ECISS

EUROPEAN COMMITTEE FOR IRON AND STEEL STANDARDIZATION
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. 059-2 0.7% CARBON STEEL

Similar to BS 1429:1980

LABORATORY MEANS (4 Values)
mass content in %

Line No.	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	Al (Acid sol.)	Cu	N
1	0.7059	0.1805	0.4863	0.0041	0.0072	–	–	0.0169	–	0.00010	–	0.0043
2	0.7099	0.1838	0.4883	0.0042	0.0074	0.0082	0.0013	0.0175	0.00035	0.00012	–	0.0044
3	0.7149	0.1839	0.4887	0.0042	0.0074	0.0085	0.0014	0.0181	0.00035	0.00012	0.0071	0.0045
4	0.7152	0.1857	0.4917	0.0042	0.0076	0.0086	0.0015	0.0190	0.00036	0.00018	0.0072	0.0047
5	0.7162	0.1863	0.4917	0.0043	0.0078	0.0086	0.0015	0.0191	0.00039	0.00018	0.0072	0.0047
6	0.7187	0.1876	0.4919	0.0044	0.0078	0.0086	0.0015	0.0193	0.00040	0.00022	0.0072	0.0050
7	0.7187	0.1884	0.4921	0.0044	0.0078	0.0088	0.0015	0.0196	0.00045	0.00022	0.0072	0.0050
8	0.7197	0.1884	0.4925	0.0044	0.0081	0.0088	0.0015	0.0197	0.00048	0.00022	0.0073	0.0050
9	0.7197	0.1885	0.4937	0.0044	0.0083	0.0089	0.0016	0.0197	0.00050	0.00030	0.0073	0.0050
10	0.7202	0.1887	0.4943	0.0044	0.0083	0.0090	0.0017	0.0198	0.00055	0.00032	0.0074	0.0050
11	0.7203	0.1887	0.4954	0.0046	0.0083	0.0090	0.0018	0.0200	0.00063		0.0074	0.0051
12	0.7203	0.1894	0.4957	0.0046	0.0084	0.0092	0.0018	0.0201			0.0074	0.0051
13	0.7212	0.1897	–	0.0046	0.0084	0.0092	0.0019	0.0202			0.0074	0.0051
14	0.7237	0.1898	0.4972	0.0047	0.0085	0.0093	0.0019	0.0202			0.0074	0.0052
15	0.7245	0.1900	0.4981	0.0048	0.0085	0.0093	0.0020	0.0203			0.0075	0.0052
16	0.7245	0.1902	0.4983	0.0050	0.0088	0.0093	0.0021	0.0204			0.0075	0.0052
17	0.7259	0.1904	0.4984	0.0050	0.0091	–	0.0022	0.0205			–	0.0054
18	0.7270	0.1909	0.4987	0.0052	0.0091	0.0094	0.0023	0.0211			0.0075	0.0054
19	0.7273	0.1922	0.4989	0.0053	0.0092	0.0095	0.0025	0.0212			0.0076	0.0054
20	0.7282	0.1936	0.5020	0.0056	0.0092	0.0095	–	0.0212			0.0077	0.0055
21	0.7348		0.5054		0.0093	0.0098		0.0213			0.0077	0.0060
22					0.0095							
M_M	**0.7208**	**0.1883**	**0.4950**	**0.0046**	**0.0084**	**0.0090**	**0.0018**	**0.0198**	**0.00045**	**0.00020**	**0.0074**	**0.0051**
s_M	0.0065	0.0031	0.0048	0.0004	0.0007	0.0004	0.0004	0.0012	0.00010	0.00008	0.0002	0.0004
s_w	0.0031	0.0022	0.0033	0.0002	0.0003	0.0003	0.0002	0.0004	0.00010	0.00005	0.0001	0.0002

M_M: Mean of the laboratory means s_M: Standard deviation of the laboratory means
s_w: Intralaboratory standard deviation s_b: Interlaboratory standard deviation

$$s_b = \sqrt{s_M^2 - s_w^2/4}$$

The laboratory mean values have been examined statistically to eliminate outstanding values. Where a "–" appears in the table it indicates that an outlying value has been omitted by either the Cochran or Grubbs Test.

CERTIFIED VALUES
mass content in %

	C	Si	Mn	P	S	Cr	Mo	Ni	Al (Total)	Al (Acid sol.)	Cu	N
M_M	**0.721**	**0.188**	**0.495**	**0.0046**	**0.0084**	**0.0090**	**0.0018**	**0.0198**	**0.00045**	**0.00020**	**0.0074**	**0.0051**
C(95%)	0.003	0.002	0.002	0.0002	0.0003	0.0002	0.0002	0.0006	0.00007	0.00006	0.0001	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.

NB An area 6mm in diameter in the centre of the discs should be avoided for optical emission spectrometry

This reference material was prepared and issued by:

BUREAU OF ANALYSED SAMPLES LIMITED

Newham Hall, Middlesbrough, England

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

NOVEMBER 2002

METHODS USED
ECRM No. 059-2

Element	Line Number	Methods
C	1-2-3-4-6-7-8-9-10-11-12-13-14-15-16-17-19-20-21	Combustion, infra-red absorption
	5	Combustion, coulometric titration
	18	Combustion, non-aqueous titration
Si	1-3-5-6-7-8-11-14-19	ICP-OES
	2	FAAS
	4-12-20	Photometric as molybdenum blue, without extraction
	9-10-13-16-17	Gravimetric, Dehydration with perchloric acid
	15	Photometric as silicomolybdate, without extraction
	18	Gravimetric, dehydration with sulphuric acid
Mn	1-3-12-17-20	Photometric, oxidation with periodate
	2-4-5-7-8-9-10-14-15-16-18-19-21	ICP-OES
	6-11	FAAS
P	1-2-5-8-9-10-11-12-14-17-19-20	ICP-OES
	3-7-13-15	Photometric as molybdenum blue, without extraction
	4-16-18	Photometric as phosphovanadomolybdate, extraction
	6	ICP-MS
S	1-2-3-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21	Combustion, infrared absorption
	4	Gravimetric as barium sulphate, without separation
	22	ICP-OES
Cr	2-3-4-5-6-7-8-9-10-11-12-13-14-18-20-21	ICP-OES
	15-16-19	FAAS
Mo	2-3-4-5-6-7-8-9-10-11-12-14-15-18-19	ICP-OES
	13-16	FAAS
	17	ICP-MS
Ni	1-2-3-4-5-6-7-8-10-11-12-13-14-16-19-21	ICP-OES
	9-15-17-18	FAAS
	20	Photometric with dimethylglyoxime, without extraction
Al (Total)	2-3-4-6-7-8-9-10-11	ICP-OES
	5	ETAAS
Al (Acid sol.)	1-3-4-5-6-7-8-9-10	ICP-OES
	2	ICP-MS
Cu	3-4-5-6-7-8-9-10-11-12-15-16-20-21	ICP-OES
	13-14-18-19	FAAS
N	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-21	Thermal conductivity, decomposition in graphite crucible
	20	Acidimetric titration after distillation, visual end point

Abbreviations:-

ETAAS: Electrothermal Atomic Absorption Spectrometry
FAAS: Flame Atomic Absorption Spectrometry
ICP-MS: Inductively Coupled Plasma-Mass Spectrometry
ICP-OES: Inductively Coupled Plasma-Optical Emission Spectrometry

PARTICIPATING LABORATORIES

Acerinox SA, Algeciras, Spain
AG der Dillinger Hüttenwerke AG, Dillingen-Saar, Germany
Ascometal, Fos-sur-Mer, France
Böhler Edelstahl GmbH & Co. KG, Kapfenberg, Austria
Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany
Carsid SA, Couillet, Belgium
Centre Technique des Industries de la Fonderie (CTIF), Sèvres, France
Centro Nacional de Investigaciones Metalurgicas (CENIM), Madrid, Spain
Corus, Construction & Industrial, Scunthorpe, UK
Corus, Engineering Steels, Stocksbridge, UK
Corus, Iron Services, IJmuiden, Netherlands
Corus Strip Products, Llanwern, UK
Corus, Swinden Technology Centre, Rotherham, UK
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Luxcontrol SA, Esch-sur-Alzette, Luxembourg
NILAB, Avesta, Sweden
Ovako Steel AB, Hofors, Sweden
Ridsdale & Co. Ltd., Middlesbrough, UK
SOLLAC Atlantique, Dunkerque, France
SOLLAC, Florange, France
SOLLAC, Fos-sur-Mer, France
Swedish Institute for Metals Research (SIMR), Stockholm, Sweden
Voest Alpine Stahl GmbH, Linz, Austria

DESCRIPTION OF THE SAMPLE

This sample is available in the form of chips passing a 1700µm aperture sieve from which the fines passing a 250µm aperture sieve have been removed. It is supplied in bottles containing 100g, ECRM 059-2(C). It is also supplied in the form of 38mm dia discs, ECRM 059-2(D).

INTENDED USE & STABILITY

The chip sample, ECRM 059-2(C), 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.
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 (eg oxidised) due to atmospheric contamination they should be discarded.
The disc sample, ECRM 059-2(D), is intended for establishing and checking the calibration of Optical Emission and X-Ray Spectrometers for the analysis of similar materials. The "as received" working surface of the sample should be linished before use to remove any protective coating. It will remain stable provided that it is not subjected to excessive heat (eg, during preparation of the working surface).

TRACEABILITY

The traceability of this ECRM is ensured by the use of either stoichiometric analytical techniques or methods that 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. (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 circulaires auprès des organismes nationaux de normalisation. (Pour la France: AFNOR, 11 Avenue Francis de Pressensé, 93571 - Saint 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. (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 dill informationscirkulär Nr. 5 (ECISS) från den nationella standardiseringsorganisationen. (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 år det STRI, Holtagardar, IS-104 Reykjavik).