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CERTIFICATE OF CHEMICAL ANALYSIS No 13 – 20

IRON ORE for X-Ray fluorescence spectrometry and wet-way analysis

SPL PT 28/9C

CERTIFIED VALUES – Mass content in %wt.

Element	Value [%wt.]	Uncertainty [%wt.]
Fe	65.4	0.2
SiO₂	8.11	0.14
Al₂O₃	0.199	0.016
Mn	0.0348	0.0029
CaO	<i>0.130</i>	
MgO	<i>0.411</i>	
P	0.0140	0.0009

PARTICIPATING LABORATORIES:

ARCELORMITTAL Poland S.A., Poland
CMC Poland, Poland
DUNAFERR Labor Nonprofit, Hungary
ENVIFORM, Czech Republic
ERÉGLI DEMIR, Turkey
INSTYTUT METALURGII ŻELAZA, Poland
U. S. STEEL Košice - Labortest, Slovakia
VOESTALPINE, Austria

PT 28/9C – ANALYTICAL DATA

Method	Fe	Method	SiO ₂	Method	Al ₂ O ₃	Method	Mn	Method	CaO	Method	MgO	Method	P
Titrimetric	64,8												
XRF	65,1												
Titrimetric	65,2	XRF	7,88	XRF	0,168	ICP	0,0300	XRF	0,127	XRF	0,399	XRF	0,0122
XRF	65,2	XRF	7,93	XRF	0,180	XRF	0,0315	ICP	0,128	XRF	0,407	ICP	0,0130
XRF	65,4	XRF	7,99	ICP	0,198	XRF	0,0317	ICP	0,130	XRF	0,412	XRF	0,0134
XRF	65,5	XRF	8,13	XRF	0,198	XRF	0,0333	XRF	0,130	XRF	0,415	XRF	0,0139
Titrimetric	65,5	ICP	8,14	ICP	0,201	XRF	0,0367	XRF	0,131	XRF	0,416	ICP	0,0140
XRF	65,6	ICP	8,17	XRF	0,202	ICP	0,0376	XRF	0,134	ICP	0,416	XRF	0,0143
Titrimetric	65,6	XRF	8,29	XRF	0,207	XRF	0,0379	XRF	0,142*	ICP	0,444*	XRF	0,0154
Wet-way	65,6	XRF	8,37	XRF	0,234	XRF	0,0394	XRF	0,149*	XRF	0,479*	XRF	0,0154
	Fe		SiO₂		Al₂O₃		Mn		CaO		MgO		P
Value	65,4		8,11		0,199		0,0348		0,130		0,411		0,0140
s _M	0,3		0,17		0,019		0,0035						0,0011
U	0,2		0,14		0,016		0,0029						0,0009

COMMENTS:

Value – reference value, **s_M** – standard deviation of intralaboratory means (* - result excluded as outlier)

U – Uncertainty of the reference value $U = \pm \frac{t_{5;0,05}}{\sqrt{n}} \cdot s_M$ in the sense of the ISO Guide to the Expression of the

Uncertainty of Measurement (1993), dependent on the standard deviation of the laboratory results.

Certified fully compliant with the ISO 17034 definition of Reference Material – with the characterization for determining the property values and their associated uncertainties.

Intended for calibration, matrix-match verification and statistical process control of FeSi analysis. They may not substitute CRM in a statement of metrological traceability, method validation. A single analysis area of at least 4 mm in diameter defines the minimum sample intake. They may be used for combustion and wet-way methods too.

Manufactured by iron ore crushing, sieving and homogenising

Supplied in plastic bottles

Homogeneity (random and trend, within- and between- samples) was tested by various analytical techniques of adequate repeatability. Its uncertainty contribution, when statistically significant, was combined to the ultimate uncertainty statement. The RM are stable by a nature of material.

Characterised by results from SPL proficiency test **PT 28/9C** - laboratories by XRF and wet-way methods, with measurements metrological traceabled to adequate CRM (CZ 2001, 2003 - 2008, 2015-2024, BAS, Brammer Standard). Identity of PT participating laboratories is confidential.

Certified values in % m/m, tabulated below in bold, are robust means of a minimum five accepted laboratory means. They are rounded to the same digit as their uncertainty statement.

Uncertainty is expressed as a ± half width interval combined from the standard uncertainty, expanded by the coverage factor $k = 2$ (corresponding to 95% level of confidence). It does not exceed 1,5 multiple of the typical uncertainty of the matching CRM.

Non-certified values in regular without the uncertainty statement do not meet the requirements for certification and are intended for the matrix information.

Produced by: SPL-LABMAT s.r.o.

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