

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. 057-2 0.05% CARBON STEEL

Similar to BS/DIN EN 10130/AFNOR NF A 36-401

LABORATORY MEANS (4 Values)

mass content in %

Line No.	C	Mn	P	S	Cr	Ni	Al (Total)	Cu	N	Si	Al (Acid sol)
1	0.0465	0.2359	0.0104	0.0110	0.0099	0.0072	0.0524	0.0138	0.0020	0.0006	0.0533
2	0.0481	0.2390	0.0106	0.0112	0.0100	0.0084	0.0541	0.0139	0.0020	0.0010	0.0541
3	0.0482	0.2417	0.0113	0.0118	0.0100	0.0087	0.0554	0.0139	0.0020	0.0011	0.0567
4	0.0483	0.2417	0.0115	0.0120	0.0105	0.0089	0.0568	0.0141	0.0021	0.0013	0.0594
5	0.0487	0.2422	0.0115	0.0124	0.0110	0.0089	0.0568	0.0141	0.0021	0.0014	
6	0.0489	0.2428	0.0117	0.0125	0.0111	0.0089	0.0573	0.0142	0.0021	0.0019	
7	—	0.2445	0.0117	0.0125	0.0111	0.0091	0.0577	0.0143	0.0021	0.0020	
8	0.0492	0.2453	0.0119	0.0125	0.0112	0.0093	0.0580	0.0143	0.0022	—	
9	0.0496	0.2459	0.0120	0.0126	0.0112	0.0093	0.0581	0.0143	0.0022	0.0027	
10	0.0500	0.2461	0.0120	0.0127	0.0114	0.0094	0.0583	0.0144	0.0022	0.0030	
11	0.0502	0.2464	0.0121	0.0127	0.0114	0.0094	0.0586	0.0145	0.0022	0.0030	
12	0.0508	0.2467	—	0.0128	0.0116	0.0095	0.0586	0.0145	0.0023	0.0031	
13	0.0508	0.2467	0.0123	0.0128	0.0116	0.0095	0.0587	0.0146	0.0024	0.0036	
14	0.0512	0.2470	0.0123	0.0129	0.0117	0.0100	0.0592	0.0146	0.0024	0.0042	
15	0.0515	0.2472	0.0123	0.0130	0.0117	0.0100	0.0594	0.0147	0.0024	0.0043	
16	0.0518	0.2473	0.0124	0.0130	0.0118	0.0100	0.0595	0.0147	0.0024	0.0050	
17	0.0520	0.2478	0.0124	0.0131	—	0.0100	0.0599	0.0148	0.0025	0.0053	
18	0.0525	0.2489	0.0125	0.0131	0.0119	0.0101	0.0607	0.0150	0.0025	0.0055	
19	0.0525	0.2497	0.0125	0.0131	0.0119	0.0102	0.0610	0.0151	0.0026	0.0057	
20	0.0528	0.2513	0.0126	0.0132	0.0119	0.0103	—	0.0153	0.0026	0.0062	
21	0.0528	0.2525	0.0127	0.0132	0.0121	0.0103	0.0632	0.0153	0.0027		
22	0.0529	—	0.0130	0.0135	0.0121	—	0.0633	0.0154	0.0029		
23	0.0531	0.2545	0.0132	0.0139	0.0121	0.0114	0.0642	—			
24	0.0544	0.2583			0.0122	0.0118		0.0155			
M_M	0.0507	0.2465	0.0120	0.0127	0.0114	0.0096	0.0587	0.0146	0.0023		
s_M	0.0020	0.0049	0.0007	0.0007	0.0007	0.0010	0.0028	0.0005	0.0002		
s_w	0.0007	0.0015	0.0003	0.0003	0.0002	0.0003	0.0005	0.0002	0.0001		

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

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

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 omitted by either the Cochran or Grubbs Test.

Values given above in italic type are for information only

CERTIFIED VALUE

mass content in %

	C	Mn	P	S	Cr	Ni	Al (Total)	Cu	N
M_M	0.0507	0.246	0.0120	0.0127	0.0114	0.0096	0.059	0.0146	0.0023
C(95%)	0.0009	0.002	0.0003	0.0003	0.0003	0.0004	0.001	0.0002	0.0001

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 and issued by:

BUREAU OF ANALYSED SAMPLES LIMITED

Newham Hall, Middlesbrough, England

MARCH 1999

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 Working Group: VDEh, BAM & MPI für Eisenforschung, Nordic
 Countries-Nordic CRM Working Group, UK—BAS Ltd.)



Certificate No. Q3993

PARTICIPATING LABORATORIES

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Ascometal, Fos (France)
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Voest-Alpine Stahl Donawitz GmbH, Leoben-Donawitz (Austria)
Voest-Alpine Stahl Linz GmbH, Linz (Austria)

DESCRIPTION OF THE SAMPLE

This sample is available in the form of chips passing a 1700µm aperture sieve from which the dust passing a 250µm aperture sieve has been removed. It is supplied in bottles containing 100g - ref ECRM 057-2(C). It is also supplied in the form of 38mm dia discs - ref ECRM 057-2(D).

INTENDED USE & STABILITY

The chip sample, ECRM 057-2(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 stoichiometric metals or 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 solid (disc) sample, ECRM 057-2(D), is intended for establishing and checking the calibration of Optical Emission and X-Ray Spectrometers for the analysis of samples of similar materials. The "as received" working surface of the sample should be finished 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 which are calibrated against pure stoichiometric metals or compounds.

METHODS USED EURONORM – CRM No. 057-2

Element	Line Number	Methods
C	1-2-3-4-5-6-8-9-10-11-13-15-16-17-18-19-21-22-24	Combustion, infrared absorption
	12	Combustion, non-aqueous titration
	14-20	Combustion, thermal conductivity
	23	Combustion, conductimetry
Mn	1-3-4-5-6-9-12-15-16-17-18-20-21-24	ICP-OES
	2-7-8-13	FAAS
	10-11-14-19-23	Photometric, periodate oxidation
P	1-2-3-8-9-14-15-16-18-20	ICP-OES
	4	Acidimetric titration of ammonium phosphomolybdate
	5-7-11-13-21-23	Photometric, phosphovanadomolybdate, with extraction
	6-17-19	Photometric, molybdenum blue, without extraction
	10	Gravimetric as quinoline phosphomolybdate
	22	Photometric, phosphovanadomolybdate without extraction
S	1-2-3-5-6-7-8-9-10-12-13-15-16-17-18-19-20-21-22-23	Combustion, infrared absorption
	4	Photometric as methylene blue, evolution as H ₂ S
	11	Acidimetric titration, photentiometric end-point detection
	14	Combustion, conductimetry
Cr	1-2-3-4-5-6-7-8-10-11-14-15-18-21-22-23	ICP-OES
	9-12-13-16-19-20-24	FAAS
Ni	1-2-4-5-7-8-9-10-13-15-17-18-20-21-23	ICP-OES
	3-6-11-12-14-19-24	FAAS
	16	Photometric with dimethylglyoxime, iron separation
Al (Total)	1-2-3-5-7-8-9-11-12-13-14-17-22-23	ICP-OES
	4-6-10-15-18-19-21	FAAS
	16	FAAS, extraction of iron
Cu	1-2-3-4-5-6-8-9-11-12-15-16-17-19-21-24	ICP-OES
	7-10-13-14-18-20-22	FAAS
N	1-2-3-5-6-7-8-9-10-11-12-13-14-15-16-17-18-20-22	Thermal conductivity, decomposition in graphite crucible
	4	Coulometry, distillation
	19-21	Acidimetric titration after distillation, visual end-point
Si	1-5-6-7-9-11-12-13-14-16-18-20	ICP-OES
	2-17	Photometric, molybdenum blue without extraction
	3-15	Photometric, molybdenum blue with extraction
	4	Photometric, silicovanadomolybdate without extraction
	10	Photometric, silicomolybdate without extraction
	19	FAAS
Al (Acid sol)	1-2-3	ICP-OES, dissolved in combinations of hydrochloric and nitric acids
	4	FAAS, dissolved in dilute hydrochloric/nitric acid mixture (ISO 9658:1990)

Abbreviations:-

FAAS: Flame Atomic Absorption Spectrometry

ICP-OES: Inductively Coupled Plasma-Optical Emission Spectrometry

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 Information Circulars No. 1 (ECISS) and No. 5 (ECSC), 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 les circulaires d'information No. 1 (ECISS) et No. 5 (CECA). On peut se procurer ces deux circulaires auprès des organismes nationaux de normalisation. (Pour la France: AFNOR, Tour Europe - Cedex 7, 92080 Paris La Défense).

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 in den Mitteilungen Nr. 1 (ECISS) und Nr. 5 (EGKS), beide zu beziehen durch die nationalen Normenorganisationen. (In Deutschland bei der Vertriebsstelle des DIN: Beuth-Verlag GmbH, Burggrafenstrasse 4-10, 10787 Berlin).