

ECSC - CECA - EGKS

**EUROPEAN COAL AND STEEL COMMUNITY**

**COMMUNAUTÉ EUROPÉENNE DU CHARBON ET DE L'ACIER**

**EUROPÄISCHE GEMEINSCHAFT FÜR KOHLE UND STAHL**

**EURO - STANDARD No. 879 - 1 BASIC SLAG**

**CERTIFICATE OF ANALYSES**

Laboratory Means (4 values), all relate to the dried (105°C) sample

Line No.	%Si	%Ti	%Al	%Fe	%Ca	%Mg	%Cr	%Mn	%V	%P (Total)	%P (Cit. sol)	%S	%F	%P (Form. sol)
1	—	—	0.4000	18.65	30.84	1.268	—	—	0.3925	—	3.130	—	0.3100	2.266
2	4.075	0.3088	0.4025	18.74	30.93	1.290	0.3000	3.378	0.4025	3.642	3.195	0.0922	0.3154	2.314
3	4.075	0.3158	0.4050	18.77	31.04	1.290	0.3085	3.379	0.4030	3.644	3.228	0.0930	0.3250	2.330
4	4.095	0.3165	0.4062	18.80	31.05	1.294	0.3100	3.388	0.4045	3.661	3.273	0.0942	0.3340	2.353
5	4.100	0.3173	0.4080	18.82	31.08	1.295	0.3110	3.404	0.4068	3.662	3.277	0.0952	0.3412	2.483
6	4.104	0.3175	0.4100	18.82	31.11	1.297	0.3110	3.412	0.4068	3.663	3.290	0.0962	0.3438	2.536
7	4.110	0.3182	0.4128	18.83	31.12	1.305	0.3208	3.412	0.4070	3.665	3.292	0.0966	0.3469	2.545
8	4.112	0.3190	0.4172	18.86	31.12	1.314	0.3233	3.428	0.4075	3.665	3.302	0.0968	0.3502	2.558
9	4.116	0.3200	0.4192	18.89	31.14	1.314	0.3245	3.431	0.4122	3.668	3.305	0.0981	0.3505	2.623
10	4.124	0.3202	0.4248	18.90	31.15	1.315	0.3262	3.434	0.4125	3.676	3.330	0.1005	0.3662	2.702
11	4.124	0.3202	0.4294	18.92	31.16	1.318	0.3300	3.452	0.4175	3.693	3.352	0.1008	0.3722	2.742
12	4.125	0.3205	0.4300	18.96	31.18	1.318	0.3308	3.458	0.4177	3.695	3.360	0.1010	0.3725	
13	4.136	0.3212	0.4308	19.00	31.22	1.320	0.3320	3.460	0.4181	3.705	3.360	0.1020	0.3775	
14	4.136	0.3220	0.4349	19.02	31.25	1.321	0.3350	3.456	0.4189	3.705	3.504	0.1035	0.3812	
15	4.140	0.3239	0.4370	19.04	31.49	1.335	0.3355	3.470	0.4200	3.706	3.505	0.1042	0.3838	
16	4.140	0.3245	0.4400	19.05	31.49	1.338	0.3355	3.478	0.4265	3.720	—	0.1072	0.3910	
17	4.148	0.3250	0.4400	19.23	31.50	1.340	0.3358	3.480	0.4290	3.725	—	0.1138	0.3910	
18	4.158	0.3258	0.4420	19.25	31.70	1.340	0.3375	3.481	0.4340	3.725	—	0.1152	0.3932	
19	4.160	0.3275	0.4422	19.26	31.82	1.354	0.3390	3.500	0.4370	3.746	—	0.1175	0.4158	
20	4.168	0.3290	0.4481	19.27	—	1.361	0.3488	3.520	—	3.752	—	—	0.4325	
21	—	0.3330	0.4538	19.27	—	1.369	—	3.537	—	—	—	—	0.4362	
M <sub>M</sub>	4.123	0.3213	0.4254	18.97	31.23	1.319	0.3261	3.448	0.4144	3.690	3.314	0.1016	0.3681	2.496
s <sub>M</sub>	0.027	0.0054	0.0164	0.19	0.26	0.026	0.0129	0.045	0.0116	0.033	0.099	0.0076	0.0353	

M<sub>M</sub>: Mean of the intralaboratory means.

s<sub>M</sub>: Standard deviation of the intralaboratory means.

**CERTIFIED VALUES**

	%Si	%Ti	%Al	%Fe	%Ca	%Mg	%Cr	%Mn	%V	%P (Total)	%P (Cit. sol)	%S	%F
M <sub>M</sub>	4.12	0.321	0.425	18.97	31.23	1.32	0.326	3.45	0.414	3.69	3.31	0.102	0.368
s <sub>M</sub>	0.03	0.005	0.016	0.19	0.26	0.03	0.013	0.04	0.012	0.03	0.10	0.008	0.035

All values are 'total' element content unless otherwise stated

Particle size less than 150 µm

The above values (M<sub>M</sub>) expressed as oxides

%SiO <sub>2</sub>	%TiO <sub>2</sub>	%Al <sub>2</sub> O <sub>3</sub>	%CaO	%MgO	%Cr <sub>2</sub> O <sub>3</sub>	%MnO	%V <sub>2</sub> O <sub>5</sub>	%P <sub>2</sub> O <sub>5</sub> (Total)	%P <sub>2</sub> O <sub>5</sub> (Cit. Sol)
8.82	0.535	0.803	43.70	2.19	0.477	4.45	0.738	8.46	7.59



**BUREAU OF ANALYSED SAMPLES LIMITED**

Newham Hall, Middlesbrough, England. SEPTEMBER, 1980

# Laboratories which have participated in the standardization of Euro-Standard 879-1

Arbed, Division d'Esch Belval, Esch-sur-Alzette (Luxembourg)  
 British Ceramic Research Association, Stoke-on-Trent (UK)  
 British Steel Corporation, Corby Works (UK)  
 British Steel Corporation, Port Talbot Works (UK)  
 British Steel Corporation, Scunthorpe Division, Scunthorpe (UK)  
 British Steel Corporation, Teesside Laboratories, Middlesbrough (UK)  
 Bundesanstalt für Materialprüfung (BAM), Berlin-Dahlem (Germany)  
 Centro Sperimentale Metallurgico (CSM), Rome (Italy)  
 Cockerill, Seraing (Belgium)  
 Fried. Krupp Huttenwerke AG, Duisburg 14 (Germany)  
 Hoesch Huttenwerke AG, Dortmund 1 (Germany)

Hoogovens-ESTEL, IJmuiden (Holland)  
 Institut de Recherches de la Sidérurgie Française (IRSID),  
 Maizières-les-Metz (France)  
 Italsider, Genova (Italy)  
 Ridsdale and Co. Ltd., Middlesbrough (UK)  
 Sacilor, Amneville (France)  
 Societe Metallurgique Hainaut Sambre, Couillet (Belgium)  
 Sollac, Florange (France)  
 Solmer, Fos-sur-Mer (France)  
 Thyssen AG, Duisburg 11 (Germany)  
 Usinor, Dunkerque, (France)

For the Commission of Co-ordination of the Nomenclature of iron and steel products—Commission of European Communities.

For information regarding the Euro-Standards, please refer to the ECSC Information Circular No. 1 available from the Institution responsible for standardisation in your country.

Pour tous renseignements sur les Euro-échantillons-types, se reporter à la Circulaire d'Information No. 1 de la CECA, diffusée par les organismes nationaux de normalisation.

Wegen Erläuterungen über Euro-Analysenkontrollproben siehe Mitteilung Nr. 1 der EGKS, zu beziehen durch die nationalen Normenorganisationen.

## METHODS USED

### ES 879-1

Element	Line No.	Method
Si	2-3-4-5-9-10-14-17-18-19-20	Gravimetric, dehydration with perchloric acid
	6-12	Photometric as molybdenum blue
	7-15	Atomic absorption spectrometry
	8-16	Gravimetric, dehydration with hydrochloric acid
	11-13	X-ray fluorescence spectrometry
Ti	2-10-17-19	Atomic absorption spectrometry
	3-20	X-ray fluorescence spectrometry
	4-7-8-11-15-21	Photometric with chromotropic acid
	5-6-12-13-16-18	Photometric with diantipyrylmethane
	9	Photometric with hydrogen peroxide
Al	14	Photometric with hydrogen peroxide, cupferron separation
	1-2-5-6-8-10-12-14-16-17-19-20-21	Atomic absorption spectrometry
	4-15	X-ray fluorescence spectrometry
	3-18	Photometric with eriochrome cyanine
	7-11	Photometric with chromazurol S
Fe	9	Gravimetric as aluminium phosphate
	13	Bromometric titration, precipitation with 8 hydroxyquinoline
	1-3-4-7-8-9-10-11-12-13-14-15-17-18-19-21	Titrimetric with dichromate
	2-20	X-ray fluorescence spectrometry
	5-6	Photometric with 1:10 phenanthroline
Ca	16	Titrimetric with permanganate
	1-8-10-11-13-15-16-18	Titrimetric with permanganate, oxalate precipitation
	2-5-6	Atomic absorption spectrometry
	3-4-9-12-17	Complexometric titration
	7-19	X-ray fluorescence spectrometry
	14	Complexometric titration, precipitation with oxalate

**METHODS USED**  
**ES 879-1**

Element	Line No.	Method
Mg	1-3-4-5-7-8-9-10-12-13-14-15-17-19-20	Atomic absorption spectrometry
	2-6	X-ray fluorescence spectrometry
	11-16-21	Gravimetric as magnesium ammonium phosphate
	18	Gravimetric as magnesium pyrophosphate
Cr	2-4-6-7-8-9-10-11-12-14-15-16-18-20	Atomic absorption spectrometry
	3-5	Photometric with diphenylcarbazide
	13	Titrimetric, oxidation with persulphate/silver nitrate
	17	Titrimetric, oxidation with persulphate/silver nitrate, potentiometric end point
	19	X-ray fluorescence spectrometry
Mn	2-4-10-12-13-17-19-20-21	Atomic absorption spectrometry
	3-5-6-7-8-11-14	Photometric, oxidation with periodate
	9-18	X-ray fluorescence spectrometry
	15-16	Photometric, oxidation with persulphate/silver nitrate
V	1-2-3-5-6-7-8-12-14-15-16-18	Atomic absorption spectrometry
	4	X-ray fluorescence spectrometry
	9	Titrimetric with ammonium ferrous sulphate
	10-17	Photometric with N-benzoylphenyl-hydroxylamine with extraction
	11	Photometric with dimethyl naphthidine
	13	Titrimetric with ammonium ferrous sulphate, potentiometric end point
	19	Photometric as phosphovanadotungstate
P (Total)	2-15	X-ray fluorescence spectrometry
	3-7-12-13-19-20	Photometric as molybdenum blue
	4-6-10-14-18	Photometric as phosphovanadomolybdate
	5	Photometric as phosphovanadomolybdate with extraction
	8	Gravimetric as quinolinium phosphomolybdate
	9-16-17	Titrimetric as phosphomolybdate
	11	Titrimetric as quinolinium phosphomolybdate
P Citric soluble*	1	Titrimetric as quinolinium phosphomolybdate
	2-8	Titrimetric as phosphomolybdate
	3-4-5-6-9-10-12	Photometric as phosphovanadomolybdate
	7-14	Photometric as phosphovanadomolybdate with extraction
	11	Gravimetric as phosphomolybdate
	13	Photometric as molybdenum blue
	15	Gravimetric as quinolinium phosphomolybdate
S	2	Combustion, conductimetric
	3-8-16	Combustion, infrared absorption
	4-6-12-18-19	Gravimetric as barium sulphate
	5-7-9-10-11-13-14-15-17	Combustion, oxidation/reduction titration
F	1-2-5-7-8-9-20	Fusion, specific ion electrode
	3-12	Pyrohydrolysis, specific ion electrode
	4-14-17	Pyrohydrolysis, photometric with alizarin fluorine blue
	6-13-16-21	Distillation, specific ion electrode
	10-11-15-18-19	Distillation, photometric with alizarin fluorine blue
P Formic soluble†	1-2-8	Photometric as phosphovanadomolybdate
	3-4-11	Gravimetric as quinolinium phosphomolybdate
	5	Titrimetric as quinolinium phosphomolybdate
	6	Titrimetric as phosphomolybdate
	7-9-10	Photometric as phosphovanadomolybdate with extraction

\* Extraction with 2% citric acid solution

† Extraction with 2% formic acid solution