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CERTIFICATE OF CHEMICAL ANALYSIS No 10 – 19

PURE IRON (~ 99.9% Fe) for solid sample spectrometry, combustion and wet-way methods

SPL LA-0B

CERTIFIED VALUES – Mass content in %wt.

Element	<i>Value</i> [%wt.]	<i>Uncertainty</i> [%wt.]
C	0.0036	0.0011
Mn	0.0380	0.0014
Si	<i>0.0043</i>	
P	0.0037	0.0007
S	0.0023	0.0003
Cu	0.0074	0.0005
Cr	0.0091	0.0016

Element	<i>Value</i> [%wt.]	<i>Uncertainty</i> [%wt.]
Ni	0.0070	0.0009
Al	0.0010	0.0005
Mo	<i>0.0016</i>	
Co	<i>0.0017</i>	
As	0.0024	0.0004
Sn	<i>0.0013</i>	
N	0.0027	0.0005

PARTICIPATING LABORATORIES:

ARCELORMITTAL, Ostrava, Czech Republic
DUNAFERR LABOR NONPROFIT, Dunaújváros, Hungary
ENVIFORM, Třinec, Czech Republic
GO STEEL, Frýdek-Místek, Czech Republic
INSTITUTE FOR CRM (ICRM), Yekaterinburg, Russia
SES INSPEKT, Tlmače, Slovakia
ŠKODA AUTO, Mladá Boleslav, Czech Republic
U. S. STEEL KOŠICE – LABORTEST, Košice, Slovakia
VÍTKOVICE TESTING CENTER, Ostrava, Czech Republic
VOESTALPINE STAHL DONAWITZ, Leoben-Donawitz, Austria
ŽĐAS, Žďár nad Sázavou, Czech Republic

LA-0B - ANALYTICAL DATA:

Method	C	Method	Mn	Method	Si	Method	P	Method	S	Method	Cu	Method	Cr
								AES	0,0017				
								IR+TCM	0,0020				
IR+TCM	0,0006							AES	0,0020				
AES	0,0015							AES	0,0020				
IR+TCM	0,0030	AES	0,0356					IR+TCM	0,0021	AES	0,0064		
IR	0,0030	AES	0,0356			AES	0,0025	AES	0,0022	ICP	0,0066		
IR+TCM	0,0038	AES	0,0370			AES	0,0030	IR+TCM	0,0023	AES	0,0070	AES	0,0016*
AES	0,0039	AES	0,0380			AES	0,0030	IR	0,0024	AES	0,0072	AES	0,0060
AES	0,0039	ICP	0,0382	AES	0,0022	AES	0,0033	IR+TCM	0,0024	AES	0,0073	AES	0,0080
IR+TCM	0,0041	AES	0,0384	AES	0,0036	AES	0,0039	AES	0,0025	AES	0,0078	AES	0,0090
AES	0,0050	AES	0,0390	AES	0,0050	AES	0,0040	IR+TCM	0,0026	AES	0,0079	AES	0,0094
AES	0,0050	AES	0,0394	AES	0,0050	AES	0,0040	AES	0,0027	AES	0,0080	AES	0,0099
IR+TCM	0,0062	AES	0,0410	AES	0,0056	AES	0,0041	AES	0,0030	AES	0,0080	AES	0,0103
IR+TCM	0,0114*	AES	0,0452*	ICP	0,0124*	AES	0,0052	IR+TCM	0,0046*	AES	0,0112*	AES	0,0111
C		Mn		Si		P		S		Cu		Cr	
Value	0,0036		0,0380		0,0043		0,0037		0,0023		0,0074		0,0091
s_M	0,0016		0,0018				0,0008		0,0004		0,0006		0,0017
U	0,0011		0,0014				0,0007		0,0003		0,0005		0,0016

Method	Ni	Method	Al	Method	Mo	Method	Co	Method	As	Method	Sn	Method	N
								AES	0,0019			AES	0,0021
AES	0,0060							ICP	0,0019			IR+TCM	0,0024
AES	0,0062			AES	0,0010			AES	0,0020	AES	0,0009	IR+TCM	0,0025
AES	0,0065	AES	0,0006	AES	0,0010	ICP	0,0011	AES	0,0024	AES	0,0010	IR+TCM	0,0026
ICP	0,0068	AES	0,0010	ICP	0,0010	AES	0,0017	AES	0,0026	AES	0,0010	AES	0,0027
AES	0,0072	AES	0,0010	AES	0,0015	AES	0,0019	AES	0,0027	AES	0,0013	AES	0,0031
AES	0,0074	AES	0,0013	AES	0,0024	AES	0,0020	AES	0,0028	AES	0,0014	AES	0,0036
AES	0,0086	AES	0,0029*	AES	0,0027	AES	0,0020	AES	0,0030	AES	0,0020	IR+TCM	0,0054*
Ni		Al		Mo		Co		As		Sn		N	
Value	0,0070		0,0010		0,0016		0,0017		0,0024		0,0013		0,0027
s_M	0,0009		0,0003						0,0004				0,0005
U	0,0009		0,0005						0,0004				0,0005

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 Guide 35 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 discs 37 mm in diameter and 25 mm of standard height.

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 inter-laboratory study of the expert laboratories listed below by spectrometric methods and alternative methods (combustion, thermoevolution, wet-way) standard methods, with measurements metrological **traceabled** to adequate CRMs.

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 \pm 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. It is recommended to storage of RM in dry and non-corrosive conditions.

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

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