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CERTIFICATE OF CHEMICAL ANALYSIS No 09 – 23

LIMESTONE for X-Ray Fluorescence spectrometries and wet-way analysis

SPL S-3A (PT 31/9B)

CERTIFIED VALUES – Mass content in %wt.

Element	*Value* [%wt.]	*Uncertainty* [%wt.]
Fe_2O_3	**0.445**	0.012
SiO_2	**0.708**	0.062
Al_2O_3	**0.280**	0.031
CaO	**47.62**	0.31
MgO	**6.420**	0.076
K_2O	**0.088**	0.012
LOI	**44.4**	0.3

PARTICIPATING LABORATORIES:

ARCELORMITTAL Poland S.A., Poland
AZTERLAN, Spain
COGNOR S.A. - Ferrostal Łabędy, Poland
DAIMLER TRUCK AG, Germany
DUNAFERR Labor Nonprofit, Hungary
ENVIFORM, Czech Republic
ESAB CZ, Czech Republic
IT Łukasiewicz, Poland
LIBERTY Ostrava, Czech Republic
TATA STEEL IJMUIDEN, Netherlands
VOESTALPINE STAHL, Austria

S-3A - ANALYTICAL DATA:

Method	Fe_2O_3	Method	SiO_2	Method	Al_2O_3	Method	CaO	Method	MgO	Method	K_2O	Method	LOI
						ICP	**46,76**	XRF	**6,241**				
		Gravim.	**0,472**			XRF	**47,08**	XRF	**6,307**				
		XRF	**0,636**	ICP	**0,193**	Titrim.	**47,17**	XRF	**6,310**			Gravim.	**43,6***
ICP	**0,300***	XRF	**0,641**	XRF	**0,226**	XRF	**47,36**	XRF	**6,329**			Gravim.	**43,7***
XRF	**0,413**	Gravim.	**0,647**	XRF	**0,247**	XRF	**47,43**	Titrim.	**6,370**	AAS	**0,062**	Gravim.	**44,2**
XRF	**0,438**	XRF	**0,695**	XRF	**0,258**	ICP	**47,51**	Titrim.	**6,376**	XRF	**0,068**	Gravim.	**44,2**
ICP	**0,438**	Gravim.	**0,702**	ICP	**0,279**	XRF	**47,53**	Titrim.	**6,432**	XRF	**0,075**	Gravim.	**44,2**
XRF	**0,441**	XRF	**0,765**	ICP	**0,287**	XRF	**47,61**	ICP	**6,440**	XRF	**0,089**	XRF	**44,3**
XRF	**0,442**	XRF	**0,765**	XRF	**0,291**	XRF	**47,71**	ICP	**6,447**	ICP	**0,092**	Gravim.	**44,3**
XRF	**0,454**	ICP	**0,775**	XRF	**0,299**	Titrim.	**47,93**	XRF	**6,471**	XRF	**0,095**	Gravim.	**44,4**
XRF	**0,454**	ICP	**0,779**	XRF	**0,320**	XRF	**47,96**	ICP	**6,589**	ICP	**0,103**	Gravim.	**44,5**
XRF	**0,456**	XRF	**0,780**	XRF	**0,322**	Titrim.	**48,44**	XRF	**6,659**	XRF	**0,103**	Gravim.	**44,5**
ICP	**0,466**	XRF	**0,835**	ICP	**0,355**	ICP	**48,59**	XRF	**7,107***	XRF	**0,105**	Gravim.	**44,6**

	Fe_2O_3		SiO_2		Al_2O_3		CaO		MgO		K_2O		LOI
Value	**0,445**		**0,708**		**0,280**		**47,62**		**6,420**		**0,088**		**44,4**
sM	0,015		0,098		0,046		0,52		0,120		0,016		0,2
U	**0,012**		**0,062**		**0,031**		**0,31**		**0,076**		**0,012**		**0,3**

Comments:

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

U – Uncertainty of the reference value $U \geq \pm \frac{t_{5;0,05}}{\sqrt{n}} \cdot s_M$ 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 low alloy steel spectrometric analysis from a plane of solid sample. 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 casting to a special ingot with discarding of the parts, which have been suspected inhomogenous and the rest has been machined to the samples of the ultimate size.

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 31/9B** – 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.

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