# METALS

## and Related Products

## Reference Materials Catalogue 2008



LGC Standards

*Excellence through measurement*

# LGC Standards office contact details:

### Bulgaria
LGC Standards Sp. z o.o.
Офис 102
Бул. "Г.М. Димитров" 52А
1125 София, България

Tel: +359(0) 2 971 4955
Fax: +359(0) 894 780 154
Email: bg@lgcstandards.com

### Czech Republic
LGC Standards Sp. z o.o.
Organizační složka
Hněvkovského 65
Brno
617 00
Česká republika

Tel: +420 543 529 205
Fax: +420 543 529 205
Email: cz@lgcstandards.com

### Finland
LGC Standards AB
Albanoliden 5, 4 trappor
Box 1737
SE-501 17 Borås
Sweden

Tel: +46 (0)33 20 90 60
Fax: +46 (0)33 20 90 79
Email: se@lgcstandards.com

### France
LGC Standards SARL
6, Rue Alfred Kastler
B.P. 83076
67123 Molsheim
France

Tel: +33 (0)3 88 04 82 82
Fax: +33 (0)3 88 04 82 90
Email: fr@lgcstandards.com

### Germany
LGC Standards GmbH
Mercatorstr. 51
46485 Wesel
Germany

Tel: +49 (0)281 9887 0
Fax: +49 (0)281 9887 199
Email: de@lgcstandards.com

### Hungary
LGC Standards GmbH
Magyarországi Közvetlen
Kereskedelmi Képviselet
H-2000 Szentendre
Körte u. 4.
Hungary

Tel/Fax: +36 (06) 26 314 891
Email: hu@lgcstandards.com

### Ireland
4 Manor Lodge
Magherafelt
County Derry
BT45 6QL
Ireland

Tel: +44 (0)28 7930 0078
Mobile: 07921 872595
Email: patrick.henry@lgcstandards.com

### India
LGC Promochem
PO Box 8061
No. 142, 3rd Floor, 5th Cross
Rajmahal Vilas Extension
Bangalore 560 080
India

Tel: +91-080-2361 4774
Fax: +91-080-2361 3859
Email: in@lgcpromochem.com

### Italy
LGC Standards S.r.l.
Via Venezia, 23
20099 Sesto San Giovanni
Italy

Tel: +39 02 2412 6830
Fax: +39 02 2412 6831
Email: it@lgcstandards.com

### Poland
LGC Standards Sp. z o.o.
ul. M. Konopnickiej 1
Dziekanów Lesny
05-092 Lomianki
Poland

Tel: +48 (0)22 751 31 40
Fax: +48 (0)22 751 58 45
Email: pl@lgcstandards.com

### Romania
LGC Standards GmbH
Str. Muncitorilor nr.1/2
400424 Cluj-Napoca
Romania

Tel/Fax: +40 364 116890
Mobil: +40 749 255121
Email: ro@lgcstandards.com

### Spain
LGC Standards S.L.U
C/Salvador Espriu 59, 2º planta
08005 Barcelona
España

Tel: +34 93 308 4181
Fax: +34 93 307 3612
Email: es@lgcstandards.com

### Sweden
LGC Standards AB
Albanoliden 5, 4 trappor
Box 1737
SE-501 17 Borås
Sweden

Tel: +46 (0)33 20 90 60
Fax: +46 (0)33 20 90 79
Email: se@lgcstandards.com

### United Kingdom
LGC Standards
Queens Road
Teddington
Middlesex
TW11 0LY
United Kingdom

Tel: +44 (0)20 8943 8489
Fax: +44 (0)20 8943 8405
Email: uksales@lgcstandards.com

### USA
LGC Standards
5853 Post Road, Suite 201B
East Greenwich, RI 02818, USA

Tel: +1 401 398 7892
Fax: +1 401 398 7893
Email: David.Krost@lgcstandards.com



# www.lgcstandards.com

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# Introduction

## About LGC Standards

LGC Standards is Europe's most comprehensive source of reference materials. We work closely with the leading manufacturers to offer laboratories worldwide improved access to reference materials, all designed to cover an increasingly large range of parameters.

Our network of offices in Europe, India and the United States, combined with our extensive experience in selling reference materials and our technical expertise, allow LGC Standards to work in partnership with our customers to provide fast delivery together with sound technical advice as well as dealing with complex import and export regulations.

LGC, whose Research and Technology Division acts as the designated UK National Measurement Institute (NMI) for Chemical and Biochemical measurement, has a long history in the development and validation of analytical methods and the production of reference materials.

Many of the analytical methods, which cover the food, environment, industrial, clinical and pharmaceutical sectors, are accredited to ISO/IEC 17025 (Requirements for the competency of testing and calibration laboratories). Full details of the accreditation schedule can be found on the UKAS website www.ukas.com.

LGC's Research and Technology Division is accredited to ISO Guide 34 (General Requirements for the competence of reference materials producers) for the production of reference materials. The measurement capabilities used to produce certified reference materials in its capacity as the UK NMI are verified through participation on key comparison studies organised by the Consultative Committee for the Amount of Substance (CCQM) of the International Weights and Measures Organisation (BIPM). The certificates are recognised by other National Measurement Institutes, under the Mutual Recognition Arrangement.

In its role as the NMI, LGC serves on the International Organisation for Standardisation (ISO) Committee for Reference Materials (REMCO), which aims to carry out and encourage a broad international effort for the harmonization, production and application of certified reference materials (CRMs)

LGC has a long history in the development and validation of analytical methods and the reference materials production facility at LGC, complements this expertise. LGC also offers a range of chemical and bio-analytical laboratory services across a variety of industries including: food and agriculture, environment, life sciences, chemicals and forensic science. LGC also plays a pivotal role in a number of programmes with both government and industry to improve analytical standards and laboratory performance.

## This catalogue

The LGC Standards' catalogue for Metals and related materials presents a listing of reference materials grouped according to their matrix type and further subdivided by their chemistry. Listings give information on each product such as composition, weight of sample and format. The Reference Materials listed in this catalogue represent some of the most comprehensive ranges suitable for chemical and spectrometric techniques such as XRF/XRD, OES, AA, ICP and Combustion analysis.

# Sourcing of reference materials

**While this catalogue includes some of the more widely used materials, it is not possible to provide a comprehensive list of all the reference materials which can be provided by LGC Standards. Through our network of offices and extensive experience in sourcing reference materials, the list of materials we can provide is impractical to include in one catalogue.**

**Please use this catalogue as a first point of reference, and to locate your local LGC Standards office. Contact your nearest office to place an order and to request any products not included in this catalogue.**

# Producers of reference materials

## Federal Institute for Materials Research and Testing (BAM)

The Federal Institute for Materials Research and Testing (BAM) has a long tradition in the production of Certified Reference Materials. Starting in 1912 with a "Normal Steel" for the determination of carbon, the development of new CRMs has increased continuously. One year later eight steel samples with different carbon contents were available. The development continued with the participation of regional German material research and testing institutes as well as industry (1957). In 1968 within the framework of EURONORM, the first European CRMs in the field of iron and steel were issued.

Today a large range of ferrous and non ferrous CRMs together with environmental CRMs and CRMs for engineering materials are offered.

## IRMM

BCR® and IRMM reference materials (BCR® is a registered trademark of JRC-IRMM) are the products of both research funding and direct action programmes of the European Commission, in which new or improved measurement or testing methods are developed. These programmes are aimed at improving, harmonising or standardising measurements and testing in the European Union.
As an authorised distributor of BCR® reference materials LGC Standards currently holds stock of more than 5000 units of certified BCR® and IRMM reference materials under carefully controlled and monitored conditions.

## European Reference Materials (ERM®)

The ERM® range of reference materials was launched in May 2004. It is the result of collaboration between three major reference material producers, LGC in the UK, the Institute for Reference Materials and Measurement (IRMM) in Belgium and Bundesanstalt für Materialforschung und Prüfung (BAM) in Germany. The partners are committed to using the most advanced principles for the production of certified reference materials. The certified values have clearly defined and stated traceability and are internationally recognized through participation of the partners in key comparisons organized by the Bureau International des Poids et Mesures (BIPM). All ERM® materials are subject to rigorous homogeneity and stability testing guaranteeing the certified values for every unit over its entire shelf life.

## The National Institute of Standards and Technology (NIST)

NIST produces standard reference materials (SRMs®). Based in the United States, NIST has provided reference materials to industry and commerce for nearly 100 years. NIST collaborates with companies to provide academia and industry with SRMs for expanding areas such as air and water pollution, which are international issues.

## Bureau of Analysed Samples (BAS)

Bureau of Analysed Samples has a long history in producing certified reference materials (CRMs) for chemical analysis (BCS-CRMs and EURONORM-CRMs) including a wide range of plain carbon and alloy steels, cast iron, ferro alloys, non-ferrous, alloys, ores and ceramic materials for the iron and steel industry.

## National Analysis Centre for Iron and Steel (NACIS)

National Analysis Centre for Iron and Steel is a research and development centre of analysis and test technology for iron and steel. Based in the Central Iron and Steel Research Institute in Beijing, China, NACIS has over fifty years experience in research of a wide variety of reference materials and production of metal alloy, ore, ferrous alloy certified reference materials (CRMs).

## EURONORM certified reference materials

**EURONORM certified reference materials for the chemical analysis of iron and steel products**

EURONORM certified reference materials are prepared under the auspices of the European Committee for Iron and Steel Standardization (ECISS) in a collaboration between the producing organizations in: France: Institute de Recherches de la Sidérurgie (IRSID), Centre de Dévelopement des Industries de Mise en Forme des Matériaux (CTIF), the Federal Republic of Germany: Iron and Steel CRM Working Group comprising Bundesanstalt für Materialforschung und -prüfung (BAM), Max-Planck-Institut für Eisenforschung, Verein Deutscher Eisenhüttenleute (VDEh), the United Kingdom: Bureau of Analysed Samples Limited, Sweden/Finland: Jernkontoret, Swedish Institute for Metals Research. Starting in 1968 EURONORM-CRMs have been analysed by laboratories in the European Community (EC) and further European countries. A number of former national CRMs are also listed which after examination by laboratories in the EC they have been accepted as EURONORM-CRMs.
Approximately 20 laboratories take part in the analysis. Each laboratory is requested to analyse the elements to be determined four times. A statistical evaluation of the laboratory mean values is carried out with respect to their normal distribution and the identification of any outlying values.
The finely divided EURONORM-CRMs are supplied in glass bottles containing 100 g. Some EURONORM-CRMs are also available in solid form (discs). Samples in the form of chips, pins and balls with certified oxygen and nitrogen content are also available.

**Types of material**
The following types of material are available as EURONORM-CRMs:

Unalloyed steels (0), alloyed steels (1), highly alloyed steels (2), special alloys (3), cast iron (4), ferro-alloys (5), ores (6), ceramics (7) and slags (8).

The system of numbering of the samples allows an easy reference to the type of material. The first digit of the sample number shows the type of material (0 - unalloyed steel, 1 - low alloyed steel, 2 - highly alloyed steel etc.). The second and third digit characterises the single sample. Another digit, separated by a hyphen gives the number of editions of the material.

**Content of the Euronorm certificate**
On the head of the certificate the EURONORM-number and the type of material is given. The mean values of the laboratories involved in the certification campaign are given in a table together with indicative values. The mean values of the accepted data sets, their standard deviations and the standard deviations of the laboratories are also given in the table. The sign "-" in the table stands for an outlier pointed out by statistical tests. The certified values are given in a second table together with their uncertainties (95%-level) or standard deviations. Additionally the following information is given: The owner of the material, a characterisation of the sample (e.g. grain size, dimensions of compact samples), the laboratories involved in the certification campaign, the analytical methods used for element determination, sources for additional information published by ECISS/EGKS.

# The use of reference materials

Reference materials are instrumental in ensuring the reliability of analytical measurements and so ensuring that decisions are based on reliable data. When choosing a matrix reference material for a particular application the analyst should consider the following factors before selecting a material:
When choosing a matrix reference material for a particular application the analyst should consider the following factors before selecting a material:

- Matrix match and potential interferences
- Analytes
- Measurement range
- Measurement uncertainties
- Certification procedures used by the producer
- Documentation supplied with the material (e.g. certificate or report).

# About proficiency testing (PT)

Proficiency testing (PT) is a powerful quality assurance tool for laboratories undertaking analytical measurements. A PT scheme provider distributes test materials on a regular basis to participating laboratories for independent testing.The results are returned to the organiser of the scheme who makes an analysis of the results and provides a report to all the participants.
There are a number of benefits of taking part in a PT scheme:

- Provides laboratories with a mechanism to compare their measurements with others
- Enables laboratories to demonstrate the quality of their results to third parties e.g. customers, regulators and accreditation bodies
- Facilitates the monitoring of trends, over time, in the quality of measurements
- Assists in the evaluation of methods and instrumentation
- Provides support and information to laboratory staff and their customers

The LGC Proficiency Testing Group (incorporating Quality Management Ltd and Aquacheck Ltd) is a major international provider of proficiency testing services. It has over twenty years experience in all aspects of proficiency testing services for laboratories undertaking chemical and microbiological analysis. Schemes of relevance to a wide range of sectors are available and most of them are run on an international basis. All LGC schemes are accredited by the United Kingdom Accreditation Service (UKAS).

Current schemes provided include:

**Environmental:**

· AQUACHECK - chemical analysis of clean waters, waste waters, sludges, sediments and soils
· QWAS - microbiological assessment of waters, effluents and sludges
· CONTEST - analysis of contaminated soils for a wide range of contaminants

**Food:**

· QMS - microbiological examination of food and food ingredients
· QDCS - composition and safety testing in the dairy sector
· QMAS - chemical analysis of meat
· QGS - analysis of gelatine samples
· QCS - microbiological testing of chocolate
· QFCS - chemical testing of food products

**Beverage:**

· BAPS - chemical, microbiological and sensory analysis of a range of beers.
· DAPS - analysis of a wide range of alcoholic beverages (except beer)
· QBS - microbiological and chemical testing of soft drinks
· SODAS - chemical analysis of carbonated and still soft drinks
· MAPS - analysis of malt and barley used by the malting, brewing and distilling industries
· SUPS - analysis of raw sugar used in soft drink production.

**Others:**

· QMIS - identification of micro organisms
· PHARMASSURE - measurement of a range of analytes in pharmaceutical products used in hospitals
· DIPS - dissolution proficiency scheme
· QUARTZ - toxicological analysis of drugs in post-mortem blood
· TOYTEST - toy safety testing to the European Standard EN71 and American Standard ASTM F963
· PACQS - particle analysis and characterisation quality scheme

In addition to these regular schemes LGC is able to offer customised or closed proficiency testing schemes tailored to a specific organisation's requirements.
LGC schemes are now available either through LGC Standards or through your local distributor.
Please contact your local LGC Standards office to find out more.

# Relevant literature

Applications of Reference Materials in Analytical Chemistry VAM
V. Barwick, S. Burke, R. Lawn, P. Roper and R. Walker RSC

Reference Materials in Analytical Chemistry – A Guide for Selection and Use
A. Zchunke published by Springer-Verlag.

Reference Materials for Chemical Analysis – Certification, Availability and Proper Usage
M. Stoeppler, W.R. Wolf, P.J. Jenks published by Wiley-VCH.

Proficiency Testing in Analytical Chemistry, R.Lawn, M.Thompson and R.Walker published by The Royal Society of Chemistry.

# Relevant training courses

A range of training courses is available from LGC to help laboratory managers and analysts demonstrate competence in, and keep abreast of, quality assurance issues and practices. LGC's analytical quality training programme includes:

- Achieving traceability in chemical testing
- Using proficiency testing in the analytical laboratory
- Method validation
- Principles and practice of measurement uncertainty in chemical testing laboratories
- Quality systems in testing laboratories
- Statistics for analytical chemists
- Further statistical tools for analytical chemists
- Evaluating measurement uncertainty for chemical testing laboratories

The majority of the courses are run in Teddington, South West London, UK. In addition, LGC can provide training for groups of staff at your own site, where the courses can be customised to meet your exact needs. For further information, please contact:

Lorraine Didinal
LGC Training Centre
Queens Road
Teddington, Middlesex
TW11 0LY, UK
Tel: +44 (0)20 8943 7631
Fax: +44 (0)20 8943 7314
Email: training@lgc.co.uk
Web: www.lgc.co.uk

# General Ordering Information

Prices and delivery procedures are shown in the price list that accompanies this catalogue, or are available from your local LGC Standards sales office. For products requiring special delivery procedures (cooled shipping, dangerous goods, etc) additional charges will be applied.

Please check with your local LGC Standards sales office for detailed procedures and transport charges where applicable.

Unless otherwise agreed in advance and in writing, orders are accepted only against LGC Standards' standard terms and conditions of sale.

Once delivered to the customer, reference substances are not returnable. For this reason it is very important for users to be certain that the product ordered meets their needs.

LGC Standards' technical staff are available to advise on the use and suitability of a particular product. Customers requiring assistance with the use or application of a particular reference substance should contact their local LGC Standards office, contact details are provided at the beginning of this catalogue.

For further information please contact your local office or visit **www.lgcstandards.com**

# Iron and steel products

## Unalloyed steels

| Code | Product | Unit |
|---|---|---|
| ECRM-D 030-4 | Steel type 60-2 - chips | 100 g |

Year of issue: 1973

Certified values

| | | |
|---|---|---|
| C ..... 0.456 ± 0.004 % | S ..... 0.021 ± 0.002 % | As ..... 0.012 ± 0.002 % |
| Si ..... 0.318 ± 0.007 % | Cr ..... 0.117 ± 0.004 % | Cu ..... 0.061 ± 0.002 % |
| Mn ..... 0.603 ± 0.004 % | Ni ..... 0.042 ± 0.002 % | N ..... 0.0051 ± 0.0003 % |
| P ..... 0.018 ± 0.002 % | $Al_{total}$ ..... 0.042 ± 0.006 % | Sn ..... 0.0055 ± 0.0007 % |

| | | |
|---|---|---|
| ECRM-D 031-3 | Unalloyed steel - chips | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 0.055 ± 0.002 % | P ..... 0.014 ± 0.001 % | As ..... 0.013 ± 0.002 % |
| Si ..... 0.037 ± 0.004 % | S ..... 0.021 ± 0.001 % | Cu ..... 0.020 ± 0.002 % |
| Mn ..... 0.329 ± 0.007 % | $Al_{total}$ ..... 0.054 ± 0.002 % | N ..... 0.0050 ± 0.0004 % |

| | | |
|---|---|---|
| ECRM-D 032-2 | Steel with 0.27% carbon - 0.56% manganese steel - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.271 ± 0.007 % | S ..... 0.0254 ± 0.0010 % | Cu ..... 0.085 ± 0.002 % |
| Si ..... 0.282 ± 0.007 % | Cr ..... (0.088) % | N ..... 0.0044 ± 0.0009 % |
| Mn ..... 0.556 ± 0.008 % | Ni ..... (0.040) % | Sn ..... (0.006) % |
| P ..... 0.0129 ± 0.0007 % | As ..... 0.020 ± 0.002 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 035-2 | 1.3% Carbon steel - powder | 100 g |

Year of issue: 1998

Certified values

| | | |
|---|---|---|
| C ..... 1.277 ± 0.005 % | Cr ..... 0.0104 ± 0.0003 % | As ..... 0.0017 ± 0.0001 % |
| Si ..... 0.216 ± 0.004 % | Mo ..... 0.0056 ± 0.0002 % | Cu ..... 0.0085 ± 0.0002 % |
| Mn ..... 0.305 ± 0.002 % | Ni ..... 0.0190 ± 0.0004 % | N ..... 0.0230 ± 0.0004 % |
| P ..... 0.0038 ± 0.0003 % | $Al_{total}$ ..... 0.0193 ± 0.0005 % | Ti ..... 0.0030 ± 0.0001 % |
| S ..... 0.0111 ± 0.0003 % | $Al_{acid\text{-}sol.}$ ..... 0.0177 ± 0.0004 % | |

| | | |
|---|---|---|
| ECRM-D 035-2-D | 1.3% Carbon steel - disc (38 mm x 20 mm) | disc |
| ECRM-D 036-1 | Tool steel C85 W2, no. 1.1630 - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.858 ± 0.008 % | Cr ..... (0.091) % | N ..... 0.0100 ± 0.0008 % |
| Si ..... 0.194 ± 0.005 % | Ni ..... (0.058) % | Sn ..... (0.006) % |
| Mn ..... 0.327 ± 0.010 % | $Al_{total}$ ..... (0.015) % | V ..... (0.019) % |
| P ..... 0.0074 ± 0.0009 % | As ..... 0.0233 ± 0.0007 % | |
| S ..... 0.0095 ± 0.0009 % | Cu ..... 0.065 ± 0.005 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 039-2 | Free cutting steel with 0.2% lead- chips | 100 g |

Year of issue: 1971

Certified values

| | | |
|---|---|---|
| C ..... 0.107 ± 0.003 % | S ..... 0.310 ± 0.005 % | Cu ..... 0.117 ± 0.006 % |
| Si ..... 0.011 ± 0.002 % | Cr ..... 0.048 ± 0.003 % | N ..... 0.0113 ± 0.0004 % |
| Mn ..... 1.274 ± 0.014 % | Ni ..... 0.051 ± 0.003 % | Pb ..... 0.207 ± 0.005 % |
| P ..... 0.083 ± 0.004 % | As ..... 0.018 ± 0.001 % | Sn ..... 0.016 ± 0.001 % |

| | | |
|---|---|---|
| ECRM-D 042-1 | 0.05% Niobium steel- chips | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 0.108 ± 0.003 % | S ..... 0.024 ± 0.024 % | Cu ..... 0.041 ± 0.002 % |
| Si ..... 0.037 ± 0.005 % | Cr ..... 0.016 ± 0.004 % | N ..... 0.0078 ± 0.0007 % |
| Mn ..... 0.666 ± 0.010 % | Ni ..... 0.029 ± 0.002 % | Nb ..... 0.054 ± 0.005 % |
| P ..... 0.0057**R** ± 0.0004 % | Al ..... 0.010 ± 0.001 % | |

**R:** revised value

| | | |
|---|---|---|
| ECRM-D 077-2 | Steel X 60 with 0.06% vanadium- chips | 100 g |

Certified values

| | | |
|---|---|---|
| C ..... 0.151 ± 0.004 % | Cr ..... (0.016) % | Cu ..... (0.029) % |
| Si ..... 0.293 ± 0.008 % | Mo ..... (0.003) % | N ..... 0.0054 ± 0.0005 % |
| Mn ..... 1.28 ± 0.02 % | Ni ..... (0.021) % | Sn ..... (0.003) % |
| P ..... 0.022 ± 0.001 % | Al ..... 0.034 ± 0.002 % | V ..... 0.058 ± 0.003 % |
| S ..... 0.014 ± 0.001 % | As ..... 0.007 ± 0.001 % | |

(Values in parenthesis are indicative values)

## Iron and steel products

| Code | Product | Unit |
|---|---|---|
| ECRM-D 079-2 | Free cutting steel - chips | 100 g |

Certified values

| | | |
|---|---|---|
| C ..... 0.596 ± 0.006 % | Cr ..... 0.0382 ± 0.0023 % | N ..... 0.0074 ± 0.0005 % |
| Si ..... 0.247 ± 0.006 % | Ni ..... 0.0219 ± 0.0010 % | Sn ..... 0.0037 ± 0.0008 % |
| Mn ..... 0.743 ± 0.013 % | Al ..... 0.0209 ± 0.0017 % | Ti ..... (0.0021) % |
| P ..... 0.0234 ± 0.0012 % | As ..... 0.0040 ± 0.0007 % | |
| S ..... 0.192 ± 0.006 % | Cu ..... 0.0462 ± 0.0010 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 082-1 | Free cutting steel - chips | 100 g |

Year of issue:1976

Certified values

| | | |
|---|---|---|
| C ..... 0.415 ± 0.003 % | Cr ..... 0.018 ± 0.001 % | N ..... (0.0047) % |
| Si ..... 0.235 ± 0.005 % | Ni ..... 0.027 ± 0.001 % | Pb ..... 0.149 ± 0.004 % |
| Mn ..... 0.769 ± 0.008 % | Al ..... 0.032 ± 0.002 % | Te ..... 0.030 ± 0.001 % |
| P ..... 0.013 ± 0.001 % | As ..... (0.029) % | |
| S ..... 0.030 ± 0.001 % | Cu ..... 0.025 ± 0.001 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 083-1 | Unalloyed steel - chips | 100 g |

Year of issue:1978

Certified values

| | | |
|---|---|---|
| C ..... 0.0262R ± 0.0003 %* | Cr ..... (0.0129) % | Cu ..... 0.016 ± 0.001 % |
| Mn ..... 0.289 ± 0.004 % | Ni ..... 0.014 ± 0.001 % | N ..... 0.0022 ± 0.0003 % |
| P ..... 0.0077 ± 0.0009 % | Al ..... (0.0044) % | |
| S ..... 0.0100 ± 0.0005 % | As ..... (0.0043) % | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 051-1 | 0.1% Sulfur carbon steel - chips | 100 g |

Year of issue: 1970

Certified values

| | | |
|---|---|---|
| C ..... 0.181 % | P ..... (0.025) % | Ni ..... (0.14) % |
| Si ..... (0.11) % | S ..... 0.126 % | Cu ..... (0.15) % |
| Mn ..... 1.18 % | Cr ..... (0.05) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 054-1 | 0.09% Phosphorus carbon steel - chips | 100 g |

Year of issue: 1975

Certified values

| | | |
|---|---|---|
| C ..... 0.22 % | P ..... 0.092 % | Ni ..... (0.14) % |
| Si ..... (0.05) % | S ..... (0.10) % | Cu ..... (0.21) % |
| Mn ..... (0.88) % | Cr ..... (0.17) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 055-1 | 0.5% Carbon steel - chips | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 0.51 % | P ..... 0.016 % | Ni ..... (0.12) % |
| Si ..... 0.24 % | S ..... 0.036 % | Cu ..... (0.15) % |
| Mn ..... 0.77 % | Cr ..... (0.16) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 056-1 | 0.8% Carbon steel - chips | 100 g |

Year of issue: 1967

Certified values

| | | |
|---|---|---|
| C ..... 0.79 % | P ..... 0.043 % | Ni ..... (0.13) % |
| Si ..... 0.30 % | S ..... 0.030 % | Cu ..... (0.12) % |
| Mn ..... 1.02 % | Cr ..... (0.11) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 057-2 | 0.05% Carbon steel (BS/DIN EN 10130) - chips | 100 g |

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| C ..... 0.0507 ± 0.0009* % | S ..... 0.0127 ± 0.0003* % | $Al_{acid\ sol}$ ..... (0.056) % |
| Si ..... (0.003) % | Cr ..... 0.0114 ± 0.0003* % | Cu ..... 0.0146 ± 0.0002* % |
| Mn ..... 0.246 ± 0.002* % | Ni ..... 0.0096 ± 0.0004* % | N ..... 0.0023 ± 0.0001* % |
| P ..... 0.0120 ± 0.0003* % | $Al_{total}$ ..... 0.059 ± 0.001* % | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 057-2-D | 0,05% Carbon steel (BS/DIN EN 10130) - disc (35-39 mm x 20-35 mm) | disc |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 058-2 | 0.15% Sulfur steel (BS 1429) - chips | 100 g |

Year of issue: 2002

Certified values

| | | |
|---|---|---|
| C ..... 0.424 ± 0.002 % | S ..... 0.1712 ± 0.0013* % | As ..... 0.0095 ± 0.0005* % |
| Si ..... 0.1080 ± 0.0012* % | Cr ..... 0.1211 ± 0.0010* % | Cu ..... 0.261 ± 0.002* % |
| Mn ..... 1.186 ± 0.005* % | Mo ..... 0.0589 ± 0.0007* % | N ..... 0.0107 ± 0.0002* % |
| P ..... 0.0098 ± 0.0003* % | Ni ..... 0.199 ± 0.002* % | |

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 058-2-D | 0,15% Sulfur steel (BS 1429) - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 059-2 | 0.7% Carbon steel (BS EN 10277) - chips | 100 g |

Year of issue: 2002

Certified values

| | | |
|---|---|---|
| C ..... 0.721 ± 0.003* % | S ..... 0.0084 ± 0.0003* % | $Al_{total}$ ..... 0.00044 ± 0.00008* % |
| Si ..... 0.188 ± 0.002* % | Cr ..... 0.0090 ± 0.0003* % | $Ala_{cid\ sol.}$ .. 0.00020 ± 0.00006* % |
| Mn ..... 0.495 ± 0.003* % | Mo ..... 0.0018 ± 0.0002* % | Cu ..... 0.0074 ± 0.0001* % |
| P ..... 0.0046 ± 0.0002* % | Ni ..... 0.0198 ± 0.0006* % | N ..... 0.0051 ± 0.0002* % |

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 059-2-D | 0.7% Carbon steel (BS EN 10277) - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 060-1 | 0.1% Carbon steel - chips | 100 g |

Year of issue: 1975

Certified values

| | | |
|---|---|---|
| C ..... 0.122 % | S ..... (0.031) % | Cu ..... (0.060) % |
| Si ..... (0.17) % | Cr ..... (0.028) % | N ..... 0.0040 % |
| Mn ..... 0.45 % | Ni ..... (0.039) % | |
| P ..... (0.024) % | $Al_{total}$ ..... (0.004) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 061-1 | 0.2% Carbon steel - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.210 % | P ..... (0.019) % | Cu ..... (0.10) % |
| Si ..... 0.12 % | S ..... (0.034) % | |
| Mn ..... (0.61) % | Ni ..... (0.21) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 063-1 | 1.2% Carbon steel - chips | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 1.26 % | P ..... 0.019 % | Ni ..... (0.10) % |
| Si ..... 0.24 % | S ..... 0.022 % | Cu ..... (0.09) % |
| Mn ..... 0.30 % | Cr ..... (0.16) % | N ..... (0.005) % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 064-1 | Nb/Ti Interstitial free steel (EN 10130 and EN 10142) - chips | 100 g |

Year of issue: 2002

Certified values

| | | |
|---|---|---|
| C ..... 0.0026 ± 0.0002 %* | Ni ..... 0.0115 ± 0.0003 %* | Nb ..... 0.0146 ± 0.0003 %* |
| Si ..... 0.0065 ± 0.0006 %* | $Al_{total}$ ..... 0.0330 ± 0.0006 %* | Pb ..... 0.00018 ± 0.00002 %* |
| Mn ..... 0.1641 ± 0.0011 %* | $Al_{acid\ sol.}$ ..... 0.0302 ± 0.0004 %* | Sn ..... 0.00051 ± 0.00005 %* |
| P ..... 0.0091 ± 0.0003 %* | As ..... 0.0036 ± 0.0002 %* | Ti ..... 0.0189 ± 0.0003 %* |
| S ..... 0.0104 ± 0.0003 %* | Co ..... 0.0027 ± 0.0001 %* | V ..... 0.00015 ± 0.00006 %* |
| Cr ..... 0.0184 ± 0.0004 %* | Cu ..... 0.0077 ± 0.0002 %* | W ..... (0.00022) % |
| Mo ..... 0.00077 ± 0.00007 %* | N ..... 0.0026 ± 0.0001 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 064-1-D | Nb/Ti Interstitial free steel (EN 10130 and EN 10142) - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 084-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1979

Certified values

| | | |
|---|---|---|
| C ..... 0.391 ± 0.005 % | P ..... 0.018 ± 0.001 % | Ni ..... 0.154 ± 0.004 % |
| Si ..... 0.265 ± 0.004 % | S ..... 0.029 ± 0.001 % | Cu ..... 0.267 ± 0.004 % |
| Mn ..... 0.860 ± 0.011 % | Mo ..... 0.033 ± 0.002 % | Sn ..... 0.023 ± 0.003 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 085-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1977

Certified values

| | | |
|---|---|---|
| C ..... 0.067 ± 0.002 % | S ..... 0.336 ± 0.008 % | V ..... 0.0021 ± 0.0007 % |
| Si ..... 0.008 ± 0.001 % | Co ..... 0.019 ± 0.001 % | Sb ..... 0.0073 ± 0.0005 % |
| Mn ..... 0.977 ± 0.015 % | Cu ..... 0.291 ± 0.008 % | Zn ..... 0.0025 ± 0.0006 % |
| P ..... 0.062 ± 0.002 % | Pb ..... 0.0010 ± 0.0001 % | |

| | | |
|---|---|---|
| ECRM-B 085-1-D | Unalloyed steel - disc (35-39 mm x 20-35 mm) | disc |

## Iron and steel products

| Code | Product | Unit |
|---|---|---|
| ECRM-B 086-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1978

Certified values

| | | |
|---|---|---|
| C ..... 0.297 ± 0.005 % | S ..... 0.037 ± 0.001 % | Cu ..... 0.320 ± 0.007 % |
| Si ..... 0.206 ± 0.006 % | Cr ..... 0.150 ± 0.006 % | Sn ..... 0.026 ± 0.002 % |
| Mn ..... 0.879 ± 0.010 % | Ni ..... 0.168 ± 0.003 % | |
| P ..... 0.024 ± 0.001 % | As ..... 0.023 ± 0.002 % | |

| | | |
|---|---|---|
| ECRM-B 086-1-D | Unalloyed steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 087-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1980

Certified values

| | | |
|---|---|---|
| C ..... 0.174 ± 0.004 % | Cr ..... 0.078 ± 0.003 % | Cu ..... 0.171 ± 0.004 % |
| Si ..... 0.263 ± 0.004 % | Mo ..... 0.021 ± 0.002 % | Sn ..... 0.017 ± 0.001 % |
| Mn ..... 0.671 ± 0.006 % | Ni ..... 0.118 ± 0.003 % | Sb ..... 0.0046 ± 0.0004 % |
| P ..... 0.010 ± 0.001 % | As ..... 0.024 ± 0.002 % | |
| S ..... 0.046 ± 0.002 % | Co ..... 0.015 ± 0.001 % | |

| | | |
|---|---|---|
| ECRM-B 090-1 | 1% Carbon steel - chips | 100 g |

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| C ..... 1.054 ± 0.005 %* | Ni ..... 0.053 ± 0.002 %* | Ga ..... 0.00228 ± 0.00020 %* |
| Si ..... 0.281 ± 0.003 %* | N ..... 0.0146 ± 0.0002 %* | Hg ..... (< 0.000010) % |
| Mn ..... 0.226 ± 0.002 %* | Nb ..... 0.00043 ± 0.00004 %* | Sb ..... 0.00090 ± 0.00008 %* |
| P ..... 0.0128 ± 0.0003 %* | Pb ..... 0.00239 ± 0.00006 %* | Se ..... (£ 0.0002) % |
| S ..... 0.0095 ± 0.0003 %* | V ..... 0.204 ± 0.006 %* | Te ..... < 0.0002 % |
| Cr ..... 0.121 ± 0.003 %* | Bi ..... < 0.00002 % | Tl ..... < 0.0001 % |
| Mo ..... 0.0089 ± 0.0004 %* | Cd ..... < 0.00002 % | Zn ..... 0.00209 ± 0.00009 %* |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 090-1-D | 1% Carbon steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 091-1 | 0.5% Carbon steel - chips | 100 g |

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| C ..... 0.518 ± 0.004 % | Mo ..... 0.098 ± 0.003 % | N ..... 0.0111 ± 0.0005 % |
| Cr ..... 0.312 ± 0.009 % | Ni ..... 0.310 ± 0.007 % | |

| | | |
|---|---|---|
| ECRM-B 096-1 | Low sulfur low calcium steel - chips | 100 g |

Year of issue: 1984

Certified values

| | | |
|---|---|---|
| C ..... 0.113 ± 0.002 % | Cr ..... 0.019 ± 0.001 % | Cu ..... 0.022 ± 0.001 % |
| Si ..... 0.263 ± 0.006 % | Mo ..... 0.003 ± 0.001 % | Nb ..... 0.029 ± 0.002 % |
| Mn ..... 1.35 ± 0.01 % | Ni ..... 0.020 ± 0.002 % | V ..... 0.0036 ± 0.0004 % |
| P ..... 0.019 ± 0.001 % | $Al_{total}$ ..... 0.044 ± 0.002 % | Ca ..... 0.0021 ± 0.0003 % |
| S ..... 0.0009 ± 0.0002 % | $Al_{acid\ sol.}$ ..... 0.040 ± 0.002 % | |

| | | |
|---|---|---|
| ECRM-B 096-2 | Low sulfur low calcium steel (BS EN 10025) - chips | 100 g |

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| C ..... 0.105 ± 0.0007 %* | S ..... 0.0016 ± 0.0001 %* | $Al_{total}$ ..... 0.0460 ± 0.0005 %* |
| Si ..... 0.262 ± 0.002 %* | Cr ..... 0.0243 ± 0.0004 %* | Cu ..... 0.0170 ± 0.0002 %* |
| Mn ..... 1.320 ± 0.005 %* | Mo ..... 0.0020 ± 0.0002 %* | Nb ..... 0.0252 ± 0.0005 %* |
| P ..... 0.0128 ± 0.0003 %* | Ni ..... 0.0253 ± 0.0004 %* | Ca ..... 0.0020 ± 0.0001 %* |

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 096-2-D | Low sulfur low calcium steel (BS EN 10025) - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-F 012-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1958

Certified values

| | | |
|---|---|---|
| C ..... 0.082 % | P ..... 0.083 % | S ..... 0.255 % |

| | | |
|---|---|---|
| ECRM-F 013-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1959

Certified values

| | |
|---|---|
| P ..... 0.053 | S ..... 0.032 |

| | | |
|---|---|---|
| ECRM-F 017-1 | Unalloyed steel - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.261 % | P ..... 0.0132**R** % | Ni ..... 0.0852 % |
| Si ..... 0.266 % | S ..... 0.0225 % | Cu ..... 0.0624 % |
| Mn ..... 0.7255 % | Cr ..... 0.0444 % | N ..... 0.0091 % |

**R:** revised value

| Code | Product | Unit |
|---|---|---|
| ECRM-F 021-1 | Unalloyed steel - chips<br>Year of issue: 1959<br>Certified values<br>C ..... 0.243 %<br>Si ..... 0.271 %<br>Mn ..... 1.27 %<br>P ..... 0.0121**R** %<br>Cr ..... 0.125 %<br>Ni ..... 0.255 %<br>Cu ..... 0.167 %<br>**R:** revised value | 100 g |
| ECRM-F 022-1 | Unalloyed steel - chips<br>Year of issue: 1964<br>Certified values<br>C ..... 0.115 %<br>Mn ..... 0.797 %<br>P ..... 0.057 %<br>S ..... 0.300 % | 100 g |
| ECRM-F 023-1 | Unalloyed steel with 0.3% lead - chips<br>Year of issue: 1964<br>Certified values<br>C ..... 0.331 %<br>Si ..... 0.264 %<br>Mn ..... 0.667 %<br>P ..... 0.021 %<br>S ..... 0.0156 %<br>Pb ..... 0.280 % | 100 g |
| ECRM-F 024-1 | Unalloyed steel with 0.3% lead - chips<br>Year of issue: 1964<br>Certified values<br>C ..... 0.104 %<br>Si ..... 0.139 %<br>Mn ..... 0.726 %<br>P ..... 0.0155**R** %<br>S ..... 0.235 %<br>Pb ..... 0.287 %<br>**R:** revised value | 100 g |
| ECRM-F 080-1 | Unalloyed steel - chips<br>Year of issue: 1973<br>Certified values<br>C ..... 0.452 ± 0.003 %<br>Si ..... 0.317 ± 0.006 %<br>Mn ..... 1.116 ± 0.012 %<br>P ..... 0.028 ± 0.001 %<br>S ..... 0.024 ± 0.001 %<br>Cr ..... 0.025 ± 0.002 %<br>N ..... 0.0073 ± 0.0005 % | 100 g |
| ECRM-F 081-1 | Unalloyed steel - chips<br>Year of issue: 1974<br>Certified values<br>C ..... 0.099 ± 0.002 %<br>Si ..... 0.105 ± 0.003 %<br>Mn ..... 0.605 ± 0.006 %<br>P ..... 0.0129R± 0.0006 %<br>S ..... 0.014 ± 0.001 %<br>Ni ..... 0.042 ± 0.002 %<br>$Al_{total}$ ..... 0.023 ± 0.001 %<br>Co ..... 0.017 ± 0.004 %<br>Cu ..... 0.026 ± 0.001 %<br>**R:** revised value | 100 g |

## Alloy steels

| Code | Product | Unit |
|---|---|---|
| ECRM-D 126-1 | Tool steel 90MnCrV8, No. 1.2842 - chips<br>Year of issue:1963<br>Certified values<br>C ..... 0.841 ± 0.008 %<br>Si ..... (0.241) %<br>Mn ..... 1.817 ± 0.009 %<br>P ..... 0.0092 ± 0.0011 %<br>S ..... 0.0050 ± 0.0007 %<br>Cr ..... 0.317 ± 0.009 %<br>Ni ..... (0.038) %<br>Cu ..... (0.098) %<br>V ..... 0.143 ± 0.004 %<br>Te ..... (0.0002) %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 128-1 | Structural steel with 0.9% Ti, No. 1.5310 - chips<br>Year of issue:1972<br>Certified values<br>C ..... 0.085 ± 0.003 %<br>Si ..... 0.949 ± 0.010 %<br>Mn ..... 0.839 ± 0.010 %<br>P ..... 0.007 ± 0.001 %<br>S ..... 0.007 ± 0.001 %<br>Cr ..... 0.108 ± 0.003 %<br>Ni ..... 0.046 ± 0.006 %<br>Al ..... 0.286 ± 0.010 %<br>Cu ..... 0.055 ± 0.003 %<br>N ..... (0.0024) %<br>Ti ..... 0.890 ± 0.013 %<br>V ..... (0.008) %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 130-1 | Rail steel - chips<br>Year of issue:1968<br>Certified values<br>C ..... 0.546 ± 0.005 %<br>Si ..... 0.313 ± 0.006 %<br>Mn ..... 1.593 ± 0.009 %<br>P ..... 0.0209 ± 0.0017 %<br>S ..... 0.0158 ± 0.0011 %<br>Cr ..... (0.032) %<br>Ni ..... (0.031) %<br>Al ..... 0.0037 ± 0.0005 %<br>$Al_{acid\ sol.}$ ..... 0.0019 ± 0.0006 %<br>As ..... 0.0167 ± 0.0011 %<br>Cu ..... 0.072 ± 0.003 %<br>N ..... 0.0093 ± 0.0008 %<br>Sn ..... (0.006) %<br>V ..... (0.003) %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-D 179-2 | Tool steel 60 WCrV 7, No. 1.2550 - chips | 100 g |

Year of issue:1990

Certified values

| | | |
|---|---|---|
| C ..... 0.598 ± 0.009 % | Cu ..... 0.111 ± 0.004 % | Ga ..... 0.00129 ± 0.00012 % |
| Si ..... 0.579 ± 0.011 % | N ..... 0.0068 ± 0.0005 % | Hg ..... (< 0.00001) % |
| Mn ..... 0.539 ± 0.010 % | Nb ..... 0.00144 ± 0.00013 % | Sb ..... 0.00175 ± 0.00010 % |
| P ..... 0.0267 ± 0.0024 % | Pb ..... 0.00013 ± 0.00002 % | Se ..... (< 0.00020) % |
| S ..... (0.0006) % | Ti ..... (0.0014) % | Te ..... < 0.00020 % |
| Cr ..... 1.08 ± 0.03 % | V ..... 0.188 ± 0.007 % | Tl ..... (< 0.000035) % |
| Mo ..... 0.070 ± 0.006 % | W ..... 1.87 ± 0.05 % | Zn ..... 0.00023 ± 0.00004 % |
| Ni ..... 0.078 ± 0.007 % | Bi ..... < 0.00003 % | |
| Co ..... (0.015) % | Cd ..... < 0.00003 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 179-2-D | Tool steel 60 WCrV 7, No. 1.2550 - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 180-1 | Low alloyed steel - chips | 100 g |

Year of issue:1973

Certified values

| | | |
|---|---|---|
| C ..... 0.197 ± 0.005 % | S ..... 0.0249 ± 0.0010 % | Cu ..... 0.115 ± 0.004 % |
| Si ..... 0.362 ± 0.007 % | Cr ..... 1.250 ± 0.018 % | N ..... 0.0068 ± 0.0009 % |
| Mn ..... 1.286 ± 0.015 % | Ni ..... 0.096 ± 0.008 % | |
| P ..... 0.0174 ± 0.0010 % | As ..... 0.030 ± 0.002 % | |

| | | |
|---|---|---|
| ECRM-D 181-1 | Low alloyed steel - chips | 100 g |

Year of issue:1973

Certified values

| | | |
|---|---|---|
| C ..... 0.590 ± 0.005 % | Cr ..... 0.126 ± 0.004 % | N ..... 0.0068 ± 0.0005 % |
| Si ..... 1.054 ± 0.015 % | Ni ..... 0.070 ± 0.004 % | Sn ..... (0.015) % |
| Mn ..... 1.047 ± 0.008 % | Al ..... 0.022 ± 0.004 % | Sb ..... (0.004) % |
| P ..... 0.018 ± 0.001 % | As ..... (0.026) % | |
| S ..... 0.035 ± 0.001 % | Cu ..... 0.174 ± 0.005 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 182-1 | Tool steel 80 CrV 2, No. 1.2235 - chips | 100 g |

Year of issue:1974

Certified values

| | | |
|---|---|---|
| C ..... 0.790 ± 0.008 % | Ni ..... 0.152 ± 0.005 % | Sn ..... (0.0135) % |
| Si ..... 0.368 ± 0.014 % | Al ..... 0.020 ± 0.003 % | V ..... 0.177 ± 0.010 % |
| Mn ..... 0.389 ± 0.007 % | As ..... (0.0202) % | Mg ..... (0.0005) % |
| P ..... 0.0076**R** ± 0.0005 % | Cu ..... 0.141 ± 0.004 % | Sb ..... 0.0042 ± 0.0005 % |
| S ..... 0.011 ± 0.001 % | N ..... 0.0102 ± 0.0004 % | Zn ..... 0.0015 ± 0.0002 % |
| Cr ..... 0.591 ± 0.012 % | Pb ..... 0.0039 ± 0.0003 % | |

(Values in parenthesis are indicative values)

**R:** revised value

| | | |
|---|---|---|
| ECRM-D 183-1 | High Copper steel, No. 1.8962 - chips | 100 g |

Year of issue:1973

Certified values

| | | |
|---|---|---|
| C ..... 0.083 ± 0.002 % | S ..... 0.031 ± 0.001 % | As ..... (0.013) % |
| Si ..... 0.421 ± 0.006 % | Cr ..... 0.670 ± 0.013 % | Cu ..... 0.445 ± 0.010 % |
| Mn ..... 0.354 ± 0.004 % | Ni ..... 0.073 ± 0.004 % | N ..... 0.0064 ± 0.0006 % |
| P ..... 0.089 ± 0.002 % | Al ..... 0.027 ± 0.002 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 184-1 | Low alloyed steel 35 NiCrMoV 14 6 - chips | 100 g |

Year of issue:1978

Certified values

| | | |
|---|---|---|
| C ..... 0.333 ± 0.003 % | Mo ..... 0.457 ± 0.009 % | N ..... 0.0051 ± 0.0004 % |
| Si ..... 0.218 ± 0.005 % | Ni ..... 3.318 ± 0.015 % | Sn ..... 0.0044 ± 0.0004 % |
| Mn ..... 0.528 ± 0.006 % | Al ..... 0.0052 ± 0.0007 % | V ..... 0.108 ± 0.006 % |
| P ..... 0.0047**R** ± 0.0003 % | As ..... 0.0180 ± 0.0011 % | Sb ..... (0.0015) % |
| S ..... 0.0032 ± 0.0003 % | Co ..... 0.0560 ± 0.0019 % | |
| Cr ..... 1.287 ± 0.011 % | Cu ..... 0.060 ± 0.002 % | |

(Values in parenthesis are indicative values

**R:** revised value

| | | |
|---|---|---|
| ECRM-D 187-1 | Low alloyed boron steel - chips | 100 g |

Year of issue:1982

Certified values

| | | |
|---|---|---|
| C ..... 0.195 ± 0.003 % | Cr ..... 1.186 ± 0.015 % | B ..... 0.0004 ± 0.0002 % |
| Si ..... 0.026 ± 0.002 % | Mo ..... 0.035 ± 0.002 % | Co ..... 0.014 ± 0.001 % |
| Mn ..... 1.354 ± 0.011 % | Ni ..... 0.096 ± 0.003 % | Cu ..... 0.161 ± 0.003 % |
| P ..... 0.014 ± 0.001 % | Al ..... 0.046 ± 0.002 % | N ..... 0.014 ± 0.001 % |
| S ..... 0.025 ± 0.001 % | As ..... 0.018 ± 0.002 % | Sn ..... 0.011 ± 0.001 % |

| Code | Product | Unit |
|---|---|---|
| ECRM-D 191-1 | 3% Si-Stahl - disc (35-39 mm x 20-35 mm) | disc |

Year of issue:1986

Certified values

| | | |
|---|---|---|
| C ..... 0.013 ± 0.002 % | Cr..... 0.025 ± 0.002 % | Cu ..... 0.0080 ± 0.0006 % |
| Si..... 3.140 ± 0.022 % | Mo ..... (0.0021) % | N ..... 0.0026 ± 0.0003 % |
| Mn..... 0.025 ± 0.002 % | Ni..... 0.018 ± 0.002 % | Ti..... 0.009 ± 0.002 % |
| P ..... 0.011 ± 0.001 % | Al ..... 0.397 ± 0.015 % | |
| S ..... 0.0017 ± 0.0003 % | As ..... 0.0031 ± 0.0006 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 191-2 | Dynamo steel, material number: 1.0812 - chips | 100 g |

Year of issue:2006

Certified values

| | | |
|---|---|---|
| C ..... 0.0043 ± 0.0002 %* | Cr..... 0.0314 ± 0.0006 %* | Cu ..... 0.0165 ± 0.0003 %* |
| Si..... 3.267 ± 0.012 %* | Mo ..... 0.0020 ± 0.0002 %* | N ..... 0.00105 ± 0.00009 %* |
| Mn..... 0.1334 ± 0.0019 %* | Ni..... 0.0224 ± 0.0004 %* | Sn ..... 0.0050 ± 0.0005 %* |
| P ..... 0.0087 ± 0.0004 %* | Al ..... 0.985 ± 0.006 %* | Ti..... 0.0024 ± 0.0002 %* |
| S ..... 0.0029 ± 0.0002 %* | As ..... 0.0018 ± 0.0003 %* | Sb ..... (0.0007) % |

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-D 192-1 | Reactor steel, No. 1.6310 - chips | 100 g |

Year of issue:1995

Certified values

| | | |
|---|---|---|
| C ..... 0.1875 ± 0.0009 %* | Mo ..... 0.482 ± 0.004 %* | Co ..... 0.0055 ± 0.0002 %* |
| Si..... 0.219 ± 0.004 %* | Ni..... 0.755 ± 0.004 %* | Cu ..... 0.0453 ± 0.0008 %* |
| Mn..... 1.377 ± 0.006 %* | Al ..... 0.0308 ± 0.0008 %* | N ..... 0.0118 ± 0.0002 %* |
| P ..... 0.0029 ± 0.0002 %* | $Al_{acid\ sol.}$ ..... 0.0285 ± 0.0008 %* | Sn ..... (0.0030) % |
| S ..... 0.0010 ± 0.0001 %* | As ..... (0.003) % | Ti..... (0.0009) % |
| Cr ..... 0.0717 ± 0.0018 %* | B ..... (0.00016) % | V ..... (0.003) % |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-D 192-1-D | Reactor steel, No. 1.6310 - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 193-1 | Reactor steel - chips | 100 g |

Year of issue:1990

Certified values

| | | |
|---|---|---|
| C ..... 0.139 ± 0.004 % | Mo ..... 0.347 ± 0.011 % | Cu ..... 0.598 ± 0.009 % |
| Si..... 0.404 ± 0.006 % | Ni..... 1.178 ± 0.019 % | N ..... 0.0108 ± 0.0004 % |
| Mn..... 0.972 ± 0.017 % | Al ..... 0.0257 ± 0.0015 % | Nb ..... 0.0232 ± 0.0019 % |
| P ..... 0.0063 ± 0.0006 % | As ..... 0.0062 ± 0.0007 % | Pb ..... (0.0002) % |
| S ..... 0.0086 ± 0.0006 % | B ..... (0.0002) % | Ti..... (0.0013) % |
| Cr ..... 0.182 ± 0.006 % | Co..... 0.0073 ± 0.0007 % | V ..... (0.0019) % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 193-1-D | Reactor steel - disc (40 mm x 35 mm) | disc |
| ECRM-D 194-1 | Low sulfur steel - chips | 100 g |

Year of issue:1993

Certified values

| | | |
|---|---|---|
| C ..... 0.1532 ± 0.0011 %* | Cr..... 0.733 ± 0.006 %* | B ..... 0.0020 ± 0.0002 %* |
| Si..... 0.431 ± 0.004 %* | Mo ..... 0.2857 ± 0.0026 %* | Cu ..... 0.0751 ± 0.0011 %* |
| Mn..... 1.188 ± 0.004 %* | Ni..... 0.3417 ± 0.0027 %* | N ..... 0.0115 ± 0.0002 %* |
| P ..... 0.0097 ± 0.0006 %* | Al ..... 0.0837 ± 0.0020 %* | V ..... 0.0243 ± 0.0009 %* |
| S ..... 0.00059**R** ± 0.00005 %* | As ..... 0.0042 ± 0.0004 %* | Ca ..... 0.0026 ± 0.0002 %* |

**R:** revised value
* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-D 194-1-D | Low sulfur steel - disc (35 mm x 35 mm) | disc |
| ECRM-B 151-1 | Low-carbon high silicon steel - chips | 100 g |

Year of issue: 1966

Certified values

| | | |
|---|---|---|
| C ..... 0.028 % | Mn ..... 0.085 % | S ..... (0.025) % |
| Si..... 3.49 % | P ..... 0.015 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 152-1 | Manganese-molybdenum steel - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.39 % | S ..... 0.043 % | Cu ..... 0.21 % |
| Si..... 0.18 % | Cr..... 0.09 % | V ..... (<0.01) % |
| Mn..... 1.61 % | Mo ..... 0.26 % | |
| P ..... 0.032 % | Ni..... 0.15 % | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| ECRM-B 153-1 | Nickel-chromium-molybdenum steel - chips | 100 g |

Year of issue: 1977

Certified values

| | | |
|---|---|---|
| C ..... 0.315 % | S ..... 0.027 % | Al ..... (0.003) % |
| Si ..... 0.079 % | Cr ..... 0.66 % | Cu ..... 0.088 % |
| Mn ..... 0.81 % | Mo ..... 0.58 % | Sn ..... 0.011 % |
| P ..... 0.011 % | Ni ..... 2.55 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 154-1 | 3% Nickel steel - chips | 100 g |

Year of issue: 1964

Certified values

| | | |
|---|---|---|
| C ..... (0.31) % | P ..... (0.020) % | Mo ..... (0.029) % |
| Si ..... (0.22) % | S ..... (0.009) % | Ni ..... 3.54 % |
| Mn ..... (0.62) % | Cr ..... (0.05) % | Cu ..... (0.14) % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 155-1 | Nickel-chromium-molybdenum steel - chips | 100 g |

Year of issue: 1963

Certified values

| | | |
|---|---|---|
| C ..... 0.40 % | S ..... 0.012 % | As ..... (0.04) % |
| Si ..... 0.23 % | Cr ..... 1.08 % | Cu ..... (0.17) % |
| Mn ..... 0.56 % | Mo ..... 0.34 % | V ..... (<0.01) % |
| P ..... 0.019 % | Ni ..... 1.43 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 186-1 | Alloy steel - chips | 100 g |

Year of issue: 1981

Certified values

| | | |
|---|---|---|
| C ..... 0.610 ± 0.004 % | S ..... 0.035 ± 0.002 % | Al ..... 0.014 ± 0.001 % |
| Si ..... 1.72 ± 0.02 % | Cr ..... 0.218 ± 0.010 % | Cu ..... 0.281 ± 0.009 % |
| Mn ..... 0.870 ± 0.008 % | Mo ..... 0.048 ± 0.003 % | |
| P ..... 0.022 ± 0.001 % | Ni ..... 0.190 ± 0.003 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 186-1-D | Alloy steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 195-1 | Chromium-molybdenum-nickel steel - chips | 100 g |

Year of issue: 1992

Certified values

| | | |
|---|---|---|
| C ..... 0.756 ± 0.003 % | Mo ..... 0.768 ± 0.004 %* | V ..... 0.312 ± 0.004 %* |
| Si ..... 0.466 ± 0.004 %* | Ni ..... 0.327 ± 0.004 %* | Ca ..... 0.0017 ± 0.0001 %* |
| Mn ..... 0.571 ± 0.003 %* | Cu ..... 0.0355 ± 0.0005 %* | Sb ..... (0.0008) % |
| P ..... 0.0160 ± 0.0006 %* | N ..... 0.0100 ± 0.0002 %* | Te ..... (< 0.0002) % |
| S ..... 0.0121 ± 0.0003 %* | Pb ..... 0.0010 ± 0.0001 %* | Zn ..... 0.0046 ± 0.0002 %* |
| Cr ..... 1.566 ± 0.009 %* | Sn ..... (0.002) % | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 195-1-D | Chromium-molybdenum-nickel steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-F 102-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1958

Certified values

| | | |
|---|---|---|
| C ..... 0.389 % | P ..... 0.012 % | Mo ..... 1.20 % |
| Si ..... 0.281 % | S ..... (0.006) % | Ni ..... 4.40 % |
| Mn ..... 0.367 % | Cr ..... 0.261 % | Cu ..... 0.169 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-F 106-2 | Low alloyed steel - chips | 100 g |

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| C ..... 0.153 % | Cr ..... 1.030 % | Cu ..... 0.078 % |
| Si ..... 0.238 % | Mo ..... 0.054 % | |
| Mn ..... 0.727 % | Ni ..... 1.430 % | |

| | | |
|---|---|---|
| ECRM-F 107-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1960

Certified values

| | | |
|---|---|---|
| C ..... 0.407 % | Cr ..... 1.443 % | Al ..... 0.345 % |
| Si ..... 0.286 % | Mo ..... 0.323 % | Cu ..... 0.108 % |
| Mn ..... 0.611 % | Ni ..... 0.191 % | |

| Code | Product | Unit |
|---|---|---|
| ECRM-F 108-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1965

Certified values

| | | |
|---|---|---|
| C ..... 0.384 % | P ..... 0.0176**R** % | Mo ..... 0.538 % |
| Si ..... 0.340 % | S ..... 0.017 % | Ni ..... 0.215 % |
| Mn ..... 0.690 % | Cr ..... 2.92 % | Cu ..... 0.118 % |

**R:** revised value

| | | |
|---|---|---|
| ECRM-F 112-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1963

Certified values

| | | |
|---|---|---|
| C ..... 0.348 % | Cr ..... 4.78 % | Cu ..... 0.115 % |
| Si ..... 1.00 % | Mo ..... 1.21 % | V ..... 0.604 % |
| Mn ..... 0.191 % | Ni ..... 0.234 % | W ..... 1.78 % |

| | | |
|---|---|---|
| ECRM-F 113-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1963

Certified values

| | | |
|---|---|---|
| C ..... 0.680 % | P ..... (0.013) % | Mo ..... 0.413 % |
| Si ..... 0.249 % | S ..... (0.006) % | Ni ..... 1.744 % |
| Mn ..... 0.586 % | Cr ..... 0.816 % | Cu ..... 0.146 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-F 114-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1964

Certified values

| | | |
|---|---|---|
| C ..... 0.044 % | Mn ..... 0.0655 % | S ..... 0.0037 % |
| Si ..... 4.00 % | P ..... 0.030 % | |

| | | |
|---|---|---|
| ECRM-F 185-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1981

Certified values

| | | |
|---|---|---|
| C ..... 1.172 ± 0.005 % | P ..... (0.02) % | Ni ..... (0.17) % |
| Si ..... (0.25) % | S ..... 0.0209 ± 0.0010 % | Cu ..... (0.17) % |
| Mn ..... (0.41) % | Cr ..... 0.990 ± 0.011 % | Sn ..... 0.0212 ± 0.0013 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-F 188-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1981

Certified values

| | | |
|---|---|---|
| C ..... 1.094 ± 0.008 % | Bi ..... < 0.00002 % | Se ..... (< 0.0002) % |
| S ..... 0.0113 ± 0.0006 % | Cd ..... < 0.00005 % | Te ..... < 0.0002 % |
| Cr ..... 1.538 ± 0.016 % | Ga ..... 0.00251±0.00017 %* | Tl ..... (< 0.000020) % |
| Nb ..... 0.00013±0.00003 %* | Hg ..... (< 0.00001) % | Zn ..... (< 0.00031) % |
| Pb ..... < 0.0001 % | Sb ..... 0.00048±0.00005 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-F 190-1 | Low alloyed steel - chips | 100 g |

Year of issue: 1986

Certified values

| | | |
|---|---|---|
| C ..... 0.395 ± 0.004 % | S ..... 0.0044 ± 0.0003 % | Co ..... 0.034 ± 0.001 % |
| Si ..... 0.278 ± 0.015 % | Cr ..... 2.18 ± 0.03 % | N ..... 0.0096 ± 0.0005 % |
| Mn ..... 1.28 ± 0.02 % | Mo ..... 0.410 ± 0.007 % | |
| P ..... 0.0112 ± 0.0002 % | Ni ..... 0.934 ± 0.017 % | |

| | | |
|---|---|---|
| ECRM-F 190-1-D | Low alloyed steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-S 196-1 | 2% Silicium steel - disc (38 mm x 25 mm) | disc |

Year of issue: 2000

Certified values

| | | |
|---|---|---|
| C ..... 0.0039 ± 0.0003 %* | P ..... 0.0076 ± 0.0005 %* | N ..... 0.0020 ± 0.0001 %* |
| Si ..... 1.908 ± 0.014 %* | S ..... 0.0005 ± 0.0001 %* | Ca ..... 0.0005 ± 0.0001 %* |
| Mn ..... 0.365 ± 0.003 %* | Al ..... 0.201 ± 0.002 %* | |

* 95%-confidence interval

## Iron and steel products

| Code | Product | Unit |
|---|---|---|
| ECRM-S 197-1 | Low-alloyed steel, No. 1.7321<br>Year of issue: 2007<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.219 ± 0.002 %* | Ni ..... 0.148 ± 0.003 %* | Pb..... (0.0003) % |
| Si..... 0.275 ± 0.005 %* | Al ..... 0.0313 ± 0.0014 %* | Sn..... 0.0097 ± 0.0005 %* |
| Mn ..... 0.792 ± 0.006 %* | $Al_{acid\ sol.}$ ..... (0.0270) % | Ti ..... 0.0005 ± 0.0001 %* |
| P..... 0.0073 ± 0.0003 %* | As ..... 0.0083 ± 0.0004 %* | V..... (0.0050) % |
| S..... 0.0232 ± 0.0007 %* | Co ..... 0.0135 ± 0.0003 %* | Bi..... (0.00001) % |
| Cr ..... 0.451 ± 0.003 %* | Cu ..... 0.152 ± 0.002 %* | Sb..... (0.0018) % |
| Mo ..... 0.402 ± 0.004 %* | N ..... 0.0114 ± 0.0003 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-S 197-1-D | Low-alloyed steel, No. 1.7321 - disc (38 mm x 25 mm) | disc |

## Highly alloyed steels

| | | |
|---|---|---|
| ECRM-D 226-1 | Stainless steel, 13.7% chromium no. 1.4034 - chips<br>Year of issue: 1967<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.416 ± 0.007 % | Cr..... 13.67 ± 0.06 % | N ..... 0.0362 ± 0.0017 % |
| Si..... 0.514 ± 0.007 % | Mo..... 0.024 ± 0.006 % | Sn..... (0.0068) % |
| Mn ..... 0.434 ± 0.013 % | Ni ..... 0.139 ± 0.014 % | V..... 0.022 ± 0.003 % |
| P..... 0.0207 ± 0.0012 % | As ..... (0.0256) % | |
| S..... 0.0094 ± 0.0014 % | Co ..... (0.0246) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 227-1 | High-speed steel, 4% chromium, 2,6% molybdenum, 2.4% vanadium und 3% tungsten, no. 1.3333 - chips<br>Year of issue: 1971<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.950 ± 0.013 % | Cr..... 4.25 ± 0.02 % | Sn..... 0.0251 ± 0.0024 % |
| Si..... 0.272 ± 0.013 % | Mo..... 2.64 ± 0.05 % | V..... 2.44 ± 0.03 % |
| Mn ..... 0.236 ± 0.007 % | Ni ..... 0.114 ± 0.008 % | W ..... 3.03 ± 0.06 % |
| P..... 0.016 ± 0.001 % | Cu ..... 0.124 ± 0.005 % | Ag..... (0.000064) % |
| S..... 0.022 ± 0.002 % | N ..... 0.040 ± 0.002 % | Sb..... 0.0035 ± 0.0005 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 231-2 | Stainless steel, 18% chromium and 10% nickel, no. 1.4306 - chips<br>Year of issue: 2002<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.0140 ± 0.0003 %* | Ni ..... 10.105 ± 0.021 %* | Pb..... (0.00007) % |
| Si..... 0.368 ± 0.006 %* | Al ..... 0.0032 ± 0.0004 %* | Sn..... 0.0043 ± 0.0003 %* |
| Mn ..... 1.263 ± 0.009 %* | As ..... 0.0048 ± 0.0003 %* | Ti..... 0.0007 ± 0.0002 %* |
| P..... 0.0179 ± 0.0007 %* | B ..... 0.0020 ± 0.0002 %* | V..... 0.0708 ± 0.0008 %* |
| S..... 0.0250 ± 0.0007 %* | Co ..... 0.0402 ± 0.0011 %* | W ..... 0.0141 ± 0.0010 %* |
| Cr ..... 18.071 ± 0.018 %* | Cu ..... 0.0941 ± 0.0009 %* | Sb..... 0.0011 ± 0.0001 %* |
| Mo ..... 0.301 ± 0.004 %* | N ..... 0.0444 ± 0.0004 %* | Ca ..... 0.00074 ± 0.00014 %* |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-D 235-1 | Austenitic manganese steel, 12.7% manganese, no. 1.3401 - chips<br>Year of issue: 1972<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.912 ± 0.014 % | S ..... 0.0072 ± 0.0007 % | Cu ..... 0.073 ± 0.002 % |
| Si..... 0.094 ± 0.010 % | Cr..... 0.354 ± 0.014 % | N ..... 0.020 ± 0.0008 % |
| Mn ..... 12.73 ± 0.07 % | Mo..... 0.032 ± 0.003 % | V..... (0.012) % |
| P..... 0.045 ± 0.002 % | Ni ..... (0.08) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 237-1 | Stainless steel, 17% chromium and 10% nickel, no. 1.4550 - chips<br>Year of issue: 1973<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.068 ± 0.002 % | Cr..... 17.24 ± 0.04 % | N ..... 0.035 ± 0.002 % |
| Si..... 0.482 ± 0.013 % | Mo..... 0.306 ± 0.006 % | Nb ..... 0.660 ± 0.023 % |
| Mn ..... 1.443 ± 0.018 % | Ni ..... 10.32 ± 0.04 % | V..... 0.057 ± 0.005 % |
| P..... 0.032 ± 0.002 % | Co ..... 0.221 ± 0.006 % | |
| S..... 0.012 ± 0.001 % | Cu ..... 0.123 ± 0.005 % | |

| Code | Product | Unit |
|---|---|---|
| ECRM-D 271-1 | High-alloyed steel (toolsteel 1.2344) - chips<br>Year of issue: 2006<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.3698 ± 0.0021 %* | As ..... 0.0057 ± 0.0004 %* | V ..... 0.850 ± 0.007 %* |
| Si ..... 0.923 ± 0.006 %* | B ..... (0.0003) % | W ..... 0.0054 ± 0.0005 %* |
| Mn ..... 0.437 ± 0.004 %* | Co ..... 0.0139 ± 0.0005 %* | Zr ..... (0.00013) % |
| P ..... 0.0120 ± 0.0004 %* | Cu ..... 0.1371 ± 0.0015 %* | Ca ..... 0.0009 ± 0.0002 %* |
| S ..... 0.00045 ± 0.00008 %* | N ..... 0.0137 ± 0.0003 %* | Mg ..... (0.00013) % |
| Cr ..... 5.002 ± 0.019 %* | Nb ..... (0.0009) % | O ..... 0.0020 ± 0.0002+1) % |
| Mo ..... 1.247 ± 0.006 %* | Pb ..... (0.0005) % | Sb ..... (0.0017) % |
| Ni ..... 0.1552 ± 0.0020 %* | Sn ..... 0.0084 ± 0.0002 %* | |
| Al ..... 0.0234 ± 0.0011 %* | Ti ..... 0.0020 ± 0.0002 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-D 271-1-D | High-alloyed steel (toolsteel 1.2344) - disc (37 mm x 25 mm) | disc |
| ECRM-D 278-1 | Stainless steel, 18% chromium, 1% molybdenum and 0,9% carbon, no. 1.4112 - chips<br>Year of issue: 1973<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.903 ± 0.019 % | S ..... 0.0052 ± 0.0011 % | Cu ..... 0.077 ± 0.008 % |
| Si ..... 0.336 ± 0.008 % | Cr ..... 18.11 ± 0.08 % | V ..... 0.077 ± 0.008 % |
| Mn ..... 0.405 ± 0.006 % | Mo ..... 1.040 ± 0.030 % | |
| P ..... 0.0154 ± 0.0014 % | Ni ..... 0.236 ± 0.024 % | |

| | | |
|---|---|---|
| ECRM-D 283-1 | Highly alloyed steel - chips<br>Year of issue: 1985<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 1.219 ± 0.009 % | Mo ..... 3.41 ± 0.09 % | Pb ..... (< 0.0005) % |
| Si ..... 0.345 ± 0.017 % | Al ..... 0.0099 ± 0.0014 % | Sn ..... (0.0065) % |
| Mn ..... 0.217 ± 0.010 % | As ..... (0.0096) % | V ..... 3.28 ± 0.03 % |
| P ..... 0.022 ± 0.002 % | B ..... 0.0003 ± 0.0001 % | W ..... 9.66 ± 0.12 % |
| S ..... 0.029 ± 0.002 % | Co ..... 10.27 ± 0.17 % | |
| Cr ..... 4.15 ± 0.06 % | N ..... 0.033 ± 0.002 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 284-2 | Stainless steel, 17% chromium, 11% nickel and 2% molybdenum, no. 1.4571 - chips<br>Year of issue: 2000<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.0201 ± 0.0005 %* | Al ..... 0.0027 ± 0.0004 %* | Ti ..... 0.191 ± 0.004 %* |
| Si ..... 0.537 ± 0.008 %* | As ..... 0.0063 ± 0.0003 %* | V ..... 0.0425 ± 0.0016 %* |
| Mn ..... 1.745 ± 0.009 %* | B ..... 0.0026 ± 0.0001 %* | W ..... (0.0183) % |
| P ..... 0.0258 ± 0.0008 %* | Co ..... 0.0525 ± 0.0011 %* | Zr ..... (0.0005) % |
| S ..... 0.0237 ± 0.0005 %* | Cu ..... 0.1831 ± 0.0014 %* | O ..... 0.0099 ± 0.0007[1] % |
| Cr ..... 16.811 ± 0.019 %* | N ..... 0.0151 ± 0.0002 %* | Ta ..... (0.0013) % |
| Mo ..... 2.111 ± 0.010 %* | Nb ..... (0.0028) % | |
| Ni ..... 10.72 ± 0.05 %* | Sn ..... 0.0047 ± 0.0002 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval
[1] Oxygen content only certified for the chips

| | | |
|---|---|---|
| ECRM-D 284-2-D | Stainless steel, 17% chromium, 11% nickel and 2% molybdenum, no. 1.4571 - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 286-1 | Stainless steel, 18% chromium, 8.5% nickel, 0.3% molybdenum and 0.3% sulfur, no. 1.4305 - chips<br>Year of issue: 1985<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.100 ± 0.005 | Mo ..... 0.329 ± 0.009 % | N ..... 0.043 ± 0.002 % |
| Mn ..... 1.92 ± 0.03 % | Ni ..... 8.54 ± 0.04 % | Pb ..... (0.0003) % |
| P ..... 0.026 ± 0.002 % | Al ..... (0.0023) % | Sn ..... 0.0084 ± 0.0009 % |
| S ..... 0.280 ± 0.014 % | B ..... (0.0003) % | O ..... (0.0315) % |
| Cr ..... 18.13 ± 0.08 % | Co ..... 0.150 ± 0.008 % | Sb ..... 0.0014± 0.0004 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 288-1 | Steel with 2% C and 12% Cr, no. 1.2436 - chips<br>Year of issue: 1986<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 2.08 ± 0.02 % | Mo ..... 0.103 ± 0.007 % | N ..... 0.0151 ± 0.0004 % |
| Si ..... 0.260 ± 0.012 % | Ni ..... 0.298 ± 0.007 % | Sn ..... (0.0043) % |
| Mn ..... 0.292 ± 0.008 % | Al ..... 0.012 ± 0.002 % | Ti ..... 0.020 ± 0.002 % |
| P ..... 0.024 ± 0.002 % | As ..... (0.0065) % | V ..... 0.055 ± 0.004 % |
| S ..... (0.0012) % | Co ..... 0.018 ± 0.002 % | W ..... (0.682) % |
| Cr ..... 12.00 ± 0.08 % | Cu ..... 0.060 ± 0.004 % | Sb ..... (0.0014) % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 288-1-D | Steel with 2% C and 12% Cr, no. 1.2436 - disc (35-39 mm x 20-35 mm) | disc |

| Code | Product | Unit |
|---|---|---|
| ECRM-D 289-1 | Heat-resisting steel - chips<br>Year of issue: 1990<br>Certified values<br>C ..... 0.0489 ± 0.0022 %<br>Si ..... 0.531 ± 0.013 %<br>Mn ..... 1.016 ± 0.016 %<br>P ..... 0.0114 ± 0.0010 %<br>S ..... 0.0027 ± 0.0004 %<br>Cr ..... 14.63 ± 0.11 %<br>Mo ..... 1.102 ± 0.015 %<br>Ni ..... 24.68 ± 0.19 %<br>Al ..... 0.199 ± 0.011 %<br>As ..... (0.0056) %<br>B ..... 0.0044 ± 0.0004 %<br>Co ..... 0.065 ± 0.006 %<br>Pb ..... (0.0008) %<br>Sn ..... 0.111 ± 0.010 %<br>Ti ..... 2.01 ± 0.05 %<br>V ..... 0.260 ± 0.015 %<br>Sb ..... (0.0013) %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 289-1-D | Heat-resisting steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 290-1 | High-speed steel, 4% chromium, 5% cobalt und 5% molybdenum, no. 1.3243 - powder<br>Year of issue: 1990<br>Certified values<br>C ..... 0.911 ± 0.010 %<br>Si ..... 0.072 ± 0.007 %<br>Mn ..... 0.244 ± 0.010 %<br>P ..... 0.0160 ± 0.0005 %<br>S ..... 0.0160 ± 0.0008 %<br>Cr ..... 4.18 ± 0.06 %<br>Mo ..... 4.83 ± 0.09 %<br>Ni ..... 0.329 ± 0.018 %<br>Co ..... 5.12 ± 0.12 %<br>Cu ..... 0.081 ± 0.004 %<br>N ..... 0.0325 ± 0.0012 %<br>V ..... 1.91 ± 0.04 %<br>W ..... 6.27 ± 0.14 % | 100 g |
| ECRM-D 290-1-D | High-speed steel, 4% chromium, 5% cobalt und 5% molybdenum, no. 1.3243 - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 291-1 | Highly alloyed steel, 17% chromium and 2% molybdenum, no. 1.4748 - powder<br>Year of issue: 1990<br>Certified values<br>C ..... 0.903 ± 0.008 %<br>Si ..... 0.907 ± 0.018 %<br>Mn ..... 0.808 ± 0.011 %<br>P ..... 0.0168 ± 0.0016 %<br>S ..... 0.0087 ± 0.0007 %<br>Cr ..... 17.10 ± 0.10 %<br>Mo ..... 2.10 ± 0.06 %<br>Ni ..... 0.563 ± 0.011 %<br>Al ..... 0.0030 ± 0.0006 %<br>Co ..... 0.0233 ± 0.0022 %<br>Cu ..... 0.0711 ± 0.0019 %<br>N ..... 0.1142 ± 0.0038 %<br>Nb ..... (0.0057) %<br>V ..... 0.388 ± 0.016 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 291-1-D | Highly alloyed steel, 17% chromium and 2% molybdenum, no. 1.4748 - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-D 294-1 | Manganese steel, material-no. 1.3816 - chips<br>Year of issue: 2005<br>Certified values<br>C ..... 0.0657 ± 0.0010 %*<br>Si ..... 0.283 ± 0.005 %*<br>Mn ..... 18.68 ± 0.04 %*<br>P ..... 0.0273 ± 0.0013 %*<br>S ..... 0.00031 ± 0.00009 %*<br>Cr ..... 17.98 ± 0.05 %*<br>Mo ..... 0.0861 ± 0.0022 %*<br>Ni ..... 0.427 ± 0.006 %*<br>Al ..... (0.0095) %<br>As ..... 0.00365 ± 0.00029 %*<br>B ..... (<0.00005) %<br>Co ..... 0.0288 ± 0.0009 %<br>Cu ..... 0.0242 ± 0.0007 %*<br>N ..... 0.566 ± 0.011 %*<br>Nb ..... (0.00117) %<br>Pb ..... (0.000128) %<br>Sn ..... (0.0014) %<br>Ti ..... (0.0008) %<br>V ..... 0.0694 ± 0.0021 %*<br>W ..... (0.00114) %<br>Zr ..... (0.0001) %<br>Ca ..... (0.00026) %<br>Sb ..... (0.00053) %<br>Te ..... (<0.00008) %<br>(Values in parenthesis are indicative values)<br>* 95%-confidence interval | 100 g |
| ECRM-D 294-1-D | Manganese steel, material-no. 1.3816 - disc (40 mm x 20 mm) | disc |
| ECRM-D 297-1 | 1.2 % boron steel, material-no. 1.4696 - chips<br>Year of issue: 2005<br>Certified values<br>C ..... 0.0223 ± 0.0004 %*<br>Si ..... 0.344 ± 0.006 %*<br>Mn ..... 0.897 ± 0.007 %*<br>P ..... 0.0135 ± 0.0004 %*<br>S ..... 0.0101 ± 0.0003 %*<br>Cr ..... 18.37 ± 0.03 %*<br>Mo ..... 0.290 ± 0.005 %*<br>Ni ..... 12.33 ± 0.02 %*<br>Al ..... 0.0195 ± 0.0009 %*<br>As ..... 0.0040 ± 0.0005 %*<br>B ..... 1.1462) ± 0.009 %*<br>Co ..... 0.0413 ± 0.0007 %*<br>Cu ..... 0.204 ± 0.004 %*<br>N ..... 0.0152 ± 0.0007 %*<br>Nb ..... (0.0089) %<br>Ti ..... 0.0072 ± 0.0004 %*<br>V ..... 0.0535 ± 0.0008 %*<br>W ..... (0.0057) %<br>Zr ..... (0.0002) %<br>Ca ..... (0.0002) %<br>(Values in parenthesis are indicative values)<br>* 95%-confidence interval | 100 g |
| ECRM-D 297-1-D | 1.2 % boron steel, material-no. 1.4696 - disc (40 mm x 25 mm) | disc |
| ECRM-B 251-1 | High-speed steel, 5,4% chromium, 5.7% cobalt, 0.5% molybdenum, 1,6% vanadium und 20% tungsten - chips<br>Year of issue: 1968<br>Certified values<br>C ..... 0.84 %<br>Si ..... 0.21 %<br>Mn ..... 0.27 %<br>P ..... 0.024 %<br>S ..... 0.025 %<br>Cr ..... 5.35 %<br>Mo ..... 0.53 %<br>Ni ..... 0.15 %<br>Co ..... 5.70 %<br>Cu ..... 0.08 %<br>Sn ..... 0.025 %<br>V ..... 1.59 %<br>W ..... 19.9 | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 253-1 | 13% Manganese steel - chips<br>Year of issue: 1973<br>Certified values<br>C 1.15 % · S 0.019 % · Co (0.35) %<br>Si 0.34 % · Cr 0.16 % · Cu (0.177) %<br>Mn 12.5 % · Mo (0.031) % · V (0.02) %<br>P 0.042 % · Ni 0.29 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 254-1 | High-speed steel, 5,1% chromium, 4,9% molybdenum, 1,9% vanadium and 7% tungsten - chips<br>Year of issue: 1971<br>Certified values<br>C 0.88 % · Cr 5.12 % · Sn 0.019 %<br>Si 0.19 % · Mo 4.92 % · V 1.94 %<br>Mn 0.30 % · Ni 0.12 % · W 6.97 %<br>P 0.023 % · Co 0.32 %<br>S 0.029 % · Cu 0.09 % | 100 g |
| ECRM-B 254-1-D | High-speed steel, 5,1% chromium, 4,9% molybdenum, 1,9% Vanadium and 7% tungsten | disc |
| ECRM-B 272-1 | 12% Chromium steel - chips<br>Year of issue: 2005<br>Certified values<br>C 0.2815 ± 0.0012 %* · Ni 0.244 ± 0.003 %* · Nb 0.0028 ± 0.0002 %*<br>Si 0.420 ± 0.004 %* · Al 0.0046 ± 0.0005 %* · Ti 0.00096 ± 0.00009 %*<br>Mn 0.600 ± 0.004 %* · As 0.0116 ± 0.0005 %* · V 0.0167 ± 0.0005 %*<br>P 0.0156 ± 0.0005 %* · B 0.0018 ± 0.0002 %* · Ca 0.00090 ± 0.00011 %*<br>S 0.0196 ± 0.0004 %* · Co 0.0145 ± 0.0003 %* · Sb 0.00070 ± 0.00006 %*<br>Cr 11.927 ± 0.022 %* · Cu 0.0192 ± 0.0004 %* · Zn 0.0031 ± 0.0003 %*<br>Mo 0.0030 ± 0.0002 %* · N 0.0508 ± 0.0004 %*<br>* 95%-confidence interval | 100 g |
| ECRM-B 272-1-D | 12% Chromium steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 276-2 | 5% Cr-Mo-V steel - chips<br>Year of issue: 1993<br>Certified values<br>C 0.399 ± 0.002 %* · S 0.0189 ± 0.0003 %* · Cu 0.183 ± 0.002 %*<br>Si 1.034 ± 0.004 %* · Cr 4.975 ± 0.012 %* · N 0.0116 ± 0.0001 %*<br>Mn 0.365 ± 0.002 %* · Mo 1.134 ± 0.010 %* · Sn 0.0133 ± 0.0002 %*<br>P 0.0093 ± 0.0003 %* · Ni 0.203 ± 0.002 %* · V 0.296 ± 0.005 %*<br>* 95%-confidence interval | 100 g |
| ECRM-B 276-2-D | 5% Cr-Mo-V steel | disc |
| ECRM-B 281-1 | Stainless steel, 18% chromium and 9% nickel - chips<br>Year of issue: 1980<br>Certified values<br>C 0.048 ± 0.002 % · Cr 18.17 ± 0.05 % · Cu 0.076 ± 0.003 %<br>Si 0.929 ± 0.008 % · Ni 9.37 ± 0.05 % · N 0.023 ± 0.001 %<br>Mn 0.786 ± 0.007 % · Al 0.015 ± 0.001 % · Pb (0.0005) %<br>P 0.012 ± 0.001 % · B (0.0012) % · Sn 0.009 ± 0.001 %<br>S 0.016 ± 0.001 % · Co 0.023 ± 0.002 % · Ti 0.216 ± 0.007 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 285-2 | Maraging steel - chips<br>Year of issue: 1997<br>Certified values<br>C 0.0018 ± 0.0002 %* · Cr 0.0236 ± 0.0011 %* · Co 7.76 ± 0.04 %*<br>Si 0.0117 ± 0.0008 %* · Mo 4.99 ± 0.02 %* · Cu 0.0094 ± 0.0004 %*<br>Mn 0.0168 ± 0.0004 %* · Ni 18.07 ± 0.04 %* · N 0.0007 ± 0.0001 %*<br>P 0.0053 ± 0.0005 %* · Al 0.1067 ± 0.0018 %* · Ti 0.520 ± 0.004 %*<br>S 0.0025 ± 0.0002 %* · B 0.0009 ± 0.0001 %* · Zr 0.0050 ± 0.0001 %*<br>* 95%-confidence interval | 100 g |
| ECRM-B 285-2-D | Maraging steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 287-1 | High boron stainless steel - chips<br>Year of issue: 1986<br>Certified values<br>C 0.016 ± 0.0005 %* · S 0.0014 ± 0.0002 %* · B 0.924R ± 0.003 %*<br>Si 0.569 ± 0.009 %* · Cr 18.61 ± 0.04 %* · Co 0.148 ± 0.002 %*<br>Mn 1.478 ± 0.009 %* · Mo 0.247 ± 0.004 %* · Cu 0.203 ± 0.002 %*<br>P 0.0267 ± 0.0006 %* · Ni 10.35 ± 0.04 %* · N 0.0194 ± 0.0005 %*<br>* 95%-confidence interval | 100 g |
| ECRM-B 287-1-D | High boron stainless steel - disc (35-39 mm x 20-35 mm) | disc |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 292-1 | Nb-stabilised stainless steel - chips<br>Year of issue: 1990<br>Certified values<br>C ..... 0.0367 ± 0.0008 %*<br>Si..... 0.402 ± 0.005 %*<br>Mn ..... 1.744 ± 0.006 %*<br>P..... 0.0175 ± 0.0007 %*<br>S..... 0.0055 ± 0.0002 %*<br>Cr ..... 18.00 ± 0.02 %*<br>Mo.....0.0464 ± 0.0011 %*<br>Ni .....10.09 ± 0.02 %*<br>Al .....(0.002) %<br>As .....(0.008) %<br>B .....(0.0003) %<br>Co.....0.0255 ± 0.0011 %*<br>Cu ..... 0.0391 ± 0.0010 %*<br>N ..... 0.0640 ± 0.0012 %*<br>Nb ..... 0.571 ± 0.012 %*<br>Ca ..... (0.0006) %<br>Ta..... (0.001) %<br>(Values in parenthesis are indicative values)<br>* 95%-confidence interval | 100 g |
| ECRM-B 292-1-D | Nb-stabilised stainless steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 295-1 | 4% Mo-Cr-Ni steel - chips<br>Year of issue: 1995<br>Certified values<br>C ..... 0.0166 ± 0.0004 %*<br>Si..... 0.418 ± 0.008 %*<br>Mn ..... 1.758 ± 0.009 %*<br>P..... 0.0167 ± 0.0005 %*<br>S..... 0.0003 ± 0.0001 %*<br>Cr ..... 19.51 ± 0.06 %*<br>Mo.....3.996 ± 0.024 %*<br>Ni .....24.40 ± 0.04 %*<br>Al .....0.0203 ± 0.0005 %*<br>As .....0.0041 ± 0.0002 %*<br>B .....0.0018 ± 0.0001 %*<br>Co.....0.0450 ± 0.0011 %*<br>Cu ..... 1.481 ± 0.012 %*<br>N ..... 0.0615 ± 0.0008 %*<br>Sn..... 0.0025 ± 0.0003 %*<br>V..... 0.0456 ± 0.0015 %*<br>Fe..... 48.36 ± 0.11 %*<br>Sb..... 0.0007 ± 0.0001 %*<br>* 95%-confidence interval | 100 g |
| ECRM-B 295-1-D | 4% Mo-Cr-Ni steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-B 296-1 | Jethete steel - chips<br>Year of issue: 1997<br>Certified values<br>C ..... 0.1166 ± 0.0008 %*<br>Si..... 0.242 ± 0.003 %*<br>Mn ..... 0.676 ± 0.005 %*<br>P..... 0.0178 ± 0.0004 %*<br>S..... 0.0026 ± 0.0001 %*<br>Cr ..... 11.82 ± 0.04 %*<br>Mo.....1.700 ± 0.009 %*<br>Ni .....2.790 ± 0.008 %*<br>Al .....0.0276 ± 0.0009 %*<br>As .....0.0139 ± 0.0006 %*<br>B .....(0.0003) %<br>Co.....0.0218 ± 0.0006 %*<br>Cu ..... 0.1498 ± 0.0013 %*<br>N ..... 0.0214 ± 0.0005 %*<br>Pb..... 0.00016 ± 0.00004 %*<br>Sn..... 0.0131 ± 0.0003 %*<br>V..... 0.363 ± 0.005 %*<br>Mg ..... (0.0003) %<br>* 95%-confidence interval | 100 g |
| ECRM-B 296-1-D | Jethete steel - disc (35-39 mm x 20-35 mm) | disc |
| ECRM-F 201-1 | Stainless steel, 12% chromium - chips<br>Year of issue: 1960<br>Certified values<br>C .....0.291 %<br>Si.....0.843 %<br>Mn .....0.363 %<br>Cr .....12.33 %<br>Mo .....0.050 %<br>Ni ..... 0.202 %<br>Cu ..... 0.099 %<br>Sn ..... 0.0193 %<br>V .....(0.020) %<br>Ca..... 0.0018 %<br>Mg ..... (0.0005) %<br>Sb..... (0.0033) %<br>Zn.....0.0005 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 210-1 | Stainless steel, 4% chromium, 8.2% molybdenum, 1.7% vanadium and 1.5% tungsten - chips<br>Year of issue: 1967<br>Certified values<br>C .....0.762 %<br>Si.....0.200 %<br>Mn .....0.250 %<br>P..... (0.028) %<br>S .....(0.022) %<br>Cr..... 3.92 %<br>Mo..... 8.15 %<br>Co..... 0.185 %<br>V.....1.65 %<br>W .....1.54 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 279-2 | Stainless steel, 15.6% chromium and 11% nickel - chips<br>Year of issue: 1972<br>Certified values<br>C .....0.0885 ± 0.0010 %<br>Si.....0.5160 ± 0.0047 %<br>Mn .....0.2584 ± 0.0045 %<br>Cr..... 15.642 ± 0.030 %<br>Ni ..... 1.603 ± 0.014 %<br>Cu ..... 0.1067 ± 0.0022 % | 100 g |
| ECRM-F 282-1 | Stainless steel, 17% chromium, 11% nickel, 2% molybdenum and 0.5% titanium - chips<br>Year of issue: 1986<br>Certified values<br>C .....0.086 ± 0.003 %<br>Si.....0.734 ± 0.016 %<br>Mn .....1.64 ± 0.02 %<br>P.....0.019 ± 0.002 %<br>S ..... 0.0042 ± 0.0005 %<br>Cr..... 16.72 ± 0.04 %<br>Mo..... 2.19 ± 0.03 %<br>Ni ..... 10.86 ± 0.09 %<br>Cu .....0.109 ± 0.003 %<br>Ti .....0.488 ± 0.007 % | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-F 273-1 | Stainless steel Z5CNU15.05 with 14.7 % Cr, 4.8 % Ni and 3 % Cu - chips | 100 g |

Year of issue: 2005

Certified values

| | | |
|---|---|---|
| C .....0.0336 ± 0.0005 %* | Mo .....0.246 ± 0.003 %* | N .....0.0444 ± 0.0004 %* |
| Si.....0.378 ± 0.004 %* | Ni .....4.852 ± 0.020 %* | Nb .....0.221 ± 0.004 %* |
| Mn.....0.785 ± 0.004 %* | Al .....(0.0062) % | Sn .....0.0021 ± 0.0001 %* |
| P .....0.0131 ± 0.0006 %* | As .....0.0030 ± 0.0002 %* | V .....0.0512 ± 0.0008 %* |
| S .....0.00037 ± 0.00006 %* | Co.....0.0391 ± 0.0005 %* | Ga .....(0.0023) % |
| Cr .....14.747 ± 0.014 %* | Cu.....3.047 ± 0.015 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-F-273-1-D | Stainless steel Z5CNU15.05 with 14.7 % Cr, 4.8 % Ni and 3 % Cu - disc (40 mm x 20 mm) | disc |
| ECRM-S 274-1 | Vanadium steel - chips | 100 g |

Year of issue: 2004

Certified values

| | | |
|---|---|---|
| C .....1.563 ± 0.006 %* | Ni .....0.077 ± 0.002 %* | Pb .....(0.0064) % |
| Si.....1.057 ± 0.008 %* | Al .....(0.0025) % | Sn .....(0.010) % |
| Mn.....0.397 ± 0.004 %* | As .....(0.0013) % | Ti.....(0.0011) % |
| P .....0.0148 ± 0.0005 %* | B .....(0.0005) % | V .....4.010 ± 0.018 %* |
| S .....0.0096 ± 0.0004 %* | Co.....(0.0229) % | W .....0.0087 ± 0.0007 %* |
| Cr .....8.036 ± 0.022 %* | Cu.....0.0281 ± 0.0005 %* | O .....0.0026 ± 0.0002+1) % |
| Mo .....1.455 ± 0.016 %* | N.....0.0769 ± 0.0010 %* | Sb .....(0.00019) % |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-S 274-1-D | Vanadium steel - disc (38 mm x 25 mm) | disc |
| ECRM-S 298-1 | Duplex stainless steel (similar to EN 1.4410) - chips | 100 g |

Year of issue: 2002

Certified values

| | | |
|---|---|---|
| C .....0.0146 ± 0.0003 %* | As .....(0.0034) % | V .....0.0607 ± 0.0011 %* |
| Si.....0.262 ± 0.005 %* | B .....0.0021 ± 0.0001 %* | W .....(0.0180) % |
| Mn.....0.398 ± 0.005 %* | Co.....0.055 ± 0.001 %* | Ca .....(0.0020) % |
| P .....0.0197 ± 0.0004 %* | Cu.....0.201 ± 0.003 %* | Fe.....63.38 ± 0.11 %* |
| S .....0.0006 ± 0.0001 %* | N.....0.263 ± 0.0005 %* | Mg .....(0.0008) % |
| Cr .....24.72 ± 0.04 %* | Nb.....(0.0037) % | O .....(0.0036) % |
| Mo .....3.799 ± 0.026 %* | Pb .....0.00008 ± 0.00002 %* | Sb .....(0.00072) % |
| Ni .....7.056 ± 0.018 %* | Sn .....(0.0044) % | Ta.....(0.00002) % |
| Al.....0.0285 ± 0.0011 %* | Ti .....0.0014 ± 0.0002 %* | Zn.....(0.0010) % |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-S 298-1-D | Duplex stainless steel (similar to EN 1.4410) - disc (38 mm x 25 mm) | disc |

## Pure iron

| | | |
|---|---|---|
| ECRM-D 098-1 | Pure iron - chips | 100 g |

Year of issue: 1993

Certified values

| | | |
|---|---|---|
| C .....5.1 ± 1.3 µg/g* | P ..... (0.6) µg/g | Mo .....8.5 ± 0.8 µg/g* |
| Si.....4.8 ± 1.1 µg/g* | S ..... 3.1 ± 0.5 µg/g* | N .....2.4 ± 0.7 µg/g* |
| Mn.....0.8 ± 0.4 µg/g* | Cr..... 57.1 ± 2.4 µg/g* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 088-2 | Pure iron - powder | 100 g |

Year of issue: 2001

Certified values

| | | |
|---|---|---|
| C .....6 ± 2 µg/g* | S ..... 70 ± 4 µg/g* | Cu .....163 ± 3 µg/g* |
| Si.....52 ± 5 µg/g* | Cr..... 244 ± 8 µg/g* | V .....2.9 ± 0.5 µg/g* |
| Mn.....809 ± 17 µg/g* | Ni ..... 275 ± 7 µg/g* | Ca .....7.2 ± 0.8 µg/g* |
| P .....48 ± 2 µg/g* | Co..... 61 ± 2 µg/g* | |

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-B 097-1 | Pure iron - chips | 100 g |

Year of issue: 1984

Certified values

| | | |
|---|---|---|
| C ..... 2.5 ± 0.7 µg/g | S .....22 ± 2 µg/g | B ..... 3 ± 1 µg/g |
| Si.....(<100) µg/g | Cr.....16 ± 5 µg/g | Co ..... 37 ± 4 µg/g |
| Mn..... 64 ± 4 µg/g | Ni .....25 ± 3 µg/g | Cu ..... 20 ± 2 µg/g |
| P .....16**R** ± 3 µg/g | As .....51 ± 5 µg/g | N ..... 7 ± 1 µg/g |

(Values in parenthesis are indicative values)

**R:** revised value

| | | |
|---|---|---|
| ECRM-B 097-1-D | Pure iron - disc (35-39 mm x 20-35 mm) | disc |

| Code | Product | Unit |
|---|---|---|

## Special alloys

**ECRM-D 326-1** — Nickel-base alloy with 61,2% nickel content and 16,4% chromium content - chips — 100 g

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 0.092 ± 0.002 % | Cr ..... 16.37 ± 0.05 % | Cu ..... (0.027) % |
| Si ..... 1.46 ± 0.025 % | Mo ..... (0.025) % | N ..... (0.0359) % |
| Mn ..... 0.406 ± 0.008 % | Ni ..... 61.16 ± 0.16 % | V ..... (0.024) % |
| P ..... 0.0093 ± 0.0009 % | Altotal ..... (0.79) % | Zr ..... 0.129 ± 0.008 % |
| S ..... 0.0028 ± 0.0006 % | Co ..... 0.223 ± 0.011 % | |

(Values in parenthesis are indicative values)

**ECRM-D 327-2** — High-temperature steel with 24,4% chromium, 19,7% nickel, 2% silicon and 0,15% carbon - chips — 100 g

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| C ..... 0.152 ± 0.003 % | Cr ..... 24.35 ± 0.08 % | Cu ..... 0.060 ± 0.003 % |
| Si ..... 2.052 ± 0.028 % | Mo ..... 0.174 ± 0.009 % | N ..... 0.059 ± 0.0024 % |
| Mn ..... 1.289 ± 0.018 % | Ni ..... 19.72 ± 0.08 % | V ..... 0.044 ± 0.004 % |
| P ..... 0.0228 ± 0.0014 % | $Al_{total}$ ..... 0.070 ± 0.006 % | |
| S ..... 0.0046 ± 0.0012 % | Co ..... 0.159 ± 0.010 % | |

(Values in parenthesis are indicative values)

**ECRM-D 328-1** — High-temperature turbine steel with 20,5% chromium, 20,4% nickel and 41,7% cobalt - chips — 100 g

Year of issue: 1973

Certified values

| | | |
|---|---|---|
| C ..... 0.390 ± 0.005 % | Mo ..... 4.41 ± 0.07 % | Nb ..... 3.61 ± 0.22 % |
| Si ..... 0.629 ± 0.014 % | Ni ..... 20.38 ± 0.19 % | W ..... 4.16 ± 0.04 % |
| Mn ..... 1.395 ± 0.012 % | $Al_{total}$ ..... 0.070 ± 0.006 % | Fe ..... 2.40 ± 0.06 % |
| P ..... 0.005 ± 0.001 % | Co ..... 41.65 ± 0.24 % | Ta ..... 0.18 ± 0.02 % |
| S ..... 0.003 ± 0.001 % | Cu ..... 0.013 ± 0.003 % | |
| Cr ..... 20.54 ± 0.07 % | N ..... 0.027 ± 0.002 % | |

**ECRM-B 376-1** — 24% Co magnet alloy — 100 g

Year of issue: 1980

Certified values

| | | |
|---|---|---|
| C ..... 0.026 ± 0.002 %* | Ni ..... 13.37 ± 0.08 %* | Nb ..... 0.309 ± 0.012 %* |
| Si ..... 0.313 ± 0.009 %* | Al ..... 8.12 ± 0.10 %* | Ti ..... 0.158**R**± 0.003 %* |
| Mn ..... 0.046 ± 0.004 %* | Co ..... 23.70 ± 0.19 %* | Ta ..... (0.0155) % |
| S ..... 0.004 ± 0.001 %* | Cu ..... 2.94 ± 0.04 %* | |

(Values in parenthesis are indicative values)

**R:** revised value
* 95%-confidence interval

**ECRM-F 377-1** — Nickel alloy IN 625 - disc (40 mm x 20 mm) — disc

Year of issue: 1995

Certified values

| | | |
|---|---|---|
| C ..... 0.0202 ± 0.0007 %* | Cr ..... 21.72 ± 0.06 %* | Co ..... 0.0348 ± 0.0009 %* |
| Si ..... 0.077 ± 0.005 %* | Mo ..... 8.94 ± 0.05 %* | Cu ..... 0.0110 ± 0.0003 %* |
| Mn ..... 0.0225 ± 0.0007 %* | Ni ..... 61.45 ± 0.08 %* | Nb ..... 3.50 ± 0.04 %* |
| P ..... 0.0036 ± 0.0004 %* | Al ..... 0.216 ± 0.007 %* | Ti ..... 0.255 ± 0.008 %* |
| S ..... 0.0006 ± 0.0001 %* | B ..... (0.0006) % | Fe ..... 3.77 ± 0.06 %* |

* 95%-confidence interval

**ECRM-F 377-2** — Nickel alloy IN 625 - disc (40 mm x 20 mm) — disc

Year of issue: 1995

Certified values

| | | |
|---|---|---|
| C ..... 0.0202 ± 0.0007 %* | Cr ..... 21.72 ± 0.06 %* | Co ..... 0.0348 ± 0.0009 %* |
| Si ..... 0.077 ± 0.005 %* | Mo ..... 8.94 ± 0.05 %* | Cu ..... 0.0104 ± 0.0003%* |
| Mn ..... 0.0225 ± 0.0007 %* | Ni ..... 61.45 ± 0.08 %* | Nb ..... 3.50 ± 0.04 %* |
| P ..... 0.0036 ± 0.0004 %* | Al ..... 0.232 ± 0.007%* | Ti ..... 0.264 ± 0.008 %* |
| S ..... 0.0006 ± 0.0001 %* | B ..... (0.0006) % | Fe ..... 3.77 ± 0.06 %* |

* 95%-confidence interval

**ECRM-F 378-1** — Cobalt alloy, stellite grade 6 - powder — 100 g

Year of issue: 1995

Certified values

| | | |
|---|---|---|
| C ..... 1.181 ± 0.009 %* | S ..... 0.0055 ± 0.0006 %* | Co ..... 63.52 ± 0.19 %* |
| Si ..... 1.172 ± 0.022 %* | Cr ..... 28.22 ± 0.14 %* | W ..... 4.43 ± 0.05 %* |
| Mn ..... 0.0579 ± 0.0015 %* | Mo ..... 0.0503 ± 0.0011 %* | Fe ..... 0.606 ± 0.011 %* |
| P ..... (0.0023) % | Ni ..... 0.617 ± 0.011 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

**ECRM-F 378-1-D** — Cobalt alloy, stellite grade 6 - disc (40 mm x 20 mm) — disc

| Code | Product | Unit |
|---|---|---|

## Cast irons

### ECRM-D 428-2 — Cast iron GG 25, powdered material produced by atomization of the melt - powder — 100 g

Year of issue: 1998

Certified values

| | | |
|---|---|---|
| $C^{total}$ ..... 2.747 ± 0.009 %* | S ..... 0.1105 ± 0.0018 %* | As ..... 0.0156 ± 0.0005 %* |
| Si ..... 1.752 ± 0.007 %* | Cr ..... 0.0366 ± 0.0017 %* | Cu ..... 0.0996 ± 0.0014 %* |
| Mn ..... 0.750 ± 0.05 %* | Mo ..... (0.0014) % | Ti ..... 0.0311 ± 0.0005 %* |
| P ..... 0.0691 ± 0.0011 %* | Ni ..... 0.0358 ± 0.0005 %* | V ..... 0.0120 ± 0.0003 %* |

(Values in parenthesis are indicative values)

* 95%-confidence interval

### ECRM-D 476-3 — Pig iron - powder — 100 g

Year of issue: 1996

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.390 ± 0.011* % | S ..... 0.0493 ± 0.0009* % | Cu ..... 0.2445 ± 0.0025* % |
| Si ..... 1.813 ± 0.005* % | Cr ..... 0.0648 ± 0.0012* % | N ..... 0.0038 ± 0.0001* % |
| Mn ..... 0.987 ± 0.008* % | Ni ..... 0.0549 ± 0.0014* % | Ti ..... 0.0222 ± 0.0005* % |
| P ..... 0.0908 ± 0.0023* % | As ..... 0.0145 ± 0.0007* % | V ..... 0.0115 ± 0.0002* % |

* 95%-confidence interval

### ECRM-D 478-2 — Hematite pig iron - powder — 100 g

Year of issue: 1996

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 4.003 ± 0.013* % | Cr ..... 0.251 ± 0.005* % | N ..... 0.0023 ± 0.0002* % |
| Si ..... 2.411 ± 0.021* % | Ni ..... 0.151 ± 0.007* % | Ti ..... 0.0328 ± 0.0007* % |
| Mn ..... 0.321 ± 0.005* % | As ..... (0.0018) % | V ..... 0.0113 ± 0.0003* % |
| P ..... 0.201 ± 0.006* % | B ..... 0.0006 ± 0.0001* % | |
| S ..... 0.0460 ± 0.0015* % | Cu ..... 0.1276 ± 0.0019* % | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

### ECRM-D 479-1 — Alloyed cast iron - powder — 100 g

Year of issue: 1978

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 2.86 ± 0.04 % | P ..... 0.076 ± 0.003 % | Mo ..... 0.196 ± 0.005 % |
| Si ..... 2.02 ± 0.02 % | S ..... 0.089 ± 0.003 % | Ni ..... 1.012 ± 0.015 % |
| Mn ..... 0.136 ± 0.008 % | Cr ..... 1.00 ± 0.02 % | Al ..... 0.014 ± 0.002 % |

(Values in parenthesis are indicative values)

### ECRM-D 480-1 — Nodular iron - powder — 100 g

Year of issue: 1979

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.03 ± 0.02 % | S ..... 0.0086 ± 0.0010 % | Cu ..... (0.0052) % |
| Si ..... 2.41 ± 0.02 % | Cr ..... (0.0164) % | Mg ..... 0.017 ± 0.001 % |
| Mn ..... 0.151 ± 0.005 % | Ni ..... 0.483 ± 0.007 % | |
| P ..... 0.0021**R** ± 0.0005 % | Al ..... 0.016 ± 0.001 % | |

(Values in parenthesis are indicative values)

**R:** revised value

### ECRM-B 451-2 — Austenitic cast iron - chips — 100 g

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| $C^{total}$ ..... 2.059 ± 0.007 %* | P ..... 0.0593 ± 0.0011 %* | Ni ..... 14.01 ± 0.04 %* |
| Si ..... 2.092 ± 0.007 %* | S ..... 0.0315 ± 0.0008 %* | Cu ..... 6.26 ± 0.02 %* |
| Mn ..... 1.079 ± 0.08 %* | Cr ..... 1.097 ± 0.010 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

### ECRM-B 453-1 — High Si and P iron - chips — 100 g

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... (2.44) % | S ..... 0.049 % | Cu ..... 0.10 % |
| Si ..... 3.17 % | Cr ..... 0.053 % | Ti ..... (0.040) % |
| Mn ..... 0.72 % | Ni ..... 0.068 % | V ..... 0.050 % |
| P ..... 1.63 % | As ..... 0.019 % | |

(Values in parenthesis are indicative values)

### ECRM-B 454-1 — Hematite pig iron - chips — 100 g

Certified values

Year of issue: 1968

| | | |
|---|---|---|
| $C_{total}$ ..... (2.53) % | P ..... 0.046 % | As ..... (0.025) % |
| Si ..... 2.00 % | S ..... 0.068 % | Cu ..... (0.07) % |
| Mn ..... 1.16 % | Ni ..... (0.21) % | Ti ..... 0.052 % |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| ECRM-B 481-1 | Nodular iron - chips | 100 g |

Year of issue: 1976

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.91 ± 0.02 % | S ..... 0.004 ± 0.001 % | Al ..... 0.023 ± 0.002 % |
| Si ..... 2.29 ± 0.02 % | Cr ..... 0.063 ± 0.006 % | As ..... 0.010 ± 0.002 % |
| Mn ..... 0.448 ± 0.014 % | Mo ..... 0.011 ± 0.001 % | Cu ..... 0.150 ± 0.004 % |
| P ..... 0.019 ± 0.001 % | Ni ..... 1.19 ± 0.02 % | Mg ..... 0.051 ± 0.002 % |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 482-2 | Low alloyed cast iron - chips | 100 g |

Year of issue: 1994

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 2.599 ± 0.012 %* | P ..... 0.0974±0.0015 %* | Mo ..... 0.454 ± 0.004 %* |
| Si ..... 1.815 ± 0.007 %* | S ..... 0.0491±0.0015 %* | Ni ..... 2.284 ± 0.009 %* |
| Mn ..... 0.728 ± 0.005 %* | Cr ..... 0.675 ± 0.006 %* | Cu ..... 1.231 ± 0.008 %* |

* 95%-confidence interval

| Code | Product | Unit |
|---|---|---|
| ECRM-B 483-1 | High duty iron - chips | 100 g |

Year of issue: 1980

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 2.46 ± 0.02 % | Mn ..... 0.596 ± 0.011 % | Cr ..... 0.039 ± 0.004 % |
| Graphit ..... (1.65) % | P ..... 0.615 ± 0.018 % | Sn ..... 0.130 ± 0.003 % |
| Si ..... 1.75 ± 0.02 % | S ..... 0.103 ± 0.003 % | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| ECRM-B 484-1 | Whiteheart malleable iron - chips | 100 g |

Year of issue: 1980

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.20 ± 0.03 % | Mn ..... 0.395 ± 0.005 % | S ..... 0.230 ± 0.009 % |
| Si ..... 0.717 ± 0.016 % | P ..... 0.121 ± 0.005 % | Cr ..... 0.155 ± 0.006 % |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| ECRM-B 486-1 | Foundry iron - chips | 100 g |

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 2.21 ± 0.03 | S ..... 0.023 ± 0.001 | Sn ..... 0.074 ± 0.006 |
| Si ..... 2.43 ± 0.02 | Cr ..... 0.104 ± 0.006 | V ..... 0.020 ± 0.003 |
| Mn ..... 0.841 ± 0.017 | Ni ..... 0.057 ± 0.004 | |
| P ..... 1.00 ± 0.04 | Cu ..... 0.548 ± 0.013 | |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 489-1 | White cast iron - chips | 100 g |

Year of issue: 1991

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 2.860 ± 0.013 %* | P ..... 0.815 ± 0.007 %* | N ..... (0.0056) % |
| Si ..... 1.524 ± 0.006 %* | S ..... 0.155 ± 0.002 %* | |
| Mn ..... (0.510) | Cu ..... 0.274 ± 0.003 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| Code | Product | Unit |
|---|---|---|
| ECRM-F 485-2 | Cast iron - chips | 100 g |

Year of issue: 1994

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.308 ± 0.015 % | P ..... 0.610 ± 0.007 % | Ni ..... 0.0742 ± 0.0010 % |
| Si ..... 0.508 ± 0.005 % | S ..... 0.165 ± 0.003 % | Cu ..... 0.0303 ± 0.0006 % |
| Mn ..... 0.190 ± 0.004 % | Cr ..... 0.0845 ± 0.0009 % | N ..... 0.0058 ± 0.0002 % |

| Code | Product | Unit |
|---|---|---|
| ECRM-F 485-3 | Cast iron - chips | 100 g |

Year of issue: 2006

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.514 ± 0.009 %* | S ..... 0.1488 ± 0.0024 %* | N ..... 0.0081 ± 0.0002 %* |

* 95%-confidence interval

| Code | Product | Unit |
|---|---|---|
| ECRM-F 487-1 | Cast iron - chips | 100 g |

Year of issue: 1986

Certified values

| | | |
|---|---|---|
| $C_{total}$ ..... 3.27 ± 0.04 % | S ..... 0.0007 ± 0.0002 % | Co ..... 0.0088 ± 0.0007 % |
| Si ..... 0.006 ± 0.001 % | Cr ..... 0.063 ± 0.003 % | N ..... 0.0042 ± 0.0004 % |
| Mn ..... 0.094 ± 0.002 % | Ni ..... 0.040 ± 0.002 % | |
| P ..... 0.0020 ± 0.0004 % | As ..... 0.011 ± 0.001 % | |

| Code | Product | Unit |
|---|---|---|
| ECRM-F 488-2 | Low alloyed white cast iron - chips<br>Year of issue: 1998<br>Certified values<br>$C_{total}$ 3.965 ± 0.009 %* · Si 0.374 ± 0.005 %* · Mn 0.201 ± 0.002 %* · P 0.0111±0.0002 %* · S 0.1173±0.0011 %* · Cr 0.303 ± 0.004 %* · Mo (0.0008) · Ni 0.1247±0.0009 %* · Cu 0.0256±0.0004 %* · N 0.0052±0.0003 %* · Sn 0.0013±0.0001 %* · Ti 0.0636±0.0009 %* · V 0.0545±0.0005 %* · Te (0.0089) % · Zn (0.0006) %<br>(Values in parenthesis are indicative values)<br>* 95%-confidence interval | 100 g |
| ECRM-F 490-1 | White cast iron (Spiegel) with 4.8% C and 10.8% Mn - chips<br>Year of issue: 2003<br>Certified values<br>$C_{total}$ 4.813 ± 0.011 %* · Si (0.029) · Mn 10.83 ± 0.05 %* · P 0.0267 ± 0.0006 %* · S 0.0040 ± 0.0004 %* · Cr 0.0183 ± 0.0010 %* · Ni (0.019) % · Cu 0.0088 ± 0.0002 %* · N 0.0030 ± 0.0002 %* · Ti 0.0035 ± 0.0003 %* · V 0.0152 ± 0.0007 %*<br>(Values in parenthesis are indicative values)<br>* 95%-confidence interval | 100 g |
| ECRM-F 491-1 | White cast iron, for C/S-determination - chips<br>Year of issue: 2006<br>Certified values<br>$C_{total}$ 3.616 ± 0.018 %* · S 0.0866 ± 0.0013 %*<br>* 95%-confidence interval | 100 g |

## Ferro alloys

| Code | Product | Unit |
|---|---|---|
| ECRM-D 502-2 | Ferromanganese, high-carbon - powder<br>Year of issue: 2004<br>Certified values<br>C 6.94 ± 0.02 % · Si (0.092) % · Mn 77.87 ± 0.11 % · P 0.148 ± 0.004 % · S (0.0024) % · Cr 0.0265 ± 0.0006 % · Ni 0.0384 ± 0.0003 % · B (0.0006) % · Co (0.048) % · Cu 0.037 ± 0.0006 % · N (0.017) % · Ti 0.0034 ± 0.0003 % · Fe (14.6) % · Pb 0.0179 ± 0.0011 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 529-1 | Ferro silicon, silicon content 91.1% - powder<br>Year of issue: 1975<br>Certified values<br>C 0.10 ± 0.01 % · Si 91.11 ± 0.33 % · Mn 0.04 ± 0.005 % · P 0.013 ± 0.001 % · Al 0.86 ± 0.02 % · Cu 0.01 ± 0.001 % · Ti 0.09 ± 0.004 % · Ca 0.46 ± 0.04 % · Fe 6.15 ± 0.08 % · Mg 0.04 ± 0.006 % | 100 g |
| ECRM-D 589-1 | Ferro titanium with titanium content 68.4%, vanadium content 2.3%, aluminium content 5.3% and iron content 16.9% - powder<br>Year of issue: 1991<br>Certified values<br>C 0.132 ± 0.008 % · Si (0.41) % · Mn 0.151 ± 0.005 % · P (0.0107) % · S 0.0152 ± 0.0011 % · Cr 0.506 ± 0.023 % · Mo 0.934 ± 0.017 % · Ni 0.663 ± 0.015 % · Al 5.34 ± 0.08 % · Co 0.115 ± 0.006 % · Cu 0.146 ± 0.006 % · N 0.64 ± 0.05 % · Sn 0.55 ± 0.03 % · Ti 68.4 ± 0.5 % · V 2.32 ± 0.07 % · Zr 0.866 ± 0.030 % · Fe 16.93 ± 0.17 % · Zn (0.0103) %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-D 591-1 | Ferro vanadium with vanadium content 79.7%, aluminium content 3.2% and iron content 14.6% - powder<br>Year of issue: 1996<br>Certified values<br>C 0.141 ± 0.004 % · Si 0.847 ± 0.012 % · Mn 0.307 ± 0.004 % · P 0.0299 ± 0.0017 % · S 0.0153 ± 0.0008 % · Ni 0.0141 ± 0.0014 % · Al 3.19 ± 0.05 % · As 0.0022 ± 0.0002 % · B (0.0018) % · Cu 0.0596 ± 0.0016 % · N (0.308) % · Ti (0.044) % · V 79.72 ± 0.14 % · Ca (0.0328) % · Fe 14.59 ± 0.10 % · Mg (0.044) % · O (0.516) %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 554-1 | Ferro chromium, low carbon with chromium content 74.6% - chips<br>Year of issue: 1972<br>Certified values<br>C 0.007 % · P (0.018) % · V (0.10) %<br>Si 0.53 % · S (< 0.005) %<br>Mn (0.09) % · Cr 74.6 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 555-1 | Ferro tungsten, tungsten content 79.9% -powder<br>Year of issue: 1975<br>Certified values<br>C 0.025 % · S (0.018) % · W 79.9 %<br>Si 1.75 % · Al 0.14 %<br>P (0.02) % · Sn 0.034 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 576-1 | Ferro niobium, niobium content 40% - powder<br>Year of issue: 1976<br>Certified values<br>C 0.201 ± 0.004 % · Nb 43.90 ± 0.22 % · Ta 0.306 ± 0.023 %<br>Si 1.79 ± 0.07 % · Sn 0.195 ± 0.011 %<br>Al 2.53 ± 0.05 % · Ti 1.32 ± 0.04 % | 100 g |
| ECRM-B 577-1 | Ferro vanadium with vanadium content 50.2% and aluminium content 0.4% - powder<br>Year of issue: 1978<br>Certified values<br>C 0.089 ± 0.003 % · P 0.035 ± 0.003 % · Al 0.414 ± 0.018 %<br>Si 1.79 ± 0.03 % · S 0.034 ± 0.002 % · Cu 0.054 ± 0.003 %<br>Mn 0.158 ± 0.007 % · Ni 0.053 ± 0.005 % · V 50.16 ± 0.13 % | 100 g |
| ECRM-B 578-1 | Ferro molybdenum, molybdenum content 72.2% - powder<br>Year of issue: 1978<br>Certified values<br>C 0.016 ± 0.002 % · P 0.024 ± 0.002 % · Mo 72.23 ± 0.16 %<br>Si 0.208 ± 0.010 % · S 0.065 ± 0.003 % · Cu 0.136 ± 0.010 % | 100 g |
| ECRM-B 579-1 | Ferro niobium, niobium content 60% - powder<br>Year of issue: 1981<br>Certified values<br>C 0.037 ± 0.002 % · Al 1.86 ± 0.06 % · Ti 0.567 ± 0.053 %<br>Si 1.03 ± 0.05 % · Co 0.0051 ± 0.0010 % · Ta 3.85 ± 0.15 %<br>P 0.064 ± 0.004 % · Nb 62.87 ± 0.17 %<br>S 0.021 ± 0.002 % · Sn 0.344 ± 0.016 % | 100 g |
| ECRM-B 580-1 | Ferro chromium, low carbon with chromium content 72,2% - chips<br>Year of issue: 1981<br>Certified values<br>C 0.019 ± 0.002 % · Cr 72.18 ± 0.11 % · V 0.083 ± 0.006 %<br>Si 0.306 ± 0.011 % · Co 0.047 ± 0.004 %<br>P 0.011 ± 0.001 % · N 0.035 ± 0.002 % | 100 g |
| ECRM-B 583-1 | Ferro manganese, low carbon with manganese content 86,4% - powder<br>Year of issue: 1982<br>Certified values<br>C 0.333 ± 0.008 % · Mn 86.42 ± 0.15 % · S (0.007) %<br>Si 0.396 ± 0.012 % · P 0.146 ± 0.006 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 584-1 | Ferro titanium with titanium content 37.2% and aluminium content 7.2% - powder<br>Year of issue: 1983<br>Certified values<br>C 0.044 ± 0.004 % · P 0.032 ± 0.003 % · Ti 37.17 ± 0.26 %<br>Si 1.80 ± 0.07 % · S 0.030 ± 0.002 %<br>Mn 1.13 ± 0.02 % · Al 7.19 ± 0.23 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-B 585-2 | High-Carbon Ferro-Chromium - powder | 100 g |
| ECRM-B 587-1 | Ferro boron, boron content 18.7% - powder<br>Year of issue: 1986<br>Certified values<br>C 0.738 ± 0.016 % · Cr (0.104) % · Ti (0.039) %<br>Si (0.129) % · Mo (0.005) % · V (0.004) %<br>Mn 0.272 ± 0.008 % · Al 0.047 ± 0.003 % · Ca (0.048) %<br>P (0.020) % · B 18.7 ± 0.3 %<br>S (0.0010) % · Co (0.010) %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 590-1 | Ferro tungsten, tungsten content 79.5% - powder<br>Year of issue: 1991<br>Certified values<br>C ..... 0.025 ± 0.007 % Mo ..... 0.101 ± 0.003 % W ..... 79.5 ± 0.11 %<br>Si..... 1.05 ± 0.03 % Cu..... 0.048 ± 0.001 %<br>Mn..... 0.136 ± 0.004 % Sn..... 0.045 ± 0.002 % | 100 g |
| ECRM-F 503-1 | Ferro manganese, low carbon with manganese content 80.8% - powder<br>Year of issue: 1962<br>Certified values<br>C ..... 0.700 ± 0.002 % Mn ..... 80.80 ± 0.10 % S .....(0.009) %<br>Si..... 0.865 ± 0.006 % P..... 0.069 ± 0.002 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 507-1 | Ferro chromium, high carbon with chromium content 70.3% - powder<br>Year of issue: 1965<br>Certified values<br>C ..... 5.40 ± 0.10 % Mn ..... 0.27 ± 0.03 % Cr ..... 70.30 ± 0.10 %<br>Si..... 1.20 ± 0.03 % P..... 0.017 ± 0.003 % N ..... 0.049 ± 0.003 % | 100 g |
| ECRM-F 509-1 | Ferro chromium, low carbon with chromium content 72.9% - chips<br>Year of issue: 1967<br>Certified values<br>C ..... 0.012 ± 0.001 % P .....(0.019) % N .....(0.032) %<br>Si..... 0.230 ± 0.008 % Cr..... 72.85 ± 0.15 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 510-1 | Ferro titanium with titanium content 26.9% - powder<br>Year of issue: 1967<br>Certified values<br>C ..... 0.058 ± 0.003 % P .....(0.035) % Ti..... 26.95 ± 0.05 %<br>Si..... 4.65 ± 0.08 % Al .....(4.9) %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 511-1 | Ferro vanadium with vanadium content 80.7% - powder<br>Year of issue: 1967<br>Certified values<br>C ..... 0.049 ± 0.002 % P .....(0.016) % V ..... 80.7 ± 0.2 %<br>Si..... 0.341 ± 0.008 % S..... 0.018 ± 0.002 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 582-2 | Ferro silicon, silicon content 75.2% - powder<br>Year of issue: 1990<br>Certified values<br>C ..... 0.150 ± 0.013 % S .....(0.003) % Ca ..... 0.405 ± 0.012 %<br>Si..... 75.22 ± 0.20 % Cr..... 0.074 ± 0.004 % Fe..... 21.42 ± 0.22 %<br>Mn..... 0.230 ± 0.006 % Al ..... 1.154 ± 0.030 %<br>P ..... 0.018 ± 0.0014 % Ti ..... 0.225 ± 0.011 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 586-1 | Silico manganese with manganese content 62.5% and silicon content 34% - powder<br>Year of issue: 1985<br>Certified values<br>C ..... 0.025 ± 0.003 % Cr..... 0.044 ± 0.002 % Ca ..... 0.039 ± 0.003 %<br>Si..... 34.0 ± 0.2 % Al ..... 0.022 ± 0.003 % Fe..... 2.89 ± 0.05 %<br>Mn..... 62.5 ± 0.2 % Co..... 0.007 ± 0.001 %<br>P ..... 0.041 ± 0.003 % V..... 0.041 ± 0.003 % | 100 g |

| Code | Product | Unit |
|---|---|---|

## Ores, iron oxide

| | | |
|---|---|---|
| ECRM-D 627-2 | Minette CaO-rich with 31.8% iron content - powder<br>Year of issue:1966<br>Certified values<br>$Fe_{total}$ ..... 31.77 ± 0.12 % MgO..... 1.57 ± 0.08 % s ..... 0.020 ± 0.001 %<br>$SiO_2$..... 9.24 ± 0.08 % Mn ..... 0.250 ± 0.012 % Cr ..... 0.018 ± 0.003 %<br>$Al_2O_3$ ..... 4.49 ± 0.12 % P..... 0.661 ± 0.014 % Cu .....(0.002) %<br>CaO ..... 15.67 ± 0.21 % S..... 0.114 ± 0.009 % $TiO_2$..... 0.225 ± 0.014 %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|
| ECRM-D 629-1 | Minette CaO-rich with 36.2% iron content - powder | 100 g |

Year of issue:1966

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 36.21 ± 0.13 % | MgO ..... 1.64 ± 0.08 % | As ..... 0.023 ± 0.001 % |
| $SiO_2$ ..... 19.25 ± 0.14 % | Mn ..... 0.390 ± 0.012 % | Cr ..... 0.016 ± 0.002 % |
| $Al_2O_3$ ..... 4.07 ± 0.08 % | P ..... 0.696 ± 0.013 % | Cu ..... (0.001) % |
| CaO ..... 5.63 ± 0.08 % | S ..... 0.063 ± 0.006 % | $TiO_2$ ..... 0.216 ± 0.013 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 630-1 | Iron ore, Bomi hill concentrate with 65.6% iron content - powder | 100 g |

Year of issue:1969

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 65.63 ± 0.17 % | CaO ..... 0.10 ± 0.017 % | P ..... 0.043 ± 0.003 % |
| $SiO_2$ ..... 5.88 ± 0.07 % | MgO ..... 0.47 ± 0.046 % | S ..... 0.032 ± 0.004 % |
| $Al_2O_3$ ..... 0.88 ± 0.038 % | Mn ..... 0.060 ± 0.005 % | $TiO_2$ ..... 0.066 ± 0.013 % |

| | | |
|---|---|---|
| ECRM-D 631-1 | Venezuela iron ore with 61.1% iron content - powder | 100 g |

Year of issue:1961

Certified values

| | | |
|---|---|---|
| Fetotal ..... 61.09 ± 0.09 % | MgO ..... 0.54 ± 0.059 % | $Na_2O$ ..... (0.04) % |
| $SiO_2$ ..... 3.20 ± 0.06 % | Mn ..... 0.044 ± 0.006 % | $K_2O$ ..... (0.04) % |
| $Al_2O_3$ ..... 1.06 ± 0.05 % | P ..... 0.114 ± 0.005 % | $TiO_2$ ..... 0.109 ± 0.006 % |
| CaO ..... 0.75 ± 0.038 % | S ..... 0.033 ± 0.006 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 633-1 | Manganese ore, Manganese Content 47.9% - powder | 100 g |

Year of issue:1967

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 1.64 ± 0.04 % | MgO ..... 0.58 ± 0.10 % | As ..... (0.0040) % |
| $SiO_2$ ..... 10.39 ± 0.15 % | Mn ..... 47.85 ± 0.21 % | BaO ..... 1.13 ± 0.08 % |
| $Al_2O_3$ ..... 1.64 ± 0.12 % | P ..... 0.170 ± 0.007 % | $TiO_2$ ..... 0.079 ± 0.009 % |
| CaO ..... 2.02 ± 0.12 % | S ..... 0.227 ± 0.009 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 678-1 | Kiruna D Iron Ore with 60.8% iron content - powder | 100 g |

Year of issue:1975

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 60.75 ± 0.07 % | Mn ..... 0.08 ± 0.01 % | K ..... 0.11 ± 0.01 % |
| Si ..... 1.73 ± 0.04 % | P ..... 1.61 ± 0.04 % | $K_2O$ ..... 0.13 % |
| Al ..... 0.28 ± 0.03 % | S ..... 0.021 ± 0.002 % | F ..... 0.29 ± 0.02 % |
| Ca ..... 3.92 ± 0.09 % | Na ..... 0.11 ± 0.01 % | Ti ..... 0.13 ± 0.01 % |
| Mg ..... 0.57 ± 0.02 % | $Na_2O$ ..... 0.15 % | V ..... 0.12 ± 0.01 % |

| | | |
|---|---|---|
| ECRM-D 680-1 | Iron ore, purple ore with 60% iron content - powder | 100 g |

Year of issue:1977

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 59.98 ± 0.08 % | MgO ..... 0.23 ± 0.02 % | Cu ..... 0.063 ± 0.003 % |
| Si ..... 4.20 ± 0.02 % | Mn ..... 0.025 ± 0.002 % | Ni ..... 0.007 ± 0.001 % |
| $SiO_2$ ..... 8.98 ± 0.04 % | P ..... 0.018 ± 0.002 % | Pb ..... 0.317 ± 0.008 % |
| Al ..... 0.66 ± 0.02 % | S ..... 0.544 ± 0.017 % | Ti ..... 0.045 ± 0.003 % |
| $Al_2O_3$ ..... 1.23 ± 0.04 % | Na ..... 0.128 ± 0.004 % | $TiO_2$ ..... 0.08 ± 0.005 % |
| Ca ..... 0.45 ± 0.02 % | K ..... 0.078 ± 0.003 % | Zn ..... 0.165 ± 0.004 % |
| CaO ..... 0.63 ± 0.03 % | As ..... 0.057 ± 0.003 % | |
| Mg ..... 0.14 ± 0.01 % | Cr ..... 0.005 ± 0.001 % | |

| | | |
|---|---|---|
| ECRM-D 686-1 | Iron oxide recovered from pickling bath (Ruthner) - powder | 100 g |

Year of issue:2002

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 69.44 ± 0.11 % | P ..... 0.0078 ± 0.0001 % | Ti ..... 0.0014 ± 0.0001 % |
| Si ..... 0.0083 ± 0.0005 % | Na ..... 0.0058 ± 0.0005 % | Zn ..... 0.0004 ± 0.0001 % |
| Al ..... 0.0407 ± 0.0012 % | K ..... 0.0024 ± 0.0004 % | Cl ..... 0.095 ± 0.006 % |
| Ca ..... 0.0097 ± 0.0007 % | Cr ..... 0.0182 ± 0.0006 % | Co ..... 0.0019 ± 0.0001 % |
| Mg ..... 0.0027 ± 0.0002 % | Cu ..... 0.0038 ± 0.0003 % | Mo ..... 0.0007 ± 0.0001 % |
| Mn ..... 0.231 ± 0.004 % | Ni ..... 0.0127 ± 0.0004 % | Sn ..... 0.0025 ± 0.0002 % |

| | | |
|---|---|---|
| ECRM-B 651-1 | Lincolnshire iron ore - powder | 100 g |

Year of issue: 1975

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ ..... 23.85 % | Mg ..... 1.04 % | $Na_2O$ ..... 0.07 % |
| Si ..... 3.46 % | MgO ..... 1.73 % | K ..... 0.27 % |
| $SiO_2$ ..... 7.40 % | Mn ..... 0.97 % | $K_2O$ ..... 0.32 % |
| Al ..... 2.25 % | MnO ..... 1.25 % | Ti ..... 0.10 % |
| $Al_2O_3$ ..... 4.26 % | P ..... 0.35 % | $TiO_2$ ..... 0.16 % |
| Ca ..... 16.2 % | S ..... 0.40 % | |
| CaO ..... 22.6 % | Na ..... 0.05 % | |

| Code | Product | Unit |
|---|---|---|

## ECRM-B 676-1 — Iron ore sinter - powder — 100 g

Year of issue: 1975

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 39.76 ± 0.08 % | Mg 1.16 ± 0.04 % | $Na_2O$ 0.128 % |
| Si 6.40 ± 0.05 % | MgO 1.92 % | K 0.43 ± 0.02 % |
| $SiO_2$ 13.69 % | Mn 0.83 ± 0.01 % | $K_2O$ 0.52 % |
| Al 3.40 ± 0.07 % | P 0.59 ± 0.02 % | F 0.10 ± 0.01 % |
| $Al_2O_3$ 6.42 % | $P_2O_5$ 1.35 % | Ti 0.19 ± 0.01 % |
| Ca 12.78 ± 0.13 % | S 0.12 ± 0.006 % | $TiO_2$ 0.32 % |
| CaO 17.88 % | Na 0.095 ± 0.004 % | V 0.070 ± 0.004 % |

## ECRM-B 681-1 — Iron ore - powder — 100 g

Year of issue: 1976

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 33.21 ± 0.13 % | MnO 0.29 % | Cr 0.041 ± 0.002 % |
| Si 8.32 ± 0.08 % | P 0.88 ± 0.02 % | $Cr_2O_3$ 0.060 % |
| $SiO_2$ 17.79 % | $P_2O_5$ 2.01 % | F 0.19 ± 0.01 % |
| Al 5.62 ± 0.10 % | S 0.103 ± 0.006 % | Ni 0.016 ± 0.001 % |
| $Al_2O_3$ 10.61 % | Na 0.068 ± 0.008 % | Pb (0.0072) % |
| Ca 2.80 ± 0.10 % | $Na_2O$ 0.092 % | Ti 0.29 ± 0.01 % |
| CaO 3.92 % | K 0.49 ± 0.01 % | $TiO_2$ 0.48 % |
| Mg 0.89 ± 0.02 % | $K_2O$ 0.59 % | V 0.077 ± 0.004 % |
| MgO 1.47 % | As (0.0109) % | $V_2O_5$ 0.138 % |
| Mn 0.22 ± 0.01 % | C 1.80 ± 0.04 % | |

(Values in parenthesis are indicative values)

## ECRM-B 683-1 — Iron ore sinter - powder — 100 g

Year of issue: 1982

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 56.06 ± 0.12 % | Mn 0.462 ± 0.007 % | Cr 0.018 ± 0.002 % |
| Si 3.38 ± 0.03 % | MnO 0.596 % | $Cr_2O_3$ 0.026 % |
| $SiO_2$ 7.23 % | P 0.148 ± 0.004 % | F 0.020 ± 0.002 % |
| Al 1.30 ± 0.05 % | $P_2O_5$ 0.339 % | Ti 0.097 ± 0.006 % |
| $Al_2O_3$ 2.46 % | S (0.013) % | $TiO_2$ 0.162 % |
| Ca 5.70 ± 0.08 % | Na 0.045 ± 0.007 % | V 0.026 ± 0.004 % |
| CaO 7.97 % | $Na_2O$ 0.061 % | $V_2O_5$ 0.046 % |
| Mg 1.04 ± 0.02 % | K 0.148 ± 0.012 % | Zn 0.010 ± 0.001 % |
| MgO 1.72 % | $K_2O$ 0.178 % | |

## ECRM-F 601-1 — Iron ore 36.8% iron content - powder — 100 g

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 36.76 ± 0.17 % | Ca 4.05 ± 0.15 % | S 0.065 ± 0.008 % |
| Fe(II) (8.8) % | Mg 1.21 ± 0.08 % | Ti 0.114 ± 0.005 % |
| Si 8.95 ± 0.07 % | Mn 0.370 ± 0.013 % | |
| Al 2.33 ± 0.25 % | P 0.590 ± 0.016 % | |

(Values in parenthesis are indicative values)

## ECRM-F 603-1 — Iron ore 53.7% iron content - powder — 100 g

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 53.65 ± 0.15 % | Ca (0.91) % | S 0.097 ± 0.006 % |
| Fe(II) (0.3) % | Mg (0.2) % | Ti 0.137 ± 0.008 % |
| Si 1.28 ± 0.03 % | Mn 0.440 ± 0.013 % | |
| Al 4.20 ± 0.16 % | P 0.084 ± 0.007 % | |

(Values in parenthesis are indicative values)

## ECRM-F 604-1 — Iron ore 65.7% iron content - powder — 100 g

Year of issue: 1968

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 65.69 ± 0.17 % | Ca (0.13) % | S 0.015 ± 0.002 % |
| Fe(II) (0.5) % | Mg (0.06) % | Ti 0.060 ± 0.006 % |
| Si 1.27 ± 0.04 % | Mn 0.092 ± 0.008 % | |
| Al 0.93 ± 0.07 % | P 0.053 ± 0.010 % | |

(Values in parenthesis are indicative values)

## ECRM-F 606-1 — Iron ore 59.7% iron content - powder — 100 g

Year of issue: 1970

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 59.66 ± 0.14 % | Ca 1.04 ± 0.12 % | S 0.033 ± 0.004 % |
| Fe(II) (0.1) % | Mg 0.32 ± 0.05 % | Ti 0.019 ± 0.004 % |
| Si 1.04 ± 0.03 % | Mn 2.59 ± 0.06 % | |
| Al 0.34 ± 0.06 % | P 0.026 ± 0.006 % | |

(Values in parenthesis are indicative values)

## Iron and steel products

| Code | Product | Unit |
|---|---|---|
| ECRM-F 607-1 | Iron ore 30.9% iron content<br>Year of issue: 1970<br>Certified values<br>$Fe_{total}$ ..... 30.89 ± 0.17 %<br>Fe(II) ..... (5.95) %<br>Si ..... 3.07 ± 0.07 %<br>Al ..... 2.48 ± 0.11 %<br>Ca ..... 13.74 ± 0.17 %<br>Mg ..... 0.77 ± 0.08 %<br>Mn ..... 0.254 ± 0.011 %<br>P ..... 0.529 ± 0.018 %<br>S ..... 0.050 ± 0.007 %<br>Ti ..... 0.123 ± 0.007 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 608-1 | Ferriferrous marl - powder<br>Year of issue: 1970<br>Certified values<br>$Fe_{total}$ ..... 4.00 ± 0.15 %<br>Fe(II) ..... (1.85) %<br>Si ..... 28.23 ± 0.27 %<br>Al ..... 5.26 ± 0.12 %<br>Ca ..... 6.22 ± 0.18 %<br>Mg ..... 0.81 ± 0.09 %<br>Mn ..... 0.044 ± 0.007 %<br>P ..... 0.053 ± 0.006 %<br>S ..... 0.455 ± 0.029 %<br>Ti ..... 0.428 ± 0.018 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 609-1 | Iron ore 30.5% iron content - powder<br>Year of issue: 1970<br>Certified values<br>$Fe_{total}$ ..... 30.52 ± 0.16 %<br>Fe(II) ..... (15.65) %<br>Si ..... 7.83 ± 0.08 %<br>Al ..... 2.26 ± 0.11 %<br>Ca ..... 6.87 ± 0.12 %<br>Mg ..... 2.00 ± 0.09 %<br>Mn ..... 0.472 ± 0.031 %<br>P ..... 0.608 ± 0.043 %<br>S ..... 1.000 ± 0.057 %<br>Ti ..... 0.118 ± 0.007 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 610-1 | Laterite, 47.5% iron content - powder<br>Year of issue: 1971<br>Certified values<br>$Fe_{total}$ ..... 47.46 ± 0.35 %<br>Si ..... 3.16 ± 0.04 %<br>Al ..... 1.96 ± 0.10 %<br>Ca ..... (0.1) %<br>Mg ..... 1.86 ± 0.11 %<br>Mn ..... 0.581 ± 0.016 %<br>P ..... 0.007 ± 0.002 %<br>S ..... 0.189 ± 0.024 %<br>Co ..... 0.075 ± 0.006 %<br>Cr ..... 1.84 ± 0.09 %<br>Ni ..... 1.48 ± 0.07 %<br>Ti ..... 0.015 ± 0.005 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 611-1 | Iron ore sinter - powder<br>Year of issue: 1971<br>Certified values<br>$Fe_{total}$ ..... 62.22 ± 0.16 %<br>Fe(II) ..... (13.84) %<br>Si ..... 2.07 ± 0.04 %<br>Al ..... 0.69 ± 0.05 %<br>Ca ..... 2.85 ± 0.14 %<br>Mg ..... 0.32 ± 0.04 %<br>Mn ..... 1.97 ± 0.06 %<br>P ..... 0.030 ± 0.008 %<br>S ..... (0.008) %<br>Ti ..... 0.035 ± 0.005 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 612-1 | Iron ore sinter - powder<br>Year of issue: 1971<br>Certified values<br>$Fe_{total}$ ..... 42.43 ± 0.13 %<br>Fe(II) ..... (9.19) %<br>Si ..... 5.94 ± 0.06 %<br>Al ..... 3.00 ± 0.13 %<br>Ca ..... 12.06 ± 0.17 %<br>Mg ..... 1.20 ± 0.07 %<br>Mn ..... 0.363 ± 0.014 %<br>P ..... 0.885 ± 0.027 %<br>S ..... 0.053 ± 0.007 %<br>Ti ..... 0.151 ± 0.006 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 677-1 | Iron ore 51.5% iron content - powder<br>Year of issue: 1975<br>Certified values<br>$Fe_{total}$ ..... 51.54 ± 0.07 %<br>Si ..... 11.78 ± 0.06 %<br>Al ..... 0.32 ± 0.02 %<br>Ca ..... 0.038 ± 0.006 %<br>Mg ..... 0.012 ± 0.002 %<br>Mn ..... 0.016 ± 0.002 %<br>P ..... 0.017R ± 0.0007 %<br>S ..... (0.005) %<br>Na ..... 0.007 ± 0.002 %<br>K ..... 0.008 ± 0.002 %<br>Co ..... (0.0006) %<br>Cr ..... (0.002) %<br>Cu ..... (0.0012) %<br>Ni ..... (0.0015) %<br>Pb ..... (0.003) %<br>Ti ..... 0.013 ± 0.001 %<br>Zn ..... (0.002) %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|

**ECRM-F 679-1** — Iron ore 24.2% iron content - powder — 100 g

Year of issue: 1977

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 24.20 ± 0.08 % | MgO 1.15 % | C 5.80 ± 0.07 % |
| Fe(II) (5.2) % | Mn 0.295 ± 0.005 % | Cr 0.012 ± 0.001 % |
| Si 3.43 ± 0.04 % | P 0.557 ± 0.009 % | Ni (0.0095) % |
| $SiO_2$ 7.34 % | $P_2O_5$ 1.275 % | Pb (0.0062) % |
| Al 1.99 ± 0.05 % | S 0.099 ± 0.005 % | Ti 0.106 ± 0.005 % |
| $Al_2O_3$ 3.76 % | Na 0.054 ± 0.004 % | $TiO_2$ 0.177 % |
| Ca 18.07 ± 0.14 % | $Na_2O$ 0.072 % | V 0.035 ± 0.002 % |
| CaO 25.30 % | K 0.157 ± 0.007 % | Zn 0.021 ± 0.002 % |
| Mg 0.70 ± 0.02 % | $K_2O$ 0.189 % | |

(Values in parenthesis are indicative values)

**ECRM-F 685-1** — Prereduced iron ore - powder — 100 g

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 91.10 ± 0.27 % | Mg 0.239 ± 0.006 % | As (0.0017) % |
| Fe(II) (7.72) % | MgO 0.397 % | C 1.49 ± 0.02 % |
| Femet 80.80 ± 0.44 % | Mn 0.042 ± 0.003 % | Co 0.013 ± 0.001 % |
| Si 0.795 ± 0.052 % | P 0.017 ± 0.001 % | Cr (0.0035) % |
| $SiO_2$ 1.701 % | S 0.0031 ± 0.0005 % | Cu (0.0016) % |
| Al 0.320 ± 0.014 % | Na 0.077 ± 0.003 % | Ni 0.018 ± 0.002 % |
| $Al_2O_3$ 0.604 % | $Na_2O$ 0.104 % | Pb (0.0020) % |
| Ca 0.140 ± 0.013 % | K 0.042 ± 0.004 % | Ti 0.220 ± 0.010 % |
| CaO 0.195 % | $K_2O$ 0.050 % | V 0.144 ± 0.009 % |

(Values in parenthesis are indicative values)

**NIST-690** — Iron ore, Canada - Constituents — 100 g

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 66.85 % | CaO 0.20 % | $Na_2O$ 0.003 % |
| P 0.011 % | $K_2O$ 0.0030 % | $SiO_2$ 3.71 % |
| S 0.003 % | MgO 0.18 % | $TiO_2$ 0.022 % |
| $Al_2O_3$ 0.18 % | MnO 0.23 % | |

**NIST-691** — Iron ore, reduced - Constituents — 100 g

Certified values

| | | |
|---|---|---|
| C 0.12 % | S 0.005 % | $Na_2O$ 0.186 % |
| Co 0.030 % | $Al_2O_3$ 1.22 % | $SiO_2$ 3.7 % |
| Cu 0.032 % | CaO 0.63 % | $TiO_2$ 0.27 % |
| $Fe_{total}$ 90.8 % | MgO 0.52 % | |
| P 0.006 % | MnO 0.043 % | |

**NIST-692** — Iron ore, Labrador - Constituents — 100 g

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 59.58 % | CaO 0.023 % | $Na_2O$ 0.008 % |
| P 0.039 % | $K_2O$ 0.039 % | $SiO_2$ 3.7 % |
| S 0.005 % | MgO 0.035 % | $TiO_2$ 0.045 % |
| $Al_2O_3$ 1.41 % | MnO 0.46 % | |

**NIST-693** — Iron ore, Nimba - Constituents — 100 g

Certified values

| | | |
|---|---|---|
| $Fe_{total}$ 65.11 % | CaO 0.016 % | $Na_2O$ 0.0028 % |
| P 0.056 % | $K_2O$ 0.0028 % | $SiO_2$ 3.87 % |
| S 0.005 % | MgO 0.013 % | $TiO_2$ 0.035 % |
| $Al_2O_3$ 1.02 % | MnO 0.091 % | |

## Ceramic materials and minerals

**ECRM-D 777-1** — Silica brick - powder — 100 g

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| Si 44.44 ± 0.15 % | MgO 0.071 ± 0.012 % | K 0.13 ± 0.02 % |
| $SiO_2$ 95.06 ± 0.32 % | Al 0.42 ± 0.02 % | $K_2O$ 0.15 ± 0.02 % |
| Ca 2.02 ± 0.08 % | $Al_2O_3$ 0.80 ± 0.04 % | Na 0.02 % |
| CaO 2.83 ± 0.10 % | Fe 0.23 ± 0.03 % | Ti 0.27 ± 0.02 % |
| Mg 0.043 ± 0.007 % | $Fe_2O_3$ 0.33 ± 0.04 % | |

**ECRM-D 779-1** — Magnesite - powder — 100 g

Year of issue: 1991

Certified values

| | | |
|---|---|---|
| Si 0.182 ± 0.015 % | B 0.0116 ± 0.0012 % | Mn 0.503 ± 0.017 % |
| Ca 1.691 ± 0.023 % | Cr (0.0030) % | Na (0.0058) % |
| Mg (54.57) % | Fe 3.73 ± 0.06 % | P 0.0267 ± 0.0026 % |
| Al 0.105 ± 0.007 % | K (0.0020) % | Ti 0.0081 ± 0.0012 % |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|

### ECRM-B 752-1 — Limestone - powder — 100 g

Year of issue: 1984

Certified values

| | | |
|---|---|---|
| $SiO_2$ 0.70 % | $Fe_2O_3$ 0.045 % | S 0.007 % |
| CaO 55.4 % | $K_2O$ 0.02 % | SrO 0.019 % |
| MgO 0.15 % | MnO 0.010 % | $TiO_2$ 0.009 % |
| $Al_2O_3$ 0.12 % | $Na_2O$ (0.02) % | L.O.I* 43.4 % |
| BaO 0.006 % | $P_2O_5$ (0.0055) % | |

* Loss On Ignition

### ECRM-B 776-1 — Firebrick - powder — 100 g

Year of issue: 1983

Certified values

| | | |
|---|---|---|
| Si 29.34 ± 0.18 % | BaO 0.122 ± 0.011 % | Na 0.362 ± 0.015 % |
| $SiO_2$ 62.76 ± 0.39 % | Cr 0.015 ± 0.002 % | $Na_2O$ 0.488 ± 0.020 % |
| Ca 0.221 ± 0.013 % | $Cr_2O_3$ 0.022 ± 0.003 % | P 0.027 ± 0.003 % |
| CaO 0.310 ± 0.018 % | Fe 0.999 ± 0.017 % | $P_2O_5$ 0.062 ± 0.007 % |
| Mg 0.287 ± 0.010 % | $Fe_2O_3$ 1.43 ± 0.02 % | Ti 0.969 ± 0.015 % |
| MgO 0.476 ± 0.016 % | K 2.42 ± 0.05 % | $TiO_2$ 1.62 ± 0.03 % |
| Al 15.50 ± 0.12 % | $K_2O$ 2.92 ± 0.07 % | Zr (0.030) % |
| $Al_2O_3$ 29.28 ± 0.22 % | Li 0.009 ± 0.001 % | L.O.I.* (0.3) % |
| Ba 0.109 ± 0.010 % | $Li_2O$ 0.019 ± 0.002 % | |

(Values in parenthesis are indicative values)

* Loss On Ignition

### ECRM-B 781-1 — Silicon carbide refractory with 35.6% silicon and 48.3% carbon - powder — 100 g

Year of issue: 1993

Certified values

| | | |
|---|---|---|
| Si 35.56 ± 0.28 % | Cfrei (37.22) % | Na (0.0308) % |
| Ca (0.0433) % | Fe (0.806) % | Ni (0.0210) % |
| Mg (0.0421) % | K (0.3765) % | P (0.0117) % |
| Al 4.39 ± 0.04 % | Mn (0.0274) % | Ti (0.0320) % |
| B (0.0149) % | Mo (0.0264) % | V (0.0216) % |
| C 48.25 ± 0.11 % | N (0.0282) % | |

(Values in parenthesis are indicative values)

### ECRM-B 782-1 — Dolomite - powder — 100 g

Year of issue: 1996

Certified values

| | | |
|---|---|---|
| Si 0.124 ± 0.003 %* | B (0.0012) % | P 0.0056 ± 0.0003 %* |
| $SiO_2$ 0.266 ± 0.007 %* | Ba (0.0007) % | $P_2O_5$ 0.0128 ± 0.0007 %* |
| Ca 21.68 ± 0.05 %* | Fe 0.314 ± 0.005 %* | Pb 0.0027 ± 0.0002 %* |
| CaO 30.34 ± 0.07 %* | K 0.0216 ± 0.0013 %* | S (0.0159) % |
| Mg 12.84 ± 0.09 %* | $K_2O$ 0.0260 ± 0.0016 %* | Ti 0.0025 ± 0.0002 %* |
| MgO 21.29 ± 0.15 %* | Mn 0.063 ± 0.002 %* | $TiO_2$ 0.0042 ± 0.0004 %* |
| Al 0.055 ± 0.003 %* | MnO 0.081 ± 0.003 %* | Zn 0.0066 ± 0.0003 %* |
| $Al_2O_3$ 0.104 ± 0.006 %* | Ni (0.0004) % | L.O.I.* 47.25 ± 0.12 %* |

(Values in parenthesis are indicative values)

* 95%-confidence interval

* Loss On Ignition

### ECRM-B 783-1 — Tungsten carbide - powder — 100 g

Year of issue: 2005

Certified values

| | |
|---|---|
| C 6.188 ± 0.011+ % | Fe 0.0022 ± 0.0002+ % |
| $C_{free}$ (0.042) % | O (0.016) % |

(Values in parenthesis are indicative values)

### ECRM-F 701-1 — Calcite - powder — 100 g

Year of issue: 1970

Certified values

| | | |
|---|---|---|
| Si 0.93 ± 0.03 % | Fe 0.73 ± 0.05 % | P 0.022 ± 0.004 % |
| Ca 37.66 ± 0.22 % | K (0.090) % | Pb (< 0.005) % |
| Mg 0.36 ± 0.04 % | Mn 0.022 ± 0.004 % | S 0.040 ± 0.010 % |
| Al 0.29 ± 0.04 % | Mo (< 0.003) % | Ti 0.018 ± 0.003 % |
| C (11.5) % | Na (0.020) % | Zn (< 0.005) % |
| Cr (< 0.002) % | Ni (0.003) % | L.O.I.* 42.4 ± 0.22 % |

(Values in parenthesis are indicative values)

* Loss On Ignition

### ECRM-F 702-1 — Dolomite - powder — 100 g

Year of issue: 1971

Certified values

| | | |
|---|---|---|
| Si 1.04 ± 0.03 % | Al 0.21 ± 0.04 % | P 0.024 ± 0.003 % |
| Ca 21.48 ± 0.27 % | Fe 0.440 ± 0.025 % | S 0.027 ± 0.010 % |
| Mg 12.37 ± 0.33 % | Mn 0.098 ± 0.006 % | Ti 0.013 ± 0.005 % |

| Code | Product | Unit |
|---|---|---|

**ECRM-F 778-1** — High carbon magnesia - powder — 100 g

Year of issue: 1986

Certified values

| | | |
|---|---|---|
| Si 0.489 ± 0.019 % | $B_2O_3$ 0.0039 % | Ni (0.007) % |
| $SiO_2$ 1.046 % | C 14.00 ± 0.22 % | P (0.004) % |
| Ca 0.883 ± 0.024 % | Cr 0.102 ± 0.004 % | Pb (< 0.001) % |
| CaO 1.236 % | $Cr_2O_3$ 0.149 % | $TiO_2$ (0.008) % |
| Mg 48.87 ± 0.27 % | Fe 0.67 ± 0.05 % | Zn (< 0.002) % |
| MgO 81.03 % | K (0.020) % | Zr (< 0.002) % |
| Al 0.297 ± 0.008 % | Mn 0.011 ± 0.001 % | L.O.I.* 15.38 ± 0.14 % |
| $Al_2O_3$ 0.561 % | MnO 0.014 % | |
| B 0.0012 ± 0.0001 % | Na (0.023) % | |

(Values in parenthesis are indicative values)

* Loss On Ignition

**ECRM-F 780-1** — Silicon carbide refractory with 63.5% silicon and 26.4% carbon - powder — 100 g

Year of issue: 1992

Certified values

| | | |
|---|---|---|
| Si 63.5 ± 0.5 % | Cr (0.010) % | Ni (0.015) % |
| Ca 0.84 ± 0.03 % | Fe 1.30 ± 0.06 % | O (5.24) % |
| Mg 0.051 ± 0.011 % | K (0.011) % | P (< 0.010) % |
| Al 1.86 ± 0.06 % | Mn 0.029 ± 0.004 % | Ti (0.050) % |
| C 26.38 ± 0.23 % | N 0.32 ± 0.05 % | V (0.025) % |
| Cfrei (0.563) % | Na (0.050) % | Zr (0.01) % |

(Values in parenthesis are indicative values)

**BCS CRM309** — Sillimanite — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 34.1 % | CaO 0.22 % | BaO (0.006) % |
| $Al_2O_3$ 61.1 % | MgO 0.17 % | $Li_2O$ (0.01) % |
| $TiO_2$ 1.92 % | $Na_2O$ 0.34 % | SrO (0.003) % |
| $Fe_2O_3$ 1.51 % | $K_2O$ 0.46 % | |
| MnO (0.03) % | L.O.I. (0.1) % | |

(Values in parenthesis are indicative values)

**BCS CRM313/1** — High purity silica — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 99.78 % | CaO 0.006 % | L.O.I. (0.1) % |
| $Al_2O_3$ 0.036 % | MgO 0.0013 % | $Cr_2O_3$ (<0.0002) % |
| $TiO_2$ 0.017 % | $Na_2O$ 0.003 % | $Li_2O$ (0.0005) % |
| $Fe_2O_3$ 0.012 % | $K_2O$ 0.005 % | |
| MnO 0.00013 % | $ZrO_2$ (0.002) % | |

(Values in parenthesis are indicative values)

**BCS CRM319/1** — Magnesite — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 1.093 % | CaO 3.00 % | BaO (0.0038) % |
| $Al_2O_3$ 0.109 % | MgO 95.38 % | $Cr_2O_3$ 0.0035 % |
| $TiO_2$ 0.007 % | $P_2O_5$ (0.007) % | SrO (0.006) % |
| $Fe_2O_3$ 0.291 % | $ZrO_2$ (0.0008) % | $Y_2O_3$ (0.0014) % |
| MnO 0.108 % | $B_2O_3$ (0.002) % | Ni (0.0075) % |

(Values in parenthesis are indicative values)

**BCS CRM348** — Ball clay — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 51.1 % | MgO 0.3 % | S (0.1) % |
| $Al_2O_3$ 31.6 % | $Na_2O$ 0.34 % | L.O.I. 11.8 % |
| $TiO_2$ 1.08 % | $K_2O$ 2.23 % | BaO (0.04) % |
| $Fe_2O_3$ 1.04 % | $P_2O_5$ 0.071 % | $Cr_2O_3$ 0.016 % |
| CaO 0.17 % | $ZrO_2$ (0.03) % | C (1.64) % |

(Values in parenthesis are indicative values)

**BCS CRM358** — Zirconia — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 0.2 % | MgO 3.42 % | BaO 0.1 % |
| $Al_2O_3$ 0.08 % | $Na_2O$ (<0.01) % | $HfO_2$ 1.63 % |
| $TiO_2$ 0.2 % | $K_2O$ (<0.01) % | SrO 0.07 % |
| $Fe_2O_3$ 0.064 % | $ZrO_2$ 92.7 % | $ThO_2$ (0.0007) % |
| CaO 1.5 % | L.O.I. 0.08 % | $U_3O_8$ (0.08) % |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| BCS CRM362 | Mine tailings sample | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 9.03 % | $Na_2O$ 0.084 % | BaO (2.02) % |
| $Al_2O_3$ 0.667 % | $K_2O$ 0.14 % | $Cr_2O_3$ (0.003) % |
| $TiO_2$ 0.047 % | PbO 2.63 % | SrO 0.034 % |
| $Fe_2O_3$ 0.483 % | ZnO 2.59 % | C (9.9) % |
| $Mn_3O_4$ 0.829 % | $P_2O_5$ (0.014) % | Cd 0.02 % |
| CaO 44.21 % | S 1.48 % | Ni (0.001) % |
| MgO 0.068 % | L.O.I. 32.81 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM369 | Magnesite-Chrome | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 2.59 % | CaO 1.17 % | $Cr_2O_3$ 17.2 % |
| $Al_2O_3$ 14.7 % | MgO 53.5 % | $Li_2O$ 0.03 % |
| $TiO_2$ 0.14 % | $Na_2O$ 0.05 % | SrO (<0.01) % |
| $Fe_2O_3$ 10.3 % | $K_2O$ 0.03 % | Ni (0.15) % |
| MnO 0.11 % | BaO (<0.01) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM370 | Magnesite-Chrome | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 3.01 % | CaO 1.54 % | $Cr_2O_3$ 13.4 % |
| $Al_2O_3$ 12.3 % | MgO 61.8 % | $Li_2O$ 0.03 % |
| TiO2 0.13 % | $Na_2O$ 0.06 % | SrO <0.01 % |
| $Fe_2O_3$ 7.23 % | $K_2O$ 0.03 % | Ni 0.08 % |
| MnO 0.11 % | BaO <0,01 % | |

| | | |
|---|---|---|
| BCS CRM375/1 | Soda feldspar | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 69.26 % | K2O 1.47 % | $Cr_2O_3$ (0.0018) % |
| $Al_2O_3$ 17.89 % | PbO (0.0004) % | $HfO_2$ (0.0004) % |
| $TiO_2$ 0.313 % | ZnO (0.0005) % | SrO (0.012) % |
| $Fe_2O_3$ 0.291 % | $P_2O_5$ 0.226 % | $ThO_2$ (0.0011) % |
| CaO 0.78 % | $ZrO_2$ (0.0107) % | $U_3O_8$ (0.0002) % |
| MgO 0.18 % | L.O.I. 0.72 % | $Y_2O_3$ (0.0023) % |
| $Na_2O$ 8.89 % | BaO (0.0106) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM376/1 | Potash feldspar | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 65.77 % | CaO 0.421 % | $P_2O_5$ (0.02) % |
| $Al_2O_3$ 18.63 % | MgO (0.03) % | $ZrO_2$ (<0.01) % |
| $TiO_2$ (<0.01) % | $Na_2O$ 3.00 % | L.O.I. 0.203 % |
| $Fe_2O_3$ 0.085 % | $K_2O$ 11.59 % | BaO 0.021 % |
| $Mn_3O_4$ (0.004) % | PbO 0.009 % | $Cr_2O_3$ 0.001 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM388 | Zircon | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 32.7 % | MgO (<0.05) % | L.O.I. (0.2) % |
| $Al_2O_3$ 0.291 % | $Na_2O$ (<0.02) % | $HfO_2$ 1.3 % |
| $TiO_2$ 0.232 % | $K_2O$ (<0.03) % | $ThO_2$ 0.018 % |
| $Fe_2O_3$ 0.049 % | $P_2O_5$ 0.12 % | $U_3O_8$ 0.034 % |
| CaO (0.04) % | $ZrO_2$ 64.9 % | $Y_2O_3$ 0.136 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM389/1 | High purity magnesia | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 0.274 % | MgO 97.89 % | $Cr_2O_3$ 0.004 % |
| $Al_2O_3$ 0.104 % | ZnO (0.0029) % | SrO 0.0007 % |
| $TiO_2$ 0.0051 % | $P_2O_5$ 0.0295 % | $Y_2O_3$ 0.0029 % |
| $Fe_2O_3$ 0.607 % | $ZrO_2$ (0.0008) % | Ni 0.0012 % |
| MnO 0.1 % | $B_2O_3$ 0.015 % | |
| CaO 0.88 % | BaO 0.0015 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM394 | Calcined bauxite | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 4.98 % | MgO 0.12 % | L.O.I. (0.4) % |
| $Al_2O_3$ 88.8 % | $Na_2O$ 0.02 % | $Cr_2O_3$ (0.08) % |
| $TiO_2$ 3.11 % | $K_2O$ 0.02 % | $Li_2O$ <0.01 % |
| $Fe_2O_3$ 1.9 % | $P_2O_5$ 0.22 % | |
| CaO 0.08 % | $ZrO_2$ (0.159) % | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| BCS CRM396 | Low silica magnesite chrome | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 1.37 % | CaO 1.12 % | $B_2O_3$ 0.09 % |
| $Al_2O_3$ 5.73 % | MgO 64.6 % | $Cr_2O_3$ 15.6 % |
| $TiO_2$ 0.26 % | $Na_2O$ (0.06) % | $Li_2O$ (0.05) % |
| $Fe_2O_3$ 10.9 % | $K_2O$ (0.03) % | |
| MnO 0.17 % | L.O.I. (0.04) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM512 | Dolomite | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 0.379 % | $K_2O$ (<0.02) % | SrO 0.024 % |
| $Al_2O_3$ 0.055 % | PbO (<0.001) % | As (<0.003) % |
| $TiO_2$ 0.002 % | ZnO (<0.01) % | C (12.4) % |
| $Fe_2O_3$ 0.03 % | $P_2O_5$ (<0.02) % | Cd (<0.0003) % |
| MnO 0.0036 % | S (<0.05) % | F (0.01) % |
| CaO 30.61 % | L.O.I. 46.8 % | Ni (<0.001) % |
| MgO 21.59 % | BaO (<0.02) % | |
| $Na_2O$ (0.1) % | $Cr_2O_3$ (<0.001) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM513 | Limestone | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 0.228 % | $K_2O$ 0.015 % | SrO 0.0176 % |
| $Al_2O_3$ 0.108 % | PbO 0.0009Pb % | As <0.001 % |
| $TiO_2$ (0.004) % | ZnO 0.0014Zn % | C 11.9 % |
| $Fe_2O_3$ 0.0275 % | $P_2O_5$ (0.005) % | Cd <0.001 % |
| MnO 0.0095 % | S 0.0097 % | F 0.002 % |
| CaO 55.59 % | L.O.I. 43.61 % | Ni <0.001 % |
| MgO 0.182 % | BaO 0.01 % | |
| $Na_2O$ (<0.3) % | $Cr_2O_3$ 0.0012 % | |

(Values in parenthesis are indicative values)

## Slags

| | | |
|---|---|---|
| ECRM-D 826-1 | Phosphate slag - powder | 100 g |

Year of issue: 1976

Certified values

| | | |
|---|---|---|
| $SiO_2$ 8.96 ± 0.15 % | Cr 0.182 ± 0.005 % | Na 0.375 ± 0.009 % |
| Al 0.696 ± 0.008 % | Cu (0.0019) % | Ni (0.0017) % |
| CaO 46.48 ± 0.54 % | F (0.3667) % | Pb (0.0049) % |
| MgO (2.46) % | $Fe_{total}$ (20.73) % | V 0.503 ± 0.008 % |
| $P_2O_5$ 14.65 ± 0.15 % | K 0.0278 ± 0.0017 % | $V_2O_5$ (0.89) % |
| $P_2O_5$ citric acid sol. 10.73 ± 0.14 % | $Mn_{total}$ (3.46) % | |
| B (0.0029) % | Mo (0.0011) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-D 827-1 | Thomas phosphate - powder | 100 g |

Year of issue: 1976

Certified values

| | | |
|---|---|---|
| $SiO_2$ 6.21 ± 0.15 % | $P_2O_5$ 20.70 ± 0.16 % | $Mn_{total}$ (2.34) % |
| $Al_2O_3$ (0.57) % | $P_2O_5$ citric acid sol. 18.79 ± 0.22 % | $V_2O_5$ (1.15) % |
| CaO 47.38 ± 0.49 % | $Cr_2O_3$ (0.14) % | |
| MgO (3.70) % | $Fe_{total}$ (15.72) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 851-1 | Basic slag - powder | 100 g |

Year of issue: 1979

Certified values

| | | |
|---|---|---|
| Si 6.09 % | F 0.10 % | Pb (0.0028) % |
| Al 2.0 % | Fe 19.9 % | S 0.37 % |
| Ca 28.66 % | K 0.0089 % | Ti 0.25 % |
| Mg 2.25 % | Mn 6.17 % | V 0.13 % |
| P 1.33 % | Mo (0.0050) % | Zn 0.0141 % |
| B (0.0144) % | Na 0.061 % | |
| Cr 0.55 % | Ni (0.0037) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-B 877-1 | Furnace dust - powder | 100 g |

Year of issue: 1977

Certified values

| | | |
|---|---|---|
| Si 1.08 ± 0.05 % | Cr 0.017 ± 0.001 % | Pb 1.00 ± 0.03 % |
| Al 0.044 ± 0.003 % | F 0.78 ± 0.05 % | S 0.18 ± 0.01 % |
| Ca 3.23 ± 0.11 % | Fe 62.07 ± 0.35 % | Ti 0.032 ± 0.003 % |
| Mg 0.28 ± 0.01 % | K 0.058 ± 0.003 % | V 0.029 ± 0.003 % |
| P 0.18 ± 0.01 % | Mn 1.37 ± 0.02 % | Zn 1.16 ± 0.04 % |
| As 0.014 ± 0.002 % | Na 0.23 ± 0.02 % | |
| C 0.83 ± 0.02 % | Ni 0.010 ± 0.001 % | |

| Code | Product | Unit |
|---|---|---|
| ECRM-B 879-1 | Basic slag - powder | 100 g |

Year of issue: 1980

Certified values

| | | |
|---|---|---|
| Si 4.12 ± 0.03 % | P 3.69 ± 0.03 % | Mn 3.45 ± 0.04 % |
| $SiO_2$ 8.82 % | P $_{citric\ acid\ sol.}$ 3.31 ± 0.10 % | MnO 4.45 % |
| Al 0.425 ± 0.016 % | $P_2O_5$ 8.46 % | S 0.102 ± 0.008 % |
| $Al_2O_3$ 0.803 % | $P_2O_5$ $_{citric\ acid\ sol.}$ 7.59 % | Ti 0.321 ± 0.005 % |
| Ca 31.23 ± 0.26 % | Cr 0.326 ± 0.013 % | $TiO_2$ 0.535 % |
| CaO 43.70 % | $Cr_2O_3$ 0.477 % | V 0.414 ± 0.012 % |
| Mg 1.32 ± 0.03 % | F 0.368 ± 0.035 % | $V_2O_5$ 0.738 % |
| MgO 2.19 % | Fe 18.97 ± 0.19 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BCS CRM381 | Basic slag | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ 8.78 % | CaO 49 % | $P_2O_{5Cit\ Sol}$ 15.2 % |
| $TiO_2$ 0.35 % | MgO 1.03 % | $P_2O_{5Total}$ 15.7 % |
| $Al_2O_3$ 0.67 % | $Cr_2O_3$ 0.33 % | S 0.19 % |
| Fe 13.3 % | MnO 3.16 % | |
| FeO 3.69 % | $V_2O_5$ 0.94 % | |

| | | |
|---|---|---|
| ECRM-F 802-1 | Blast furnace slag - powder | 100 g |

Year of issue: 1971

Certified values

| | | |
|---|---|---|
| Si 15.16 ± 0.14 % | Cr 0.0053 ± 0.0004 %* | Pb (0.0015) % |
| Al 8.53 ± 0.31 % | F 0.243 ± 0.008 %* | S 0.714 ± 0.036 % |
| Ca 30.62 ± 0.27 % | Fe 0.576 ± 0.021 % | Ti 0.366 ± 0.018 % |
| Mg 2.87 ± 0.17 % | K 0.491 ± 0.006 %* | V 0.028 ± 0.002 %* |
| P 0.109 ± 0.011 % | Mn 0.460 ± 0.016 % | Zn 0.0025 ± 0.0005 %* |
| B 0.0245 ± 0.003 %* | Na 0.236 ± 0.004 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-F 803-1 | Blast furnace slag - powder | 100 g |

Year of issue: 1971

Certified values

| | | |
|---|---|---|
| Si 17.01 ± 0.13 % | Mg 2.44 ± 0.19 % | Mn 0.552 ± 0.004 % |
| Al 6.98 ± 0.28 % | P 0.118 ± 0.011 % | S 0.767 ± 0.044 % |
| Ca 30.93 ± 0.25 % | Fe 0.613 ± 0.025 % | Ti 0.301 ± 0.017 % |

| | | |
|---|---|---|
| ECRM-F 804-1 | Basic slag - powder | 100 g |

Year of issue: 1971

Certified values

| | | |
|---|---|---|
| Si 2.59 ± 0.09 % | P 7.67 ± 0.10 % | Ti 0.152 ± 0.014 % |
| Al (0.407) % | Fe 11.92 ± 0.27 % | V 0.460 ± 0.024 % |
| Ca 36.88 ± 0.34 % | Mn 1.48 ± 0.04 % | |
| Mg 0.88 ± 0.15 % | S 0.127 ± 0.015 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-F 805-1 | Basic slag - powder | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| Si 3.10 ± 0.04 % | P 7.07 ± 0.05 % | Ti 0.205 ± 0.008 % |
| Al 0.326 ± 0.013 % | Fe 14.87 ± 0.07 % | V 0.514 ± 0.009 % |
| Ca 34.96 ± 0.12 % | Mn 1.59 ± 0.03 % | |
| Mg 1.12 ± 0.05 % | S 0.092 ± 0.005 % | |

| | | |
|---|---|---|
| ECRM-F 806-1 | Basic slag - powder | 100 g |

Year of issue: 1972

Certified values

| | | |
|---|---|---|
| Si 5.48 ± 0.06 % | P 0.982 ± 0.022 % | Ti 0.302 ± 0.008 % |
| Al 0.477 ± 0.020 % | Fe 17.89 ± 0.10 % | V 0.288 ± 0.009 % |
| Ca 32.97 ± 0.19 % | Mn 4.60 ± 0.06 % | |
| Mg 1.82 ± 0.06 % | S 0.110 ± 0.004 % | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| ECRM-F 876-1 | Electric furnace dust - powder<br>Year of issue: 1977<br>Certified values<br>Si 1.72 ± 0.04 %, $SiO_2$ 3.67 %, Al 0.34 ± 0.03 %, $Al_2O_3$ 0.63 %, Ca 3.43 ± 0.13 %, CaO 4.80 %, Mg 1.31 ± 0.03 %, MgO 2.17 %, P 0.128 ± 0.007 %, As 0.023 ± 0.001 %, C 0.26 ± 0.01 %, Cd 0.13 ± 0.01 %, Cl 3.63 ± 0.08 %, Cr 0.17 ± 0.01 %, F 0.24 ± 0.03 %, Fe 24.85 ± 0.17 %, K 1.63 ± 0.06 %, $K_2O$ 1.96 %, Mn 2.84 ± 0.04 %, MnO 3.67 %, Na 1.98 ± 0.07 %, $Na_2O$ 2.67 %, Ni 0.034 ± 0.003 %, Pb 7.82 ± 0.23 %, S 0.87 ± 0.07 %, Sn 0.094 ± 0.004 %, Ti 0.048 ± 0.004 %, $TiO_2$ 0.080 %, Zn 23.29 ± 0.32 %<br>(Values in parenthesis are indicative values) | 100 g |
| ECRM-F 878-1 | Blast furnace slag - powder<br>Year of issue: 1977<br>Certified values<br>Si 15.77 ± 0.08 %, $SiO_2$ 33.73 %, Al 8.45 ± 0.10 %, $Al_2O_3$ 15.97 %, Ca 25.46 ± 0.13 %, CaO 35.63 %, Mg 5.80 ± 0.07 %, MgO 9.62 %, P 0.013 ± 0.001 %, $P_2O_5$ 0.029 %, F 0.15 ± 0.01 %, Fe 0.60 ± 0.03 %, K 1.07 ± 0.03 %, $K_2O$ 1.29 %, Mn 0.99 ± 0.01 %, MnO 1.28 %, Na 0.35 ± 0.02 %, $Na_2O$ 0.47 %, S 0.83 ± 0.02 %, Ti 0.37 ± 0.01 %, $TiO_2$ 0.62 %<br>(Values in parenthesis are indicative values) | 100 g |

## Steel with oxygen and nitrogen content

| | | |
|---|---|---|
| ECRM-D 026-1 | Rolled wire for the determination of oxygen and nitrogen - rods<br>Year of issue: 1969<br>Certified values<br>O 0.0031 ± 0.0003 %, N 0.0053 ± 0.0004 % | 100 g |
| ECRM-D 026-1-S | Rolled wire for the determination of oxygen and nitrogen - set rods | 5 x 100 g |
| ECRM-D 026-2 | Rolled wire for the determination of oxygen and nitrogen - rod<br>Year of issue: 1973<br>Certified values<br>O 0.0025 ± 0.0004 %, N 0.0042 ± 0.0003 % | 100 g |
| ECRM-D 026-2-S | Rolled wire for the determination of oxygen and nitrogen - set rod | 5 x 100 g |
| ECRM-D 027-1 | Rolled wire for the determination of oxygen and nitrogen - rod<br>Year of issue: 1970<br>Certified values<br>O 0.0084 ± 0.0006 %, N 0.0157 ± 0.0010 % | 100 g |
| ECRM-D 027-1-S | Rolled wire for the determination of oxygen and nitrogen - set rod | 5 x 100 g |
| ECRM-D 028-1 | Rolled wire for the determination of oxygen and nitrogen - rod<br>Year of issue: 1970<br>Certified values<br>O 0.0113 ± 0.0007 %, N 0.0029 ± 0.0005 % | 100 g |
| ECRM-D 028-1-S | Rolled wire for the determination of oxygen and nitrogen - set rod | 5 x 100 g |
| ECRM-D 029-1 | Rolled wire for the determination of oxygen and nitrogen - rod<br>Year of issue: 1970<br>Certified values<br>O 0.0312 ± 0.0010 %, N 0.0083 ± 0.0008 % | 100 g |
| ECRM-D 029-1-S | Rolled wire for the determination of oxygen and nitrogen - set rod | 5 x 100 g |
| ECRM-D 099-1 | Ball bearing steel for the determination of oxygen and nitrogen<br>Year of issue: 1987<br>Certified values<br>O 0.0008 ± 0.0002 %, N 0.0078 ± 0.0005 % | 100 g |

## Non ferrous metals and alloys

| Code | Product | Unit |
|---|---|---|
| ECRM-D 284-2 | Stainless steel, 17% chromium, 11% nickel and 2% molybdenum, no. 1.4571 - chips<br>Year of issue: 2000<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.0201 ± 0.0005 %* | Al ..... 0.0027 ± 0.0004 %* | Ti ..... 0.191 ± 0.004 %* |
| Si ..... 0.537 ± 0.008 %* | As ..... 0.0063 ± 0.0003 %* | V ..... 0.0425 ± 0.0016 %* |
| Mn ..... 1.745 ± 0.009 %* | B ..... 0.0026 ± 0.0001 %* | W ..... (0.0183) % |
| P ..... 0.0258 ± 0.0008 %* | Co ..... 0.0525 ± 0.0011 %* | Zr ..... (0.0005) % |
| S ..... 0.0237 ± 0.0005 %* | Cu ..... 0.1831 ± 0.0014 %* | O ..... 0.0099 ± 0.0007[1] % |
| Cr ..... 16.811 ± 0.019 %* | N ..... 0.0151 ± 0.0002 %* | Ta ..... (0.0013) % |
| Mo ..... 2.111 ± 0.010 %* | Nb ..... (0.0028) % | |
| Ni ..... 10.72 ± 0.05 %* | Sn ..... 0.0047 ± 0.0002 %* | |

(Values in parenthesis are indicative values)

* 95%-confidence interval
[1] Oxygen content only certified for the chips

| | | |
|---|---|---|
| ECRM-D 286-1 | Stainless steel, 18% chromium, 8.5% nickel, 0.3% molybdenum and 0.3% sulfur, no. 1.4305 - chips<br>Year of issue: 1985<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 0.100 ± 0.005 | Mo ..... 0.329 ± 0.009 % | N ..... 0.043 ± 0.002 % |
| Mn ..... 1.92 ± 0.03 % | Ni ..... 8.54 ± 0.04 % | Pb ..... (0.0003) % |
| P ..... 0.026 ± 0.002 % | Al ..... (0.0023) % | Sn ..... 0.0084 ± 0.0009 % |
| S ..... 0.280 ± 0.014 % | B ..... (0.0003) % | O ..... (0.0315) % |
| Cr ..... 18.13 ± 0.08 % | Co ..... 0.150 ± 0.008 % | Sb ..... 0.0014± 0.0004 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| ECRM-S 274-1 | Vanadium steel - chips<br>Year of issue: 2004<br>Certified values | 100 g |

| | | |
|---|---|---|
| C ..... 1.563 ± 0.006 %* | Ni ..... 0.077 ± 0.002 %* | Pb ..... (0.0064) % |
| Si ..... 1.057 ± 0.008 %* | Al ..... (0.0025) % | Sn ..... (0.010) % |
| Mn ..... 0.397 ± 0.004 %* | As ..... (0.0013) % | Ti ..... (0.0011) % |
| P ..... 0.0148 ± 0.0005 %* | B ..... (0.0005) % | V ..... 4.010 ± 0.018 %* |
| S ..... 0.0096 ± 0.0004 %* | Co ..... (0.0229) % | W ..... 0.0087 ± 0.0007 %* |
| Cr ..... 8.036 ± 0.022 %* | Cu ..... 0.0281 ± 0.0005 %* | O ..... 0.0026 ± 0.0002+1) % |
| Mo ..... 1.455 ± 0.016 %* | N ..... 0.0769 ± 0.0010 %* | Sb ..... (0.00019) % |

(Values in parenthesis are indicative values)

* 95%-confidence interval

| | | |
|---|---|---|
| ECRM-S 274-1-D | Vanadium steel - disc (38 mm x 25 mm) | disc |

## Setting-up sample for spectrometric analysis of low alloyed steels

| | | |
|---|---|---|
| BAM SUS-1 R | Setting-up sample for spectrometric analysis of low alloyed steels<br>Uncertified mass fractions | cylinder |

| | | |
|---|---|---|
| C ..... 0.9 % | Cr ..... 1.7 % | Cu ..... 0.7 % |
| Si ..... 0.8 % | Mo ..... 0.9 % | Co ..... 0.3 % |
| Mn ..... 1.1 % | Ni ..... 2.9 % | Nb ..... 0.55 % |
| P ..... 0.02 % | V ..... 0.5 % | |
| S ..... 0.017 % | W ..... 0.7 % | |

# Non ferrous metals and alloys

## Aluminium base standards

| Code | Product | Unit |
|---|---|---|
| BAM-M315 | Aluminium alloy AlSi9Cu3<br>Year of issue: 2006<br>Certified values | disc |

| | | |
|---|---|---|
| Si ..... 9.18 ± 0.21 % | B ..... (< 3) µg/g | Na ..... (~ 15) µg/g ** |
| Fe ..... 0.59 ± 0.02 % | Be ..... 5 ± 2 µg/g | P ..... (13 ± 7) µg/g |
| Cu ..... 2.51 ± 0.09 % | Bi ..... 41 ± 7 µg/g | Pb ..... 0.079 ± 0.004 |
| Mn ..... 0.314 ± 0.007 % | Ca ..... (~ 15) µg/g **) | Sb ..... (32 ± 24) µg/g |
| Mg ..... 0.422 ± 0.012 % | Cd ..... 11 ± 4 µg/g | Sn ..... 0.0771 ± 0.0025 % |
| Cr ..... 0.0311 ± 0.0007 % | Co ..... (< 3) µg/g | Sr ..... (~ 70) µg/g ** |
| Ni ..... 0.096 ± 0.003 % | Ga ..... 101 ± 5 µg/g | V ..... 54 ± 2.5 µg/g |
| Zn ..... 0.77 ± 0.02 % | Hg ..... (33 ± 2) µg/g | Zr ..... 30 ± 7 µg/g |
| Ti ..... 0.143 ± 0.005 % | Li ..... (~ 7) µg/g ** | |

(Values in parenthesis are indicative values)

** the given values are average values. the exact value must be calculated for each single sample

| Code | Product | Unit |
|---|---|---|
| BAM-307 | Aluminium alloy AlMg4,5Mn - disc (60 mm x 25 mm) | disc |

Year of issue: 1990

Certified values

| | | |
|---|---|---|
| Si ..... 0.155 ± 0.005 % | Cr ..... 0.162 ± 0.003 % | Cd ..... 0.00489 ± 0.00009 % |
| Fe ..... 0.412 ± 0.004 % | Zn ..... 0.0634 ± 0.0006 % | Li ..... 0.00044 ± 0.00003 % |
| Cu ..... 0.1043 ± 0.0012 % | Ti ..... 0.1009 ± 0.0012 % | Na ..... 0.00214 ± 0.00008 % |
| Mn ..... 0.701 ± 0.004 % | Be ..... 0.0011 ± 0.00003 % | |
| Mg ..... 4.576 ± 0.021 % | Ca ..... 0.00053 ± 0.00005 % | |

| | | |
|---|---|---|
| BAM-308 | Aluminium alloy AlZnMgCu1,5 - disc (60 mm x 25 mm) | disc |

Year of issue: 1990

Certified values

| | | |
|---|---|---|
| Si ..... 0.0707 ± 0.0024 % | Mg ..... 2.290 ± 0.013 % | Ti ..... 0.0285 ± 0.0009 % |
| Fe ..... 0.1634 ± 0.0027 % | Cr ..... 0.1962 ± 0.0024 % | Be ..... 0.00022 ± 0.00001 % |
| Cu ..... 1.315 ± 0.011 % | Ni ..... 0.0122 ± 0.0004 % | Zr ..... 0.0078 ± 0.0004 % |
| Mn ..... 0.0342 ± 0.0009 % | Zn ..... 5.67 ± 0.04 % | |

| | | |
|---|---|---|
| BAM-310 | Aluminium alloy Al99,85Mg1 - disc (60 mm x 25 mm) | disc |

Year of issue: 1993

Certified values

| | | |
|---|---|---|
| Si ..... 0.0797 ± 0.0012 % | Ti ..... 0.00301 ± 0.00011 % | Na ..... (0.0003) % |
| Fe ..... 0.0705 ± 0.0012 % | B ..... (0.0006) % | P ..... (0.0003) % |
| Cu ..... 0.00169 ± 0.00009 % | Be ..... 0.000128 ± 0.000014 % | Pb ..... 0.00347 ± 0.00025 % |
| Mn ..... 0.00307 ± 0.00011 % | Ca ..... 0.00073 ± 0.00004 % | Sn ..... 0.00238 ± 0.00018 % |
| Mg ..... 0.994 ± 0.015 % | Cd ..... 0.00237 ± 0.00007 % | V ..... 0.00444 ± 0.00023 % |
| Cr ..... 0.00090 ± 0.00012 % | Co ..... (0.0009) % | Zr ..... 0.00135 ± 0.00019 % |
| Ni ..... 0.00244 ± 0.00014 % | Ga ..... 0.01152 ± 0.00024 % | |
| Zn ..... 0.0086 ± 0.0004 % | Li ..... 0.000366 ± 0.000012 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-311 | Aluminium alloy AlCuMg2 - disc (60 mm x 25 mm) | disc |

Year of issue: 1993

Certified values

| | | |
|---|---|---|
| Si ..... 0.2040 ± 0.0029 % | Zn ..... 0.2005 ± 0.0022 % | Ga ..... 0.0159 ± 0.0005 % |
| Fe ..... 0.310 ± 0.006 % | Ti ..... 0.0562 ± 0.0006 % | Li ..... 0.00053 ± 0.00005 % |
| Cu ..... 4.653 ± 0.028 % | Be ..... 0.00052 ± 0.00004 % | Na ..... (0.0018) % |
| Mn ..... 0.694 ± 0.006 % | Bi ..... 0.0500 ± 0.0030 % | Pb ..... 0.0504 ± 0.0011 % |
| Mg ..... 1.567 ± 0.014 % | Ca ..... (0.0006) % | Sn ..... 0.0127 ± 0.0012 % |
| Cr ..... 0.1037 ± 0.0014 % | Cd ..... 0.00127 ± 0.00005 % | V ..... 0.0240 ± 0.0008 % |
| Ni ..... 0.0519 ± 0.0009 % | Co ..... 0.00115 ± 0.00010 % | Zr ..... 0.140 ± 0.005 % |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-312 | Aluminium alloy AlMgSi0,5 - disc (60 mm x 25 mm) | disc |

Year of issue: 1995

Certified values

| | | |
|---|---|---|
| Si ..... 0.415 ± 0.006 % | Ni ..... 0.00452 ± 0.00015 % | Pb ..... 0.00439 ± 0.00025 % |
| Fe ..... 0.185 ± 0.004 % | Zn ..... 0.0290 ± 0.0004 % | Sn ..... (0.002) % |
| Cu ..... 0.0419 ± 0.0008 % | Ti ..... 0.0288 ± 0.0004 % | Sr ..... 0.00082 ± 0.00010 % |
| Mn ..... 0.0416 ± 0.0008 % | Bi ..... 0.0023 ± 0.0004 % | V ..... 0.00615 ± 0.00023 % |
| Mg ..... 0.410 ± 0.005 % | Cd ..... 0.00226 ± 0.00010 % | Zr ..... 0.00101 ± 0.00005 % |
| Cr ..... 0.0276 ± 0.0008 % | Ga ..... 0.0115 ± 0.0004 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-314 | Aluminium alloy AlSi11Cu2(Fe) - disc (60 mm x 25 mm) | disc |

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| Si ..... 11.49 ± 0.10 % | Zn ..... 1.195 ± 0.012 % | Ga ..... 0.0154 ± 0.0006 % |
| Fe ..... 0.757 ± 0.007 % | Ti ..... 0.1638 ± 0.0025 % | Pb ..... 0.221 ± 0.006 % |
| Cu ..... 2.071 ± 0.0019 % | As ..... 0.00279 ± 0.00020 % | Sb ..... 0.0093 ± 0.0005 % |
| Mn ..... 0.400 ± 0.003 % | Be ..... 0.000396 ± 0.000021 % | Sn ..... 0.199 ± 0.005 % |
| Mg ..... 0.1805 ± 0.0029 % | Bi ..... 0.0094 ± 0.0004 % | V ..... 0.0192 ± 0.0005 % |
| Cr ..... 0.0517 ± 0.0008 % | Cd ..... 0.00130 ± 0.00005 % | Zr ..... 0.00552 ± 0.00013 % |
| Ni ..... 0.221 ± 0.003 % | Co ..... 0.00532 ± 0.00021 % | |

| | | |
|---|---|---|
| ERM-EB313 | Aluminium alloy AlMg3 - disc (60 mm x 25 mm) (BAM-313) | disc |

Year of issue: 1997

Certified values

| | | |
|---|---|---|
| Si ..... 0.363 ± 0.007 % | As ..... 0.00072 ± 0.00007 % | Na ..... 0.00370 ± 0.00024 % |
| Fe ..... 0.391 ± 0.003 % | Be ..... 0.000547 ± 0.00002 % | Pb ..... 0.00433 ± 0.00028 % |
| Cu ..... 0.0932 ± 0.0014 % | Bi ..... 0.0095 ± 0.0008 % | Sb ..... 0.00087 ± 0.00019 % |
| Mn ..... 0.495 ± 0.003 % | Ca ..... 0.00057 ± 0.00008 % | Sn ..... 0.0197 ± 0.0006 % |
| Mg ..... 3.40 ± 0.04 % | Cd ..... 0.00074 ± 0.00004 % | Tl ..... 0.00064 ± 0.00004 % |
| Cr ..... 0.1224 ± 0.0012 % | Ga ..... 0.0121 ± 0.0005 % | V ..... 0.0299 ± 0.0006 % |
| Ni ..... 0.0278 ± 0.0006 % | Hg ..... 0.00041 ± 0.00004 % | Zr ..... 0.0359 ± 0.0019 % |
| Zn ..... 0.1579 ± 0.0015 % | Li ..... 0.000604 ± 0.00001 % | |
| Ti ..... 0.0947 ± 0.0014 % | Mo ..... 0.00053 ± 0.00012 % | |

## Non ferrous metals and alloys

| Code | Product | Unit |
|---|---|---|
| BAM 201 | Aluminium alloy GAlSi12 - chips | 100 g |

Year of issue: 1963

Certified values

| | | |
|---|---|---|
| Si 13.20 % | Fe 0.18 % | Zn 0.038 % |
| Mg 0.0024 % | Mn 0.38 % | |
| Cu 0.009 % | Ti 0.011 % | |

| | | |
|---|---|---|
| BAM 209 | Aluminium alloy GAlSi10Mg - chips | 100 g |

Year of issue: 1963

Certified values

| | | |
|---|---|---|
| Si 9.65 % | Fe 0.18 % | Zn 0.021 % |
| Mg 0.31 % | Mn 0.36 % | |
| Cu 0.004 % | Ti 0.023 % | |

| | | |
|---|---|---|
| BAM 300 | Aluminium alloy AlMg3 - chips | 100 g |

Year of issue: 1959

Certified values

| | | |
|---|---|---|
| Si 0.14 % | Mn 0.018 % | Ti 0.011 % |
| Mg 2.67 % | Cr 0.23 % | Zn 0.128 % |
| Cu 0.046 % | Pb 0.016 % | |
| Fe 0.203 % | Sn (< 0.0005) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM 301 | Aluminium 99.8 - chips | 100 g |

Year of issue: 1961

Certified values

| | | |
|---|---|---|
| Si 0.061 % | Fe 0.054 % | Ti 0.005 % |
| Mg 0.0008 % | Mn 0.001 % | V 0.0018 % |
| Cu 0.0016 % | Sn (< 0.0005) % | Zn 0.033 % |

(Values in parenthesis are indicative values)

## Copper base standards

| | | |
|---|---|---|
| BAM-M381 | Pure copper - disc (40 mm x 30 mm) | disc |

Year of issue: 2006

Certified values

| | | |
|---|---|---|
| Al (< 1) µg/g | Bi < 0.3 µg/g | Sb < 1 µg/g |
| Ni 0.7 ± 0.2 µg/g | Cd < 0.4 µg/g | Se (< 1) µg/g |
| Fe 3.3 ± 0.2 µg/g | Co < 0.3 µg/g | Si (< 3) µg/g |
| Mn 0.22 ± 0.03 µg/g | Cr < 0.4 µg/g | Sn 3.86 ± 0.25 µg/g |
| Zn 5.3 ± 0.3 µg/g | Mg < 0.6 µg/g | Te (< 0.3) µg/g |
| Ag < 1 µg/g | Pb 0.59 ± 0.07 µg/g | Ti (< 0.3) µg/g |
| As < 0.5 µg/g | S (3.2 ± 1.3) µg/g | Zr < 6 µg/g |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-M382 | Pure copper - disc (40 mm x 30 mm) | disc |

Year of issue: 2006

Certified values

| | | |
|---|---|---|
| Al < 2.5 µg/g | Bi 0.53 ± 0.03 µg/g | Sb 0.7 ± 0.2 µg/g |
| Ni 1.7 ± 0.2 µg/g | Cd 0.90 ± 0.09 µg/g | Se 0.6 ± 0.1 µg/g |
| Fe 6.0 ± 0.4 µg/g | Co 0.73 ± 0.07 µg/g | Si < 6 µg/g |
| Mn 0.76 ± 0.06 µg/g | Cr 0.56 ± 0.06 µg/g | Sn 4.29 ± 0.21 µg/g |
| Zn 6.0 ± 0.5 µg/g | Mg (1.4 ± 0.3) µg/g | Te 0.61 ± 0.06 µg/g |
| Ag 1.8 ± 0.2 µg/g | Pb 1.0 ± 0.2 µg/g | Ti (0.6 ± 0.2) µg/g |
| As (0.6 ± 0.2) µg/g | S (3.2 ± 1.4) µg/g | Zr < 3 µg/g |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-M383 | Pure copper - disc (40 mm x 30 mm) | disc |

Year of issue: 2005

Certified values

| | | |
|---|---|---|
| Al (2.3 ± 0.6) µg/g | Bi 1.02 ± 0.09 µg/g | Sb 1.44 ± 0.17 µg/g |
| Ni 3.59 ± 0.21 µg/g | Cd 1.48 ± 0.15 µg/g | Se (1.16 ± 0.19) µg/g |
| Fe 10.9 ± 0.5 µg/g | Co 1.37 ± 0.05 µg/g | Si < 10 µg/g |
| Mn 1.24 ± 0.05 µg/g | Cr 1.03 ± 0.09 µg/g | Sn 4.7 ± 0.6 µg/g |
| Zn (7.8 ± 0.4) µg/g | Mg 2.37 ± 0.29 µg/g | Te 1.40 ± 0.16 µg/g |
| Ag 4.70 ± 0.20 µg/g | Pb 1.31 ± 0.20 µg/g | Ti 1.56 ± 0.16 µg/g |
| As 1.93 ± 0.15 µg/g | S (2.8 ± 1.4) µg/g | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|
| BAM-M384 | Pure copper - disc (40 mm x 30 mm)<br>Year of issue: 2005<br>Certified values | disc |

| | | |
|---|---|---|
| Al 13.0 ± 0.8 µg/g | Bi 3.34 ± 0.22 µg/g | Sb 12.0 ± 0.4 µg/g |
| Ni 5.7 ± 0.4 µg/g | Cd 3.95 ± 0.09 µg/g | Se 4.24 ± 0.19 µg/g |
| Fe 32.8 ± 1.9 µg/g | Co 3.88 ± 0.16 µg/g | Si (5.0 ± 0.7) µg/g |
| Mn 6.88 ± 0.15 µg/g | Cr 6.53 ± 0.21 µg/g | Sn (10.2 ± 0.9) µg/g |
| Zn (12.7 ± 2.1) µg/g | Mg 14.6 ± 0.5 µg/g | Te 7.0 ± 0.5 µg/g |
| Ag 10.3 ± 0.4 µg/g | Pb 5.7 ± 0.5 µg/g | Ti (2.10 ± 0.23) µg/g |
| As 5.0 ± 0.4 µg/g | S (4.1 ± 1.0) µg/g | Zr < 9 µg/g |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-229 | Copper-alloy CuZn37 - chips<br>Year of issue: 1996<br>Certified values | 100 g |

| | | |
|---|---|---|
| Cu 63.334 ± 0.007% % | Fe 106.1 ± 2.1 µg/g | Sb 7.2 ± 0.7 µg/g |
| Zn 36.63 ± 0.04% % | Ni 111.4 ± 0.9 µg/g | Se 34 ± 4 µg/g |
| Sn 48.5 ± 1.1 µg/g | As 21.7 ± 0.8 µg/g | |
| Pb 192 ± 5 µg/g | P (10.6 ± 1.6) µg/g | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-365 | Refined copper - chips<br>Year of issue: 1996<br>Certified values | 100 g |

| | | |
|---|---|---|
| Cu 99.937 ± 0.012% % | Mn (< 1) µg/g | S (7.7 ± 1.4) µg/g |
| Sn (< 5) µg/g | Ag 102.7 ± 1.7 µg/g | Sb 8.8 ± 0.3 µg/g |
| Pb 28.8 ± 1.3 µg/g | As 29.8 ± 1.0 µg/g | Te 4.6 ± 0.6 µg/g |
| Fe 22.3 ± 1.3 µg/g | Bi 29.4 ± 1.4 µg/g | |
| Ni 175.3 ± 1.5 µg/g | Co 23.6 ± 1.4 µg/g | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-366 | SF-copper - chips<br>Year of issue: 1992<br>Certified values | 100 g |

| | | |
|---|---|---|
| Zn 15.6 ± 1.2 % | Ag 7.9 ± 0.8 % | S 8.7 ± 0.6 % |
| Sn 111 ± 3 % | As 1.11 ± 0.08 % | Sb 0.99 ± 0.10 % |
| Pb 10.8 ± 0.5 % | Bi (< 0.3) % | Se (< 1.1) % |
| Fe 23.4 ± 0.5 % | Cd 0.27 ± 0.04 % | Te (< 0.3) % |
| Ni 3.2 ± 0.7 % | P 263 ± 6 % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-366-D | SF-copper | disc |
| BAM-367 | Copper-alloy CuNi10Fe1Mn - disc (40 mm x 30 mm)<br>Year of issue: 1995<br>Certified values | disc |

| | | |
|---|---|---|
| Cu 87.88 ± 0.04% % | Zn 715 ± 9 % | P 124 ± 6 % |
| Ni 9.72 ± 0.05% % | C 28.7 ± 0.6 % | Pb 298 ± 6 % |
| Fe 1.443 ± 0.012% % | Co 498 ± 3 % | S 162 ± 9 % |
| Mn 0.723 ± 0.005% % | Mg 347 ± 13 % | Sn 105 ± 4 % |

| | | |
|---|---|---|
| BAM-368 | Copper-alloy CuZn20Al2- disc (40 mm x 30 mm)<br>Year of issue: 1993<br>Certified values | disc |

| | | |
|---|---|---|
| Cu 77.049 ± 0.018% % | Mn 202.8 ± 2.4 µg/g | Pb 131.3 ± 2.4 µg/g |
| Al 1.972 ± 0.014% % | As 246 ± 9 µg/g | S (18.5 ± 2.9) µg/g |
| Ni 258 ± 4 µg/g | Mg 62.1 ± 1.5 µg/g | Si 130 ± 7 µg/g |
| Fe 192.7 ± 2.9 µg/g | P 89.9 ± 1.6 µg/g | Sn 147 ± 4 µg/g |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| BAM-369 | OF-copper- disc (40 mm x 30 mm)<br>Year of issue: 1993<br>Certified values | disc |

| | | |
|---|---|---|
| Zn 22.0 ± 0.6 % | Co 10.42 ± 0.29 % | Mg 3.60 ± 0.18 % |
| Bi 9.7 ± 0.4 % | Cr 9.2 ± 0.5 % | |

| | | |
|---|---|---|
| BAM-370 | OF-copper- disc (40 mm x 30 mm)<br>Year of issue: 1993<br>Certified values | disc |

| | | |
|---|---|---|
| Al 12.6 ± 0.8 % | Pb 15.8 ± 1.1 % | Si 18.7 ± 3.0 % |
| P 11.7 ± 0.7 % | Sb 15.6 ± 1.3 % | Sn 16.8 ± 0.9 % |

| | | |
|---|---|---|
| BAM-371 | OF-copper- disc (40 mm x 30 mm)<br>Year of issue: 1995<br>Certified values | disc |

| | | |
|---|---|---|
| Fe 18.3 ± 0.7 % | Cd 1.63 ± 0.08 % | Te 14.4 ± 0.6 % |
| Be 11.5 ± 0.6 % | S 12.1 ± 0.9 % | Ti 12.9 ± 0.7 % |

| Code | Product | Unit |
|---|---|---|
| BAM-372 | OF-copper- disc (40 mm x 30 mm)<br>Year of issue: 1995<br>Certified values | disc |

| | | |
|---|---|---|
| Ni 11.66 ± 0.24 % | Ag 9.01 ± 0.29 % | Se (8.4 ± 0.6) % |
| Mn 11.4 ± 0.4 % | As 10.3 ± 0.6 % | Zr 5.8 ± 0.4 % |

(Values in parenthesis are indicative values)

| | |
|---|---|
| BAM-373/1-3 | E-copper with increasing P-contents - disc (50 mm x 30 mm)<br>Set of BAM-373/1, BAM-373/2 and BAM-373/3<br>Certified values |

BAM-373/1
P 33.8 ± 1.2 µg/g

BAM-373/2
P 226.5 ± 1.7 µg/g

BAM-373/3
P 455.7 ± 1.7 µg/g

set of discs

| | |
|---|---|
| BAM-376 | Pure copper - disc (40 mm x 30 mm)<br>Year of issue: 1996<br>Certified values |

| | | |
|---|---|---|
| Al (181.5 ± 10) % | Bi 200 ± 5 % | Sb 202 ± 5 % |
| Ni 209 ± 6 % | Cd 186.1 ± 2.5 % | Se 210 ± 4 % |
| Fe 234.6 ± 2.7 % | Co 207.9 ± 1.8 % | Sn 247.3 ± 2.9 % |
| Mn 205.9 ± 2.5 % | Cr (400 ± 9) % | Te 215 ± 7 % |
| Zn 217.3 ± 2.7 % | Mg 124 ± 4 % | Ti (4.5 ± 1.7) % |
| Ag 163.0 ± 2.4 % | P 203 ± 5 % | Zr 42.2 ± 1.9 % |
| As 199.9 ± 2.5 % | Pb 236 ± 4 % | |
| Be 40.6 ± 0.9 % | S 133 ± 5 % | |

(Values in parenthesis are indicative values)

disc

| | |
|---|---|
| ERM-EB374 | Copper-alloy CuSn8 - cylinder (40 mm x 30 mm) (BAM-374)<br>Year of issue: 1999<br>Certified values |

| | | |
|---|---|---|
| Cu 92.22 ± 0.04% | Bi (2.2 ± 1.3) µg/g | Sb (6.3 ± 1.4) µg/g |
| Al (< 1) µg/g | Cd (< 1) µg/g | Se (< 2) µg/g |
| Ni 32.7 ± 1.3 µg/g | Co (< 1) µg/g | Si (< 10) µg/g |
| Fe 40 ± 4 µg/g | Cr (< 1) µg/g | Sn 7.60% ± 0.13% |
| Mn 4.3 ± 0.3 µg/g | Mg (< 1) µg/g | Te (< 1) µg/g |
| Zn 40.4 ± 1.9 µg/g | P 0.1697 ± 0.0023% | Ti (< 1) µg/g |
| Ag 12.1 ± 1.3 µg/g | Pb 8.3 ± 0.9 µg/g | Zr (< 1) µg/g |
| As (4.3 ± 1.2) µg/g | S (13 ± 5) µg/g | |

(Values in parenthesis are indicative values)

cylinder

| | |
|---|---|
| ERM-EB375 | Copper-alloy CuZn39Pb3 - cylinder (40 mm x 30 mm) (BAM-375)<br>Year of issue: 1999<br>Certified values |

| | | |
|---|---|---|
| Cu 58.32 ± 0.05 % | Ag 166 ± 4 µg/g | Pb 2.90 ± 0.03 % |
| Al 270 ± 5 µg/g | As 231 ± 4 µg/g | Sb 122 ± 4 µg/g |
| Ni 0.1053 ± 0.0015 % | Bi 68.6 ± 2.5 µg/g | Si 211 ± 14 µg/g |
| Fe 0.207 ± 0.004 % | Cd 85.9 ± 2.1 µg/g | Sn 0.2090 ± 0.0024 % |
| Mn 222 ± 3 µg/g | Co 196.4 ± 2.8 µg/g | Te 53.8 ± 2.4 µg/g |
| Zn 38.02 ± 0.08 % | P (8.6 ± 1.2) µg/g | |

cylinder

| | |
|---|---|
| ERM-EB377 | Copper-alloy CuSn6 - cylinder (40 mm x 30 mm)<br>Year of issue: 1999<br>Certified values |

| | | |
|---|---|---|
| Cu 94.04 ± 0.05 % | Bi 42.2 ± 1.5 µg/g | Sb 13.0 ± 1.3 µg/g |
| Al 45.1 ± 1.2 µg/g | Cd (< 1) µg/g | Se 55 ± 4 µg/g |
| Ni 107.4 ± 1.5 µg/g | Co (< 2) µg/g | Si (134) µg/g |
| Fe 104.2 ± 2.7 µg/g | Cr 66.9 ± 2.1 µg/g | Sn 5.92 ± 0.13 % |
| Mn 92.1 ± 2.1 µg/g | Mg (< 1) µg/g | Te (< 1) µg/g |
| Zn 100.6 ± 3.0 µg/g | P (< 10) µg/g | Ti (< 1) µg/g |
| Ag 64.4 ± 1.1 µg/g | Pb 44.9 ± 2.3 µg/g | |
| As (< 10) µg/g | S (6.8 ± 0.8) µg/g | |

(Values in parenthesis are indicative values)

cylinder

| | |
|---|---|
| ERM-EB378 | Copper-alloy CuSn6 - cylinder (40 mm x 30 mm) (BAM-378)<br>Year of issue: 2000<br>Certified values |

| | | |
|---|---|---|
| Cu 94.13 ± 0.04 % | Bi (< 1) µg/g | Sb 86.1 ± 2.6 µg/g |
| Al (< 1) µg/g | Cd 100.7 ± 2.2 µg/g | Se (< 2) µg/g |
| Ni 18.3 ± 0.9 µg/g | Co 89 ± 5 µg/g | Si (< 10) µg/g |
| Fe 182 ± 7 µg/g | Cr 311 ± 5 µg/g | Sn 5.74 ± 0.21 % |
| Mn (0.74 ± 0.24) µg/g | Mg 28.7 ± 0.8 µg/g | Te 85.0 ± 2.6 µg/g |
| Zn (7.4 ± 1.0) µg/g | P 602 ± 23 µg/g | Ti (29.4 ± 4) µg/g |
| Ag 26.6 ± 1.3 µg/g | Pb 4.2 ± 0.7 µg/g | Zr (1.7 ± 0.09) µg/g |
| As 99.5 ± 2.5 µg/g | S 9.1 ± 1.9 µg/g | |

(Values in parenthesis are indicative values)

cylinder

| Code | Product | Unit |
|---|---|---|

**ERM-EB385** — Pure copper - cylinder (40 mm x 30 mm) (BAM-M385) — cylinder

Year of issue: 2003

Certified values

| | | |
|---|---|---|
| Al 28.6 ± 2.5 µg/g | Cd 5.8 ± 0.3 µg/g | Se 7.2 ± 0.5 µg/g |
| Ni 11.9 ± 0.8 µg/g | Co 6.93 ± 0.15 µg/g | Si (7.2 ± 1.5) µg/g |
| Fe 45.4 ± 1.4 µg/g | Cr 9.81 ± 0.20 µg/g | Sn 18.0 ± 0.9 µg/g |
| Mn 10.1 ± 0.2 µg/g | Mg 29.1 ± 1.3 µg/g | Te 10.0 ± 0.4 µg/g |
| Zn 57.9 ± 4.0 µg/g | P 12.9 ± 1.0 µg/g | Ti 3.83 ± 0.17 µg/g |
| Ag 28.6 ± 0.8 µg/g | Pb 11.3 ± 0.5 µg/g | Zr (< 7) µg/g |
| As 11.4 ± 0.8 µg/g | S 31.3 ± 1.5 µg/g | |
| Bi 5.81 ± 0.17 µg/g | Sb 19.9 ± 0.8 µg/g | |

(Values in parenthesis are indicative values)

**ERM-EB386** — Pure copper- cylinder (40 mm x 30 mm) (BAM-M386) — cylinder

Year of issue: 2003

Certified values

| | | |
|---|---|---|
| Al 36.5 ± 2.5 µg/g | Cd 7.8 ± 0.4 µg/g | Se 11.6 ± 0.3 µg/g |
| Ni 25.0 ± 1.0 µg/g | Co 5.20 ± 0.14 µg/g | Si (14.3 ± 4.3) µg/g |
| Fe 64.7 ± 1.8 µg/g | Cr 12.4 ± 0.7 µg/g | Sn 28.3 ± 0.8 µg/g |
| Mn 13.3 ± 0.2 µg/g | Mg 36.1 ± 1.2 µg/g | Te 38.3 ± 0.9 µg/g |
| Zn 49.5 ± 1.6 µg/g | P 7.2 ± 0.7 µg/g | Ti 33.1 ± 1.3 µg/g |
| Ag 47.4 ± 1.2 µg/g | Pb 23.4 ± 1.2 µg/g | Zr (8.9 ± 1.7) µg/g |
| As 24.2 ± 1.0 µg/g | S 21.9 ± 2.1 µg/g | |
| Bi 9.6 ± 0.5 µg/g | Sb 31.2 ± 1.1 µg/g | |

(Values in parenthesis are indicative values)

**ERM-EB387** — Copper alloy CuZn20Ni5 - cylinder (40 mm x 30 mm) (BAM-M387) — cylinder

Year of issue: 2004

Certified values

| | | |
|---|---|---|
| Cu 75.18 ± 0.04 % | Mn 796 ± 6 µg/g | Sn 30.1 ± 1.2 µg/g |
| Ni 5.020 ± 0.025 % | Zn 19.57 ± 0.06 % | |
| Fe 617 ± 10 µg/g | Pb 10.8 ± 0.8 µg/g | |

**ERM-EB388** — Copper alloy CuAl5Zn5Sn - cylinder (40 mm x 30 mm) (BAM-M388) — cylinder

Year of issue: 2004

Certified values

| | | |
|---|---|---|
| Cu 89.27 ± 0.05 % | Fe 303 ± 9µg/g | Pb 9.69 ± 0.83 µg/g |
| Al 4.972 ± 0.024 % | Mn 512 ± 6 µg/g | Sn 0.857 ± 0.011 % |
| Ni 73.6 ± 2.0 µg/g | Zn 4.81 ± 0.03 % | |

**BAM 211** — Copper-alloy G-SnBz10 — 100 g

Year of issue: 1974

Certified values

| | | |
|---|---|---|
| Cu 87.71 ± 0.03 % | Ni 0.122 ± 0.002 % | Cd 0.00144 ± 0.00005 % |
| Sn 10.60* ± 0.04 % | Mn 0.0019 ± 0.0002 % | P 0.0267 ± 0.0005 % |
| Zn 0.56 ± 0.02 % | Ag 0.059 ± 0.002 % | S 0.0211 ± 0.0006 % |
| Pb 0.74 ± 0.02 % | As 0.0213 ± 0.0008 % | Sb 0.033 ± 0.001 % |
| Fe 0.110 ± 0.003 % | Bi 0.0020 ± 0.0002 % | Se 0.00114 ± 0.00005 % |

**BAM 223** — Copper-alloy CuZn39Pb2 — 100 g

Year of issue: 1974

Certified values

| | | |
|---|---|---|
| Cu 58.74 ± 0.02 % | Ni 0.0214 ± 0.0005 % | P 0.0003 ± 0.00015 % |
| Sn 0.089 ± 0.004 % | Mn (< 0.001) % | S 0.0011 ± 0.0001 % |
| Zn 38.82 ± 0.09 % | Al (< 0.002) % | Sb 0.0040 ± 0.0002 % |
| Pb 2.13 ± 0.02 % | As 0.0084 ± 0.0005 % | Se (< 0.0001) % |
| Fe 0.091 ± 0.002 % | Bi 0.0018 ± 0.0001 % | Si (< 0.003) % |

(Values in parenthesis are indicative values)

**BAM 224** — Copper-alloy CuZn40MnPb — 100 g

Year of issue: 1975

Certified values

| | | |
|---|---|---|
| Cu 57.40 ± 0.02 % | Ni 0.038 ± 0.001 % | P 0.0112 ± 0.0002 % |
| Sn 0.066 ± 0.003 % | Mn 1.70 ± 0.03 % | S 0.0004 ± 0.0001 % |
| Zn 39.40 ± 0.04 % | Al 0.0012 ± 0.0002 % | Sb 0.0026 ± 0.0001 % |
| Pb 1.13 ± 0.04 % | As 0.0025 ± 0.0002 % | Si (0.002) % |
| Fe 0.136 ± 0.002 % | Bi 0.0006 ± 0.0001 % | |

**BAM 227** — Copper-alloy Rg7 — 100 g

Year of issue: 1979

Certified values

| | | |
|---|---|---|
| Cu 85.57 ± 0.03 % | Ni 0.284 ± 0.003 % | S 0.122 ± 0.005 % |
| Sn 6.01 ± 0.07 % | Al (< 0.0001) % | Sb 0.160 ± 0.002 % |
| Zn 3.46 ± 0.03 % | As 0.081 ± 0.002 % | Se 0.0028 ± 0.0002 % |
| Pb 4.12 ± 0.04 % | Bi 0.0088 ± 0.0002 % | Si (< 0.01) % |
| Fe 0.129 ± 0.002 % | P (0.0002) % | Te 0.0012 ± 0.0003 % |

(Values in parenthesis are indicative values)

## Non ferrous metals and alloys

| Code | Product | Unit |
|---|---|---|
| BAM 228 | Copper-alloy Rg10<br>Year of issue: 1979<br>Certified values<br>Cu ..... 85.34 ± 0.03 %<br>Sn ..... 9.76 ± 0.05 %<br>Zn ..... 3.32 ± 0.05 %<br>Pb ..... 1.24 ± 0.03 %<br>Fe ..... 0.036 ± 0.002 %<br>Ni ..... 0.109 ± 0.005 %<br>Mn ..... (< 0.001) %<br>Al ..... (0.0001) %<br>As ..... 0.024 ± 0.001 %<br>Bi ..... 0.0086 ± 0.0003 %<br>P ..... 0.019 ± 0.001 %<br>S ..... 0.036 ± 0.002 %<br>Sb ..... 0.078 ± 0.001 %<br>Se ..... 0.0012 ± 0.0001 %<br>(Values in parenthesis are indicative values) | 100 g |
| BCR-017A | Copper - Sulphur and phosphorous<br>42 mm diameter x 30 mm disc<br>Certified values<br>P ..... 6.85 mg/kg<br>S ..... 10.4 mg/kg | 370 g |
| BCR-017B | Copper - Sulphur and phosphorous<br>Chips (bottle with 50 g) | 50 g |

## Oxygen in copper

| | | |
|---|---|---|
| BAM-379/1 | Oxygen in copper - disc (40 mm x 30 mm)<br>Certified value<br>O ..... 38 ± 4 µg/g | disc |
| BAM-379/2 | Oxygen in copper - disc (40 mm x 30 mm)<br>Certified value<br>O ..... 212 ± 8 µg/g | disc |
| BAM-379/3 | Oxygen in copper - disc (40 mm x 30 mm)<br>Certified value<br>O ..... 378 ± 12 µg/g | disc |
| BAM-379/1-3 | Oxygen in copper - disc (40 mm x 30 mm)<br>Set of BAM-379/1, BAM-379/2 and BAM-379/3<br>Certified values<br>BAM-379/1<br>O ..... 38 ± 4 µg/g<br>BAM-379/2<br>O ..... 212 ± 8 µg/g<br>BAM-379/3<br>O ..... 378 ± 12 µg/g | set of discs |
| BCR-022A | Copper (electrolytic tough pitch) - Oxygen<br>26 mm diameter x 9 mm disc<br>Certified value<br>O ..... 138 mg/kg | 42 g |
| BCR-022B | Copper (electrolytic tough pitch) - Oxygen<br>9 mmm diameter x 50 mm rods | 28 g |
| BCR-054R | Copper - Oxygen<br>7 mm diameter x 50 mm rod<br>Certified value<br>O ..... 0.47 mg/kg | 42 g |
| BCR-058 | Copper (continuous cast) - Oxygen<br>7 mm diameter x 50 mm rods<br>Certified value<br>O ..... 390 mg/kg | 17 g |
| BCR-074A | Electrolytic copper - Trace elements<br>Cylinder of 40 mm diameter and 30 mm height<br>Certified values<br>Ag ..... 12.8 mg/kg<br>As ..... 0.78 mg/kg<br>Cd ..... <0.02 mg/kg<br>Co ..... <0.05 mg/kg<br>Cr ..... <0.1 mg/kg<br>Fe ..... 1.14 mg/kg<br>Mn ..... 1.27 mg/kg<br>Ni ..... 1.04 mg/kg<br>Pb ..... 0.97 mg/kg<br>Sb ..... 0.576 mg/kg<br>Se ..... 0.37 mg/kg<br>Sn ..... <0.07 mg/kg<br>Zn ..... 0.46 mg/kg<br>Indicative values for Bi, Te | disc |
| BCR-074C | Electrolytic copper - Trace elements<br>Small pieces (approx. 4 mm x 4 mm x 2 mm) in a bottle containing about 50 g | 50 g |

| Code | Product | Unit |
|---|---|---|

**BCR-691** — Copper alloys - Alloying elements — Set (5)

Set of five discs (one of each composition) of 35 diameter and 2 mm thickness

Certified values

| Substance | Quaternary bronze | Brass | Arsenic-Copper | Lead-bronze | Tin-bronze |
|---|---|---|---|---|---|
| As | 1.94 g/kg | 0.99 g/kg | 46.0 g/kg | 2.85 g/kg | 1.94 g/kg |
| Pb | 79 g/kg | 3.9 g/kg | 1.75 g/kg | 92 g/kg | 2.04 g/kg |
| Sn | 71.6 g/kg | 20.6 g/kg | 2.02 g/kg | 101 g/kg | 70 g/kg |
| Zn | 60.2 g/kg | 148 g/kg | 0.55 g/kg | 1.48 g/kg | 1.57 g/kg |

## Unalloyed zinc

**BAM-M601** — Pure zinc- disc (45 mm x 30 mm) — disc

Year of issue:2005

Certified values

| | | |
|---|---|---|
| Cd 0.55 ± 0.06 µg/g | Tl 2.25 ± 0.09 µg/g | In < 0.05 µg/g |
| Fe 2.20 ± 0.09 µg/g | Pb 15.7 ± 0.3 µg/g | |
| Cu 1.89 ± 0.11 µg/g | Al < 0.5 µg/g | |

(Values in parenthesis are indicative values)

**BCR-321** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 80 mm diameter and 20 mm thickness

Certified values

| | | |
|---|---|---|
| Al <0.7 mg/kg | Pb 4.85 mg/kg | Tl 0.78 mg/kg |
| In <0.2 mg/kg | Sn <0.5 mg/kg | |

Indicative values for Cd, Cu, Fe

**ERM-EB322** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 60 mm diameter and 30 mm thickness

Certified values

| | | |
|---|---|---|
| Cd 15.08 mg/kg | Fe 19.1 mg/kg | Sn 5.6 mg/kg |
| Cu 5.89 mg/kg | Pb 15.0 mg/kg | Tl 5.28 mg/kg |

**ERM-EB323** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 60 mm diameter and 30 mm thickness

Certified values

| | | |
|---|---|---|
| Cd 6.51 mg/kg | Fe 11.3 mg/kg | Sn 18.7 mg/kg |
| Cu 18.9 mg/kg | Pb 48.6 mg/kg | Tl 10.8 mg/kg |

**ERM-EB324** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 60 mm diameter and 30 mm thickness

Certified values

| | | |
|---|---|---|
| Cd 48.6 mg/kg | Fe 58.5 mg/kg | Sn 9.8 mg/kg |
| Cu 9.87 mg/kg | Pb 26.1 mg/kg | Tl 19.9 mg/kg |

**ERM-EB325** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 60 mm diameter and 30 mm thickness

Certified values

| | | |
|---|---|---|
| Cd 94.7 mg/kg | Fe 56.1 mg/kg | Sn 46.1 mg/kg |
| Cu 47.5 mg/kg | Pb 142 mg/kg | Tl 36.8 mg/kg |

**BCR-326** — Unalloyed zinc - Trace elements — 0.7 kg

Discs of 80 mm diameter and 20 mm thickness

Certified values

| | |
|---|---|
| Cd 203.0 mg/kg | Fe 264.8 mg/kg |
| Cu 104.8 mg/kg | Pb 307.0 mg/kg |

Indicative value for Al

**BCR-327** — Unalloyed zinc - Trace elements — 0.7 kg

Disc of 80 mm diameter and 20 mm thickness

Certified values

| | | |
|---|---|---|
| Cd 301.4 mg/kg | Fe 144.0 mg/kg | Pb 409.4 mg/kg |

Indicative value for Cu

## Zinc alloys

**BCR-351** — Zinc alloy ZnAl4 - Trace elements — 0.7 kg

Disc of 80 mm diameter and 20 mm thickness

Certified values

| | | |
|---|---|---|
| Al 43.55 x $10^3$ mg/kg | Mg 131.0 mg/kg | Tl 0.74 mg/kg |
| Cu 12.13 mg/kg | Pb 4.50 mg/kg | |
| In <0.2 mg/kg | Sn <1 mg/kg | |

Indicative values for Cd, Ni

| Code | Product | Unit |
|---|---|---|
| BCR-352 | Zinc alloy ZnAl4 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 41.50 x $10^3$ mg/kg, Cd 2.88 mg/kg, Cu 31.26 mg/kg, In 3.02 mg/kg, Mg 283.0 mg/kg, Ni 6.74 mg/kg, Sn 3.0 mg/kg, Tl 3.2 mg/kg<br>Indicative value for Pb | 0.7 kg |
| BCR-353 | Zinc alloy ZnAl4 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 39.5 x $10^3$ mg/kg, Cd 10.44 mg/kg, Cu 100.0 mg/kg, In 2.55 mg/kg, Mg 452.5 mg/kg, Pb 24.4 mg/kg, Sn 5.6 mg/kg, Tl 3.95 mg/kg | 0.7 kg |
| BCR-354 | Zinc alloy ZnAl4 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 37.27 x $10^3$ mg/kg, Cd 29.7 mg/kg, Cu 312.3 mg/kg, In 9.8 mg/kg, Mg 602 mg/kg, Ni 83.1 mg/kg, Pb 30.8 mg/kg, Sn 14.1 mg/kg, Tl 11.01 mg/kg | 0.7 kg |
| BCR-355 | Zinc alloy ZnAl4 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 34.43 x $10^3$ mg/kg, Cd 58.1 mg/kg, Cu 1035 mg/kg, In 24.6 mg/kg, Mg 786 mg/kg, Ni 268 mg/kg, Pb 56.9 mg/kg, Sn 29.1 mg/kg, Tl 23.25 mg/kg | 0.7 kg |
| BCR-356 | Zinc alloy ZnAl4Cu1 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 44.34 x $10^3$ mg/kg, Cd 0.73 mg/kg, Cu 3.944 x $10^3$ mg/kg, Fe 31.5 mg/kg, In <0.2 mg/kg, Mg 132.3 mg/kg, Ni 3.43 mg/kg, Pb 9.87 mg/kg, Tl 0.79 mg/kg<br>Indicative value for Sn | 0.7 kg |
| BCR-357 | Zinc alloy ZnAl4Cu1 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 42.27 x $10^3$ mg/kg, Cd 2.83 mg/kg, Cu 5.849 x $10^3$ mg/kg, Fe 25.7 mg/kg, In 3.30 mg/kg, Mg 273 mg/kg, Ni 9.82 mg/kg, Pb 13.8 mg/kg, Sn 3.51 mg/kg, Tl 2.76 mg/kg | 0.7 kg |
| BCR-359 | Zinc alloy ZnAl4Cu1 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 37.11 x $10^3$ mg/kg, Cd 29.8 mg/kg, Cu 9.89 x $10^3$ mg/kg, Fe 119.7 mg/kg, In 15.5 mg/kg, Mg 557 mg/kg, Ni 92.6 mg/kg, Pb 36.2 mg/kg, Sn 16.93 mg/kg, Tl 13.34 mg/kg | 0.7 kg |
| BCR-360 | Zinc alloy ZnAl4Cu1 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 34.27 x $10^3$ mg/kg, Cd 59.5 mg/kg, Cu 12.34 x $10^3$ mg/kg, In 29.8 mg/kg, Mg 705 mg/kg, Ni 267 mg/kg, Pb 73.9 mg/kg, Sn 33.0 mg/kg, Tl 25.9 mg/kg | 0.7 kg |
| BCR-361 | Zinc alloy ZnAl4Cu1 - Trace elements<br>Disc of 80 mm diameter and 20 mm thickness<br>Certified values<br>Al 40.68 x $10^3$ mg/kg, Cu 7.98 x $10^3$ mg/kg, Fe 10.34 mg/kg, Pb 5.31 mg/kg, Sn 46.3 mg/kg, Tl 37.4 mg/kg<br>Indicativ values for Cd, In | 0.7 kg |

| Code | Product | Unit |
|---|---|---|

## Lead base standards

**BNM 010** — Tin-lead solder - granulated powder — 100 g

Year of issue: 1991

Certified values

| | | |
|---|---|---|
| Sn ..... 63.40 ± 0.07 % | Ni ..... 0.0021 ± 0.0002 % | Fe ..... (0.0020) % |
| Pb ..... 36.47 ± 0.17 % | Sb ..... 0.0488 ± 0.0008 % | In ..... (< 0.001) % |
| Bi ..... 0.0245 ± 0.0010 % | Ag ..... (0.014) % | Zn ..... (< 0.0001) % |
| Cd ..... 0.0016 ± 0.0002 % | As ..... (0.012) % | |
| Cu ..... 0.0417 ± 0.0014 % | Au ..... (< 0.001) % | |

(Values in parenthesis are indicative values)

**ERM-EB101** — Lead alloy PbCaSnAl - disc (50 mm x 30 mm) (BAM-101) — disc

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| Ca ..... 0.1436 ± 0.0016 % | Al ..... 0.0257 ± 0.0006 % | Bi ..... 0.0165 ± 0.0007 % |
| Sn ..... 0.293 ± 0.007 % | Ag ..... 0.00288 ± 0.00007 % | Cu ..... 0.00173 ± 0.00018 % |

**ERM-EB102** — Lead alloy PbCaSn - disc (50 mm x 30 mm) (BAM-102) — disc

Year of issue: 1999

Certified values

| | | |
|---|---|---|
| Ca ..... 0.0705 ± 0.0011 % | Al ..... 0.0124 ± 0.0004 % | Bi ..... 0.0148 ± 0.0005 % |
| Sn ..... 0.895 ± 0.011 % | Ag ..... 0.00248 ± 0.00007 % | Cu ..... 0.00109 ± 0.00007 % |

**ERM-EB103** — Lead-alloy, PbSb1,6 - disc (50 mm x 30 mm) (BAM-103) — disc

Year of issue: 2006

Certified values

| | | |
|---|---|---|
| Sn ..... 0.183 ± 0.026 %* | As ..... 0.097 ± 0.004 %* | Ni ..... 3.02 ± 0.27 mg/kg* |
| Bi ..... 0.0158 ± 0.0004 %* | Se ..... 0.0180 ± 0.0010 %* | Cd ..... 0.20 ± 0.08 mg/kg* |
| Cu ..... 9.7 ± 0.9 mg/kg* | Ag ..... 0.0066 ± 0.0006 %* | S ..... (5.4 ± 1.2 mg/kg*) |
| Sb ..... 1.64 ± 0.06 %* | Tl ..... 15.2 ± 0.7 mg/kg* | Te ..... (1.9 ± 0.6 mg/kg*) |

(Values in parenthesis are indicative values)

**BCR-286A** — Lead (electrolytically refined) - Trace elements — 600 g

Block of 60 mm x 60 mm x 12 mm

Certified values

| | |
|---|---|
| Bi ..... 21.5 mg/kg | Tl ..... 2.47 mg/kg |
| Sb ..... 0.099 mg/kg | Zn ..... <0.1 mg/kg |

**BCR-286B** — Lead (electrolytically refined) - Trace elements — 160 g

Chips in bottles containing about 160 g

**BCR-287A** — Lead (thermally refined) -Trace elements — 600 g

Block of 60 mm x 60 mm x 12 mm

Certified values

| | | |
|---|---|---|
| Ag ..... 15.2 mg/kg | Cu ..... 0.98 mg/kg | Tl ..... 0.73 mg/kg |
| Bi ..... 67.3 mg/kg | Sb ..... 0.040 mg/kg | Zn ..... <0.1 mg/kg |
| Cd ..... 0.356 mg/kg | Sn ..... <0.05 mg/kg | |

**BCR-287B** — Lead (thermally refined) -Trace elements — 160 g

Chips in bottles containing about 160 g

**BCR-288A** — Lead with added impurities - Trace elements — 600 g

Block of 60 mm x 60 mm x 12 mm

Certified values

| | | |
|---|---|---|
| As ..... 55.7 mg/kg | Cu ..... 19.3 mg/kg | Tl ..... 2.26 mg/kg |
| Bi ..... 215.8 mg/kg | Se ..... <0.2 mg/kg | Zn ..... 8.2 mg/kg |
| Cd ..... 33.3 mg/kg | Te ..... 32.8 mg/kg | |

**BCR-288B** — Lead with added impurities - Trace elements — 160 g

Chips in bottles containing about 160 g

**BCR-055** — Lead (refined) - Oxygen — 71 g

Disc of 30 mm diameter x 9 mm thickness

Certified value

O ..... 1.0 mg/kg

## Gold base standards

**BAM-501** — Potassium Dicyanoaurate (I) — 6 g

Year of issue: 1997

Certified value

Au ..... 682.23 ± 0.25 g/kg

| Code | Product | Unit |
|---|---|---|

### Nickel base standards

**BCR-099** — Nickel - Oxygen and nitrogen — 50 g
25 cubes of nominally 2 g each
Certified values
O ..... 8.4 mg/kg N .....1.1 mg/kg

### Titanium base standards

**BCR-059A** — Titanium alloy Ti6Al4V - Oxygen and nitrogen — 21 g
26 mm diameter x 9 mm discs
Certified values
O ..... 1750 mg/kg N .....172 mg/kg

**BCR-059B** — Titanium alloy Ti6Al4V - Oxygen and nitrogen — 5 g
25 cubes of 0.2 g

**BCR-089** — Titanium alloy Ti 6Al 4V - Aluminium, Vanadium — disc
Cylinder of 40 mm diameter and 20 mm height
Certified values
Al..... 59.7 g/kg V ..... 39.76 g/kg

**BCR-090A** — Titanium - Impurities — disc
Cylinder of 40 mm diameter and 20 mm height
Certified values

| | | |
|---|---|---|
| B..... 28.2 x $10^{-3}$ g/kg | Cu.....0.513 g/kg | Mo ..... 0.488 g/kg |
| Co ..... 0.501 g/kg | Fe ..... 0.563 g/kg | Ni..... 0.667 g/kg |
| Cr ..... 0.533 g/kg | Mn..... 0.314 g/kg | |

Indivativ values for Nb, Sn, W, Zr

**BCR-090B** — Titanium - Impurities — 25 g
Cubes of about 0.2 g

**BCR-024B** — Titanium - Oxygen and nitrogen — 10 g
25 cubes of 0.4 g
Certified values
N ..... 117 mg/kg O.....608 mg/kg

**BCR-024C** — Titanium - Oxygen, nitrogen — 5 g
25 cubes of 0.2 g

**BCR-318** — Titanium - Hydrogen — 20 g
7 mm diameter x 1 mm discs (approx. 100 discs of at least 0.2 g each)
Certified value
H ..... 12.2 mg/kg

### Zirconium base standards

**BCR-275** — Zirconium alloy Zircaloy-4 - Oxygen, nitrogen and carbon — 9 g
10 discs each 13 mm diameter x 1 mm
Certified values
O ..... 1670 mg/kg N .....39.0 mg/kg C ..... 113 mg/kg

**BCR-276** — Zirconium alloy Zircaloy-4 - Oxygen, nitrogen and carbon — 20 g
4.5 mm diameter x 2 mm (approx. 100 cylinders)
Certified values
O ..... 1540 mg/kg N .....41.0 mg/kg C ..... 108 mg/kg

### Tungsten base standards

**BCR-102** — Tungsten carbide powder - Oxygen — 2-3 g
Powder sealed under argon
Certified value
O ..... 185 mg/kg

# Bauxite and Fluorspar

| Code | Product | Unit |
|---|---|---|
| BCS CRM395 | Bauxite | 100 g |

Certified values %

| | | |
|---|---|---|
| $Fe_2O_3$ ..... 16.3 % | $Na_2O$ ..... (0.02) % | Pb ..... (0.0028) % |
| $SiO_2$ ..... 1.24 % | $K_2O$ ..... (0.02) % | Sr ..... (0.0023) % |
| $Al_2O_3$ ..... 52.4 % | Cr ..... (0.0453) % | Zn ..... (0.0043) % |
| $TiO_2$ ..... 1.93 % | Cu ..... (0.0021) % | L.O.I. ..... 27.8 % |
| CaO ..... 0.05 % | Mn ..... (0.0042) % | |
| MgO ..... 0.02 % | Ni ..... (0.0034) % | |

(Values in parenthesis are indicative values)

| | | |
|---|---|---|
| NIST-69B | Bauxite, Arkansas - Constituents | 60 g |

Certified values

| | | |
|---|---|---|
| $Al_2O_3$ ..... 48.8 % | MgO ..... 0.085 % | $TiO_2$ ..... 1.90 % |
| CaO ..... 0.13 % | MnO ..... 0.110 % | $V_2O_5$ ..... 0.028 % |
| $Cr_2O_3$ ..... 0.011 % | $P_2O_5$ ..... 0.118 % | ZnO ..... 0.0035 % |
| $Fe_2O_3$ ..... 7.14 % | $SO_3$ ..... 0.551 % | $ZrO_2$ ..... 0.29 % |
| $K_2O$ ..... 0.068 % | $SiO_2$ ..... 13.43 % | LOI* ..... 27.2 % |

Indicative values for Co, BaO, $Na_2O$

LOI* Loss on Ignition

| | | |
|---|---|---|
| NIST-600 | Bauxite, Australian - Constituents | 90 g |

Certified values

| | | |
|---|---|---|
| $Al_2O_3$ ..... 40.0 % | MnO ..... 0.013 % | $V_2O_5$ ..... 0.060 % |
| CaO ..... 0.22 % | $Na_2O$ ..... 0.022 % | ZnO ..... 0.003 % |
| $Cr_2O_3$ ..... 0.024 % | $P_2O_5$ ..... 0.039 % | $ZrO_2$ ..... 0.060 % |
| $Fe_2O_3$ ..... 17.0 % | $SO_3$ ..... 0.155 % | LOI* ..... 20.5 % |
| $K_2O$ ..... 0.23 % | $SiO_2$ ..... 20.3 % | |
| MgO ..... 0.055 | $TiO_2$ ..... 1.31 % | |

LOI* Loss on Ignition

| | | |
|---|---|---|
| NIST-696 | Bauxite, Surinam - Constituents | 60 g |

Certified value

| | | |
|---|---|---|
| $Al_2O_3$ ..... 54.5 % | MgO ..... 0.012 % | $TiO_2$ ..... 2.64 % |
| CaO ..... 0.018 % | MnO ..... 0.004 % | $V_2O_5$ ..... 0.072 % |
| $Cr_2O_3$ ..... 0.047 % | $P_2O_5$ ..... 0.050 % | ZnO ..... 0.0014 % |
| $Fe_2O_3$ ..... 8.70 % | $SiO_2$ ..... 3.79 % | $ZrO_2$ ..... 0.14 % |
| $K_2O$ ..... 0.009 % | $SO_3$ ..... 0.15 % | LOI* ..... 29.9 % |

Indicative values for Co, BaO, $Na_2O$

LOI* Loss on Ignition

| | | |
|---|---|---|
| NIST-697 | Bauxite, Dominican - Constituents | 60 g |

Certified value

| | | |
|---|---|---|
| $Al_2O_3$ ..... 45.8 % | MgO ..... 0.18 % | $TiO_2$ ..... 2.52 % |
| CaO ..... 0.71 % | MnO ..... 0.41 % | $V_2O_5$ ..... 0.063 % |
| $Cr_2O_3$ ..... 0.100 % | $P_2O_5$ ..... 0.97 % | ZnO ..... 0.037 % |
| $Fe_2O_3$ ..... 20.0 % | $SiO_2$ ..... 6.81 % | $ZrO_2$ ..... 0.065 % |
| $K_2O$ ..... 0.062 % | $SO_3$ ..... 0.077 % | LOI* ..... 22.1 % |

Indicative values for Co, BaO, $Na_2O$

LOI* Loss on Ignition

| | | |
|---|---|---|
| NIST-698 | Bauxite, Jamaican - Constituents | 60 g |

Certified value

| | | |
|---|---|---|
| $Al_2O_3$ ..... 48.2 % | MgO ..... 0.058 % | $TiO_2$ ..... 2.38 % |
| CaO ..... 0.62 % | MnO ..... 0.38 % | $V_2O_5$ ..... 0.064 % |
| $Cr_2O_3$ ..... 0.080 % | $P_2O_5$ ..... 0.37 % | ZnO ..... 0.029 % |
| $Fe_2O_3$ ..... 0.013 % | $SiO_2$ ..... 0.69 % | $ZrO_2$ ..... 0.0,061 % |
| $K_2O$ ..... 0.010 % | $SO_3$ ..... 0.143 % | LOI* ..... 27.3 % |

Indicative values for Co, BaO, $Na_2O$

LOI* Loss on Ignition

| | | |
|---|---|---|
| BCS CRM392 | Fluorspar | 100 g |

Certified values

| | | |
|---|---|---|
| $SiO_2$ ..... 0.67 % | BaO ..... 0.37 % | Pb ..... 0,18 % |
| $CaF_2$ ..... 97.2 % | S ..... 0.12 % | |
| CaO ..... 0.52 % | $CO_2$ ..... 0.48 % | |

| | | |
|---|---|---|
| NIST-79A | Fluorspar, customs grade - Calcium fluoride | 120 g |

Certified value

$CaF_2$ ..... 297.39 %

| | | |
|---|---|---|
| NIST-180 | Fluorspar, high grade - Calcium fluoride | 120 g |

Certified value

$CaF_2$ ..... 98.80%

# Ores

| Code | Product | Unit |
|---|---|---|
| BCS CRM308 | Grecian chrome ore<br>Certified values<br>FeO 15.3 %, $SiO_2$ 4.25 %, $Al_2O_3$ 19.4 %, $Cr_2O_3$ 41.5 %, TiO2 (0.16) %, CaO 0.34 %, MgO 16.4 %, MnO (0.14) %, $Na_2O$ (0.04) %, $K_2O$ (0.01) %, L.O.I. (0.9) %<br>(Values in parenthesis are indicative values) | 100 g |
| BCR-010 | Tin ore powder - Tin<br>Certified value<br>Sn 765.9 g/kg | 225 g |
| BCS CRM355 | Tin ore<br>Certified values<br>Sn 31.42 %, Fe 17.08 %, Cu 0.085 %, As 0.14 %, Bi 0.015 %, Zn 0.059 %, Pb 0.012 %, S 0.5 %, W 0.35 %, Ni 0.004 %, Si 7.14 %, Ti 0.37 %, Al 4.12 %, Ca 2.63 %, F 2.07 % | 100 g |
| BCR-109 | Zinc ore concentrate - Trace elements<br>Certified values<br>Cd 4.61 g/kg, Cu 9.46 g/kg, F 0.081 g/kg, Fe 145.1 g/kg, Hg 0.00096 g/kg, Mg 0.20 g/kg, Pb 7.38 g/kg | 200 g |
| BCR-110 | Zinc ore concentrate - Trace elements<br>Certified values<br>Cd 10.51 g/kg, Cu 16.28 g/kg, F 0.055 g/kg, Fe 5.46 g/kg, Hg 0.1484 g/kg, Mg 1.36 g/kg, Pb 97.8 g/kg | 200 g |
| NIST-181 | Lithium ore, Spodumene - Lithium oxide<br>Certified value<br>$Li_2O$ 6.39 % | 45 g |
| NIST-182 | Lithium ore, Petalite - Lithium oxide<br>Certified value<br>$Li_2O$ 4.34 % | 45 g |
| NIST-183 | Lithium ore, Lepidolite - Lithium oxide<br>Certified value<br>$Li_2O$ 4.12 % | 45 g |
| NIST-330 | Copper ore mill heads - Copper, molybdenum and rhenium<br>Certified values<br>Cu 0.84 %, Mo 0.018 %, Re 0.30 mg/kg<br>Indicative values for Ag, Au | 100 g |
| NIST-25D | Manganese ore - Constituents<br>Certified values<br>Mn 51.78 %, $Al_2O_3$ 5.32 %, $Fe_2O_3$ 3.92 %, $K_2O$ 0.93 %, $P_2O_5$ 0.25 %, $SiO_2$ 2.52 %, $TiO_2$ 0.13 %, Available oxygen 14.28 %<br>Indicative values for BaO, CaO, Moisture | 100 g |
| BCS CRM176/2 | Manganese ore<br>Certified values<br>Fe 6.86 %, $SiO_2$ 2.53 %, $Al_2O_3$ 5.2 %, $TiO_2$ 0.3 %, CaO 0.09 %, MgO 0.04 %, S 0.018 %, P 0.087 %, Mn 47.5 %, $Na_2O$ 0.11 %, $K_2O$ 1.3 %, BaO 0.19 %, Pb 0.01 %, $As_2O_3$ 0.22 % | 100 g |
| NCS DC47004 | Manganese ore - Constituents<br>Certified values<br>Cu 0.013 %, Fe 1.22 %, Mn 45.39 %, Ni 0.019 %, P 0.054 %, S 0.007 %, Zn 0.027 %, $Al_2O_3$ 2.20 %, BaO 0.68 %, CaO 1.06 %, $K_2O$ 1.00 %, MgO 0.64 %, $MnO_2$ 67.25 %, $Na_2O$ 0.044 %, $SiO_2$ 16.16 %, $TiO_2$ 0.063 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |

| Code | Product | Unit |
|---|---|---|
| NCS DC47005 | Manganese ore - Constituents<br>Certified values<br>Cu 0.014 %, Fe 2.24 %, Mn 36.99 %, Ni 0.019 %, P 0.081 %, S 0.013 %, Zn 0.029 %, $Al_2O_3$ 3.00 %, BaO 0.47 %, CaO 3.60 %, $K_2O$ 0.46 %, MgO 1.44 %, $MnO_2$ 54.38 %, $Na_2O$ 0.048 %, $SiO_2$ 22.24 %, $TiO_2$ 0.10 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |
| NCS DC47006 | Manganese ore - Constituents<br>Certified values<br>Cu 0.036 %, Fe 11.24 %, Mn 32.54 %, Ni 0.099 %, P 0.207 %, S 0.019 %, Zn 0.064 %, $Al_2O_3$ 8.55 %, BaO 0.18 %, CaO 0.083 %, $K_2O$ 0.93 %, MgO 0.11 %, $MnO_2$ 48.01 %, $Na_2O$ 0.039 %, $SiO_2$ 14.50 %, $TiO_2$ 0.43 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |
| NCS DC47007 | Manganese ore - Constituents<br>Certified values<br>Cu 0.028 %, Fe 20.99 %, Mn 25.00 %, Ni 0.073 %, P 0.275 %, S 0.032 %, Zn 0.048 %, $Al_2O_3$ 8.97 %, BaO 0.23 %, CaO 0.051 %, $K_2O$ 0.72 %, MgO 0.10 %, $MnO_2$ 36.93 %, $Na_2O$ 0.030 %, $SiO_2$ 10.46 %, $TiO_2$ 0.54 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |
| NCS DC47008 | Manganese ore - Constituents<br>Certified values<br>Cu 0.009 %, Fe 1.40 %, Mn 22.54 %, Ni 0.041 %, P 0.043 %, S 0.21 %, Zn 0.018 %, $Al_2O_3$ 1.68 %, BaO 0.13 %, CaO 14.73 %, $K_2O$ 0.46 %, MgO 3.50 %, $Mn(CO_3^{2-})$ 22.46 %, $Na_2O$ 0.024 %, $SiO_2$ 14.07 %, $TiO_2$ 0.10 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |
| NCS DC47009 | Manganese ore - Constituents<br>Certified values<br>Cu 0.01 %, Fe 2.07 %, Mn 15.74 %, Ni 0.050 %, P 0.061 %, S 0.27 %, Zn 0.020 %, $Al_2O_3$ 2.49 %, BaO 0.15 %, CaO 19.78 %, $K_2O$ 0.70 %, MgO 3.82 %, $Mn(CO_3^{2-})$ 15.69 %, $Na_2O$ 0.040 %, $SiO_2$ 15.82 %, $TiO_2$ 0.15 %<br>Indicative value for $Mn(SiO_3^{2-})$ | 100 g |
| NIST-RM 8602 | Chinese lead ore - Elements and constituents<br>This Reference Material (RM) is a lead ore mined from a skarn lead-zinc-copper deposit, then prepared and certified by the Hubei Geological Research Laboratory (HGRL) in China which is the sole authority for the information provided with this material including reference values and other technical information. It is intended for use in geological and geochemical investigations, particularly in geochemical exploration programs and in studies of ore genesis, and for environmental monitoring in mining areas. Each unit of this RM consists of 100 g of ore pulverized to pass a 100 µm screen (-160 mesh). Reference values for selected elements and gangue constituents are given. | 100 g |
| NIST-RM 8603 | Chinese lead ore - Elements and constituents<br>This Reference Material (RM) is a lead ore mined from a skarn lead-zinc-copper deposit, then prepared and certified by the Hubei Geological Research Laboratory (HGRL) in China which is the sole authority for the information provided with this material including reference values and other technical information. It is intended for use in geological and geochemical investigations, particularly in geochemical exploration programs and in studies of ore genesis, and for environmental monitoring in mining areas. Each unit of this RM consists of 100 g of ore pulverized to pass a 100 µm screen (-160 mesh). Reference values for selected elements and gangue constituents are given. | 100 g |
| NIST-277 | Tungsten concentrate - Tungsten oxide<br>Certified value<br>$WO_3$ 67.4 %<br>Indicative values for Ca, Fe, Mn, Mo, Nb, O, P, Pb, S, Si, Sn, Ta, Ti | 100 g |
| NIST-RM 8607 | Chinese tungsten ore - Elements and constituents<br>This Reference Material (RM) is a tungsten ore mined from a greisen tungsten-tin-bismuth deposit, then prepared and certified by the Hubei Geological Research Laboratory (HGRL) in China which is the sole authority for the information provided with this material including reference values and other technical information. It is intended for use in geological and geochemical investigations, particularly in geochemical exploration programs and in studies of ore genesis, and for environmental monitoring in mining areas. Each unit of this RM consists of 100 g of ore pulverized to pass a 100 µm screen (-160 mesh). Reference values for selected elements and gangue constituents are given. | 100 g |

| Code | Product | Unit |
|---|---|---|
| NIST-RM 8608 | Chinese tungsten ore - Elements and constituents<br>This Reference Material (RM) is a molybdenum ore mined from a skarn molybdenum deposit, then prepared and certified by the Hubei Geological Research Laboratory (HGRL) in China which is the sole authority for the information provided with this material including reference values and other technical information. It is intended for use in geological and geochemical investigations, particularly in geochemical exploration programs and in studies of ore genesis, and for environmental monitoring in mining areas. Each unit of this RM consists of 100 g of ore pulverized to pass a 100 µm screen (-160 mesh). Reference values for selected elements and gangue constituents are given | 100 g |
| NCS DC70008 | Tungsten ore - Constituents<br>Certified values for 38 elements, 9 oxides<br>Indicative values for 5 elements | 100 g |
| NIST-886 | Gold ore, refractory - Trace elements<br>Certified values<br>S.....1.466 %  $Al_2O_3$.....8.25 mg/kg<br>Indicative values for C (total), $SO_3$ | 200 g |
| NIST-1835 | Borate ore - Constituents<br>Certified values<br>F.....0.348 %  $Fe_2O_3$..... 1.141 %  $Na_2O$ .....3.484 %<br>$Al_2O_3$ .....3.474 %  MgO..... 3.411 %  $SO_3$ .....1.477 %<br>$B_2O_3$ .....18.739 %  MnO..... 0.0333 %  SrO.....0.9418 %<br>BaO.....0.0497 %  $K_2O$..... 1.261 %  $TiO_2$.....0.1332 %<br>CaO.....21.622 %  $SiO_2$ ..... 18.408 %  LOI*.....25.72 % | 60 g |

# Refractories and carbides

| Code | Product | Unit |
|---|---|---|
| BAM-S002 | Tungsten metal powder<br>Certified values<br>Al..... 29.4 ± 0.9 mg/kg  Fe .....53 ± 5 mg/kg  Na ..... 41 ± 5 mg/kg<br>Ca ..... 46 ± 4 mg/kg  K .....40.0 ± 1.8 mg/kg  Ni..... 29 ± 4 mg/kg<br>Co ..... 45 ± 6 mg/kg  Mg.....38.8 ± 2.7 mg/kg  P.....(7.2 ± 1.3) mg/kg<br>Cr ..... 47.0 ± 1.4 mg/kg  Mn.....16.7 ± 1.9 mg/kg  Si..... 106 ± 10 mg/kg<br>Cu ..... 28.4 ± 2.9 mg/kg  Mo.....59 ± 4 mg/kg  Sn..... 42 ± 6 mg/kg<br>(Values in parenthesis are indicative values) | 100 g |
| NIST-76A | Burnt refractory ($Al_2O_3$-40%) - Constituents<br>Certified values<br>$Al_2O_3$ .....38.7 %  $Li_2O$..... 0.042 %  $SiO_2$.....54.9 %<br>CaO.....0.22 %  MgO..... 0.52 %  SrO.....0.037 %<br>$Fe_2O_3$ .....1.60 %  $Na_2O$..... 0.07 % %  $TiO_2$.....2.03 %<br>$K_2O$ .....1.33 %  $P_2O_5$..... 0.120 %<br>Indicative value for LOI*<br>* Loss on Ignition | 75 g |
| NIST-77A | Burnt refractory ($Al_2O_3$ - 60%) - Constituents<br>Certified values<br>$Al_2O_3$ .....60.2 %  $Li_2O$..... 0.025 %  $SiO_2$.....35.0 %<br>CaO.....0.05 %  MgO..... 0.38 %  SrO.....0.009 %<br>$Fe_2O_3$ .....1.00 %  $Na_2O$..... 0.037 %  $TiO_2$.....2.66 %<br>$K_2O$ .....0.090 %  $P_2O_5$..... 0.092 %<br>Indicative value for LOI*<br>* Loss on Ignition | 75 g |
| NIST-78A | Burnt refractory ($Al_2O_3$- 70%) - Constituents<br>Certified values<br>$Al_2O_3$ .....71.7 %  $Li_2O$..... 0.12 %  $SiO_2$.....19.4 %<br>CaO.....0.11 %  MgO..... 0.70 %  SrO.....0.25 %<br>$Fe_2O_3$ .....1.2 %  $Na_2O$..... 0.078 %  $TiO_2$.....3.22 %<br>$K_2O$ .....1.22 %  $P_2O_5$..... 1.3 %<br>Indicative value for LOI*<br>* Loss on Ignition | 75 g |
| NIST-198 | Silica brick - Constituents<br>Certified values<br>$Al_2O_3$ .....0.16 %  $Li_2O$..... 0.001 %  $P_2O_5$ .....0.022 %<br>CaO.....2.71 %  MgO..... 0.07 %  $TiO_2$.....0.02 %<br>$Fe_2O_3$ .....0.66 %  MnO..... 0.008 %  LOI*.....0.21 %<br>$K_2O$ .....0.017 %  $Na_2O$..... 0.012 %<br>* Loss on Ignition | 45 g |

| Code | Product | Unit |
|---|---|---|
| NIST-199 | Silica brick - Constituents<br>Certified values<br>$Al_2O_3$ ..... 0.48 %<br>CaO ..... 2.41 %<br>$Fe_2O_3$ ..... 0.74 %<br>$K_2O$ ..... 0.094 %<br>$Li_2O$ ..... 0.002 %<br>$Na_2O$ ..... 0.015 %<br>MgO ..... 0.13 %<br>MnO ..... 0.007 %<br>$P_2O_5$ ..... 0.015 %<br>$TiO_2$ ..... 0.06 %<br>LOI* ..... 0.17 %<br>* Loss on Ignition | 45 g |
| NIST-887 | Cemented carbide (W83-Co25-Ti4) - Cobalt<br>Certified value<br>Co ..... 10.35 %<br>Indicative value for C | 100 g |
| NIST-888 | Cemented carbide (W64-Co25-Ti4) - Cobalt and tantalum<br>Certified values<br>Co ..... 24.7 %<br>Ta ..... 4.77 %<br>Indicative value for C | 100 g |
| NIST-889 | CEM carbide (W75-Co9-Ta5-Ti4) - Cobalt, tantalum and titanium<br>Certified values<br>Co ..... 9.50<br>Ta ..... 4.60<br>Ti ..... 4.03<br>Indicative value for C | 100 g |
| NIST-889 | CEM carbide (W75-Co9-Ta5-Ti4) - Cobalt, tantalum and titanium<br>Certified values<br>Co ..... 9.50<br>Ta ..... 4.60<br>Ti ..... 4.03<br>Indicative value for C | 100 g |
| NIST-889 | CEM carbide (W75-Co9-Ta5-Ti4) - Cobalt, tantalum and titanium<br>Certified values<br>Co ..... 9.50<br>Ta ..... 4.60<br>Ti ..... 4.03<br>Indicative value for C | 100 g |
| BCS CRM352/1 | Tungsten carbide<br>Certified values<br>$C_{Total}$ ..... 6.154 %<br>$C_{Free}$ ..... 0.036 %<br>Fe ..... 0.0029 %<br>O ..... 0.11 % | 100 g |
| NIST-276B | Tungsten carbide - Carbon<br>Certified value<br>C ..... 6.10 %<br>Indicative values for C (free), O, N | 75 g |
| BCS CRM359 | Nitrogen bearing silicon carbide<br>Certified values<br>$C_{Total}$ ..... 23.46 %<br>$Si_{Total}$ ..... 67.6 %<br>$Al_{Total}$ ..... 0.118 %<br>$C_{Free}$ ..... (0.061) %<br>$Si_{Free}$ ..... (0.325) %<br>$Fe_{Total}$ ..... 0.175 %<br>Mn ..... (<0.01) %<br>Ni ..... (0.014) %<br>O ..... (0.532) %<br>N ..... (7.84) %<br>Ti ..... 0.022 %<br>V ..... (0.027) %<br>Ca ..... 0.108 %<br>Mg ..... (<0.01) %<br>Na ..... (<0.01) %<br>K ..... (<0.01) %<br>(Values in parenthesis are indicative values) | 100 g |
| BCS CRM360 | Sialon bonded silicon carbide<br>Certified values<br>$C_{Total}$ ..... 23.53 %<br>$Si_{Total}$ ..... 60.8 %<br>$Al_{Total}$ ..... 6.52 %<br>$C_{Free}$ ..... (0.085) %<br>$Si_{Free}$ ..... (0.538) %<br>$Fe_{Total}$ ..... (0.19) %<br>Mn ..... (<0.01) %<br>Cr ..... (<0.01) %<br>Ni ..... (0.013) %<br>O ..... (4.03) %<br>N ..... (4.77) %<br>Ti ..... 0.025 %<br>Ca ..... 0.115 %<br>Mg ..... (<0.02) %<br>Na ..... (<0.01) %<br>K ..... (<0.01) %<br>(Values in parenthesis are indicative values) | 100 g |

| Code | Product | Unit |
|---|---|---|

### Cement

**BCS CRM353** — Sulphate resist portland cement — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 20.5 % | $Mn_2O_3$ 0.23 % | $P_2O_5$ 0.077 % |
| $Al_2O_3$ 3.77 % | CaO 64.8 % | $SO_3$ 2.25 % |
| $TiO_2$ 0.16 % | MgO 2.42 % | SrO 0.23 % |
| $Fe_2O_3$ 4.82 % | $Na_2O$ (Acid Sol) 0.1 % | Cl (0.01) % |
| $Cr_2O_3$ (0.02) % | $K_2O$ (Acid Sol) 0.49 % | |

(Values in parenthesis are indicative values)

**BCS CRM354** — White Portland Cement — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 21.8 % | $Mn_2O_3$ 0.057 % | $P_2O_5$ 0.12 % |
| $Al_2O_3$ 4.85 % | CaO 70 % | $SO_3$ 2.25 % |
| $TiO_2$ 0.04 % | MgO 0.42 % | SrO 0.11 % |
| $Fe_2O_3$ 0.3 % | $Na_2O$ (Acid Sol) 0.1 % | Cl 0.005 % |
| $Cr_2O_3$ (0.003 %) | $K_2O$ (Acid Sol) 0.11 % | |

(Values in parenthesis are indicative values)

**BCS CRM372/1** — Ordinary portland cement — 100 g

Certified values

| | | |
|---|---|---|
| $SiO_2$ 20.3 % | $Mn_2O_3$ 0.074 % | $P_2O_5$ (0.07) % |
| $Al_2O_3$ 5.37 % | CaO 65.3 % | $SO_3$ 2.95 % |
| $TiO_2$ 0.27 % | MgO 1.31 % | SrO (0.05) % |
| $Fe_2O_3$ 3.42 % | $Na_2O$ (Acid Sol) 0.1 % | Cl (0.008) % |
| $Cr_2O_3$ (0.01) % | $K_2O$ (Acid Sol) 0.75 % | |

(Values in parenthesis are indicative values)

# Special materials

## High tech ceramics

| Code | Product | Unit |
|---|---|---|

**ERM-ED101** — Silicon nitride powder (BAM-S001) — 50 g

Certified values

| | | |
|---|---|---|
| Al 469 ± 12 mg/kg | Mg 4.3 ± 0.4 mg/kg | N 38.1 ± 0.2 % |
| Ca 14.1 ± 0.5 mg/kg | Na 7.59 ± 0.27 mg/kg | O (1.91± 0.07) % |
| Co 43.5 ± 0.8 mg/kg | W 41.3 ± 1.3 mg/kg | ß-phase 7.43 ± 0.09 % |
| Fe 79.5 ± 1.3 mg/kg | C 0.162 ± 0.024 % | |

(Values in parenthesis are indicative values)

**BAM-S003** — Silicon carbide powder — bottle

Certified values

| | | |
|---|---|---|
| Al 372 ± 20 mg/kg | Mn 1.44 ± 0.17 mg/kg | O 910 ± 35 mg/kg |
| B 63 ± 7 mg/kg | Na 17.7 ± 0.8 mg/kg | N (93 ± 22) mg/kg |
| Ca 29.4 ± 1.8 mg/kg | Ni 32.9 ± 2.7 mg/kg | $SiO_{2\ free}$ (600 ± 148) mg/kg |
| Cr 3.5 ± 0.4 mg/kg | Ti 79 ± 4 mg/kg | $Si_{free}$ (481 ± 223) mg/kg |
| Cu 1.5 ± 0.4 mg/kg | V 41.4 ± 2.8 mg/kg | $C_{total}$ 29.89 ± 0.07 % |
| Fe 149 ± 10 mg/kg | Zr 25.2 ± 2.0 mg/kg | |
| Mg 6.3 ± 0.6 mg/kg | $C_{free}$ 493 ± 79 mg/kg | |

(Values in parenthesis are indicative values)

**NIST-154C** — Titanium dioxide - Purity — 90 g

This Standard Reference Material® (SRM®) is intended primarily for use in the evaluation of techniques employed in the assay of titanium dioxide in the paint and ceramic industries.

Certified value

Titanium dioxide 99.951 %

Informational values for impurities

**BCS CRM201A** — Nepheline Syenite — 100 g

| | | |
|---|---|---|
| $SiO_2$ (57.3) % | MgO (0.025) % | $Mn_2O_3$ (0.007) % |
| $Al_2O_3$ (23.54) % | $Na_2O$ (7.53) % | SrO (0.43) % |
| $TiO_2$ (0.05) % | $K_2O$ (8.9) % | L.O.I. (0.76) % |
| $Fe_2O_3$ (0.12) % | $P_2O_5$ (0.025) % | |
| CaO (1.07) % | BaO (0.37) % | |

(Values in parenthesis are indicative values)

**BCS CRM202A** — Plaster (Gypsum) — 100 g

| | | |
|---|---|---|
| $SiO_2$ (1.38) % | CaO (37.4) % | $P_2O_5$ (<0.01) % |
| $Al_2O_3$ (0.33) % | MgO (0.39) % | SrO (0.33) % |
| $TiO_2$ (0.03) % | $Na_2O$ (<0.03) % | $SO_3$ (53) % |
| $Fe_2O_3$ (0.1) % | $K_2O$ (0.1) % | |

(Values in parenthesis are indicative values)

| Code | Product | Unit |
|---|---|---|

**BCS CRM203A** — Talc — 100 g

| | | |
|---|---|---|
| $SiO_2$ (59.7) % | CaO (0.25) % | $P_2O_5$ (0.13) % |
| $Al_2O_3$ (0.3) % | MgO (32.08) % | L.O.I. (6.78) % |
| $TiO_2$ (<0.01) % | $Na_2O$ (0.02) % | |
| $Fe_2O_3$ (0.22) % | $K_2O$ (0.005) % | |

(Values in parenthesis are indicative values)

**BCS CRM204A** — Zircon — 100 g

| | | |
|---|---|---|
| $SiO_2$ (37,6) % | CaO (0.15) % | $P_2O_5$ (0.77) % |
| $Al_2O_3$ (0.74) % | MgO (0.012) % | $SnO_2$ (1.69) % |
| $TiO_2$ (2.22) % | $Na_2O$ (0.014) % | $ZrO2+HfO_2$ (53.8) % |
| $Fe_2O_3$ (0.18) % | $K_2O$ (0.017) % | L.O.I. (0.5) % |

(Values in parenthesis are indicative values)

## Multielement glass for XRF analysis – type A – type B

**BAM-S005A** — Multielement glass for XRF analysis (soda lime glass) - disc 39 mm x 5 mm (26 g - 30 g) — disc

Certified values

| | |
|---|---|
| Arsenic (III) oxide 132 ± 8 mg/kg | Tin (IV) oxide 100 ± 7 mg/kg |
| Barium oxide 115 ± 9 mg/kg | Sulfur trioxide 1942 ± 85 mg/kg |
| Cadmium oxide 62 ± 4 mg/kg | Strontium oxide 151 ± 7 mg/kg |
| Cerium (IV) oxide 105 ± 6 mg/kg | Titanium (IV) oxide 164 ± 9 mg/kg |
| Chloride 247 ± 33 mg/kg | Vanadium (V) oxide 350 ± 22 mg/kg |
| Cobalt oxide 49.4 ± 2.4 mg/kg | Zinc oxide 203 ± 10 mg/kg |
| Chromium (III) oxide 15.6 ± 2.4 mg/kg | Zirconium (IV) oxide 842 ± 125 mg/kg |
| Copper (II) oxide 112 ± 5 mg/kg | Silicon (IV) oxide (71) % |
| Iron (III) oxide 422 ± 11 mg/kg | Sodium oxide (13.7) % |
| Manganese (II) oxide 124 ± 5 mg/kg | Calcium oxide (10.5) % |
| Molybdenum (VI) oxide 343 ± 12 mg/kg | Magnesium oxide (2.3) % |
| Nickel (II) oxide 59.0 ± 2 mg/kg | Aluminium oxide (1.1) % |
| Lead (II) oxide 202 ± 8 mg/kg | Potassium oxide (0.7) % |
| Antimony (III) oxide 132 ± 7 mg/kg | Certified values |
| Selenium 19.6 ± 1.7 mg/kg | |

(Values in parenthesis are indicative values)

**BAM-S005B** — Multielement glass for XRF analysis (soda lime glass) - disc 39 mm x 5 mm (26 g - 30 g) — disc

Certified values

| | |
|---|---|
| Arsenic (III) oxide 132 ± 8 mg/kg | Selenium 19.6 ± 1.2 mg/kg |
| Barium oxide 115 ± 5 mg/kg | Tin (IV) oxide 100 ± 7 mg/kg |
| Cadmium oxide 62 ± 3 mg/kg | Sulfur trioxide 1942 ± 57 mg/kg |
| Cerium (IV) oxide 105 ± 5 mg/kg | Strontium oxide 151 ± 7 mg/kg |
| Chloride 247 ± 24 mg/kg | Titanium (IV) oxide 163 ± 7 mg/kg |
| Cobalt oxide 49.4 ± 2.3 mg/kg | Vanadium (V) oxide 349 ± 22 mg/kg |
| Chromium (III) oxide 15.2 ± 1.2 mg/kg | Zinc oxide 203 ± 6 mg/kg |
| Copper (II) oxide 112 ± 4 mg/kg | Zirconium (IV) oxide 842 ± 76 mg/kg |
| Iron (III) oxide 422 ± 10 mg/kg | Silicon (IV) oxide (71) % |
| Manganese (II) oxide 124 ± 5 mg/kg | Sodium oxide (13.7) % |
| Molybdenum (VI) oxide 343 ± 12 mg/kg | Calcium oxide (10.5) % |
| Nickel (II) oxide 59.0 ± 1.9 mg/kg | Magnesium oxide (2.3) % |
| Lead (II) oxide 202 ± 7 mg/kg | Aluminium oxide (1.1) % |
| Antimony (III) oxide 132 ± 6 mg/kg | Potassium oxide (0.7) % |

(Values in parenthesis are indicative values)

# Coals

| Code | Product | Unit |
|---|---|---|

**BCR-182** — Steam coal - Elements, ash and gross calorific value — 15 g

A medium volatile coal of high ash content.

Certified values

| | | |
|---|---|---|
| C 732.9 g/kg | Mn 195 mg/kg | Zn 33.3 mg/kg |
| Cd 0.057 mg/kg | N 16.36 g/kg | Ash 122.7 g/kg |
| Cl 3.70 g/kg | Se 0.68 mg/kg | GCV* 29.68 MJ/kg |
| Hg 0.040 mg/kg | V 24.3 mg/kg | |

Indicative values for Al, As, B, Br, Ce, Co, Cr, Cu, Fe, H, K, La, Mn, Na, Ni, Pb, Rb, Sc, Th, Ti, Vol. matter

*Gross calorific value

**BCR-331** — Low volatile steam coal - Sulphur — 20 g

Certified value

S 4.99 g/kg

**BCR-332** — High volatile industrial coal - Sulphur — 20 g

Certified value

S 9.61 g/kg

**BCR-333** — Coking steam coal - Sulphur — 20 g

Certified value

S 13.44 g/kg

## Coals

| Code | Product | Unit |
|---|---|---|
| BCR-335 | Flame coal - Sulphur<br>Certified value<br>S..... 50.8 g/kg | 20 g |
| BCR-336 | High volatile steam coal - Sulphur<br>Certified value<br>S..... 32.90 g/kg | 20 g |
| BCR-460 | Coal - Fluorine<br>Certified value<br>F..... 225 mg/kg<br>Indicative value for Cl | 40 g |
| NCS FC82007 | Coal - Fluorine<br>Certified value<br>F.....248±12 µg/g | 50 g |
| NCS FC82008 | Coal - Fluorine<br>Certified value<br>F.....864±16 µg/g | 50 g |
| NCS FC82009 | Coal - Fluorine<br>Certified value<br>F.....1496±20 µg/g | 50 g |
| NIST-2682B | Coal (sub-bituminous) - Sulphur, mercury and heat of combustion<br>Certified values<br>S.....0.4917 % Hg.....108.8 µg/kg<br>Indicative values for chlorine, ash content, gross calorific value | 50 g |
| NIST-2683B | Coal (bituminous) - Sulphur<br>Certified value<br>S.....1.955 %<br>Indicative value for Furnace ash | 50 g |
| NIST-2684B | Coal (bituminous) - Sulphur, mercury and heat of combustion<br>Certified values<br>S.....3.076 % Heat of combustion ..... 28.56 MJ/kg<br>Hg ..... 97.4 µg/kg<br>Indicative values for Ash content, Gross calorific value | 50 g |
| NIST-2692b | Coal (bituminous) - Sulphur, mercury and gross calorific value<br>Certified values<br>S.....1.170 % ± 0.020 % Chlorine.....1651 ± 28 mg/kg<br>Hg ..... 133.3 µg/kg ± 4.1 µg/kg<br>Reference values<br>Ash Content (mass fraction) .....7.90 % Gross Calorific Value ..... 32.81 MJ/kg | 50 g |
| NIST-2693 | Coal (bituminous) - Sulphur and mercury<br>Certified values<br>S.....0.4571 % Hg.....37.3 µg/kg Cl..... 369.6 mg/kg | 50 g |
| NIST-2685B | Coal - Sulphur, mercury and heat of combustion<br>This Standard Reference Material (SRM®) is intended primarily for use in the evaluation of techniques employed in the determination of sulfur, mercury, ash content, and calorific value (MJ·kg-1) in coal and materials of a similar matrix. NIST-2685b consists of 50 g of bituminous coal ground to pass a 250 µm (60 mesh) sieve, homogenized, and packaged in an amber glass bottle.<br>Certified values<br>S.....4.730 % Cl.....517 mg/kg<br>Hg ..... 146.2 µg/kg<br>Indicative values for the ash content, gross calorific value and elements | 50 g |
| NIST-1632C | Coal (bituminous) - Elements<br>Certified values<br>H .....5.11% Ba .....41.1 mg/kg Selenium ..... 1.326 mg/kg<br>S.....1.462 % Co.....3.48 mg/kg Sodium..... 298.8 mg/kg<br>Potassium .....0.1100 % Mn.....13.04 mg/kg Strontium..... 63.8 mg/kg<br>Chlorine.....0.1139 % Hg.....0.0938 mg/kg Thorium..... 1.40 mg/kg<br>Sb..... 0.461 mg/kg Rb.....7.52 mg/kg Zinc ..... 12.1 mg/kg<br>Indicative values for Carbon (total), N , Si, Al, As, B, Br, Ca, Cd, Ce, Cr, Cs, Co, Eu, Fe, Hf, Mg, Ni, Pb, Sm, Sc,Ti, U, V, Ash | 50 g |

| Code | Product | Unit |
|---|---|---|
| NIST-1635 | Coal - Trace elements<br>Certified values | 75 g |

| | | |
|---|---|---|
| As 0.42 mg/kg | Fe 0.239 % | Se 0.9 mg/kg |
| Cd 0.03 mg/kg | Mn 21.4 mg/kg | Th 0.62 mg/kg |
| Cr 2.5 mg/kg | Ni 1.74 mg/kg | U 0.24 mg/kg |
| Cu 3.6 mg/kg | Pb 1.9 mg/kg | V 5.2 mg/kg |
| F 25.9 mg/kg | S 0.3616 % | Zn 4.7 mg/kg |

Indicative values for Al, Ce, Co, Eu, Ga, Hf, Hg, Na, Sb, Sc, Ti

| Code | Product | Unit |
|---|---|---|
| NCS FC28001J | Coal (bitumite) - Elements and properties<br>Coal type: Bitumite<br>Certified values | 50 g |

| | |
|---|---|
| C 78.35 % | Ash 9.63 % |
| H 4.28 % | Volatile matter 24.43 % |
| N 1.36 % | Relative density (20°C) 1.41 |
| Total S 0.50 % | Gross calorific value 31.47 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28002H | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values | 50 g |

| | |
|---|---|
| C 57.84 % | Ash 28.69 % |
| H 3.77 % | Volatile matter 27.27 % |
| N 1.08% | Relative density (20°C) 1.57 |
| Total S 1.5 % | Calorific value 23.63 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28003F | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values | 50 g |

| | |
|---|---|
| C 78.22 % | Ash 16.29 % |
| H 0.95 % | Volatile matter 6.32 % |
| N 0.23 % | Relative density (20°C) 1.95 |
| Total S 0.28 % | Calorific value 26.44 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28004E | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values | 50 g |

| | |
|---|---|
| C 66.8 % | Ash 28.13 % |
| H 1.43 % | Volatile matter 4.81 % |
| N 0.74 % | Relative density (20°C) 1.89 |
| Total S 0.99 % | Calorific value 23.8 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28005C | Coal (anthracite) - Elements and properties<br>Coal type: Anthracite<br>Certified values | 50 g |

| | |
|---|---|
| C 80.73 % | Ash 11.63 % |
| H 2.74 % | Volatile matter 6.94 % |
| N 1.06 % | Relative density (20°C) 1.57 |
| S 1.86 % | Gross calorific value 30.84 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28008D | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values | 50 g |

| | |
|---|---|
| C 66.71 % | Ash 21.65 % |
| H 3.63 % | Volatile matter 18.34 % |
| N 1.19 % | Relative density (20°C) 1.54 |
| Total S 3.54 % | Calorific value 27.06 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28009E | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values | 50 g |

| | |
|---|---|
| C 54.1 % | Ash 32.78 % |
| H 3.02 % | Volatile matter 17.14 % |
| N 0.97 % | Relative density (20°C) 1.73 |
| Total S 4.09 % | Calorific value 21.5 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28011C | Coal - Elements and properties<br>Certified values | 50 g |

| | |
|---|---|
| C 72.79 % | Ash 20.41 % |
| H 2.12 % | Volatile matter 6.45 % |
| N 0.52 % | Density (20°C) 1.72 |
| Total S 2.20 % | Gross calorific value 27.27 MJ/kg |

| Code | Product | Unit |
|---|---|---|
| NCS FC28017 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 73.64 %<br>H ..... 0.91 %<br>N ..... 0.23 %<br>Total S..... 0.21 %<br>Ash ..... 21.01 %<br>Volatile matter ..... 5.9 %<br>Relative density (20°C) ..... 1.97<br>Calorific value..... 25.01 MJ/kg | 50 g |
| NCS FC28101 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 90.27 %<br>H ..... 3.01 %<br>N ..... 0.60 %<br>Total S..... 0.20 %<br>Ash ..... 3.95 %<br>Volatile matter ..... 6.64 %<br>Relative density (20 °C) ..... 1.47<br>Calorific value..... 34.34 MJ/kg | 50 g |
| NCS FC28102 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 87.47 %<br>H ..... 2.86 %<br>N ..... 0.60 %<br>Total S..... 0.19 %<br>Ash ..... 6.46 %<br>Volatile matter ..... 7.90 %<br>Relative density (20 °C) ..... 1.5<br>Calorific value..... 33.1 MJ/kg | 50 g |
| NCS FC28103 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 81.55 %<br>H ..... 3.33 %<br>N ..... 1.30 %<br>Total S..... 0.36 %<br>Ash ..... 10.51 %<br>Volatile matter ..... 9.45 %<br>Relative density (20 °C) ..... 1.47<br>Calorific value..... 31.8 MJ/kg | 50 g |
| NCS FC28104 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 81.60 %<br>H ..... 3.52 %<br>N ..... 1.34 %<br>Total S..... 0.41 %<br>Ash ..... 10.09 %<br>Volatile matter ..... 11 %<br>Relative density (20 °C) ..... 1.45<br>Calorific value..... 32.04 MJ/kg | 50 g |
| NCS FC28105 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 81.54 %<br>H ..... 3.70 %<br>N ..... 1.16 %<br>Total S..... 1.06 %<br>Ash ..... 9.61 %<br>Volatile matter ..... 12.21 %<br>Relative density (20 °C) ..... 1.43<br>Calorific value..... 32.31 MJ/kg | 50 g |
| NCS FC28106 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 79.09 %<br>H ..... 4.95 %<br>N ..... 1.38 %<br>Total S..... 1.72 %<br>Ash ..... 8.56 %<br>Volatile matter ..... 31.92 %<br>Relative density (20 °C) ..... 1.35<br>Calorific value..... 32.98 MJ/kg | 50 g |
| NCS FC28107 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 79.89 %<br>H ..... 3.80 %<br>N ..... 1.12 %<br>Total S..... 0.67 %<br>Ash ..... 10.41 %<br>Volatile matter ..... 15.30 %<br>Relative density (20 °C) ..... 1.43<br>Calorific value..... 31.64 MJ/kg | 50 g |
| NCS FC28108 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 72.94 %<br>H ..... 4.46 %<br>N ..... 1.26 %<br>Total S..... 0.57 %<br>Ash ..... 13.68 %<br>Volatile matter ..... 30.84 %<br>Relative density (20 °C) ..... 1.42<br>Calorific value..... 29.9 MJ/kg | 50 g |

| Code | Product | Unit |
|---|---|---|
| NCS FC28109 | Coal - Elements and properties<br>Coal type: Anthracite<br>Certified values<br>C ..... 79.42 %<br>H ..... 3.28 %<br>N ..... 1.09 %<br>Total S ..... 0.58 %<br>Ash ..... 11.98 %<br>Volatile matter ..... 11.30 %<br>Relative density (20 °C) ..... 1.49<br>Calorific value ..... 30.66 MJ/kg | 50 g |
| NCS FC28110 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 75.96 %<br>H ..... 4.56 %<br>N ..... 1.33 %<br>Total S ..... 0.87 %<br>Ash ..... 8.42 %<br>Volatile matter ..... 32.94 %<br>Relative density (20 °C) ..... 1.41<br>Calorific value ..... 30.92 MJ/kg | 50 g |
| NCS FC28111 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 60.24 %<br>H ..... 3.73 %<br>N ..... 1.04 %<br>Total S ..... 1.28 %<br>Ash ..... 25.19 %<br>Volatile matter ..... 28.39 %<br>Relative density (20 °C) ..... 1.57<br>Calorific value ..... 24.35 MJ/kg | 50 g |
| NCS FC28112 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 78.75 %<br>H ..... 5.01 %<br>N ..... 1.31 %<br>Total S ..... 2.10 %<br>Ash ..... 8.08 %<br>Volatile matter ..... 33.70 %<br>Relative density (20 °C) ..... 1.33<br>Calorific value ..... 33.04 MJ/kg | 50 g |
| NCS FC28113 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 74.80 %<br>H ..... 4.47 %<br>N ..... 1.02 %<br>Total S ..... 0.27 %<br>Ash ..... 7.06 %<br>Volatile matter ..... 33.40 %<br>Relative density (20 °C) ..... 1.41<br>Calorific value ..... 30.03 MJ/kg | 50 g |
| NCS FC28114 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 76.36 %<br>H ..... 4.54 %<br>N ..... 1.08 %<br>Total S ..... 0.20 %<br>Ash ..... 4.66 %<br>Volatile matter ..... 33.07 %<br>Relative density (20 °C) ..... 1.4<br>Calorific value ..... 30.73 MJ/kg | 50 g |
| NCS FC28115 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 77.44 %<br>H ..... 4.42 %<br>N ..... 1.21 %<br>Total S ..... 0.42 %<br>Ash ..... 6.38 %<br>Volatile matter ..... 32.22 %<br>Relative density (20 °C) ..... 1.41<br>Calorific value ..... 31.05 MJ/kg | 50 g |
| NCS FC28116 | Coal - Elements and properties<br>Coal type: Bitumite<br>Certified values<br>C ..... 78.68 %<br>H ..... 4.59 %<br>N ..... 1.34 %<br>Total S ..... 0.54 %<br>Ash ..... 6.08 %<br>Volatile matter ..... 32.34 %<br>Relative density (20 °C) ..... 1.39<br>Calorific value ..... 31.82 MJ/kg | 50 g |
| NCS FC59001 | Coke - Sulphur, ash and volatile matter<br>Certified values<br>Total Sulphur ..... 0.63±0.03 %<br>Ash ..... 7.22±0.06 %<br>Volatile matter ..... 1.39±0.08 % | 60 g |
| NCS FC59002 | Coke - Sulphur, ash and volatile matter<br>Certified values<br>Total Sulphur ..... 0.47±0.02 %<br>Ash ..... 12.62±0.08 %<br>Volatile matter ..... 1.5±0.2 % | 60 g |
| NCS FC82004 | Coal - Chlorine<br>Certified value<br>Cl ..... 0.010±0.002 % | 50 g |

## Coals

| Code | Product | Unit |
|---|---|---|
| NCS FC82005 | Coal - Chlorine<br>Certified value<br>Cl.....0.057±0.003 % | 50 g |
| NCS FC82006 | Coal - Chlorine<br>Certified value<br>Cl.....0.110±0.006 % | 50 g |
| NCS FC82001 | Coal - Arsenic and phosphorous<br>Certified value<br>As.....15±1 µg/g P ..... 0.031±0.002% | 50 g |
| NCS FC82002 | Coal - Arsenic and phosphorous<br>Certified value<br>As.....34±2 µg/g P ..... 0.007±0.001% | 50 g |
| NCS FC82003 | Coal - Arsenic and Phosphorus<br>Certified value<br>As.....51±3 µg/g P ..... 0.092±0.005% | 50 g |
| NCS FC62001 | Bituminous Coal<br>Certified values<br>$M_{ad}$ .....4.51% $V_{ad}$ ..... 22.89% $S_{t,d}$ .....1.53%<br>$A_{ad}$ .....21.17% $V_d$ ..... 23,97% $Q_{gr,ad}$ ..... 23.91 MJ/kg<br>$A_d$ .....22.17% $S_{t,ad}$ ..... 1,46% $Q_{gr,d}$ ..... 25.04 MJ/kg<br>$M_{ad}$, $A_{ad}$, $V_{ad}$, $S_{t,ad}$ and $Q_{gr,ad}$ mean moisture, ash, volatile material, total sulfur and calorific value of air dried sample; $A_d$, $V_d$, $S_{t,d}$ and $Q_{gr,d}$ mean ash, volatile material, total sulfur and calorific value of dried sample. | 20 g |
| NCS FC62002 | Bituminous Coal<br>Certified values<br>$M_{ad}$ .....2.27% $V_{ad}$ ..... 4.21% $S_{t.d}$ .....2.95%<br>$A_{ad}$ .....25.82% $V_d$ ..... 4.31% $Q_{gr.ad}$ ..... 23.48 MJ/kg<br>$A_d$ .....26.42% $S_{t.ad}$ ..... 2.88% $Q_{gr.d}$ ..... 24.02 MJ/kg<br>$M_{ad}$, $A_{ad}$, $V_{ad}$, $S_{t,ad}$ and $Q_{gr,ad}$ mean moisture, ash, volatile material, total sulfur and calorific value of air dried sample; $A_d$, $V_d$, $S_{t,d}$ and $Q_{gr,d}$ mean ash, volatile material, total sulfur and calorific value of dried sample. | 20 g |
| NIST-2775 | Foundry coke - Sulphur<br>Certified value<br>S.....0.5816 %<br>Indicative values for ash, volatile matter, carbon, hydrogen and nitrogen | 50 g |
| NIST-2776 | Foundry coke - Sulphur, ash and volatile matter<br>Certified values<br>S.....0.825 ± 0.016 %<br>Indicative values for ash, volatile matter, carbon, hydrogen, nitrogen | 50 g |
| NIST-2718 | Green petroleum coke - Trace elements<br>Certified values<br>Al..... 16.5 mg/kg Fe .....290 mg/kg S..... 47032 mg/kg<br>Ca ..... 174 mg/kg Ni .....139.1 mg/kg V..... 302 mg/kg<br>Indicative values for C, Co, H, N, Na, Si, Ash, Volatile matter, Gross calorific value | 50 g |
| NIST-2719 | Calcinated petroleum coke - Trace elements<br>Certified values<br>Al..... 58.9 mg/kg Fe .....201.6 mg/kg S..... 8877 mg/kg<br>Ca ..... 57.7 mg/kg Ni .....204 mg/kg V..... 58.6 mg/kg<br>Indicative values for C, Co, H, N, Na, Si, Ash, Volatile content, Gross calorific value | 50 g |

LGC Standards, Queens Road, Teddington, Middlesex TW11 0LY, UK
www.lgcstandards.com




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