

## SPL REFERENCE MATERIALS

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### CERTIFICATE

#### Alloy Steel **QCM** for Spectrometry **SL 1 – SL 6, HS 1 – HS 2**

##### **Status**

The Quality Control Materials – QCM comply with the latest ISO Guide 35 definition of the Reference Material.

##### **Purpose**

The QCM are primarily intended for quality assurance purposes in the routine spectrometric analysis of the stainless or other nickel and chromium steels and high speed steels, that is to control the state of statistic regulation of continuously operating analysers („setting-up“) to verify the matrix-match in metal sorting etc. They may not substitute the CRM in establishing traceability of values.

##### **Source and Manufacture**

The candidate materials were either cast to ingots with head, bottom and centre removed and the rest machined to final diameter, or meticulously selected from the commercially available rolled steel bars.

##### **Supply units**

The QCM of 35 to 43 mm in diameter are regularly supplied in heights of 10 and 25mm (as set or individually), with the option of longer samples upon request.

##### **Homogeneity and Stability**

Both random and trend (axial, radial) inhomogeneity was tested in compliance with ISO Guide 35 by various spectrometric techniques of excellent repeatability, and found statistically insignificant. The QCM are stable by the nature of material.

##### **Characterisation**

The QCM were characterised by an interlaboratory experiment with participation of the most competent and experienced industrial and application laboratories. Various spectrometric methods were applied for each value (AES with spark and glow discharge excitation, XRF), supported when necessary by alternative techniques (wet-way, combustion, thermoevolution). The **participating laboratories** were:

Leco Instrumente Plzeň, Plzeň  
Mittal Steel Ostrava, Ostrava  
PCS, Žďár nad Sázavou  
PSP Slévárna, Přerov  
Škoda Kovárny, Plzeň

Thermo ARL, Ecublens  
Třinecké Železářny, Třinec  
Vítkovice Testing Center, Ostrava  
Západočeská Univerzita v Plzni, Plzeň  
Žďas, Žďár nad Sázavou

##### **Assigned values**

are robust means of at least five laboratory means accepted by the technical assessment. The values of the successive batches, distinguished by the last capital of the QCM code are traced to the original batch values by three qualified laboratories. The particular **uncertainties** are not stated, yet their estimates do not exceed double

of those for the corresponding elements/contents in the contemporary matrix-matching CRM. They are reflected by rounding of the assigned values.

The assigned values are **traceable** to the adequate CRM (ČKD, BAS, Brammer Standards and other) only, no direct traceability has been established.

#### Assigned values in % m/m\*

QCM	C	Mn	Si	P	S	Cu	Cr	Ni	Al	Mo
SL-1A	0.078	0.46	1.39	0.024	0.011	0.09	13.4	0.23	0.86	0.03
SL-2A	0.015	1.84	0.64	0.025	0.027	0.50	16.9	11.0	0.005	2.03
SL-3A	0.043	1.73	0.53	0.024	0.002	0.22	24.6	19.6	0.007	0.38
SL-4A	1.38	2.85	2.28	0.038	0.017	0.75	26.3	2.04	0.12	0.92
SL-5A	0.37	5.8	0.36	0.021	0.014	2.90	11.7	4.94	0.035	4.12
SL-6A	0.17	0.24	0.23	0.015	0.029	0.22	6.8	32.3	0.26	0.13
HS-1A	0.72	0.28	0.28	0.023	0.011	0.08	4.15	0.14	0.03	0.06
HS-2A	1.24	0.27	0.24	0.024	0.017	0.08	4.15	0.21	0.035	3.75
QCM	W	V	Ti	Co	As	Sn	Nb	N	B	Ta
SL-1A	0.1	0.017	0.004	0.02		0.01		0.025		
SL-2A	0.03	0.075	0.06	0.09	0.008	0.01		0.04	0.002	
SL-3A	0.03	0.066	0.003	0.06		0.006	0.013	0.065	0.002	
SL-4A	0.35	0.54	0.8	0.11		0.02	1.11		0.0013	
SL-5A	0.78	0.21	0.004	0.26	0.005	0.004	0.20			0.07
SL-6A	1.74	0.15	1.8	0.69	0.004	0.006	0.36			
HS-1A	17.5	1.33	0.003	4.7		0.02				
HS-2A	9.3	3.4	0.003	9.9		0.01				

\*sum of non-listed TMI below 0.05%

#### Users instruction

The working surface of the QCM must be prepared before the analysis in accordance with the particular analyser manual. The storage in dry and non-corrosive environment is recommended. There are no safety hazards in the storage and proper use of QCM.

#### Producer

SPL is the authorised producer of the CRM for the Czech Metrology Institute, producer of its own RM, QCM and laboratory consumables, organiser of the Proficiency Testing Programs on behalf of the Czech Accreditation Institute, expert in sample management and provider of sampling devices, with the QM compliant to ISO 17025 and ISO Guide 34.

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#### Responsible person

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