

ECISS
 EUROPEAN COMMITTEE FOR IRON AND STEEL STANDARDISATION
 COMITÉ EUROPÉEN DE NORMALISATION DU FER ET DE L'ACIER
 EUROPÄISCHES KOMITEE FÜR EISEN-UND STAHLNORMUNG
 EUROPEAN CERTIFIED REFERENCE MATERIAL (EURONORM – CRM)
 CERTIFICATE OF CHEMICAL ANALYSIS

EURONORM – CRM No. 783-1 TUNGSTEN CARBIDE

**LABORATORY MEANS (4 Values)
 mass content in %**

Line No	C (total)	Fe	C (free)	O
1	—	—	0.0169	0.0088
2	6.1549	—	0.0233	0.0127
3	6.1585	0.0020	0.0333	0.0132
4	6.1688	0.0020	0.0355	0.0134
5	6.1688	0.0021	0.0355	0.0141
6	6.1730	0.0022	0.0389	0.0144
7	6.1750	0.0022	0.0420	0.0153
8	6.1835	0.0023	0.0483	0.0163
9	6.1850	0.0023	0.0497	0.0164
10	6.1863	0.0023	0.0512	0.0203
11	6.1950	0.0023	0.0538	0.0209
12	6.1960	0.0024	0.0545	0.0232
13	6.2008	0.0024	0.0635	
14	6.2050	0.0024		
15	6.2075			
16	6.2097			
17	6.2146			
18	6.2198			
M_M	6.1884	0.0022		
s_M	0.0198	0.0002		
s_W	0.0131	0.0002		

M_M : Mean of the intralaboratory means, s_M : Standard Deviation of the intralaboratory means.

s_W : Intralaboratory standard deviation, s_b : Interlaboratory standard deviation, $s_b = \sqrt{s_M^2 - \frac{s_W^2}{4}}$

The laboratory mean values have been examined statistically to eliminate outlying values. Where a "—" appears in the table it indicates that an outlying value has been eliminated by either the Cochran or Grubbs Test.
 Values in small italic type are for information only.

**CERTIFIED VALUES
 Mass content in %**

	C (total)	Fe
M_M	6.188	0.0022
C(95%)	0.011	0.0002

The half-width confidence interval C(95%) = $\frac{t \times s_M}{\sqrt{n}}$ where "t" is the appropriate Student's t value and "n" is the number of acceptable mean values.

For further information regarding the confidence interval for the certified value see ISO Guide 35:1989 section 4.

This reference material was prepared in accordance with the recommendations set out in ISO Guides 30 - 35 and issued by:

BUREAU OF ANALYSED SAMPLES LIMITED

Newham Hall, Middlesbrough, England TS8 9EA

On behalf of:- The Iron and Steel Nomenclature Co-ordinating Committee(COCOR) of the ECISS, after approval by all the participating laboratories and all the producing organizations. (France – IRSID/CTIF, Germany – Iron and Steel CRM Working Group: VDEh, BAM & MPI für Eisenforschung, Nordic Countries – Nordic CRM Working Group, UK – BAS Ltd.)



Certificate No: Q3993

METHODS USED
EURONORM – CRM No. 783-1

Element	Line Number	Methods
C (total)	2	Coulometric titration
	3-7-9	Thermal conductivity
	5-6-8-10-11-12-13-14-15-17	Infrared absorption
	4-16	Gravimetric
	18	Conductimetric
Fe	3-4-5-6-7-8	Inductively Coupled Plasma-Optical Emission Spectrometry
	9-10-11-12-14	Flame Atomic Absorption Spectrometry
	13	Electrothermal Atomic Absorption Spectrometry
<i>C (Free)</i>	1-2-6-7-11-12-13	<i>Infrared absorption, graphitic carbon separated in nitric acid</i>
	3	<i>Coulometric titration, graphitic carbon separated in nitric acid</i>
	4	<i>Thermal Conductivity</i>
	5	<i>Conductimetric, graphitic carbon separated in nitric acid</i>
	8-9	<i>Infrared absorption</i>
O	10	<i>Non-aqueous titration after absorption in organic solvent</i>
	1-3-5-6-7-8-9-11	<i>Infrared absorption, reduction fusion under helium</i>
	2-4-12	<i>Thermal conductivity, reduction fusion under helium</i>
	10	<i>Infrared absorption, reduction fusion under vacuum</i>

PARTICIPATING LABORATORIES

Bundesanstalt für Materialforschung und –prüfung (BAM), Berlin, Germany
Carsid SA, Couillet, Belgium
Centre de Développement des Industries de Mise en Forme des Matériaux (CTIF), Sèvres, France
CERAM Research Ltd., Stoke on Trent, UK
CERMeP, Grenoble, France
Cerazit, Luxembourg
Corrosion and Metals Research Institute, Stockholm, Sweden
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Sandvik Hard Materials, Coventry, UK
Sandvik Tooling, Stockholm, Sweden
Seco Tools AB, Fagersta, Sweden
Treibacher Industrie AG, Treibach-Althofen, Austria
Uddeholm Tooling AB, Hagfors, Sweden
voestalpine Stahl GmbH, Linz, Austria

DESCRIPTION OF THE SAMPLE

The sample is available in a finely divided form of particle size approximately 20 - 30 µm. It is supplied in bottles containing 100 g.

INTENDED USE & STABILITY

This sample, ECRM 783-1, is intended for the verification of analytical methods, such as those used by the participating laboratories, for the calibration of analytical instruments in cases where the calibration with primary substances (pure metals or stoichiometric compounds) is not possible and for establishing values for secondary reference materials.

Additional work on the determination of the free carbon content has indicated that the variation of this constituent is associated with the particle size. It is therefore important that a representative sample is taken for analysis by rotating the bottle before extracting the sample.

It will remain stable provided that the bottle remains sealed and is stored in a cool, dry atmosphere. When the bottle has been opened the lid should be secured immediately after use. If the contents should become discoloured (e.g. oxidised) by atmospheric contamination they should be discarded.

TRACEABILITY

The traceability of this ECRM is ensured by the use of either stoichiometric analytical techniques or methods which are calibrated against pure metals or stoichiometric compounds.

FURTHER INFORMATION

For information regarding the preparation, certification and supply of these European Certified Reference Materials (EURONORM-CRMS) and the use of the statistical information given on this certificate, please refer to CEN Report CR 10317 and ECISS Information Circular No. 5, both of which are available from the national standards body in your country or from CEN in Brussels. (In the UK this is the BSI, 389 Chiswick High Road, London W4 4AL).

Des informations complémentaires sur la fabrication, la certification et la distribution des Matériaux de Référence Certifiés Européens (EURONORM-MRC) ainsi que sur l'utilisation des informations statistiques données sur le certificat se trouvent dans le Rapport CEN CR 10317 et dans la circulaire d'information No. 5 (ECISS). On peut se procurer ces deux documents auprès des organismes nationaux de normalisation ou auprès du CEN, Bruxelles. (Pour la France: AFNOR, 11 Avenue Francis de Pressensé, 93571 – St Denis la Plaine Cedex).

Angaben über Herstellung, Zertifizierung und Bezugsmöglichkeiten dieser Europäischen Zertifizierten Referenzmaterialien (EURONORM-ZRM) sowie über die Anwendungen der in diesem Zertifikat enthaltenen statistischen Daten finden sich im CEN-Report CR 10317 und in der Mitteilung Nr. 5 (ECISS), beide zu beziehen durch die nationalen Normenorganisationen oder direkt von CEN, Brüssel. (In Deutschland bei der Vertriebsstelle des DIN: Beuth-Verlag GmbH, Burggrafenstrasse 4-10, 10787 Berlin).

För information angående tillverkning, certifiering och distribuering av dessa europeiska certifierade referensmaterial (EURONORM CRM) och för användning av statistisk information, som angivits i detta certifikat, refereras till CEN rapport CR 10317 och till informationscirkulär Nr. 5 (ECISS) från den nationella standardiseringsorganisationen eller från CEN, Bruxelles. (I Sverige är det SIS, S:t Paulsgatan 6, SE-118 80 Stockholm, i Finland är det SFS, PL. 116, FIN-002 41, Helsinki, i Danmark är det DS, Kollegievej 6, DK-Charlottenlund 2920, i Norge är det NSF, Drammensveien, 145 A, Postboks 353 Skøyen, NO-0213 Oslo, på Island är det STRI, Holtagarðar, IS-104 Reykjavík).

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