0265**	…	**0.0384**	…	*0.0003*	…	**0.0370**	**0.0179**	*0.02*	…	**0.0034**	…	…	…	…	*14.6*
ECRM 529-1	**1975**	**0.10**	**91.11**	**0.04**	**0.013**	…	…	…	…	**0.86**	…	…	…	…	…	…	**0.09**	…	…	**0.46**	**0.04**	**6.15**
***ECRM 589-1**	**1991**	**0.132**	*0.412*	**0.151**	*0.011*	**0.0152**	**0.506**	**0.934**	**0.663**	**5.34**	…	**0.115**	**0.146**	…	**0.64**	**0.55**	**68.4**	**2.32**	**0.866**	…	…	**16.93**
***ECRM 591-1**	**1996**	**0.141**	**0.847**	**0.307**	**0.0299**	**0.0153**	…	…	**0.0141**	**3.19**	…	…	**0.0596**	…	…	…	*0.044*	**79.72**	…	…	…	**14.59**

* Denotes Full EURONORM-Certified Reference Materials

BUNDESANSTALT FÜR MATERIALFORSCHUNG UND -PRÜFUNG (BAM), Germany

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

Ore Certified Reference Materials (Finely divided material – units of 100g)

BAM No.	Description	Cert. Date	Fe	SiO_2	Al_2O_3	TiO_2	CaO	MgO	Mn	P	S	Na_2O	K_2O	As	Ba	Cr	Cu	CO_2	H_2O
ECRM 627-2	Minette Ore	**1966**	**31.77**	**9.24**	**4.49**	**0.225**	**15.67**	**1.57**	**0.250**	**0.661**	**0.114**	…	…	**0.020**	…	**0.018**	*0.002*	…	…
ECRM 630-1	Bomi-Hill Concentrate	**1969**	**65.63**	**5.88**	**0.88**	**0.066**	**0.10**	**0.47**	**0.060**	**0.043**	**0.032**	…	…	…	…	…	…	…	…
ECRM 631-1	Venezuela Iron Ore	**1961**	**61.09**	**3.20**	**1.06**	**0.109**	**0.75**	**0.54**	**0.044**	**0.114**	**0.033**	*0.04*	*0.04*	…	…	…	…	…	…
ECRM 633-1	Manganese Ore	**1967**	**1.64**	**10.39**	**1.64**	**0.079**	**2.02**	**0.58**	**47.85**	**0.170**	**0.227**	…	…	*0.0040*	**1.13**	…	…	*3.48*	*7.11*

Iron Ore Certified Reference Materials (Finely divided material – units of 100g; 686-1 supplied as 2 x 50g)

BAM No.	Description	Cert. Date	Fe	Si	Al	Ti	Ca	Mg	Mn	P	S	Na	K	Zn	Cl	Co	Cr	Cu	Ni	Others
***ECRM 678-1**	Kiruna D Iron Ore	**1975**	**60.76**	**1.73**	**0.280**	**0.128**	**3.93**	**0.572**	**0.075**	**1.61**	**0.021**	**0.107**	**0.110**	…	…	…	…	…	…	**0.29 F, 0.11 V**
***ECRM 680-1**	Purple Ore	**1977**	**59.98**	**4.20**	**0.66**	**0.045**	**0.45**	**0.14**	**0.025**	**0.018**	**0.544**	**0.128**	**0.078**	**0.165**	…	**0.013**	**0.005**	**0.063**	**0.007**	**0.317 Pb, 0.057 As**
***ECRM 686-1**	Iron Oxide	**2002**	**69.44**	**0.0083**	**0.0407**	**0.0014**	**0.0097**	**0.0027**	**0.231**	**0.0078**	…	**0.0058**	**0.0024**	**0.0004**	**0.095**	**0.0019**	**0.0182**	**0.0003**	**0.0004**	**0.0007 Mo, 0.0002 Sn**
***ECRM 687-1**	Iron Oxide	**2009**	**69.66**	**0.0157**	**0.0356**	**0.0303**	**0.0113**	**0.0018**	**0.1658**	**0.0120**	…	**0.0030**	**0.0011**	**0.0051**	**0.0173**	*(0.002)*	**0.0227**	**0.0030**	**0.0122**	**0.0020 Mo, 0.0006 Sn**

Ceramic Certified Reference Materials (Finely divided material – units of 100g; 777-1 supplied as 2 x 50g)

BAM No.	Cert. Date	Description	Si	Ca	Mg	Al	Ti	Mn	P	Fe	Na	K	B	Cr
***ECRM 777-1**	**1984**	Silica Brick	**44.44**	**2.02**	**0.043**	**0.42**	**0.27**	…	…	**0.23**	*0.02*	**0.13**	…	…
***ECRM 779-1**	**1991**	Magnesite	**0.182**	**1.691**	*54.6*	**0.105**	**0.0081**	**0.503**	**0.0267**	**3.73**	*0.006*	*0.002*	**0.0116**	*0.003*

Slag Certified Reference Materials (Finely divided material – units of 100g)

BAM No.	Cert. Date	Description	SiO_2	CaO	P_2O_5 (Citric Acid Sol.)	P_2O_5 (Total)	Cr	Al	V	K	Na	Mo	Ni	B	Cu	Pb	F
ECRM 826-1	**1994**	Phosphate Slag	**8.96**	**46.48**	**10.73**	**14.65**	**0.182**	**0.696**	**0.503**	**0.0278**	**0.375**	*0.001*	*0.002*	*0.003*	*0.002*	*0.005*	*0.37*
ECRM 827-1	**1991**	Thomas Phosphate	**6.21**	**47.38**	**18.79**	**20.70**	…	…	…	…	…	…	…	…	…	…	…

* Denotes Full EURONORM-Certified Reference Materials

Aluminium Alloy Certified Reference Materials (201-301 finely divided material – units of 100g; 307-ERM-EB316 – approx. 60mm dia. x 25mm discs)

BAM No.	Si	Mn	Fe	Cu	Ti	Zn	Mg	Pb	Al	Cr	Ni	V	Be	Bi	Ca	Cd	Li	Na	Sn	Zr	Ga
201	**13.20**	**0.38**	**0.18**	**0.009**	**0.011**	**0.038**	**0.0024**	…	Bal.	…	…	…	…	…	…	…	…	…	…	…	…
209	**9.65**	**0.36**	**0.18**	**0.004**	**0.023**	**0.021**	**0.31**	…	Bal.	…	…	…	…	…	…	…	…	…	…	…	…
300	**0.14**	**0.018**	**0.203**	**0.046**	**0.011**	**0.128**	**2.67**	**0.016**	Bal.	**0.23**	…	…	…	…	…	…	…	…	*<0.0005*	…	…
301	**0.061**	**0.001**	**0.054**	**0.0016**	**0.005**	**0.033**	**0.0008**	…	Bal.	…	…	**0.0018**	…	…	…	…	…	…	*<0.0005*	…	…
307	**0.155**	**0.701**	**0.412**	**0.104**	**0.101**	**0.063**	**4.58**	…	Bal.	**0.162**	…	…	**0.0011**	…	**0.00053**	**0.0049**	**0.00044**	**0.0021**	…	…	…
308	**0.071**	**0.034**	**0.163**	**1.32**	**0.029**	**5.67**	**2.29**	…	Bal.	**0.196**	**0.012**	…	**0.00022**	…	…	…	…	…	…	**0.0078**	…
310	**0.080**	**0.003**	**0.070**	**0.0017**	**0.003**	**0.009**	**0.994**	**0.0035**	Bal.	**0.0009**	**0.002**	**0.0044**	**0.00013**	…	**0.00073**	**0.0024**	**0.00037**	*0.0003*	**0.0024**	**0.0014**	**0.0115**
311	**0.204**	**0.694**	**0.310**	**4.653**	**0.056**	**0.200**	**1.567**	**0.0504**	Bal.	**0.104**	**0.052**	**0.0240**	**0.00052**	**0.0500**	**0.00056**	**0.0013**	**0.00053**	*0.0018*	**0.0127**	**0.140**	**0.0159**
312	**0.415**	**0.042**	**0.185**	**0.042**	**0.029**	**0.029**	**0.409**	**0.0044**	Bal.	**0.028**	**0.004**	**0.0062**	…	**0.0023**	…	**0.0023**	…	…	*0.002*	**0.0010**	**0.0115**
ERM-EB313	**0.363**	**0.495**	**0.391**	**0.0932**	**0.0947**	**0.1579**	**3.40**	**0.00433**	Bal.	**0.1224**	**0.0278**	**0.0299**	**0.000547**	**0.0095**	**0.00057**	**0.00074**	**0.00060**	**0.00370**	**0.0197**	**0.0359**	**0.0121**
314	**11.49**	**0.400**	**0.757**	**2.071**	**0.1638**	**1.195**	**0.1805**	**0.221**	Bal.	**0.0517**	**0.221**	**0.0192**	**0.000396**	**0.0094**	…	**0.00130**	…	…	**0.199**	**0.00552**	**0.0154**
M315	**9.18**	**0.314**	**0.59**	**2.51**	**0.143**	**0.77**	**0.422**	**0.079**	Bal.	**0.0311**	**0.096**	**0.0054**	**0.0005**	**0.0041**	<0.002	**0.0011**	<0.002	<0.008	**0.0771**	**0.0030**	**0.0101**
ERM-EB316	**11.98**	**0.204**	**0.1054**	**0.2970**	**0.0790**	**0.0611**	**0.045**	**0.0087**	Bal.	**0.00593**	**0.0235**	**0.0098**	**0.000295**	**0.0140**	*0.0011*	**0.00208**	*0.00010*	**0.0206 Sr**	*0.011*	**0.00328**	**0.0105**

BUNDESANSTALT FÜR MATERIALFORSCHUNG UND - PRÜFUNG (BAM), Germany

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

Copper and Copper Alloy Certified Reference Materials (211-366 Finely divided material – units of 100g; 366 to ERM-EB389 - 40mm dia. x 30mm discs)

BAM No.	Cu	Sn	Zn	Pb	Fe	Ni	Al	Mn	Bi	As	Sb	Si	P	S	Cd	Co	Cr	Ag	Se	Te	Mg	Ti	Zr
223	**58.74**	**0.089**	**38.82**	**2.13**	**0.091**	**0.0214**	*<0.002*	*<0.001*	**0.0018**	**0.0084**	**0.0040**	*<0.003*	**0.0003**	**0.0011**	…	…	…	…	*<0.0001*	…	…	…	…
224	**57.40**	**0.066**	**39.38**	**1.13**	**0.136**	**0.038**	**0.0012**	**1.70**	**0.0007**	**0.002**	**0.0026**	*0.002*	**0.0113**	**0.0004**	…	…	…	…	…	…	…	…	…
227	**85.57**	**6.01**	**3.46**	**4.12**	**0.129**	**0.284**	*<0.0001*	…	**0.0088**	**0.081**	**0.160**	*<0.01*	*0.0002*	**0.122**	…	…	…	…	**0.0028**	**0.0012**	…	…	…
228	**85.34**	**9.76**	**3.32**	**1.24**	**0.036**	**0.109**	*0.0001*	*<0.001*	**0.0086**	**0.024**	**0.078**	…	**0.019**	**0.036**	…	…	…	…	**0.0012**	…	…	…	…
229	**63.334**	**0.0048**	**36.63**	**0.0192**	**0.0106**	**0.0111**	…	…	…	**0.0022**	**0.0007**	…	*0.0011*	…	…	…	…	…	**0.0034**	…	…	…	…
366	Bal.	**0.011**	**0.0016**	**0.0011**	**0.0023**	**0.0003**	…	*<0.0001*	*<0.00003*	**0.0001**	**0.0001**	…	**0.0263**	**0.0009**	**0.00003**	…	…	**0.0008**	*<0.00001*	*<0.00003*	…	…	…
367	**87.88**	**0.0105**	**0.0715**	**0.0298**	**1.443**	**9.72**	…	**0.723**	…	…	…	…	**0.0124**	**0.0162**	…	…	…	…	…	…	**0.0347**	…	…
368	**77.05**	**0.0147**	Bal.	**0.0131**	**0.0193**	**0.0258**	**1.972**	**0.0203**	…	**0.0246**	…	*0.013*	**0.0090**	*0.0019*	…	…	…	…	…	…	**0.0062**	…	…
369	…	…	**0.0022**	…	…	…	…	…	**0.00097**	…	…	…	…	…	…	…	…	…	…	…	**0.00036**	…	…
370	…	**0.00168**	…	**0.00158**	…	…	**0.00126**	…	…	…	**0.00156**	**0.00187**	**0.00117**	…	…	…	…	…	…	…	…	…	…
371	…	…	…	…	**0.00183**	…	…	…	…	…	…	…	…	**0.00121**	**0.00016**	…	…	…	…	**0.00144**	…	…	…
372	…	…	…	…	…	**0.00117**	…	**0.00114**	…	**0.00103**	…	…	…	…	…	…	…	**0.00090**	**0.00084**	…	…	…	…
ERM-EB374	**92.22**	**7.60**	**0.00404**	**0.00083**	**0.0040**	**0.00327**	*<0.0001*	**0.00043**	**0.00022**	**0.00043**	**0.00063**	*<0.001*	**0.1697**	**0.0013**	*<0.0001*	…	…	**0.00121**	*<0.0002*	*<0.0001*	*<0.0001*	…	…
ERM-EB375	**58.32**	**0.209**	**38.02**	**2.90**	**0.207**	**0.1053**	**0.0270**	**0.0222**	**0.00686**	**0.0231**	**0.0122**	**0.0211**	*0.00086*	…	**0.00859**	…	…	**0.0166**	…	**0.00538**	…	…	…
376	Bal.	**0.0247**	**0.0217**	**0.0236**	**0.0235**	**0.0209**	…	**0.0206**	**0.0200**	**0.0200**	**0.0202**	…	**0.0203**	**0.0133**	**0.0186**	…	…	**0.0163**	**0.0210**	**0.0215**	**0.0124**	…	…
ERM-EB377	**94.04**	**5.92**	**0.01006**	**0.00449**	**0.01042**	**0.01074**	**0.00451**	**0.00921**	**0.00422**	*<0.001*	**0.0013**	*<0.0134*	**<***0.001*	**0.00068**	*<0.0001*	…	…	**0.00644**	**0.0055**	*<0.0001*	*<0.0001*	…	…
ERM-EB378	**94.13**	**5.74**	*0.00073*	*0.00042*	**0.00182**	**0.00183**	*<0.0001*	*0.000074*	*<0.0001*	**0.00995**	**0.00861**	*<0.0010*	**0.0602**	*0.00091*	**0.01007**	**0.0089**	**0.0311**	**0.00266**	*<0.0002*	**0.00850**	**0.00287**	…	…
ERM-EB387	**75.18**	**0.00301**	**19.57**	**0.00108**	**0.0617**	**5.020**	…	**0.0796**	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
ERM-EB388	**89.27**	**0.857**	**4.81**	**0.000969**	**0.0303**	**0.00736**	**4.972**	**0.0512**	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
ERM-EB389	**74.3**	**0.0262**	**0.1125**	**0.0098**	**0.107**	**24.7**	*0.0123*	**0.415**	**0.0044**	…	**0.0046**	*0.0349*	**0.0093**	*0.0308*	**0.0016**	**0.0770**	**0.0153**	…	…	…	**0.067**	**0.0660**	**0.098**

Also available: 373/1, 373/2 and 373/3 which are certified for phosphorus at 33.8µg/g, 226.5µg/g and 455.7µg/g respectively (50mm dia. x 30mm discs)
379/1, 379/2 and 379/3 which are certified for oxygen at 38µg/g, 212µg/g and 378µg/g respectively (30mm dia. x 40mm discs)

Pure Copper Certified Reference Materials (40mm dia. x 30mm discs) Mass fraction in µg/g

BAM No.	Cu	Sn	Zn	Pb	Fe	Ni	Al	Mn	Bi	As	Sb	Si	P	S	Cd	Co	Cr	Ag	Se	Te	Mg	Ti	Zr
M381	Bal.	**3.86**	**5.3**	**0.59**	**3.3**	**0.7**	*<1*	**0.22**	**<0.3**	**<0.5**	**<1**	*<3*	…	*3.2*	**<0.4**	**<0.3**	**<0.4**	**<1**	*<1*	**<0.3**	**<0.6**	**<0.3**	**<6**
M382	Bal.	**4.29**	**6.0**	**1.0**	**6.0**	**1.7**	**<2.5**	**0.76**	**0.53**	*0.6*	**0.7**	**<6**	…	*3.2*	**0.90**	**0.73**	**0.56**	**1.8**	**0.6**	**0.61**	*1.4*	*0.6*	**<3**
ERM-EB383	Bal.	**4.7**	*7.8*	**1.31**	**10.9**	**3.59**	*2.3*	**1.24**	**1.02**	**1.93**	**1.44**	*<10*	…	*2.8*	**1.48**	**1.37**	**1.03**	**4.70**	*1.16*	**1.40**	**2.37**	**1.56**	…
ERM-EB384	Bal.	*10.2*	*12.7*	**5.7**	**32.8**	**5.7**	**13.0**	**6.88**	**3.34**	**5.0**	**12.0**	*5.0*	…	***4.1***	**3.95**	**3.88**	**6.53**	**10.3**	**4.24**	**7.0**	**14.6**	…	…
ERM-EB385	Bal.	**18.0**	**57.9**	**11.3**	**45.4**	**11.9**	**28.6**	**10.1**	**5.81**	**11.4**	**19.9**	*7.2*	**12.9**	**31.2**	**5.8**	**6.93**	**9.81**	**28.6**	**7.2**	**10.0**	**29.1**	…	…
ERM-EB386	Bal.	**28.3**	**49.5**	**23.4**	**64.7**	**25.0**	**36.5**	**13.3**	**9.6**	**24.2**	**31.2**	*14.3*	**7.2**	**21.9**	**7.8**	**5.20**	**12.4**	**47.4**	**11.6**	**38.3**	**36.1**	…	…
M390	Bal.	*<0.01*	…	…	**0.79**	…	…	…	…	…	…	…	**1.3**	…	…	…	…	…	…	…	…	…	…
M391	Bal.	*<0.01*	…	…	**0.90**	…	…	…	…	…	…	…	**3.3**	…	…	…	…	…	…	…	…	…	…
M392	Bal.	*<0.01*	…	…	**0.80**	…	…	…	…	…	…	…	**7.0**	…	…	…	…	…	…	…	…	…	…

Lead Alloy Certified Reference Materials (disc samples – dimensions as below) Mass fraction in %

BAM No.	Description	Disc Dimensions	Ca	Sb	As	Sn	Se	Bi	Ag	Al	Cu	Tl	Ni	Cd	S	Te	Zn
ERM-EB101a	PbCaSnAl	40mm dia. x 40mm	**0.136**	*<0.00012*	*<0.0002*	**0.294**	…	**0.0165**	**0.00290**	**0.0227**	**0.00243**	**0.00102**	*<0.00006*	*(0.0002)*	*(<0.0003)*	*<0.0003*	**0.00010**
ERM-EB102a	PbCaSn	40mm dia. x 40mm	**0.0635**	*0.0004*	*<0.0002*	**1.01**	…	**0.00737**	**0.0170**	**0.0124**	**0.00013**	**0.00302**	…	…	*(<0.0003)*	*<0.00011*	*<0.00005*
ERM-EB103	PbSb1.6	40mm dia. x 30mm	…	**1.64**	**0.097**	**0.183**	**0.0180**	**0.0158**	**0.0066**	…	**0.00097**	**0.00152**	**0.000302**	**0.000020**	*0.00054*	*0.00019*	…

Zinc (Pure) Certified Reference Material (45mm dia. X 30mm disc) Mass fraction in µg/g

BAM No.	Cd	Fe	Cu	Tl	Pb	Al	In	Zn
M601	**0.55**	**2.20**	**1.89**	**2.25**	**15.7**	*<0.5*	*<0.05*	Bal.

BUNDESANSTALT FÜR MATERIALFORSCHUNG UND - PRÜFUNG (BAM), Germany

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

High Purity Substances Certified Reference Materials (Finely divided material - units of 100g) Mass fraction in µg/g

BAM No.	Description	Cert. Date	CO_2	H_2O	Ag	Al	As	B	Ba	Be	Bi	C	Ca	Cd	Ce	Cl
RS 1	SiO_2 (>99.99%)	**1991**	…	…	…	**8.7**	**<0.1**	…	…	…	…	…	**0.42**	**<0.05**	…	…
RS 2	Al_2O_3 (99.76%)	**1994**	…	**2280**	…	…	*<0.5*	*<5*	*<0.5*	*<0.2*	…	…	**3.1**	*<0.2*	*<0.1*	*<10*
RS 3	$CaCO_3$ (99.79%)	**1994**	**43970**	**1320**	…	*<5*	…	*<1*	**45.3**	…	…	…	…	*<0.5*	…	…
RS 4	Ni (99.995%)	**1996**	…	…	**<1**	**<1**	**<0.5**	*<2*	…	…	*<2*	**9.4**	**<1**	**<0.2**	…	…
RS 5	NiO (Ni (79.3%))	**1996**	…	**150**	**<1**	**6**	**<0.2**	…	**<1**	…	*<1*	**14**	**2.2**	**<0.2**	…	…
RS 6A	MgO (Mg (60.19%))	**1997**	…	**110**	…	**46**	…	…	*<10*	…	…	*<50*	**994**	…	…	…
RS 6B	MgO (Mg (60.17%))	**1997**	…	**283**	…	**49**	…	…	*<20*	…	…	*<210*	**956**	…	…	…

BAM No.	Co	Cr	Cu	Fe	Ga	Ge	Hg	In	K	La	Li	Mg	Mn	Mo	N	Na
RS 1 continued	…	**0.062**	**<0.1**	**0.62**	…	**<1**	**<0.05**	…	**0.48**	…	**0.25**	**<0.5**	**<0.2**	…	…	**<2**
RS 2 continued	**<1**	**<1.5**	**<2.5**	**3.3**	*<2*	…	…	*<0.5*	*<5*	*<0.3*	*<1*	**<3**	**<1.5**	*<1*	…	**<15**
RS 3 continued	*<1*	**<1**	**<1**	**<5**	*<1.5*	…	…	…	*<20*	*<0.5*	…	**183**	**3.0**	…	…	**47.5**
RS 4 continued	**<1**	**<0.5**	**<2**	**4.2**	**<0.2**	…	*<1*	*<0.2*	…	…	…	**<0.8**	**<0.5**	*<0.2*	**2.5**	*<1*
RS 5 continued	**<2**	**10**	**1.53**	**27**	**<0.5**	…	…	*<1*	**<2**	…	*<2*	**<1**	**<1**	**<5**	…	**<2**
RS 6A continued	*<5*	**9.2**	*<6*	**82**	…	…	…	…	…	…	…	**601900**	**5.4**	*<10*	…	…
RS 6B continued	*<5*	**8.1**	*<6*	**80**	…	…	…	…	…	…	…	**601700**	**5.2**	*<10*	…	…

BAM No.	Ni	O	Pb	S	Sb	Se	Si	Sn	Sr	Te	Ti	Tl	V	W	Zn	Zr
RS 1 continued	**<0.2**	…	**<0.15**	…	…	…	…	…	…	…	**1.3**	…	…	…	**<1.3**	**<0.1**
RS 2 continued	**<10**	…	…	…	…	…	**<20**	*<1*	…	…	**<2**	…	*<1*	…	**<2**	**3.2**
RS 3 continued	*<3*	…	*<0.1*	…	…	…	*<20*	*<1*	**173**	…	*<0.5*	…	…	…	**<2**	*<0.2*
RS 4 continued	**999950**	*29*	**<1**	*<2*	**<0.2**	**<1**	*<2*	**0.3**	…	*<0.2*	…	**<0.2**	*<0.2*	*<0.1*	**<4**	…
RS 5 continued	**793000**	**207000**	**<2**	*<4*	*<0.1*	**<1**	*<5*	*<1*	*<1*	*<0.2*	*<2*	**<0.5**	**<1**	*<1*	**3.4**	*<1*
RS 6A continued	**3.9**	…	*<5*	…	…	…	…	…	**2.0**	…	**1.3**	…	**8.4**	…	*<6*	*<20*
RS 6B continued	**3.3**	…	*<5*	…	…	…	…	…	**2.1**	…	**1.2**	…	**7.8**	…	*<6*	*<160*

Silicon Nitride Powder Certified Reference Material (finely divided material - units of 50g) Mass fraction in µg/g

BAM No.	Al	Ca	Co	Fe	Mg	Na	W	C	N	O	β-phase
ERM-ED101	**469**	**14.1**	**43.5**	**79.5**	**4.3**	**7.59**	**41.3**	**1620**	**381000**	*19100*	**74300**

Tungsten Metal Powder Certified Reference Material (Finely divided material - units of 100g) Mass fraction in µg/g

BAM No.	Al	Ca	Co	Cr	Cu	Fe	K	Mg	Mn	Mo	Na	Ni	P	Si	Sn
S002	**29.4**	**46**	**45**	**47.0**	**28.4**	**53**	**40.0**	**38.8**	**16.7**	**59**	**41**	**29**	*7.2*	**106**	**42**

Glass Containing Hexavalent Chromium Certified Reference Material (Finely divided material - units of 50g) Mass fraction in %

BAM No.	SiO_2	Na_2O	CaO	Al_2O_3	BaO	MgO	ZnO	SO_3	K_2O	Cr_2O_3	Fe_2O_3	CuO	Cr Hexavalent	Cr Total
S004	*70.9*	*14.5*	*9.4*	*2.15*	*1.2*	*0.90*	*0.33*	*0.17*	*0.16*	*0.07*	*0.06*	*0.04*	**0.0094**	**0.0471**

Multielement Glass for XRF Analysis Certified Reference Materials (39mm x 5mm discs) Mass fraction in µg/g

BAM No.	As_2O_3	BaO	CaO	Ce_2O_3	Cl	CoO	Cr_2O_3	CuO	Fe_2O_3	MnO_2	MoO_3	Ni0	Pb0	Sb_2O_5	Se	SnO_2	SO_3	SrO	TiO_2	V_2O_5	ZnO	ZrO_2
S005A - Type A	**132**	**115**	**62**	**105**	**247**	**49.4**	**15.6**	**112**	**422**	**124**	**343**	**59.0**	**202**	**132**	**19.6**	**100**	**1942**	**151**	**164**	**350**	**203**	**842**
S005B - Type B	**132**	**115**	**62**	**105**	**247**	**49.4**	**15.2**	**112**	**422**	**124**	**343**	**59.0**	**202**	**132**	**19.6**	**100**	**1942**	**151**	**163**	**349**	**203**	**842**

COMMUNITY BUREAU OF REFERENCE (BCR), Belgium

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

Biological and Environmental Certified Reference Materials (Finely divided material - unit weights as shown below)

BCR No.	Description	Unit	Al	As	C	Ca	Cd	Cl	Cr	Cu	Fe	Hg	I	K	Mg	Mn
060	Lagarosiphon Major (Aquatic Plant)	25g	**4180**	…	…	…	**2.20**	*10000*	…	**51.2**	…	**0.34**	…	…	…	**1759**
062	Olive Europoea (Olive Leaves)	25g	**450**	…	…	…	**0.10**	*700*	…	**46.6**	…	**0.28**	…	…	…	**57.0**
063R	Skim Milk Powder-natural	50g	…	…	…	**13490**	…	**9940**	…	**0.602**	**2.32**	…	*0.81*	**17680**	**1263**	…
100	Beech Leaves	30g	**435**	…	*500000*	*5100*	*0.34*	**1490**	**6.7**	*12.0*	*550*	…	…	*9600*	*873*	*1.330*
129	Hay Powder	30g	…	…	*45200*	**6400**	…	…	…	*10*	*114*	…	**0.167**	**33800**	**1450**	**70**
150	Skim Milk Powder - spiked	23g	…	…	…	…	**0.0218**	…	…	**2.23**	**11.8**	**0.0094**	**1.29**	…	…	*23600*
151	" - spiked	23g	…	…	…	…	**0.101**	…	…	**5.23**	**50.1**	**0.101**	**5.35**	…	…	*22300*
184	Bovine Muscle	15g	…	***0.26***	…	*150*	**0.013**	*2000*	*0.076-0.153**	**2.36**	**79**	**0.0026**	*0.04*	*16600*	*1020*	**334**
185R	Bovine Liver	15g	…	**0.033**	…	…	**0.544**	…	…	**277**	…	…	…	…	…	**11.07**
191	Brown Bread	40g	…	*0.023*	…	*410*	**0.0284**	*16500*	*0.068-0.360**	**2.6**	**40.7**	*0.002*	…	*3100*	*500*	**20.3**
279	Ulva Lactuca (Sea Lettuce)	35g	…	**3.09**	…	*27000*	**0.274**	…	…	**13.14**	*2400*	*0.05*	*1.54*	*13000*	…	…
402	White Clover	25g	…	**0.093**	…	…	…	…	…	…	*244*	…	…	…	…	…
414	Plankton	5g	…	**6.82**	…	…	**0.383**	…	**23.8**	**29.5**	*1.85*	**0.276**	…	…	…	**299**
482	Lichen	15g	**1103**	**0.85**	…	…	**0.56**	…	**4.12**	**7.03**	…	**0.48**	…	…	…	…
679	White Cabbage	15g	…	**0.0070**	…	…	**1.66**	…	…	**2.89**	**55.0**	**0.0063**	…	…	…	…

* Range of results observed

BCR No.	Mo	N	Na	Ni	P	Pb	S	Se	Sr	Tl	Zn	Others
060 continued	…	*41200*	…	…	…	**63.8**	*5200*	…	…	…	**313**	…
062 continued	…	*19500*	…	…	…	**25.0**	*1600*	…	…	…	**16.0**	…
063R continued	*0.33*	**62300**	**4370**	…	**11100**	**0.0185**	…	*0.129*	…	…	**49.0**	…
100 continued	…	**26290**	…	…	**1550**	*16.3*	**2690**	…	…	…	*69*	…
129 continued	*1*	**37200**	…	…	**2360**	…	**3160**	*0.025*	…	…	**32.1**	…
150 continued	…	…	…	*0.062*	…	**1.00**	…	*0.127*	…	*0.001*	*49*	…
151 continued	…	…	…	*0.056*	…	**2.002**	…	*0.125*	…	*0.0008*	*50*	…
184 continued	…	…	*2000*	*0.27*	*8300*	**0.239**	…	**0.183**	…	…	**166**	…
185R continued	…	…	…	…	…	**0.172**	…	**1.680**	…	…	**138.6**	…
191 continued	…	…	*10000*	*0.44*	*2100*	**0.187**	…	*0.025*	…	…	**19.5**	…
279 continued	…	*20800*	…	…	*1800*	**13.48**	…	**0.593**	…	…	**51.3**	*345* **Br**
402 continued	**6.93**	…	…	*8.25*	…	…	…	**6.70**	…	…	*25.2*	**0.178 Co**
414 continued	…	…	…	**18.8**	…	**3.97**	…	**1.75**	**261**	…	**112**	**8.23 V**
482 continued	…	…	…	**2.47**	…	**40.9**	…	…	…	…	**100.6**	…
679 continued	**14.8**	…	…	**27.0**	…	…	…	…	**11.8**	**0.00295**	**79.7**	**27.7 B, 0.0103 Ba, 0.0206 Sb**

COMMUNITY BUREAU OF REFERENCE (BCR), Belgium

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

Environmental Certified Reference Materials (Finely divided material – unit weights as shown below)

BCR No.	Description		Unit	As	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Se	Na	Zn	Others
038	Coal Fly Ash	µg/g	5g	**48.0**	**4.6**	**53.8**	**192**	**176**	**33800**	**2.10**	**479**	*194*	**262**	…	**3740**	**581**	*17.3* **Th**, *334* **V**
142R	Light Sandy Soil	"	40g	…	**0.34**	**12.1**	*113*	**69.7**	…	**0.067**	**970**	**64.5**	**40.2**	…	…	*101*	} Data on Aqua Regia Solubles
143R	Sewage Sludge- amended soil	"	40g	…	**71.8**	**12.3**	*577*	**130.6**	…	**1.10**	**904**	**299**	**179.7**	*0.6*	…	**1055**	
144R	Sewage Sludge- domestic origin	"	40g	…	**1.82**	**15.0**	**104**	**308**	…	**3.14**	**208**	**47.7**	**106**	…	…	**932**	
145R	Sewage Sludge- mixed origin	"	40g	…	**3.50**	**5.61**	*313*	**696**	…	**2.01**	**156**	**247**	**286**	…	…	**2122**	
146R	Sewage Sludge- industrial origin	"	40g	…	**18.8**	**7.39**	**196**	**838**	…	**8.62**	**324**	**69.7**	**609**	…	…	**3061**	…

Particle Size Distribution and Surface Area Certified Reference Materials

BCR No.	Type of Quartz	Unit	Certified Property	Size Range
066	Powder	10g	Stokes' Diameter	**0.35 - 3.50** µm
067	Powder	10g	"	**2.4 - 32** µm
068	Sand	100g	Volume Diameter	**160 - 630** µm
069	Powder	10g	Stokes' Diameter	**14 - 90** µm
070	Powder	10g	"	**1.2 - 20** µm
130	Powder	50g	Volume Diameter	**50 - 220** µm
131	Powder	200g	"	**0.48 - 1.80** mm
132	Gravel	700g	"	**1.4 - 5** mm
169	Alpha alumina	60g	Specific Surface Area	**0.104** m^2/g
170	Alpha alumina	60g	" " "	**1.05** m^2/g
171	Alumina	50g	" " "	**2.95** m^2/g
172	Quartz	10g	" " "	**2.56** m^2/g
173	Rutile Titania	46g	" " "	**8.23** m^2/g
175	Tungsten	200g	" " "	**0.181** m^2/g

Sulphur in Fuel Certified Reference Materials

BCR No.	Description		Unit	S
106	"	%	25g	**0.502**
107	"	%	25g	**1.040**
331	Low Volatile Steam Coal	mg/g	20g	**4.99**
332	HV Industrial Coal	mg/g	20g	**9.61**
333	Coking Steam Coal	mg/g	20g	**13.44**
334	Anthracite	mg/g	20g	**16.09**
335	Flame Coal	mg/g	20g	**50.8**
336	HV Steam Coal	mg/g	20g	**32.90**

Zinc and Zinc Alloy Certified Reference Materials (80mm dia x 20mm discs)

BCR No.	Description		Al	Cd	Cu	Fe	In	Mg	Ni	Pb	Sn	Tl
321	Unalloyed Zinc	µg/g	**<0.7**	*0.22*	*0.95*	*2.3*	**<0.2**	…	…	**4.7**	**<0.5**	**0.8**
EB322	"	"	…	**15.08**	**5.89**	**19.1**	…	…	…	**15.0**	**5.6**	**5.28**
EB323	"	"	…	**6.51**	**18.9**	**11.3**	…	…	…	**48.6**	**18.7**	**10.8**
EB324	"	"	…	**48.6**	**9.87**	**58.5**	…	…	…	**26.1**	**9.8**	**19.9**
EB325	"	"	…	**94.7**	**47.5**	**56.1**	…	…	…	**142**	**46.1**	**36.8**
326	"	"	*<0.7*	**204**	**105**	**265**	…	…	…	**307**	…	…
327	"	"	…	**302**	*0.56*	**144**	…	…	…	**408**	…	…
351	Zamak 3	"	**43500**	*0.2*	**12.1**	…	**<0.2**	**130**	*1.9*	**4.5**	**<1**	**0.7**
352	"	"	**41500**	**2.9**	**31.2**	…	**3.0**	**282**	**6.8**	*6.5*	**3.0**	**3.2**
353	"	"	**39500**	**10.5**	**100**	…	**2.6**	**452**	…	**24.7**	**5.5**	**4.0**
354	"	"	**37300**	**30**	**311**	…	**9.8**	**604**	**83.5**	**31.0**	**14.0**	**11.0**
355	"	"	**34400**	**58**	**1034**	…	**24.6**	**786**	**267**	**57**	**29.4**	**23**
356	Zamak 5	"	**44300**	**0.73**	**3940**	**31.4**	**<0.2**	**133**	**3.4**	**10**	**0.3**	**0.8**
357	"	"	**42300**	**2.8**	**5850**	**25.5**	**3.3**	**273**	**9.8**	**14**	**3.5**	**2.8**
359	"	"	**37100**	**30**	**9880**	**120**	**15.5**	**560**	**92**	**36**	**17.2**	**13.4**
360	"	"	**34200**	**60**	**12320**	…	**30**	**707**	**267**	**75**	**33.3**	**26.0**
361	"	"	*40700*	*0.80*	**798**	**10.4**	*<0.2*	…	…	**5.3**	**46.8**	**37.2**

COMMUNITY BUREAU OF REFERENCE (BCR), Belgium

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

Water Certified Reference Materials (Concentrations and unit weights as shown below)

BCR No.	Description	Unit	Al	As	Ca	Cd	Cl	Cu	K	Mg	Na	Ni	Pb	Zn	NO_3	SO_4	Mn
505	Estuarine Water nmol/kg	1litre	…	…	…	**0.80**	…	**29.4**	…	…	…	**24.1**	…	**172**	…	…	…
609	Ground Water mg/kg	500ml	**47.7**	**1.20**	…	**0.164**	…	**2.48**	…	…	…	…	**1.63**	…	…	…	…
610	Ground Water mg/kg	500ml	**159**	**10.8**	…	**2.94**	…	**45.7**	…	…	…	…	**7.78**	…	…	…	…
617	Ground Water mg/kg	75ml	…	…	**14.6**	…	**26.4**	…	**9.93**	**7.32**	**14.6**	…	…	…	**25.8**	**26.3**	**0.050**

Coal Certified Reference Material (Finely divided material – units of 40g) nominal mass content in µg/g

BCR No.	Description	F
460	Fluorine in Coal	**225**

Copper Certified Reference Materials nominal mass content in µg/g

BCR No.	Description	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	O	P	Pb	S	Sb	Se	Sn	Te	Zn
017	Phosphorus Deoxidised Copper	…	…	…	…	…	…	…	…	…	…	**6.9**	…	**10.4**	…	…	…	…	…
022	Electrolytic Copper	…	…	…	…	…	…	…	…	…	**138**	…	…	…	…	…	…	…	…
054R	Low Oxygen in Copper	…	…	…	…	…	…	…	…	…	**0.47**	…	…	…	…	…	…	…	…
058	Continuous Cast Copper	…	…	…	…	…	…	…	…	…	**390**	…	…	…	…	…	…	…	…
074	Electrolytic Copper (OFHC)	**12.8**	**0.78**	*0.10*	**<0.02**	**<0.05**	**<0.1**	**1.14**	**1.27**	**1.04**	…	…	**0.97**	…	**0.58**	**0.37**	**<0.07**	*0.21*	**0.46**

These copper CRMs are available in the following forms:

017A 42mm dia x 30mm discs
022A 26mm dia x 9mm discs
054R 7mm dia x 50mm rods
058 7mm dia x 50mm rods
074A 40mm dia x 30mm discs

Lead Certified Reference Materials (All available as finely divided material units of 160g, 286 and 287 also available as blocks, 60 x 60 x 12mm) nominal mass content in µg/g

BCR No.	Description	Ag	As	Bi	Cd	Cu	Ni	Pb	Sb	Se	Sn	Tl	Ti	Zn
286	Electrorefined Lead	**0.015**	**<0.002**	**21.5**	**0.125**	**1.49**	**0.041**	Bal.	**0.10**	**<0.05**	**<0.05**	**<0.1**	**2.5**	**<0.1**
287	Thermally Refined Lead	**15.2**	**<0.003**	**67.3**	**0.36**	**0.98**	**0.024**	Bal.	**0.040**	**<0.05**	**<0.05**	**<0.2**	**0.73**	**<0.1**
288	Lead with added impurities	**30.5**	**55.7**	**215.8**	**33.3**	**19.3**	**4.57**	Bal.	**32.5**	**<0.2**	**30.6**	**32.8**	**2.3**	**8.2**

These tables represent only a small selection from the BCR range, which includes samples under the headings:

Gases in Metals
Non Ferrous Metals
Ores
Coke
Coal
PCBs
Lead Crystal Glass
Fertilizers
Organic Compounds
Flash Point
Limiting Viscosity Number
Cosmetic Preservatives
Biomedical
Thermal Conductivity
Gas Mixtures
Polycyclic Aromatic Compounds

BNF - FULMER, (BNF) UK

CHEMICAL COMPOSITION (nominal mass content in %)

Following the closure of the BNF-Fulmer organization in October 1992, BAS purchased their entire stock of non-ferrous spectroscopic reference materials and will continue to supply these until exhausted. Replacement samples are being produced by BAS in order to maintain continuity of these samples (see BAS Catalogue No. 782 for details of 43 such samples, designated CURMs, produced by BAS).

Copper Base Reference Materials (Approx. 50mm dia x 10mm discs)

BNF No.	Description	Cu	Sn	Pb	Zn	Ni	P	Fe	Si	Mn	As	Sb	Bi	Al	Mg	Co	S	Ag	Te
C09.05	Phos. Deoxidised Copper	Bal.	*<0.001*	*<0.001*	*<0.005*	*<0.001*	*0.027*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.0005*	*<0.001*	…	*<0.0005*	…	*<0.001*	*<0.002*
C11.01	Copper Tin Binary Bronzes	Bal.	*3.4*	*0.01*	*<0.005*	*0.006*	*0.009*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.0005*	*<0.005*	*<0.001*	…	*<0.001*	…	…
C11.02	″	Bal.	*5.5*	*0.02*	*<0.005*	*0.006*	*0.02*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.0005*	*<0.005*	*<0.001*	…	*<0.001*	…	…
C11.03	″	Bal.	*7.4*	*0.01*	*<0.005*	*<0.005*	*0.04*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.0005*	*<0.005*	*<0.001*	…	*<0.001*	…	…
C11.04	″	Bal.	*9.6*	*0.01*	*<0.005*	*<0.005*	*0.05*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.0005*	*<0.005*	*<0.001*	…	*<0.001*	…	…
C30.01	Main Elements in Brasses	*51.48*	*<0.01*	*<0.01*	Bal.	*<0.005*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*0.005*	*<0.002*	…	…	…	…	…
C30.02	″	*55.6*	*<0.01*	*<0.01*	Bal.	*<0.005*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	…	…	…	…	…
C30.03	″	*60.6*	*<0.01*	*<0.01*	*39.3*	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	…	…	…	…	…
C30.06	″	*74.8*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.07	″	*82.0*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.08	″	*85.1*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.09	″	*89.5*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.10	″	*93.8*	*<0.01*	*<0.01*	*6.1*	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.12	″	*60.85*	*<0.01*	*<0.01*	Bal.	*0.52*	…	*<0.005*	*<0.005*	*0.90*	*<0.005*	*<0.005*	*<0.002*	*<0.005*	…	…	…	…	…
C30.13	″	*60.6*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*1.9*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.14	″	*60.5*	*<0.005*	*<0.01*	Bal.	*1.0*	…	*<0.01*	*<0.005*	*2.4*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	…	…	…	…	…
C30.15	″	*60.6*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*0.55*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.16	″	*61.2*	*<0.01*	*<0.01*	Bal.	*<0.01*	…	*0.90*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.002*	*<0.002*	…	…	…	…	…
C30.17	″	*61.6*	*<0.01*	*0.01*	Bal.	*0.01*	…	*1.4*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	…	…	…	…	…
C30.18	″	*64.36*	*0.65*	*<0.01*	Bal.	*<0.005*	…	*<0.005*	*0.10*	*<0.005*	*<0.005*	*<0.005*	*<0.003*	*2.91*	…	…	…	…	…
C30.19	″	*69.9*	*1.07*	*<0.01*	Bal.	*<0.01*	…	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.01*	*<0.002*	*4.65*	…	…	…	…	…
C30.21	″	*56.0*	*1.96*	*<0.005*	Bal.	*<0.005*	…	*<0.005*	*0.18*	*<0.005*	*<0.005*	*<0.01*	…	*1.44*	…	…	…	…	…
C30.22	″	*58.28*	*0.009*	*1.05*	Bal.	*<0.01*	…	*0.006*	*<0.005*	*<0.005*	*0.011*	*<0.012*	*<0.005*	*<0.003*	…	…	…	…	…
C38.01	Impurities in Brasses	*61*	*0.20*	*0.20*	Bal.	*0.01*	…	*0.01*	*<0.0005*	*0.009*	*0.03*	*0.02*	*<0.0005*	*0.003*	…	…	…	…	…
C38.02	″	*61*	*0.10*	*0.10*	Bal.	*0.03*	…	*0.09*	*0.01*	*0.14*	*0.06*	*0.06*	*0.005*	*0.004*	…	…	…	…	…
C38.03	″	*61*	*0.05*	*0.06*	Bal.	*0.13*	…	*0.05*	*0.07*	*0.07*	*0.08*	*0.08*	*0.008*	*0.07*	…	…	…	…	…
C38.04	″	*61*	*0.02*	*0.03*	Bal.	*0.06*	…	*0.04*	*0.12*	*0.22*	*0.04*	*0.12*	*0.008*	*0.02*	…	…	…	…	…
C38.05	″	*61*	*0.01*	*0.02*	Bal.	*0.19*	…	*0.008*	*0.14*	*0.02*	*0.01*	*0.01*	*0.01*	*0.12*	…	…	…	…	…
C38.06	″	*61*	*<0.005*	*0.002*	Bal.	*<0.005*	…	*<0.005*	*<0.0005*	*<0.001*	*<0.001*	*<0.002*	*<0.0005*	*<0.001*	…	…	…	…	…
C38.07	60/40 Brass Setting-Up Sample	*60*	*0.2*	*0.2*	Bal.	*0.2*	…	*0.1*	*0.03*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	…	…	…	…	…

BNF - FULMER, (BNF) UK

CHEMICAL COMPOSITION (nominal mass content in %)

Copper Base Reference Materials (Approx. 50mm dia x 10mm discs)

BNF No.	Description	Cu	Sn	Pb	Zn	Ni	P	Fe	Si	Mn	As	Sb	Bi	Al	Mg	Co	S	Cr	Ag	Cd
C42.21	Admiralty and Naval Brasses	*66.1*	*0.54*	*0.23*	*Bal.*	*0.096*	*0.081*	*0.06*	*0.081*	*<0.005*	*<0.005*	*0.19*	*0.012*	*0.005*	…	…	*0.007*	…	…	…
C42.25	″	*58.5*	*2.2*	*<0.01*	*Bal.*	*<0.005*	*0.06*	*<0.005*	*<0.002*	*0.13*	*0.10*	*<0.005*	*<0.002*	*0.02*	…	…	*0.001*	…	…	…
C43.03	Aluminium Brass	*80.0*	*<0.01*	*0.11*	*Bal.*	*<0.003*	…	*0.044*	*<0.005*	*<0.002*	*<0.005*	*<0.01*	*<0.005*	*1.41*	…	…	…	…	…	…
C48.03	Cartridge Brasses	*70.45*	*0.047*	*0.054*	*Bal.*	*0.030*	*<0.001*	*<0.001*	*<0.002*	*0.040*	*0.079*	*0.097*	*0.029*	*0.007*	*0.001*	…	*0.004*	*0.0005*	…	*0.013*
C48.06	″	*71.6*	*0.03*	*0.02*	*Bal.*	*0.11*	*0.002*	*0.02*	*0.006*	*0.006*	*0.008*	*0.006*	*0.004*	*0.002*	*0.001*	…	*0.006*	*0.0006*	…	*0.008*
C50.03	Leaded Bronze	Bal.	*8.46*	*8.41*	*1.55*	*1.56*	*0.13*	*0.04*	*<0.005*	*0.004*	*0.094*	*0.11*	*0.027*	*<0.005*	…	…	*0.08*	…	…	…
C51.11	Aluminium Bronzes	Bal.	*0.025*	*0.31*	*0.07*	*0.15*	*0.03*	*0.07*	*0.11*	*<0.005*	*<0.01*	…	…	*5.0*	…	…	…	…	…	…
C51.12	″	Bal.	*0.18*	*0.25*	*0.42*	*0.11*	*<0.005*	*2.90*	*<0.01*	*1.25*	*0.11*	…	…	*6.06*	…	…	…	…	…	…
C51.13	″	Bal.	*0.19*	*0.12*	*0.30*	*0.053*	*0.021*	*2.05*	*0.16*	*0.77*	*0.21*	…	…	*6.93*	…	…	…	…	…	…
C52.51	Aluminium Bronzes	Bal.	*<0.01*	*<0.01*	*0.02*	*5.1*	…	*4.3*	*<0.01*	*<0.01*	…	…	…	*10.0*	*<0.01*	…	…	*<0.01*	…	…
C52.53	″	Bal.	*0.07*	*0.04*	*0.11*	*4.1*	…	*5.5*	*0.10*	*0.38*	…	…	…	*10.7*	*0.07*	…	…	*0.19*	…	…
C52.55	″	Bal.	*0.03*	*0.14*	*0.10*	*4.6*	…	*4.9*	*0.03*	*1.1*	…	…	…	*9.3*	*0.13*	…	…	*0.05*	…	…
C52.56	″	Bal.	*0.11*	*0.17*	*0.28*	*5.6*	…	*4.6*	*0.15*	*0.74*	…	…	…	*8.9*	*0.09*	…	…	*0.14*	…	…
C54.01	Phosphor Bronzes	Bal.	*3.2*	*0.29*	*0.31*	*0.26*	*0.05*	*0.01*	*0.006*	*0.13*	*0.04*	*0.08*	…	*0.009*	*<0.001*	…	*0.03*	…	…	…
C62.11	Cupro-Nickels	Bal.	*0.04*	*<0.005*	*0.097*	*29.8*	…	*0.60*	*0.36*	*0.52*	…	…	…	…	*0.03*	*<0.005*	*<0.005*	…	…	…
C62.13	″	Bal.	*0.06*	*0.046*	*0.01*	*14.2*	…	*<0.005*	*0.071*	*0.95*	…	…	…	…	*0.014*	*0.055*	*0.12*	…	…	…
C62.14	″	Bal.	*0.12*	*0.01*	*0.12*	*20.2*	…	*1.49*	*0.022*	*0.24*	…	…	…	…	*0.002*	*0.03*	*0.083*	…	…	…
C62.15	″	Bal.	*0.03*	*0.016*	*0.04*	*25.9*	…	*2.36*	*0.014*	*0.23*	…	…	…	…	*0.004*	*0.042*	*0.023*	…	…	…
C65.26	Nickel Silvers	*56.7*	*<0.01*	*0.06*	*30.5*	*11.9*	*0.11*	*<0.01*	*<0.002*	*0.70*	…	…	…	…	*<0.01*	…	*0.0006*	…	…	…
C65.27	″	*57.0*	*0.01*	*0.04*	*28.7*	*13.9*	*0.02*	*0.26*	*<0.002*	*0.13*	…	…	…	…	*<0.01*	…	*0.03*	…	…	…
C65.28	″	*56.9*	*0.15*	*0.06*	*26.7*	*15.3*	*0.07*	*0.13*	*0.01*	*0.57*	…	…	…	…	*0.01*	…	*0.03*	…	…	…
C65.29	″	*58.9*	*0.08*	*0.11*	*23.4*	*16.8*	*0.07*	*0.39*	*0.02*	*0.17*	…	…	…	…	*0.01*	…	*0.07*	…	…	…
C65.30	″	*55.0*	*0.04*	*0.25*	*23.5*	*19.8*	*0.05*	*1.0*	*0.10*	*0.09*	…	…	…	…	*0.01*	…	*0.04*	…	…	…
C71.34	Gunmetal	Bal.	*8.20*	*2.47*	*1.55*	*<0.01*	*0.020*	*0.29*	*0.04*	*0.05*	*0.18*	*0.071*	*0.029*	*0.007*	…	…	*0.16*	*0.03*	*0.025*	…

BNF - FULMER, (BNF) UK

CHEMICAL COMPOSITION (nominal mass content in %)

Nickel Base Alloy Reference Materials (28.6mm dia. x 25mm discs)

BNF No.	Description	C	Si	Cu	Fe	Mn	Cr	Ti	Al	Co	Mo	Mg	Ni
B6998	MONEL alloy 400	*0.09*	*0.04*	*31.3**	*2.30*	*0.29*	*0.02*	*0.11*	*0.008*	*0.025*	…	*0.079*	Bal.
B7000	″	*0.05*	*0.11*	*31.5**	*0.64*	*0.87*	*0.035*	*0.03*	*0.028*	*0.50*	…	*0.026*	Bal.
B7001	″	*0.01*	*0.28*	*31.4**	*0.32*	*1.66*	*0.05*	*0.025*	*0.040*	*0.25*	…	*0.010*	Bal.
B7002	″	*0.015*	*0.15*	*31.7**	*0.13*	*2.65*	*0.10*	*0.015*	*0.060*	*0.10*	…	*0.007*	Bal.
E3918	NIMONIC Alloy 75	*0.05*	*1.14*	*0.005*	*1.57*	*0.85*	*19.4**	*0.72*	*0.25*	*0.22*	*0.49*	*0.058*	Bal.
E3919	″	*0.07*	*0.89*	*0.055*	*2.62*	*0.47*	*19.6**	*0.40*	*0.15*	*1.00*	*0.25*	*0.040*	Bal.
E3920	″	*0.07*	*0.57*	*0.11*	*3.02*	*0.28*	*19.2**	*0.35*	*0.13*	*2.02*	*0.095*	*0.020*	Bal.
E3921	″	*0.11*	*0.34*	*0.27*	*3.50*	*0.14*	*19.4**	*0.20*	*0.045*	*0.53*	*0.05*	…	Bal.
E3922	″	*0.14*	*0.16*	*0.50*	*3.98*	*0.10*	*19.2**	*0.08*	*0.035*	*0.115*	*0.03*	*0.014*	Bal.
B7004	NIMONIC Alloy 80A	*0.01*	*0.17*	*0.14*	*0.97*	*0.08*	*19.6**	*2.63*	*1.64*	*0.06*	*0.06*	*0.002*	Bal.
B7005	″	*0.035*	*0.23*	*0.045*	*0.32*	*0.16*	*19.6**	*2.52*	*1.55*	*1.04*	*0.10*	*0.005*	Bal.
B7006	″	*0.08*	*1.03*	*0.075*	*0.61*	*0.25*	*19.6**	*2.14*	*1.19*	*0.35*	*0.20*	*0.008*	Bal.
B7007	″	*0.14*	*0.66*	*0.22*	*0.22*	*0.53*	*19.4**	*2.31*	*1.36*	*0.15*	*0.39*	*0.019*	Bal.
B7008	″	*0.21*	*0.36*	*0.025*	*0.19*	*0.02*	*19.3**	*2.33*	*1.46*	*2.00*	*<0.01*	*0.030*	Bal.
B7010	NIMONIC Alloy 90	*0.05*	*0.22*	*0.04*	*0.62*	*0.24*	*19.7**	*2.48*	*1.61*	*16.9**	*0.10*	*0.004*	Bal.
B7011	″	*0.095*	*1.02*	*0.065*	*0.34*	*0.16*	*19.7**	*2.05*	*1.20*	*17.0**	*0.20*	*0.010*	Bal.
B7012	″	*0.16*	*0.39*	*0.11*	*0.25*	*0.53*	*19.6**	*2.28*	*1.25*	*17.0**	*0.39*	*0.018*	Bal.
B7013	″	*0.22*	*0.65*	*0.20*	*0.22*	*0.06*	*19.6**	*2.39*	*1.46*	*17.0**	*<0.01*	*0.030*	Bal.
E3923	NIMONIC Alloy 800	*0.01*	*0.17*	*0.54*	*Bal.*	*1.00*	*20.6**	*0.29*	*0.57*	*0.06*	*0.51*	…	*32.0**
E3924	″	*0.03*	*0.30*	*0.29*	*Bal.*	*0.85*	*20.6**	*0.30*	*0.28*	*0.13*	*0.26*	…	*32.3**
E3925	″	*0.08*	*0.41*	*0.14*	*Bal.*	*0.68*	*20.8**	*0.28*	*0.24*	*0.28*	*0.10*	…	*32.2**
E3926	″	*0.06*	*0.60*	*0.085*	*Bal.*	*0.50*	*20.2**	*0.39*	*0.08*	*0.54*	*0.05*	…	*32.0**
E3927	″	*0.08*	*0.75*	*0.055*	*Bal.*	*0.40*	*20.4**	*0.58*	*0.10*	*1.02*	*0.025*	…	*32.1**
E3928	INCOLOY Alloy DS	*0.10*	*1.77*	*0.05*	*Bal.*	*1.44*	*18.2**	*0.24*	*0.115*	*1.01*	*0.025*	…	*36.5**
E3929	″	*0.085*	*1.80*	*0.085*	*Bal.*	*1.30*	*17.9**	*0.14*	*0.07*	*0.52*	*0.055*	…	*36.3**
E3930	″	*0.08*	*2.09*	*0.135*	*Bal.*	*1.18*	*18.6**	*0.065*	*0.03*	*0.26*	*0.105*	…	*36.2**
E3931	″	*0.05*	*2.32*	*0.28*	*Bal.*	*1.06*	*18.5**	*0.035*	*0.015*	*0.12*	*0.25*	…	*36.4**
E3932	″	*0.04*	*2.50*	*0.55*	*Bal.*	*0.93*	*18.5**	*0.025*	*0.01*	*0.07*	*0.49*	…	*36.4**

***** These values are not designed for calibration purposes and are quoted for reference only.(MONEL, NIMONIC and INCOLOY are all trade marks of INCO Ltd.)

BNF - FULMER, (BNF) UK

CHEMICAL COMPOSITION (nominal mass content)

Nickel Base Alloy Reference Materials (B5789 to B7050 are 28.6. x 25mm discs; N50.03 is approximately a 50mm dia. x 10mm disc) Nominal mass content in %

BNF No.	Description	C	Si	Cu	Sn	Zn	P	Fe	Mn	Cr	Ti	Al	Co	Mg	Mo	Nb	S	Ni
B5789	INCONEL Alloy 600	…	*0.61*	*0.24*	…	…	…	*6.10*	*0.39*	*16.5**	*0.52*	*0.09*	*0.60*	*0.017*	…	…	…	Bal.
B5871	″	…	*0.88*	*0.02*	…	…	…	*6.34*	*0.57*	*16.0**	*0.27*	*0.18*	*1.09*	*0.013*	…	…	…	Bal.
B5967	″	…	*0.45*	*0.41*	…	…	…	*7.18*	*0.23*	*16.0**	*0.28*	*0.09*	*0.31*	*0.038*	…	…	…	Bal.
B5968	″	…	*0.22*	*0.80*	…	…	…	*8.05*	*0.12*	*16.0**	*0.11*	*0.03*	*0.18*	*0.059*	…	…	…	Bal.
B7047	INCONEL Alloy X-750	*0.035*	*0.17*	*0.49*	…	…	…	*5.51*	*1.29*	*15.0**	*2.71*	*0.49*	…	…	*0.58*	*1.36†*	…	Bal.
B7048	″	*0.075*	*0.23*	*0.30*	…	…	…	*6.09*	*1.00*	*15.1**	*2.52*	*0.71*	…	…	*0.30*	*1.18†*	…	Bal.
B7049	″	*0.09*	*0.33*	*0.155*	…	…	…	*7.08*	*0.81*	*15.0**	*2.30*	*0.91*	…	…	*0.20*	*0.97†*	…	Bal.
B7050	″	*0.125*	*0.44*	*0.075*	…	…	…	*8.09*	*0.61*	*15.0**	*2.27*	*1.01*	…	…	*0.10*	*0.77†*	…	Bal.
N50.03	Nickel Cu30 Sn10 Fe2	*0.10*	*0.02*	*33.2*	*11.0*	*0.36*	*0.9*	*2.3*	*0.80*	…	…	…	…	*0.02*	…	…	*0.16*	Bal.

***** These values are not designed for calibration purposes and are quoted for reference only.
† Samples contain less than 0.01% Ta.
(INCONEL is a trade mark of INCO Ltd.)

Lead Base Alloy Reference Materials (Approximately 50mm square x 20mm blocks) Nominal mass content in µg/g

BNF No.	Description	Cu	Sn	Pb	Zn	Ni	Cd	As	Sb	Bi	Ag	Te
L01.02-1	Impurities in lead	*18.0*	*≤0.7*	Bal.	*4*	*8*	*22.6*	*0.95*	*3*	*101*	*1.3*	*7.4*
L01.03-1	″	*24.3*	*≤0.7*	Bal.	*4.5*	*5.1*	*6.2*	*1.3*	*2.7*	*6*	*52*	*6.1*

Lead Base Alloy Reference Materials (Approximately 50mm square x 20mm blocks) Nominal mass content in %

BNF No.	Description	Cu	Sn	Pb	Zn	Ni	Cd	Sb	Bi	Ca	Ag
L21.01-1	Battery Alloys	*0.0008*	*0.10*	Bal.	*0.002*	*0.0005*	*0.0015*	*0.0005*	*0.03*	*0.05*	*0.005*
L21.02-1	″	*0.0013*	*0.27*	Bal.	*0.0016*	*≤0.0002*	*≤0.0002*	*0.0003*	*0.01*	*0.03*	*0.008*
L21.03-1	″	*0.002*	*0.35*	Bal.	*0.001*	*≤0.0002*	*0.001*	*0.0006*	*0.03*	*0.1*	*0.015*
L21.04-1	″	*0.003*	*0.45*	Bal.	*0.001*	*≤0.0002*	*0.001*	*0.0008*	*<0.001*	*0.1*	*0.0002*

BRAMMER STANDARD COMPANY, Inc. (BS), USA

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Chill Cast Iron Reference Material (32mm dia. x 17mm disc)

BRAMMER No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N
BS 4C	*3.82*	*0.52*	*0.21*	*0.003*	*0.001*	*0.111*	*0.105*	*0.068*	*0.003*	*0.007*	*0.0002*	*0.014*	*0.014*	*0.008*

BRAMMER No.	Nb	Pb	Sn	Ti	V	W	Zr	Ca	Ce	La	Mg	Sb	Te
BS 4C (continued)	*(0.0005)*	*(0.0004)*	*(0.0004)*	*0.002*	*0.0005*	*(0.006)*	*0.010*	*0.0013*	*0.010*	*0.002*	*0.0002*	*0.0012*	*0.0011*

Low Alloy Steel Reference Materials (CSN 2-1, CSN 2-2, CSN 3 & CSN 4 are 500 x 1g pins; HON T is 100 x 1g pins; CSN 2C is 100g finely divided material; CSN-2D 35mm dia. x 19mm discs)

BRAMMER No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Cu	H	N	O	Sn	Ti	V	Ca
BS CSN 2-1	*0.476*	…	…	…	*0.034*	…	…	…	…	…	…	…	*0.064*	…	…	…	…	…
BS CSN 2-2	*0.548*	…	…	…	*0.028*	…	…	…	…	…	…	…	*0.076*	…	…	…	…	…
BS CSN 2C	*0.469*	*0.17*	*0.60*	*0.012*	*0.0305*	*0.072*	*(0.008)*	*0.071*	*0.046*	…	*0.073*	…	*0.0173*	…	…	…	*0.004*	*0.0033*
BS CSN 2D	*0.467*	*0.17*	*0.60*	*0.012*	*0.031*	*0.072*	*(0.008)*	*0.071*	*0.046*	*0.006*	*0.073*	…	*0.0173*	…	*0.0046*	*0.002*	*0.004*	*0.0033*
BS CSN 3	*0.892*	…	…	…	*0.0035*	…	…	…	…	…	…	…	*0.0047*	…	…	…	…	…
BS CSN 4	*0.011*	*(0.20)*	*(1.6)*	*(0.04)*	*0.0008*	*(18.2)*	…	*(9.4)*	…	…	*(3.8)*	…	*0.026*	…	…	…	…	…
BS HON T	*0.050*	…	…	…	*0.0040*	…	…	…	…	…	…	*0.00027*	*0.0365*	*0.0044*	…	…	…	…

Low Alloy Steel Reference Material with minor Elements - Chill Cast (32mm dia. x 17mm discs)

BRAMMER No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb
BS 13B	*0.211*	*0.015*	*0.316*	*0.018*	*0.005*	*0.081*	*0.050*	*0.43*	*0.016*	*0.050*	*(0.00002)*	*0.19*	*0.023*	*0.0099*	*0.003*	*0.0009*

BRAMMER No.	Sn	Ti	V	W	Zr	Bi	Ca	Ce	La	Mg	Sb	Se	Ta	Zn
BS 13B (continued)	*0.061*	*0.004*	*0.010*	*0.04*	*(0.01)*	*(<0.0001)*	*(<0.0001)*	*(<0.0005)*	*(<0.0005)*	*(0.00005)*	*0.027*	*0.023*	*0.005*	*0.0003*

Calcium Treated Carbon Steel Reference Materials (41-42mm dia. x 19mm disc)

BRAMMER No.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	As	B	Ca	Co	Nb	N	O	Pb	Sb	Sn	Ti	V	W
BS 2931A	*0.178*	*0.842*	*0.0046*	*0.0262*	*0.244*	*0.199*	*0.064*	*0.086*	*0.018*	*0.0011*	*0.005*	*0.0004*	*0.0014*	*0.0067*	*(0.0004)*	*0.0099*	*0.0050*	*0.0008*	*0.0021*	*0.0094*	*0.0006*	*0.0006*	*(0.0013)*
BS 3941	*0.41*	*0.80*	*0.016*	*0.023*	*0.25*	*0.053*	*0.019*	*0.068*	*0.006*	*0.002*	*0.003*	…	*0.0013*	*0.004*	*0.031*	*0.0070*	*(0.006)*	*0.0010*	*(0.0007)*	*(0.002)*	*(0.002)*	*0.003*	…
BS 3942	*0.47*	*0.72*	*0.023*	*0.032*	*0.26*	*0.281*	*0.14*	*0.165*	*0.037*	*0.004*	*0.009*	…	*0.0012*	*0.010*	*0.019*	*(0.0088)*	*(0.0041)*	*0.0003*	*0.003*	*0.012*	*0.003*	*0.0019*	*0.003*

BRAMMER STANDARD COMPANY, Inc. (BS), USA

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

High Manganese Steel Reference Materials (32mm dia. x 17mm discs)

BRAMMER No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Cu	N	Nb	Sn	V
BS 17A	*0.588*	*0.22*	*19.38*	*0.043*	*0.005*	*1.37*	*0.52*	*0.060*	*0.052*	*0.013*	*0.135*	*0.038*	*0.06*	*0.012*	*0.016*
BS 18A	*1.13*	*0.64*	*11.30*	*0.019*	*0.043*	*0.22*	*0.049*	*0.36*	*0.019*	*0.009*	*0.029*	*0.042*	*0.05*	*0.007*	*0.32*
BS 19A	*1.57*	*1.46*	*8.76*	*0.092*	*0.009*	*3.75*	*1.97*	*1.48*	*0.057*	*0.014*	*0.51*	*0.039*	*0.040*	*0.037*	*0.10*

Stainless and High Temperature Steel Reference Materials (35 to 45mm dia. x 12mm discs)

BRAMMER No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Ca	Co	Cu	N	O	Nb	Sn	Ti	V	W	Others
BS 17-4PHA	*0.018*	*0.40*	*0.85*	*0.023*	*0.022*	*15.40*	*0.34*	*4.69*	*0.004*	*0.0016*	*0.0009*	*0.072*	*3.30*	*0.022*	*0.006*	*0.204*	*0.007*	*(0.002)*	*0.043*	*0.04*	*(0.002)* **Ta**
BS 17-4PHB	*0.042*	*0.42*	*0.56*	*0.021*	*0.024*	*15.60*	*0.11*	*4.53*	*0.0935*	*0.0036*	*(0.0003)*	*0.040*	*3.35*	*0.046*	*(0.0021)*	*0.31*	*0.012*	*0.005*	*0.059*	*(0.01)*	*(0.002)* **Ta**
BS 81P	*0.026*	*0.36*	*1.35*	*0.023*	*0.012*	*18.15*	*0.41*	*10.06*	*(0.003)*	*0.0026*	*(0.0004)*	*0.21*	*0.19*	*0.069*	*(0.0064)*	*...*	*0.007*	*0.003*	*0.078*	*0.037*	*...*
BS 82E	*0.062*	*0.58*	*1.61*	*0.027*	*0.001*	*22.38*	*0.31*	*12.49*	*0.006*	*0.0024*	*0.0014*	*0.12*	*0.26*	*0.072*	*...*	*0.062*	*0.006*	*0.003*	*0.064*	*0.041*	*...*
BS 83G	*0.073*	*0.56*	*1.66*	*0.024*	*0.004*	*24.50*	*0.085*	*19.15*	*(0.004)*	*(0.0001)*	*...*	*0.153*	*0.114*	*0.026*	*0.0064*	*0.061*	*0.003*	*(0.003)*	*0.077*	*0.007*	*...*
BS 84J	*0.017*	*0.57*	*1.46*	*0.035*	*0.025*	*17.12*	*2.08*	*10.34*	*(0.002)*	*0.0005*	*0.0010*	*0.23*	*0.46*	*0.056*	*0.0063*	*0.024*	*0.007*	*(0.002)*	*0.09*	*0.054*	*...*
BS 85D	*0.049*	*0.55*	*1.69*	*0.025*	*0.024*	*17.09*	*0.59*	*10.03*	*0.13*	*0.0006*	*0.0004*	*0.97*	*0.45*	*0.016*	*0.0014*	*0.065*	*(0.006)*	*0.48*	*0.134*	*0.06*	*0.006* **As** *0.001* **Sb**
BS 86F	*0.054*	*1.22*	*1.30*	*0.021*	*0.0011*	*18.74*	*0.24*	*34.99*	*(0.007)*	*0.0020*	*(0.001)*	*0.098*	*0.23*	*0.035*	*...*	*0.19*	*0.004*	*(0.006)*	*0.061*	*(0.03)*	*0.003* **As** *0.001* **Pb**
BS 87F	*0.055*	*0.67*	*1.64*	*0.024*	*0.025*	*17.30*	*0.29*	*10.12*	*0.004*	*(0.0006)*	*0.0007*	*0.17*	*0.28*	*0.037*	*0.005*	*0.57*	*0.004*	*0.004*	*0.13*	*0.050*	*0.005* **As**
BS 90F	*0.085*	*0.58*	*0.53*	*0.023*	*0.328*	*13.01*	*0.14*	*0.30*	*(0.006)*	*...*	*...*	*0.021*	*0.12*	*0.037*	*0.011*	*0.011*	*0.005*	*...*	*0.076*	*0.032*	*...*
BS 92B	*0.150*	*0.42*	*0.42*	*0.021*	*0.003*	*15.92*	*0.17*	*2.12*	*(0.002)*	*...*	*(0.0009)*	*0.04*	*0.13*	*0.073*	*0.0064*	*(0.006)*	*0.006*	*...*	*0.07*	*(0.02)*	*...*
BS 93E	*1.02*	*0.90*	*0.52*	*0.022*	*0.001*	*17.33*	*0.50*	*0.35*	*0.009*	*...*	*...*	*0.048*	*0.12*	*0.036*	*0.0040*	*0.005*	*0.003*	*0.007*	*0.24*	*0.11*	*...*
BS 94C	*0.057*	*0.62*	*0.45*	*0.024*	*0.002*	*25.90*	*0.20*	*0.43*	*0.004*	*...*	*0.0008*	*0.042*	*0.056*	*0.065*	*0.0061*	*0.032*	*0.006*	*...*	*0.12*	*...*	*...*
BS 180A	*0.018*	*0.32*	*5.05*	*0.012*	*0.001*	*21.09*	*2.04*	*13.19*	*0.012*	*(0.0023)*	*...*	*0.039*	*0.067*	*0.334*	*0.003*	*0.20*	*(0.002)*	*(0.002)*	*0.20*	*0.02*	*...*
BS 181A	*0.071*	*4.03*	*8.16*	*0.019*	*0.001*	*16.52*	*0.21*	*8.15*	*0.022*	*0.0009*	*...*	*0.07*	*0.18*	*0.148*	*0.0010*	*0.017*	*0.005*	*0.007*	*0.094*	*0.04*	*...*
BS 183A	*0.172*	*0.37*	*0.35*	*0.016*	*0.004*	*12.14*	*0.12*	*1.85*	*0.002*	*(<0.0005)*	*0.0020*	*0.036*	*0.093*	*0.0256*	*0.0065*	*0.006*	*0.003*	*0.002*	*0.090*	*2.60*	*...*
BS 184A	*0.035*	*0.08*	*0.06*	*0.007*	*0.001*	*12.66*	*2.20*	*8.34*	*1.00*	*(0.0004)*	*(0.0003)*	*0.036*	*0.041*	*0.0045*	*(0.0003)*	*0.006*	*(0.002)*	*0.051*	*0.014*	*0.032*	*...*
BS 185A	*0.033*	*0.38*	*0.49*	*0.022*	*0.002*	*14.46*	*0.30*	*4.43*	*0.002*	*0.0012*	*(0.0002)*	*0.026*	*3.41*	*0.027*	*(0.0021)*	*0.32*	*0.007*	*(0.001)*	*0.048*	*(0.014)*	*(0.002)* **Ta**
BS 186A	*0.040*	*0.19*	*0.72*	*0.008*	*0.005*	*0.16*	*0.003*	*35.86*	*(0.001)*	*...*	*...*	*0.028*	*0.016*	*0.0026*	*...*	*<0.002*	*(0.002)*	*<0.003*	*0.001*	*<0.03*	*0.229* **Se**
BS 187C	*0.020*	*0.77*	*0.77*	*0.024*	*<0.002*	*20.16*	*2.07*	*32.93*	*0.10*	*(0.0019)*	*...*	*0.096*	*3.17*	*0.022*	*0.0024*	*0.36*	*0.004*	*(0.001)*	*0.059*	*...*	*...*
BS 188A	*0.050*	*0.15*	*0.14*	*0.015*	*0.005*	*14.04*	*1.10*	*24.61*	*0.19*	*0.0065*	*...*	*0.18*	*0.099*	*0.0029*	*0.0012*	*0.050*	*0.002*	*2.21*	*0.24*	*0.055*	*...*
BS 318	*0.020*	*0.48*	*1.39*	*0.019*	*0.002*	*22.30*	*3.31*	*5.61*	*0.006*	*(0.0004)*	*(0.0004)*	*0.101*	*0.17*	*0.159*	*(0.0004)*	*...*	*0.004*	*(0.003)*	*0.064*	*<0.02*	*...*
BS 9841	*0.067*	*0.54*	*1.69*	*0.024*	*0.024*	*24.30*	*0.57*	*19.55*	*(<0.006)*	*0.0026*	*(0.0002)*	*0.116*	*0.356*	*0.064*	*(0.011)*	*0.070*	*0.006*	*(0.002)*	*0.070*	*0.06*	*(0.006)* **Sb**
BS 9941	*0.021*	*0.33*	*1.78*	*0.027*	*0.024*	*18.48*	*3.24*	*13.68*	*0.004*	*0.0025*	*(0.0003)*	*0.178*	*0.424*	*0.036*	*(0.0058)*	*0.015*	*0.007*	*(0.002)*	*0.062*	*0.068*	*(0.010)* **As**

BRAMMER STANDARD COMPANY, Inc. (BS), USA

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Nickel Base Alloy Reference Materials (disc samples – dimensions as below)

Brammer No.	Description	Disc dimensions mm	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	Nb	Pb	Sn	Ti	V	W	Fe	Mg	Others
BS 200A	Nickel 200	38 dia. x 12	*0.077*	*0.007*	*0.15*	*<0.003*	*0.004*	*(0.001)*	*<0.002*	*Bal.*	*0.029*	*0.0044*	*0.057*	*0.004*	*(0.001)*	*<0.0005*	…	*0.043*	*0.001*	*<0.01*	*0.076*	*0.013*	…
BS 200-1	"	38 dia. x 20	*0.042*	*0.039*	*0.113*	*(0.002)*	*0.001*	*0.001*	*0.001*	*Bal.*	*0.005*	*0.0033*	*0.090*	*0.008*	*(0.002)*	*0.0012*	…	*0.021*	*0.001*	*<0.001*	*0.050*	*0.031*	…
BS 200-2	"	"	*0.051*	*0.060*	*0.242*	*(0.003)*	*0.007*	*0.010*	*(0.001)*	*Bal.*	*0.006*	*0.0040*	*0.104*	*0.052*	*(0.002)*	*0.0007*	…	*0.020*	*0.002*	*<0.001*	*0.120*	*0.036*	…
BS 200-3	"	"	*0.014*	*0.011*	*0.16*	*0.002*	*0.004*	*0.008*	*(0.002)*	*Bal.*	*(0.007)*	*0.0041*	*0.103*	*0.108*	*(0.002)*	*0.0009*	…	*0.024*	*0.003*	*<0.001*	*0.142*	*0.023*	…
BS 200-4	"	"	*0.11*	*0.100*	*0.31*	*0.003*	*0.008*	*0.130*	*0.001*	*Bal.*	*(0.007)*	*0.0037*	*0.091*	*0.049*	*0.002*	*0.0010*	…	*0.019*	*0.003*	*<0.001*	*0.290*	*0.030*	…
BS 600C	Inconel Alloy	38 dia. x 12	*0.071*	*0.39*	*0.50*	*0.008*	*0.001*	*15.64*	*0.03*	*73.5*	*0.21*	*0.0012*	*0.033*	*0.05*	*0.021*	*0.005*	*0.002*	*0.21*	*0.03*	*0.002*	*9.31*	*0.0022*	*0.002* **Ta**
BS 600-1	"	40 dia. x 6	*0.07*	*0.11*	*0.39*	*0.006*	*0.006*	*15.30*	*0.011*	*74.5*	*0.23*	*0.01*	*0.10*	*0.14*	*0.024*	*0.004*	*0.003*	*0.31*	*0.028*	*0.003*	*8.77*	*0.021*	*<0.001* **Ta**
BS 600-2	"	38 dia. x 12	*0.07*	*0.24*	*0.31*	*0.006*	*0.007*	*16.34*	*0.008*	*75.4*	*0.16*	*0.01*	*0.09*	*0.10*	*0.029*	*0.003*	*0.003*	*0.37*	*0.029*	*<0.001*	*6.80*	*0.011*	*0.004* **Ta**
BS 600-3	"	"	*0.02*	*0.19*	*0.28*	*0.009*	*0.005*	*14.77*	*0.005*	*75.1*	*0.18*	*0.009*	*0.10*	*0.25*	*0.023*	*0.004*	*0.003*	*0.20*	*0.018*	*<0.001*	*8.84*	*0.011*	*0.002* **Ta**
BS 600-4	"	"	*0.04*	*0.22*	*0.20*	*0.008*	*0.004*	*14.68*	*0.001*	*76.0*	*0.06*	*0.006*	*0.09*	*0.09*	*0.022*	*0.003*	*0.002*	*0.19*	*0.022*	…	*8.37*	*0.017*	*0.004* **Ta**
BS 600-5	"	"	*0.047*	*0.26*	*0.21*	*0.005*	*<0.002*	*15.59*	*0.049*	*74.83*	*0.19*	*0.0018*	*0.029*	*0.10*	*(0.03)*	*(<0.001)*	*(<0.003)*	*0.23*	*0.054*	…	*8.36*	*0.004*	*0.011* **N**
BS 600-6	"	"	*0.083*	*0.31*	*0.21*	*0.007*	*0.001*	*14.86*	*0.12*	*76.00*	*0.278*	*0.0028*	*0.066*	*0.24*	*0.14*	*(<0.001)*	*(<0.003)*	*0.24*	*0.030*	…	*7.33*	*0.004*	*0.0078* **N**
BS 625B	Inconel 625	"	*0.023*	*0.12*	*0.10*	*0.010*	*<0.003*	*21.28*	*9.58*	*(59.8)*	*0.33*	*(0.0021*	*0.24*	*0.22*	*3.53*	…	…	*0.20*	*0.015*	*0.06*	*4.51*	*0.003*	*0.017* **N**
BS 800	Cr/Fe Nickel Alloy	44 dia. x 12	*0.075*	*0.55*	*0.80*	*0.016*	*0.0006*	*19.92*	*0.19*	*31.38*	*0.28*	*0.0034*	*0.056*	*0.32*	*(0.02)*	…	…	*0.475*	…	…	*45.9*	…	…
BS 197A	Ra 333 Alloy	50 dia. x 12	*0.050*	*0.96*	*1.56*	*0.021*	*<0.001*	*25.11*	*2.99*	*Bal.*	*0.18*	*0.0019*	*3.06*	*0.12*	*0.20*	…	…	*0.017*	*0.051*	*2.79*	*18.07*	…	…
BS 199A	Waspaloy	"	*0.033*	*0.05*	*0.014*	*0.006*	*<0.001*	*19.25*	*3.99*	*Bal.*	*1.26*	*(0.004)*	*13.47*	*0.022*	*0.040*	…	…	*3.07*	*0.020*	…	*1.05*	…	…
BS 263	Nickel Alloy 263	"	*0.071*	*0.28*	*0.36*	*0.005*	*<0.002*	*19.84*	*5.70*	*(50.56)*	*0.38*	*(0.001)*	*19.92*	*0.024*	*0.04*	…	…	*2.21*	*0.004*	*0.24*	*0.47*	…	*0.002* **Zr**
BS 718B	In 718 Alloy	38 dia. x 12	*0.036*	*0.12*	*0.125*	*(0.006)*	*0.001*	*17.60*	*2.93*	*52.1*	*0.57*	*0.0042*	*0.19*	*0.044*	*5.29*	…	…	*0.95*	…	…	*19.64*	…	…
BS 825C	Nickel Alloy 825	"	*0.024*	*0.24*	*0.49*	*0.013*	*0.0004*	*20.06*	*2.70*	*38.7*	*(0.10)*	*(0.0004)*	*0.13*	*1.64*	*(0.04)*	…	…	*0.74*	*(0.03)*	…	*35.1*	*(0.002)*	*0.0070* **N**
BS 400C	Monel Alloy	"	*0.160*	*0.18*	*1.05*	*0.012*	*0.001*	*0.48*	*0.059*	*64.55*	*0.056*	*(0.0002)*	*0.053*	*31.68*	*0.021*	*0.0007*	*0.0009*	*0.056*	*(0.005)*	…	*1.61*	*0.009*	*0.0019* **As**
BS 400-1	"	38 dia. x 20	*0.109*	*0.16*	*1.07*	*0.022*	*0.008*	*0.033*	*0.001*	*66.0*	*0.004*	*(0.0005)*	*0.37*	*30.97*	*0.0003*	*0.0020*	*0.0010*	*(0.001)*	*(0.001)*	…	*1.27*	*0.048*	*0.004* **As**
BS 400-2	"	"	*0.170*	*0.17*	*1.17*	*0.027*	*0.008*	*0.091*	*0.0012*	*65.9*	*0.006*	*(0.0006)*	*0.46*	*30.75*	*0.0004*	*(0.001)*	*0.0012*	*0.011*	*(0.003)*	…	*1.42*	*0.033*	*0.004* **As**
BS 400-3	"	"	*0.153*	*0.063*	*0.85*	*0.026*	*0.006*	*0.21*	*0.003*	*65.4*	*0.001*	*(0.0002)*	*0.46*	*31.25*	*(0.0004)*	*(0.0015)*	*0.0014*	*0.004*	*0.003*	…	*1.60*	*0.012*	*0.004* **As**
BS 500D	"	38 dia. x 12	*0.15*	*0.07*	*0.69*	*0.009*	*<0.002*	*0.21*	*0.024*	*Bal.*	*2.98*	…	*0.033*	*29.7*	…	…	…	*0.45*	…	…	*0.73*	*0.010*	…
BS H-1 B	Hastelloy (B-2)	38 dia. x 12	*0.006*	*0.049*	*0.82*	*0.003*	*0.000*	*<0.01*	*26.52*	*(71.3)*	*0.12*	*0.003*	*<0.02*	*(0.01)*	*0.005*	…	…	*0.11*	*<0.01*	*0.01*	*1.00*	…	…
BS H-3B	(x)	"	*0.078*	*0.63*	*0.11*	*0.013*	*<0.001*	*22.23*	*8.84*	*44.9*	*0.14*	*0.0052*	*1.96*	*0.27*	*0.28*	…	…	*0.020*	*0.060*	*0.49*	*19.92*	…	…
BS H-6A	(C-22)	"	*0.005*	*(0.03)*	*0.31*	*0.010*	*<0.002*	*21.37*	*13.37*	*(55.8)*	*0.24*	*0.0012*	*1.11*	*0.070*	*(0.029)*	…	*0.003*	*0.007*	*0.17*	*3.09*	*4.34*	…	…

BRAMMER STANDARD COMPANY, Inc. (BS), USA

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Copper Base Alloy Reference Materials (38mm dia. x 12mm discs)

BRAMMER No.	Cu	Pb	Sn	Zn	Mn	Al	Fe	Ni	P	As	Si	Sb	C	S	Others
BS 172 Be-1 (Wrought)	*97.68*	*(0.002)*	*0.033*	*0.007*	*0.001*	*(0.02)*	*0.052*	*0.039*	…	…	*0.055*	…	…	…	*1.89* **Be**, *0.21* **Co**
BS 314B (Wrought)	*89.8*	*1.68*	*0.001*	*8.58*	*0.001*	*0.001*	*0.013*	*0.006*	*0.0007*	*0.002*	*0.01*	*0.001*	*0.002*	*(0.002)*	…
BS 464A (Wrought)	*60.6*	*0.056*	*0.62*	*38.73*	*0.0002*	*(0.001)*	*0.013*	*0.004*	*0.012*	*<0.002*	*<0.01*	*(0.001)*	*(0.003)*	*(0.003)*	…
BS 482A (Wrought)	*60.0*	*0.50*	*0.65*	*38.8*	*<0.002*	*(0.003)*	*0.020*	*(0.007)*	*<0.003*	*<0.002*	*(0.002)*	*0.0012*	*(0.0006)*	*0.001*	…
BS 510A (Wrought)	*96.10*	*0.016*	*4.6*	*0.21*	*<0.002*	*<0.002*	*0.005*	*0.020*	*0.11*	*0.0008*	*<0.003*	*(0.003)*	*(0.0006)*	*0.008*	…
BS 544A (Wrought)	*88.4**	*4.16*	*4.42*	*3.42*	*<0.002*	*(0.0005)*	*0.092*	*0.16*	*0.021*	*0.011*	*<0.002*	*0.040*	*0.003*	*0.038*	…
BS 623A (Wrought)	*88.13*	*0.001*	*0.002*	*0.008*	*0.273*	*9.12*	*2.19*	*0.146*	*<0.002*	*0.006*	*0.014*	*<0.002*	*(0.002)*	*(0.0005)*	…
BS 630A (Wrought)	*81.0*	*0.007*	*0.019*	*0.17*	*0.11*	*10.05*	*3.65*	*4.75*	*<0.01*	*(0.002)*	*0.037*	*<0.001*	*0.005*	*(0.005)*	…
BS 642A (Wrought)	*91.0*	*0.001*	*0.018*	*0.011*	*0.005*	*6.70*	*0.17*	*0.025*	*0.001*	*<0.002*	*1.80*	*(<0.002)*	*0.001*	*<0.001*	…
BS 655A (Wrought)	*95.74*	*0.008*	*0.07*	*0.02*	*0.91*	*(0.002)*	*0.075*	*0.008*	*(0.004)*	*<0.002*	*3.14*	*<0.002*	*(0.0006)*	*(0.0006)*	…
BS 675A (Wrought)	*58.5*	*0.074*	*0.80*	*39.1*	*0.32*	*<0.002*	*1.12*	*0.019*	*0.010*	*0.003*	*(0.005)*	*0.0011*	*(0.0007)*	*(0.0005)*	…
BS 706B (Wrought)	*87.00*	*0.006*	*0.006*	*0.054*	*0.61*	*<0.003*	*1.56*	*10.9*	*0.009*	*<0.0005*	*<0.002*	*<0.002*	*(0.004)*	*0.009*	*0.005* **Co**
BS 715A (Wrought)	*68.0*	*(0.007)*	*0.008*	*0.10*	*0.82*	*(0.01)*	*0.61*	*30.22*	*0.006*	*(0.0014)*	*0.10*	*(0.003)*	*0.03*	*0.001*	…
BS 857B-1 (Cast)	*61.3*	*1.22*	*1.14*	*34.91*	*0.003*	*0.35*	*0.30*	*0.61*	*0.004*	*(0.001)*	*0.004*	*(0.002)*	…	…	*(0.002)* **Ag**
BS 903B (Cast)	*86.7*	*0.10*	*7.9*	*4.39*	*0.0004*	*(0.001)*	*0.049*	*0.50*	*0.073*	*0.003*	*0.002*	*0.003*	*(0.0004)*	*0.006*	…
BS 932E (Cast)	*82.15*	*7.3*	*7.33*	*2.86*	*0.0001*	*(<0.001)*	*0.029*	*0.16*	*0.022*	*0.048*	*(<0.005)*	*0.097*	…	*0.053*	…
BS 938-1 (Cast)	*77.1*	*14.8*	*7.16*	*0.26*	*(0.001)*	*(<0.002)*	*0.015*	*0.49*	*0.059*	*(0.004)*	*(<0.004)*	*0.033*	…	*0.009*	*0.0048* **Ag**
BS 954B (Cast)	*83.9*	*0.047*	*0.07*	*0.10*	*0.27*	*10.20*	*3.90*	*1.38*	*0.012*	*(0.005)*	*0.07*	*(0.001)*	*(0.005)*	*(<0.0005)*	…
BS 955C (Cast)	*80.60**	*0.003*	*0.003*	*0.150*	*0.062*	*10.72*	*4.04*	*4.30*	*0.012*	*0.001*	*0.025*	*0.001*	…	…	*0.014* **Ag**

* Cu by difference

Cobalt Base Reference Materials (38mm dia. X 9mm discs)

BRAMMER No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	Nb	V	W	Fe	La
BS 171B	Stellite 4605	*0.09*	*0.29*	*1.90*	*0.008*	*<0.001*	*20.5*	*0.65*	*10.68*	*0.08*	*(0.0025)*	Bal.	*0.035*	*0.035*	*(0.02)*	*15.1*	*1.82*	…
BS 172A	Stellite 188	*0.10*	*0.37*	*0.77*	*(0.011)*	*<0.0005*	*21.85*	*0.30*	*23.7*	*0.08*	*(0.003)*	Bal.	*0.027*	*0.09*	*0.07*	*14.0*	*1.76*	*0.045*

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY (CANMET), Canada

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Base Metal Ore Certified Reference Materials (Finely divided material – units of 200g)

CANMET No.	Description	Si	Al	S	Fe	K	Na	Ca	As	Mg	C	Cd	Pb	Cu	Ti	W
BH-1	Tungsten Ore	*38.0*	*3.5*	*0.8*	*3.2*	*0.7*	*0.1*	*0.5*	…	*0.4*	*0.1*	…	…	…	*0.4*	**0.422**
CD-1	Antimony Ore	*32.9*	*5.5*	*3.1*	*2.8*	*1.8*	*0.1*	*1.4*	**0.66**	*0.6*	*0.21*	…	*0.02*	*<0.01*	…	…
CT-1	Tungsten Ore	*17.2*	*2.9*	*8.2*	*17.5*	*0.7*	*0.2*	*12.2*	…	*2.0*	*1.7*	…	…	…	*0.2*	**1.04**
HV-2	Copper-Molybdenum Ore	…	…	*0.57*	*1.09*	…	…	…	…	…	*0.61*	…	*0.0008*	**0.57**	…	*0.0003*
MP-1b	Zinc-Tin-Copper-Lead Ore	**16.79**	*3.46*	**13.79**	**8.19**	*(0.2)*	…	**2.47**	**2.30**	**0.024**	*(0.028)*	**0.0527**	**2.091**	**3.069**	*0.075*	*(0.11)*
MW-1	Iron Ore	**2.15**	**0.17**	*0.011*	**66.08**	**0.011**	*0.008*	**0.040**	…	**0.021**	…	…	…	…	*0.08*	…
OKA-1	Niobium Ore	*2.4*	*0.9*	*0.6*	*2.8*	*0.3*	*0.2*	*31.3*	…	*1.3*	…	…	…	…	…	…
SCH-1	Iron Ore	**3.78**	**0.509**	**0.007**	**60.73**	**0.026**	**0.019**	**0.029**	…	**0.020**	…	…	…	…	**0.031**	…
TAN-1	Tantalum Ore	*33.42*	*8.2*	…	*0.2*	*1.5*	*4.6*	*0.5*	…	*0.02*	…	…	…	…	…	…
TLG-1	Tungsten Ore	*21.5*	*3.0*	…	*8.6*	*0.4*	*0.2*	*16.6*	…	*2.7*	*1.4*	…	…	…	*0.1*	**0.083**

(Continued from above)

CANMET No.	Mn	Mo	P	F	Bi	Zn	Sr	In	Nb	Ta	Sn	Sb	Ag	H_2O (105°C)	LOI
BH-1 (continued)	*0.2*	*0.02*	…	…	…	…	…	…	…	…	…	…	…	…	…
CD-1 (continued)	…	…	…	…	…	…	…	…	…	…	…	**3.57**	…	*0.2*	*4.0*
CT-1 (continued)	*0.7*	*0.03*	…	…	…	…	…	…	…	…	…	…	…	…	…
HV-2 (continued)	…	**0.048**	…	…	…	*0.0056*	…	…	…	…	…	*0.0007*	*0.00022*	…	*4.72*
MP-1b (continued)	*(0.048)*	**0.0285**	*(0.02)*	…	**0.0954**	**16.67**	…	*0.056*	…	…	**1.61**	*0.0054*	**0.00470**	…	…
MW-1 (continued)	*0.012*	…	**0.011**	…	…	…	…	…	…	…	…	…	…	…	…
OKA-1 (continued)	*1.1*	…	*1.1*	…	…	*0.05*	*1.0*	…	**0.37**	…	…	…	…	…	*31.9*
SCH-1 (continued)	**0.777**	…	**0.054**	…	…	…	…	…	…	…	…	…	…	…	…
TAN-1 (continued)	*0.02*	…	…	…	…	…	…	…	*0.02*	**0.236**	*0.01*	…	…	…	…
TLG-1 (continued)	*1.3*	*<0.01*	…	…	…	…	…	…	…	…	…	…	…	*1.6*	…

Noble Metal Ore, Concentrate and Matte Certified Reference Materials

(Finely divided material – CH-4, MA-1b, MA-3a, PTC-1a, SU-1b in units of 200g, DS-1, GTS-2, MA-2c, PTA-1, PTM-1a and UMT-1 in units of 400g)

CANMET No.	Description	Si	SiO_2	Fe	Al	Ca	K	Na	S	Mg	Ni	Cu	Co	Pb	Ag	As	Pd	Pt	Au	Rh	C	Zn	H_2O	LOI
CH-4	Gold Ore	…	**62.75**	**5.32**	**7.73**	**1.96**	**1.80**	**3.18**	**0.65**	**1.40**	*0.0051*	**0.20**	**0.0026**	*(0.0014)*	**0.00021**	**0.00082**	…	…	**0.000088**	…	*0.12*	**0.020**	…	*(0.9)*
DS-1	Gold Ore	*25.68*	…	*(3.0)*	**4.48**	*6.248*	*1.1*	…	*2.85*	**2.76**	**0.00487**	**0.00271**	**0.00095**	**0.00138**	**0.000047**	**0.6960**	…	…	**0.003259**	…	…	**0.0206**	…	*13*
GTS-2	Gold Tailings	…	*50*	*8*	*6*	*4*	*2*	*0.7*	*0.8*	*3*	*0.009*	*0.01*	…	…	*0.0001*	*0.01*	…	…	**0.0000263**	…	*2.4*	*0.02*	…	*9.3*
MA-1b	Gold Ore	*24.5*	…	*4.62*	*6.11*	*4.6*	*4.45*	*1.49*	*1.17*	*2.6*	…	…	…	…	*0.0004*	…	…	…	**0.00170**	…	*2.44*	…	*0.1*	*7.9*
MA-2c	Gold Ore	*24.40*	…	*5.39*	*6.70*	*4.76*	*3.20*	*2.23*	*0.23*	*2.91*	*0.0064*	*0.0095*	*0.0029*	*0.0029*	*0.000051*	*0.0009*	…	…	**0.000302**	…	*1.78*	*0.0093*	…	*7.55*
MA-3a	Gold Ore	*21*	…	*5*	*6*	*5.5*	*4*	*1.5*	*1*	*3*	*0.007*	*0.01*	*0.003*	*0.002*	*0.00024*	*0.0008*	…	…	**0.000856**	…	*2.5*	*0.008*	…	*10*
PTA-1	Platiniferous Black Sand	…	*3.6*	*63.0*	*2.9*	*1.2*	…	…	…	*0.6*	…	…	…	…	…	…	…	**0.000305**	…	…	…	…	…	…
PTC-1a	Sulphide Concentrate	…	…	*34.6*	…	…	…	…	*31.8*	…	**10.03**	**13.51**	*0.30*	*0.05*	**0.0056**	*0.012*	**0.000448**	**0.000272**	*0.000131*	**0.000033**	…	…	…	…
PTM-1a	Nickel, Copper, Matte	…	…	*1.48*	…	…	…	…	*22.4*	…	**47.44**	**24.96**	*1.97*	*0.029*	*0.0135*	*0.22*	**0.001001**	**0.000731**	*0.00033*	*0.00007*	…	…	…	…
SU-1b	Nickel Copper Cobalt Ore	**15.23**	…	***25.54***	**4.30**	**2.21**	(0.6)	*(1.6)*	**14.14**	**1.790**	**1.953**	**1.185**	**0.0672**	**0.0058**	**0.00639**	**0.000249**	**0.0000791**	**0.0000491**	*(0.00002)*	…	*0.04*	**0.0235**	*(0.6)*	*(8)*
UMT-1	Ultramafic ore Tailings	…	…	…	…	…	…	…	…	…	*0.1396*	*0.0743*	*0.0077*	…	…	…	**0.0000106**	**0.0000129**	**0.0000048**	**0.000001**	…	…	…	…

DS-1 also certified for Ba: 0.0221%, Hg: 0.0082%, Mn: 0.0437%, P: 0.034% and Tl: 0.0020% and SU-b is also certified for Mn: 0.0703%

PTC-1a, PTM-1a and UMT-1 also have provisional constituent values for Ir and Ru. SU-1b has provisional constituent values for Bi, Se and V.

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY (CANMET), Canada

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Ore Concentrate Certified Reference Materials (Finely divided material – units of 200g)

CANMET No.	Description	SiO_2	Al_2O_3	MgO	CaO	Cu	Zn	Pb	Ag	Hg	Au	S	Fe	Sb	As	Bi	C	Cd	Co	Mn	Mo	Se
CCU-1c	Copper Concentrate	**2.52**	*0.34*	**1.02**	**0.15**	**25.62**	**3.99**	*0.34*	**0.0129**	*0.0032*	**0.000494**	**33.3**	**29.34**	*0.004*	**0.0034**	*0.0070*	**0.09**	**0.0136**	*0.0018*	**0.012**	**0.0020**	**0.0107**
CPB-2	Lead Concentrate	*0.652*	**0.074 Al**	**0.0683 Mg**	*0.0776* **Ca**	**0.1213**	**6.04**	**63.52**	*0.03573*	*0.001003*	*0.000002*	*17.82*	**7.065**	*0.423*	*0.04*	*0.02112*	…	**0.0167**	*(0.0004)*	*0.0395*	*0.009*	*0.01*
CZN-4	Zinc Concentrate	**0.295 Si**	**0.0715 Al**	*0.0352* **Mg**	*0.0419* **Ca**	**0.403**	**55.24**	**0.1861**	**0.00514**	**0.000454**	*(0.04)*	**33.07**	*9.086*	*(0.001)*	**0.0356**	*(0.001)*	*(0.09)*	**0.2604**	**0.00935**	*(0.009)*	…	**0.00867**

Uranium, Uranium Thorium Ore and Uranium Tailings Certified Reference Materials (Finely divided material – OKA-2 and UTS-4 are in units of 100g and UTS-1 and UTS-3 are in units of 200g)

CANMET No.	Description	Al	Fe	S	Ca	K	Ti	U	Th	Ba	SO_3	As
OKA-2	Rare-Earth Thorium Ore	…	…	…	…	*0.34*	…	**0.02186**	**2.893**	…	…	…
UTS-1	Uranium Tailings	**6.24**	**4.87**	**1.00**	**5.24**	…	**0.54**	**0.0049**	**0.0138**	**0.0324**	**2.54**	…
UTS-3	Uranium Tailings	**5.80**	**3.25**	**0.23**	**4.03**	…	**0.23**	**0.0513**	**0.0010**	**0.0212**	…	…
UTS-4	Uranium Tailings	**6.29**	**2.61**	**1.00**	**1.75**	…	**0.24**	**0.1010**	**0.0015**	**0.0065**	**5.21**	**0.0038**

For samples UTS-1 to UTS-4 values are also given in Bq/g for Th-230, Ra-226, Pb-210, Th-232, Ra-228, Th-228. OKA-2 has provisional mean values for many Rare-Earth elements.

Sulphide Ore Mill Tailings and Concentrate/Tailings Certified Reference Materials (Finely divided material – RTS-1, RTS-2, RTS-3a, TLS-1 in units of 100g, TPO-1 in units of 25g)

CANMET No.	Description	Al	As	Ca	Co	Cu	Fe	Mg	Ni	Pb	Si	SiO_2	S (Sulphate)	S (Total)	Zn
RTS-1	Sulphide Ore Mill Tailings	**4.26**	**0.00082**	**2.67**	**0.00166**	**0.0595**	**19.64**	**2.67**	**0.0022**	**0.0105**	**19.89**	…	**1.26**	**1.66**	**0.0553**
RTS-2	Sulphide Ore Mill Tailings	**0.83**	**0.00063**	**0.53**	**0.0072**	**0.0670**	**37.4**	**0.35**	**0.2430**	**0.0045**	**2.92**	…	**3.87**	**18.95**	**0.0117**
RTS-3a	Sulphide Ore Mill Tailings	**5.12**	**0.00182**	**2.14**	**0.0143**	**0.2353**	**20.49**	**2.483**	**0.00613**	**0.0209**	**18.28**	…	*(1.1)*	**9.59**	**0.289**
TLS-1	Unoxidised Tailings	*(6.92)*	…	*(4.73)*	*0.0008*	**0.078**	**10.51**	*(3.45)*	**0.151**	*(0.023)*	…	*51.87*	…	**1.81**	*(0.013)*
TPO-1	Iron Sulphide Conc./Tailings	*3.51*	…	*2.17*	**0.021**	**0.118**	**34.85**	*1.66*	**0.617**	…	…	**25.52**	…	**18.03**	*0.02*

CANMET No.	Ag	Au	Ba	Bi	C	Cd	CO_2	Cr	Fe	H_2O	K
RTS-1 (continued)	*<0.0003*	*0.0000262*	*0.0123*	*0.0081*	*<0.9*	*0.0002*	*<0.1*	*0.0050*	*19.89*	*1.5*	*0.52*
RTS-2 (continued)	*<0.0002*	*0.0000038*	*0.0072*	*0.0003*	*<2*	*0.0002*	*<2*	*0.0125*	*37.90*	*1.7*	*0.12*
RTS-3a (continued)	**0.00111**	*0.0000561*	**0.0106**	**0.00313**	*(0.04)*	**0.00092**	*(0.04)*	*0.0176*	*(20.49)*	…	**0.460**
TLS-1 (continued)	…	…	…	…	…	…	…	*(0.030)*	…	…	*(1.025)*
TPO-1 (continued)	…	…	…	…	…	…	…	*0.03*	…	…	*0.56*

CANMET No.	Mn	Na	Pd	Pt	P	Se	Sr	S (Elemental)	S (Sulphide)	Ti	Zr
RTS-1 (continued)	*0.19*	*0.50*	*<0.0000020*	*<0.0000070*	*0.06*	*0.0040*	*0.0060*	*0.50*	*0.0*	*0.40*	*0.0060*
RTS-2 (continued)	*0.04*	*0.22*	*0.0000136*	*0.0000217*	*0.02*	*0.0057*	*0.0030*	*14.47*	*0.61*	*0.16*	*0.0030*
RTS-3a (continued)	**0.1585**	**0.684**	*(0.0000004)*	…	*0.0446*	*0.00448*	**0.00447**	*(1.2)*	*(8)*	*0.351*	*0.0078*
TLS-1 (continued)	*(0.120)*	*(1.690)*	…	…	*(0.087)*	…	…	…	…	*(0.553)*	…
TPO-1 (continued)	*0.08*	*0.85*	*0.02*	…	*0.03*	…	…	…	…	*0.35*	…

CANADA CENTRE FOR ENERGY AND MINERAL TECHNOLOGY (CANMET), Canada

CHEMICAL COMPOSITION (nominal mass content)

Lake and Stream Sediment Reference Materials (Finely divided material – units of 100g)

CANMET No.	Description	Mass content	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	MnO	TiO_2	P_2O_5	C	Fe	S	H_2O	LOI (500 °C)	LOI (1000 °C)
LKSD-1	Lake Sediment	**%**	*40.1*	*7.8*	*4.1*	*1.7*	*10.8*	*2.0*	*1.1*	*0.1*	*0.5*	*0.2*	*12.3*	*2.8*	*1.57*	*2.92*	*23.5*	*29.9*
LKSD-2	Lake Sediment	**%**	*58.9*	*12.3*	*6.2*	*1.7*	*2.2*	*1.9*	*2.6*	*0.3*	*0.6*	*0.3*	*4.5*	*4.3*	*0.14*	*2.23*	*12.3*	*13.6*
LKSD-3	Lake Sediment	**%**	*58.5*	*12.5*	*5.7*	*2.0*	*2.3*	*2.3*	*2.2*	*0.2*	*0.5*	*0.2*	*4.5*	*4.0*	*0.14*	*2.07*	*11.8*	*13.4*
LKSD-4	Lake Sediment	**%**	*41.6*	*5.9*	*4.1*	*0.9*	*1.8*	*0.7*	*0.8*	*0.1*	*0.4*	*0.3*	*17.7*	*2.8*	*0.99*	*6.55*	*40.8*	*43.6*
STSD-1	Stream Sediment	**%**	*42.5*	*9.0*	*6.5*	*2.2*	*3.6*	*1.8*	*1.2*	*0.5*	*0.8*	*0.4*	*12.3*	*4.7*	*0.18*	*4.46*	*29.7*	*31.6*
STSD-2	Stream Sediment	**%**	*53.7*	*16.1*	*7.5*	*3.1*	*4.0*	*1.7*	*2.1*	*0.1*	*0.8*	*0.3*	*1.6*	*5.2*	*0.06*	*2.43*	*8.7*	*10.3*
STSD-3	Stream Sediment	**%**	*48.6*	*10.9*	*6.2*	*2.2*	*3.3*	*1.5*	*1.8*	*0.3*	*0.7*	*0.4*	*8.4*	*4.4*	*0.14*	*3.47*	*21.6*	*23.6*
STSD-4	Stream Sediment	**%**	*58.9*	*12.1*	*5.7*	*2.1*	*4.0*	*2.7*	*1.6*	*0.2*	*0.8*	*0.2*	*4.1*	*4.1*	*0.09*	*1.73*	*10.2*	*11.6*

CANMET No.	Mass content	Ag	As	Au	B	Ba	Be	Br	Ce	Co	Cr	Cs	Cu	Dy	Eu	F	Hf	La	Li	Lu	Mn	Mo
LKSD-1 (continued)	µg/g	*0.6*	*40*	*0.005*	*49*	*430*	*1.1*	*11*	*27*	*11*	*31*	*1.5*	*44*	*3.4*	*0.9*	*300*	*3.6*	*16*	*7*	*0.4*	*700*	*10*
LKSD-2 (continued)	µg/g	*0.8*	*11*	*0.003*	*65*	*780*	*2.5*	*18*	*108*	*17*	*57*	*3.0*	*37*	*7.3*	*1.9*	*590*	*7.0*	*69*	*20*	*0.6*	*2020*	*<5*
LKSD-3 (continued)	µg/g	*2.7*	*27*	*0.003*	*25*	*680*	*1.9*	*16*	*90*	*30*	*87*	*2.3*	*35*	*4.9*	*1.5*	*490*	*4.8*	*52*	*25*	*0.4*	*1440*	*<5*
LKSD-4 (continued)	µg/g	*<0.5*	*16*	*0.002*	*22*	*330*	*1.0*	*49*	*48*	*11*	*33*	*17*	*31*	*3.7*	*1.1*	*260*	*2.8*	*26*	*12*	*0.5*	*500*	*<5*
STSD-1 (continued)	µg/g	*<0.5*	*23*	*0.008*	*89*	*630*	*1.6*	*40*	*51*	*17*	*67*	*1.8*	*36*	*5.6*	*1.6*	*950*	*6.1*	*30*	*11*	*0.8*	*3950*	*<5*
STSD-2 (continued)	µg/g	*0.5*	*42*	*0.003*	*42*	*540*	*5.2*	*4*	*93*	*19*	*116*	*12*	*47*	*6.5*	*2.0*	*940*	*5.0*	*59*	*65*	*0.7*	*1060*	*13*
STSD-3 (continued)	µg/g	*<0.5*	*28*	*0.007*	*82*	*1490*	*2.6*	*24*	*63*	*16*	*80*	*5.2*	*39*	*5.4*	*1.3*	*850*	*5.1*	*39*	*23*	*0.8*	*2730*	*6*
STSD-4 (continued)	µg/g	*<0.5*	*15*	*0.004*	*46*	*2000*	*1.7*	*13*	*44*	*13*	*93*	*1.9*	*65*	*3.8*	*1.2*	*380*	*5.5*	*24*	*14*	*0.5*	*1520*	*<5*

CANMET No.	Mass content	Nb	Nd	Ni	Pb	Rb	Sb	Sc	Sm	Sn	Sr	Ta	Tb	Th	Ti	U	V	W	Y	Yb	Zn	Zr
LKSD-1 (continued)	µg/g	*7*	*16*	*16*	*82*	*24*	*1.2*	*9*	*4*	*16*	*250*	*0.3*	*0.6*	*2.2*	*3010*	*9.7*	*50*	*<4*	*19*	*2.0*	*331*	*134*
LKSD-2 (continued)	µg/g	*8*	*58*	*26*	*44*	*85*	*1.1*	*13*	*11*	*5*	*220*	*0.8*	*1.4*	*13.4*	*3460*	*7.6*	*77*	*<4*	*44*	*4.0*	*209*	*254*
LKSD-3 (continued)	µg/g	*8*	*44*	*47*	*29*	*78*	*1.3*	*13*	*8*	*3*	*240*	*0.7*	*1.0*	*11.4*	*3330*	*4.6*	*82*	*<4*	*30*	*2.7*	*152*	*178*
LKSD-4 (continued)	µg/g	*9*	*25*	*31*	*91*	*28*	*1.7*	*7*	*5*	*5*	*110*	*0.4*	*1.2*	*5.1*	*2270*	*31.0*	*49*	*<4*	*23*	*2.0*	*194*	*105*
STSD-1 (continued)	µg/g	*5*	*28*	*24*	*35*	*30*	*3.3*	*14*	*6*	*4*	*170*	*0.4*	*1.2*	*3.7*	*4600*	*8.0*	*98*	*<4*	*42*	*4.0*	*198*	*218*
STSD-2 (continued)	µg/g	*20*	*43*	*53*	*66*	*104*	*4.8*	*16*	*8*	*5*	*400*	*1.6*	*1.3*	*17.2*	*4870*	*18.6*	*101*	*7*	*37*	*3.7*	*246*	*185*
STSD-3 (continued)	µg/g	*12*	*33*	*30*	*40*	*68*	*4.0*	*13*	*7*	*4*	*230*	*0.9*	*1.1*	*5.5*	*4400*	*10.5*	*134*	*<4*	*36*	*3.4*	*204*	*196*
STSD-4 (continued)	µg/g	*9*	*21*	*30*	*16*	*39*	*7.3*	*14*	*5*	*2*	*350*	*0.6*	*0.9*	*4.3*	*4530*	*3.0*	*106*	*<4*	*24*	*2.6*	*107*	*190*

Information is also given on the certificates of analysis re values for several Partial Extraction Elements using HNO_3/HCl.

Soil Certified Reference Materials (Finely divided material – units of 200g) Nominal mass content in %

CANMET No.	Description	Al	Ca	Fe	K	Mg	Mn	Na	P	Si	Ti	Cr	Cu	Hg	Ni	Pb	Sr	V	Zn	Ba	Rb	Co
SO-3	Calcereous C Horizon Soil	**3.06**	**14.63**	**1.51**	**1.16**	**4.98**	**0.052**	**0.74**	**0.048**	**15.86**	**0.20**	**0.0026**	**0.0017**	**0.0000017**	**0.0016**	**0.0014**	**0.0217**	**0.0038**	**0.0052**	**0.0296**	**0.0039**	**0.0008**
SO-4	Chernozemic A Horizon Soil	**5.46**	**1.11**	**2.37**	**1.73**	**0.56**	**0.060**	**1.00**	**0.090**	**31.97**	**0.34**	**0.0061**	**0.0022**	**0.0000030**	**0.0026**	**0.0016**	**0.0170**	**0.0090**	**0.0094**	…	…	**0.0011**

CANADA CENTRE FOR ENERGY AND MINERAL TECHNOLOGY (CANMET), Canada

CHEMICAL COMPOSITION (nominal mass content)

Geochemical Soil and Till Reference Materials (Finely divided material – units of 100g)

CANMET No.	Description	Mass content	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_20	K_20	MnO	TiO_2	P_2O_5	S	LOI (500°C)	LOI (1000°C)
TILL-1	Soil	%	*60.9*	*13.7*	*6.82*	*2.15*	*2.72*	*2.71*	*2.22*	*0.18*	*0.98*	*0.22*	*<0.05*	*6.3*	*7.3*
TILL-2	Till	%	*60.8*	*16.0*	*5.39*	*1.83*	*1.27*	*2.19*	*3.07*	*0.10*	*0.88*	*0.17*	*<0.05*	*6.8*	*8.1*
TILL-3	Soil	%	*69.1*	*12.2*	*3.92*	*1.71*	*2.63*	*2.64*	*2.42*	*0.06*	*0.49*	*0.11*	*<0.05*	*3.6*	*4.6*
TILL-4	Till	%	*65.0*	*14.4*	*5.63*	*1.26*	*1.25*	*2.46*	*3.25*	*0.06*	*0.81*	*0.20*	*0.08*	*4.4*	*5.7*

CANMET No.	Mass content	As	Au	Ba	Be	Bi	Br	Ce	Co	Cr	Cs	Cu	Eu	Er	Hf	La	Li	Lu	Mn	Mo	Nb
TILL-1 (continued)	µg/g	*18*	*0.013*	*702*	*2.4*	*<5*	*6.4*	*71*	*18*	*65*	*1.0*	*47*	*1.3*	*3.6*	*13*	*28*	*15*	*0.6*	*1420*	*2*	*10*
TILL-2 (continued)	µg/g	*26*	*0.002*	*540*	*4.0*	*<5*	*12.2*	*98*	*15*	*74*	*12*	*150*	*1.0*	*3.7*	*11*	*44*	*47*	*0.6*	*780*	*14*	*20*
TILL-3 (continued)	µg/g	*87*	*0.006*	*489*	*2.0*	*<5*	*4.5*	*42*	*15*	*123*	*1.7*	*22*	*<1*	*1.4*	*8*	*21*	*21*	*0.2*	*520*	*2*	*7*
TILL-4 (continued)	µg/g	*111*	*0.005*	*395*	*3.7*	*40*	*8.6*	*78*	*8*	*53*	*12*	*237*	*<1*	*3.2*	*10*	*41*	*30*	*0.5*	*490*	*16*	*15*

CANMET No.	Mass content	Nd	Ni	P	Pb	Rb	Sb	Sc	Sm	Sr	Ta	Tb	Th	Ti	U	V	W	Y	Yb	Zn	Zr
TILL-1 (continued)	µg/g	*26*	*24*	*930*	*22*	*44*	*7.8*	*13*	*5.9*	*291*	*0.7*	*1.1*	*5.6*	*5990*	*2.2*	*99*	*<1*	*38*	*3.9*	*98*	*502*
TILL-2 (continued)	µg/g	*36*	*32*	*750*	*31*	*143*	*0.8*	*12*	*7.4*	*144*	*1.9*	*1.2*	*18.4*	*5300*	*5.7*	*77*	*5*	*40*	*3.7*	*130*	*390*
TILL-3 (continued)	µg/g	*16*	*39*	*490*	*26*	*55*	*0.9*	*10*	*3.3*	*300*	*<0.5*	*<0.5*	*4.6*	*2910*	*2.1*	*62*	*<1*	*17*	*1.5*	*56*	*230*
TILL-4 (continued)	µg/g	*30*	*17*	*880*	*50*	*161*	*1.0*	*10*	*6.1*	*109*	*1.6*	*1.1*	*17.4*	*4840*	*5.0*	*67*	*204*	*33*	*3.4*	*70*	*385*

Information is also given on the certificate of analysis re several partial extraction elements using HNO_3/HCl.

Rock and Mineral Certified Reference Materials (Finely divided material – units of 400g, except WMS-1a - 200g) Nominal mass content in %

CANMET No.	Description	SiO_2	Al_2O_3	Fe_2O_3	Fe	TiO_2	CaO	MgO	K_2O	Na_2O	MnO	P_2O_5	Cu	Cr	Ni	S	LOI
TDB-1	Diabase Rock	*50.2*	*13.6*	*14.4*	**10.4**	*2.3*	*9.6*	*5.9*	*0.89*	*2.2*	*0.20*	*0.23*	**0.0323**	**0.0251**	**0.0092**	*0.03*	*0.3*
WGB-1	Gabbro Rock	*49.1*	*11.15*	**6.71**	…	*0.84*	*15.78*	**9.40**	**0.94**	*2.15*	*0.143*	*0.099*	…	**0.0291**	…	*0.02*	*4*
WMG-1	Mineralized Gabbro	*40.3*	**8.32**	**17.52**	…	*0.68*	*15.0*	*11.86*	**0.09**	**0.174**	**0.151**	*0.13*	*0.59*	*0.077*	*0.27*	*3.7*	*4.0*
WMS-1a	Massive Sulphide	*(4.7)* **Si**	**1.350 Al**	…	**45.4**	*0.084*	**3.09 Ca**	*0.331* **Mg**	*0.0991* **K**	**0.0329 Na**	*0.060* **Mn**	*(0.018)* **P**	**1.396**	*0.0068*	**3.02**	**28.17**	…
WPR-1	Altered Peridotite	*36.2*	*2.95*	**14.6**	…	**0.29**	*2.07*	*31*	**0.12**	*0.041*	**0.166**	*0.037*	**0.164**	*0.33*	*0.29*	*0.94*	*10.2*

Nominal mass content in ng/g

CANMET No.		As	Au	Pt	Pd	Rh	Ru	Ir	Os	Ba	Ce	Ag	Co	Sb	Cr	Th	Zn
TDB-1	(continued)	…	**6.3**	**5.8**	**22.4**	*0.7*	*0.3*	*0.15*	…	**241000**	**41000**	…	…	…	…	**2700**	**155000**
WGB-1	(continued)	…	**2.9**	**6.1**	**13.9**	*0.32*	*0.3*	*0.33*	…	…	…	…	…	…	…	…	…
WMG-1	(continued)	**7000**	**110**	**731**	**382**	**26.3**	**34.7**	**46.4**	*24.1*	*114000*	*16000*	…	…	…	…	*1100*	**110000**
WMS-1a	(continued)	**30900**	**300**	**1910**	**1450**	**222**	*145*	322	*(150)*	*(70000)*	*(7900)*	*3700*	*1450000*	*6920*	*68000*	*(1200)*	*130000*
WPR-1	(continued)	*1400*	**42.2**	**285**	**235**	**13.4**	**21.6**	**13.5**	*13.3*	*22000*	*6000*	…	…	…	…	*400*	*95000*

CANADA CENTRE FOR ENERGY AND MINERAL TECHNOLOGY (CANMET), Canada

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

Rock Certified Reference Materials (Finely divided material – units of 100g)

CANMET No.	Description	SiO_2	TiO_2	Al_2O_3	Fe_T	FeO	Fe_2O_3	MnO	MgO	CaO	Na_2O	K_2O	CO_2	P_2O_5	F	S	Cr_2O_3	ZnO	Cu	Ni	Co	H_2O
FER-1	Iron Formation Sample	**16.95**	**0.03**	**0.52**	…	*23.34*	*49.88*	**0.22**	**0.30**	**3.29**	**0.03**	**0.02**	**1.39**	**2.39**	*0.06*	**0.26**	…	…	…	…	…	**0.41**
FER-3	Iron Formation Sample	**53.61**	**0.01**	**0.09**	…	*13.63*	*29.4*	**0.08**	**1.02**	**0.84**	**0.03**	**0.03**	**1.20**	**0.07**	*0.01*	*0.03*	…	…	…	…	…	*0.20*
FER-4	Iron Formation Sample	**50.07**	**0.07**	**1.70**	…	**15.54**	**22.7**	**0.19**	**1.41**	**2.23**	**0.05**	**0.29**	**4.86**	**0.13**	*0.02*	**0.11**	…	…	…	…	…	**0.72**
SY-4	Diorite Gneiss	**49.9**	**0.29**	**20.69**	…	**2.86**	**6.21**	**0.108**	**0.54**	**8.05**	**7.10**	**1.66**	**3.5**	**0.131**	…	…	…	…	**0.0007**	**0.0009**	**0.0003**	…
UM-2	Sulphide Bearing Ultramafic Rock	*39.2*	*0.24*	*7.23*	*12.95*	…	…	*0.08*	*25.45*	*4.68*	*0.32*	*0.11*	*0.10*	*0.02*	…	*0.94*	*1.51*	*0.004*	**0.095**	**0.29**	**0.012**	*6.27*
UM-4	Sulphide Bearing Ultramafic Rock	*39.35*	*0.35*	*8.89*	*12.8*	…	…	*0.15*	*22.5*	*6.79*	*0.45*	*0.18*	*0.26*	*0.02*	…	*0.44*	*2.59*	*0.008*	**0.054**	**0.19**	**0.007**	*4.86*

Samples FER-1 to FER-4 and SY-4 also show values for trace levels of many elements, including Ba, Be, Co, Cr, Cs, Cu, La, Li, Lu, Ni, Pb, Rb, Sc, Sm, Sr, Th, V, Y, Yb, Zn, Zr

Petroleum Coke Reference Materials (Finely divided material – units of 75g)

CANMET No.	Description	Moisture (%)	Ash Content (% dry basis)	Total Sulphur (% dry basis)	Calorific Value BTU/lb	Calorific Value MJ/kg
PC-2	Petroleum Coke	*<2*	*2.57*	*6.04*	*14.737*	*34.23*
PC-3	Petroleum Coke	*<2*	*1.13*	*2.73*	*15.400*	*35.80*

Non Ferrous Dust Certified Reference Material (Finely divided material – units of 200g)

CANMET No.	Description	Zn	Fe	S_T	S_{so4}	Cu	Si	Pb	As	Cd	Hg	H_2O
PD-1	Non Ferrous Dust	*35.9*	*12.2*	*8.23*	*4.27*	*7.03*	*3.05*	**2.75**	**0.77**	*0.28*	**0.0389**	*0.4*

Commercially Pure Copper Certified Reference Materials (8mm dia. x 300mm rods)

CANMET No.	Description	Ag	As	Bi	Cd	Fe	Ni	O	Pb	S	Sb	Se	Sn	Te	Zn
SSC-1	Copper Rods	**0.00188**	**0.000116**	**0.000115**	**none found**	**0.00392**	**0.00176**	**0.0216**	**0.00653**	**0.00196**	**0.000264**	**0.000728**	**0.00549**	**0.000457**	**0.00333**
SSC-3	Copper Rods	**0.00161**	**0.000545**	**0.000059**	**none found**	**0.00400**	**0.00480**	**0.0176**	**0.000458**	**0.00167**	**0.000167**	**0.000387**	**0.00120**	**0.000253**	**0.00153**

Zinc-Aluminium Foundry Alloy Certified Reference Materials (50mm dia. x 12mm discs; also as finely divided material – units of 80g)

CANMET No.	Description	Al	Cu	Mg	Fe	Sn	Pb	Cd
NZA-1	Zinc-Aluminium Foundry Alloy	**28.70**	**1.51**	**0.020**	**0.046**	**0.0069**	**0.0030**	**0.00098**
NZA-2	Zinc-Aluminium Foundry Alloy	**23.81**	**3.00**	**0.029**	**0.021**	**0.0045**	**0.0076**	**0.0047**
NZA-3	Zinc-Aluminium Foundry Alloy	**25.99**	**2.00**	**0.0049**	**0.066**	**0.0034**	**0.0045**	**0.0064**
NZA-4	Zinc-Aluminium Foundry Alloy	**26.65**	**2.45**	**0.0106**	**0.027**	**0.0087**	**0.0101**	**0.0029**
NZA-5	Zinc-Aluminium Foundry Alloy	**10.85**	**1.04**	**0.021**	**0.016**	**0.0017**	**0.0012**	**0.0095**
NZA-6	Zinc-Aluminium Foundry Alloy	**7.54**	**3.17**	**0.00037**	**0.0105**	**0.0051**	**0.0809**	**0.0147**
NZA-7	Zinc-Aluminium Foundry Alloy	**13.17**	**0.212**	**0.052**	**0.016**	**0.0116**	**0.0136**	**0.00020**

CERAM Research, (CERAM) UK

CHEMICAL COMPOSITION (nominal mass content in %)

Siliceous, Zircon Bearing and Basic Reference Materials (Finely divided material – units of 25g or 100g; 2CAS1, 2CAS2, 2CAS7, AN11 and AN21A in units of 25g only)

CERAM No.	Description	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	Li_2O	BaO	P_2O_5	Mn_3O_4	Cr_2O_3	ZrO_2 + HfO_2	PbO	B_2O_3	LOI
AN25	Alumina	*<0.01*	*<0.01*	*99.4*	*0.03*	*0.05*	*0.01*	*0.53*	*<0.01*	…	…	*0.05*	…	…	…	…	…	**#**
AN26	Alumina	*0.09*	*<0.01*	*99.8*	*0.04*	*0.06*	*<0.01*	*0.03*	*<0.01*	…	…	…	…	…	…	…	…	**#**
AN27	Alumina	*0.05*	*<0.01*	*99.84*	*0.03*	*0.06*	*<0.01*	*0.02*	*<0.01*	…	…	…	…	…	…	…	…	**#**
2CAS1	Ball Clay	*52.5*	*1.16*	*32.0*	*1.03*	*0.20*	*0.28*	*0.34*	*2.25*	*0.03*	…	…	…	…	…	…	…	*9.80*
AN41	China Clay	*54.8*	*0.05*	*41.5*	*0.71*	*0.16*	*0.41*	*<0.05*	*1.81*	…	…	…	…	…	…	…	…	***#**(12.4)*
AN29	Bauxite	*6.17*	*3.28*	*88.6*	*1.72*	*0.07*	*0.09*	*0.04*	*0.03*	*<0.01*	…	…	…	…	…	…	…	*0.09*
2CAS2	Bauxite	*5.93*	*3.14*	*89.0*	*1.74*	*0.10*	*0.08*	*0.01*	*0.02*	*<0.01*	…	…	*<0.01*	…	…	…	…	*0.10*
CAS8	Feldspar	*67.15*	*0.03*	*18.63*	*0.11*	*0.22*	*0.02*	*3.53*	*10.6*	…	…	…	…	…	…	…	…	***#**(0.30)*
2CAS7	Firebrick	*49.9*	*1.35*	*44.4*	*2.58*	*0.36*	*0.45*	*0.13*	*0.54*	*0.07*	*0.08*	…	…	…	…	…	…	*0.07*
CEB 1	Earthenware Body †	*74.0*	*0.34*	*16.2*	*0.48*	*0.52*	*0.16*	*0.71*	*1.75*	…	*0.05*	*0.14*	*<0.01*	*<0.01*	…	…	*<0.01*	*5.60*
2CAS12	Sillimanite	*34.0*	*1.34*	*63.6*	*0.30*	*0.31*	*0.06*	*0.13*	*0.12*	*<0.01*	…	…	…	…	…	…	…	*0.12*
AN40	Molochite	*58.9*	*0.02*	*38.2*	*0.90*	*0.15*	*0.27*	*0.10*	*1.48*	…	…	…	…	…	…	…	…	**#**
2CAS14	Steatite	*62.5*	*0.01*	*0.15*	*0.35*	*0.28*	*31.7*	*0.02*	*<0.01*	*<0.01*	…	…	…	…	…	…	…	*5.15*
AN30	Borax Frit	*51.8*	*0.03*	*7.41*	*0.18*	*13.0*	*0.22*	*8.67*	*1.13*	…	…	…	…	…	…	…	*17.4*	**#**
AN28	Lead Bisilicate	*32.8*	*<0.01*	*2.40*	*0.03*	*0.04*	*<0.01*	*0.04*	*0.04*	…	…	…	…	…	…	*64.5*	…	*0.13*
AN46	Zircon Batt	*45.5*	*0.50*	*30.5*	*0.85*	*0.21*	*5.36*	*0.15*	*1.01*	*0.01*	…	…	…	…	*15.7*	…	…	*0.08*
2CAS15	Zircon	*34.1*	*0.18*	*0.36*	*0.08*	*0.52*	*0.11*	*0.03*	*0.02*	*<0.01*	…	…	…	…	*64.6*	…	…	*0.25*
AN35	Magnesite	*0.49*	*0.01*	*0.44*	*1.34*	*0.83*	*96.4*	*<0.05*	*<0.01*	…	…	*0.011*	*0.11*	*0.046*	…	…	*0.10*	**#**
AN36	Magnesite	*0.48*	*0.01*	*0.42*	*4.66*	*0.94*	*93.2*	*<0.05*	*<0.01*	…	…	*0.008*	*0.11*	*0.004*	…	…	*0.11*	**#**
AN37	Magnesite	*1.39*	*0.03*	*1.06*	*1.80*	*1.46*	*94.0*	*<0.05*	*<0.01*	…	…	*0.016*	*0.12*	*0.005*	…	…	*0.11*	**#**
AN43	Magnesite	…	…	…	…	…	…	…	*0.06*	…	…	…	…	…	…	…	*0.005*	…
AN45	Magnesite	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	*0.222*	…
AN11	Chrome Magnesite	*8.85*	*0.11*	*13.5*	*11.6**	*1.46*	*39.5*	*0.10*	*0.06*	*0.03*	…	…	*0.16*	*24.2*	…	…	…	**#**
AN21A	Chrome Magnesite	*3.97*	*0.12*	*5.94*	*10.6**	*1.20*	*47.7*	*0.07*	*0.02*	*0.02*	…	…	*0.18*	*29.7*	…	…	…	**#**
AN22	Chrome Ore	*3.45*	*0.26*	*29.3*	*15.4**	*0.39*	*16.5*	*0.08*	*0.03*	*0.02*	…	…	*0.14*	*34.0*	…	…	…	**#**
2CAS5	Chrome Ore	*5.55*	*0.29*	*23.2*	*16.4**	*0.57*	*16.8*	*0.03*	*0.03*	*<0.01*	…	…	*0.13*	*35.8*	…	…	…	*0.76*
CCB1	Calcined Bone ††	*1.28*	*<0.01*	*0.05*	*0.04*	*53.4*	*1.14*	*0.52*	*0.011*	…	*0.031*	*40.5*	…	*<0.01*	…	*<0.02*	…	*2.60*

***** Total iron as Fe_2O_3.

† Additional elements: SrO *0.02%* plus ZrO_2, HfO_2, ZnO, SnO_2 and CuO are all *<0.01%*

†† Additional elements: ZnO *0.01%*, SrO *0.049%*, HfO_2 *<0.01%*, SnO_2 *<0.01%*, CuO *<0.01%*, ZrO_2 *<0.02%*, SO_3 *0.114%*, F *0.130%* and moisture *0.12%*

LOI calculated to the ignited basis (otherwise calculated on the dried basis at 110°C)

Please note that CERAM Research also prepare Reference Materials giving Thermal Expansion and Bulk Density data for Polycrystalline Alumina. Further details of these Alumina Calibration Bars will gladly be provided on request. In addition, Cordierite Thermal Expansion CRMs are also available.

CERAM Research also supplies a Dental Frit Particle Size Distribution CRM, with D50% 3.2 µm, Median diameter 3.2 µm, with 90% between 0.6 and 10.0 µm. This is available in units of 75g.

Please ask us for further details of these Alumina & Cordierite Thermal Expansion CRMs and Dental Frit Particle Size Distribution CRM.

RESEARCH INSTITUTE CKD, (CKD), Czech Republic

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

Cast Iron Certified Reference Materials (38mm x 38mm x 20mm Chill Cast Blocks)

CKD No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	Nb	N
241b	**1.84**	**3.15**	**0.060**	**0.007**	**0.123**	**0.683**	**0.61**	**0.021**	**0.003**	**0.002**	*0.001*	**0.004**	**0.011**	**0.003**	**0.0053**
242a	**1.84**	**3.06**	**0.060**	**0.039**	**0.036**	**0.029**	**1.13**	**0.039**	**0.036**	**0.015**	**0.008**	**0.002**	**0.055**	**0.013**	…
242b	**2.06**	**2.81**	**0.189**	**0.044**	**0.028**	**0.031**	**1.21**	**0.022**	**0.042**	**0.009**	**0.005**	**0.004**	**0.040**	**0.009**	**0.0092**
243b	**2.29**	**2.44**	**0.466**	**0.173**	**0.081**	**0.394**	**0.252**	**0.098**	**0.013**	**0.078**	**0.010**	**0.027**	**0.191**	**0.024**	**0.0050**
244c	**2.57**	**2.15**	**0.715**	**0.027**	**0.012**	**0.248**	**0.059**	**0.344**	**0.071**	**0.043**	**0.086**	**0.050**	**0.301**	**0.006**	…
245a	**2.94**	**1.58**	**1.38**	**0.41**	**0.039**	**0.168**	**0.114**	**0.161**	**0.019**	**0.002**	**0.007**	**0.003**	**0.076**	*0.001*	…
245b	**2.95**	**1.59**	**1.38**	**0.42**	**0.035**	**0.197**	**0.115**	**0.194**	**0.038**	**0.006**	**0.003**	**0.007**	**0.081**	**0.029**	…
246b	**2.73**	**0.76**	**0.354**	**0.66**	**0.020**	**1.16**	**0.009**	**0.065**	**0.101**	**0.003**	**0.000**	**0.012**	**1.39**	*0.001*	…
249c	**4.06**	**0.49**	**0.099**	**0.27**	**0.0075**	**0.148**	**0.011**	**1.21**	**0.032**	**0.016**	**0.017**	**0.014**	**0.486**	**0.011**	…
250	**1.12**	**0.55**	**0.32**	**0.015**	**0.024**	**0.61**	**0.005**	**17.7**	*0.01*	…	…	**0.085**	**0.22**	**0.00**	…
251	**2.25**	**1.14**	**1.97**	**0.017**	**0.015**	**1.07**	**0.12**	**19.7**	*0.02*	…	…	**0.09**	**0.38**	**0.10**	…
252	**2.40**	**2.06**	**1.00**	**0.027**	**0.008**	**1.66**	**0.005**	**22.0**	*0.01*	…	…	**0.105**	**0.13**	**0.00**	…
253	**2.45**	**2.28**	**0.74**	**0.060**	**0.008**	**2.92**	**0.01**	**23.6**	*0.035*	…	…	**0.105**	**0.29**	**0.00**	…
254	**2.78**	**2.60**	**4.50**	**0.043**	**0.018**	**0.23**	**0.41**	**14.3**	*0.05*	…	…	**0.06**	**0.11**	**0.26**	…

Cast Iron Certified Reference Materials (continued)

CKD No.	Pb	Sn	Ti	V	W	Zr	Bi	Ce	La	Mg	Sb	Se	Te	Zn	Fe
241b (cont)	**0.001**	*0.003*	**0.001**	**0.080**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.139**	*0.00*	*0.000*	**0.000**	*93.2*
242a (cont)	*0.012*	**0.010**	**0.19**	**0.37**	*0.007*	*0.000*	*0.015*	*0.00*	*0.00*	**0.000**	**0.007**	*0.000*	*0.08*	*0.00*	*92.9*
242b (cont)	**0.027**	**0.010**	**0.28**	**0.46**	*0.002*	*0.000*	**0.020**	*0.00*	**0.000**	**0.000**	**0.005**	*0.002*	*0.031*	*0.00*	*92.6*
243b (cont)	**0.013**	**0.110**	**0.003**	**0.227**	**0.026**	**0.000**	*0.000*	**0.000**	**0.000**	**0.000**	**0.079**	*0.016*	*0.000*	**0.025**	*93.0*
244c (cont)	**0.003**	**0.027**	**0.034**	**0.002**	**0.052**	**0.037**	**0.000**	**0.017**	**0.008**	**0.031**	**0.004**	*0.000*	*0.000*	**0.027**	*92.9*
245a (cont)	**0.016**	**0.076**	**0.087**	**0.073**	**0.021**	**0.003**	**0.008**	*0.00*	*0.00*	**0.003**	**0.050**	*0.036*	*0.018*	**0.000**	*92.7*
245b (cont)	**0.020**	**0.076**	**0.110**	**0.055**	**0.020**	**0.004**	**0.009**	*0.00*	*0.00*	**0.003**	**0.052**	*0.029*	*0.017*	*0.00*	*92.5*
246b (cont)	*0.002*	**0.002**	**0.014**	**0.013**	*0.011*	**0.000**	*0.001*	**0.007**	**0.003**	**0.016**	**0.004**	*0.00*	*0.00*	*0.00*	*92.6*
249c (cont)	**0.009**	**0.002**	**0.026**	**0.026**	**0.009**	**0.027**	**0.004**	**0.017**	**0.004**	**0.042**	**0.005**	*0.002*	*0.00*	**0.006**	*92.9*
250 (cont)	*0.00*	*0.009*	*0.00*	*0.00*	…	…	…	**0.00**	…	**0.000**	…	…	…	…	…
251 (cont)	*0.009*	*0.01*	*0.005*	*0.02*	…	…	…	**0.017**	…	**0.022**	…	…	…	…	…
252 (cont)	*0.00*	*0.005*	*0.02*	*0.03*	…	…	…	**0.00**	…	**0.125**	…	…	…	…	…
253 (cont)	*0.00*	*0.005*	*0.005*	*0.02*	…	…	…	**0.018**	…	**0.038**	…	…	…	…	…
254 (cont)	*0.012*	*0.02*	*0.005*	*0.005*	…	…	…	**0.039**	…	**0.058**	…	…	…	…	…

Some other CKD samples are available, and information on these will be provided on request.

CENTRE DE DÉVELOPPEMENT DES INDUSTRIES DE MISE EN FORME DES MATÉRIAUX (CTIF), France

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

Highly Alloyed Steel Certified Reference Material (Finely divided material units of 100g or a 40mm dia x 20mm disc)

CTIF No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	As	Co	Cu	N	Nb	Sn	V	$Al_{Sol.}$	$Al_{Tot.}$	Ga
***ECRM 273-1**	Highly Alloyed Steel	**0.0336**	**0.378**	**0.785**	**0.0131**	**0.00037**	**14.747**	**0.246**	**4.852**	**0.0030**	**0.0391**	**3.047**	**0.0444**	**0.221**	**0.0021**	**0.0512**	*0.0032*	*0.0062*	*0.0023*

Special Alloy Certified Reference Materials (40mm dia x 20mm discs: ECRM 378-1 is also available in the finely divided form in units of 100g.)

CTIF No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	Cu	Nb	Ti	W	Fe
***ECRM 377-1**	Nickel Alloy IN 625	**0.0202**	**0.077**	**0.0225**	**0.0036**	**0.0006**	**21.72**	**8.94**	**61.45**	**0.216**	*0.0006*	**0.0348**	**0.0110**	**3.50**	**0.255**	…	**3.77**
***ECRM 377-2**	Nickel Alloy IN 625	**0.0202**	**0.077**	**0.0225**	**0.0036**	**0.0006**	**21.72**	**8.94**	**61.45**	**0.232**	*0.0006*	**0.0348**	**0.0104**	**3.50**	**0.264**	…	**3.77**
***ECRM 378-1**	Cobalt Alloy, Stellite grade 6	**1.181**	**1.172**	**0.0579**	*0.0023*	**0.0055**	**28.22**	**0.0503**	**0.617**	…	…	**63.52**	…	…	…	**4.43**	**0.606**

Cast Iron Certified Reference Materials (Finely divided material units of 100g)

CTIF No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	Co	Cu	N	Sn	Te	Ti	V	Zn
***ECRM 485-2**	**3.308**	**0.508**	**0.190**	**0.610**	**0.165**	**0.0845**	…	**0.0742**	…	…	…	**0.0303**	**0.0058**	…	…	…	…	…
***ECRM 485-3**	**3.514**	…	…	…	**0.1488**	…	…	…	…	…	…	…	**0.0081**	…	…	…	…	…
***ECRM 487-1**	**3.27**	**0.0060**	**0.094**	**0.0020**	**0.0007**	**0.063**	…	**0.040**	…	**0.011**	**0.009**	…	**0.004**	…	…	…	*0.0005*	…
***ECRM 487-2**	**3.573**	**0.0899**	**0.0491**	**0.0066**	**0.0031**	**0.0249**	**0.0034**	**0.0219**	**0.079**	**0.0064**	**0.0151**	**0.0136**	**0.0044**	**0.0045**	**0.0064**	**0.0021**	**0.0117**	**0.0012**
***ECRM 488-2**	**3.956**	**0.374**	**0.201**	**0.0111**	**0.1173**	**0.303**	*0.0008*	**0.1247**	…	…	…	**0.0256**	**0.0052**	**0.0013**	*0.0089*	**0.0636**	**0.0545**	*0.0006*
***ECRM 490-1**	**4.813**	*0.03*	**10.83**	**0.0267**	**0.0040**	**0.0183**	…	*0.02*	…	…	…	**0.0088**	**0.0030**	…	…	**0.0035**	**0.0152**	…
***ECRM 491-1**	**3.616**	…	…	…	**0.0866**	…	…	…	…	…	…	…	…	…	…	…	…	…
***ECRM 492-1**	**3.258**	…	…	…	**0.0854**	…	…	…	…	…	…	…	**0.0048**	…	…	…	…	…

* Denotes Full EURONORM Certified Reference Materials

Low Alloy Iron Reference Materials (43mm dia x 5mm chill cast discs) Supplied as a pair of discs of the same material.

CTIF No.	C	Si	Mn	P	S	Cr	Mo	Ni	Co	Cu	Sn	Ti	V	Others
FPA-1	*3.1*	*0.03*	*0.10*	*0.002*	*0.0009*	*0.07*	*0.0109*	*0.045*	*0.0097*	*0.062*	…	*0.0010*	*0.0010*	*0.0109* **As**, *0.01* **N**
FL 1-1	*2.14*	*3.24*	*0.820*	*0.118*	*0.0765*	*0.063*	*0.038*	*0.245*	…	*0.0195*	*0.305*	*0.02*	*0.0205*	…
FL 3-1	*2.45*	*2.11*	*0.270*	*0.729*	*(0.013)*	*0.107*	*0.106*	*0.553*	*(0.022)*	*0.102*	*0.111*	*0.054*	*0.049*	*0.0060* **N**
FO 1-5	*2.02*	*3.18*	*0.715*	*0.112*	*0.074*	*0.08*	*0.04*	*0.120*	…	*0.036*	*0.382*	*0.018*	*0.019*	…
FO 3-6	*2.56*	*1.93*	*0.735*	*0.27*	*0.175*	*0.10*	*0.105*	*0.458*	*(0.006)*	*0.108*	*0.104*	*0.054*	*0.036*	*(0.002)* **As**
FO 4-3	*2.81*	*1.51*	*0.64*	*0.58*	*0.009*	*0.17*	*0.10*	*0.32*	…	*0.31*	*0.013*	*0.075*	*0.049*	…
FO 5-4	*3.2*	*0.7*	*0.2*	*1.30*	*0.027*	*0.24*	*0.40*	*0.172*	*(0.019)*	*0.12*	*0.109*	*0.04*	*0.14*	*(0.001)* **As**
FO 6-4	*3.5*	*0.55*	*0.7*	*0.87*	*0.106*	*0.50*	*0.21*	*0.128*	…	*0.12*	*0.039*	*0.09*	*0.11*	…
FO 7-2	*2.45*	*0.675*	*0.70*	*0.84*	*0.085*	*0.45*	*0.26*	*0.15*	…	*0.125*	…	*0.065*	*0.13*	*0.0113* **N**
FO 8-2	*3.6*	*1.04*	*0.37*	*0.107*	*0.021*	*0.26*	…	*0.30*	…	*0.215*	*0.05*	*0.055*	*0.014*	…
FO 9-2	*2.7*	*1.5*	*0.7*	*0.02*	*0.015*	*0.18*	*0.12*	*0.355*	…	*0.31*	*0.144*	*0.017*	*0.022*	…
FO 12-1	*3.71*	*1.86*	*0.44*	*0.038*	*0.004*	…	…	…	…	*0.77*	*0.011*	…	…	…
FO 18-1	*3.25*	*1.33*	*0.52*	*1.11*	*0.132*	*0.09*	*0.16*	*0.18*	…	*0.09*	*0.15*	*0.17*	*0.17*	…
FO 19-2	*4.04*	*1.05*	*1.05*	*0.032*	*0.057*	…	…	…	…	…	…	…	…	*0.0005* **Te**
FT 1-3	*2.9*	*2.25*	*0.7*	*0.118*	*(0.006)*	*0.07*	…	*0.134*	…	*0.018*	…	*0.04*	*0.7*	…
FT 2-1	*3.4*	*1.4*	*0.78*	*0.045*	*0.095*	*0.03*	…	*0.07*	…	*0.01*	…	*0.10*	*0.405*	…
FT 3-1	*3.2*	*1.55*	*0.345*	*0.063*	*0.051*	*0.685*	…	*0.092*	…	*0.015*	…	*0.2*	*0.016*	…

CENTRE DE DÉVELOPPEMENT DES INDUSTRIES DE MISE EN FORME DES MATÉRIAUX (CTIF), France

CHEMICAL COMPOSITION (nominal mass content in %)

Cu, Ni, Cr, Mo Iron Reference Materials

(43mm dia. x 5mm chill cast discs) Supplied as a pair of discs of the same material.

CTIF No.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu
NH 1-2	*2.98*	*1.35*	*0.90*	*0.060*	*0.105*	*0.83*	*1.45*	*1.38*	*1.99*
NH 2-2	*2.50*	*1.81*	*1.04*	*0.047*	*0.058*	*1.26*	*1.01*	*1.78*	*1.02*
NH 3-2	*3.47*	*0.85*	*0.175*	*0.36*	*0.024*	*1.76*	*0.73*	*2.53*	*0.031*
NH 4-2	*2.84*	*0.49*	*0.28*	*0.12*	*0.022*	*2.46*	*0.30*	*3.60*	*0.09*
NH 5-2	*2.31*	*0.31*	*0.24*	*0.115*	*0.04*	*2.85*	*0.017*	*4.90*	*0.035*
NH 6-1	*2.70*	*2.28*	*0.355*	*0.066*	*0.036*	*6.60*	*0.11*	*7.06*	*0.115*
NH 7-1	*3.43*	*0.95*	*0.63*	*0.035*	*0.022*	*9.02*	*…*	*5.53*	*0.105*
NH 8-1	*2.98*	*0.80*	*0.57*	*0.052*	*0.076*	*5.03*	*0.125*	*8.16*	*0.065*
NH 9-1	*3.13*	*1.24*	*0.65*	*0.087*	*0.029*	*11.70*	*0.059*	*4.11*	*0.203*

Austenitic (Ni-resist) Iron Reference Materials

(43mm dia. x 5mm chill cast discs) Supplied as a pair of discs of the same material.

CTIF No.	C	Si	Mn	P	S	Cr	Ni	Cu
NR CU 1	*3.1*	*1.0*	*1.5*	*0.17*	*0.09*	*1.0*	*18.0*	*5.0*
NR CU 2	*2.6*	*2.1*	*1.1*	*0.12*	*0.05*	*2.0*	*15.9*	*6.5*
NR CU 3	*2.0*	*3.1*	*0.6*	*0.05*	*0.02*	*3.5*	*13.3*	*8.0*
NR 1S	*2.6*	*3.0*	*1.5*	*0.19*	*…*	*2.0*	*20.6*	*0.11*
NR 2S	*2.3*	*1.4*	*0.53*	*0.06*	*…*	*0.51*	*36.4*	*0.21*
NR 3S	*3.0*	*2.9*	*0.77*	*0.02*	*…*	*3.1*	*24.6*	*0.33*
NR 4S	*2.5*	*4.9*	*1.7*	*0.14*	*…*	*1.5*	*18.3*	*0.63*
NR 5S	*1.7*	*2.0*	*1.2*	*0.04*	*…*	*0.20*	*27.0*	*0.50*
NR 6S	*1.8*	*2.4*	*0.99*	*0.02*	*…*	*1.1*	*30.7*	*0.03*
NR 8S	*3.1*	*1.4*	*4.4*	*0.12*	*…*	*0.19*	*14.2*	*0.07*
NR 1L	*2.5*	*3.0*	*1.3*	*0.12*	*0.10*	*1.7*	*25.9*	*0.49*
NR 3L	*3.0*	*3.1*	*0.73*	*0.09*	*0.05*	*3.0*	*21.6*	*0.26*
NR 4L	*2.4*	*5.3*	*1.5*	*0.15*	*0.02*	*1.4*	*16.0*	*0.75*
NR 5L	*1.8*	*3.0*	*1.2*	*0.04*	*0.08*	*0.27*	*33.9*	*0.48*
NR 6L	*1.8*	*2.1*	*0.70*	*0.03*	*0.06*	*3.5*	*30.4*	*0.02*
NR 8L	*2.9*	*1.7*	*5.2*	*0.06*	*0.03*	*0.15*	*14.0*	*0.06*
NR4-1G	*2.3*	*5.6*	*1.7*	*0.11*	*…*	*1.4*	*21.3*	*0.64*

Chromium Iron Reference Materials

(43mm dia. x 5mm chill cast discs) Supplied as a pair of discs of the same material.

CTIF No.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N
FCR 1-3	*2.45*	*0.45*	*0.60*	*0.019*	*0.007*	*18.71*	*1.41*	*1.30*	*0.031*	*…*
FCR 2-4	*2.8*	*1.07*	*0.74*	*0.137*	*0.055*	*11.8*	*3.88*	*1.87*	*0.135*	*…*
FCR 3-1	*2.03*	*0.255*	*0.99*	*0.034*	*0.035*	*14.85*	*0.91*	*0.65*	*0.049*	*…*
FCR 4-1	*2.45*	*1.40*	*2.05*	*0.097*	*0.066*	*24.2*	*2.16*	*0.57*	*1.32*	*…*
FCR 5-1	*3.43*	*0.30*	*0.55*	*0.052*	*0.018*	*28.5*	*3.27*	*2.69*	*1.02*	*…*
FCR 6-1	*1.3*	*0.75*	*1.4*	*0.201*	*0.086*	*30.84*	*0.46*	*0.19*	*0.480*	*…*
FCR 7-1	*3.3*	*1.07*	*0.365*	*0.099*	*0.043*	*33.65*	*2.62*	*0.95*	*0.74*	*…*
FCR NI 1	*1.27*	*1.63*	*0.71*	*0.41*	*0.06*	*26.20*	*…*	*16.50*	*0.02*	*…*
FCR NI 2	*2.0*	*1.51*	*0.60*	*0.185*	*0.024*	*29.07*	*…*	*13.11*	*…*	*0.1*
FCR NI 3	*2.74*	*0.67*	*0.46*	*0.036*	*0.011*	*31.65*	*…*	*11.05*	*…*	*…*

CENTRE DE DÉVELOPPEMENT DES INDUSTRIES DE MISE EN FORME DES MATÉRIAUX (CTIF), France

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Brass Reference Materials (60mm dia. x 6 mm mushrooms, except EA1 which is a 40mm dia. x 18mm disc)

CTIF No.	Cu	Sn	Pb	Zn	Fe	Ni	Mn	Al	Si	Sb	P	Others
L 1	*58.9*	*0.05*	*0.06*	*40.6*	*<0.02*	*0.11*	…	…	*0.38*	…	…	…
L 2	*61.6*	*0.50*	*0.41*	*35.2*	*0.22*	*0.70*	*0.35*	*0.50*	*0.20*	…	…	…
L 3-1	*58.5*	*1.62*	*1.32*	*35.5*	*0.36*	*0.99*	*0.21*	*1.22*	*0.026*	*0.32*	*0.031*	*0.07* **As**
L 4-1	*61.7*	*0.69*	*2.0*	*34.6*	*0.47*	*0.23*	*0.11*	*0.06*	*0.12*	…	…	…
L 5-1	*61.0*	*0.88*	*2.99*	*31.5*	*(1.0)*	*0.49*	*0.50*	*0.64*	*(0.50)*	*0.17*	*(0.15)*	*0.13* **As**
L 6	*66.6*	*0.25*	*0.20*	*30.3*	*0.08*	*1.2*	*0.06*	*0.14*	*1.25*	…	…	…
L 7	*55.6*	*0.04*	*0.71*	*42.4*	*0.03*	*0.02*	*0.62*	*0.30*	*0.13*	…	…	…
L 20	*85.5*	*0.56*	*0.27*	*13.2*	*0.12*	*0.20*	*0.04*	*0.01*	*0.04*	…	…	*0.12* **As**
L 21	*82.5*	*1.5*	*0.21*	*15.6*	*0.09*	*0.16*	*<0.01*	*<0.02*	*0.04*	…	…	*0.10* **As**
L 22	*84.3*	*1.0*	*0.10*	*15.0*	*0.20*	*0.10*	*<0.01*	*<0.02*	*<0.05*	*0.088*	*0.06*	*<0.05* **Mg**
L 23	*81.2*	*0.20*	*0.06*	*17.9*	*0.25*	*0.03*	…	*<0.02*	*0.28*	…	…	*0.05* **As**
LH 1-1	*64.9*	*(0.01)*	*0.02*	*16.9*	*4.48*	*0.094*	*5.18*	*7.99*	*0.20*	*0.081*	*0.079*	…
LH 2	*61.9*	*0.06*	*0.08*	*22.1*	*3.1*	*3.0*	*3.6*	*6.2*	*0.09*	…	…	…
LH 5	*65.9*	*0.12*	*0.18*	*25.5*	*1.2*	*1.6*	*1.2*	*4.3*	*0.11*	…	…	…
LH 6-1	*63.2*	*0.26*	*0.25*	*19.0*	*3.1*	*3.2*	*4.5*	*6.1*	*0.20*	…	…	…
LH 7-1A	*63.4*	*0.23*	*0.33*	*26.9*	*2.4*	*0.70*	*3.0*	*3.2*	*0.06*	…	…	…
LH 10	*59.0*	*0.20*	*1.8*	*29.0*	*1.0*	*1.5*	*3.6*	*2.7*	*1.3*	…	…	…
LH 11	*66.8*	*0.44*	*1.3*	*26.2*	*0.36*	*2.9*	*0.71*	*0.46*	*0.88*	…	…	…
LH 12	*62.8*	*0.83*	*0.20*	*33.2*	*1.2*	*0.50*	*0.12*	*1.0*	*0.06*	…	…	…
LH 13	*55.8*	*1.2*	*0.60*	*31.8*	*2.0*	*3.2*	*3.1*	*2.0*	*0.21*	…	…	…
LS 1	*78.5*	*0.25*	*0.2*	*16.0*	*0.5*	*0.5*	*0.04*	*0.02*	*4.2*	*0.05*	…	…
LS 2	*79.6*	*0.34*	*0.89*	*11.6*	*1.02*	*1.11*	*0.22*	*0.16*	*4.91*	*0.010*	*0.064*	…
LS 3	*76*	*0.15*	*0.58*	*19*	*0.10*	*0.11*	*0.15*	*0.43*	*3.3*	*0.11*	*0.011*	…
UZ 5	*59.9*	*0.06*	*0.07*	*39.6*	*0.02*	*0.02*	…	…	*0.32*	…	…	…
UZ 30	*63.8*	*1.3*	*1.0*	*33.0*	*0.07*	*0.05*	*0.07*	*0.50*	*0.05*	…	…	…
UZ 50	*85.4*	*0.50*	*0.25*	*13.2*	*0.04*	*0.16*	*0.09*	*0.02*	*0.10*	…	…	…
UZ 51	*83.7*	*1.5*	*0.19*	*14.2*	*0.10*	*0.16*	…	…	*0.01*	…	…	*0.09* **As**
UZ 52-3	*81.2*	*1.1*	*0.11*	*16.9*	*0.32*	*0.084*	*0.002*	…	*0.12*	*0.08*	*0.068*	*0.040* **Mg**, *0.014* **Be**
UZ 53	*82.6*	*0.20*	*0.02*	*16.7*	*0.26*	*0.02*	*≤0.001*	…	*0.14*	…	*0.055*	*0.01* **As**
UZHR 1	*64.8*	*0.52*	*0.96*	*17.8*	*2.5*	*2.4*	*5.4*	*5.1*	*0.28*	…	…	…
UZHR 3	*65.2*	*0.23*	*0.65*	*23.8*	*2.8*	*1.0*	*3.1*	*3.2*	…	…	…	…
UZHR 4	*66.8*	*0.40*	*0.22*	*23.4*	*1.4*	*0.52*	*4.3*	*2.9*	*0.06*	…	…	…
UZHR 6	*60.7*	…	…	*23.5*	*4.5*	…	*3.0*	*8.5*	…	…	…	…
UZHR 7	*59.5*	…	…	*26*	*3.8*	…	*4.0*	*7.0*	…	…	…	…
UZHR 8	*60.1*	…	…	*29.6*	*3.0*	…	*2.0*	*5.5*	…	…	…	…
UZHR 9	*60.2*	…	…	*27.7*	*2.2*	…	*6.0*	*3.8*	…	…	…	…
UZHR 10	*59.1*	…	…	*32*	*1.5*	…	*5.0*	*2.5*	…	…	…	…
UZS 60	*78.9*	*0.40*	*0.57*	*15.3*	*0.47*	*0.49*	…	…	*3.7*	…	*0.07*	…
EA1*	*(57.8)*	*(0.20)*	*(2.95)*	*(38.5)*	*(0.14)*	*(0.065)*	…	…	*(<0.01)*	…	…	*(0.09)* **As**

***** This denotes a Setting Up Sample giving approximate composition only.

CENTRE DE DÉVELOPPEMENT DES INDUSTRIES DE MISE EN FORME DES MATÉRIAUX (CTIF), France

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Bronze Reference Materials (60mm dia. x 6 mm mushrooms)

CTIF No.	Cu	Sn	Pb	Zn	Fe	Ni	Mn	Si	S	P	Al	Sb	As
B1	*83.0*	*15.1*	*0.2*	*0.9*	*0.09*	*0.06*	*...*	*0.05*	*0.03*	*0.03*	*0.06*	*0.44*	*...*
B2	*85.9*	*13.5*	*0.02*	*0.11*	*0.05*	*<0.01*	*...*	*0.2*	*0.05*	*0.17*	*<.0.01*	*<0.01*	*...*
B3	*80.2*	*13.0*	*1.6*	*2.3*	*0.22*	*1.5*	*0.20*	*0.06*	*0.05*	*0.48*	*0.10*	*0.20*	*...*
B4	*84.0*	*10.8*	*2.5*	*1.2*	*<0.05*	*0.6*	*...*	*<0.05*	*0.02*	*0.5*	*...*	*0.1*	*...*
B5	*86.0*	*9.9*	*0.5*	*0.4*	*0.18*	*2.3*	*0.08*	*0.05*	*0.07*	*0.04*	*0.04*	*0.5*	*...*
B10	*83.9*	*6.6*	*4.0*	*2.6*	*0.17*	*0.97*	*<0.01*	*<0.01*	*0.05*	*0.02*	*0.17*	*1.1*	*0.01*
B11	*84.8*	*8.0*	*1.9*	*2.0*	*0.17*	*2.0*	*...*	*0.13*	*0.09*	*0.06*	*...*	*0.70*	*...*
B12	*85.7*	*9.6*	*0.2*	*0.6*	*0.2*	*2.6*	*0.25*	*0.05*	*0.01*	*0.5*	*0.1*	*0.1*	*0.1*
B13	*86.4*	*10.0*	*0.99*	*1.1*	*0.25*	*0.50*	*0.05*	*0.08*	*0.07*	*0.22*	*0.02*	*0.24*	*0.06*
B14	*87.0*	*10.8*	*0.5*	*0.2*	*0.11*	*0.3*	*0.02*	*0.08*	*0.02*	*0.64*	*<0.01*	*0.08*	*0.04*
B20-1	*83.4*	*6.4*	*5.1*	*3.8*	*0.17*	*0.5*	*...*	*0.06*	*0.12*	*0.07*	*0.04*	*0.52*	*...*
B21	*83.0*	*5.1*	*3.8*	*6.2*	*0.28*	*1.2*	*...*	*0.14*	*0.05*	*<0.01*	*...*	*0.18*	*...*
B22-1	*83.0*	*3.5*	*6.0*	*4.0*	*<0.1*	*2.5*	*...*	*<0.1*	*0.03*	*...*	*...*	*0.05*	*...*
B23-1	*83.4*	*7.2*	*7.2*	*1.5*	*(0.04)*	*0.09*	*...*	*0.03*	*0.02*	*0.07*	*0.0*	*0.38*	*...*
B30-1	*76.5*	*11.1*	*9.6*	*1.0*	*0.07*	*1.2*	*0.10*	*(<0.06)*	*0.08*	*0.05*	*(<0.05)*	*0.21*	*...*
B31	*78.6*	*7.7*	*11.8*	*0.8*	*(0.02)*	*0.50*	*...*	*(0.05)*	*0.03*	*...*	*(0.03)*	*0.48*	*...*
B32	*74.6*	*6.0*	*16.1*	*1.2*	*0.11*	*1.5*	*...*	*0.08*	*0.03*	*0.04*	*0.08*	*0.13*	*<0.01*
UE-30	*88.0*	*7.2*	*2.0*	*2.0*	*0.02*	*0.15*	*0.15*	*0.10*	*0.04*	*0.07*	*...*	*0.1*	*...*

Cupro - Beryllium Cobalt and Cupro-Nickel Reference Materials (60mm dia. x 6mm mushrooms)

CTIF No.	Cu	Sn	Pb	Zn	Fe	Ni	Mn	Si	S	Al	Be	Co	Ag	C	Nb	Others
4583	*96.3*	*0.25*	*0.08*	*0.09*	*0.15*	*2.0*	*0.06*	*0.08*	*...*	*0.03*	*0.8*	*0.002*	*...*	*...*	*...*	*...*
4584	*97.0*	*0.02*	*0.002*	*0.02*	*0.12*	*0.02*	*<0.01*	*0.17*	*...*	*0.03*	*2.5*	*0.04*	*...*	*...*	*...*	*...*
4594	*95.5*	*0.002*	*0.003*	*<0.01*	*0.10*	*0.06*	*...*	*0.12*	*0.07*	*0.03*	*0.14*	*3.0*	*0.99*	*...*	*...*	*0.067* **Cr**
4640	*95.7*	*0.05*	*0.06*	*0.06*	*0.13*	*1.1*	*0.06*	*0.17*	*0.1*	*0.10*	*0.70*	*1.4*	*0.50*	*...*	*...*	*0.1* **Cr**
4766	*96.8*	*0.10*	*0.05*	*0.07*	*0.16*	*0.20*	*<0.01*	*0.11*	*0.2*	*0.03*	*1.6*	*0.64*	*...*	*...*	*...*	*0.2* **Cr**
4868	*96.2*	*0.02*	*0.02*	*0.06*	*0.20*	*0.04*	*0.02*	*0.21*	*...*	*0.04*	*2.9*	*0.25*	*...*	*...*	*...*	*...*
4872	*97.0*	*0.04*	*0.02*	*0.12*	*0.08*	*0.10*	*<0.01*	*0.16*	*0.04*	*0.06*	*1.9*	*0.40*	*...*	*...*	*...*	*0.04* **Cr**
4873	*98.4*	*0.007*	*0.003*	*0.02*	*0.10*	*0.05*	*<0.01*	*0.09*	*...*	*0.10*	*0.17*	*1.0*	*...*	*...*	*...*	*0.105* **Cr**
CN1	*85.0*	*(0.005)*	*0.085*	*0.2*	*1.1*	*12.3*	*0.8*	*(0.05)*	*0.046*	*(0.003)*	*...*	*...*	*...*	*(0.002)*	*(0.1)*	*...*
CN2	*88.5*	*(0.005)*	*0.055*	*0.5*	*1.6*	*7.8*	*1.1*	*0.24*	*0.028*	*(0.005)*	*...*	*...*	*...*	*(0.005)*	*(0.005)*	*...*
CN3	*87.5*	*<0.01*	*0.02*	*0.1*	*0.7*	*9*	*1.5*	*0.2*	*0.01*	*0.1*	*...*	*...*	*...*	*0.05*	*0.6*	*...*
CN4	*84.0*	*0.058*	*0.006*	*0.07*	*1.8*	*11.2*	*1.5*	*(0.01)*	*(0.001)*	*(0.02)*	*...*	*...*	*...*	*(0.001)*	*0.7*	*...*
CN33	*67.1*	*(0.003)*	*0.053*	*0.37*	*1.6*	*29.75*	*0.45*	*0.47*	*0.013*	*(0.01)*	*...*	*...*	*...*	*0.02*	*0.06*	*0.02* **P**, *0.0212* **Bi** *0.006* **Cd**, *<0.06* **Mg** *0.0224* **Te**
UN 3S	*92.6*	*0.22*	*0.20*	*1.6*	*0.30*	*3.4*	*0.07*	*1.2*	*...*	*0.11*	*...*	*...*	*...*	*...*	*...*	*...*

CENTRE DE DÉVELOPPEMENT DES INDUSTRIES DE MISE EN FORME DES MATÉRIAUX (CTIF), France

CHEMICAL COMPOSITION (nominal mass content in %)

Cupro-Aluminium Reference Materials (60mm dia. x 6mm mushrooms)

CTIF No.	Cu	Sn	Pb	Zn	Fe	Ni	Mn	Al	Si	Cd	Mg	Bi	Cr
2 206-B	*81.0*	*0.07*	*0.08*	*0.18*	*1.6*	*5.7*	*2.5*	*8.7*	*0.17*	...	...	...	...
2 499-C	*80.8*	*0.16*	*0.16*	*0.08*	*4.7*	*3.5*	*0.38*	*9.8*	*0.45*	...	...	...	...
2 549-D	*80.1*	*0.5*	*0.43*	*0.76*	*2.4*	*4.4*	*0.8*	*10.1*	*0.3*	...	...	...	...
2 504-E	*79.5*	*0.5*	*0.60*	*0.55*	*3.6*	*6.4*	*0.7*	*8.1*	*0.08*	...	...	...	...
3 018-F	*81.9*	*0.06*	*0.02*	*0.06*	*4.5*	*4.5*	*1.6*	*7.2*	*0.08*	...	...	...	...
3 011-G	*84.8*	*0.12*	*0.10*	*0.25*	*2.0*	*2.0*	*0.17*	*10.4*	*0.16*	...	...	...	...
4 149-G	*85.0*	*0.34*	*0.15*	*0.37*	*2.0*	*2.0*	*0.21*	*9.8*	*0.18*	...	...	...	...
2 794-H	*90.3*	*0.11*	...	...	*0.82*	*0.70*	...	*8.0*	*0.05*	...	...	...	...
3 299-J	*87.6*	*0.11*	*0.11*	*0.19*	*0.38*	*0.21*	*1.1*	*10.1*	*0.14*	...	...	...	...
2 552-K	*85.7*	*0.41*	*0.10*	*0.40*	*0.18*	*0.18*	*0.59*	*12.2*	*0.20*	...	...	...	...
3 296-L	*88.5*	*0.06*	*0.30*	*0.62*	*0.07*	*0.41*	*0.37*	*9.4*	*0.20*	...	...	...	...
3 300-M	*89.5*	*0.21*	*0.21*	*0.08*	*0.45*	*0.21*	*0.17*	*8.7*	*0.42*	...	...	...	...
2 505-N	*79.2*	*0.07*	*0.3*	*0.4*	*2.8*	*2.5*	*3.1*	*11.2*	*0.25*	...	...	...	...
3 010-O	*81.3*	*0.82*	*0.48*	*1.2*	*5.6*	*1.7*	*1.2*	*7.6*	*0.05*	...	...	...	...
2 205-P	*81.2*	...	*0.003*	...	*3.2*	*3.2*	*0.08*	*12.2*	*0.05*	...	...	...	...
4 065-P	*81.2*	*0.18*	*0.03*	*0.03*	*3.4*	*3.2*	*0.08*	*11.9*	*0.03*	...	...	...	...
3 610-Q	*82.3*	*0.25*	*0.25*	*0.5*	*4.0*	*5.4*	*0.05*	*7.1*	*0.06*	*0.090*	...	...	...
2 151-R	*84.7*	...	...	...	*4.5*	*0.55*	*0.7*	*9.4*	*0.02*	...	...	...	...
2 152-S	*85.0*	...	...	...	*4.0*	*0.7*	*0.4*	*9.8*	*0.02*	...	...	...	...
2 154-V	*85.0*	...	...	*0.01*	*3.1*	*0.4*	*0.1*	*11.3*	*0.02*	...	...	...	...
2 158-W	*85.0*	...	...	*0.01*	*2.5*	*0.1*	*0.25*	*12.0*	*0.02*	...	...	...	...
2 805-X	*84.0*	*0.35*	*0.10*	*0.26*	*0.8*	*1.0*	*6.4*	*7.0*	*0.03*	...	...	...	...
3 297-Y	*87.4*	*0.1*	*0.1*	*0.3*	*1.9*	...	*0.03*	*10.0*	*0.15*	...	...	...	...
3 301-Z	*87.3*	*0.03*	*0.03*	*0.06*	*4.0*	*0.13*	*0.26*	*8.1*	*0.06*	...	...	...	...
CA 3	*86.5*	*0.20*	*0.15*	*0.30*	*0.80*	*0.80*	*0.06*	*10.9*	*0.08*	...	...	...	...
CA 10	*80.7*	*0.16*	*0.16*	*0.067*	*4.55*	*3.39*	*0.333*	*10.1*	*0.46*	...	...	...	...
CA 11	*84.5*	*0.26*	*0.11*	*0.21*	*1.27*	*1.95*	*0.78*	*10.5*	*0.25*	...	*0.1*	...	...
CA 12	*84.1*	*0.036*	*0.047*	*0.45*	*2.77*	*1.39*	*3.09*	*8.0*	*0.058*	...	...	...	...
CA 13	*82.4*	*(0.01)*	*0.023*	*0.65*	*3.82*	*0.50*	*1.22*	*11.2*	*0.11*	...	...	...	...
CA 20	*87.2*	*0.19*	*0.18*	*0.41*	*0.79*	*1.18*	*1.85*	*8.0*	*0.17*	*0.05*	...	...	...
CA 21	*81.9*	*0.07*	*0.05*	*0.100*	*3.45*	*3.09*	*0.30*	*10.8*	*0.07*	*0.010*	...	...	...
CA 22	*80.5*	*0.30*	*0.243*	*0.605*	*2.5*	*4.5*	*0.74*	*10.4*	*0.32*	...	...	...	...
CA 25	*79.1*	*0.18*	*0.03*	*0.252*	*6.1*	*5.7*	*0.51*	*8.0*	*0.084*	...	...	...	...
CA 26	*81.2*	*0.005*	*0.058*	*0.038*	*4.36*	*4.87*	*0.188*	*9.1*	*0.035*	*0.034*	...	...	...
CA 27	*81.1*	*0.054*	*0.11*	*0.428*	*2.81*	*3.88*	*1.20*	*10.2*	*0.127*	*0.012*	...	...	...
CA 30	*81.6*	*0.10*	*0.142*	*0.066*	*5.2*	*3.10*	*2.05*	*7.6*	*0.15*	...	...	...	...
CA 31	*76.5*	*0.063*	*0.020*	*0.145*	*3.18*	*7.51*	*3.27*	*9.2*	*0.064*	...	*0.02*	...	...
CA 35	*75.6*	*0.30*	*0.10*	*0.56*	*6.1*	*3.80*	*1.6*	*11.4*	*0.25*	...	...	...	...
CA 36	*77.3*	*0.20*	*0.015*	*0.24*	*3.0*	*6.3*	*0.13*	*12.6*	*0.11*	...	*0.1*	*0.058*	*0.041*
CA 37	*76.8*	*0.147*	*0.050*	*0.36*	*6.85*	*4.98*	*0.752*	*9.8*	*0.04*	...	*0.08*	*0.012*	*0.085*

DILLINGER LABORATORY (DL), Germany

CHEMICAL COMPOSITION (nominal mass content in %)

Ferro-Alloy, Calcium-Silicon, Silico-Chromium, Silico-Manganese, Titanium and Electrolytic Manganese Reference Materials (Finely divided material - units of 50g)

Dillinger No.	Description	C	Si	Mn	P	S	Cr	Mo	Ni	Al	B	Co	O
DL SL01-07	Silico – Manganese	*1.65*	*17.36*	*77.82*	*0.135*	…	…	…	*0.021*	…	…	*0.030*	…
DL SL04-03	Calcium – Silicon	*0.40*	*60.12*	*0.611*	*0.014*	…	*0.018*	*0.003*	*0.008*	*1.59*	…	…	…
DL SL17-03	Ferro – Boron	*0.318*	*0.326*	*0.246*	*0.018*	…	*0.080*	…	*0.359*	*0.141*	*18.78*	…	…
DL SL18-20	Ferro – Chromium	*1.98*	*0.888*	*0.150*	*0.037*	…	*53.76*	…	*0.206*	…	…	*0.0826*	…
DL SL12-07	Ferro – Manganese	*1.630*	*1.113*	*88.00*	*0.081*	…	*0.060*	…	*0.022*	…	…	*0.039*	…
DL SL19-06	Ferro – Manganese, high C	*6.895*	*0.040*	*77.09*	*0.167*	…	*0.010*	…	*0.057*	…	…	*0.069*	…
DL SL20-08	Ferro – Molybdenum	*0.018*	*0.710*	*0.088*	*0.017*	*0.059*	*0.039*	*72.82*	*0.020*	…	…	…	*0.216*
DL SL23-05	Ferro – Silicon	*0.238*	*76.58*	*0.070*	*0.016*	…	*0.021*	…	*0.004*	*1.64*	…	…	…
DL SL24-14	Ferro – Titanium	*0.132*	…	*0.151*	…	*0.0152*	*0.506*	*0.934*	*0.663*	*5.34*	…	*0.115*	…
DL SL25-07	Ferro – Vanadium	*0.289*	*0.959*	*0.101*	*0.031*	*0.108*	…	*0.015*	*0.032*	*4.04*	…	*0.009*	*0.60*
DL SL28-09	Ferro – Niobium	*0.495*	*3.47*	*0.530*	*0.097*	…	*0.035*	…	*0.017*	*2.22*	…	*0.003*	*0.912*
DL SL54-03	Silico – Chromium	*0.034*	*40.46*	*0.41*	*0.022*	…	*36.93*	…	*0.190*	*0.579*	…	…	…
DL SL27-03	Titanium	…	…	*0.017*	*<0.006*	…	*0.059*	*0.016*	*0.031*	*0.024*	…	*0.0019*	…
DL SL77-01	Electrolytic Manganese	*0.120*	*1.09*	*95.85*	*0.056*	*0.016*	*0.411*	…	*0.0068*	*0.0015*	…	*0.0012*	…

Dillinger No.	Cu	N	Nb	Pb	Sn	Ti	V	W	Zr	Ca	Mg	Ta	Zn	Fe
DL SL01-07 (cont)	*0.012*	…	…	…	…	*0.122*	*0.015*	…	…	…	…	…	…	*2.64*
DL SL04-03 (cont)	*0.016*	…	…	…	…	*0.169*	…	…	…	*28.60*	*0.188*	…	…	*5.56*
DL SL17-03 (cont)	*0.064*	…	…	…	…	*0.017*	*0.004*	…	…	…	…	…	…	*79.36*
DL SL18-20 (cont)	…	…	…	…	…	…	*0.3882*	*0.116*	…	…	…	…	…	*41.79*
DL SL12-07 (cont)	*0.016*	…	…	…	…	…	*0.026*	…	…	…	…	…	*0.009*	*8.78*
DL SL19-06 (cont)	*0.040*	…	…	…	…	*0.003*	*0.035*	…	…	…	…	…	*0.007*	*15.40*
DL SL20-08 (cont)	*0.378*	*0.009*	…	…	…	…	*0.022*	*0.022*	…	…	…	…	…	*25.51*
DL SL23-05 (cont)	*0.009*	…	…	…	…	*0.107*	*0.005*	…	…	*1.45*	*0.013*	…	…	*18.62*
DL SL24-14 (cont)	*0.146*	*0.64*	…	…	*0.550*	*68.40*	*2.32*	…	*0.866*	…	…	…	…	*16.93*
DL SL25-07 (cont)	*0.009*	*0.30*	*0.007*	…	…	*0.047*	*76.14*	*0.029*	…	…	…	…	…	*15.82*
DL SL28-09 (cont)	*0.037*	*0.043*	*60.12*	*0.010*	…	*1.35*	*0.878*	…	*0.238*	…	…	*0.217*	…	*27.46*
DL SL54-03 (cont)	*0.020*	…	…	…	…	*0.124*	*0.074*	…	…	…	…	…	…	*20.93*
DL SL27-03 (cont)	*0.002*	…	…	*0.00030*	…	*98.42*	…	*0.015*	*0.0002*	…	…	…	*0.00067*	*0.238*
DL SL77-01 (cont)	*0.007*	…	…	…	…	…	…	…	…	…	…	…	*0.0011*	*2.07*

The above represents a selection of samples prepared by Dillinger Laboratory in which the reference values have been obtained after a preliminary multi-element analysis by a complete reconstitution of the test sample using pure and ultrapure compounds as primary references. Sets of Dillinger samples are available to provide ranges of values for most categories of materials stated, and details can be provided on request.

The Dillinger certified values are based on the SI units kg and mole and are obtained by means of absolute calibration.

DILLINGER LABORATORY (DL), Germany

CHEMICAL COMPOSITION (nominal mass content in %)

Ore, Sinter, Dust and Slag Reference Materials (Finely divided material - all units of 100g except DL X6205-units of 20g)

Dillinger No.	Description	CaO	SiO_2	Fe	FeO	Fe_2O_3	Mn	Mn_3O_4	P_2O_5	S	SO_3	CuO
DL SX15-01	Dust	*7.11*	*6.13*	*52.32*	*3.24*	…	…	*0.327*	*0.104*	…	*0.830*	…
DL SX74-02	Zinc Slag	*0.405*	*11.01*	*0.207*	…	…		*0.113*	*14.03*	*0.114*	…	*7.02*
DL SX39-21	Converter Slag	*50.05*	*10.56*	*16.92*	…	…	*2.31*	…	*1.36*	*0.196*	…	*0.007*
DL SX66-04	Tundish Slag	*1.609*	*24.75*	…	…	*4.62*	…	*0.098*	*0.084*	…	*0.026*	…
DL SX51-17	Vacuum Ladle Slag	*54.57*	*5.62*	*2.13*	…	…	*1.93*	…	*0.042*	*0.28*	…	…
DL SX56-20	Iron Ore Sinter	*8.19*	*5.84*	*58.04*	*7.64*	…	*0.241*	…	*0.126*	…	…	…
DL SX62-05	Cupola Dust	*4.91*	*34.52*	…	…	*9.49*	…	*2.57*	*0.147*	…	*2.70*	*0.163*
DL SX67-04	Ilmenite	*1.30*	*7.93*	*36.23*	…	…	*0.097*	…	*0.025*	*0.311*	…	*0.020*

Dillinger No.	Al_2O_3	MgO	NiO	Cr_2O_3	Nb_2O_5	SnO_2	V_2O_5	MoO_3	TiO_2	Pb	PbO	SrO	BaO
DL SX15-01 (cont)	*1.23*	*1.49*	…	…	…	…	…	…	*0.107*	*0.096*	…	…	…
DL SX74.02 (cont)	*5.99*	*0.118*	…	*0.086*	…	…	…	…	*0.274*	…	…	…	…
DL SX39-21 (cont)	*4.79*	*2.99*	…	*0.196* **Cr**	*0.030*	…	*0.422*	…	*0.780*	…	…	…	…
DL SX66-04 (cont)	*1.884*	*64.65*	*0.165*	*0.255*	…	…	…	…	*0.141*	…	…	…	
DL SX51-17 (cont)	*20.34*	*11.23*	…	*0.092*	*0.124*	…	*0.129*	…	*1.18*	…	…	*0.036*	*0.014*
DL SX56-20 (cont)	*1.41*	*1.54*	*0.006*	*0.027*	…	…	*0.016*	…	*0.131*	…	…	…	…
DL SX62-05 (cont)	*1.30*	*1.85*	*0.005*	*0.041*	…	*0.018*	*0.019*	*0.030*	*0.060*	…	*2.43*	…	…
DL SX67-04 (cont)	*4.64*	*2.81*	*0.038*	*0.109*	…	…	*0.286*	…	*31.92*	…	…	…	…

Dillinger No.	SnO_2	Zn	ZnO	Co_3O_4	Cd	Cl	F	Na_2O	K_2O	CO_2	C(tot)	H_2O (900°C)	H_2O (600°C)
DL SX15-01 (cont)	…	*0.010*	…	…	*0.001*	*1.11*	*0.377*	*0.121*	*1.59*	*2.59*	*2.78*	…	*1.04*
DL SX74.02 (cont)	*0.386*	…	*45.16*	…	…	…	…	*0.133*	*0.164*	…	*11.92*	*0.077*	…
DL SX39-21 (cont)	…	…	…	…	…	…	*0.500*	*0.020*	*0.013*	…	…	…	…
DL SX66-04 (cont)	…	…	…	…	…	…	…	*0.516*	*0.089*	*0.35*	*0.471*	*1.02*	…
DL SX51-17 (cont)	…	…	…	…	…	…	…	…	*0.010*	…	…	…	…
DL SX56-20 (cont)	…	…	*0.013*	…	…	…	…	*0.022*	*0.043*	*0.041*	*0.033*	…	…
DL SX62-05 (cont)	…	…	*21.01*	…	…	*2.88*	*0.096*	*2.26*	*3.68*	*3.84*	*6.80*	*0.107*	…
DL SX67-04 (cont)	…	…	*0.019*	*0.023*	…	…	…	*0.642*	*0.127*	*0.160*	…	*0.502*	…

The above represents a selection of samples prepared by Dillinger Laboratory in which the reference values have been obtained after a preliminary multi-element analysis by a complete reconstitution of the test sample using pure and ultrapure compounds as primary references. Sets of Dillinger samples are available to provide ranges of values for most categories of materials stated, and details can be provided on request.

The Dillinger certified values are based on the SI units kg and mole and are obtained by means of absolute calibration.

DILLINGER LABORATORY (DL), Germany

CHEMICAL COMPOSITION (nominal mass content in %)

Refractory, Manganese Ore, Magnesite, Dunite and Tundish Slag Reference Materials (Finely divided material - units of 100g)

Dillinger No.	Description	CaO	SiO_2	Fe	FeO	Fe_2O_3	Mn	MnO	Mn_3O_4	P_2O_5
DL SX05-01	Chromium Magnesite	*1.30*	*3.88*	…	…	*11.02*	…	…	*0.27*	*0.028*
DL SX10-01	Dunite	*2.00*	*40.66*	*5.66*	*1.92*	*5.96*	…	*0.125*	…	*0.031*
DL SX26-12	Refractory	*1.80*	*40.80*	…	…	*3.10*	…	…	*0.135*	*0.279*
DL SX42-07	Magnesite	*2.23*	*7.72*	…	…	*1.49*	…	…	*0.074*	*0.086*
DL SX43-04	Manganese Ore	*0.078*	*2.41*	*28.25*	…	…	*30.65*	…	…	*0.253*
DL SX59-03	Tundish Slag	*61.81*	*21.41*	…	…	*1.36*	…	…	*0.046*	*0.151*

Dillinger No.	SO_3	CuO	Al_2O_3	MgO	NiO	TiO_2	Cr_2O_3	V_2O_5	PbO	ZnO	Co_3O_4
DL SX05-01 (cont)	*0.025*	*0.012*	*11.59*	*50.74*	*0.119*	*0.070*	*20.73*	*0.100*	…	*0.038*	*0.023*
DL SX10-01 (cont)	*0.101*	…	*3.01*	*35.35*	*0.243*	*0.119*	*0.373*	*0.012*	…	*0.006*	*0.014*
DL SX26-12 (cont)	…	…	*36.45*	*13.3*	*0.032*	*1.25*	*0.385*	*0.027*	…	…	…
DL SX42-07 (cont)	*0.037*	…	*2.38*	*83.61*	…	*0.148*	…	…	…	…	…
DL SX43-04 (cont)	*0.016*	…	*2.96*	*0.064*	…	*0.104*	*0.001*	*0.004*	*0.002*	*0.002*	*0.001*
DL SX59-03 (cont)	…	…	*3.70*	*10.07*	…	*0.183*	…	…	…	…	…

Dillinger No.	ZrO_2	Ba	Na_2O	K_2O	C (elem)	C (tot)	CO_2	H_20 (900°C)	L0I
DL SX05-01 (cont)	*0.00*	…	*0.011*	*0.06*	…	*0.002*	*0.007*	*0.024*	…
DL SX10-01 (cont)	*0.005*	…	*0.133*	*0.063*	*0.057*	…	*0.395*	*10.00*	*9.85*
DL SX26-12 (cont)	*0.163*	…	*0.242*	*0.759*	…	*0.437*	*0.54*	*0.75*	…
DL SX42-07 (cont)	*0.011*	…	*0.385*	*0.074*	…	*0.539*	*0.536*	*0.838*	…
DL SX43-04 (cont)	*0.015*	*0.204*	*0.012*	*0.261*	…	*0.041*	*0.056*	*4.46*	*9.05*
DL SX59-03 (cont)	…	…	*0.174*	*0.599*	…	…	*0.016*	*0.023*	…

The above represents a selection of samples prepared by Dillinger Laboratory in which the reference values have been obtained after a preliminary multi-element analysis by a complete reconstitution of the test sample using pure and ultrapure compounds as primary references. Sets of Dillinger samples are available to provide ranges of values for most categories of materials stated, and details can be provided on request.

The Dillinger certified values are based on the SI units kg and mole and are obtained by means of absolute calibration.

DILLINGER LABORATORY (DL), Germany

CHEMICAL COMPOSITION (nominal mass content in %)

Dolomite, Limestone, Fluorspar, Gravel and Continuous Casting Powder Reference Materials (Finely divided material - all units of 100g)

Dillinger No.	Description	Ca	CaO	SiO_2	Fe_2O_3	MnO	Mn_3O_4	P_2O_5
DL SX07-08	Dolomite	…	*28.36*	*7.93*	*3.12*	…	*0.527*	*0.123*
DL SX35-15	Limestone	…	*48.91*	*8.75*	*1.293*	*0.028*	…	*0.036*
DL SX27-07	Fluorspar	*46.76*	…	*6.16*	*0.257*	*0.008*	…	…
DL SX36-09	Gravel	…	*0.047*	*96.35*	*0.706*	…	*0.20*	*0.019*
DL SX30-10	Continuous Casting Powder	*27.06*	…	*38.56*	*2.63*	*0.059*	…	*0.454*

Dillinger No.	S	SO_4	Al_2O_3	MgO	TiO_2	Na_2O	K_2O	BaO	F
DL SX07-08 (cont)	*0.171*	…	*13.45*	*45.22*	*0.255*	…	*0.171*	…	…
DL SX35-15 (cont)	*0.025*	…	*0.787*	*0.379*	*0.048*	*0.032*	*0.187*	…	…
DL SX27-07 (cont)	…	*0.042*	*0.371*	*0.070*	…	*0.061*	*0.042*	*<0.006*	*41.79*
DL SX36-09 (cont)	…	…	*1.46*	*0.104*	*0.086*	*0.045*	*0.334*	…	…
DL SX30-10 (cont)	*0.131*	…	*5.05*	*4.13*	*0.055*	*5.479*	*0.155*	…	*8.97*

Dillinger No.	V_2O_5	Cr_2O_3	Co_3O_4	NiO	PbO	SrO	ZnO	CO_2	H_2O (900°C)
DL SX07-08 (cont)	*0.024*	*0.082*	…	*0.009*	…	*0.016*	*0.021*	…	…
DL SX35-15 (cont)	…	…	…	…	…	*0.050*	…	…	…
DL SX27-07 (cont)	…	…	…	…	*0.00019*	…	…	*2.91*	*0.363*
DL SX36-09 (cont)	*<0.006*	*0.029*	*0.005*	…	…	…	…	*<0.025*	*0.043*

Rice Straw Ash and Rutile Reference Materials (Finely divided material - DL SX57-04 - units of 20g, DL SX58-02 - units of 100g,)

Dillinger No.	Description	CaO	SiO_2	Fe_2O_3	Mn_3O_4	P_2O_5	SO_3	Al_2O_3	MgO
DL SX57-04	Rice Straw Ash	*0.302*	*92.49*	*0.090*	*0.067*	*0.273*	*0.071* **S**	*0.198*	*0.362*
DL SX58-02	Rutile	*0.048*	*2.04*	*0.629*	*0.007*	*0.025*	…	*0.449*	…

Dillinger No.	Cr_2O_3	TiO_2	Na_2O	K_2O	V_2O_5	Nb_2O_5	ZrO_2	C	CO_2	H_2O (900°C)
DL SX57-04 (cont)	…	…	*0.070*	*0.97*	…	…	…	*3.60*	*0.008*	*1.38*
DL SX58-02 (cont)	*0.213*	*93.76*	*0.021*	…	*0.454*	*0.297*	*1.60*	…	…	*0.245*

The above represents a selection of samples prepared by Dillinger Laboratory in which the reference values have been obtained after a preliminary multi-element analysis by a complete reconstitution of the test sample using pure and ultrapure compounds as primary references. Sets of Dillinger samples are available to provide ranges of values for most categories of materials stated, and details can be provided on request.

The Dillinger certified values are based on the SI units kg and mole and are obtained by means of absolute calibration.

DILLINGER LABORATORY (DL), Germany

CHEMICAL COMPOSITION (nominal mass content)

Iron Ore Reference Materials (Finely divided material – units of 100g) nominal mass content in %

Dillinger No.	Description	CaO	SiO_2	Fe	FeO	Mn	P_2O_5	S	Al_2O_3	MgO	Cr_2O_3	V_2O_5	TiO_2	Na_2O	K_2O	C(tot)	CO_2	H_2O (900°C)
DL SX11-08	Nimba-washed fines	*0.007*	*4.60*	*64.05*	*2.30*	*0.077*	*0.138*	*0.008*	*1.207*	*0.017*	…	…	*0.043*	*0.003*	*0.005*	*0.046*	…	…
DL SX11-12	Carajas Sinter-feed	*0.007*	*0.597*	*67.83*	*0.408*	*0.101*	*0.106*	…	*0.704*	*0.018*	…	…	*0.046*	*0.002*	…	*0.038*	*0.022*	*1.270*
DL SX11-13	…	*0.030*	*1.80*	*66.33*	*0.04*	*0.432*	*0.084*	*0.002*	*1.11*	*0.040*	*0.010*	*0.007*	*0.046*	*<0.003*	*0.010*	*0.035*	…	*1.244*
DL SX11-14	…	*0.421*	*7.47*	*65.55*	*27.20*	*0.029*	*0.028*	*0.019*	*0.271*	*0.565*	*0.006*	*0.002*	*0.060*	*0.078*	*0.061*	*0.125*	…	…
DL SX11-15	…	*0.494*	*5.79*	*63.17*	…	*0.074*	*0.101*	…	*2.68*	*0.244*	*0.005*	*0.010*	*0.128*	*0.020*	*0.008*	…	…	…
DL SX11-16	…	*1.149*	*4.67*	*64.69*	…	*0.198*	*0.058*	…	*0.722*	*0.400*	*0.038*	*0.009*	*0.078*	*0.016*	*0.023*	*0.016*	*0.026*	*0.059*
DL SX11-18	…	*0.052*	*1.56*	*64.72*	…	*0.713*	*0.141*	*0.009*	*1.785*	*0.057*	…	*0.017*	*0.075*	*0.014*	*0.020*	*0.085*	*0.033*	*2.51*
DL SX11-24	Samarco Pellets	*2.05*	*2.54*	*65.47*	*0.109*	*0.034*	*0.081*	*0.004*	*1.26*	*0.135*	*0.003*	…	*0.045*	*0.014*	*0.031*	*0.068*	*0.098*	*0.079*
DL SX11-25	Samarco Pellets	*2.53*	*2.52*	*64.05*	*0.193*	*0.068*	*0.087*	*0.010*	*1.20*	*0.421*	*0.002*	*0.008*	*0.045*	*0.016*	*0.033*	*0.671*	*0.929*	…
DL SX11-26	Carol Concentrate	*0.424*	*4.64*	*65.88*	*8.07*	*0.095*	*0.011*	*0.004*	*0.151*	*0.306*	*0.002*	*0.009*	*0.046*	*0.001*	*0.001*	*0.280*	*0.97*	*0.097*
DL SX11-28	Samarco Pellets	*2.08*	*2.55*	*65.52*	*0.144*	*0.044*	*0.094*	*0.004*	*1.23*	*0.110*	…	*0.005*	*0.043*	*0.011*	*0.024*	*0.030*	*0.075*	*0.059*
DL SX11-32	Morro Agudo Sinter-feed	*0.023*	*5.00*	*65.21*	*0.588*	*0.072*	*0.052*	*0.005*	*0.811*	*0.025*	*0.017*	*0.008*	*0.053*	*0.001*	*0.005*	*0.033*	*0.005*	*0.628.*
DL SX11-35	…	*0.011*	*0.696*	*64.69*	*0.06*	*1.520*	*0.140*	*0.006*	*1.49*	*0.033*	…	…	*0.052*	…	*0.016*	*0.069*	*0.007*	*2.31*
DL SX11-36	…	*0.370*	*3.35*	*65.74*	…	*1.21*	*0.017*	*0.002*	*0.345*	*0.083*	*0.025*	*0.006*	*0.023*	*0.025*	*0.033*	*0.016*	*0.030*	*0.057*
DL SX11-37	…	*1.930*	*2.365*	*66.15*	*0.32*	*0.038*	*0.113*	*0.003*	*0.442*	*0.164*	*0.017*	…	*0.032*	*0.020*	*0.011*	*0.101*	*0.089*	*0.080*

Some additional information is also given regarding the following oxides and trace element in these iron ore samples:- CuO, NiO, ZnO, Co_3O_4 and U.

Cement Reference Materials (Finely divided material – units of 100g) nominal mass content in %

Dillinger No.	Ca	CaO	SiO_2	Fe_2O_3	Mn_3O_4	P_2O_5	S	Al_2O_3	MgO	TiO_2	ZrO_2	SrO	K_2O	Na_2O	BaO	V_2O_5	Cr	F
DL SX02-02	*27.17*	…	*4.08*	*15.83*	*0.039*	*0.043*	*0.046*	*39.31*	*0.487*	*1.81*	*0.056*	*0.017*	*0.111*	*0.033*	…	…	*0.070*	*0.009*
DL SX02-09	*48.78*	…	*21.95*	*0.204*	*0.025*	*0.043*	*1.19*	*4.63*	*0.717*	*0.095*	…	*0.051*	*1.01*	*0.078*	*0.028*	…	…	…
DL SX02-10	*33.39*	*46.72*	*30.30*	*1.66*	*0.327*	*0.066*	*1.77*	*9.99*	*4.96*	*0.421*	…	*0.077*	*0.541*	*0.236*	*0.071*	*0.011*	…	…
DL SX02-11	*40.63*	…	*25.04*	*2.98*	*0.172*	*0.137*	*1.48*	*6.86*	*2.79*	*0.319*	…	*0.083*	*0.524*	*0.156*	*0.041*	*0.014*	…	…
DL SX02-12	*46.48*	…	*21.16*	*3.94*	*0.062*	*0.191*	*1.18*	*4.41*	*0.945*	*0.242*	…	*0.086*	*0.495*	*0.084*	…	…	…	…

Information is also given regarding the following trace elements in the cement sample DL SX02-02:- As, Ba, Be, Bi, Cd, Ce, Co, Cu, In, La, Mo, Ni, Pb, Sb, Se, Te, Th, Tl, U, V and Zn.

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The Dillinger certified values are based on the SI units kg and mole and are obtained by means of absolute calibration.

INSTITUTE OF GEOLOGICAL SCIENCES/BRITISH GEOLOGICAL SURVEY (IGS), U.K. AND SOCIETY OF GLASS TECHNOLOGY (SGT), U.K.

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Ore and Concentrate Reference Materials (Finely divided material - approximate unit weights as shown in table)

IGS No.	Description	Unit Weight	Ba	Co	Cu	F	Fe	MnO_2	Nb	Ni	Sr	Ti	W	SiO_2	Others
21	Nickel Ore (Norite)	50g	...	*0.069*	*0.798*	...	*23.59*	...	...	*1.97*	...	...	...	...	...
27	Molybdenum-Tungsten Ore	65g	...	...	...	...	*1.76*	...	...	...	...	...	*0.036*	...	*0.276* **Mo**
29	Pyrolusite	40g	*0.59*	...	*0.185*	...	...	*93.38*	...	...	...	...	...	*2.21*	...
30	Chromite	55g	...	...	...	...	*11.20*	...	...	...	...	*0.14*	...	*2.76*	*23.95* **Cr**, *16.63* **MgO** *29.12* **Al_2O_3**
32	Rutile	45g	...	...	...	...	...	...	*0.26*	...	...	*57.19*	...	...	...
35	Zircon	50g	...	...	...	...	...	...	...	...	...	*0.16*	...	...	*1.20* **Hf,** *48.96* **Zr**
39	Fluorite	55g	*0.44*	...	...	*46.85*	...	...	...	...	*0.014*	...	...	...	...

Glass Certified Reference Materials from Society of Glass Technology (SGT), U.K. (Broken pieces - units of 25g) (G4, G6, G7, G10 & G11 are also available as 40mm dia. glass discs)

SGT No.	Description	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	BaO	Na_2O	K_2O	PbO	As_2O_3	B_2O_3	TiO_2	Cr_2O_3	ZnO	ZrO_2	Mn_3O_4	F	SO_3	LOI (550°C)
G4	Fluoride Opal Glass	**69.49**	**3.02**	**0.099**	**4.24**	*<0.05*	...	**15.45**	**0..57**	...	...	**0.19**	**0.041**	...	**3.28**	...	...	**4.96**	*<0.05**	**0.22**
G6	Soda-Lime-Silica Glass	**73.06**	**1.70**	**0.034***	**9.97**	*<0.1*	...	**14.65**	*<0.1*	...	...	...	**0.02**	...	...	...	...	...	**0.20***	...
G7	Soda-Lime-Silica Glass	**72.64**	**1.50**	**0.044***	**11.03**	**0.14**	...	**13.90**	**0.43**	...	...	...	**0.042**	...	...	...	...	...	**0.19***	**0.07**
G8	Lead Oxide-Potassium Oxide-Silica Glass	**56.34**	**0.05**	**0.010***	*<0.02*	*<0.02*	...	**0.23**	**11.85**	**30.59**	**0.32***	**0.36**	**0.02**	...	...	...	...	...	...	**0.21**
G9	Lead Oxide-Silica Glass	***56.7***	***1.4***	***0.045****	***0.1***	...	...	**4.0**	**8.4**	**28.4**	**0.4***	...	**0.03**	...	...	...	...	...	...	...	**0.4**
G10	Amber Soda-Lime-Silica Container Glass	**72.7**	**1.62**	**0.325**	**10.7**	**1.81**	**0.02**	**12.2**	**0.35**	...	...	...	**0.097**	**0.020**	...	*(0.024)*	*(0.038)*	...	**0.05**	...
G11	Green Soda-Lime-Silica Container Glass	**70.7**	**1.83**	**0.342**	**10.3**	**2.14**	**0.03**	**13.6**	**0.69**	...	...	...	**0.068**	**0.205**	...	*(0.015)*	*(0.034)*	...	**0.06**	...

* Total iron as iron (III) oxide Fe_2O_3 * Total arsenic as As_2O_3 * Total sulphur as SO_3

Glass Sand Certified Reference Materials from Society of Glass Technology (SGT), U.K. (Finely divided material - units of 200g)

SGT No.	Description	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	Na_2O	K_2O	Cr_2O_3	LOI
S6	Standard Glass Sand	**98.66**	**0.60**	**0.032***	**0.024**	*<0.02*	*<0.02*	*<0.02*	**0.40**	*(0.0003)*	**0.14**
S8	Standard Glass Sand	**95.63**	**2.07**	**0.26***	**0.073**	**0.06**	**0.12**	**0.20**	**1.06**	*(0.0011)*	**0.48**

*Total iron as iron (III) oxide Fe_2O_3

IMI WOLVERHAMPTON METAL (IMI), U.K.

CHEMICAL COMPOSITION (nominal mass content in %)

Aluminium Alloy Reference Materials to BS 1490: LM 2 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 2WM1	*1.69*	*0.005*	*8.90*	*0.26*	*0.60*	*0.39*	*2.42*	*0.21*	*0.20*	*0.20*	*<0.005*
IMI 2WM2	*1.10*	*0.095*	*9.76*	*0.85*	*0.48*	*0.30*	*1.20*	*0.15*	*0.14*	*0.16*	*0.05*
IMI 2WM3	*0.41*	*0.19*	*8.33*	*1.19*	*0.35*	*0.21*	*0.70*	*0.10*	*0.10*	*0.11*	*0.09*

Aluminium Alloy Reference Materials to BS 1490: LM 4 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 4P1	*1.80*	*0.25*	*5.92*	*0.25*	*0.63*	*0.40*	*0.01*	*0.19*	*0.19*	*0.21*	*<0.005*
IMI 4P2	*2.35*	*0.19*	*5.50*	*0.40*	*0.54*	*0.31*	*0.16*	*0.14*	*0.15*	*0.15*	*0.05*
IMI 4P3	*3.04*	*0.09*	*5.10*	*0.61*	*0.45*	*0.22*	*0.31*	*0.10*	*0.10*	*0.10*	*0.09*
IMI 4P4	*3.69*	*0.045*	*4.55*	*0.84*	*0.30*	*0.11*	*0.46*	*0.05*	*0.055*	*0.05*	*0.15*
IMI 4P5	*4.25*	*<0.005*	*3.94*	*1.03*	*0.14*	*<0.005*	*0.61*	*<0.005*	*<0.005*	*<0.005*	*0.19*

Aluminium Alloy Reference Materials to BS 1490: LM6/9/20 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 620WM3	*0.11*	*0.23*	*11.50*	*0.55*	*0.40*	*0.085*	*0.11*	*0.08*	*0.06*	*0.11*	*0.07*
IMI 620WM4	*0.055*	*0.11*	*11.76*	*0.35*	*0.62*	*0.04*	*0.055*	*0.04*	*0.03*	*0.06*	*0.095*
IMI 620WM5	*<0.005*	*0.005*	*12.85*	*0.15*	*0.84*	*<0.005*	*0.005*	*<0.005*	*<0.005*	*0.005*	*0.14*

Aluminium Alloy Reference Materials to BS 1490: LM 20 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 231P2	*0.41*	*0.22*	*12.64*	*0.46*	*0.48*	*0.10*	*0.16*	*0.055*	*0.055*	*0.16*	*0.14*
IMI 231P4	*1.08*	*0.39*	*10.23*	*0.88*	*0.29*	*0.22*	*0.46*	*0.15*	*0.16*	*0.055*	*0.05*
IMI 231P6	*0.90*	*0.39*	*12.00*	*0.87*	*0.34*	*0.16*	*0.41*	*0.17*	*0.08*	*0.13*	*0.04*

Note that the IMI RMs have a dimple, approx 15mm diameter, in the surface and hence are unsuitable for XRF analysis.

IMI WOLVERHAMPTON METAL (IMI), U.K. and NILAB, Sweden

CHEMICAL COMPOSITION (nominal mass content in %)

Aluminium Alloy Reference Materials to BS 1490: LM 24 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 24WM4	*2.93*	*0.26*	*8.85*	*0.69*	*0.43*	*0.45*	*1.50*	*0.24*	*0.16*	*0.16*	*0.045*
IMI 24WM6	*1.85*	*0.20*	*6.55*	*1.02*	*0.63*	*0.45*	*0.56*	*0.26*	*0.10*	*0.23*	*0.19*

Aluminium Alloy Reference Materials to BS 1490: LM 25 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 25WM1	*<0.005*	*0.87*	*5.92*	*0.59*	*0.24*	*0.19*	*0.20*	*<0.005*	*0.12*	*0.19*	*<0.005*
IMI 25WM4	*0.16*	*0.31*	*7.35*	*0.025*	*<0.005*	*0.14*	*0.045*	*0.10*	*0.06*	*0.16*	*0.02*
IMI 25WM5	*0.075*	*0.19*	*8.36*	*0.42*	*0.15*	*<0.005*	*0.015*	*0.07*	*<0.005*	*<0.005*	*0.10*

Aluminium Alloy Reference Materials to BS 1490: LM27 (mushroom samples, approx 58mm diameter x 7mm thick)

IMI Ref No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr
IMI 27WM1	*0.94*	*0.005*	*7.77*	*0.17*	*0.66*	*0.39*	*0.40*	*0.17*	*<0.005*	*0.21*	*0.14*
IMI 27WM2	*1.52*	*0.12*	*7.79*	*0.35*	*0.57*	*0.30*	*0.63*	*0.14*	*0.045*	*0.16*	*0.12*
IMI 27WM3	*1.98*	*0.18*	*7.50*	*0.55*	*0.40*	*0.20*	*0.80*	*0.10*	*0.085*	*0.11*	*0.075*
IMI 27WM4	*2.45*	*0.31*	*6.50*	*0.76*	*0.24*	*0.11*	*0.98*	*0.05*	*0.12*	*0.06*	*0.035*
IMI 27WM5	*2.79*	*0.36*	*5.60*	*0.91*	*0.10*	*0.005*	*1.13*	*<0.005*	*0.15*	*0.005*	*<0.005*

Note that all the IMI RMs have a dimple, approx 15mm diameter, in the surface and hence are unsuitable for XRF analysis.

Alloy Steel Certified Reference Materials from Nordisk Industrilaboratorium AB (NILAB), Sweden (Available in both finely divided and in disc form - see table)

NILAB No.	Description	Unit sizes	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	Co	Cu	N	Nb	Ti	V
100 LA	Bearing Steel	150g chips 34mm dia. x 20mm disc	**1.002**	**0.283**	**0.333**	**0.012**	**0.018**	**1.517**	**0.012**	**0.027**	**0.005**	**0.004**	**0.007**	**0.019**	**0.0046**	…	**0.0007**	**0.004**
500 HA	Stainless Steel	150g powder 38mm dia. x 20mm disc	**0.041**	**0.720**	**1.541**	**0.024**	**0.012**	**16.93**	**2.73**	**11.00**	…	…	**0.139**	**0.182**	**0.1154**	**0.023**	…	**0.074**
501 HA	Highly Alloyed Steel	150g powder 38mm dia. x 20mm disc	**0.014**	**0.676**	**0.858**	**0.020**	**0.003**	**19.79**	**6.14**	**17.69**	**0.003**	…	**0.159**	**0.761**	**0.2243**	**0.007**	…	**0.044**

INDUSTRIAL ANALYTICAL (PTY) LTD, SOUTH AFRICA

CHEMICAL COMPOSITION (nominal mass content) – Figures in brackets are for information only.

Concentrate/Tailing Reference Materials (Finely divided material – unit of 120g) (nominal mass content in %)

IA No.	Description	SiO_2	Al_2O_3	CaO	MgO	Pb	Cu	Zn	Fe	C	S	Mn	As	Sn	Cd	Ni	Ag
RPZ-PC	Lead Concentrate	*1.26*	*0.22*	*4.06*	*2.30*	*52.13*	*0.66*	*7.05*	*5.03*	*3.45*	*16.76*	*0.39*	*0.059*	*0.012*	*0.015*	*0.00052*	*0.0660*
RPZ-PF	Lead Feed Stock	*14.32*	*1.66*	*14.12*	*8.48*	*3.85*	*0.29*	*12.85*	*5.16*	*5.77*	*1.57*	*1.35*	*0.023*	*0.018*	*0.026*	*0.00071*	*0.0070*
RPZ-ZC	Zinc Concentrate	*0.53*	*0.14*	*1.80*	*0.89*	*3.53*	*0.65*	*55.26*	*4.02*	*0.89*	*31.75*	*0.77*	*0.023*	*0.012*	*0.11*	*0.00032*	*0.0310*

Concentrate/Tailing Reference Materials (Finely divided material – units of 120g) (nominal mass content in µg/g)

IA No.	Description	Co	Cu	Ni	Au	Pt	Pd	Rh	Ru	Ir	Ag
HGC	High Grade Sulphide Concentrate	*1600*	*69500*	*61500*	*9.7*	*81.5*	*47.5*	*4.79*	*4.44*	*2.42*	*(14.7)*
HGT	High Grade Tail	*97*	*230*	*78*	*0.13*	*0.40*	*0.32*	*0.05*	*0.051*	*0.016*	*(0.27)*
LGC	Low Grade Sulphide Concentrate	*1000*	*29100*	*34900*	*5.39*	*38.5*	*27.0*	*2.89*	*2.74*	*1.44*	*(0.98)*
LGT	Low Grade Tail	*97*	*220*	*700*	*0.097*	*0.37*	*0.28*	*0.05*	*0.053*	*0.023*	*(0.18)*
MGC-A	Medium Grade Sulphide Concentrate A	*1030*	*31900*	*35700*	*5.56*	*40.4*	*29.1*	*3.28*	*3.02*	*1.55*	*(1.17)*
MIM C2	PGM bearing Pyroxenite Concentrate	*1230*	*33100*	*42800*	*4.90*	*44.5*	*33.4*	*4.01*	*3.76*	*2.18*	*(5.5)*
MIM T2	PGM bearing Pyroxenite Tailing	*70*	*180*	*840*	*0.13*	*0.358*	*0.384*	*0.048*	*0.055*	*(<0.5)*	*(0.15)*
MIM O1	Pyroxenite Ore	*117*	*1134*	*2104*	*0.31*	*1.97*	*1.55*	*0.16*	*0.18*	*0.11*	…

Nickel Ore/Concentrate/Tailing Reference Materials (Finely divided material – unit of 130g) (nominal mass content in %)

IA No.	Description	Ni	Co	Cu	Si	Fe	Ca	Mg	Al	S	Ti
TN-C 01	Tati Nickel Concentrate	*6.24*	*0.18*	*4.22*	*4.00*	*39.86*	*1.47*	*0.83*	*1.78*	*30.05*	…
TN-O 01	Tati Nickel Ore	*0.40*	*0.014*	*0.31*	*22.52*	*7.07*	*6.41*	*5.48*	*9.32*	*1.94*	…
TN-T 01	Tati Nickel Tailing	*0.083*	*0.0047*	*0.047*	…	…	…	…	…	*0.22*	*0.20*

Nickel Ore/Concentrate/Tailing RMs (continued) (nominal mass content in µg/g)

IA No.	Au	Pt	Pd	Rh	Ag	Ru	Ir	Sn	Sb	Se	Te	Zn	Pb	Cd	Cr	As	Mn	Bi	V
TN-C 01 (cont.)	*0.32*	*1.58*	*8.09*	*0.27*	*4.5*	*(0.07)*	*0.15*	*(0.66)*	*(1.21)*	*1.29*	*8.28*	*141*	*19.4*	*1.56*	*456*	…	…	…	…
TN-O 01 (cont.)	*0.04*	*0.15*	*0.65*	*(<0.01)*	*0.60*	…	…	*0.73*	…	*11.50*	*0.82*	*46.5*	*10.80*	*22.10*	*547*	*12.0*	*771*	*0.75*	*101*
TN-T 01 (cont.)	…	…	…	…	…	…	…	…	…	…	…	…	…	…	*490*	…	*860*	…	…

Ferro-Chrome Metal Reference Materials (Finely divided material – unit of 120g) (nominal mass content in %)

IA No.	Description	Cr	Fe	Si	Al	C	P	S	Ti	V	Ni	Mn	Co	Ca	Mg
XS-FCMA	Ferro-Chrome Metal A	*50.65*	*36.59*	*4.64*	*0.037*	*6.26*	*0.010*	*0.036*	*0.38*	*0.36*	*0.17*	*0.19*	*0.054*	*(<0.01)*	*(0.024)*
XS-FCME	Ferro-Chrome Metal E	*49.30*	*37.11*	*4.06*	*0.36*	*6.05*	*0.011*	*0.054*	*0.31*	*0.34*	*0.16*	*0.16*	*0.048*	*(<0.01)*	*(0.134)*

Ferro-Alloy Slag Reference Materials (Finely divided material – units of 120g) (nominal mass content in %)

IA No.	Description	SiO_2	Al_2O_3	FeO	Fe_2O_3	MnO	MgO	CaO	B_2O_3	Cr_2O_3
XS-FCS	Ferro-Chrome Slag	*24.34*	*23.72*	*10.82*	…	…	*15.39*	*3.91*	…	*22.45*
SAM-FMS1	Ferro-Manganese Slag	*30.21*	*4.95*	…	*0.065*	…	*7.38*	*30.26*	*0.59*	…
SAM-SMS1	Silico-Manganese Slag	*43.28*	*8.96*	…	*0.178*	*16.81*	*5.16*	*19.47*	*0.26*	…

INSTITUTO DE PESQUISAS TECNOLOGICAS (IPT), BRAZIL

CHEMICAL COMPOSITION (nominal mass content in %) – Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Cast Iron Certified Reference Materials (Finely divided material – units of 80g)

IPT No.	Description	C (Total)	C (Graphitic)	Si	Mn	P	S	Cr	Mo	Ni	Cu	Ti	V
37B	Gray Iron	**3.37**	**2.85**	**1.66**	**0.737**	**0.148**	**0.069**	**0.088**	…	**0.074**	**0.052**	**0.034**	…
49	White Iron	**2.11**	…	**0.78**	**0.272**	**0.012**	**0.019**	**0.020**	…	**0.021**	**0.040**	…	…
69	Cast Iron	**3.34**	**2.50**	**2.07**	**0.715**	**0.267**	**0.018**	**0.353**	**0.004**	**0.272**	**0.473**	**0.019**	…
75A	Ni-Cr-Mo-Cu Iron	**3.4**	**2.7**	**1.98**	**0.722**	**0.250**	**0.033**	**0.487**	**0.439**	**0.425**	**0.433**	**0.022**	**0.030**

Copper Base Alloy Certified Reference Materials (Finely divided material – unit weights as shown).

IPT No.	Description	Unit Weight	Cu	Sn	Pb	Zn	Ni	P	Fe	As	Sb	Bi	Al	S	Ag	Cd	Se	Te
10B	Bronze	80g	**85.2**	**4.61**	**4.74**	**4.73**	**0.33**	**0.003**	**0.211**	**0.019**	**0.114**	…	…	**0.068**	…	…	…	…
40	Brass	100g	**58.10**	**0.18**	**2.45**	**39.1**	**0.001**	…	**0.007**	…	**0.023**	…	**0.010**	…	**0.0015**	**0.049**	…	…
64	Pure Copper	50g	**99.98**	*<0.0005*	**0.00006**	*0.001*	**0.00018**	…	**0.00045**	*0.0002*	*0.0002*	*<0.0001*	*<0.0006*	…	**0.0010**	…	*<0.0002*	*<0.0001*
74	Bronze	60g	**80.41**	**2.84**	**6.24**	**9.88**	**0.15**	**0.002**	**0.315**	**0.002**	**0.016**	…	…	**0.056**	…	**0.013**	…	…

Silicon Metal Certified Reference Materials (Finely divided material – units of 60g)

IPT No.	Fe	Ca	Al	C	S	Mn	Ti	Mg	P	Cu	Cr	Ni	V	Pb
134	**0.29**	**0.102**	**0.085**	**0.025**	**0.002**	**0.0113**	**0.0097**	**0.0048**	**0.0033**	**0.0014**	**0.0011**	**0.0006**	**0.0004**	*0.0002*
135	**0.125**	**0.011**	**0.045**	**0.018**	**0.002**	**0.0070**	**0.0113**	**0.0012**	**0.0027**	**0.0008**	**0.0006**	**0.0005**	**0.0003**	*0.0002*

Iron Ore Certified Reference Material (Finely divided material – units of 90g)

IPT No.	$Fe_{(Total)}$	SiO_2	Al_2O_3	TiO_2	P	S	MnO	CaO	MgO	Na_2O	K_2O	Ba	Zn	Cu	Co	Cr	V	Pb	Ni	C	LOI
146	**65.49**	**3.65**	**1.27**	**0.074**	**0.032**	**0.006**	**0.118**	**0.012**	**0.021**	**0.006**	**0.038**	**0.0075**	**0.0032**	**0.0037**	*(0.0009)*	**0.0061**	**0.0059**	*(0.003)*	**0.0016**	**0.04**	**1.08**

Clay, Limestone, Feldspar Refractory, Glass Sand and Bauxite Certified Reference Materials (Finely divided material – unit weights as shown)

IPT No.	Description	Unit Weight	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	ZrO_2	SrO	CaO	MgO	MnO	Li_2O	Na_2O	K_2O	P_2O_5	LOI
28	Clay	50g	**45.1**	**37.6**	**0.83**	**2.04**	…	…	**0.09**	**0.04**	…	…	**0.02**	**0.03**	**0.15**	**13.9**
32	Plastic Clay	50g	**51.8**	**28.5**	**3.46**	**1.49**	…	…	**0.17**	**0.39**	…	…	**0.16**	**0.80**	**0.13**	**12.6**
42	Clay	50g	**51.9**	**32.2**	**1.09**	**0.96**	…	…	**0.05**	**0.19**	…	…	**0.02**	**0.47**	**0.07**	**12.9**
44	Limestone	80g	**2.69**	**0.33**	**0.30**	**0.019**	…	**0.04**	**50.5**	**2.93**	**0.015**	…	**0.003**	**0.12**	**0.013**	**42.9**
122	Dolomitic Limestone	80g	**4.3**	**1.24**	**0.65**	**0.06**	…	**0.018**	**32.0**	**17.5**	**0.042**	…	**0.019**	**0.43**	**0.048**	**43.3**
51	Burnt Refractory	80g	**55.0**	**40.3**	**1.19**	**2.19**	**0.070**	…	**0.06**	**0.20**	…	**0.018**	**0.09**	**0.69**	**0.09**	**0.16**
53	Potash Feldspar	80g	**65.8**	**18.3**	**0.13**	**0.013**	…	…	**0.27**	**0.05**	…	…	**2.5**	**12.1**	**0.072**	**0.51**
57	Burnt Refractory	80g	**24.3**	**71.5**	**1.25**	**1.19**	**0.20**	**0.009**	**0.05**	**0.13**	…	**0.008**	**0.35**	**0.83**	**0.054**	**0.20**
63	Silica Refractory	80g	**96.28**	**0.48**	**0.52**	**0.030**	*0.002*	…	**2.21**	**0.18**	**0.008**	*0.0005*	**0.013**	**0.043**	**0.013**	**0.17**
61	Glass Sand	100g	**99.79**	**0.054**	**0.014**	**0.026**	**0.010**	…	*0.004*	*0.003*	…	…	*0.002*	*0.007*	…	*0.06*
62	Glass Sand	100g	**99.62**	**0.11**	**0.072**	**0.036**	**0.010**	…	*0.004*	*0.004*	…	…	*0.002*	*0.007*	…	**0.10**
72	Soda Feldspar	80g	**66.2**	**20.26**	**0.09**	**0.005**	…	…	**0.18**	*0.022*	…	…	**10.0**	**1.47**	**1.03**	**0.66**
131	Bauxite	70g	**0.78**	**54.1**	**11.5**	**1.77**	**0.35**	…	…	…	**0.31**	…	…	**0.022**	**0.15**	**30.0**

INSTITUT DE RECHERCHES DE LA SIDÉRURGIE FRANÇAISE (IRSID), France

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

Unalloyed Steel Certified Reference Materials (Finely divided material – units of 100g)

IRSID. No.	C	Si	Mn	P	S	Cr	Ni	Al Total	Co	Cu	N	Pb	Sn
ECRM 012-1	**0.082**	…	…	**0.083**	**0.255**	…	…	…	…	…	…	…	…
ECRM 017-1	**0.261**	**0.266**	**0.725**	**0.0132**	**0.022**	**0.044**	**0.085**	…	…	**0.062**	**0.0091**	…	…
ECRM 021-1	**0.243**	**0.271**	**1.29**	**0.0121**	**0.0087**	**0.125**	**0.255**	…	…	**0.167**	…	…	…
ECRM 022-1	**0.115**	…	**0.797**	**0.057**	**0.300**	…	…	…	…	…	…	…	…
ECRM 023-1	**0.331**	**0.264**	**0.667**	**0.021**	**0.0156**	…	…	…	…	…	…	**0.280**	…
ECRM 024-1	**0.104**	**0.139**	**0.726**	**0.0155**	**0.235**	…	…	…	…	…	…	**0.287**	…
***ECRM 080-1**	**0.452**	**0.317**	**1.116**	**0.028**	**0.024**	**0.025**	…	…	…	…	**0.0073**	…	*0.006*
***ECRM 081-1**	**0.099**	**0.105**	**0.605**	**0.0129**	**0.014**	…	**0.042**	**0.023**	**0.017**	**0.026**	…	…	*0.0039*

Alloy Steel Certified Reference Materials (Finely divided material – units of 100g; 190-1 also available as 35mm x 35mm x 30mm blocks)

IRSID No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Co	Cu	N	Sn	V	W
ECRM 102-1	**0.389**	**0.281**	**0.367**	**0.012**	*0.006*	**0.261**	**1.20**	**4.40**	…	…	**0.169**	…	…	…	…
ECRM 106-2	**0.153**	**0.238**	**0.727**	…	…	**1.030**	**0.054**	**1.430**	…	…	**0.078**	…	…	…	…
ECRM 107-1	**0.407**	**0.286**	**0.611**	…	…	**1.443**	**0.323**	**0.191**	**0.345**	…	**0.108**	…	…	…	…
ECRM 108-1	**0.384**	**0.340**	**0.690**	**0.0176**	**0.017**	**2.92**	**0.538**	**0.215**	…	…	**0.118**	…	…	…	…
ECRM 112-1	**0.348**	**1.00**	**0.191**	…	…	**4.78**	**1.21**	**0.234**	…	…	**0.115**	…	…	**0.604**	**1.78**
ECRM 113-1	**0.680**	**0.249**	**0.586**	*0.013*	*0.006*	**0.816**	**0.413**	**1.744**	…	…	**0.146**	…	…	…	…
***ECRM 185-1**	**1.172**	*0.25*	*0.41*	*0.02*	**0.0209**	**0.990**	…	*0.17*	…	…	*0.17*	…	**0.0212**	…	…
***ECRM 188-1**	**1.094**	…	…	…	**0.0113**	**1.538**	*0.17*	*0.28*	…	*0.06*	…	…	…	*0.02*	…
***ECRM 190-1**	**0.395**	**0.278**	**1.28**	**0.0112**	**0.0044**	**2.18**	**0.410**	**0.934**	…	**0.034**	…	**0.0096**	…	…	…

Alloy Steel Certified Reference Materials (continued)

IRSID. No.	Bi	Cd	Ga	Hg	Nb	Pb	Sb	Se	Te	Tl	Zn
***ECRM 188-1**	**<0.00002**	**<0.00005**	**0.00251**	*<0.00001*	**0.00013**	**<0.0001**	**0.00048**	*<0.0002*	**<0.0002**	*<0.00002*	*<0.0003*

Highly Alloyed Steel Certified Reference Materials (Finely divided material – units of 100g)

IRSID. No.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	Sn	Ti	V	Ca	Zn
ECRM 201-1	**0.291**	**0.843**	**0.363**	…	…	**12.33**	**0.050**	**0.202**	**0.099**	…	**0.0193**	…	*0.020*	**0.0018**	**0.0005**
***ECRM 276-1**	**0.364**	**0.985**	**0.368**	**0.012**	**0.011**	**5.29**	**1.47**	**0.178**	**0.083**	**0.0207**	…	…	**0.541**	…	…
***ECRM 279-2**	**0.088**	**0.516**	**0.258**	…	…	**15.64**	…	**1.603**	**0.107**	*0.043*	…	…	…	…	…
***ECRM 282-1**	**0.086**	**0.734**	**1.64**	**0.019**	**0.0042**	**16.72**	**2.19**	**10.86**	**0.109**	…	…	**0.488**	*0.031*	…	…

* Denotes Full EURONORM-Certified Reference Material

INSTITUT DE RECHERCHES DE LA SIDÉRURGIE FRANÇAISE (IRSID), France

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

Ferro-Alloy Certified Reference Materials (Finely divided material – units of 100g)

IRSID No.	C	Si	Mn	P	S	Cr	Al	Co	N	Ti	V	Fe	Ca
ECRM 503-1	**0.700**	**0.865**	**80.8**	**0.069**	*0.009*	…	…	…	…	…	…	…	…
ECRM 507-1	**5.40**	**1.20**	**0.270**	**0.017**	…	**70.30**	…	…	**0.049**	…	…	…	…
ECRM 509-1	**0.012**	**0.230**	…	*0.019*	…	**72.85**	…	…	*0.03*	…	…	…	…
ECRM 510-1	**0.058**	**4.65**	…	*0.035*	…	…	*4.9*	…	*0.014*	**26.95**	…	…	…
ECRM 511-1	**0.049**	**0.341**	…	*0.016*	**0.018**	…	…	…	…	…	**80.7**	…	…
***ECRM 586-1**	**0.025**	**34.0**	**62.5**	**0.041**	…	**0.044**	**0.022**	**0.007**	…	…	**0.041**	**2.89**	**0.039**

Mineral, Concentrate and Ore Certified Reference Materials (Finely divided material – units of 100g)

IRSID No.	Description	Fe	Si	Ca	Mg	Al	Ti	Mn	P	S	Na	K	V	Cr	Ni	Co	C(T)	Zn	Fe^{++}	Others
ECRM 601-1	Iron Ore.	**36.76**	**8.95**	**4.05**	**1.21**	**2.33**	**0.114**	**0.370**	**0.590**	**0.065**	…	…	…	…	…	…	…	…	*8.8*	…
ECRM 603-1	Iron Ore	**53.65**	**1.28**	*0.91*	*0.2*	**4.20**	**0.137**	**0.440**	**0.084**	**0.097**	…	…	…	…	…	…	…	…	*0.3*	…
ECRM 604-1	Iron Ore	**65.69**	**1.27**	*0.107*	*0.049*	**0.93**	**0.060**	**0.092**	**0.053**	**0.015**	…	…	…	…	…	…	…	…	*0.5*	…
ECRM 606-1	Iron Ore	**59.66**	**1.04**	**1.04**	**0.32**	**0.34**	**0.019**	**2.59**	**0.026**	**0.033**	…	…	…	…	…	…	…	…	*0.1*	…
ECRM 607-1	Iron Ore	**30.89**	**3.07**	**13.74**	**0.77**	**2.48**	**0.123**	**0.254**	**0.529**	**0.050**	…	…	…	…	…	…	…	…	*6.0*	…
ECRM 608-1	Ferriferrous Marl	**4.00**	**28.23**	**6.22**	**0.81**	**5.26**	**0.428**	**0.044**	**0.053**	**0.455**	…	…	…	…	…	…	…	…	*1.8*	…
ECRM 610-1	Laterite	**47.46**	**3.16**	*0.1*	**1.86**	**1.96**	**0.015**	**0.581**	**0.007**	**0.189**	…	…	…	**1.84**	**1.48**	**0.075**	…	…	…	…
ECRM 611-1	Iron Ore Sinter	**62.22**	**2.07**	**2.85**	**0.32**	**0.69**	**0.035**	**1.97**	**0.030**	0.008	…	…	…	…	…	…	…	…	*13.8*	…
ECRM 612-1	Iron Ore Sinter	**42.43**	**5.94**	**12.06**	**1.20**	**3.00**	**0.151**	**0.363**	**0.885**	**0.053**	…	…	…	…	…	…	…	…	*9.2*	…
***ECRM 677-1**	Iron Ore	**51.54**	**11.78**	**0.038**	**0.012**	**0.32**	**0.013**	**0.016**	**0.017**	0.005	**0.007**	**0.008**	…	*0.002*	*0.0015*	*0.0006*	…	*0.002*	…	**0.43 H_2O+**
***ECRM 679-1**	Iron Ore	**24.20**	**3.43**	**18.07**	**0.70**	**1.99**	**0.106**	**0.295**	**0.557**	**0.099**	**0.054**	**0.157**	**0.035**	**0.012**	*0.0095*	…	**5.80**	**0.021**	*5.2*	**0.018 As**
***ECRM 685-1**	Pre-reduced Iron Ore	**91.10**	**0.795**	**0.140**	**0.239**	**0.320**	**0.220**	**0.042**	**0.017**	**0.0031**	**0.077**	**0.042**	**0.144**	…	**0.018**	**0.013**	**1.49**	…	*7.72*	**80.80 Fe_m**

Refractory Certified Reference Materials (Finely divided material – units of 100g)

IRSID No.	Description	Fe	Si	Ca	Mg	Al	Ti	Cr	Mn	B	N	P	S	C(T)	H_2O	LOI
ECRM 701-1	Calcite	**0.73**	**0.93**	**37.66**	**0.36**	**0.29**	**0.018**	*<0.002*	**0.022**	…	…	**0.022**	**0.040**	*11.5*	*0.47*	*42.4*
ECRM 702-1	Dolomite	**0.440**	**1.04**	**21.48**	**12.37**	**0.21**	**0.013**	*<0.002*	**0.098**	…	…	**0.024**	**0.027**	*12.3*	**0.5**	**45.6**
***ECRM 778-1**	High Carbon Magnesia	**0.67**	**0.489**	**0.883**	**48.87**	**0.297**	*0.008*	**0.102**	**0.011**	**0.0012**	…	*0.004*	…	**14.00**	…	**15.38**
***ECRM 780-1**	Silicon Carbide	**1.30**	**63.5**	**0.84**	**0.051**	**1.86**	…	…	**0.029**	…	**0.32**	…	…	**26.38**	…	…

Slag and Dust Certified Reference Materials (Finely divided material – units of 100g)

IRSID No.	Description	Fe	Si	Ca	Mg	Al	Ti	Mn	P	S	Na	K	F	V	Cr	Ni	Zn	Cu	As	Pb	C(T)	Cl	Others
ECRM 802-1	Blast Furnace Slag	**0.576**	**15.16**	**30.62**	**2.87**	**8.53**	**0.366**	**0.460**	**0.109**	**0.714**	**0.236**	**0.491**	**0.243**	**0.028**	**0.0053**	…	**0.0025**	…	…	…	…	…	**0.0245 B**
ECRM 803-1	Blast Furnace Slag	**0.613**	**17.01**	**30.93**	**2.44**	**6.98**	**0.301**	**0.552**	**0.118**	**0.767**	…	…	…	…	…	…	…	…	…	…	…	…	…
ECRM 804-1	Basic Slag	**11.92**	**2.59**	**36.88**	**0.88**	*0.42*	**0.152**	**1.48**	**7.67**	**0.127**	…	…	…	**0.460**	…	…	…	…	…	…	…	…	…
ECRM 805-1	Basic Slag	**14.87**	**3.10**	**34.96**	**1.12**	**0.326**	**0.205**	**1.59**	**7.07**	**0.092**	…	…	…	**0.514**	…	…	…	…	…	…	…	…	…
ECRM 806-1	Basic Slag	**17.89**	**5.48**	**32.97**	**1.82**	**0.477**	**0.302**	**4.60**	**0.982**	**0.110**	…	…	…	**0.288**	…	…	…	…	…	…	…	…	…
***ECRM 876-1**	Electric Furnace Dust	**24.85**	**1.72**	**3.43**	**1.31**	**0.34**	**0.048**	**2.84**	**0.128**	**0.87**	**1.98**	**1.63**	**0.24**	…	**0.17**	**0.034**	**23.29**	**0.42**	**0.023**	**7.82**	**0.26**	**3.63**	**0.13 Cd** **0.094 Sn**
***ECRM 880-1**	Blast Furnace Dust	**31.0**	**3.34**	**3.15**	**0.714**	**1.28**	**0.081**	**0.218**	**0.038**	**0.425**	**0.041**	**0.108**	**0.034**	…	**0.027**	**0.014**	**0.064**	**0.005**	…	**0.017**	*37.8*	**0.086**	…

* Denotes Full EURONORM Certified Reference Materials

JERNKONTORET / SWEREA KIMAB (JK), Sweden

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

Iron, Steel and Special Alloy Certified Reference Materials (Finely divided and/or disc material – as shown in table)

Ref No.	Description	Unit	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	N	Nb	Pb	Sn	Ti	V	W	Ca	Ce	Sb	Fe	O
ECRM 197-1	Low alloy Steel	100g & disc	**0.219**	**0.275**	**0.792**	**0.0073**	**0.0232**	**0.451**	**0.402**	**0.148**	**0.0313**	**0.0083**	…	**0.0135**	**0.152**	**0.0114**	…	*0.0003*	**0.0097**	**0.0005**	*0.005*	…	…	…	*0.002*	…	…
ECRM 270-1	Stainless Steel	100g & disc	**0.0742**	**1.517**	**0.540**	**0.0196**	**0.0007**	**20.88**	**0.2099**	**10.86**	…	…	…	**0.0685**	**0.1076**	**0.1417**	…	…	…	…	**0.0256**	…	…	**0.0487**	…	…	…
ECRM 274-1	Vanadium Steel	100g & disc	**1.563**	**1.057**	**0.397**	**0.0148**	**0.0096**	**8.041**	**1.455**	**0.077**	*0.0033*	*0.0013*	*0.0005*	…	**0.0281**	**0.0769**	…	*0.00006*	*0.001*	*0.0011*	**4.010**	**0.0087**	…	…	*0.0002*	…	*0.0026*
ECRM 298-1	Duplex Steel	100g & disc	**0.0146**	**0.262**	**0.398**	**0.0198**	**0.0006**	**24.72**	**3.799**	**7.056**	**0.0285**	*0.003*	**0.0021**	**0.055**	**0.201**	**0.263**	*0.004*	**0.00008**	*0.004*	**0.0014**	**0.0607**	*0.02*	*0.002*	*0.00004*	*0.0007*	**63.38**	*0.0036*
ECRM 379-1	Stainless Steel	100g & disc	**0.0121**	**0.393**	**1.804**	**0.0166**	**0.0006**	**26.79**	**3.290**	**30.83**	*0.0246*	*0.0027*	**0.00190**	**0.0390**	**0.984**	**0.0550**	*0.0024*	*0.00002*	**0.0021**	*0.0014*	**0.0663**	…	**0.0033**	…	**0.00057**	*35.6*	*0.0043*
JK 3B	Unalloyed Steel	150g	**0.742**	**0.251**	**0.803**	**0.0101**	**0.0071**	**0.0529**	**0.0051**	**0.0591**	**0.0036**	*0.002*	…	**0.0048**	**0.0175**	**0.0054**	…	*0.0002*	**0.0044**	*0.0015*	*0.002*	…	*0.0005*	…	*0.0005*	…	*0.018*
JK 7B	Low Alloy Steel	150g	**0.342**	**0.267**	**0.697**	**0.0057**	**0.0064**	**1.34**	**0.182**	**1.34**	**0.014**	…	…	…	**0.021**	**0.0050**	…	…	…	…	**0.004**	…	…	…	…	…	…
JK 12A	Tool Steel	150g	**0.886**	**0.30**	**0.312**	**0.020**	**0.023**	**4.04**	**4.85**	**0.191**	…	…	…	**0.189**	**0.062**	**0.0259**	…	**0.0004**	**0.007**	…	**1.94**	**6.42**	…	…	…	…	…
JK 20A	Unalloyed Steel	150g	**1.263**	…	…	…	**0.0094**	…	…	…	…	…	…	…	…	**0.0027**	…	**0.160**	…	…	**0.161**	**1.75**	…	…	…	…	…
JK 25	Stainless Steel	150g	…	…	*1.7*	…	…	*22.3*	*0.1*	*11.3*	…	…	…	…	…	…	…	…	…	…	…	…	…	**0.096**	…	…	…
JK 27A	Stainless Steel	150g & disc	**0.0477**	**0.411**	**1.589**	**0.0222**	**0.0168**	**16.76**	**2.531**	**12.04**	**0.0169**	…	**0.0018**	**0.089**	**0.199**	**0.0629**	*0.002*	**0.00016**	**0.0040**	*<0.005*	**0.041**	**0.028**	**0.0033**	…	*0.0011*	…	…
JK 36	Stainless Steel	150g	**0.0125**	…	…	…	**0.0126**	…	…	…	…	…	…	…	…	**0.0337**	…	…	…	…	…	…	…	…	…	…	…	…
JK 37	Stainless Steel	150g	**0.0133**	**0.141**	**1.73**	**0.0160**	**0.0009**	**26.72**	**3.55**	**30.82**	**0.008**	**0.039**	**0.0012**	**0.058**	**0.936**	**0.0344**	**0.0012**	…	…	…	**0.075**	…	…	**0.123**	*0.001*	…	…
JK 49	High Alloy Steel	25g & disc	*1*	*0.5*	*0.4*	*0.02*	*0.01*	*5*	*3*	*0.2*	…	…	…	*0.3*	*0.1*	**1.89**	…	…	…	…	*9*	*4*	…	…	…	…	…

JK 37 also certified for Bi: 0.000032%, Ga: 0.0043%, Ir: 0.000021%, Nd: 0.0362% and Pr: 0.0139%. ECRM 270-1 also certified for La: 0.0154%

Ferro-Alloy Certified Reference Materials (Finely divided material – unit weights as shown in table)

JK No.	Description	Unit	C	Si	Mn	P	S	Cr	Ni	Al	As	Co	Cu	N	Ti	V	W	Fe	Others
JK 14B	Low C Ferro-Chromium	100g	**0.0233**	**0.652**	**0.293**	**0.0143**	**0.002**	**72.84**	**0.317**	…	…	**0.044**	**0.0090**	**0.0432**	…	**0.097**	…	…	…
JK 17	Ferro-Tungsten	100g	**0.74**	**0.23**	…	…	…	…	…	…	**0.076**	…	…	…	…	…	**81.0**	…	**0.05 Sn**
JK 39	Ferro-Silicon	50g	**0.105**	**75.9**	**0.165**	**0.018**	…	*0.01*	*0.008*	**1.45**	…	*0.002*	**0.013**	…	**0.116**	*0.007*	…	**21.6**	**0.24 Ca**

Iron Ore Certified Reference Material (Finely divided material – unit of 150g)

JK No.	Description	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	CaO	MgO	P_2O_5	S	V_2O_5	Cu	Na_2O	K_2O	Co	Fe	Ni	P	Pb	Zn	Cr	Sn
ECRM 688-1	Iron Ore	**3.383 Si**	**0.408 Ti**	**0.679 Al**	…	…	**0.0457 Mn**	**1.449 Ca**	**1.061 Mg**	…	*0.047*	**0.135 V**	**0.0023**	**0.333 Na**	**0.180 K**	**0.0096**	**61.38**	**0.0136**	**0.337**	**0.00025**	**0.0015**	*0.002*	*0.0003*
JK 28	Iron Ore	**4.20**	**0.20**	**0.60**	**91.5**	**2.4**	**0.059**	**0.30**	**0.30**	**0.102**	**0.004**	**0.21**	**0.002**	**0.106**	**0.120**	…	**65.86**	…	**0.045**	…	…	…	…

Slag and Fluorspar Reference Materials (Finely divided material – unit weights as shown in table)

JK No.	Description	Unit	SiO_2	Al_2O_3	TiO_2	FeO	Fe_2O_3	Ca	CaO	CaF_2	MgO	MnO	P	S	C	F	V_2O_5	Pb	BaO
JK S9	Electro Slag Refining	100g	**1.4**	**31.5**	**0.05**	**0.04**	…	**39.0**	**29.1**	**35.5**	**2.2**	**0.04**	**0.005**	…	**0.042**	**17.3**	**0.11**	…	…
JK S10	Electro Slag Refining	100g	**7.8**	**0.54**	**0.05**	**0.10**	…	**50.8**	**20.3**	**70.7**	**0.30**	**0.03**	**0.002**	…	**0.022**	**34.4**	*<0.01*	…	…
JK C	Fluorspar	100g	**8.2**	**0.66**	…	…	**0.70**	…	…	**76.91**	…	…	**0.026**	**1.75**	…	**37.43**	…	**0.070**	**8.2**
JK D	Fluorspar	100g	*1.5*	**0.04**	…	…	**0.20**	…	…	**97.07**	…	…	**0.035**	**0.004**	…	**47.24**	…	*<0.001*	…

Industrial Fly Ash Certified Reference Material (Finely divided material – unit of 100g)

ECRM No.	Description	Fe	Ca	Al	Na	K	Zn	Pb	Cd	Cr	Ni	Cu	V	As	Bi	Sb	Hg	Sn
882-1	Industrial Fly Ash	**22.20**	**10.11**	**0.375**	**0.697**	**0.960**	**28.49**	**1.324**	**0.0183**	**0.490**	**0.0263**	**0.218**	**0.0090**	**0.0054**	**0.0026**	**0.0116**	**0.000075**	*0.021*

MBH ANALYTICAL LTD., U.K.

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Pure Zinc (Cast) Reference Materials (50mm dia. x 20mm discs)

MBH No.	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Ti	In	Tl	Bi	Sb	Si	Hg
41X Z1(P)	*0.00164*	*0.00010*	*0.00009*	*0.00059*	*0.00245*	*0.00049*	*0.00098*	*0.00032*	*0.00021*	*...*	*0.00023*	*0.0007*	*0.00028*	*0.00022*	*...*	*0.00015*
41X Z2(N)	*0.00264*	*0.00014*	*0.00082*	*0.00168*	*0.0077*	*0.00162*	*0.00179*	*0.00131*	*0.00053*	*...*	*0.00057*	*0.0012*	*0.00052*	*0.00057*	*...*	*0.0031*
41X Z3(L)	*0.0080*	*0.0138*	*0.0164*	*0.0050*	*0.0022*	*0.0029*	*0.0066*	*0.0029*	*0.0029*	*...*	*0.0010*	*0.0012*	*0.0022*	*0.0045*	*...*	*(0.0013)*
41X Z4(L)	*0.0058*	*0.0033*	*0.0065*	*0.00437*	*0.0148*	*0.00221*	*0.00326*	*0.00320*	*0.00286*	*<0.0005*	*0.00300*	*0.00277*	*0.00310*	*0.00340*	*(0.0014)*	*0.0025*
41X Z5(N)	*0.0286*	*0.0107*	*0.0243*	*0.0165*	*0.0262*	*0.0062*	*0.0109*	*0.00052*	*0.0050*	*0.00044*	*0.0057*	*0.0066*	*0.0054*	*0.0054*	*...*	*0.0048*
41X Z6(A)	*0.031*	*<0.0005*	*0.0096*	*0.0093*	*(0.002)*	*0.0038*	*0.0088*	*0.0002*	*0.0002*	*...*	*0.0228*	*0.0004*	*0.0122*	*...*	*...*	*...*
41X Z11(A)	*0.0077*	*...*	*0.0261*	*0.0155*	*0.0019*	*0.0072*	*0.0116*	*...*	*...*	*...*	*0.0345*	*(0.0010)*	*0.0189*	*0.0026*	*...*	*(0.0009)*

Low Alloy Zinc (Cast) Reference Materials (50mm dia. x 20mm discs)

MBH No.	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Cr	Ti
41X 2951Zn1(A)	*0.0042*	*0.0029*	*0.029*	*0.0005*	*0.011*	*(0.0007)*	*0.79*	*0.0038*	*0.0013*	*0.083*	*0.278*
41X 2951Zn2(A)	*0.0040*	*0.0123*	*0.032*	*0.0037*	*0.019*	*(0.0015)*	*1.37*	*0.0027*	*0.0011*	*0.142*	*0.209*
41X 2951Zn3(A)	*0.0065*	*0.0164*	*0.078*	*0.0062*	*0.029*	*(0.006)*	*1.89*	*0.0010*	*0.0018*	*0.184*	*0.133*

Zinc/Aluminium (Cast) Reference Materials (50mm dia. x 20mm discs)

MBH No.	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Cr	In	Ti	Tl	Si	Sb	Ce	La
42X Z1(H)	*0.0022*	*0.0041*	*4.61*	*0.0005*	*0.0024*	*0.0006*	*0.0019*	*0.0017*	*0.0007*	*<0.0005*	*...*	*...*	*...*	*0.0046*	*(0.0009)*	*0.0027*	*0.0026*
42X Z2(J)	*0.0064*	*0.0146*	*4.07*	*0.0020*	*0.0074*	*0.0061*	*0.0305*	*0.0032*	*0.0058*	*0.0013*	*...*	*...*	*...*	*0.011*	*0.0013*	*0.0071*	*0.0029*
42X Z3(H)	*0.0060*	*0.0288*	*3.72*	*0.0048*	*(0.047)*	*0.0030*	*0.159*	*0.0102*	*0.0252*	*0.0020*	*...*	*...*	*...*	*0.015*	*0.003*	*(0.0003)*	*(0.0003)*
42X Z4(H)	*0.0113*	*0.058*	*3.55*	*0.0076*	*0.012*	*0.0060*	*0.063*	*0.0177*	*0.0077*	*...*	*0.0016*	*...*	*(0.0025)*	*...*	*(0.0029)*	*0.020*	*0.020*
***42X Z5(L)**	*0.005*	*0.047*	*4.3*	*0.0027*	*0.02*	*0.002*	*0.105*	*0.035*	*0.003*	*<0.001*	*0.003*	*...*	*<0.001*	*...*	*...*	*0.025*	*0.015*
42X Z6(B)	*0.0093*	*0.177*	*3.67*	*0.0039*	*0.008*	*0.0057*	*0.238*	*0.00030*	*0.0157*	*0.0034*	*0.00191*	*...*	*0.0021*	*(0.010)*	*0.0169*	*(0.012)*	*(0.011)*
42X Z7(B)	*0.0097*	*0.0095*	*4.39*	*0.030*	*0.027*	*0.012*	*0.0249*	*0.0067*	*0.0045*	*(0.0001)*	*...*	*(0.0001)*	*...*	*0.006*	*...*	*0.072*	*0.061*
42X Z8(A)	*0.0025*	*0.0033*	*7.03*	*0.0003*	*0.013*	*(0.0023)*	*0.0215*	*0.0019*	*0.0014*	*(0.0002)*	*...*	*(0.0001)*	*...*	*0.013*	*...*	*0.0081*	*0.0079*
42X Z9(A)	*0.0021*	*0.0464*	*5.58*	*0.0054*	*0.032*	*(0.00035)*	*0.0070*	*(0.0003)*	*0.0006*	*...*	*...*	*0.020*	*...*	*(0.004)*	*0.011* **Zr**	*0.0047*	*0.0044*
42X Z11(A)	*0.0058*	*0.0329*	*3.19*	*0.0020*	*(0.036)*	*0.0017*	*0.093*	*0.0241*	*0.0196*	*0.0016*	*0.0037*	*...*	*0.0047*	*...*	*0.0047*	*0.0014*	*(0.0009)*
42X Z12(A)	*0.0079*	*0.0488*	*4.72*	*0.00277*	*0.0457*	*0.0022*	*0.156*	*0.0413*	*0.0483*	*0.00063*	*0.0068*	*...*	*0.0076*	*...*	*0.0070*	*0.0116*	*0.0084*

* Provisional values

Zinc/Aluminium/Copper (Cast) Reference Materials (50mm dia. x 20mm discs)

MBH No.	Pb	Mg	Al	Cd	Fe	Sn	Cu	Ni	Mn	Cr	Ti	In	Tl	Sb	Bi	Si
43X Z1(J)	*0.0017*	*0.0145*	*4.50*	*0.00037*	*0.0058*	*(0.0007)*	*0.501*	*0.0010*	*0.0005*	*0.0009*	*0.0014*	*...*	*...*	*0.0016*	*0.0031*	*(0.0037)*
43X Z2(M)	*0.0110*	*0.0826*	*3.88*	*0.0053*	*0.0078*	*0.0103*	*1.005*	*0.0025*	*0.0086*	*0.0062*	*...*	*...*	*...*	*0.0065*	*...*	*0.011*
43X Z3(L)	*0.0132*	*0.0143*	*3.64*	*0.0132*	*0.061*	*0.0125*	*1.58*	*0.0061*	*0.0125*	*0.004(5)*	*...*	*(0.0019)*	*(0.0035)*	*(0.0030)*	*0.018*	*0.005*
43X Z4(B)	*(0.0024)*	*0.043*	*4.76*	*0.0025*	*(0.064)*	*(0.0023)*	*3.21*	*0.0286*	*0.088*	*0.0063*	*0.0017*	*...*	*...*	*0.0043*	*0.012*	*(0.0065)*
43X Z5(A)	*0.0045*	*0.041*	*3.05*	*0.0111*	*0.023*	*0.0032*	*6.05*	*0.0021*	*0.0030*	*0.0010*	*0.0009*	*...*	*...*	*...*	*...*	*0.003*
43X Z6(A)	*0.0016*	*0.0256*	*4.02*	*0.0016*	*0.019*	*0.0053*	*2.72*	*0.029*	*0.0006*	*0.0006*	*0.0013*	*...*	*...*	*0.0045*	*0.0049*	*0.012*
43X Z7(A)	*0.0058*	*0.062*	*3.68*	*0.00092*	*0.029*	*0.0031*	*3.14*	*0.0005*	*0.0025*	*0.0003*	*0.067*	*0.0194* **Be**	*...*	*0.0016*	*(0.0009)*	*...*
43X Z8(A)	*0.0027*	*0.00155*	*2.51*	*0.00090*	*(0.0017)*	*(0.0005)*	*0.481*	*0.00033*	*0.00021*	*0.00024*	*...*	*...*	*...*	*...*	*...*	*...*
43X Z9(A)	*0.0078*	*0.0472*	*3.17*	*0.0034*	*0.073*	*0.0020*	*4.82*	*0.0027*	*0.0108*	*0.0034*	*0.0012*	*0.0010* **Be**	*...*	*0.0033*	*0.0033*	*...*
43X Z10(A)	*0.0046*	*0.0405*	*3.98*	*0.0014*	*0.0072*	*0.0012*	*2.97*	*0.0036*	*0.0050*	*0.00027*	*...*	*...*	*...*	*...*	*...*	*0.0094*
43X Z11(E)	*0.0305*	*0.053*	*11.61*	*0.0224*	*0.0091*	*0.0206*	*0.515*	*0.0014*	*0.0089*	*0.0010*	*0.013*	*...*	*...*	*0.0091*	*0.0035*	*0.020*
43X Z12(D)	*0.0133*	*0.027*	*10.05*	*0.0114*	*0.047*	*0.0089*	*0.796*	*0.0035*	*0.0059*	*0.0023*	*0.0054*	*...*	*...*	*0.0039*	*(0.002)*	*(0.008)*
43X Z13(D)	*0.0125*	*0.0204*	*9.55*	*0.0100*	*0.05*	*0.0111*	*0.981*	*0.0109*	*0.0070*	*...*	*...*	*...*	*...*	*0.009*	*...*	*(0.0048)*
43X Z14(E)	*0.015*	*0.0133*	*8.05*	*0.0083*	*0.031*	*0.0054*	*1.13*	*0.0066*	*0.0050*	*0.0047*	*0.0014*	*...*	*...*	*0.0089*	*0.0096*	*0.016*
43X Z15(C)	*0.0054*	*0.0024*	*7.36*	*0.0030*	*0.009*	*0.004*	*1.53*	*0.0019*	*0.0020*	*0.0025*	*0.0020*	*...*	*...*	*0.005*	*0.005*	*(0.011)*

MBH ANALYTICAL LTD., U.K.

CHEMICAL COMPOSITION (nominal mass content in %) - Figures in brackets are for information only.

Aluminium/Silicon/Copper (Cast) Reference Materials (50mm dia. x 15mm discs)

MBH No.	Cu	Mg	Si	Fe	Mn	Ni	Zn	Pb	Sn	Ti	Cr	Co	V	Sb	Cd	Be
55X G02D5(A)	*0.406*	*0.331*	*10.03*	*0.557*	*0.391*	*0.0652*	*0.131*	*0.067*	*0.051*	*0.0180*	*0.760*	*0.0752*	*0.0129*	*0.031*	*0.0182*	*0.0037*
55X G02D6(K)	*0.510*	*0.376*	*11.55*	*0.528*	*0.300*	*0.0511*	*0.577*	*0.0580*	*0.0355*	*0.055*	*0.366*	*0.0195*	*0.0182*	*0.0150*	*0.0115*	*0.0026*
55X G02D7(M)	*1.48*	*0.304*	*10.19*	*1.001*	*0.547*	*0.234*	*1.688*	*0.292*	*0.368*	*0.157*	*0.0106*	*0.0179*	*0.0179*	*0.0042*	*0.0032*	*0.0025*
55X G02D8(K)	*2.54*	*0.112*	*9.08*	*0.505*	*0.398*	*0.352*	*1.44*	*0.141*	*0.241*	*0.185*	*0.0504*	*0.0094*	*0.0646*	*0.046*	*0.0055*	*0.0017*
55X G02D9(J)	*3.22*	*0.108*	*8.33*	*0.644*	*0.222*	*0.150*	*2.17*	*0.245*	*0.261*	*0.124*	*0.136*	*0.0377*	*0.0154*	*0.123*	*0.0011*	*0.0038*
55X G02D10(L)	*4.59*	*0.0206*	*7.33*	*0.975*	*0.0524*	*0.645*	*2.77*	*0.022*	*0.138*	*0.0302*	*0.128*	*0.0544*	*0.0341*	*0.0086*	*0.0012*	*0.0389*

Magnesium/Aluminium/Zinc (Cast) Reference Materials (40-45mm dia. x 15-20mm discs)

MBH No.	Al	Zn	Mn	Cu	Si	Fe	Ni	Ca	Sn	Pb	Ag	Be	Cd	Ce	La	Sr	Ti	Zr
65X MgA1(J)	*5.45*	*1.26*	*0.060*	*0.221*	*0.20*	*0.021*	*0.021*	*0.029*	*0.072*	*0.012*	*0.012*	*0.006*	*0.013*	*0.009*	*0.007*	*…*	*(0.005)*	*(0.0015)*
65X MgA5(A)	*8.00*	*0.411*	*0.401*	*0.0195*	*0.110*	*0.006*	*0.0201*	*(0.014)*	*0.0124*	*0.042*	*0.0050*	*0.0013*	*0.0035*	*…*	*…*	*0.0004*	*(0.001)*	*…*
65X MgA7(A)	*9.38*	*0.66*	*0.285*	*0.0010*	*0.006*	*0.0103*	*0.0009*	*…*	*<0.002*	*<0.002*	*<0.0005*	*…*	*…*	*…*	*…*	*0.015*	*…*	*(0.0008)*
65X MgA11(A)	*3.63*	*1.59*	*0.044*	*0.0496*	*0.022*	*0.0048*	*0.0134*	*0.102*	*0.093*	*0.0190*	*(0.0002)*	*0.0021*	*0.0014*	*(0.0005)*	*(0.0005)*	*0.006* **Hg**	*…*	*…*
65X MgA12(A)	*5.68*	*3.18*	*0.198*	*0.266*	*0.0142*	*0.0053*	*0.0148*	*0.037*	*0.0021*	*0.010*	*0.0128*	*(0.0036)*	*0.0121*	*0.0009*	*0.0007*	*(0.016)* **Hg**	*…*	*…*
65X MgA13(A)	*7.45*	*0.925*	*0.092*	*0.125*	*0.022*	*(0.008)*	*0.0039*	*0.0064*	*0.043*	*0.0085*	*0.0074*	*(0.010)*	*0.0055*	*0.0024*	*0.0021*	*(0.033)* **Hg**	*…*	*…*
65X MgA14(A)	*9.09*	*0.685*	*0.282*	*0.0102*	*0.080*	*0.008*	*0.0082*	*0.016*	*0.0085*	*0.006*	*0.0016*	*0.0029*	*0.0014*	*0.0120*	*0.0111*	*(0.082)* **Hg**	*…*	*…*
65X MgA15(A)	*10.67*	*0.348*	*0.067*	*0.0273*	*0.034*	*0.010*	*0.0026*	*(0.0014)*	*0.0021*	*0.0051*	*0.030*	*0.0062*	*0.0034*	*0.0069*	*0.0048*	*0.011)* **Hg**	*…*	*…*
65X MgA16(A)	*6.78*	*4.03*	*0.271*	*0.099*	*0.023*	*0.0073*	*0.0057*	*0.0024*	*0.028*	*0.050*	*0.0035*	*0.0011*	*0.0066*	*0.0017*	*0.0012*	*0.005)* **Hg**	*…*	*…*
65X MgA17(A)	*4.20*	*0.128*	*0.203*	*0.0215*	*0.33*	*0.0069*	*0.0141*	*0.021*	*0.0050*	*0.009*	*0.0064*	*…*	*0.0049*	*…*	*…*	*…*	*…*	*…*
65X MgB1(C) *	*2.34*	*1.71*	*0.61*	*0.195*	*0.14*	*0.006*	*0.012*	*0.001*	*0.012*	*0.01*	*0.03*	*0.0006*	*0.07*	*0.010*	*0.010*	*…*	*…*	*(0.001)*
65X MgB2(C)	*2.67*	*0.95*	*0.333*	*0.113*	*0.069*	*0.010*	*0.0028*	*0.011*	*0.0047*	*0.0036*	*0.0099*	*0.0008*	*0.0115*	*0.0009*	*0.0007*	*…*	*0.0003*	*<0.001*
65X MgB3(B)*	*3.19*	*0.608*	*0.0122*	*0.0214*	*0.012*	*(0.0047)*	*0.0020*	*0.030*	*0.0050*	*0.0037*	*(0.0024)*	*0.0029*	*0.012*	*…*	*…*	*…*	*(0.0028)*	*<0.001*
65X MgB4(C)	*3.86*	*0.333*	*0.031*	*0.0183*	*0.037*	*(0.009)*	*0.0003*	*0.0010*	*0.0050*	*0.0037*	*0.0046*	*0.0033*	*0.0002*	*0.0003*	*(0.00016)*	*…*	*(0.0008)*	*<0.001*

***** Denotes that samples may be unsuitable for use with glow discharge analysis.

Tin with Impurities (Cast) Reference Materials (40mm dia. x 15mm discs)

MBH No.	Sb	As	Bi	Pb	Cu	Fe	Ni	Al	Co	Ag	Cr	Cd	Zn	In	Au	Te	Se	Ga	Hg	Ge
71X SR0(B)	*0.0034*	*0.0008*	*(0.0025)*	*0.0113*	*0.0013*	*0.0008*	*0.0004*	*0.0197*	*…*	*0.0018*	*…*	*0.0015*	*0.0034*	*0.0047*	*0.0007*	*0.0009*	*0.0005*	*0.0027*	*0.0044*	*…*
71X SR1(E)	*0.0156*	*0.0102*	*0.0107*	*0.0324*	*0.0111*	*(0.0021)*	*0.0041*	*(0.0016)*	*…*	*0.0121*	*…*	*0.0104*	*0.0146*	*0.0120*	*0.0014*	*0.0112*	*(0.0015)*	*0.0049*	*0.0142*	*…*
***71X SR2(F)**	*0.065*	*0.007*	*0.039*	*0.15*	*0.115*	*0.013*	*0.018*	*…*	*0.005*	*0.028*	*0.003*	*0.036*	*0.006*	*0.059*	*0.007*	*0.024*	*0.001*	*…*	*0.135*	*0.01*
71X SR3(F)	*0.128*	*0.097*	*0.123*	*0.306*	*0.121*	*0.0203*	*0.0371*	*(0.0014)*	*…*	*0.050*	*…*	*0.100*	*0.054*	*0.104*	*0.0145*	*0.070*	*0.0031*	*0.0339*	*0.115*	*…*

***** Provisional values

Cobalt Alloy (Cast) Reference Materials (40-43mm dia. x 15-20mm) discs (112X 14944 is wrought material)

MBH No.	C	Si	Mn	Ni	Cr	W	Mo	Ta	Fe	Al	Ti	Cu	Nb	P	S	B	N	Pb	Sn
111X 12667(M)	*0.008*	*0.749*	*0.52*	*(0.70)*	*21.79*	*8.22*	*0.161*	*0.145*	*1.36*	*0.005*	*…*	*0.047*	*1.50*	*(0.003)*	*0.0068*	*…*	*0.085*	*…*	*…*
111X 12670(N)	*(0.007)*	*0.589*	*0.48*	*1.10*	*19.24*	*10.95*	*(0.057)*	*0.105*	*1.28*	*(0.004)*	*…*	*(0.059)*	*2.53*	*0.0052*	*0.026*	*…*	*0.006*	*…*	*0.021*
111X 12673(A)	*(0.005)*	*0.82*	*0.52*	*1.69*	*19.0*	*9.75*	*0.086*	*0.06*	*1.70*	*<0.005*	*…*	*0.104*	*2.35*	*0.010*	*0.022*	*…*	*0.031*	*(0.003)*	*0.074*
112X 14937(S)	*0.340*	*1.18*	*0.407*	*2.88*	*25.17*	*2.84*	*7.16*	*…*	*2.28*	*0.012*	*0.017*	*0.093*	*0.191*	*0.009*	*0.0242*	*0.0123*	*0.142*	*…*	*…*
112X 14943(G)	*0.129*	*0.58*	*1.20*	*0.138*	*30.64*	*0.060*	*7.94*	*…*	*1.23*	*(0.024)*	*…*	*0.229*	*0.119*	*0.006*	*0.026*	*0.00591*	*0.056*	*…*	*…*
112X 14944(A)	*0.225*	*0.71*	*0.744*	*0.128*	*29.24*	*<0.02*	*6.29*	*…*	*0.14*	*<0.01*	*…*	*0.006*	*<0.01*	*0.0017*	*0.0040*	*(0.0004)*	*0.148*	*(0.0001)*	*(0.0001)*
119X ST3(K)	*2.39*	*0.794*	*1.09*	*2.55*	*29.8*	*12.1*	*0.353*	*…*	*3.10*	*…*	*…*	*0.078*	*…*	*…*	*0.063*	*0.148*	*0.040*	*…*	*…*

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), USA

CHEMICAL COMPOSITION (nominal mass content in %) - . Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Electrolytic Iron and Low Alloy Steel Certified Reference Materials

(SRMs 361-364 finely divided material, units of 150g; SRMs 1262b-1265a 31mm dia x 19mm discs & 1761a-1768 31-34mm dia. x 19mm discs)

NIST No.	Description	Cert. Date	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	As	B	Co	Cu
… **(SRM 361)**	AISI 4340	**2001**	**0.383**	**0.222**	**0.66**	**0.014**	**0.0143**	**0.694**	**0.19**	**2.00**	**0.021**	**0.017**	**0.000478**	**0.032**	**0.042**
SRM 1262b	AISI 94B17 (mod)	**1992**	**0.160**	**0.40**	**1.05**	**0.044**	**0.037**	**0.30**	**0.070**	**0.59**	**0.081**	**0.096**	**0.0025**	**0.57**	**0.51**
… **(SRM 363)**	Cr-V (Mod)	**2001**	**0.62**	**0.74**	**1.50**	**0.029**	**0.0068**	**1.31**	**0.028**	**0.30**	**0.24**	**0.010**	**0.00131**	**0.048**	**0.10**
SRM 1264a (364)	High Carbon (Mod)	**2006**	**0.87**	**0.067**	**0.258**	**0.010**	**0.025**	**0.066**	**0.49**	**0.142**	*0.008*	**0.052**	*0.011*	**0.15**	**0.250**
SRM 1265a	Electrolytic Iron	**1989**	**0.0067**	**0.0080**	**0.0057**	**0.0011**	**0.0055**	**0.0072**	**0.0050**	**0.041**	*0.0007*	*0.0002*	**0.00013**	**0.0070**	**0.0058**
SRM 1761a	Low Alloy Steel	**2008**	*1.05*	*0.182*	**0.679**	**0.042**	**0.037**	**0.222**	**0.103**	**1.981**	**0.055**	*0.011*	**0.0023**	*0.027*	**0.298**
SRM 1762a	Low Alloy Steel	**2009**	**0.341**	**0.351**	**1.99**	**0.0346**	**0.0295**	**0.923**	**0.353**	**1.156**	**0.0706**	**0.0173**	**0.0042**	**0.0616**	**0.1186**
SRM 1763a	Low Alloy Steel	**2008**	**0.202**	**0.663**	**1.584**	**0.0123**	**0.022**	**0.498**	**0.490**	**0.513**	**0.0435**	**0.055**	**0.0054**	**0.093**	**0.42**
SRM 1764a	Low Alloy Steel	**2009**	**0.592**	**0.0595**	**1.193**	**0.0210**	**0.0118**	**1.468**	**0.2007**	**0.2006**	**0.0098**	**0.0100**	*0.0010*	*0.012*	**0.5178**
SRM 1765	Low Alloy Steel	**1993**	**0.006**	*0.004*	**0.144**	**0.0052**	**0.0038**	**0.051**	**0.005**	**0.154**	0.006	**0.0010**	**0.0009**	**0.0012**	**0.0013**
SRM 1766	Low Alloy Steel	**1993**	**0.015**	**0.010**	**0.067**	**0.002**	**0.0024**	**0.024**	**0.0035**	**0.021**	**0.012**	**0.0035**	**0.00012**	**0.0020**	**0.015**
SRM 1767	Low Alloy Steel	**1993**	**0.052**	**0.026**	**0.022**	**0.0031**	**0.0090**	**0.0015**	**0.020**	**0.002**	**0.004**	**0.0005**	**0.001**	**0.0050**	**0.0014**
SRM 1768	High Purity Iron	**2000**	**0.0010**	*(<0.001)*	**0.0014**	**0.0013**	**0.0003**	*(<0.0002)*	*(<0.0003)*	**0.0014**	**0.0024**	*(<0.0001)*	*(<0.0002)*	**0.0025**	**0.0006**

Electrolytic Iron and Low Alloy Steel CRMs (continued)

NIST No.	N	Nb	Pb	Sn	Ta	Ti	V	W	Zr	Ag	Bi	Ca	Ce
… **(SRM 361)**	*0.0037*	**0.022**	**0.000025**	**0.010**	**0.020**	**0.020**	**0.011**	**0.017**	**0.009**	**0.0004**	*0.0004*	**0.00010**	**0.0040**
SRM 1262b	*0.0041*	**0.30**	**0.00043**	**0.016**	**0.20**	**0.100**	**0.041**	**0.20**	**0.22**	**0.0011**	*0.002*	*0.0001*	**0.0019**
… **(SRM 363)**	*0.0041*	**0.049**	**0.00186**	**0.104**	*0.053*	**0.050**	**0.31**	**0.046**	**0.049**	**0.0037**	*0.0008*	**0.00022**	**0.0030**
SRM 1264a (364)	*0.0032*	**0.157**	**0.024**	*0.008*	**0.11**	**0.24**	**0.106**	**0.102**	**0.069**	*0.00002*	*0.0009*	**0.00004**	**0.00022**
SRM 1265a	*0.0011*	…	**0.000015**	*0.0002*	*<0.0005*	*0.0001*	**0.0006**	*0.00004*	*<0.00001*	*0.000002*	*<0.00001*	*<0.00001*	*<0.000005*
SRM 1761a	*0.0042*	**0.021**	…	*0.050*	*0.050*	**0.173**	**0.054**	…	**0.012**	…	…	…	…
SRM 1762a	*0.002*	**0.0692**	…	**0.0479**	**0.0203**	**0.0952**	**0.2010**	…	**0.0285**	…	…	…	…
SRM 1763a	*0.0045*	**0.100**	…	*0.011*	*0.012*	**0.308**	**0.307**	*(0.002)*	**0.044**	…	…	…	…
SRM 1764a	*0.0023*	**0.0416**	…	*0.024*	**0.0297**	**0.0286**	**0.1063**	*(0.0016)*	*0.0012*	…	…	…	…
SRM 1765	**0.0010**	**0.0004**	**0.0003**	**0.002**	*0.004*	**0.0055**	**0.0040**	…	*0.0002*	**0.0002**	*<0.0001*	…	…
SRM 1766	**0.0033**	**0.005**	**0.003**	**0.0010**	*0.006*	**0.0005**	**0.009**	*0.001*	*0.0004*	**0.0005**	*<0.0001*	…	*0.002*
SRM 1767	**0.0008**	**0.010**	*0.0001*	**0.006**	*0.002*	**0.011**	**0.033**	…	*0.004*	**0.0008**	*<0.0001*	*0.0003*	…
SRM 1768	**0.002**	*(<0.0005)*	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*	*(<0.001)*	*(<0.0001)*	*(<0.0002)*	*(<0.0001)*	…	*(<0.0004)*	*(<0.0001)*	…

Electrolytic Iron and Low Alloy Steel CRMs (continued)

NIST No.	Fe	Au	Ge	H	Hf	La	Mg	Nd	O	Pr	Sb	Te	Zn
… **(SRM 361)**	*95.6*	*<0.00005*	*0.006*	*<0.0005*	*0.0002*	*0.001*	**0.00026**	**0.00029**	*0.0009*	*0.0003*	**0.0042**	*0.0006*	*0.0001*
SRM 1262b	*95.3*	*<0.00005*	*0.002*	*<0.0005*	*0.0003*	*0.0004*	**0.00062**	**0.00064**	*0.0011*	*0.00012*	**0.0120**	*0.001*	*0.0005*
… **(SRM 363)**	*94.4*	**0.0005**	*0.010*	*<0.0005*	*0.0005*	*0.002*	**0.00062**	**0.0012**	*0.00066*	*0.0004*	**0.002**	*0.0009*	*0.0004*
SRM 1264a (364)	*96.7*	**0.0001**	*0.003*	*<0.0005*	*0.0013*	**0.00007**	**0.00015**	**0.00007**	*0.0010*	*0.00003*	**0.034**	**0.00018**	*0.001*
SRM 1265a	*99.9*	*<0.000002*	*0.0014*	*0.0001*	*<0.00002*	*<0.000005*	*<0.00002*	*<0.000005*	*0.0063*	*<0.000005*	*<0.00001*	*<0.00001*	*<0.0001*
SRM 1761a	*95.0*	…	…	…	…	…	…	…	…	…	*0.0052*	…	…
SRM 1762a	*94.2*	…	…	…	…	…	…	…	…	…	…	…	…
SRM 1763a	*(95.3)*	…	…	…	…	…	…	…	…	…	*0.011*	…	…
SRM 1764a	*(95.1)*	…	…	…	…	…	…	…	…	…	…	…	…
SRM 1768	*99.9*	…	…	…	…	…	*(<0.0006)*	…	**0.036**	…	*(<0.0001)*	*(<0.0001)*	*(<0.0001)*

Information on NIST samples not included in this list will be provided on request. SRM 1261a, SRM 362 and SRM 365 are completely exhausted.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), USA

CHEMICAL COMPOSITION (nominal mass content in %) - . Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Ore and Concentrate Certified Reference Materials (Finely divided material – unit weights as shown in table)

NIST No.	Description	Cert. Date	Unit Weight	Fe_2O_3	SiO_2	Al_2O_3	TiO_2	CaO	MgO	MnO	P_2O_5	SO_3	K_2O
SRM 25d	Manganese Ore	**2010**	60g	*3.91*	**2.54**	*5.33*	*0.136*	*(0.052)*	…	**51.78 Mn**	**0.251**	…	*0.928*
SRM 69b	Bauxite, Arkansas	**1991**	60g	**7.14**	**13.43**	**48.8**	**1.90**	**0.13**	**0.085**	**0.110**	**0.118**	**0.63**	**0.068**
SRM 113b	Zinc Concentrate	**1995**	100g	**2.077 Fe**	…	…	…	**0.8196 Ca**	**0.4460 Mg**	…	…	**30.032 S**	…
SRM 120c	Phosphate Rock (Florida)	**1988**	90g	**1.08**	*5.5*	**1.30**	**0.103**	*48.00*	*0.32*	**0.027**	*33.34*	…	**0.147**
SRM 277	Tungsten Concentrate	**1978**	100g	*7.4* **Fe**	*(0.85)* **Si**	…	*(2.2)* **Ti**	*(0.37)* **Ca**	…	*(10.0)* **Mn**	*(0.03)* **P**	*(0.25)* **S**	…
SRM 600	Bauxite, Australian	**1991**	90g	**17.0**	**20.3**	**40.0**	**1.31**	**0.22**	**0.05**	**0.013**	**0.039**	**0.19**	**0.23**
SRM 670	Rutile Ore	**1993**	90g	**0.86**	**0.51**	…	**96.16**	…	…	…	…	…	…
SRM 690	Iron Ore, Canada	**1992**	100g	**66.85 Fe**	**3.71**	**0.18**	**0.022**	**0.20**	**0.18**	**0.23**	**0.011 P**	**0.003 S**	**0.0030**
SRM 691	Iron Oxide, Reduced	**1991**	100g	**90.8 Fe**	**3.7**	**1.22**	**0.27**	**0.63**	**0.52**	**0.043**	**0.006 P**	**0.008 S**	…
SRM 692	Iron Ore, Labrador	**1992**	150g	**59.58 Fe**	**10.14**	**1.41**	**0.045**	**0.023**	**0.035**	**0.46**	**0.039 P**	**0.005 S**	**0.039**
SRM 693	Iron Ore, Nimba	**1990**	100g	**65.11 Fe**	**3.87**	**1.02**	**0.035**	**0.016**	**0.013**	**0.091**	**0.056 P**	**0.005 S**	**0.0028**
SRM 694	Phosphate Rock (Western)	**1993**	90g	**0.79**	**11.2**	**1.8**	0.11	**43.6**	**0.33**	**0.0116**	**30.2**	…	**0.51**
SRM 696	Bauxite, Surinam	**1991**	60g	**8.70**	**3.79**	**54.5**	**2.64**	**0.018**	**0.012**	**0.004**	**0.050**	**0.21**	**0.009**
SRM 697	Bauxite, Dominican	**1991**	60g	**20.0**	**6.81**	**45.8**	**2.52**	**0.71**	**0.18**	**0.41**	**0.97**	**0.0769**	**0.062**
SRM 698	Bauxite, Jamaican	**1991**	60g	**19.6**	**0.69**	**48.2**	**2.38**	**0.62**	**0.058**	**0.38**	**0.37**	**0.22**	**0.010**
SRM 699	Alumina (Reduction grade)	**2006**	60g	**0.013**	**0.0120**	…	…	**0.036**	**0.0006**	**0.0005**	**0.0002**	…	…
SRM 1835	Borate Ore	**1987**	60g	**1.141**	**18.408**	**3.47**	**0.133**	**21.622**	**3.411**	**0.0333**	…	**1.477**	**1.261**
SRM 2430	Scheelite Ore	**1987**	100g	*(1.0)* **Fe**	*(4)*	*(0.04)* **Al**	…	…	*(0.5)* **Mg**	*(0.12)* **Mn**	**0.017 P**	**0.26 S**	*(0.16)* **K**

Ore and Concentrate CRMs (continued)

NIST No.		Na_2O	Cr_2O_3	Ga_2O_3	Li_2O	V_2O_5	WO_3	ZnO	ZrO_2	Bi	Cu	F	Mo	Pb	Others	LOI
SRM 25d	(continued)	…	…	…	…	…	…	…	…	…	…	…	…	…	*(1)* **Moisture**	…
SRM 69b	(continued)	*0.025*	**0.011**	…	…	**0.028**	…	**0.0035**	**0.29**	…	…	…	…	…	…	**25.72**
SRM 113b	(continued)	…	…	…	…	…	…	**56.49 Zn**	…	…	**0.2953**	…	…	**2.731**	**0.04607 Ag**	…
SRM 120c	(continued)	**0.52**	…	…	…	…	…	…	…	…	…	*3.82*	…	…	**0.0128 U**	…
SRM 277	(continued)	…	…	…	…	…	**67.4**	…	…	…	…	…	*(0.06)*	*(0.07)*	*(21.4)* **O_2**	…
SRM 600	(continued)	**0.022**	**0.024**	…	…	**0.060**	…	**0.003**	**0.060**	…	…	…	…	…	…	…
SRM 670	(continued)	…	**0.23**	…	…	**0.66**	…	…	**0.84**	…	…	…	…	…	…	…
SRM 690	(continued)	**0.003**	…	…	…	…	…	…	…	…	…	…	…	…	…	…
SRM 691	(continued)	**0.186**	…	…	…	…	…	…	…	…	**0.032**	…	…	…	**0.030 Co**	…
SRM 692	(continued)	**0.008**	…	…	…	…	…	…	…	…	…	…	…	…	…	…
SRM 693	(continued)	**0.0028**	…	…	…	…	…	…	…	…	…	…	…	…	…	…
SRM 694	(continued)	**0.86**	*0.10*	…	…	**0.31**	…	*0.19*	…	…	…	**3.2**	…	…	**0.0141 U**	…
SRM 696	(continued)	*0.007*	**0.047**	…	…	**0.072**	…	**0.0014**	**0.14**	…	…	…	…	…	…	**29.9**
SRM 697	(continued)	*0.036*	**0.100**	…	…	**0.063**	…	**0.037**	**0.065**	…	…	…	…	…	*0.0013* **Co**	**22.1**
SRM 698	(continued)	*0.015*	**0.080**	…	…	**0.064**	…	**0.029**	**0.061**	…	…	…	…	…	…	**27.3**
SRM 699	(continued)	**0.59**	**0.0002**	**0.010**	**0.002**	**0.0005**	…	**0.013**	…	…	…	…	…	…	**0.000281 Be**	**0.69**
SRM 1835	(continued)	**3.484**	…	…	…	…	…	…	…	…	…	**0.348**	…	…	…	…
SRM 2430	(continued)	*(0.02)* **Na**	…	…	…	…	**70.26**	…	…	**0.078**	*(0.01)*	…	**0.22**	…	**0.002 As**	…

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), USA

CHEMICAL COMPOSITION (nominal mass content in %) – Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Rock, Mineral and Refractory Certified Reference Materials (Finely divided material – unit weights as shown in table)

NIST No.	Description	Cert. Date	Unit Weight	SiO_2	Al_2O_3	TiO_2	FeO	Fe_2O_3	Cr_2O_3	MnO	CaO	MgO	BaO	Na_2O	K_2O	Li_2O	P_2O_5	Rb_2O	SrO	ZrO_2	LOI
SRM 1d	Limestone, Argillaceous	**2005**	70g	**4.080**	**0.526**	**0.07**	…	**0.3191**	*0.0012*	…	**52.85**	**0.301**	*0.0033*	**0.0109**	**0.1358**	…	**0.0413**	…	**0.0303**	…	**39.9**
SRM 70a	Feldspar, Potash	**1990**	40g	**67.1**	**17.9**	**0.01**	…	**0.075**	…	…	**0.11**	…	**0.02**	**2.55**	**11.8**	…	…	**0.06**	…	…	**0.4**
SRM 76a	Burnt Refractory (Al_2O_3-40%)	**1992**	75g	**54.9**	**38.7**	**2.03**	…	**1.60**	…	…	**0.22**	**0.52**	…	**0.07**	**1.33**	**0.042**	**0.120**	…	**0.037**	…	*0.34*
SRM 77a	Burnt Refractory (Al_2O_3-60%)	**1992**	75g	**35.0**	**60.2**	**2.66**	…	**1.00**	…	…	**0.05**	**0.38**	…	**0.037**	**0.090**	**0.025**	**0.092**	…	**0.009**	…	*0.22*
SRM 78a	Burnt Refractory (Al_2O_3-70%)	**1992**	75g	**19.4**	**71.7**	**3.22**	…	**1.2**	…	…	**0.11**	**0.70**	…	**0.078**	**1.22**	**0.12**	**1.3**	…	**0.25**	…	*0.42*
SRM 81a	Glass Sand	**1978**	75g	…	**0.66**	**0.12**	…	**0.082**	**0.0046**	…	…	…	…	…	…	…	…	…	…	**0.034**	…
SRM 88b	Limestone, Dolomitic	**1994**	75g	**1.13**	**0.34**	0.016	…	**0.28**	…	**0.016**	**30.12**	**21.03**	…	**0.029**	**0.10**	…	**0.004**	…	**0.008**	…	*47.0*
SRM 165a	Glass Sand (low iron)	**1992**	75g	…	**0.059**	**0.011**	…	**0.012**	**0.00011**	…	…	…	…	…	…	…	…	…	…	**0.006**	…
SRM 198	Silica Brick	**1960**	45g	…	**0.16**	**0.02**	…	**0.66**	…	**0.008**	**2.71**	**0.07**	…	**0.012**	**0.017**	**0.001**	**0.022**	…	…	**<0.01**	**0.21**
SRM 199	Silica Brick	**1991**	45g	…	**0.48**	**0.06**	…	**0.74**	…	**0.007**	**2.41**	**0.13**	…	**0.015**	**0.094**	**0.002**	**0.015**	…	…	**0.01**	**0.17**
SRM 278	Obsidian Rock	**1992**	35g	**73.05**	**14.15**	**0.245**	…	**2.04**	…	**0.052**	**0.983**	…	…	**4.84**	**4.16**	…	**0.036**	…	…	…	…
SRM 688	Basalt Rock	**1981**	60g	**48.4**	**17.36**	**1.17**	**7.64**	**10.35**	…	**0.167**	…	…	…	**2.15**	**0.187**	…	**0.134**	…	…	…	…
SRM 1413	Glass Sand (high alumina)	**1985**	75g	**82.77**	**9.90**	**0.11**	…	**0.24**	**ZnO**	**Mn_2O_3**	**0.74**	**0.06**	**0.12**	**1.75**	**3.94**	…	…	…	…	…	…
SRM 2696	Silica Fume	**2007**	70g	**95.61**	**0.2080**	**0.11**	…	*0.055*	**0.051**	**0.032**	**0.426**	**0.235**	…	*0.129*	**0.652**	…	*0.0863*	…	…	…	*2.11*

Cement Certified Reference Materials (Finely divided material – units of 4 x 5g sealed vials, except SRM 634a units of 100g, SRM 1884b units of 5 x 4.5g sealed vials and SRM 114q – units of 20 x 5g vials)

NIST No.	Cert. Date	CaO	SiO_2	Al_2O_3	Fe_2O_3	MgO	SO_3	Na_2O	K_2O	TiO_2	SrO	Mn_2O_3	P_2O_5	Cl	F	ZnO	Cr_2O_3	LOI
SRM 634a	**2006**	**65.07**	**20.493**	**5.015**	**3.362**	**1.0057**	**2.780**	*0.0842*	**0.3572**	**0.2463**	*0.0735*	*0.0229*	**0.1767**	…	…	*0.0222*	*0.0114*	*1.66*
SRM 1880b	**2009**	**64.16**	**20.42**	**5.183**	**3.681**	**1.176**	**2.710**	**0.0914**	**0.646**	**0.236**	*0.0272*	**0.1981**	**0.2443**	**0.01830**	*0.0539*	*0.01054*	**0.01927**	*1.666*
SRM 1881a	**2002**	**57.58**	**22.26**	**7.060**	**3.09**	**2.981**	**3.366**	**0.199**	**1.228**	**0.3663**	**0.036**	**0.1042**	**0.1459**	*0.013*	*0.09*	**0.0489**	**0.0588**	*1.59*
SRM 1882a	**1999**	**39.29**	**4.01**	**39.14**	**14.67**	**0.51**	…	**0.021**	**0.051**	**1.786**	*0.024*	*0.060*	*0.070*	…	…	*0.004*	*0.113*	*0.20*
SRM 1883a	**1999**	**29.52**	**0.24**	**70.04**	**0.078**	**0.19**	…	**0.30**	**0.014**	*0.02*	*0.019*	*0.003*	*0.003*	…	…	…	*0.006*	*0.35*
SRM 1884b	**2009**	**61.31**	**19.30**	**4.851**	**2.937**	**4.74**	**4.034**	**0.278**	**0.957**	**0.2651**	**0.0258**	**0.0750**	**0.0965**	*0.0065*	*0.0394*	*0.0042*	**0.00791**	*0.597*
SRM 1885a	**2001**	**62.39**	**20.909**	**4.026**	**1.929**	**4.033**	**2.830**	**1.068**	**0.206**	**0.195**	**0.638**	**0.0478**	**0.220**	*0.0040*	*0.13*	*0.0029*	**0.0195**	*1.68*
SRM 1886a	**2002**	**67.87**	**22.38**	**3.875**	**0.152**	**1.932**	**2.086**	**0.021**	**0.093**	**0.084**	*0.018*	**0.0073**	**0.022**	*0.0042*	*0.02*	*0.001*	**0.0024**	*1.56*
SRM 1887a	**2001**	**60.90**	**18.637**	**6.202**	**2.861**	**2.835**	**4.622**	**0.4778**	**1.100**	**0.2658**	**0.322**	**0.1186**	**0.306**	*0.0104*	*0.09*	**0.0667**	*0.009*	*1.43*
SRM 1888a	**2002**	**63.23**	**21.22**	**4.265**	**3.076**	**2.982**	**2.131**	**0.1066**	**0.526**	**0.263**	**0.082**	**0.1256**	*0.080*	*0.0036*	*0.11*	**0.107**	*0.0186*	*1.75*
SRM 1889a	**2002**	**65.34**	**20.66**	**3.89**	**1.937**	**0.814**	**2.69**	**0.195**	**0.605**	**0.227**	**0.110**	**0.2588**	**0.110**	*0.0019*	*0.05*	**0.0048**	**0.0072**	*3.28*
SRM 114q	**2008**	Specific Surface Area by ASTM C204-96a, **3818 cm^2/g**: Specific Surface Area by ASTM C115-96a, **2183 cm^2/g**: Sieve Residue on 45µm sieve by ASTM C430-96, **0.79%**:																

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), USA

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

Biological Certified Reference Materials (Finely divided material – unit weights as shown in table). nominal mass content in %

NIST No.	Description	Cert. Date	Unit Weight	Ca	Cl	Mg	N	P	K	Na	S
SRM 1515	Apple leaves	**1993**	50g	**1.526**	**0.0579**	**0.271**	**2.25**	…	**1.61**	**0.00244**	*0.18*
SRM 1547	Peach leaves	**1993**	50g	**1.56**	**0.0360**	**0.432**	**2.94**	…	**2.43**	**0.0024**	*0.2*
SRM 1549	Non-fat Powdered Milk	**2009**	100g	**1.30**	**1.09**	**0.120**	…	…	**1.69**	**0.497**	**0.351**
SRM 1566b	Oyster Tissue	**2001**	25g	**0.0838**	**0.514**	**0.1085**	*7.6*	…	**0.652**	**0.3297**	**0.6887**
SRM 1567a	Wheat Flour	**1988**	80g	**0.0191**	…	**0.040**	…	**0.134**	**0.133**	**0.00061**	**0.165**
SRM 1568a	Rice Flour	**1995**	80g	**0.0118**	*0.0300*	**0.056**	…	**0.153**	**0.128**	**0.00066**	**0.120**
SRM 1569	Brewers Yeast	**1976**	50g	…	…	…	…	…	…	…	…
SRM 1570a	Spinach Leaves	**2001**	60g	**1.527**	…	*0.89*	*6.06*	**0.518**	**2.903**	**1.818**	*0.46*
SRM 1573a	Tomato Leaves	**1995**	50g	**5.05**	*0.66*	*1.2*	**3.03**	**0.216**	**2.70**	**0.0136**	*0.96*
SRM 1575a	Pine Needles	**2002**	50g	**0.25**	**0.0421**	*0.106*	…	**0.107**	**0.417**	*0.0063*	…

Biological CRMs (continued) nominal mass content in µg/g

NIST No.		Al	As	B	Ba	Cu	Fe	Mn	Rb	Sr	Zn
SRM 1515	(continued)	**286**	**0.038**	**27**	**49**	**5.64**	*80*	**54**	**10.2**	**25**	**12.5**
SRM 1547	(continued)	**249**	**0.060**	**29**	**124**	**3.7**	*220*	**98**	**19.7**	**53**	**17.9**
SRM 1549	(continued)	…	…	…	…	**0.7**	**1.78**	**0.26**	…	…	**46.1**
SRM 1566b	(continued)	**197.2**	**7.65**	*4.5*	*8.6*	**71.6**	**205.8**	**18.5**	**3.262**	*6.8*	**1424**
SRM 1567a	(continued)	**5.7**	…	…	…	**2.1**	**14.1**	**9.4**	…	…	**11.6**
SRM 1568a	(continued)	**4.4**	**0.29**	…	…	**2.4**	**7.4**	**20.0**	**6.14**	…	**19.4**
SRM 1569	(continued)	…	…	…	…	…	…	…	…	…	…
SRM 1570a	(continued)	**310**	**0.068**	**37.6**	…	**12.2**	…	**75.9**	*13*	**55.6**	**82**
SRM 1573a	(continued)	**598**	**0.112**	**33.3**	*63*	**4.70**	**368**	**246**	**14.89**	*85*	**30.9**
SRM 1575a	(continued)	**580**	*0.039*	*9.6*	**6.0**	**2.8**	**46**	488	**16.5**	…	**38**

Biological CRMs (continued) nominal mass content in ng/g

NIST No.		Cd	Cr	Co	I	Pb	Hg	Mo	Ni	Se	Ag	Th	U	V
SRM 1515	(continued)	*14*	*300*	*90*	*300*	**470**	**44**	**94**	**910**	**50**	…	30	*6*	**260**
SRM 1547	(continued)	**26**	*1000*	*70*	*300*	**870**	**31**	**60**	**690**	**120**	…	50	*15*	**370**
SRM 1549	(continued)	**0.5**	**2.6**	…	**3380**	**19**	**0.3**	…	…	**110**	…	…	…	…
SRM 1566b	(continued)	**2480**	…	**371**	…	**308**	**37.1**	…	**1040**	**2060**	**666**	**36.7**	*2550*	**577**
SRM 1567a	(continued)	**26**	…	…	…	…	…	**480**	…	**1100**	…	…	…	…
SRM 1568a	(continued)	**22**	…	*18*	*9*	…	**5.8**	**1460**	*160*	**380**	…	…	*0.3*	*7*
SRM 1569	(continued)	…	**2120**	…	…	…	…	…	…	…	…	…	…	…
SRM 1570a	(continued)	**2890**	…	**390**	…	*200*	**30**	…	**2140**	**117**	…	**48**	*155*	**570**
SRM 1573a	(continued)	**1520**	**1990**	**570**	*850*	**10800**	**34**	*460*	**1590**	**54**	…	*120*	*35000*	**835**
SRM 1575a	(continued)	**233**	*<0.5*	**61**	…	*167*	**39.9**	…	*1470*	*99*	…	…	…	…

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), USA

CHEMICAL COMPOSITION – Figures in bold type certified, figures in small italic type only approximate and figures in brackets for information only.

Environmental Certified Reference Materials (Finely divided materials – unit weights as shown in table) nominal mass content in %

NIST No.	Description	Cert. Date	Unit Weight	Al	Ca	Cl	C	Fe	H	K	Mg	N	Na	P	Pb	S	Si	Ti	Ash content	Calorific Value (Btu/lb)
SRM 1634c	Trace Elements in Fuel Oil	**2002**	100ml	…	…	45	…	…	…	…	…	*37*	*0.004*	…	…	*2*	…	…	…	…
SRM 1646a	Estuarine Sediment	**2004**	70g	**2.297**	**0.519**	…	…	**2.008**	…	**0.864**	**0.388**	…	**0.741**	**0.027**	**0.00117**	**0.352**	**40.00**	**0.456**	…	…
SRM 1648a	Urban Particulate	**2008**	2g	**3.43**	**5.84**	*0.4543*	*(12.7)*	**3.92**	…	**1.056**	**0.813**	…	**0.4240**	…	**0.655**	**5.51**	*12.8*	**0.4021**	…	…
SRM 2584	Trace Elements in Indoor Dust	**1999**	8g	*2.32*	*6.33*	…	…	*1.64*	…	*0.950*	*1.59*	…	*2.77*	*0.20*	**0.9761**	…	*(10.6)*	*0.42*	…	…
SRM 2682b	Sulphur in Coal	**2001**	50g	*(0.46)*	*(1.1)*	…	*(66.6)*	*(0.24)*	*(4.3)*	*(0.01)*	*(0.2)*	*(1.0)*	*(0.10)*	*(0.01)*	…	**0.4917**	…	*(0.05)*	*6.32*	*11030*
SRM 2684b	Sulphur in Coal	**2001**	50g	*(1.1)*	*(0.44)*	*(0.1037)*	*(69.3)*	*(1.5)*	*(4.6)*	*(0.20)*	*(0.08)*	*(1.5)*	*(0.03)*	…	…	**3.076**	…	*0.06*	*9.93*	*(13163)*
SRM 2689	Fly Ash, Low Lime	**1993**	Set (3)	**12.94**	**2.18**	…	…	**9.32**	…	**2.20**	**0.61**	…	**0.25**	**0.10**	*(0.0052)*	…	**24.06**	**0.75**	*15.94*	*11582*
SRM 2690	Fly Ash, Medium Lime	**1993**	Set (3)	**12.35**	**5.71**	…	…	**3.57**	…	**1.04**	**1.53**	…	**0.24**	**0.52**	*(0.0039)*	**0.15**	**25.85**	**0.52**	*(12)*	*(12000)*
SRM 2691	Fly Ash, High Lime	**1993**	Set (3)	**9.81**	**18.45**	…	…	**4.42**	…	**0.34**	**3.12**	…	**1.09**	**0.51**	*(0.0029)*	**0.83**	**16.83**	**0.90**	*(5.3)*	*(9700)*
SRM 2709a	San Jaoquin Soil	**2009**	50g	**7.37**	**1.91**	…	…	**3.36**	…	**2.11**	**1.46**	…	**1.22**	**0.0688**	**0.00173**	…	**30.3**	**0.336**	…	…
SRM 2710a	Montana I Soil	**2009**	50g	**5.95**	**0.964**	…	…	**4.32**	…	**2.17**	**0.734**	…	**0.894**	**0.105**	**0.552**	…	**31.1**	**0.311**	…	…
SRM 2711a	Montana II Soil	**2009**	50g	**6.72**	**0.00541**	…	…	**2.82**	…	**2.53**	**1.07**	…	**1.20**	**0.0842**	**0.140**	…	**31.4**	**0.317**	…	…
RM 8704	Buffalo River Sediment	**2008**	50g	*6.10*	*2.641*	…	*3.351*	*3.97*	…	*2.001*	*1.200*	…	*0.553*	…	*0.0150*	…	…	*0.457*	…	…

SRM 1643e, Trace Elements in Water, is also available (250ml units) with certified contents in µg/kg and µg/L for Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Cr, Co, Cu, Fe, K, Li, Pb, Mg, Mn, Mo, Na, Ni, Rb, Sb, Se, Sr, Te, Tl, V, Zn

Environmental CRMs (continued) nominal mass content in µg/g.

NIST No.		Ag	As	Ba	Cd	Co	Cr	Cu	F	Hg	Mn	Ni	Rb	Sb	Se	Sr	Th	Tl	U	V	Zn
SRM 1634c	(continued)	…	**0.1426**	*1.8*	…	**0.1510**	…	…	…	…	…	**17.54**	…	…	**0.1020**	…	…	…	…	**28.19**	…
SRM 1646a	(continued)	*<0.3*	**6.23**	*210*	**0.148**	*5*	**40.9**	**10.01**	…	*0.04*	**234.5**	**22.5**	*38*	*0.3*	**0.193**	*68*	*5.8*	…	*2.0*	**44.84**	**48.9**
SRM 1648a	(continued)	*6.0*	**115.5**	…	**73.7**	**17.93**	**402**	**610**	…	…	**790**	**81.1**	**51.0**	**45.4**	*28.4*	**215**	…	…	…	**127**	**4800**
SRM 2584	(continued)	…	**17.4**	*(1300)*	**10.0**	*(10)*	**135.0**	*(320)*	…	**5.20**	*(370)*	*(90)*	*(33)*	*(14)*	*(2)*	*(160)*	*(4)*	…	*(1.6)*	*(34)*	**2580**
SRM 2682b	(continued)	…	*(1.0)*	*(382)*	…	*(1.7)*	*(15)*	…	…	**0.1088**	*(26)*	…	*(<2)*	*(0.19)*	*(0.91)*	…	*(1.5)*	…	*(0.52)*	*(15)*	*(8.6)*
SRM 2684b	(continued)	…	*(3.9)*	*(41)*	…	*(3.9)*	*(17)*	…	*(67)*	**0.0974**	*(36)*	…	*(15)*	*(0.35)*	*(1.9)*	…	*(2.0)*	…	*(0.90)*	*(22)*	*(110)*
SRM 2689	(continued)	…	*(200)*	*(800)*	*(3)*	*(48)*	*(170)*	…	…	*(<0.003)*	*(300)*	*(122)*	…	*(9)*	*(7)*	*(700)*	*(25)*	…	…	…	*(240)*
SRM 2690	(continued)	…	*(26)*	*(5800)*	*(0.7)*	*(19)*	*(67)*	…	…	*(<0.003)*	*(300)*	*(46)*	…	*(6)*	*(0.8)*	*(2000)*	*(25)*	…	…	…	*(120)*
SRM 2691	(continued)	…	*(30)*	*(5900)*	*(0.9)*	*(26)*	*(68)*	…	…	*(<0.003)*	*(200)*	*(53)*	…	*(3)*	*(17)*	*(2700)*	*(26)*	…	…	…	*(120)*
SRM 2709a	(continued)	…	*10.5*	**979**	**0.371**	**12.8**	**130**	*33.9*	…	*0.9*	**529**	*85*	*99*	**1.55**	*(1.5)*	**239**	*10.9*	*0.58*	*3.15*	**110**	*103*
SRM 2710a	(continued)	*(40)*	**1540**	**792**	**12.3**	**5.99**	*6*	**3420**	…	**9.88**	**2149**	*8*	*117*	**52.5**	*(1)*	**255**	*18.1*	*1.52*	**9.11**	*82*	**4180**
SRM 2711a	(continued)	*(6)*	**107**	**730**	**54.1**	**9.89**	**52.3**	**140**	…	**7.42**	**675**	**21.7**	*120*	**23.8**	*(2)*	**242**	*15*	*(3)*	**3.01**	**80.7**	**414**
RM 8704	(continued)	…	*(17)*	*413*	*2.94*	*13.57*	*121.9*	…	…	…	*544*	*42.9*	…	*3.07*	…	…	*9.07*	…	*3.09*	*94.6*	*408*

Please note that other categories of NIST SRMs (Standard Reference Materials) are available from BAS if required.

NATIONAL RESEARCH COUNCIL CANADA (NRCC), CANADA

CHEMICAL COMPOSITION (nominal mass content) – Figures in bold type certified, figures in italic type only approximate and figures in brackets are for information only.

Marine and Environmental Certified Reference Materials (Finely divided material or liquid – unit weights/volumes as shown in table)

NRCC No.	Description	Mass Content	Unit Weight/Vol.	Ag	Al	As	Ba	Be	Cd	Co	Cr	Cu	Fe	CH_3Hg (as Hg)	Hg
DOLT-4	Dogfish Liver	mg/kg	25g	**0.93**	*200*	**9.66**	…	…	**24.3**	*0.25*	*1.4*	**31.2**	**1833**	**1.33**	**2.58**
DORM-3	Dogfish Muscle	mg/kg	20g	*0.04*	*1700*	**6.88**	…	…	**0.290**	…	**1.89**	**15.5**	**347**	**0.355**	**0.382**
FEBS-1	Sagittal Otolith	mg/kg	1g	…	…	…	**5.09**	…	*(0.002)*	…	…	*(5.5)*	…	…	…
LUTS-1	Lobster Pancreas(non defatted)	mg/kg	6 x 10g	**0.580**	…	**2.83**	…	…	**2.12**	**0.051**	**0.079**	**15.9**	**11.6**	…	…
TORT-2	Lobster Pancreas	mg/kg	35g	…	…	**21.6**	…	…	**26.7**	**0.51**	**0.77**	**106**	**105**	**0.152**	**0.27**
HISS-1	Sandy Sediment	mg/kg	100g	**0.016**	**7300**	**0.801**	…	**0.129**	**0.024**	*0.65*	**30.0**	**2.29**	**2460**	…	*0.01*
MESS-3	Estuarine Sediment	mg/kg	50g	**0.18**	**85900**	**1.2**	…	**2.30**	**0.24**	**4.4**	**105**	**33.9**	**43400**	…	**0.091**
PACS-2	Harbour Marine Sediment	mg/kg	65g	**1.22**	**66200**	**26.2**	…	**1.0**	**2.11**	**11.5**	**90.7**	**310**	**40900**	…	**3.04**
CASS-4	Seawater (Coastal)	µg/l	470 ml	…	…	**1.11**	…	…	**0.026**	**0.026**	**0.144**	**0.592**	**0.713**	…	…
NASS-5	Seawater (Open Ocean)	µg/l	470 ml	…	…	**1.27**	…	…	**0.023**	**0.011**	**0.110**	**0.297**	**0.207**	…	…
SLEW-3	Estuarine Water	µg/l	470 ml	*0.003*	…	**1.36**	…	…	**0.048**	**0.042**	**0.183**	**1.55**	**0.568**	…	…
SLRS-5	Riverine Water	µg/l	470 ml	…	**49.5**	**0.413**	14.0	0.005	0.0060	0.05	0.208	17.4	91.2	…	…
ORMS-4	River Water	µg/l	3 x 50ml	…	…	…	…	…	…	…	…	…	…	…	**22.0**
BEST-1	Marine Sediment	mg/kg	50g	…	…	…	…	…	…	…	…	…	…	…	**12.6**

Also PACS 2; Tributyltin (as Sn) = 0.98mg/kg, Dibutyltin (as Sn) = 1.09mg/kg, Monobutyltin (as Sn) = 0.45mg/kg

NRCC No.	Mass Content	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn	Sr	Th	U	V	Zn
DOLT-4 (continued)	mg/kg	…	…	*1*	**0.97**	**0.16**	…	**8.3**	*0.17*	*5.5*	…	…	*0.6*	**116**
DORM-3 (continued)	mg/kg	…	*4.6*	…	**1.28**	**0.395**	…	*3.3*	**0.066**	…	…	…	…	**51.3**
FEBS-1 (continued)	mg/kg	**0.305**	**0.686**	…	*(0.002)*	*(0.58)*	…	…	…	**0.2055**	…	…	…	*(4.8)*
LUTS-1 (continued)	mg/kg	…	**1.20**	…	**0.200**	**0.010**	…	**0.641**	…	**2.46**	…	…	…	**12.4**
TORT-2 (continued)	mg/kg	…	**13.6**	**0.95**	**2.50**	**0.35**	…	**5.63**	*0.04*	**45.2**	…	…	**1.64**	**180**
HISS-1 (continued)	mg/kg	**2.83**	**66.1**	*0.13*	**2.16**	**3.13**	*0.13*	**0.050**	*0.11*	**96.9**	*0.06*	*0.26*	**6.80**	**4.94**
MESS-3 (continued)	mg/kg	**73.6**	**324**	**2.78**	**46.9**	**21.1**	**1.02**	**0.72**	**2.50**	**129**	*0.90*	*4*	**243**	**159**
PACS-2 (continued)	mg/kg	**32.2**	**440**	**5.43**	**39.5**	**183**	**11.3**	**0.92**	**19.8**	**276**	*0.6*	*3*	**133**	**364**
CASS-4 (continued)	µg/l	…	**2.78**	**8.78**	**0.314**	**0.0098**	…	*0.043*	…	…	…	**3.0**	**1.18**	**0.381**
NASS-5 (continued)	µg/l	…	**0.919**	**9.6**	**0.253**	**0.008**	…	*0.017*	…	…	…	*2.6*	*1.2*	**0.102**
SLEW-3 (continued)	µg/l	…	**1.61**	*5.1*	**1.23**	**0.0090**	…	…	…	…	…	*1.8*	*2.57*	**0.201**
SLRS-5 (continued)	µg/l	…	4.33	0.5	0.476	0.081	**0.3**	…	…	53.6	…	0.1	0.317	0.845

NRCC No.	Mass Content	C	Ca	Cl	K	Mg	Na	P	S	Si	Ti
DOLT-4 (continued)	%	…	*0.068*	…	*0.98*	*0.15*	*0.68*	…	…	…	…
FEBS-1 (continued)	%	…	**38.3**	…	…	**0.00236**	**0.2594**	…	…	…	…
LUTS-1 (continued)	%	…	**0.0203**	…	**0.0948**	**0.00895**	…	…	…	…	…
HISS-1 (continued)	%	…	**1.14**	*0.35*	**0.332**	**0.075**	**0.375**	…	…	*44*	**0.076**
MESS-3 (continued)	%	*2*	**1.97**	…	*0.26*	*1.6*	*1.6*	*0.12*	*0.19*	*27*	*0.44*
PACS-2 (continued)	%	*3.3*	**1.96**	*3*	**1.24**	**1.47**	**3.45**	**0.096**	**1.29**	*28*	**0.443**
SLRS-5 (continued)	mg/l	…	**10.5**	…	**0.839**	**2.54**	**5.38**	…	…	…	…

STANDARDS AUSTRALIA (SAA), Australia

CHEMICAL COMPOSITION (nominal mass content in %)

Electrode Carbon Reference Material (Units of 1.5 kg)

ASRM No.	Description	Moisture	Ash	Volatiles	Relative Density	Size Fraction + 212µm
003-2	Electrode Carbon	*<1.0*	*<5.0*	*<1.5*	*2.2-2.3*	*<5.0*

Zircon Sand Reference Material (Finely divided material – units of 100g)

ASRM No.	Description	$ZrO_2 + HfO_2$	SiO_2	Al_2O_3	TiO_2	Fe_2O_3	P_2O_5
008	Zircon Sand Concentrate	*66.62*	*32.66*	*0.103*	*0.097*	*0.063*	*0.090*

Coal Ash Reference Material (Finely divided material – units of 100g)

ASRM No.	Description	Al_2O_3	BaO	CaO	Fe_2O_3	K_2O	MgO	Mn_3O_4	P_2O_5	SiO_2	Na_2O	SrO	SO_3	TiO_2
010-2	Coal Ash	*27.1*	*0.14*	*3.47*	*10.80*	*0.92*	*1.40*	*0.16*	*1.13*	*52.2*	*0.47*	*0.11*	*0.21*	*1.34*

Also: Data given for Ash Fusion temperatures

Coal Reference Materials (Finely divided material – unit weights as shown in table)

ASRM No.	Description	Unit Weight	Ash	Volatile Matter	Total C	H	N	P	C as CO_3	Cl	Total S	Hardgrove Grindability Index	Gross Calorific Value	Relative Density
011-12	Coal	4 x 2kg	…	…	…	…	…	…	…	…	…	*34 to 96*	…	…
012A-2	Coal	125g	…	…	…	…	…	…	…	…	*0.33*	…	…	…
012B-4	Coal	250g	…	…	…	…	…	…	…	…	*0.72*	…	…	…
012C-3	Coal	125g	…	…	…	…	…	…	…	…	*1.22*	…	…	…
012D-2	Coal	125g	…	…	…	…	…	…	…	…	*5.21*	…	…	…
013-12	Coal	250g	*9.61*	*20.26*	…	*4.43*	*1.82*	*0.031*	*0.021*	*0.057*	*0.594*	…	*32.68 MJ/kg*	*1.37*
014	Coke	200g	*12.23*	*1.04*	*85.65*	*0.32*	*0.82*	*0.09*	…	…	*0.314*	…	*28.26 MJ/kg*	*1.87*
015-5	Coal	250g	…	…	…	…	…	…	…	…	…	…	…	*1.42*

Alumina Reference Materials (Finely divided material – unit weights as shown in table)

ASRM No.	Description	Unit weight	Attrition Index (AI units)	Minus 20 Micron %
025	Alumina	750g	*18.8*	…
026	Alumina	210g	…	*1.0*

SOUTH AFRICAN BUREAU OF STANDARDS (SABS), South Africa

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

Igneous Rock Certified Reference Materials (Finely divided material – units of 100g) nominal mass content in %

SABS No.	Description	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	MnO	TiO_2	P_2O_5	ZrO_2	BaO	SrO	Nb_2O_5	Cl	F	H_2O^+	CO_2
SARM 1	NIM-G Granite	**75.7**	**12.08**	*0.6*	**1.30**	*0.06*	**0.78**	**3.36**	**4.99**	…	…	…	…	…	…	…	…	**0.42**	**0.49**	*0.1*
SARM 2	NIM-S Syenite	**63.63**	**17.34**	**1.11**	**0.30**	**0.46**	**0.68**	**0.43**	**15.35**	…	…	**0.12**	…	**0.27**	…	…	…	…	**0.22**	**0.09**
SARM 3	NIM-L Lujavrite	**52.40**	**13.64**	**8.78**	**1.13**	**0.28**	**3.22**	**8.37**	**5.51**	**0.77**	**0.48**	…	**1.49**	…	**0.54**	**0.14**	**0.12**	**0.44**	**2.31**	**0.17**
SARM 4	NIM-N Norite	**52.64**	**16.50**	0.8	**7.47**	**7.50**	**11.50**	**2.46**	**0.25**	**0.18**	**0.20**	**NiO**	…	**Cr_2O_3**	…	…	…	…	**0.33**	*0.1*
SARM 5	NIM-P Pyroxenite	**51.10**	**4.18**	**0.87**	**10.59**	**25.33**	**2.66**	**0.37**	**0.09**	**0.22**	**0.20**	…	…	**3.50**	…	…	…	…	**0.26**	*0.08*
SARM 6	NIM-D Dunite	**38.96**	*0.3*	**0.71**	**14.63**	**43.51**	**0.28**	*0.04*	*0.01*	**0.22**	…	**0.26**	…	**0.42**	…	…	…	…	**0.30**	**0.40**

Values are also given for the following minor and trace elements:- Ba, Ce, Co, Cr, Cu, Dy, Eu, F, Ga, Gd, La, Li, Lu, Mn, Nb, Ni, P, Pb, Rb, S, Sm, Sr, Tb, Th, Ti, Tm, U, V, Y, Yb, Zn, and Zr.

PGM and Gold Ore Certified Reference Materials (Finely divided material – unit weights as shown in table) nominal mass content in µg/g

SABS No	Description	Units	Pt	Pd	Au	Ag	Rh	Ru	Ir	Ni
SARM 56	Gold Calcine	500g	…	…	**2.69**	*1.7*	…	…	…	…
SARM 64	Platinum Ore Tails	500g	**0.475**	**0.210**	**0.018**	…	**0.080**	**0.240**	**0.052**	…
SARM 75	Sheba Sulphide Zone	3kg	**0.32**	**0.61**	**0.053**	…	…	…	…	**2300**
SARM 76	Gold Ore	3kg	**3.59**	**1.53**	*0.23*	…	**0.256**	**0.49**	*0.14*	**1890**
SARM 81	Gold Ore	500g	**2.50**	**1.48**	*0.034*	…	**0.490**	*0.76*	*0.18*	…

Chromium Ore Certified Reference Materials (Finely divided material – units of 100g) nominal mass content in %

SABS No.	Description	Al_2O_3	CaO	Cr_2O_3	Fe (Total)	MgO	MnO	SiO_2	TiO_2	V_2O_5	P	S	FeO
SARM 8	Chromium Ore	**10.57**	**0.26**	**48.97**	**14.13**	**14.69**	**0.25**	**4.30**	**0.24**	**0.14**	**0.0039**	**0.0341**	*13.9*
SARM 9	Chromium Ore	**15.17**	*0.16*	**46.45**	**19.41**	**10.85**	**0.21**	**0.61**	**0.56**	**0.32**	**0.0024**	**0.0028**	*17.5*

Ferro-Alloy Certified Reference Materials (Finely divided material – units of 100g) nominal mass content in %

SABS No.	Description	C	Cr	Fe	Mn	Ni	Si	Tl	V	Co	P	S
SARM 33	Ferro-silicon	**1.01**	**0.43**	**80.2**	**0.75**	**0.28**	**15.60**	…	…	…	**0.043**	…
SARM 74	Ferro-chromium	**6.44**	**49.7**	**37.5**	*0.193*	**0.21**	**4.34**	*0.47*	**0.36**	*0.06*	*0.018*	*0.04*

Iron Ore Certified Reference Materials (Finely divided material – units of 100g) nominal mass content in %

SABS No.	Description	Fe	Al	K	Si	As	Ca	Cd	Co	Cr	Cu	Mg	Mn	Na	Ni	P	Pb	S	Ti	Zn	V
SARM 11	Hematite Ore	**66.16**	**0.73**	**0.12**	**1.45**	**0.0019**	**0.0323**	**0.0003**	…	**0.0041**	**0.0011**	**0.0124**	**0.0113**	**0.0113**	**0.003**	**0.0419**	**0.0018**	**0.0118**	**0.0382**	**0.0023**	**0.004**
SARM 12	Magnetite Ore	**66.63**	**0.41**	**0.0108**	**0.16**	*0.0002*	**0.78**	*0.0005*	**0.0223**	**0.0021**	**0.0502**	**1.69**	**0.17**	**0.0091**	**0.0281**	**0.0477**	**0.0025**	**0.0695**	**0.43**	**0.0142**	**0.0520**

Zirconium Concentrate Certified Reference Material (Finely divided material – units of 100g) nominal mass content in %

SABS No.	Description	ZrO_2	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	P_2O_5	HfO_2	CaO	MgO	Cr
SARM 13	Zirconium Concentrate	**64.01**	**32.45**	**0.61**	**0.187**	**0.295**	**0.23**	**1.29**	*0.14*	*0.044*	*0.0023*

SOUTH AFRICAN BUREAU OF STANDARDS (SABS), South Africa

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

Fluorspar Certified Reference Materials (Finely divided material – units of 100g)

SABS No.	Description	CaF_2	$CaCO_3$	$MgCO_3$	P_2O_5	Mn	SiO_2	Fe_2O_3
SARM 14	Acid Grade, Buffalo	**97.32**	*0.3*	*0.03*	*0.18*	…	*0.57*	*0.06*
SARM 15	Acid Grade, Zeerust	**97.84**	**0.95**	**0.55**	**0.017**	**0.0213**	*0.26*	*0.23*

Manganese Ore Certified Reference Materials (Finely divided material – units of 100g)

SABS No.	Description	Mn	Fe	SiO_2	CaO	MgO	Al_2O_3	P	Na_2O	K_2O	BaO	S	CO_2	Zn
SARM 16	Manganese Ore (Wessels)	**49.17**	**11.48**	**5.04**	**4.70**	**0.76**	*0.3*	**0.033**	*0.03*	**0.02**	**0.60**	**0.17**	*1.3*	**0.0364**
SARM 17	Manganese Ore (Mamatwan)	**38.81**	**4.27**	**4.69**	*14.4*	**3.03**	**0.24**	**0.018**	**0.09**	**0.09**	*0.08*	*0.01*	**15.40**	**0.0043**

Coal Certified Reference Materials (Finely divided material – units of 120g)

SABS No.	Description	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	Na_2O	K_2O	P_2O_5	S	LOI
SARM 18	Witbank Coal	**6.20**	**2.57**	**0.29**	**0.114**	**0.18**	**0.11**	…	**0.145**	…	**0.56**	**90.11**
SARM 19	OFS Coal	**15.00**	**8.01**	**1.75**	**0.341**	**1.39**	**0.20**	**0.29**	**0.24**	…	**1.49**	**71.28**
SARM 20	Sasolburg Coal	**17.66**	**11.27**	**1.17**	**0.63**	**1.87**	**0.43**	**0.27**	**0.14**	**0.14**	**0.51**	**64.66**

Values are also given for the following minor and trace elements:- As, Ba, Be, Ce, Co, Cr, Cs, Cu, Ga, Ge, Hf, Hg, La, Mn, Ni, P, Pb, Rb, Sc, Se, Sm, Sr, Ta, Th, U, V, Y, Zn and Zr.

Uranium-Bearing Certified Reference Materials (Finely divided material - units of 120g, except SARM 79, 86 and 98 which are units of 100g)

SABS No.		Description	U_3O_8
SARM 21	**UREM 1**	Uranium, acid leach residue	**0.00344**
SARM 23	**UREM 3**	Uranium, pyrite concentrate	**0.0439**
SARM 24	**UREM 4**	Uranium, slimes dam material	**0.01008**
SARM 26	**UREM 6**	Uranium, pyrite concentrate	**0.1887**
SARM 27	**UREM 7**	Uranium, acid leach residue	**0.00512**

SABS No.		Description	U_3O_8
SARM 28	**UREM 8**	Uranium, acid plant calcine	**0.0130**
SARM 31	**UREM 11**	Uranium, head sample (low grade)	**0.00696**
SARM 79		Uranium Ore	**0.0499**
SARM 86		Uranium Ore	**0.1206**
SARM 98		Uranium Ore, Witwatersrand	**0.0205**

Phosphate Rock Certified Reference Material (Finely divided material – units of 100g)

SABS No.	Description	P_2O_5	CaO	F	CO_2	MgO	SrO	Fe_2O_3
SARM 32	Phosphate rock	**39.96**	**54.44**	**2.49**	**1.61**	**0.50**	**0.52**	**0.14**

Andalusite Certified Reference Material (Finely divided material – units of 100g)

SABS No.	Description	Al_2O_3	SiO_2	Fe (as Fe_2O_3)	TiO_2	K_2O	Na_2O	MgO	CaO	LOI
SARM 34	Andalusite	**59.15**	**39.04**	**0.75**	**0.168**	**0.238**	**0.093**	**0.131**	*0.13*	**0.622**

Vanadium Pentoxide Certified Material (Finely divided material – units of 100g)

SABS No.	Description	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	Na_2O	P_2O_5	SiO_2	As	S	V (Total)
SARM 38	Vanadium Pentoxide	**0.14**	*0.019*	**0.119**	**0.060**	**0.0037**	**0.22**	*0.008*	**0.11**	*0.001*	*0.0045*	**55.84**

SOUTH AFRICAN BUREAU OF STANDARDS (SABS), South Africa

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

Rock, Mineral and Sediment Certified Reference Materials (finely divided material – units of 100g)

SABS No.	Description	Mass content	SiO_2	Al_2O_3	Fe as Fe_2O_3	Fe0	MgO	CaO	Na_2O	K_2O	MnO	TiO_2	P_2O_5	Cr_2O_3	S
SARM 39	Kimberlite	%	**33.44**	**4.29**	**9.29**	*4-0*	**26.24**	**9.69**	*0.5*	**1.04**	**0.17**	**1.58**	**1.46**	**0.19**	**0.15**
SARM 40	Carbonatite	%	**3.08**	**0.41**	**2.75**	*0.4*	**1.97**	**49.77**	*0.05*	*0.03*	**0.18**	**0.05**	**2.05**	…	*0.05*
SARM 41	Carbonaceous Shale	%	**56.67**	**13.50**	**4.23**	*0.3*	**8.10**	**1.50**	**0.93**	**1.39**	**0.06**	**0.55**	**0.05**	…	**0.15**
SARM 42	Soil	%	**74.09**	**10.03**	**4.68**	*4.0*	**1.92**	**0.89**	*0.15*	**0.45**	**0.10**	**0.36**	*0.04*	**0.63**	**0.02**
SARM 43	Magnesite	%	**5.99**	*0.06*	**0.26**	*0.1*	**44.11**	**0.75**	*0.05*	*0.04*	*0.01*	*0.01*	*0.02*	…	**0.04**
SARM 44	Sillimanite Schist	%	**38.84**	**58.80**	**2.60**	*1.0*	*0.1*	**0.14**	*0.05*	**0.18**	**0.03**	**1.83**	**0.10**	…	**0.03**
SARM 45	Kinzingite	%	**49.62**	**26.22**	**12.60**	*10.0*	**3.39**	**0.78**	**0.84**	**3.18**	**0.10**	**1.82**	**0.08**	…	**0.05**
SARM 46	Stream Sediment	%	**35.90**	**6.71**	**28.16**	*18.0*	**3.16**	**1.32**	**0.28**	**0.35**	**1.14**	**0.60**	**0.11**	…	**0.17**
SARM 47	Serpentinite	%	**36.30**	**1.09**	**4.14**	*0.4*	**42.09**	*0.10*	*0.05*	*0.02*	**0.06**	0.01	*0.02*	**0.29**	**0.02**
SARM 48	Flourspar Granite	%	**67.11**	**11.24**	**0.58**	*0.2*	**0.18**	**8.90**	**3.22**	**4.26**	**0.02**	**0.10**	*0.09*	…	…
SARM 49	Quartz	%	**99.60**	*0.05*	*0.05*	…	*0.05*	*0.01*	*0.05*	*0.01*	*0.01*	*0.01*	…	…	…
SARM 50	Dolerite	%	**51.56**	**15.28**	**11.00**	**8.49**	**7.57**	**10.80**	**2.30**	**0.61**	**0.17**	**0.86**	**0.15**	…	**0.03**
SARM 51	Stream Sediment	%	**33.81**	**11.87**	**18.36**	*30*	**0.92**	**0.86**	**0.07**	**0.33**	**0.21**	**0.82**	**0.21**	…	**0.24**
SARM 52	Stream Sediment	%	**57.81**	**9.38**	**19.71**	*4.0*	**0.60**	**0.37**	*0.1*	**0.25**	**0.27**	**1.30**	**0.09**	**0.19**	*0.02*

Rock, Mineral and Sediment Certified Reference Materials (continued)

SABS No.	Mass content	Ba	Ce	Co	Cr	Cu	Ga	Mo	Nb	Ni	Pb	Rb	Sr	Th	V	Y	Zn	Zr
SARM 39 (continued)	µg/g	**1700**	85	**77**	…	**58**	*10*	*5*	**110**	**994**	*25*	**52**	**1400**	*10*	**109**	**17**	**70**	**239**
SARM 40 (continued)	µg/g	*310*	*160*	*20*	*35*	*10*	*10*	*10*	*10*	*25*	*20*	*10*	**1600**	*12*	**27**	**33**	**25**	**87**
SARM 41 (continued)	µg/g	**820**	*60*	*15*	**123**	**53**	*20*	*5*	**8**	**122**	*30*	**59**	**54**	*12*	**139**	**17**	**76**	**146**
SARM 42 (continued)	µg/g	*250*	*30*	**35**	…	**17**	*12*	*5*	8	**125**	*10*	**22**	**37**	*5*	**94**	**11**	**44**	**192**
SARM 43 (continued)	µg/g	*25*	*20*	**4**	*195*	*15*	…	…	…	**252**	…	…	**8**	…	…	…	*10*	…
SARM 44 (continued)	µg/g	*50*	*220*	*8*	**384**	*10*	*55*	*15*	**96**	*15*	*30*	**13**	**5**	**50**	**395**	**84**	**271**	**405**
SARM 45 (continued)	µg/g	*900*	*100*	**41**	**256**	**11**	*35*	…	**27**	**80**	*20*	**142**	**92**	*21*	**266**	**63**	**74**	**322**
SARM 46 (continued)	µg/g	*180*	*110*	**56**	**559**	**566**	…	*10*	…	*125*	*1.3*	*20*	**25**	…	**225**	*20*	**5900**	**101**
SARM 47 (continued)	µg/g	*75*	*20*	**79**	…	*5*	*5*	…	…	**2221**	*60*	…	*3*	…	*16*	*5*	**45**	…
SARM 48 (continued)	µg/g	*290*	*850*	…	**23**	*10*	…	*5*	**202**	…	**135**	**291**	*5*	**113**	*8*	**436**	**53**	**300**
SARM 49 (continued)	µg/g	…	…	…	…	…	…	…	…	…	…	…	**5**	…	…	…	…	…
SARM 50 (continued)	µg/g	**220**	*30*	**40**	**357**	**84**	…	…	*10*	*85*	*25*	**14**	**195**	*6*	**216**	**23**	**81**	**86**
SARM 51 (continued)	µg/g	*335*	*120*	**60**	**509**	**268**	*20*	…	9	**178**	**5200**	**37**	**44**	*10*	**181**	**21**	**2200**	**121**
SARM 52 (continued)	µg/g	*410*	*210*	**81**	…	**219**	*15*	…	**11**	**182**	**1200**	**20**	**25**	*11*	**346**	**20**	**264**	**250**

Rock, Mineral and Sediment Certified Reference Materials (continued) (Finely divided material - units of 100g)

SABS No.	Description	Total Ti as TiO_2	Total Fe as Fe_2O_3	SiO_2	Al_2O_3	MgO	CaO	MnO	Cr_2O_3	K_2O	Nb_2O_5	P_2O_5	Ti_2O_3	ThO_2	U_3O_8	V_2O_5	ZrO_2	HfO_2	GOI
SARM 57	Titanium Slag (RBM)	**85.4**	**11.8**	**1.72**	**1.23**	**0.98**	**0.16**	**1.76**	**0.16**	…	…	…	*27.1*	…	…	**0.39**	…	…	*3.92*
SARM 61	Rutile (RBM)	**93.3**	**0.68**	**2.03**	**0.93**	*0.06*	*0.09*	*0.01*	**0.11**	*0.06*	*0.03*	*0.03*	…	*0.0055*	*0.0045*	**0.42**	*1.34*	…	…
SARM 62	Zircon (RBM)	**0.13**	**0.07**	**32.8**	**0.88**	*0.04*	*0.11*	…	…	…	…	**0.12**	…	**0.0158**	**0.0354**	…	**64.2**	**1.31**	…

SOUTH AFRICAN BUREAU OF STANDARDS (SABS), South Africa

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

Ceramic Certified Reference Material (Finely divided material – units of 100g)

SABS No.	Description	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	MnO	K_2O	Na_2O	P_2O_3	TiO_2	Ba	Cr	Zn	Ni	Cu	Co	Sc	LOI
SARM 69	Ceramic-1	**66.6**	**14.4**	**7.18**	**2.37**	**1.85**	**0.129**	**1.96**	*0.79*	*0.28*	**0.777**	**0.0518**	**0.223**	**0.0068**	**0.0053**	**0.0046**	**0.0028**	**0.0020**	*3.6*

Ferro-Chrome Slag Certified Reference Material (Finely divided material – units of 100g)

SABS No.	Description	Cr_2O_3	SiO_2	Al_2O_3	Fe_{Total}	CaO	MgO	S
SARM 77	Ferro-Chrome Slag	**12.5**	**26.8**	**27.5**	**5.31**	**3.64**	**22.99**	*0.32*

Coal Certified Reference Materials (Finely divided material – units of 150g)

SABS No.	Description	Ash	Volatile Matter	Total Sulphur	Phosphorus	Total Carbon	Hydrogen	Nitrogen
CRM 001	Coal, Bituminous	**14.50**	**24.50**	**0.50**	…	…	…	…
CRM 022	Coal, Sub-bituminous	**11.44**	**34.96**	**0.98**	**0.01**	**71.49**	**4.70**	**1.36**
CRM 024	Coal, Sub-bituminous	**10.94**	**33.05**	**0.96**	**0.01**	**71.01**	**4.35**	**1.90**
CRM 026	Coal, Steam	**37.83**	**22.07**	**0.65**	**0.07**	**46.63**	**2.59**	**1.11**
CRM 029	Coal, Steam	**32.97**	**23.96**	**0.86**	**0.05**	**50.86**	**2.86**	**1.17**
CRM 030	Coal, Steam	**8.14**	**29.26**	**0.62**	**0.11**	**77.44**	**4.43**	**1.91**
CRM 037	Coal	**15.26**	**24.84**	**0.48**	**0.10**	**71.17**	**3.67**	**1.72**
CRM 038	Coal	**29.88**	**22.17**	**1.13**	**0.08**	**54.54**	**2.72**	**1.39**
CRM 039	Coal	**24.51**	**23.34**	**0.75**	**0.08**	**59.97**	**2.93**	**1.56**
CRM 041	Coal	**27.62**	**22.84**	**0.94**	**0.07**	**57.61**	**3.08**	**1.48**
CRM 042	Coal	**26.66**	**22.40**	**0.78**	**0.10**	**57.78**	**2.98**	**1.46**
CRM 043	Coal	**22.31**	**23.82**	**0.74**	…	**61.69**	**3.03**	**1.56**
CRM 044	Coal	**24.01**	**22.79**	**0.73**	**0.09**	**60.54**	**3.06**	**1.54**
CRM 045	Coal	**15.45**	**24.50**	**0.49**	…	**71.24**	**3.73**	**1.71**
CRM 046	Coal	**11.86**	**26.87**	**0.66**	…	**74.21**	**3.77**	**1.76**
CRM 047	Coal	**13.58**	**25.45**	**0.60**	**0.06**	**71.85**	**3.81**	**1.66**
CRM 051	Coal	**39.70**	**20.89**	**0.72**	**0.11**	**44.44**	**2.45**	**1.10**
CRM 052	Coal	**7.94**	**5.17**	**0.85**	**0.02**	**85.79**	**2.47**	**1.77**
CRM 053	Coal	**29.42**	**27.86**	**1.20**	**0.04**	**55.76**	**3.61**	**1.28**

Coal Ash Certified Reference Materials (Finely divided material – units of 25-30g)

SABS No.	Description	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	TiO_2	K_2O	Na_2O	MnO_2	P_2O_3	SO_3	Ash (dry basis)
102	Coal Ash (Limpopo Province)	**69.92**	**17.41**	**5.11**	**1.28**	**0.60**	**1.60**	**1.10**	**0.16**	**1.06**	**0.12**	**0.89**	*10.0*
106	Coal Ash (Mpumalanga)	**57.71**	**24.50**	**3.87**	**5.55**	**1.46**	**1.51**	**0.68**	**0.19**	…	**0.67**	**2.89**	*13.2*
107	Coal Ash (Mpumalanga)	**45.51**	**37.47**	**0.58**	**3.91**	**1.80**	**2.09**	**1.78**	**1.69**	…	**1.28**	**1.32**	…
108	Coal Ash (Mpumalanga)	**40.03**	**34.46**	**2.42**	**9.13**	**1.98**	**1.95**	**0.78**	**0.20**	…	**2.69**	**4.46**	…

Hardgrove Grindability Index Certified Reference Material (Finely divided material – units of 4x4kg)

SABS No.	Description	Hardgrove Grindability Index
CRM 1001	Coal	**37** to **71**

SUS, Germany

CHEMICAL COMPOSITION (nominal mass content in %) – figures in small italic type only approximate.

Aluminium and Aluminium Alloy Setting-up Samples (50mm dia. x 50mm discs)

SLICKERS No.	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Ag	Bi	Cd	Co	Ga	P	Pb	Sn	V	Zr	Sb
SL RA10	*99.99*	*0.0010*	*0.0005*	*0.0002*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0002*	*<0.0003*	*<0.0001*	*<0.0001*	*<0.0003*	...	*<0.0001*	*<0.0001*	...	*<0.0003*	*<0.0003*	*<0.0002*	*<0.0001*	*<0.0003*
SL RA18	*75*	*15*	*0.2*	*7.5*	*0.3*	*0.2*	*0.0003*	*3*	*0.3*	*0.001*	*0.01*	*0.001*	*0.0005*	*<0.001*	*0.008*	*0.015*	*0.37*	*0.37*	*0.001*	*0.005*	*0.45*
SL RA19	*78*	*1.7*	*1.3*	*0.8*	*1.3*	*8*	*0.2*	*0.6*	*7*	*0.2*	*0.3*	*0.2*	*0.04*	*0.3*	*0.06*	*0.0009*	*0.01*	*0.02*	*0.1*	*0.2*	*0.007*

Copper and Copper Alloy Setting-up Samples (40mm dia. x 40mm discs)

SLICKERS No.	Cu	Zn	Pb	Sn	Mn	Fe	Ni	Si	Sb	Al	C	S
SL RC11	*99.99*	*0.0002*	*0.0002*	*0.0004*	*0.0001*	*0.0005*	*0.0005*	*0.0001*	*0.0001*	*0.0001*	...	*0.0010*
SL RC32	*60*	*35*	*(0.6)*	*(0.2)*	*(0.5)*	*(0.3)*	*(1.5)*	*0.5*	...	*1.5*	...	...
SL RC33	*80*	*(0.02)*	*(0.01)*	...	*(0.4)*	*4.5*	*4*	...	...	*10*	...	...
SL RC36	*80*	*(0.4)*	*12*	*7*	...	*(0.01)*	*(1.7)*	...	*(0.3)*	...	...	...
SL RC38	*65*	*(0.02)*	*(0.01)*	...	*0.75*	*0.5*	*30*	...	...	...	*(0.05)*	*(0.015)*
SL RC40	*82*	*(0.01)*	*(0.02)*	...	*5*	*1.5*	*2*	...	...	*9*	...	...

Iron and Steel Setting-up Samples (40mm dia. x 40mm discs, except SL CFE3, CFE4 and CFE5 which are 35-40 dia. x 30mm)

SLICKERS No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	Nb	Pb	Sn	Ti	V	W
SL RE12	*<0.005*	*0.003*	*<0.01*	*<0.005*	*<0.002*	*<0.01*	*<0.005*	*<0.01*	*<0.005*	*<0.001*	*<0.0001*	*0.002*	*<0.01*	*0.002*	*<0.002*	*0.001*	*0.0003*	*<0.001*	*<0.01*
SL RG13	*3*	*2*	*1*	*0.3*	*0.05*	*1*	*0.3*	*0.6*	*0.02*	...	...	...	*0.05*	...	...	*0.2*	*0.04*	*0.3*	...
SL RG14	*3*	*2*	*0.2*	*0.02*	*0.005*	*1*	...	...	*0.02*	...	...	...	*0.05*	...	...	*0.2*	...	*0.1*	...
SL RH12	*0.5*	*0.6*	*17*	*(0.01)*	*(0.01)*	*4*	...	...	...	...	...	...	...	...	...	...	...	...	...
SL RH18	*1.3*	*(0.04)*	*(0.3)*	*(0.01)*	*(0.01)*	*4*	*3.5*	...	...	...	...	...	*10*	...	...	...	...	*3*	*10*
SL RH31	*0.03*	*0.3*	*1.2*	*(0.01)*	*(0.01)*	*17*	*2*	*20*	...	...	...	...	*2*	*0.3*	*2*	...	...	...	...
SL RN13	*1*	*(0.05)*	*1.8*	*(0.005)*	*(0.005)*	*(0.05)*	*(0.01)*	*3*	*0.4*	*(0.002)*	*(0.0005)*	*(0.01)*	*(0.01)*	*(0.005)*	*(0.001)*	*0.05*	*(0.01)*	*(0.01)*	*(0.01)*
SL RN14	*(0.05)*	*1.8*	*(0.07)*	*0.08*	*0.08*	*3*	*0.5*	*(0.01)*	*(0.01)*	*0.05*	*0.006*	*0.4*	*0.4*	*0.5*	*0.03*	*(0.0005)*	*0.1*	*0.5*	*0.4*
SL RN19	*1*	*1*	*1.5*	*0.08*	*0.07*	*3*	*1*	*1*	*0.5*	*0.05*	*0.006*	*0.8*	*0.5*	*0.5*	*(0.03)*	*0.1*	*0.1*	*0.5*	*0.5*
SL CFE3	*0.04*	*0.4*	*1.7*	*0.3*	*0.002*	*16.7*	*2.0*	*11*	*0.007*	...	*0.005*	*0.21*	*0.09*	*0.77*	...	...	*0.005*	*0.07*	*0.03*
SL CFE4	*1.7*	*0.4*	*0.4*	*0.01*	*0.01*	*11*	*0.8*	*0.3*	*0.008*	*0.008*	*0.002*	*0.03*	*0.06*	*0.04*	*0.005*	*0.005*	*0.003*	*1*	*0.03*
SL CFE5	*4*	*0.3*	*0.3*	*0.1*	*0.03*	*0.1*	*0.1*	*0.1*	*0.1*	...	...	...	*0.1*	...	...	*0.04*	...	*0.1*	...

Zinc and Zinc Alloy Setting-up Samples (40mm dia. x 40mm discs)

SLICKERS No.	Zn	Pb	Sn	Cd	Cu	Fe	Al	Mg	Ti	Ni	Mn	Ag	In	Sb	Tl
SL RZN11	*99.99*	*0.0008*	*<0.0001*	*<0.0001*	*0.0003*	*0.0005*	*<0.0001*	*<0.0001*	*<0.0001*	*0.0001*	*<0.0001*	...	...	...	...
SL RZN13	*99*	*0.6*	*0.3*	*0.3*	*0.3*	*0.02*	*0.3*	*<0.001*	*<0.001*	*0.05*	*<0.001*	*0.05*	*0.3*	*0.2*	*0.03*
SL RZN14	*87.5*	*0.03*	*0.02*	*0.02*	*4*	*0.05*	*10*	*0.08*	*0.1*	*0.004*	*0.015*	*0.007*	*<0.01*	*<0.01*	...

The above figures are target levels and may vary between batches. Bracketed figures may vary more significantly

VASIPARI KUTATO ES FEJLESZTO VALLALAT (VASKUT), Hungary

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

Unalloyed and Low Alloy Steel Certified Reference Materials (35mm dia. x 19mm discs)

VASKUT No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	Nb	Sn	Ti	V	Sb
A11/1	0.043	1.46	0.21	0.011	0.014	0.02	1.08	0.04	0.02	...	...	0.008	0.047	0.16	0.002	0.17	0.46	*<0.001*
A12	0.031	1.19	0.31	0.014	0.082	1.25	0.47	2.43	0.18	0.007	...	0.012	0.18	*0.03*	...	0.05	0.042	0.013
A13	0.104	0.81	0.49	0.053	0.073	0.14	0.91	1.93	0.042	0.070	*0.002*	0.013	0.166	...	0.060	0.11	0.23	0.024
A14	0.12	0.73	0.75	0.041	0.052	0.59	0.25	1.32	0.01	0.13	0.004	0.070	0.20	0.044	0.10	0.12	0.67	0.047
A15	0.34	0.042	0.99	0.071	0.70	0.79	0.55	0.32	0.03	0.06	0.008	...	0.29	0.16	0.13	0.09	0.80	...
A16/1	0.36	0.55	1.13	0.063	0.023	1.45	0.062	0.92	0.10	0.007	...	...	0.25	...	0.007	0.085	0.44	*<0.001*
A17	0.78	0.37	1.73	0.039	0.024	0.24	0.074	0.59	0.016	0.03	0.012	0.036	0.53	0.043	0.05	0.022	0.15	*0.10*
A18	1.16	0.15	*1.99*	0.014	0.007	0.90	...	0.125	*0.02*	0.003	*0.011*	...	0.066	0.035	0.016	0.01	0.10	0.005

Unalloyed and Low Alloy Steel Certified Reference Materials (35mm dia. x 20mm discs)

VASKUT No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al	As	B	Co	Cu	Nb	Ti	V	W	Zr	Others
B1/1	0.98	1.79	0.08	0.019	0.020	1.83	...	4.08	...	...	...	...	0.50	...	...	...	...	0.074	...
B2/1	0.067	0.34	1.34	0.047	0.046	...	1.09	1.49	0.082	...	...	...	0.24	...	0.22	0.91	...	...	...
B3	0.20	0.53	0.14	*0.015*	0.025	5.95	...	...	...	...	...	...	0.25	...	...	1.15	1.20	...	...
B4	0.54	1.72	1.08	0.048	0.043	...	...	...	...	...	...	...	0.49	...	...	...	...	0.09	...
B10	0.011	0.006	0.019	0.008	0.010	*(0.01)*	*(<0.005)*	0.023	*(0.004)*	*(0.005)*	...	...	0.032	...	*(<0.002)*	*(<0.005)*	...	...	...
B14	1.16	1.21	0.65	0.028	0.005	3.17	1.25	0.16	...	...	0.0006	0.30	0.107	0.41	0.26	0.14	...	...	*0.002* **Ce**
B15	0.98	0.80	0.69	0.030	0.031	3.70	1.20	0.15	...	...	...	0.21	0.14	...	0.32	0.33	...	...	...
B16	0.16	1.95	2.05	0.068	0.051	0.26	0.11	3.74	0.037	...	...	...	0.09	0.11	0.075	0.53	...	...	...
B20	0.008	0.005	0.09	0.012	0.013	0.03	*<0.01*	0.038	*0.02*	*0.003*	...	*<0.01*	0.034	...	*<0.002*	*<0.005*	...	...	*0.003* **Sn** *0.002* **Pb**
K3	1.03	0.32	0.46	*0.02*	0.010	1.63	...	0.18	...	...	...	...	0.09	...	...	...	...	...	...
K4	0.52	0.46	0.84	*0.02*	0.025	1.24	...	0.1	...	...	...	...	0.28	...	...	0.20	...	...	...
K6	0.51	0.30	0.79	*0.02*	0.026	0.96	0.37	1.72	...	...	...	...	0.26	...	...	...	...	...	...
K9	0.096	0.59	1.53	*0.01*	0.018	0.64	0.56	0.97	*0.01*	...	...	...	0.73	*0.04*	0.11	0.27	...	...	...

Austenitic Stainless Steel Certified Reference Materials (30mm dia. x 20mm discs)

VASKUT No.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	Ti	Fe
K7	0.063	0.89	1.35	*0.025*	0.010	17.5	...	10.42	0.20	...	0.28	...
K10	0.155	0.88	1.77	0.022	0.020	17.5	2.98	11.2	0.16	0.98	...	...
S14	0.030	0.25	1.15	0.017	0.022	12.8	1.06	12.5	...	...	...	*72.1*
S15	0.043	0.26	0.38	*0.02*	0.013	16.7	2.46	3.90	1.54	0.64	...	*74.0*
S16	0.59	0.25	0.54	*0.02*	0.017	23.6	0.46	7.51	2.06	1.41	...	*63.5*
S19	0.26	2.32	0.32	0.012	0.021	7.00	0.11	12.7	0.19	0.81	0.048	*76.1*
S20	0.097	1.80	1.50	0.011	0.025	2.06	3.15	18.2	0.44	1.22	*0.01*	*71.5*
S21	0.37	1.26	0.19	0.017	0.021	3.99	4.12	22.3	0.11	...	0.50	*67.1*
S22	0.014	0.61	0.34	0.009	0.008	1.00	0.82	28.2	*0.02*	...	0.13	*68.8*
S23	0.007	0.12	0.82	0.007	0.008	0.13	0.021	33.4	0.04	...	...	*65.4*
S24	0.65	0.77	0.94	0.062	0.036	10.28	0.41	9.19	0.12	1.65	0.27	*75.6*
S25	0.067	1.49	1.90	0.045	0.015	15.6	1.77	13.8	0.07	0.07	0.46	*64.7*
S26	0.076	0.67	0.99	0.027	0.026	18.9	2.59	3.31	0.14	0.07	0.11	*73.1*
S27/1	0.61	*1.20*	2.01	0.030	0.025	25.22	0.14	6.20	0.09	*0.12*	*0.50*	*65.9*

OTHER OTHER MATERIALS

Endecotts sieve calibration samples

Sample No.	For Sieve Aperture Size	Approx Sample Quantity
ZSICSA-020	20 Micron	4 grms
ZSICSA-025	25 Micron	4 grms
ZSICSA-032	32 Micron	5 grms
ZSICSA-038	38 Micron	5 grms
ZSICSA-045	45 Micron	5 grms
ZSICSA-053	53 Micron	5 grms
ZSICSA-063	63 Micron	5 grms
ZSICSA-075	75 Micron	5 grms
ZSICSA-090	90 Micron	5 grms
ZSICSA-106	106 Micron	5 grms

Sample No.	For Sieve Aperture Size	Approx Sample Quantity
ZSICSA-125	125 Micron	5 grms
ZSICSA-150	150 Micron	7.5 grms
ZSICSA-180	180 Micron	7.5 grms
ZSICSA-212	212 Micron	7.5 grms
ZSICSA-250	250 Micron	12.5 grms
ZSICSA-300	300 Micron	12.5 grms
ZSICSA-355	355 Micron	12.5 grms
ZSICSA-425	425 Micron	12.5 grms
ZSICSA-500	500 Micron	12.5 grms
ZSICSA-600	600 Micron	12.5 grms

Sample No.	For Sieve Aperture Size	Approx Sample Quantity
ZSICSA-710	710 Micron	12.5 grms
ZSICSA-850	850 Micron	15 grms
ZSICSA-1.00	1.00 mm	35 grms
ZSICSA-1.18	1.18 mm	50 grms
ZSICSA-1.40	1.40 mm	75 grms
ZSICSA-1.70	1.70 mm	75 grms
ZSICSA-2.00	2.00 mm	100 grms
ZSICSA-2.36	2.36 mm	100 grms
ZSICSA-2.80	2.80 mm	125 grms
ZSICSA-3.35	3.35 mm	125 grms

PURCHASE PROCEDURE

ORDERING PROCEDURE Please give the quantity, unit size or weight, reference number, description and producer of the samples required, and ensure we have your full delivery and invoice address. In the case of EU customers, please also provide your VAT number.

PRICES For prices see separate price list. Prices are stated in £ Sterling and are subject to revision without notice. They exclude packing, despatch and VAT where applicable.

TERMS The following terms apply:-

(i) **United Kingdom.** Net monthly account (subject to approved bank and trade references). Insurance and freight are charged extra, and VAT at the standard rate is charged on the net invoice value.

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PAYMENT By cheque, money order, etc, payable to "Bureau of Analysed Samples Ltd." at the address below.
By most major credit/debit cards, eg Visa and MasterCard (but not American Express).
By confirmed irrevocable Letter of Credit (see above).
By BACS or inter-bank transfer to Barclays Bank Ltd, Albert Road, Middlesbrough, Sort Code 20-56-74, SWIFT BARC GB22.
In Sterling to account No 90217506, IBAN GB 07 BARC20567490217506.
In Euros to account No 85465422, IBAN GB 10 BARC20567485465422.
We accept Barclays charges but not your own bank's charges.

Please send all orders, enquiries and correspondence to:

BUREAU OF ANALYSED SAMPLES LTD.,
NEWHAM HALL, NEWBY, MIDDLESBROUGH,
ENGLAND TS8 9EA

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