CERTIFICATE OF CHEMICAL ANALYSIS No 10 – 24

FERROMANGANESE for X-Ray Fluorescence spectrometries, wet-way and combustion analysis

SPL S-4A (PT 32/9A)

CERTIFIED VALUES – Mass content in %wt.

Element	Value [%wt.]	Uncertainty [%wt.]
Mn	**80.70**	0.45
C	**0.921**	0.009
Si	**0.422**	0.084
P	**0.204**	0.004
S	**0.0053**	0.0011

PARTICIPATING LABORATORIES:

ARCELORMITTAL Gijón, Spain
ARCELORMITTAL Poland S.A., Poland
AZTERLAN, Spain
CMC Poland, Poland
COGNOR S.A. - Ferrostal Łabędy, Poland
ČEZ - JE Temelín, Czech Republic

DUNAFERR Labor Nonprofit, Hungary
ENVIFORM, Czech Republic
U. S. STEEL Košice, Slovakia
VÍTKOVICE TESTING CENTER, Czech Republic
VOESTALPINE STAHL, Austria

S-4A - ANALYTICAL DATA:

Method	Mn	Method	C	Method	Si	Method	P	Method	S
Titrimetric	79,64								
XRF	79,92	IR	0,821*						
XRF	80,18	IR	0,898	XRF	0,276	XRF	0,185*	IR	0,0018
Titrimetric	80,27	IR	0,903	Gravim.	0,282	ICP	0,188*	XRF	0,0032
XRF	80,44	IR	0,906	XRF	0,283	XRF	0,200	IR	0,0045
ICP	80,64	IR	0,922	Gravim.	0,321	XRF	0,201	IR	0,0048
Titrimetric	80,65	IR	0,923	ICP	0,353	XRF	0,202	XRF	0,0050
XRF	80,72	IR	0,925	XRF	0,435	XRF	0,202	IR	0,0052
XRF	81,11	IR	0,926	XRF	0,486	XRF	0,203	IR	0,0063
XRF	81,15	XRF	0,927	XRF	0,488	ICP	0,204	IR	0,0064
XRF	81,39	IR	0,927	XRF	0,523	Titrimetric	0,206	IR	0,0068
XRF	82,25	IR	0,930	XRF	0,590	XRF	0,207	IR	0,0070
ICP	84,52*	IR	0,944	XRF	0,607	XRF	0,210	IR	0,0076
	Mn		**C**		**Si**		**P**		**S**
Value	80,70		0,921		0,422		0,204		0,0053
s_M	0,71		0,013		0,125		0,003		0,0017
U	0,45		0,009		0,084		0,004		0,0011

Comments:

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

U – Uncertainty of the reference value $U \geq \pm \dfrac{t_{5;0,05}}{\sqrt{n}} \cdot s_M$ 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 analysis. They may not substitute CRM in a statement of metrological traceability, method validation. They may be used for combustion and wet-way methods too.

Manufactured by crushing, sieving, and homogenizing the input material.

Supplied as 100g bottle.

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 32/9A** – X-Ray Fluorescence spectrometries and wet-way analysis, S on combustion analysers by IR absorption with measurements metrological traceabled to adequate CRM. 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.

User instruction: the surface of the specimens and RM should be prepared in a similar manner in accordance with manufacturer´s instructions of spectrometers.

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

Responsible person: Martin Bogumský

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