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**CERTIFICATE No 03 – 13**

**REFERENCE MATERIALS OF LOW ALLOY STEEL  
for solid sample spectrometry**

**SPL LA 0-5**

**Recertified** to make the former QCM fully compliant with the ISO Guide 35 definition of Reference Material – with the values confirmed and their uncertainties assessed.

**Compliant** with the ISO Guide 35 definition of Reference Material.

**Intended** for calibration and the control of matrix-match and of the state of statistic regulation in the automated spectrometry of low alloy steel from a plane of solid sample. They may not substitute CRM in establishing traceability of the results. A single analysis area of at least 4 mm in diameter defines the minimum sample intake.

**Manufactured** by casting to a special ingot with the parts suspected inhomogenous discarded and rest machined to the samples of the ultimate size. Their structure thus remains as-cast, matching with that of the foundry samples

**Supplied** as discs of 37 mm in diameter and in 10 or 25 mm standard heights, with size on option of height up to 50 mm on request.

**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 an interlaboratory experiment of the expert laboratories listed below by various spectrometric (AES spark, glow discharge, XRF) and alternative (combustion, thermoevolution, wet-way) standard methods, with values **traceable** to values of the adequate CRM (CZ 2001, 2003 - 2008, BAS, Brammer Standards).

*ARCELORMITTAL a.s., Ostrava, Czechia*

*U. S. STEEL KOŠICE – LABORTEST, Košice, Slovakia*

*LECO INSTRUMENTE PLZEŇ s.r.o., Plzeň, Czechia*

*ŽĎAS a.s., Žďár nad Sázavou, Czechia*

*ENVIFORM a.s., Třinec, Czechia*

*ZPS-SLÉVÁRNA, a.s., Zlín, Czechia*

*VÍTKOVICE TESTING CENTER s.r.o., Ostrava, Czechia*

**Certified values** in % m/m, tabulated over page in bold, are robust means of a minimum five laboratory means accepted by a technical scrutiny, each of them based on at least five independent results. They are rounded to the same digit as their respective:

**Uncertainty** (tabulated in regular below the respective value), expressed as a  $\pm$  half width interval of combined uncertainty, expanded by a coverage factor  $k = 2$  (corresponding to 95% probability level). 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.

RM	C	Mn	Si	P	S	Cu	Cr	Ni
LA-0A	0,006 ±0,0015	0,045 ±0,005	0,0015 ±0,0003	0,005 ±0,0005	0,005 ±0,0003	0,012 ±0,001	0,022 ±0,002	0,028 ±0,002
LA-1B	0,005 ±0,001	0,13 ±0,006	0,020 ±0,002	0,004 ±0,001	0,017 ±0,002	0,01 ±0,002	0,042 ±0,003	0,014 ±0,002
LA-2D	0,065 ±0,005	0,26 ±0,008	1,48 ±0,028	0,011 ±0,002	0,052 ±0,004	0,53 ±0,01	0,135 ±0,005	2,00 ±0,03
LA-3E	0,60 ±0,01	0,70 ±0,006	1,19 ±0,015	0,044 ±0,002	0,026 ±0,003	0,22 ±0,007	0,94 ±0,01	1,01 ±0,016
LA-4C	0,95 ±0,012	1,63 ±0,025	0,07 ±0,01	0,021 ±0,003	0,012 ±0,001	0,056 ±0,002	1,78 ±0,03	0,045 ±0,004
LA-5B	0,38 ±0,01	1,75 ±0,03	0,39 ±0,014	0,017 ±0,002	0,010 ±0,001	0,12 ±0,005	3,60 ±0,04	2,43 ±0,03
RM	Al	Mo	W	V	Ti	Co	As	Sn
LA-0A	0,0015 ±0,0005	0,0044 ±0,0010			0,001 ±0,0003	0,002 ±0,0003	0,0015	0,001
LA-1B	0,003 ±0,001	0,007 ±0,001	0,010 ±0,002	0,004 ±0,001	0,001	0,002	0,002	0,001
LA-2D	0,18 ±0,01	0,57 ±0,01	0,29 ±0,02	0,30 ±0,01	0,30 0,01	0,26 ±0,015	0,095 ±0,008	0,085 ±0,003
LA-3E	0,061 ±0,003	0,32 ±0,008	0,10 ±0,02	0,22 ±0,005	0,135 ±0,005	0,11 ±0,005	0,056 ±0,010	0,026 ±0,002
LA-4C	0,048 ±0,003	0,008 ±0,001	0,008 ±0,001	0,010 ±0,002	0,002 ±0,001	0,006 ±0,002	0,003 ±0,001	0,006 ±0,001
LA-5B	0,073 ±0,005	0,75 ±0,02	0,59 ±0,03	0,47 0,014	0,05 ±0,004	0,075 ±0,005	0,016 ±0,002	0,028 ±0,002
RM	B	Nb	Pb	Sb	Zr	Ca	Ta	N
LA-0A			0,001	0,0007				0,0023 ±0,0002
LA-1B	0,010 ±0,001	0,001	0,0007	0,002	0,002	0,0016 ±0,0003	0,000	0,003 ±0,0004
LA-2D	0,007 ±0,001	0,24 ±0,015	0,050 ±0,007	0,040 ±0,005	0,003 ±0,001	0,0004		0,008 ±0,0012
LA-3E	0,005 ±0,001	0,077 ±0,003	0,009 ±0,002	0,024 ±0,001	0,13 ±0,01	0,001		0,010 ±0,001
LA-4C	0,0005 ±0,0001	0,053 ±0,004						0,012 ±0,001
LA-5B	0,0009 ±0,0001	0,060 ±0,005	0,015 ±0,002	0,011 0,002	0,017 ±0,002			0,02 ±0,001

**User instruction:** the working surface of the RM must be prepared before the analysis in the same way as the analysed sample in accordance with the particular analyser manual. Storage in dry and non-corrosive environment is recommended.

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

**Responsible person:** Martin Bogumský

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