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CERTIFICATE OF CHEMICAL ANALYSIS No 11 – 20

FEROSILICIUM (FeSi) for X-Ray fluorescence spectrometry and wet-way analysis, C for combustion analysers by IR absorption

SPL PT 28/9A

CERTIFIED VALUES – Mass content in %wt.

Element	*Value* [%wt.]	*Uncertainty* [%wt.]
C	*0.235*	
Mn	**0.515**	0.045
Si	**75.41**	0.62
P	**0.0374**	0.0027
Cr	*0.122*	
Al	**1.49**	0.08
Ti	**0.139**	0.013
Ca	**0.436**	0.034

PARTICIPATING LABORATORIES:

ARCELORMITTAL Poland S.A., Poland
CMC Poland, Poland
COGNOR S.A. - Ferrostal Łabędy, Poland
DUNAFERR Labor Nonprofit, Hungary
ENVIFORM, Czech Republic
LIBERTY Ostrava, Ostrava
SIJ METAL RAVNE, Slovenia
U. S. STEEL Košice – Labortest, Slovakia
VÍTKOVICE TESTING CENTER, Czech Republic
ZPS - SLÉVÁRNA, Czech Republic

PT 28/9A – ANALYTICAL DATA

Method	C	Method	Mn	Method	Si	Method	P	Method	Cr	Method	Al	Method	Ti	Method	Ca
										XRF-m.	**1,29**				
				XRF	**74,26**					Titrimetric	**1,34**				
IR	**0,157***			Gravim.	**74,31**	XRF	**0,0309**			XRF	**1,40**				
IR	**0,195***			XRF	**74,35**	XRF	**0,0345**			XRF	**1,40**				
IR	**0,228**	XRF-m.	**0,413**	Gravim.	**74,89**	Photom.	**0,0350**			XRF	**1,41**				
IR	**0,228**	ICP	**0,484**	XRF	**74,96**	ICP	**0,0358**			Titrimetric	**1,42**			XRF	**0,373**
IR	**0,232**	XRF	**0,498**	XRF	**75,38**	ICP	**0,0364**			AAS	**1,52**	XRF	**0,121**	XRF	**0,419**
IR	**0,235**	ICP	**0,519**	Volumetric	**75,52**	Photom.	**0,0366**	ICP	**0,114**	XRF	**1,60**	XRF	**0,133**	XRF	**0,423**
IR	**0,238**	ICP	**0,527**	XRF	**76,24**	XRF	**0,0388**	ICP	**0,116**	XRF	**1,61**	ICP	**0,136**	ICP	**0,442**
IR	**0,240**	XRF	**0,535**	Gravim.	**76,26**	XRF	**0,0415**	ICP	**0,128**	ICP	**1,63**	ICP	**0,146**	Titrimetric	**0,442**
IR	**0,241**	XRF	**0,550**	XRF	**76,58**	XRF-m.	**0,0421**	XRF	**0,130**	ICP	**1,64**	XRF	**0,149**	ICP	**0,464**
IR	**0,259***	XRF	**0,597**	XRF	**76,72**	XRF	**0,0426**	XRF-m.	**0,179***	XRF	**1,67**	XRF	**0,151**	XRF	**0,489**

	C	Mn	Si	P	Cr	Al	Ti	Ca
Value	*0,235*	**0,515**	**75,41**	**0,0374**	*0,122*	**1,49**	**0,139**	**0,436**
sM		0,054	0,93	0,0038		0,13	0,012	0,037
U		**0,045**	**0,62**	**0,0027**		**0,08**	**0,013**	**0,034**

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 FeSi 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 28/9A** - laboratories by XRF and wet-way methods, combustion for C, 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.

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