

ECSC - CECA - EGKS

EUROPEAN COAL AND STEEL COMMUNITY  
COMMUNAUTÉ EUROPÉENNE DU CHARBON ET DE L'ACIER  
EUROPÄISCHE GEMEINSCHAFT FÜR KOHLE UND STAHL

CERTIFIED REFERENCE MATERIAL

CERTIFICATE OF CHEMICAL ANALYSIS

EURO-CRM No. **486-1** FOUNDRY IRON

LABORATORY MEANS (4 values)  
mass content in %

Line No.	C (Total)	Si	Mn	P	S	Cr	Ni	Cu	Sn	V
1	2.150	2.385	0.8025	0.934	0.0210	0.0940	—	—	0.0655	0.0142
2	2.176	2.408	0.8125	0.948	0.0215	0.0960	0.0518	0.5240	0.0670	0.0167
3	2.184	2.412	0.8208	0.952	0.0220	0.0962	0.0532	0.5250	0.0681	0.0168
4	2.190	2.412	0.8260	0.967	0.0224	0.0976	0.0534	0.5331	0.0703	0.0170
5	2.195	2.421	0.8268	0.968	0.0228	0.0991	0.0537	0.5350	0.0706	0.0171
6	2.198	2.422	0.8338	0.974	0.0230	0.0992	0.0545	0.5400	0.0712	0.0175
7	2.202	2.425	0.8365	0.982	0.0230	0.1007	0.0552	0.5412	0.0715	0.0175
8	2.208	2.425	0.8417	0.986	0.0230	0.1040	0.0555	0.5440	0.0728	0.0188
9	2.210	2.428	0.8425	0.995	0.0230	0.1042	0.0557	0.5460	0.0730	0.0195
10	2.211	2.430	0.8445	0.997	0.0232	0.1048	0.0560	0.5519	0.0735	0.0195
11	2.215	2.433	0.8465	1.000	0.0235	0.1058	0.0563	0.5525	0.0740	0.0198
12	2.215	2.438	0.8465	1.009	0.0236	0.1080	0.0570	0.5554	0.0760	0.0200
13	2.220	2.438	0.8475	1.010	0.0237	0.1081	0.0571	0.5555	0.0766	0.0212
14	2.230	2.440	0.8488	1.018	0.0238	0.1084	0.0575	0.5558	0.0780	0.0218
15	2.232	2.445	0.8505	1.019	0.0240	0.1106	0.0585	0.5560	0.0805	0.0221
16	2.235	2.446	0.8575	1.025	0.0242	0.1108	0.0600	0.5572	0.0843	0.0228
17	2.252	2.455	0.8585	1.026	0.0246	0.1112	0.0601	0.5600	0.0888	0.0242
18	2.256	2.458	0.8638	1.052	0.0250	0.1119	0.0605	0.5602	—	0.0280
19	2.258	—	0.8640	1.064	0.0257	0.1136	0.0710	0.5728	—	—
$\bar{M}_M$	2.212	2.429	0.8406	0.996	0.0233	0.1044	0.0571	0.5480	0.0742	0.0197
$s_M$	0.028	0.018	0.0168	0.034	0.0012	0.0061	0.0043	0.0130	0.0061	0.0033

$\bar{M}_M$ : Mean of the intralaboratory means.  $s_M$ : Standard deviation of the intralaboratory means.

The laboratory mean values have been examined statistically to eliminate any outlying values.  
Where a "—" appears in the table it indicates that an outlying value has been omitted.

CERTIFIED VALUES  
mass content in %

	C (Total)	Si	Mn	P	S	Cr	Ni	Cu	Sn	V
$\bar{M}_M$	2.21	2.43	0.841	1.00	0.023	0.104	0.057	0.548	0.074	0.020
$s_M$	0.03	0.02	0.017	0.04	0.001	0.006	0.004	0.013	0.006	0.003

DESCRIPTION OF THE SAMPLE

This sample consists of finely divided turnings all passing a 450  $\mu$ m aperture sieve from which the graphite rich fines passing a 125  $\mu$ m aperture sieve have been removed. It is supplied only in bottles containing 100g.

PARTICIPATING LABORATORIES

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This reference material prepared and issued by:

**BUREAU OF ANALYSED SAMPLES LIMITED**

Newham Hall, Middlesbrough, England

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Metallurgical Products — Commission of European Communities.

**METHODS USED**  
**ECRM 486-1**

Element	Line Number	Method
<b>C</b>	1-9-12-17	Combustion, non-aqueous titration
	2-4	Combustion, coulometric
	3-10	Combustion, gravimetric
	5-6-7-8-11-15-18-19	Combustion, infra-red absorption
	13	Combustion, gas volumetric
	14-16	Combustion, conductimetric
<b>Si</b>	1-4-5-6-7-8-10-11-12-13-14-15-16-17-18	Gravimetric, dehydration with perchloric acid
	2-3	Photometric, as molybdenum blue without extraction
	9	FAAS
<b>Mn</b>	1-6-10-11-12-14-16-19	Photometric, oxidation with periodate
	2-3-5-7-8-17	FAAS
	4-9	Titrimetric with arsenite, persulphate/silver nitrate oxidation
	13-18	Photometric, oxidation with persulphate/silver nitrate
	15	Titrimetric with Mn VIII in pyrophosphate medium
<b>P</b>	1-3-7-10-15-17-19	Photometric as molybdenum blue without extraction
	2-4-5-6-8-11	Photometric as phosphovanadomolybdate after extraction
	9	Gravimetric, as ammonium phosphomolybdate
	12-13-16-18	Acidimetric titration of ammonium phosphomolybdate
	14	Photometric as phosphovanadomolybdate, without extraction
<b>S</b>	1-3-11-14-18	Combustion, acidimetric titration
	2-5	Combustion, conductimetric
	4-6-7-8-12-17-19	Combustion, infra-red absorption
	9	Combustion, oxidation/reduction titration
	10-13	Gravimetric as barium sulphate
	15	Combustion, gas volumetric
	16	Combustion, thermal conductivity
<b>Cr</b>	1-3-5-6-7	Photometric with diphenylcarbazide
	2-4-8-9-10-11-12-13-15-16-17-18-19	FAAS
	14	Titrimetric with Fe II, persulphate/silver nitrate oxidation
<b>Ni</b>	2-3-4-5-6-7-8-9-10-12-13-16-18	FAAS
	11-14-17-19	Photometric with dimethylglyoxime, without extraction
	15	Photometric with dimethylglyoxime, after extraction
<b>Cu</b>	2-3-4-5-6-7-11-12-13-14-15-18	FAAS
	8	Photometric with cuproin, without extraction
	9-17-19	Photometric with 2,2'-diquinolol, after extraction
	10	Photometric with dithio-oxamide
	16	Photometric with diethyldithiocarbamate, after extraction
<b>Sn</b>	1-5-6-7-8-9-10-15-17	FAAS
	2-11-14-16	Titrimetric with iodate solution, reduction with aluminium
	3-4-12-13	Photometric with pyridyl-3-fluorone, after extraction
<b>V</b>	1-4-7-8-9-10-13-14-15-17	FAAS
	2-3-18	Photometric with N-benzoylphenylhydroxylamine, after extraction
	5-12	ICP AES
	6	Titrimetric with Fe II, oxidation with permanganate
	11	Photometric with dimethylnaphthidine
	16	Photometric with hydrogen peroxide

Abbreviations: FAAS: Flame Atomic Absorption Spectrometry. ICP AES: Inductively Coupled Plasma Atomic Emission Spectrometry.

**FURTHER INFORMATION**

For information regarding the preparation and certification of Euro-CRMs (Certified Reference Materials) and sources of supply please refer to ECSC Information Circular No. 1 available from the Institution responsible for standardization in your country. (In the UK this is the BSI, 2 Park Street, London, W1A 2BS).

Pour tous renseignements sur les Euro-MRC (Matériaux de Référence Certifiés) se reporter à la Circulaire d'information No. 1 de la CECA, diffusée par les organismes nationaux de normalisation.

Wegen Erläuterungen über Euro-ZRM (Zertifiziertes Referenzmaterial) siehe Mitteilung Nr. 1 der EGKS, zu beziehen durch die nationalen Normenorganisationen.