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. 195-1 Cr-Mo-Ni STEEL

LABORATORY MEANS (4 values)
mass content in %

Line No.	C*	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	Pb	V	Ca	Zn
1	0.7420	0.4498	—	0.0146	0.0111	—	0.7513	0.3114	0.0337	0.0086	0.0009	0.2968	0.0014	0.0040
2	0.7493	0.4538	0.5597	0.0148	0.0112	1.540	0.7525	—	0.0339	—	0.0009	0.2975	0.0014	0.0043
3	0.7500	0.4573	0.5625	0.0148	0.0116	1.544	0.7560	0.3150	—	0.0093	0.0009	0.2980	0.0015	0.0044
4	0.7523	0.4588	0.5629	0.0149	0.0116	1.554	0.7580	0.3179	0.0347	0.0096	0.0009	0.3000	0.0015	0.0044
5	0.7524	0.4591	0.5644	0.0149	0.0117	1.554	0.7600	0.3203	0.0347	0.0096	0.0010	0.3037	0.0016	0.0044
6	0.7528	0.4596	0.5650	0.0150	0.0117	1.554	0.7628	0.3203	0.0350	0.0098	0.0010	0.3041	0.0016	0.0044
7	0.7535	0.4628	0.5684	0.0150	0.0117	1.555	0.7636	0.3220	0.0350	0.0098	0.0010	0.3048	0.0017	0.0045
8	0.7547	0.4631	0.5686	0.0155	0.0118	1.561	0.7660	0.3224	0.0351	0.0099	0.0010	0.3057	0.0017	0.0045
9	0.7555	0.4639	0.5691	0.0157	0.0119	1.561	0.7664	0.3229	0.0352	0.0099	0.0010	0.3121	0.0017	0.0046
10	0.7558	0.4643	0.5698	0.0157	0.0120	1.562	0.7671	0.3251	0.0354	0.0099	0.0010	0.3125	0.0018	0.0047
11	0.7565	0.4647	0.5727	0.0158	0.0120	1.562	0.7675	0.3264	0.0354	0.0100	0.0010	0.3126	0.0018	0.0047
12	0.7568	0.4665	0.5728	0.0160	0.0120	1.564	0.7683	0.3269	0.0356	0.0101	0.0011	0.3151	0.0018	0.0048
13	0.7573	0.4673	0.5733	0.0160	0.0121	1.566	0.7699	0.3275	0.0356	0.0102	0.0011	0.3166	0.0019	0.0048
14	0.7575	0.4682	0.5738	0.0167	0.0122	1.566	0.7702	0.3288	0.0361	0.0102	0.0012	0.3183	0.0019	0.0050
15	0.7589	0.4702	0.5741	0.0168	0.0123	1.572	0.7705	0.3294	0.0362	0.0102	0.0012	0.3184		—
16	0.7600	0.4709	0.5748	0.0172	0.0126	1.578	—	0.3303	0.0365	0.0103		0.3187		0.0054
17	0.7600	0.4713	0.5750	0.0175	0.0127	1.578	0.7758	0.3330	0.0365	0.0104		0.3198		
18	0.7609	0.4725	0.5759	—	0.0128	1.585	0.7787	0.3359	0.0370	0.0106		0.3208		
19	0.7673	0.4763	0.5780	0.0186	0.0130	—	0.7810	0.3373	0.0370	0.0107		0.3210		
20	0.7700	0.4932	0.5788	0.0187	0.0132	1.619	0.7813	0.3424	0.0373	0.0109		0.3225		
21		—	0.5795			—	0.7838	0.3476				0.3235		
M_M	**0.7562**	**0.4657**	**0.5710**	**0.0160**	**0.0121**	**1.566**	**0.7675**	**0.3271**	**0.0355**	**0.0100**	**0.0010**	**0.3115**	**0.0017**	**0.0046**
s_M	0.0061	0.0092	0.0057	0.0013	0.0006	0.018	0.0093	0.0090	0.0010	0.0005	0.0001	0.0090	0.0002	0.0003
s_W	0.0027	0.0056	0.0041	0.0004	0.0004	0.008	0.0040	0.0035	0.0007	0.0002	0.0001	0.0041	0.0002	0.0002

M_M: Mean of the intralaboratory means s_M: Standard deviation of the intralaboratory means
s_W: Mean 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 any 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 (from two laboratories) for information only:- Ag $\simeq$ 0.0002%; Sb $\simeq$ 0.0008%; Sn $\simeq$ 0.002%; Te <0.0002%

CERTIFIED VALUES
mass content in %

	C*	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	Pb	V	Ca	Zn
M_M	**0.756**	**0.466**	**0.571**	**0.0160**	**0.0121**	**1.566**	**0.768**	**0.327**	**0.0355**	**0.0100**	**0.0010**	**0.312**	**0.0017**	**0.0046**
C(95%)	0.003	0.004	0.003	0.0006	0.0003	0.009	0.004	0.004	0.0005	0.0002	0.0001	0.004	0.0001	0.0002

*** Note: The certified value for carbon applies only to the chip form, 195-1(C), and not to the solid form, 195-1(D), which has a lower carbon content of approximately 0.73%**

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, 195-1(D), should be avoided for optical emission spectrometry.

This reference material prepared and issued by:

BUREAU OF ANALYSED SAMPLES LIMITED

Newham Hall, Middlesbrough, England Revised MARCH 1992

(first issued October 1989 before revision of values for P and certification of Pb, Ca & Zn)

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; German Federal Republic—Iron and Steel CRM Working Group; UK—BAS Ltd.)

DESCRIPTION OF THE SAMPLE

This sample is available in the form of chips all passing a 1700 um aperture sieve from which the dust passing a 250 um aperture sieve has been removed.

It is supplied in bottles containing 100g...ref 195-1(C) It is also supplied in the form of 38mm dia. discs...ref 195-1(D)

PARTICIPATING LABORATORIES

AB Sandvik Steel, Sandviken (Sweden)
Acerinox S.A., Algeciras (Spain)
Acieries Aubert & Duval, Les Ancizes (France)
A.G. der Dillingen Hüttenwerke, Dillingen-Saar (Germany)
Ascomental Usine des Dunes, Dunkerque (France)
Ascomental Usine de Fos, Fos-sur-Mer (France)
BCIRA, Birmingham (UK)
Bundesanstalt für Materialforschung und-prüfung (BAM), Berlin (Germany)
Böhler AG, Düsseldorf (Germany)
Böhler GmbH., Kapfenberg (Austria)
British Steel Strip Products, Llanwern Works, Newport (UK)
British Steel Technical Centre, Corby (UK)
British Steel Welsh Laboratories, Port Talbot (UK)
Centro Nacional de Investigaciones Metalurgicas (CENIM), Madrid (Spain)
Centre de Recherches de Pont à Mousson, Maidières (France)
Centro Sviluppo Materiali, (CSM), Rome (Italy)
Dantest, Copenhagen (Denmark)
Department of Quality Assurance/Technical Support, MOD, London (UK)
GST Gesellschaft für Systemtechnik mbH., Essen (Germany)
Hoogovens Groep BV, IJmuiden (Holland)
Laboratoires Pourquery, Lyon (France)
Mannesman Forschungsinstitut, Duisburg (Germany)
Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf (Germany)
NEI International Research and Development Co. Ltd., Newcastle upon Tyne (UK)
Norsk Jernverk AS, Mo (Norway)
Rautaruukki Oy, Raahe (Finland)
Ridsdale & Co. Ltd., Middlesbrough (UK)
RNU Renault, Billancourt (France)
Rotherham Engineering Steels Ltd., Rotherham (UK)
Sanderson Kayser Ltd., Sheffield (UK)
Staatliches Materialprüfungsamt Nordrhein-Westfalen, Dortmund (Germany)
Stocksbridge Engineering Steels Ltd., Sheffield (UK)
Thyssen Stahl AG, Duisburg (Germany)
Ugine A.C.G., Isbergues (France)
Ugine A.C.G., Usine de l'Ardoise, Laudun (France)
Voest Alpine Stahl GmbH, Linz (Austria)

METHODS USED
EURONORM-CRM 195-1

Element	Line Number •	Methods
C	1- 3- 4- 5- 6- 9-10-11-12-13-14-15-16-17-18-20	Combustion, infrared absorption
	2	Combustion, gravimetry
	7- 8	Combustion, non-aqueous titration
	19	Combustion, thermal conductivity
Si	1- 6	Atomic absorption spectrometry
	2- 3- 5- 7- 8- 9-11-13-14-15-18	Gravimetric, dehydration with perchloric acid
	4-10-12-17-19	Photometric, as molybdenum blue, without extraction
	16-20	Plasma emission spectrometry
Mn	2- 3- 5- 7-10-11-12-21	Atomic absorption spectrometry
	4- 8-16-17	Plasma emission spectrometry
	6- 9-13-15-18-19	Photometric, oxidation with periodate
	14-20	Photometric, persulphate oxidation
P	1- 4- 6- 7- 8- 9-11-16-17-20	Photometric, as phosphovanadomolybdate, with extraction
	2	Photometric, as molybdenum blue, with extraction
	3-14	Plasma emission spectrometry
	5-10-13-15	Photometric, as molybdenum blue, without extraction
	12	Acidimetric titration as quinoline phosphate
	19	Photometric as molybdenum blue after separation of interfering elements
S	1- 4- 5- 6- 7- 8- 9-11-12-14-15-16-18-19-20	Combustion, infrared absorption
	2	Photometric, as methylene blue, separation as sulphide
	3	Gravimetric as barium sulphate after chromatographic separation on alumina
	10-13	Acidimetric titration, absorption in peroxide or silver nitrate
	17	Combustion, conductivity
Cr	2- 4- 9-10-12-13-16-17-18	Titration with Fe (II), oxidation with persulphate
	3- 5- 7-14-15	Atomic absorption spectrometry
	6	Plasma emission spectrometry
	8-11	Titration with Fe (II), oxidation with perchloric acid
	20	Photometric as chromate
Mo	1	Photometric as thiocyanate in presence of Sn (II) without extraction
	2- 3- 4- 7- 8-12-13-14-15-17-19	Atomic absorption spectrometry
	5- 6- 9-11	Plasma emission spectrometry
	10-18-20	Photometric as thiocyanate in presence of Sn (II) with extraction
	21	Photometric as thiocyanate in presence of Sn (II), hydroxide separation
Ni	1- 3- 7- 8-11-12-13-15-16-18-21	Atomic absorption spectrometry
	4- 6-17-20	Plasma emission spectrometry
	5-14-19	Photometric with dimethylglyoxime
	9	Titration with potassium dichromate after separation with dimethylglyoxime
	10	Complexometric titration
Cu	1- 2- 4- 5- 7- 8- 9-10-11-12-13-14-16	Atomic absorption spectrometry
	6-15-18-19-20	Plasma emission spectrometry
	17	Photometric with oxalyldihydrazide

METHODS USED
EURONORM-CRM 195-1

Element	Line Number	Methods
N	1- 4-18	Acidimetric titration after distillation, visual end point
	3- 5- 6- 7- 8- 9-10-12-14-15-16-17-19-20	Thermal conductivity, decomposition in graphite crucible
	11	Photometric with indophenol blue, distillation
	13	Photometric, Nessler reagent, distillation
Pb	1- 2- 7- 8-10-12-14-15	Furnace atomic absorption spectrometry
	3- 4- 6- 9-11	Flame atomic absorption spectrometry
	5	Inductively coupled plasma-mass spectrometry
	13	Plasma emission spectrometry
V	1- 4- 7-12-15	Plasma emission spectrometry
	2- 9-10-11-14-17-19	Atomic absorption spectrometry
	3- 5- 8-16-20	Titration with Fe (II), oxidation with Mn (VII)
	6-18	Photometric as phosphovanadotungstate
	13	Photometric with dimethylnaphthide
	21	Photometric with 3.3′ hydroxy-2-methyl-1,4-pyron
Ca	1- 3- 4- 7- 9-10-11-12-13-14	Flame atomic absorption spectrometry
	2- 5- 6- 8	Plasma emission spectrometry
Zn	1	Furnace atomic absorption spectrometry
	2- 3- 5- 6- 7- 8- 9-10-11-12-13-14-16	Flame atomic absorption spectrometry
	4	Plasma 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, 2 Park Street, London W1A 2BS).

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 Zertifizierten Europäischen Referenzmaterialien (EURONORM-ZRM) sowie über die Anwendung der in diesem Zertifikat enthaltenen statistischen Daten finden sich in den Mitteilung en 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, 1000 Berlin 30).