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. 577-1 FERRO-VANADIUM

LABORATORY MEANS (4 Values)
mass content in %

Line No	C	Si	Mn	P	S	Ni	%Al (Total)	Cu	V	*Al (Acid-soluble)*
1	0.0838	1.726	—	—	—	0.0458	—	—	49.98	
2	0.0842	1.728	0.1488	—	0.0298	0.0465	0.3850	0.0482	49.99	*0.1778*
3	0.0842	1.732	0.1500	0.0300	0.0320	0.0492	0.3862	0.0502	49.99	*0.1882*
4	0.0845	1.745	0.1505	0.0305	0.0320	0.0500	0.4010	0.0508	50.00	*0.2000*
5	0.0848	1.767	0.1510	0.0328	0.0322	0.0502	0.4025	0.0509	50.06	*0.2000*
6	0.0865	1.777	0.1538	0.0338	0.0327	0.0502	0.4040	0.0518	50.07	*0.2025*
7	0.0868	1.780	0.1550	0.0338	0.0332	0.0502	0.4048	0.0530	50.07	*0.2090*
8	0.0875	1.785	0.1552	0.0340	0.0332	0.0505	0.4048	0.0541	50.08	*0.2105*
9	0.0878	1.788	0.1555	0.0342	0.0333	0.0515	0.4050	0.0544	50.08	*0.2125*
10	0.0880	1.798	0.1572	0.0348	0.0336	0.0524	0.4095	0.0555	50.13	*0.2142*
11	0.0882	1.802	0.1600	0.0352	0.0339	0.0525	0.4118	0.0562	50.16	*0.2152*
12	0.0895	1.804	0.1600	0.0352	0.0339	0.0530	0.4140	0.0562	50.18	*0.2205*
13	0.0900	1.805	0.1618	0.0360	0.0346	0.0550	0.4248	0.0570	50.20	*0.2250*
14	0.0905	1.807	0.1645	0.0362	0.0350	0.0555	0.4275	0.0580	50.22	*0.2275*
15	0.0905	1.808	0.1648	0.0366	0.0352	0.0600	0.4305	0.0588	50.24	*0.2295*
16	0.0908	1.810	0.1675	0.0380	0.0360	0.0618	0.4400	0.0590	50.27	*0.2305*
17	0.0908	1.811	0.1750	0.0400	0.0360	0.0660	0.4425	—	50.28	*0.2306*
18	0.0912	1.818			0.0360		0.4432		50.29	*0.2348*
19	0.0921	1.821			0.0365				50.32	
20	0.0940	1.835			0.0367				50.36	
21	0.0948	1.835			0.0378				50.37	
M_M	**0.0886**	**1.790**	**0.1582**	**0.0347**	**0.0342**	**0.0530**	**0.4139**	**0.0543**	**50.16**	
s_M	0.0033	0.034	0.0073	0.0026	0.0020	0.0054	0.0181	0.0034	0.13	

M_M: Mean of the intralaboratory means, s_M: Standard deviation of the intralaboratory means

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 reported as "less than" values by the participating laboratories have not been taken into account in the statistical calculations.

CERTIFIED VALUES

Mass content in %

	C	Si	Mn	P	S	Ni	%Al (Total)	Cu	V
M_M	**0.089**	**1.79**	**0.158**	**0.035**	**0.034**	**0.053**	**0.414**	**0.054**	**50.16**
C(95%)	0.002	0.02	0.004	0.002	0.001	0.003	0.010	0.002	0.06

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 35:2006 sections 6.1 and 10.5.2

This Certified Reference Material was prepared in accordance with the principles and 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: Stahlinstitut VDEh, BAM Bundesanstalt für Materialforschung und –prüfung & MPI für Eisenforschung, Nordic Countries – Nordic CRM Working Group, UK – BAS Ltd.)

revised JULY 2014 with editorial amendments and uncertainty values for the certified elements
(first published in May 1978 and revised in September 1980 with certified values for Mn, Ni, Total Al and Cu)

EURONORM – CRM No. 577-1

PARTICIPATING LABORATORIES

Arbed, d'Esch-Belval, Esch-sur-Alzette, Luxembourg
Böhler AG, Düsseldorf-Oberkassel, Germany
Breda Siderurgica, Milan, Italy
British Steel Corporation, Stocksbridge and Tinsley Park Works, U.K.
Brown- Firth Research Laboratories, Sheffield, U.K
Bundesanstalt für Materialprüfung (BAM) Berlin-Dahlem, Germany
Centro Sperimentale Metallurgico (CSM), Rome, Italy
Cockerill, Seraing, Belgium
Gesellschaft für Elektrometallurgie mbH, Nürnberg, Germany
Hainaut Sambre, Couillet, Belgium
Institut de Recherches de la Sidérugie Française (IRSID), Saint Germain en Laye, France
Laboratoires d'Analyses Pourquery, Paris, France
London & Scandinavian Metallurgical Co. Ltd., Rotherham, U.K.
Murex Ltd., Rainham, U.K.
Ridsdale & Co. Ltd., Middlesbrough, U.K.
Société Française d'Electrometallurgie, (SOFREM) Aiguebelle, France
Société Française d'Electrometallurgie,(SOFREM) Chedde, Le Fayet, France
Société Nouvelle des Acieries de Pompey, France
Sollac, Florange, France
Stahlwerke Röchling-Burbach GmbH, Völklingen-Saar, Germany
Thyssen Edeistahlwerke AG, Forschungsinstitut, Krefeld, Germany

METHODS USED

Element	Line Number	Methods
C	1-3-4-15	Combustion, thermal conductivity
	2-10-13-17	Combustion, gas conductimetry
	5-9	Combustion, coulometric titration
	6-7-8-12-14-19-20-21	Combustion, infrared absorption
	11-16	Combustion, non-aqueous titration
	18	Combustion, gravimetric
Si	1-3-6-9-11-15-17-19-21	Gravimetry, dehydration with perchloric acid
	2-4-5-7-8-10-12-13-14-16-20	Gravimetry, dehydration with sulphuric acid
	18	Acidimetric titration of fluosilicate
Mn	2-4-5-7-9-10-11-12-13-14-15-16-17	Atomic absorption spectrometry
	3-8	Spectrophotometry, periodate oxidation
	6	Spectrophotometry, persulphate oxidation
P	3-4-6-9	Spectrophotometry, molybdenum blue, extraction
	5-8-11-13-14-17	Spectrophotometry, phosphovanadomolybdate, extraction
	7-10	Spectrophotometry, molybdenum blue, without extraction
	12-15	Spectrophotometry, phosphovanadomolybdate, without extraction
	16	Acidimetric titration as phosphomolybdate
S	2-10	Combustion, conductimetry
	3-4-5-6-9-11-12-13-15-16	Combustion, infrared absorption
	7-17-18	Combustion, acidimetric titration
	8	Combustion, coulometric titration
	14	Combustion, spectrophotometry, para rosaniline
	19-20-21	Combustion, oxidation reduction titration
Ni	1	Titration with cyanide, separation with dimethylglyoxime
	2-3-7-8-9-10-11-12-13-14-15-16-17	Atomic absorption spectrometry
	4-5	Spectrophotometry, dimethylglyoxime
	6	Spectrophotometry, dimethylglyoxime after ion exchange separation
Al (Total)	2	Spectrophotometry, hydroxyquinolate, fusion of insoluble residue with peroxide
	3	Atomic absorption spectrometry
	4-9-14-15	Atomic absorption spectrometry, fusion of insoluble residue with bisulphate
	5	Spectrophotometry, eriochrome cyanine, fusion of insoluble residue with carbonate/borax
	6-16	Atomic absorption spectrometry, fusion of insoluble residue with pyrosulphate
	7	Spectrophotometry, chrome azurol S, fusion of insoluble residue with peroxide
	8-10-11-12-17-18	Atomic absorption spectrometry, fusion of insoluble residue with carbonate/borax
	13	Atomic absorption spectrometry, fusion of insoluble residue with peroxide
Cu	2-3-4-5-7-8-10-11-12-14-15-16	Atomic absorption spectrometry
	6-9	Spectrophotometry, diethyldithiocarbamate
	13	Spectrophotometry, 2,2 diquinolyl
V	1-2-3-5-6-8-15-16-21	Titration with Fe(II), visual end point
	4-7-9-10-11-12-14-17-18-19-20	Titration with Fe(II), potentiometric end point
	13	Titration with Mn (VII), potentiometric end point
Al (Acid Soluble)	*2-3-4-5-6-7-10-11-12-14-15-16-17*	*Atomic absorption spectrometry*
	8	*Spectrophotometry, chrome azurol s*
	9	*Spectrophotometry, eriochrome cyanine after mercury cathode separation*
	13	*Gravimetry as oxinate*
	18	*Complexometric titration after ion exchange separation*

DESCRIPTION OF THE SAMPLE

The sample consists of a fine powder which has been sieved to a nominal particle size of 50 to 180 microns. It is supplied in bottles containing 100g.

INTENDED USE & STABILITY

ECRM 577-1 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 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 (e.g. oxidised) by atmospheric contamination they should be discarded.

TRACEABILITY

The traceability of ECRM 577-1 has been established in accordance with principles of ISO Guides 30 – 35 and the International Vocabulary of Basic and General Terms In Metrology.
The characterisation of this material has been achieved by inter-laboratory study, each laboratory using the method of their choice, details of which are given above. These methods are either stoichiometric analytical techniques or methods which are calibrated against pure metals or stoichiometric compounds. Most methods used were either international or national standard methods or methods which are technically equivalent.

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 either to the producer of this Certified Reference Material or to Technical Reports CEN/TR 10317:2013 and CEN/TR 10350:2013, 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).

Further information and advice on this or other Certified Reference Materials or Reference Materials produced by Bureau of Analysed Samples Ltd. may be obtained from the address below.

Pour disposer d'informations 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 ce certificat, se reporter soit au producteur de ce Matériau de Référence Certifié, soit aux Rapports Techniques CEN/TR 10317:2013 et CEN/TR 10350:2013. On peut se procurer ces deux documents auprès des organismes nationaux de normalisation. (Pour la France: AFNOR, 11 Avenue Francis de Pressensé, 93571 – St Denis la Plaine Cedex).

D'autres informations et avis au sujet de ce Matériau de Référence Certifié, ou de tout autre Matériau de Référence Certifié ou Matériau de Référence produits par le Bureau of Analysed Samples Ltd., peuvent être demandés en contactant l'adresse figurant dans le bas de ce Certificat.

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Weitere Informationen und Hinweise zu diesem oder anderen durch Bureau of Analysed Samples Ltd. hergestellten zertifizierten Referenzmaterialien oder Referenzmaterialien können unter der unten angegebenen Adresse erhalten werden.

För information angående tillverkning, certifiering och anskaffning av dessa europeiska certifierade referensmaterial (EURONORM CRM) och för användning av statistisk information, som angivits i detta certifikat, refereras antingen till producenten av detta certifierade referensmaterial eller till Teknisk Rapport CEN/TR 10317:2013 och CEN/TR 10350:2013 som kan erhållas från den nationella standardiseringsorganisationen. (Sverige: SIS, S:t Paulsgatan 6, SE-118 80 Stockholm, Finland: SFS, PL. 116, FIN-002 41, Helsingfors, Danmark: DS, Kollegievej 6, DK-Charlottenlund 2920, Norge: NSF, Drammensveien, 145 A, Postboks 353 Skøyen, NO-0213 Oslo, Island: STRI, Holtagardar, IS-104 Reykjavik).

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