The SPL RM divide into four groups:

- CRM (with the status of national CRM)
- RM and QCM for quality control
- Hi Tec candidate materials to be ultimately certified by the user (instrument producers, big industrial labs etc.)

The following tables state the RM codes, certified values **c** and ± interval of the expanded combined uncertainty $\mathbf{U_c}$, respectively, both expressed in % m/m.
A consecutive replacement with slightly different figures, distinguished alphabetically in the code, is available for supply when the original batch is out of stock.

Contact details:
SPL-LABMAT s.r.o.
(registered in the Commercial Register administered by the
Regional Court in Ostrava, Section C, Insert 72079)
1. máje 432
735 31 Bohumín
Czech Republic

ID: 06480870
VAT: CZ06480870

Tel: (+420) 596014627
e-mail info@spl-labmat.cz
www.spl-labmat.cz

Bank:
Fio banka, a.s.
V Celnici 1028/10
117 21 Praha 1
Czech Republic
Bank account: 2101309874/2010
IBAN: CZ1920100000002101309874
BIC code: FIOBCZPPXXX

CRM – certified reference materials

SPL is authorised and regularly audited by the Czech Metrological Institute (CMI) to produce the national CRM, bearing a prefix CZ in their code. The entire course of projecting, candidate materials selection, processing and testing and a final characterisation comply with the ISO 17034, ISO guide 35 and ISO 17025. The certified values as results of the interlaboratory experiment with the international participation are traceable to the adequate references.

Currently available, a „C, S, N combustion line“ of steel and cast iron sets covers together the ranges of C from 0.002 through 4.5%, S from 0.002 through 0.25% and N from 0.004 through 0.013%.

LOW ALLOY STEEL CRM FOR C, S, N in a 250 g packing (CRM CZ 2025 in a 200g packing)

CRM CZ 2003 – 8 (valid till 2022), **CRM CZ 2025 A, 2026 A** (valid till 2022)

	2003 A	2004 A	2005 A	2006 A	2007 A	2008 A	2025 A*	2026 A*
C	**0.0402**	**0.079**	**0.358**	**0.461**	**0.684**	**0.977**	**0.0020**	**0.068**
	0.0008	0.001	0.004	0.002	0.006	0.003	0.0003	0.001
S	**0.0316**	**0.0464**	**0.0250**	**0.0172**	**0.0106**	**0.0091**	**0.0018**	**0.255**
	0.0006	0.0010	0.0005	0.0007	0.0004	0.0004	0.0002	0.005
N	**0.0046**	**0.0038**	**0.0081**	**0.0066**	**0.0128**	**0.0066**		
	0.0002	0.0002	0.0002	0.0004	0.0004	0.0003		

*2025 A pure iron powder (in a 200g packing)
*2026 A free-cutting steel

CAST IRON CRM FOR C, S in a 100 g packing

CRM CZ 2015 A - 2024 A (valid till 2022)

	2015 A	2016 A	2017 A	2018 A	2023 A
C	**1.996**	**2.053**	**2.463**	**3.173**	**4.029**
	0.011	0.016	0.023	0.020	0.016
S	**0.0157**	**0.0048**	**0.0755**	**0.0142**	**0.0886**
	0.0004	0.0004	0.0026	0.0005	0.0028

CRM SPL CZ 2015B-2024B (certified in Brammer Standard company)

	2015B	2016B	2017B	2018B	2019B	2020B	2021B	2022B	2023B	2024B
C	**1.99**	**2.15**	**2.57**	**3.07**	**3.43**	**3.52**	**3.80**	**3.86**	**4.06**	**4.40**
	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
S	**0.017**	**0.0047**	**0.095**	**0.014**	**0.017**	**0.043**	**0.043**	**0.085**	**0.114**	**0.047**
	0.001	0.0007	0.003	0.001	0.001	0.002	0.002	0.002	0.003	0.002

CERTIFIED REFERENCE MATERIALS
CRM CZ 02033 and CRM CZ 20034

CRM CZ 02033 - Cast iron for solid sample spectrometry, CRM set 1-8 (valid till 2027)

Intended for calibration, validation and matrix-match verification of cast iron spectrometric analysis from a plane of solid sample: Atomic Emission Spectrometry with spark, glow-discharge or laser excitation, and X-ray Fluorescence Spectrometry.
Eight CRM 1–8 represent the most frequent unalloyed and low alloy cast iron types in sequence: unalloyed ductile iron, Ni-Cu ductile iron, vermicular iron (CGI), pig iron, malleable iron, Mn-Cr-V and Ni-Mo alloyed iron and plain grey iron.
Supplied in a set or as individual discs 40 mm in diameter and approximately 18 mm of total height, with two certified layers extending 6 mm upwards from either working surface. The discs are marked on the side by the CRM code and the certified layers' limits. When used to both limits, the remainder, which may contain minor structure defects, should be discarded.

	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Mg	Ce
4B	**3.95** 0.02	**0.145** 0.002	**0.252** 0.004	**0.041** 0.002	**0.046** 0.002	**0.049** 0.001	**0.023** 0.001	**0.062** 0.002	**0.005** 0.001		
4C	**4.06** 0.02	**0.250** 0.002	**0.423** 0.005	**0.054** 0.002	**0.038** 0.002	**0.080** 0.002	**0.084** 0.001	**0.085** 0.002	**0.002** 0.001		
5B	**2.42** 0.04	**0.812** 0.005	**1.32** 0.02	**0.033** 0.001	**0.073** 0.003	**0.061** 0.001	**0.188** 0.003	**0.031** 0.001	**0.089** 0.002		
6B	**2.95** 0.04	**1.15** 0.01	**3.23** 0.04	**0.095** 0.003	**0.020** 0.002	**1.36** 0.002	**0.026** 0.001	**0.272** 0.003	**0.005** 0.001		
7B	**3.61** 0.03	**0.304** 0.003	**1.82** 0.02	**0.021** 0.002	**0.020** 0.002	**0.536** 0.005	**1.28** 0.01	**0.036** 0.001	**0.96** 0.01		

	V	Ti	Al	Sn	Sb	Bi	B	Zn	Pb	W	Co
4B	**0.004** 0.001	**0.006** 0.001	**0.003** 0.001	**0.001** 0.001	0.001			**0.008** 0.001	**0.004** 0.001		**0.005** 0.001
4C	**0.015** 0.001	**0.010** 0.001	**0.005** 0.001	**0.002** 0.001	0.001			**0.016** 0.002	**0.003** 0.001		**0.035** 0.002
5B	**0.005** 0.001	**0.007** 0.001	**0.062** 0.001			**0.020** 0.003	**0.014** 0.001				
6B	**0.083** 0.002	**0.068** 0.003	**0.007** 0.001	**0.140** 0.004	**0.049** 0.003						
7B	**0.007** 0.001	**0.015** 0.001	**0.022** 0.001							**0.045** 0.004	**0.050** 0.002

Further non-certified values are: 0.010% As in 4B, 0.008% As in 6B

Further non-certified values are 0.007% As in 3C, 0.018% As in 3D, 0.012% As in 4D, 0.006% As in 8C,0.007% Te in 1F, 0.006% Te in 2E, 0.004% Te in 2G, 0.005% Te in 3C, 0.010% Te in 5C, 0.006% Te in 7C, 0.007% Zr in 1E 0.008% Zr in 1F, 0.004% Zr in 1G, 0.005% Zr in 2F, 0.009% Zr in 5C

	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Mg	Ce
1F	**3.23** 0.03	**0.693** 0.005	**2.68** 0.03	**0.043** 0.002	**0.005** 0.001	**0.035** 0.001	**0.373** 0.003	**0.018** 0.001	**0.182** 0.002	**0.070** 0.003	**0.036** 0.003
2F	**3.77** 0.03	**0.091** 0.002	**1.23** 0.02	**0.159** 0.004	**0.009** 0.001	**0.022** 0.001	**0.658** 0.005	**0.893** 0.010	**0.002** 0.001	**0.053** 0.002	**0.018** 0.002
2G	**3.78** 0.04	**0.096** 0.002	**1.10** 0.02	**0.125** 0.003	**0.009** 0.001	**0.027** 0.001	**0.650** 0.005	**0.880** 0.010	**0.002** 0.001	**0.036** 0.002	**0.013** 0.002
3C	**3.68** 0.03	**0.333** 0.003	**2.15** 0.02	**0.026** 0.001	**0.007** 0.001	**0.100** 0.002	**0.040** 0.001	**0.421** 0.004	**0.490** 0.006	**0.006** 0.001	**0.013** 0.002
3D	**3.24** 0.03	**0.317** 0.002	**2.12** 0.02	**0.008** 0.001	**0.006** 0.001	**0.236** 0.003	**0.025** 0.001	**0.396** 0.004	**0.453** 0.005	**0.016** 0.002	**0.006** 0.002
4D	**4.19** 0.03	**0.112** 0.002	**0.259** 0.004	**0.050** 0.002	**0.041** 0.002	**0.056** 0.001	**0.063** 0.002	**0.084** 0.002	**0.024** 0.001		
4E	**4.45** 0.04	**0.034** 0.002	**0.090** 0.005	**0.023** 0.001	**0.006** 0.001	**0.030** 0.001	**0.049** 0.002	**0.005** 0.001	**0.002** 0.001		
5C	**2.30** 0.02	**0.704** 0.004	**1.40** 0.02	**0.027** 0.001	**0.091** 0.003	**0.085** 0.002	**0.188** 0.003	**0.013** 0.001	**0.104** 0.002		
6C	**3.11** 0.03	**1.25** 0.01	**3.25** 0.03	**0.097** 0.003	**0.019** 0.002	**1.33** 0.01	**0.021** 0.001	**0.273** 0.003	**0.006** 0.001		
7C	**3.55** 0.03	**0.389** 0.004	**1.73** 0.02	**0.028** 0.002	**0.026** 0.002	**0.542** 0.004	**1.26** 0.01	**0.016** 0.001	**0.966** 0.010		
	V	**Ti**	**Al**	**Sn**	**Sb**	**Bi**	**B**	**Zn**	**Pb**	**W**	**Co**
1F	**0.014** 0.001	**0.041** 0.001	**0.073** 0.003	**0.030** 0.002		**0.001** 0.001	**0.0043** 0.0003	**0.004** 0.001	**0.009** 0.001	**0.022** 0.001	**0.024** 0.001
2F	**0.010** 0.001	**0.021** 0.001	**0.024** 0.001	**0.014** 0.001	**0.028** 0.002	**0.002** 0.001	**0.0020** 0.0002	**0.018** 0.001	**0.005** 0.001	**0.003** 0.001	**0.003** 0.001
2G	**0.017** 0.001	**0.029** 0.001	**0.019** 0.001	**0.015** 0.001	**0.029** 0.002	**0.006** 0.001	**0.0023** 0.0002	**0.020** 0.001	**0.008** 0.001	**0.004** 0.001	**0.012** 0.001
3C	**0.016** 0.001	**0.021** 0.001	**0.024** 0.001	**0.009** 0.001		**0.002** 0.001	**0.0044** 0.0002		**0.005** 0.001	**0.003** 0.001	**0.026** 0.001
3D	**0.072** 0.002	**0.016** 0.001	**0.055** 0.002	**0.009** 0.001	**0.007** 0.001	**0.002** 0.001	**0.0071** 0.0003		**0.005** 0.001		**0.014** 0.001
4D	**0.012** 0.001	**0.009** 0.001	**0.007** 0.001	**0.001** 0.001		*0.002*	*0.0001*	**0.009** 0.001	**0.007** 0.001		**0.003** 0.001
4E	**0.015** 0.001	**0.011** 0.001	**0.003** 0.001	**0.001** 0.001		*0.002*			*0.002*		**0.033** 0.001
5C	**0.054** 0.002	**0.008** 0.001	**0.103** 0.003	**0.002** 0.001	*0.002*	**0.007** 0.002	**0.0078** 0.0003				**0.013** 0.001
6C	**0.192** 0.002	**0.107** 0.004	**0.024** 0.001	**0.131** 0.003	**0.044** 0.002		**0.0024** 0.0002		**0.003** 0.001	**0.007** 0.001	**0.005** 0.001
7C	**0.067** 0.001	**0.026** 0.001	**0.040** 0.002	**0.004** 0.001		*0.002*	**0.0008** 0.0002			**0.037** 0.002	**0.048** 0.001

(valid till 2030)

CRM CZ 20034 - Cast iron for solid sample spectrometry, CRM set 11-17

(valid till 2029)

	C	Mn	Si	P	S	Cr	Ni	Cu
11A	**2.37**	**0.343**	**3.31**	**0.271**	**0.163**	**1.219**	**0.084**	**0.086**
	0.02	0.007	0.04	0.009	0.007	0.015	0.002	0.003
11B	**2.44**	**0.382**	**3.67**	**0.271**	**0.140**	**1.178**	**0.082**	**0.130**
	0.02	0.008	0.04	0.009	0.007	0.016	0.002	0.003
12A	**2.82**	**0.996**	**2.57**	**0.480**	**0.073**	**0.640**	**0.174**	**0.160**
	0.02	0.010	0.03	0.011	0.003	0.008	0.002	0.004
12B	**2.92**	**1.047**	**2.96**	**0.484**	**0.077**	**0.638**	**0.174**	**0.223**
	0.02	0.011	0.03	0.011	0.003	0.008	0.002	0.005
13A	**3.13**	**0.691**	**2.19**	**0.0244**	**0.0046**	**0.122**	**1.266**	**0.021**
	0.03	0.006	0.02	0.0016	0.0004	0.003	0.016	0.002
13B	**3.12**	**0.692**	**2.12**	**0.0243**	**0.0041**	**0.125**	**1.313**	**0.021**
	0.03	0.006	0.02	0.0017	0.0004	0.003	0.017	0.002
13C	**3.15**	**0.704**	**2.23**	**0.0261**	**0.0044**	**0.124**	**1.299**	**0.089**
	0.03	0.007	0.02	0.0017	0.0004	0.003	0.017	0.003
14B	**3.26**	**0.240**	**2.34**	**0.0115**	**0.0096**	**0.042**	**0.020**	**0.640**
	0.02	0.003	0.02	0.0011	0.005	0.002	0.002	0.008
14C	**3.14**	**0.275**	**2.49**	**0.0162**	**0.0081**	**0.045**	**0.030**	**0.585**
	0.02	0.003	0.02	0.0011	0.005	0.002	0.002	0.008
15B	**3.52**	**0.048**	**1.66**	**0.054**	**0.0031**	**0.067**	**0.681**	**1.322**
	0.03	0.002	0.02	0.003	0.0003	0.002	0.008	0.018
15C	**3.47**	**0.060**	**1.68**	**0.054**	**0.0028**	**0.078**	**0.728**	**1.123**
	0.03	0.002	0.02	0.003	0.0003	0.003	0.009	0.018
16A	**3.80**	**1.292**	**1.00**	**0.171**	**0.0266**	**0.374**	**0.390**	**0.332**
	0.03	0.012	0.01	0.006	0.0014	0.006	0.004	0.007
16B	**3.78**	**1.327**	**1.00**	**0.170**	**0.0236**	**0.378**	**0.388**	**0.332**
	0.03	0.013	0.01	0.006	0.0014	0.006	0.005	0.007
16C	**3.87**	**1.311**	**0.95**	**0.173**	**0.0243**	**0.332**	**0.376**	**0.345**
	0.03	0.013	0.01	0.006	0.0014	0.006	0.005	0.007
17A	**4.30**	**0.494**	**0.170**	**0.115**	**0.0034**	**0.200**	**2.38**	**0.082**
	0.04	0.005	0.008	0.005	0.0004	0.004	0.03	0.004
17B	**4.38**	**0.501**	**0.178**	**0.089**	**0.0040**	**0.200**	**2.34**	**0.111**
	0.04	0.005	0.009	0.005	0.0004	0.005	0.03	0.005
17C	**4.08**	**0.503**	**0.150**	**0.104**	**0.0033**	**0.178**	**2.32**	**0.037**
	0.04	0.005	0.008	0.005	0.0004	0.005	0.03	0.002

	Mo	Mg	Ce	V	Ti	Al	Sn	Sb
11A	**1.130** 0.019			**0.184** 0.004	**0.028** 0.002	**0.046** 0.002	**0.070** 0.003	**0.013** 0.003
11B	**1.144** 0.020			**0.182** 0.005	**0.041** 0.002	**0.067** 0.003	**0.074** 0.003	**0.011** 0.003
12A	**0.114** 0.002			**0.340** 0.005	**0.085** 0.003	**0.077** 0.003	**0.041** 0.003	**0.046** 0.004
12B	**0.117** 0.002			**0.326** 0.005	**0.071** 0.003	**0.077** 0.003	**0.042** 0.003	**0.046** 0.004
13A	**0.364** 0.006	**0.053** 0.003	**0.011** 0.002	**0.048** 0.002	**0.014** 0.001	**0.017** 0.001	**0.014** 0.001	0.002
13B	**0.364** 0.007	**0.054** 0.003	**0.011** 0.002	**0.048** 0.002	**0.012** 0.001	**0.019** 0.001	**0.014** 0.001	0.002
13C	**0.360** 0.007	**0.064** 0.004	**0.011** 0.002	**0.043** 0.002	**0.015** 0.001	**0.022** 0.001	**0.014** 0.001	0.002
14B	**0.635** 0.009	**0.015** 0.002	**0.012** 0.002	**0.012** 0.001	**0.021** 0.001	**0.012** 0.001	**0.028** 0.002	**0.016** 0.003
14C	**0.646** 0.009	**0.017** 0.002	**0.019** 0.003	**0.013** 0.001	**0.018** 0.001	**0.007** 0.001	**0.025** 0.002	**0.020** 0.003
15B	**0.004** 0.001	**0.037** 0.002	**0.021** 0.003	**0.013** 0.001	**0.025** 0.002	**0.029** 0.002	**0.005** 0.001	**0.058** 0.006
15C	**0.002** 0.001	**0.040** 0.002	**0.030** 0.003	**0.019** 0.001	**0.036** 0.002	**0.010** 0.001	**0.006** 0.001	**0.056** 0.006
16A	**0.203** 0.004			**0.021** 0.001	**0.073** 0.002	**0.007** 0.001	**0.125** 0.006	**0.011** 0.002
16B	**0.202** 0.004			**0.029** 0.001	**0.070** 0.002	**0.007** 0.001	**0.121** 0.006	**0.011** 0.002
16C	**0.195** 0.004			**0.027** 0.001	**0.057** 0.002	**0.004** 0.001	**0.125** 0.006	**0.010** 0.002
17A	**0.030** 0.002	**0.007** 0.001	**0.003** 0.001	**0.086** 0.003	**0.016** 0.001	**0.002** 0.001	**0.002** 0.001	
17B	**0.030** 0.002	**0.009** 0.001	**0.003** 0.001	**0.086** 0.003	**0.016** 0.001	**0.002** 0.001	**0.002** 0.001	
17C	**0.030** 0.002	**0.007** 0.001	**0.003** 0.001	**0.076** 0.003	**0.015** 0.001	**0.002** 0.001	**0.002** 0.001	

	Bi	B	Zn	Pb	W	Co	Zr	As
11A	**0.011** 0.001	**0.0018** 0.0003		**0.017** 0.003	0.005	**0.005** 0.001	**0.007** 0.001	**0.005** 0.001
11B	**0.007** 0.001	**0.0032** 0.0004		**0.007** 0.001	0.005	**0.005** 0.001	**0.007** 0.001	**0.005** 0.001
12A	**0.005** 0.001	**0.036** 0.002	**0.003** 0.001	**0.007** 0.001	**0.011** 0.002	**0.004** 0.001	0.002	**0.022** 0.002
12B	**0.006** 0.001	**0.047** 0.002	**0.004** 0.001	**0.009** 0.001	**0.007** 0.002	**0.008** 0.001	0.002	**0.024** 0.002
13A					0.003	**0.024** 0.001	**0.029** 0.003	**0.002** 0.001
13B					0.003	**0.024** 0.001	**0.023** 0.003	**0.002** 0.001
13C					0.003	**0.024** 0.001	*0.02*	**0.002** 0.001
14B	**0.007** 0.001	**0.0100** 0.0006	**0.009** 0.001	0.005	0.005	**0.005** 0.001	**0.014** 0.001	**0.034** 0.004
14C		**0.0123** 0.0006	**0.010** 0.001		0.003	**0.009** 0.001	**0.013** 0.001	**0.035** 0.004
15B	**0.010** 0.001	**0.0033** 0.0003			**0.007** 0.001	**0.027** 0.001		0.003
15C	**0.008** 0.001	**0.0057** 0.0004			**0.004** 0.001	**0.026** 0.001		0.003
16A		**0.018** 0.001	**0.019** 0.002	**0.006** 0.001	**0.019** 0.002	**0.010** 0.001	0.002	**0.005** 0.001
16B		**0.018** 0.001	**0.020** 0.002	**0.007** 0.001	**0.019** 0.002	**0.010** 0.001	0.002	**0.005** 0.001
16C		**0.020** 0.001	**0.017** 0.002	**0.015** 0.003	**0.015** 0.002	**0.006** 0.001	0.002	**0.003** 0.001
17A	0.001	0.0002		**0.002** 0.001	**0.004** 0.001	**0.043** 0.002		**0.007** 0.001
17B	0.001	0.0002		**0.002** 0.001	**0.004** 0.001	**0.043** 0.002		**0.008** 0.001
17C	0.002	0.0006		**0.002** 0.001	**0.004** 0.001	**0.043** 0.002		**0.005** 0.001

Further non-certified values : Nb: 0.007% in 11A, 0.008% in 12A, 0.01% in 14B, 0.006% in 16A, 0.03% in 16B, Te: 0.005% in 11A, 0.01% in 11B, 0.006% in 16A, 16B and 0.007% in 16C

RM for spectrometry

fully compliant with the ISO Guide 35 definition of Reference Material – with the values confirmed and their uncertainties assessed.

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.

RM CI-SPL-17 – RM of cast iron for solid sample spectrometry,
ø 40 mm, h = 18 mm

	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	Mg	Ce	V
31A (ID-0A)	**3.54**	**0.041**	**2.10**	**0.025**	**0.006**	**0.019**	**0.538**	**0.005**	**0.004**	**0.070**	*0.004*	**0.008**
	0.04	0.002	0.02	0.001	0.001	0.001	0.004	0.001	0.001	0.003		0.001
32A (ID-1B)	**3.39**	**0.288**	**2.74**	**0.037**	**0.007**	**0.060**	**0.015**	**0.306**	**0.116**	**0.024**	*0.004*	**0.005**
	0.02	0.003	0.03	0.002	0.001	0.002	0.001	0.005	0.002	0.002		0.001
33A (ID-3B)	**2.75**	**0.710**	**3.10**	**0.060**	**0.007**	**0.239**	**0.389**	**0.730**	**0.220**	**0.021**	**0.026**	**0.356**
	0.02	0.006	0.03	0.002	0.001	0.002	0.004	0.010	0.003	0.002	0.003	0.004
34A (ID-5B)	**3.48**	**0.980**	**2.29**	**0.105**	**0.008**	**0.102**	**0.493**	**0.230**	**0.072**	**0.026**	**0.008**	**0.073**
	0.03	0.010	0.02	0.003	0.001	0.002	0.004	0.004	0.002	0.002	0.002	0.002
35A (IP-1B)	**4.55**	**0.096**	**0.078**	**0.024**	**0.011**	**0.022**	**0.024**	**0.004**	**0.003**			**0.009**
	0.04	0.003	0.004	0.001	0.001	0.002	0.002	0.001	0.001			0.001
36A (IG-0A)	**3.02**	**0.057**	**2.13**	**0.026**	**0.010**	**0.014**	**0.011**	**0.007**	**0.004**	**0.012**	**0.007**	**0.021**
	0.02	0.002	0.02	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
37A (IG-1B)	**3.07**	**0.211**	**3.30**	**0.025**	**0.023**	**0.328**	**0.106**	**0.149**	**0.325**			**0.122**
	0.02	0.003	0.03	0.001	0.001	0.002	0.002	0.003	0.004			0.003
38A (IG-2B)	**3.39**	**0.401**	**2.37**	**0.067**	**0.036**	**0.141**	**0.306**	**0.510**	**0.101**			**0.061**
	0.03	0.004	0.02	0.002	0.002	0.002	0.003	0.006	0.002			0.002
39A (IG-3B)	**3.70**	**0.812**	**1.90**	**0.160**	**0.045**	**0.488**	**0.032**	**0.298**	**0.203**			**0.232**
	0.03	0.011	0.02	0.003	0.002	0.003	0.001	0.005	0.003			0.004
40A (IG-4A)	**3.38**	**0.042**	**1.98**	**0.021**	**0.0035**	**0.031**	**0.045**	**0.010**	**0.005**	**0.007**	**0.012**	**0.014**
	0.02	0.002	0.02	0.002	0.0005	0.001	0.001	0.001	0.001	0.001	0.002	0.001
41A (IG-5B)	**3.41**	**0.512**	**1.92**	**0.199**	**0.068**	**0.125**	**0.104**	**0.151**	**0.041**			**0.011**
	0.03	0.004	0.02	0.004	0.002	0.002	0.002	0.003	0.003			0.001
42A (ID-2B)	**3.94**	**0.764**	**1.94**	**0.294**	**0.0040**	**0.145**	**0.492**	**0.199**	**0.021**	*0.06*	**0.039**	**0.093**
	0.03	0.010	0.03	0.004	0.0005	0.002	0.004	0.003	0.002		0.003	0.002
43A (ID-4B)	**3.98**	**1.322**	**1.63**	**0.190**	**0.008**	**0.032**	**0.411**	**0.385**	**0.152**	*0.04*	**0.017**	**0.152**
	0.03	0.016	0.02	0.004	0.001	0.002	0.005	0.006	0.003		0.002	0.002

	Ti	Al	Sn	Sb	Bi	B	Zn	Pb	W	Co	Nb	N
31A (ID-0A)	**0.007**	**0.005**	*0.003*			*0.0004*			*0.005*	**0.022**		**0.0042**
	0.001	0.001								0.001		0.0003
32A (ID-1B)	**0.044**	**0.029**	*0.012*	**0.023**	*0.007*	*0.0005*	**0.011**	**0.022**	*0.008*	*0.002*		**0.0042**
	0.001	0.001		0.002			0.001	0.002				0.0003
33A (ID-3B)	**0.130**	**0.054**	**0.039**	**0.019**	*0.002*	**0.0064**	**0.009**	**0.010**	**0.079**	**0.015**	**0.032**	**0.0043**
	0.005	0.002	0.001	0.002		0.0003	0.001	0.001	0.003	0.001	0.002	0.0003
34A (ID-5B)	**0.044**	**0.010**	**0.051**	**0.007**	*0.005*	**0.0076**	**0.007**	*0.006*	**0.016**	**0.025**	**0.014**	**0.0041**
	0.001	0.001	0.002	0.002		0.0003	0.001		0.002	0.001	0.001	0.0003
35A (IP-1B)	*0.002*	*0.002*	*0.002*			*0.0002*		*0.002*	*0.005*	**0.023**		**0.0036**
										0.002		0.0003
36A (IG-0A)	**0.021**	*0.003*	*0.002*		*0.007*	**0.022**	*0.002*	**0.016**		*0.004*		**0.0038**
	0.001					0.002		0.002				0.0003
37A (IG-1B)	**0.008**	**0.039**	**0.073**		*0.002*	**0.0124**	*0.001*	*0.002*	**0.026**	**0.031**		**0.0089**
	0.001	0.002	0.002			0.0005			0.002	0.001		0.0004
38A (IG-2B)	**0.012**	**0.034**	**0.032**	**0.018**	*0.002*	**0.0027**	**0.028**	*0.003*	*0.005*	**0.021**	**0.008**	**0.0100**
	0.001	0.001	0.001	0.002		0.0002	0.002			0.001	0.002	0.0004
39A (IG-3B)	*0.074*	**0.008**	*0.003*	**0.037**	**0.008**	**0.0195**	**0.035**	**0.017**		*0.002*		**0.0037**
		0.001		0.002	0.002	0.0006	0.003	0.002				0.0003
40A (IG-4A)	**0.015**	**0.096**	*0.004*			**0.0008**	*0.002*			**0.027**		**0.0063**
	0.001	0.003				0.0002				0.001		0.0004
41A (IG-5B)	**0.048**	*0.003*	**0.066**	**0.016**	*0.007*	*0.0004*	*0.001*	**0.010**	**0.012**	**0.031**		**0.0070**
	0.001		0.002	0.002				0.001	0.002	0.001		0.0003
42A (ID-2B)	**0.126**	**0.087**	**0.027**	**0.015**	*0.002*	**0.0036**	**0.013**	**0.020**	**0.020**	**0.010**	**0.045**	**0.0027**
	0.005	0.003	0.001	0.002		0.0003	0.002	0.003	0.002	0.001	0.002	0.0003
43A (ID-4B)	**0.065**	**0.024**	**0.067**	*0.004*	*0.002*	**0.0014**	**0.013**	**0.014**	**0.038**	**0.045**	**0.008**	**0.0045**
	0.002	0.001	0.003			0.0002	0.002	0.002	0.002	0.001	0.002	0.0003

Further non-certified values are: 0.041% As in 37A, 0.025% As in 32A, 0.016% As in 33A, 0.008% As in 41A, 0.008% Te in 33A, 0.007% Te in 37A and 39A.

RM of steel for solid sample spectrometry

RM LA 0 – LA 5

- sample of 37 mm in diameter, height 25 mm or an agreed option

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-0B	**0.0036** ±0.0011	**0.0380** ±0.0014	*0.0043*	**0.0037** ±0.0007	**0.0023** ±0.0003	**0.0074** ±0.0005	**0.0091** ±0.0016	**0.0070** ±0.0009
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-2E	**0.081** ±0.002	**0.111** ±0.003	**1.725** ±0.019	**0.060** ±0.003	**0.044** ±0.002	**0.577** ±0.010	**0.149** ±0.003	**2.015** ±0.022
LA-3G	**0.626** ±0.004	**0.687** ±0.010	**1.296** ±0.011	**0.0472** ±0.0010	**0.0351** ±0.0011	**0.236** ±0.004	**1.377** ±0.007	**1.019** ±0.010
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-4D	**1.143** ±0.005	**1.266** ±0.009	**0.181** ±0.005	**0.0289** ±0.0011	**0.0091** ±0.0002	**0.066** ±0.004	**1.831** ±0.021	**0.367** ±0.007
LA-5C	**0.439** ±0.007	**1.873** ±0.012	**0.394** ±0.008	**0.0179** ±0.0011	**0.0088** ±0.0008	**0.138** ±0.002	**3.815** ±0.026	**2.591** ±0.020

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-0B	**0.0010** ±0.0005	0.0016				0.0017	**0.0024** ±0.0004	0.0013
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-2E	**0.357** ±0.010	**0.652** ±0.004	**0.307** ±0.010	**0.310** ±0.005	**0.343** 0.010	**0.268** ±0.009	**0.083** ±0.005	**0.087** ±0.002
LA-3G	**0.047** ±0.002	**0.326** ±0.005	**0.105** ±0.004	**0.232** ±0.002	**0.143** ±0.004	**0.127** ±0.003	**0.051** ±0.004	**0.031** ±0.001
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-4D	**0.067** ±0.002	**0.136** ±0.004	**0.0251** ±0.0025	**0.103** ±0.002	**0.0154** ±0.0007	**0.0370** ±0.0013	**0.0104** ±0.0016	**0.0142** ±0.0010
LA-5C	**0.081** ±0.003	**0.867** ±0.011	**0.631** ±0.008	**0.536** ±0.006	**0.048** ±0.001	**0.088** ±0.002	**0.026** ±0.002	**0.031** ±0.001

RM	B	Nb	Pb	Sb	Zr	Ca	Ta	N
LA-0A			0.001	0.0007				**0.0023** ±0.0002
LA-0B								**0.0027** ±0.0005
LA-1B	**0.010** ±0.001	0.001	0.0007	0.002	0.002	**0.0016** ±0.0003		**0.003** ±0.0004
LA-2E	**0.0043** ±0.0004	**0.111** ±0.003	**0.068** ±0.007	**0.033** ±0.004				**0.0071** ±0.0006
LA-3G	**0.0039** ±0.0002	**0.0711** ±0.0015	**0.0098** ±0.0005	**0.0242** ±0.0036	**0.068** ±0.003	**0.0016** ±0.0002		**0.0115** ±0.0010
LA-4C	**0.0005** ±0.0001	**0.053** ±0.004						**0.012** ±0.001
LA-4D		**0.0046** ±0.0009	**0.0401** ±0.0035					**0.0064** ±0.0005
LA-5C		**0.057** 0.002	**0.0156** 0.0011	**0.018** ±0.003			*Zn 0.013*	**0.0248** 0.0012

RM CM and SP (CM-1C, 1D, 2B, 3A, 4B, 5C, 6A, 7A, 8B, 9B, 12C, 14A, 15C, 16A, 17A, 18A, 19A, 20A, 22A, SP-1B, 2C, 3C, 3D, 4C, BO-2B)

- sample of 35 - 43 mm in diameter. Height 25 mm or an agreed option.

RM	C	Mn	Si	P	S	Cu	Cr	Ni	Al	Mo	W	V
CM-1C	**0.72**	**1.73**	**0.31**	**0.023**	**0.025**	**0.18**	**0.47**	**0.52**	**0.034**	**0.084**	**0.064**	**0.073**
	0.01	0.01	0.01	0.001	0.002	0.01	0.015	0.015	0.001	0.004	0.002	0.002
CM-1D	**0.735**	**1.800**	**0.341**	**0.0218**	**0.0268**	**0.186**	**0.456**	**0.547**	**0.0245**	**0.100**	**0.063**	**0.089**
	0.005	0.015	0.006	0.0004	0.0011	0.003	0.007	0.006	0.0011	0.002	0.002	0.002
CM-2B	**0.247**	**0.894**	**1.950**	**0.082**	**0.0114**	**0.994**	**1.538**	**1.205**	**0.0464**	**0.332**	**0.223**	**0.109**
	0.004	0.007	0.040	0.002	0.0007	0.019	0.015	0.014	0.0011	0.011	0.013	0.005
CM-3A	**0.295**	**0.37**	**0.27**	**0.016**	**0.0013**	**0.16**	**1.87**	**1.82**	**0.05**	**0.33**	**0.015**	**0.007**
	0.013	0.01	0.02	0.002	0.0003	0.005	0.04	0.04	0.002	0.01	0.003	0.002
CM-4B	**0.72**	**0.50**	**0.80**	**0.023**	**0.012**	**0.40**	**2.23**	**1.40**	**0.025**	**0.33**	**0.116**	**0.18**
	0.02	0.01	0.02	0.003	0.002	0.01	0.03	0.03	0.002	0.01	0.005	0.01
CM-5C	**1.04**	**1.17**	**0.54**	**0.029**	**0.021**	**0.151**	**2.45**	**0.42**	**0.063**	**0.132**	**0.034**	**0.106**
	0.02	0.02	0.02	0.002	0.002	0.004	0.05	0.01	0.003	0.003	0.005	0.002
CM-6A	**0.52**	**0.37**	**0.27**	**0.016**	**0.058**	**0.05**	**0.37**	**0.19**	**0.02**	**0.04**	**0.04**	**0.05**
	0.015	0.013	0.014	0.002	0.003	0.003	0.01	0.006	0.002	0.003	0.003	0.003
CM-7A	**0.05**	**1.17**	**0.56**	**0.011**	**0.016**	**0.09**	**0.10**	**0.05**	**0.13**	**0.015**	**0.01**	**0.012**
	0.005	0.02	0.016	0.002	0.002	0.003	0.006	0.003	0.01	0.002	0.002	0.001
CM-8B	**0.185**	**1.95**	**0.112**	**0.015**	**0.014**	**0.081**	**1.22**	**0.032**	**0.0028**	**0.011**	*0.009*	**0.0078**
	0.006	0.02	0.003	0.001	0.001	0.003	0.02	0.002	0.0006	0.001		0.0005
CM-9B	**0.17**	**2.27**	**0.89**	**0.008**	**0.010**	**0.04**	**1.36**	**0.023**	**0.049**	*0.002*		**0.006**
	0.01	0.03	0.02	0.002	0.002	0.003	0.01	0.003	0.003			0.001
CM-12C	**0.0389**	**0.275**	**3.770**	**0.0103**	**0.0110**	**0.175**	**0.081**	**0.046**	**0.145**	**0.0128**	*0.004*	**0.0271**
	0.0017	0.003	0.150	0.0006	0.0004	0.004	0.002	0.002	0.005	0.0011		0.0014
CM-14A	**0.523**	**1.58**	**1.15**	**0.051**	**0.028**	**0.30**	**1.13**	**1.14**	**0.063**	**0.395**	**0.021**	**0.345**
	0.012	0.03	0.02	0.003	0.002	0.01	0.02	0.02	0.003	0.010	0.002	0.01
CM-15C	**0.075**	**1.13**	**0.006**	**0.063**	**0.32**	**0.141**	**0.052**	**0.072**		**0.021**		
	0.006	0.04	0.002	0.003	0.01	0.004	0.003	0.004		0.003		
CM-17A	**0.142**	**0.524**	**0.612**	**0.0310**	**0.0175**	**0.201**	**9.58**	**0.520**	**0.0089**	**1.116**	**0.099**	**0.247**
	0.003	0.006	0.009	0.0010	0.0012	0.004	0.05	0.015	0.0012	0.017	0.004	0.005
CM-18A	**0.143**	**1.792**	**0.903**	**0.0182**	**0.0119**	**2.393**	**20.59**	**20.44**	**0.0344**	**2.282**	**0.097**	**0.113**
	0.003	0.018	0.021	0.0015	0.0009	0.041	0.12	0.09	0.0027	0.037	0.007	0.004
CM-19A	**0.361**	**0.783**	**1.588**	**0.0440**	**0.0182**	**0.986**	**13.12**	**15.27**	**0.0788**	**1.023**	**0.311**	**1.235**
	0.008	0.010	0.015	0.0020	0.0008	0.031	0.11	0.16	0.0045	0.018	0.022	0.055
CM-20A	**0.63**	**0.594**	**1.74**	**0.0383**	**0.020**	**0.237**	**0.97**	**1.007**	**0.076**	**0.365**	**0.104**	**0.225**
	0.01	0.005	0.02	0.0015	0.001	0.008	0.01	0.015	0.002	0.007	0.007	0.004
CM-22A	**0.154**	**1.443**	**0.248**	**0.086**	**0.084**	**0.419**	**0.167**	**3.106**	**0.0049**	**0.132**	**0.599**	**0.653**
	0.002	0.009	0.008	0.004	0.003	0.006	0.004	0.041	0.0017	0.006	0.010	0.008
SP-1B	**0.050**	**1.67**	**0.505**	**0.039**	**0.30**	**0.47**	**17.42**	**8.32**	*0.003*	**0.40**	**0.032**	**0.060**
	0.002	0.03	0.017	0.003	0.02	0.01	0.12	0.16		0.01	0.003	0.004
SP-2C	**1.40**	**14.50**	**0.29**	**0.037**	**0.016**	**0.35**	**1.56**	**0.050**	**0.030**	**0.050**	**0.033**	**0.051**
	0.03	0.21	0.02	0.003	0.002	0.03	0.03	0.003	0.002	0.002	0.005	0.003
SP-3C	**0.30**	**0.43**	**0.84**	**0.026**	**0.011**	**0.185**	**16.42**	**5.31**	**0.095**	**0.26**	**0.12**	**0.19**
	0.02	0.03	0.04	0.003	0.003	0.011	0.11	0.07	0.010	0.01	0.01	0.01
SP-3D	**0.171**	**0.34**	**0.71**	**0.021**	**0.015**	**0.73**	**16.44**	**5.36**	**0.037**	**0.25**	**0.12**	**0.11**
	0.007	0.02	0.03	0.003	0.003	0.04	0.23	0.15	0.003	0.01	0.01	0.01
SP-4C	**0.34**	**1.66**	**1.75**	**0.020**	**0.010**	**0.056**	**22.1**	**37.1**	**0.011**	**0.105**	*0.01*	**0.059**
	0.02	0.04	0.04	0.004	0.002	0.007	0.1	0.2	0.003	0.008		0.005
BO-2B	**0.515**	**0.745**	**0.309**	**0.0093**	**0.0016**	**0.100**	**0.212**	**0.057**	**0.0196**	**0.006**	*0.005*	*0.001*
	0.010	0.011	0.007	0.0007	0.0003	0.005	0.004	0.002	0.0008	0.001		

RM	Ti	Co	As	Sn	B	Nb	Pb	Sb	Zr	Ca	Ta	N
CM-1C	**0.066**	**0.026**		**0.012**	**0.0020**	**0.054**	**0.005**	**0.01**		**0.0007**		**0.009**
	0.002	0.001		0.001	0.0002	0.002	0.002	0.002		0.0002		0.001
CM-1D	**0.054**	**0.029**		**0.0144**	**0.0017**	**0.050**		**0.0112**				**0.0124**
	0.004	0.001		0.0009	0.0002	0.004		0.0008				0.0005
CM-2B	**0.342**	**0.454**	**0.120**	**0.091**	**0.0010**	*0.58*	**0.087**	**0.020**	**0.013**			**0.0062**
	0.008	0.022	0.017	0.003	0.0001		0.008	0.004	0.002			0.0007
CM-3A	**0.006**	**0.012**	**0.005**	**0.007**	**0.0002**	**0.006**						**0.007**
	0.0003	0.002	0.002	0.002	0.0001	0.001						0.001
CM-4B	**0.12**	**0.115**	**0.015**	**0.028**	**0.017**	**0.071**	**0.022**	**0.052**		**Zn 0.007**		**0.013**
	0.01	0.004	0.001	0.002	0.001	0.002	0.003	0.002		0.001		0.001
CM-5C	**0.031**	**0.022**	**0.020**	**0.018**	**0.0012**	**0.014**	**0.009**	**0.005**	*0.07*	*0.0006*		**0.014**
	0.002	0.002	0.003	0.003	0.0002	0.001	0.002	0.002				0.001
CM-6A	**0.03**	**0.03**	**0.025**	**0.017**	**0.015**	**0.028**	**0.017**	**0.03**	**0.04**			**0.009**
	0.003	0.005	0.002	0.002	0.001	0.002	0.001	0.003	0.003			0.001
CM-7A	**0.14**	**0.007**	**0.005**	**0.008**	**0.0003**	**0.004**	0.0014	0.0003	**0.042**			**0.01**
	0.005	0.001	0.001	0.002	0.0001	0.001			0.003			0.002
CM-8B	**0.0008**	**0.007**	**0.0035**	**0.0126**	**0.0023**	*0.002*	*0.003*	*0.004*	*0.002*			**0.0075**
	0.0002	0.001	0.0003	0.0007	0.0003							0.0004
CM-9B	**0.002**	**0.004**	0.002	**0.003**	**0.004**	**0.06**	**0.002**	**0.003**	**0.003**			
	0.001	0.001		0.001	0.001	0.01	0.001	0.001	0.001			
CM-12C	**0.0128**	**0.0044**	**0.0030**	**0.0055**	**0.0033**	**0.0066**				**0.0010**		**0.0056**
	0.0004	0.0006	0.0007	0.0010	0.0002	0.0005				0.0002		0.0005
CM-14A	**0.40**	**0.015**	**0.016**	**0.027**	**0.0062**	**0.115**	**0.013**	**0.006**	**0.044**	0.004	**0.015**	**0.0095**
	0.01	0.002	0.001	0.002	0.0005	0.005	0.001	0.001	0.003		0.002	0.0010
CM-15C		*0.01*					**0.29**					
							0.01					
CM-17A	**0.0236**	**0.0329**	**0.0105**	**0.0109**	**0.0060**		**0.0177**					**0.0743**
	0.0016	0.0022	0.0014	0.0011	0.0005		0.0032					0.0040
CM-18A		**0.097**										**0.0848**
		0.005										0.0029
CM-19A	**0.254**	**0.222**		**0.0283**	*0.091*	**0.091**				*0.0036*		*0.021*
	0.009	0.007		0.0030		0.004						
CM-20A	**0.175**	**0.124**	**0.073**	**0.033**	**0.0071**	**0.074**	**0.015**	**0.025**	**0.083**		**Zn 0.007**	**0.0086**
	0.008	0.002	0.005	0.001	0.0004	0.003	0.002	0.001	0.004		0.001	0.0012
CM-22A	**0.0038**	**0.130**	**0.057**	**0.069**		**0.0195**						**0.0065**
	0.0004	0.002	0.006	0.002		0.0022						0.0002
SP-1B	*0.002*	**0.161**	*0.003*	**0.013**	**0.0007**	**0.012**						**0.063**
		0.003		0.001	0.0002	0.002						0.005
SP-2C	**0.014**	**0.044**	*0.005*	**0.037**	*0.003*							**0.027**
	0.001	0.003		0.003								0.001
SP-3C	*0.17*	**0.041**	0.03	0.02	**1.67**	*0.04*						
		0.004			0.03							
SP-3D	**0.088**	**0.033**	*0.03*	*0.04*	**2.45**	*0.04*						
	0.008	0.004			0.03							
SP-4C	**0.031**	**0.065**				**0.022**				*Fe 36.6*		*0.04*
	0.003	0.007				0.002						
BO-2B	**0.0017**	**0.0055**	**0.0057**	**0.0062**						*0.0008*		**0.004**
	0.0003	0.0005	0.0005	0.0005								0.001

RM of silicon steel SST – (1A, 2A, 3A, 4A)

- sample of 37 mm in diameter. Height 25 mm or an agreed option, **steel chips on request.**

	C	Mn	Si	P	S	Cu	Cr	Ni
SST-1A	**0.072**	**0.062**	**2.57**	**0.041**	**0.0043**	**0.654**	**0.209**	**0.155**
	0.003	0.004	0.04	0.002	0.0004	0.013	0.005	0.004
SST-2A	**0.083**	**0.160**	**3.07**	**0.026**	**0.0089**	**0.205**	**0.138**	**0.066**
	0.003	0.004	0.04	0.002	0.0008	0.006	0.004	0.002
SST-3A	**0.035**	**0.221**	**3.27**	**0.007**	**0.0093**	**0.096**	**0.043**	**0.061**
	0.003	0.005	0.05	0.002	0.001	0.004	0.002	0.002
SST-4A	**0.062**	**0.376**	**4.73**	**0.031**	**0.020**	**0.111**	**0.105**	**0.082**
	0.004	0.010	0.05	0.003	0.002	0.004	0.005	0.002

	Al	Mo	W	V	Ti	Co	As	Sn
SST-1A	**0.061**	*0.002*		**0.006**	**0.004**	**0.005**	**0.002**	**0.110**
	0.003			0.002	0.001	0.001	0.001	0.006
SST-2A	**0.010**	**0.054**	**0.019**	**0.024**	**0.016**	**0.022**		**0.055**
	0.002	0.002	0.002	0.002	0.002	0.002		0.004
SST-3A	**0.009**	**0.036**	**0.016**	**0.041**	**0.009**	**0.038**	**0.003**	**0.015**
	0.002	0.002	0.002	0.002	0.001	0.003	0.001	0.002
SST-4A	**0.514**	**0.019**	**0.026**	**0.031**	**0.035**	**0.012**	**0.004**	**0.025**
	0.018	0.002	0.003	0.002	0.002	0.002	0.001	0.003

	B	Pb	Sb	Zr	Zn	N
SST-1A	**0.0003**	*0.002*	*0.002*			**0.0059**
	0.0001					0.0005
SST-2A	**0.0089**	**0.015**	**0.008**	**0.017**	**0.011**	**0.0078**
	0.0006	0.003	0.002	0.002	0.003	0.0007
SST-3A	**0.0019**	**0.013**			**0.011**	**0.0088**
	0.0004	0.002			0.003	0.0012
SST-4A	**0.0006**	**0.008**	*0.003*	*0.003*	*0.002*	**0.0058**
	0.0002	0.002				0.0007

QCM for spectrometry

The quality control materials comply with the latest ISO Guide 35 definition of the Reference Material. They are primarily intended for quality control of the automated analysers.

The current three flexible sets of alloy (SL, HS), special (SP) and custom-made (CM) steel QCM for spectrometry cover a broad range of elements/concentrations relevant to the contemporary steel production.

The combination of the individual QCM may be tailored to fit for any particular task of the spectrometric steel analysis.

QCM SL 1 – SL 6, HS 1 – HS 2

- sample of 35 - 43 mm in diameter, height 25 mm or an agreed option

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				

QCM SP

- sample of 35 - 43 mm in diameter, height 25 mm or an agreed option

QCM	C	Mn	Si	P	S	Cu	Cr	Ni	Al	Mo
SP-3B	0.27	0.29	0.72	0.023	0.008	0.62	15.1	5.65	0.08	0.24
SP-8B	2.37	0.86	1.40	0.022	0.012	0.075	37.6	2.72	0.13	0.10
QCM	**W**	**V**	**Ti**	**Co**	**As**	**Sn**	**B**	**Nb**	**Pb**	**Sb**
SP-3B	0.12	0.10	0.13	0.02		0.01	0.88			
SP-8B	0.05	0.13	0.13	0.075	0.05	0.06	0.03	0.04		

QCM CM

- sample of 35 - 43 mm in diameter, height 25 mm or an agreed option

QCM	C	Mn	Si	P	S	Cu	Cr	Ni
CM-5B	1.09	1.28	0.39	0.021	0.012	0.13	2.07	0.23
QCM	**Al**	**Mo**	**W**	**V**	**Ti**	**Co**	**As**	**Sn**
CM-5B	0.083	0.10	0.03	0.06	0.02	0.022	0.018	0.012
QCM	**B**	**Nb**	**Pb**	**Sb**	**N**	**Zr**	**Ta**	**Zn**
CM-5B	0.002	0.015	0.01	0.006	0.0135	0.09		

REFERENCE MATERIALS OF SOLID FUEL AND ASH
for thermodynamic, chemical and technological properties

The SF and SFA Reference Materials comply with the ISO Guide 35 definition of the Reference Material.

Intended for quality control and validation of methods for gross calorific content measurement, elemental analysis of C, N, H, S content and determination of the conventional of volatile matter and ash content. For this, the values in the set are evenly distributed over the entire application ranges.
Supplied in 50g packing.

Certified dry-basis values in bold with ± uncertainty shown below in regular								
Property	**Gross calorific content**		**Elemental composition**				**Volatile matter**	**Ash**
			C	**H**	**N**	**S**		
Unit	**kJ/kg**	**BTU/Lb**	**Mass fraction wt.%**				**Mass fraction wt.%**	
SF-01-14 BROWN COAL	**14617**	6284	**36.40**	**3.31**	**0.60**	**1.33**	**31.72**	**44.90**
Uc	±49	±21	±0.30	±0.07	±0.04	±0.03	±0.17	±0.14
SF-02-14 BLACK COAL	**33090**	14226	**91.84**	**2.09**	**0.65**	**0.16**	**13.10**	**2.80**
Uc	±58	±25	±0.46	±0.10	±0.04	±0.01	±0.18	±0.06
SF-03-14 BLACK COAL	**32060**	13783	**96.30**	**0.21**	**0.32**	**0.14**	**1.15**	**2.98**
Uc	±115	±49	±0.50	±0.06	±0.04	±0.01	±0.15	±0.03
SF-04-14 BLACK COAL	**34618**	14883	**85.53**	**4.59**	**1.35**	**0.48**	**23.67**	**4.43**
Uc	±80	±34	±0.45	±0.10	±0.04	±0.01	±0.22	±0.06
SF-05-14 COKE	**30410**	13074	**90.40**	**0.20**	**0.98**	**0.45**	**1.28**	**7.84**
Uc	±110	±47	±0.44	±0.06	±0.03	±0.01	±0.12	±0.04
SF-06-14 BLACK COAL	**23990**	10314	**58.28**	**3.51**	**3.80**	**3.13**	**27.36**	**27.21**
Uc	±93	±40	±0.36	±0.05	±0.05	±0.05	±0.22	±0.11
SF-07-14 BROWN COAL	**21337**	9173	**50.97**	**4.26**	**1.05**	**2.52**	**38.80**	**28.73**
Uc	±86	±37	±0.28	±0.08	±0.04	±0.04	±0.20	±0.05
SFA-01-14 BLACK COAL ASH			**3.10**			**0.029**		**96.60**
Uc			±0.19			±0.008		±0.17