



CZECH METEOROLOGICAL INSTITUTE CMI
Certified reference materials Iron and Steel
Solid sample discs and chips

The following tables state the RM codes, validity period, certified values **c** and \pm interval of the expanded combined uncertainty **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.

CRM

The entire course of projecting, candidate materials selection, processing, testing and final characterisation comply with ISO Guides 34, 35 and ISO 17025. The certified values as results of the interlaboratory experiment with international participation are traceable to the adequate references.

A line of steel and cast iron samples cover the ranges of C from 0,002 % up to 4,5 %, S from 0,002 % up to 0,25 % and N from 0,004 % up to 0,013 %.

LOW ALLOY STEEL CRM FOR C, S, N

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

		2003	2004	2005	2006	2007	2008	2025 A*	2026 A**
C	c	0.0402	0.079	0.358	0.461	0.684	0.977	0.0020	0.068
	U_c	0.0008	0.001	0.002	0.002	0.004	0.003	0.0003	0.001
S	c	0.0316	0.0464	0.0250	0.0172	0.0106	0.0091	0.0018	0.255
	U_c	0.0006	0.0008	0.0005	0.0007	0.0003	0.0004	0.0002	0.0050
N	c	0.0046	0.0038	0.0081	0.0066	0.0128	0.0066		
	U_c	0.0001	0.0002	0.0002	0.0003	0.0003	0.0002		

Please note: CZ 2025 A contains 200 gr, all others 250 gr

* 2025 A: pure iron powder (chips)

** 2026 A: free-cutting steel (chips)

CAST IRON CRM FOR C, S

CRM CZ 2015 A - 2024 A, Chips 100 g (valid till 2022)

		2015 A	2016 A	2017 A	2018 A	2019 A	2020 A	2021 A	2022 A	2023 A	2024 A
C	c	1.996	2.053	2.463	3.173	3.270	3.532	3.806	3.826	4.029	4.512
	U_c	0.011	0.016	0.023	0.020	0.014	0.015	0.012	0.014	0.016	0.022
S	c	0.0157	0.0048	0.0755	0.0142	0.0116	0.0417	0.0357	0.0768	0.0886	0.0264
	U_c	0.0004	0.0004	0.0026	0.0005	0.0004	0.0013	0.0011	0.0030	0.0028	0.0004



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 Spectrometers.

The current four flexible sets of low alloy (LA), alloy (SL, HS), special (SP) and custom-made (CM) steel QCM for spectrometry cover a wide range of elements / concentrations corresponding to today's steel production.

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

Diameter of solid samples LA, SL, HS, SP and CM is 35 up to 43 mm, standard height is 25 mm. Up to 50 mm height is available upon request.

LA1 – LA5 (valid till 2015)

QCM	C	Mn	Si	P	S	Cu	Cr	Ni
LA-1A	0.007	0.13	0.008	0.004	0.011	0.027	0.042	0.014
LA-2B	0.19	0.19	1.53	0.077	0.040	0.45	0.28	2.01
LA-3B	0.67	0.75	0.76	0.036	0.030	0.13	1.05	1.09
LA-4B	1.18	1.76	0.043	0.023	0.010	0.20	1.85	0.08
LA-5A	0.39	1.87	0.43	0.022	0.010	0.25	3.75	2.78
QCM	Al	Mo	W	V	Ti	Co	As	Sn
LA-1A	0.001	0.003	0.001	0.001	0.001	0.002	0.002	0.002
LA-2B	0.27	0.62	0.32	0.33	0.32	0.29	0.062	0.046
LA-3B	0.04	0.34	0.135	0.205	0.072	0.115	0.084	0.046
LA-4B	0.025	0.006	0.003	0.008	0.002	0.004	0.003	0.004
LA-5A	0.09	0.89	0.77	0.52	0.04	0.07	0.005	0.031
QCM	B	Nb	Pb	Sb	Zr	Ca	Ta	N
LA-1A	0.010	0.0001	0.001	0.001	0.000	0.001	0.000	0.0045
LA-2B	0.004	0.25	0.05	0.047		0.003		
LA-3B	0.008	0.07	0.03	0.054		0.006		0.015
LA-4B	0.0002	0.09						0.008
LA-5A	0.0005	0.05			0.013			0.012

SL 1 – SL 6 and HS 1 – HS 2 (valid till 2015)

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				

SP 1 – SP 8 (valid till 2015)

QCM	C	Mn	Si	P	S	Cu	Cr	Ni	Al	Mo
SP-1A	0.047	1.87	0.33	0.024	0.26	0.52	17.7	8.6	0.004	0.42
SP-2A	1.38	20.1	0.63	0.062	0.004	0.11	2.30	0.27	0.05	0.24
SP-3B	0.27	0.29	0.72	0.023	0.008	0.62	15.1	5.65	0.08	0.24
SP-4A	0.31	1.49	1.38	0.018	0.007	0.02	21.1	35.9	0.045	0.053
SP-5B	0.20	1.86	3.07	0.108	0.023	0.15	0.38	3.00	0.18	0.13
SP-6A	0.10	0.38	4.65	0.017	0.009	0.12	0.11	0.04	0.32	0.01
SP-7A	0.006	0.08	0.036	0.007	0.010	0.08	0.01	47.3	0.003	0.01
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-1A	0.03	0.058	0.02	0.095	0.006	0.01	0.0007	0.012		
SP-2A	0.03	0.024	0.04	0.02		0.006				
SP-3B	0.12	0.10	0.13	0.02		0.01	0.88			
SP-4A	0.027	0.031	0.004	0.029		0.005	0.0005	N 0.054		
SP-5B	0.62	0.71	0.35	0.135	0.19	0.08	0.14	0.09	0.09	0.07
SP-6A	0.02	0.016	0.008	0.003	0.003	0.01				
SP-7A		0.001	0.004	0.003						
SP-8B	0.05	0.13	0.13	0.075	0.05	0.06	0.03	0.04		

CM 1 – CM 10 (valid till 2015)

QCM	C	Mn	Si	P	S	Cu	Cr	Ni
CM-1A	0.79	1.97	0.16	0.023	0.011	0.14	0.52	0.48
CM-2A	0.20	0.97	1.66	0.10	0.012	1.01	1.50	1.20
CM-3A	0.295	0.37	0.27	0.016	0.0013	0.16	1.87	1.82
CM-4A	0.66	0.73	0.86	0.02	0.012	0.32	1.65	1.22
CM-5A	1.03	1.30	0.16	0.021	0.013	0.075	2.00	0.18
CM-6A	0.52	0.37	0.27	0.016	0.058	0.05	0.37	0.19
CM-7A	0.05	1.17	0.56	0.011	0.016	0.09	0.10	0.05
CM-8A	0.16	2.13	0.18	0.007	0.011	0.03	1.38	0.03
CM-9A	0.16	2.54	0.86	0.008	0.012	0.04	1.35	0.02
CM-10A	0.694	1.00	0.817	0.040	0.022	0.31	5.48	2.38
QCM	Al	Mo	W	V	Ti	Co	As	Sn
CM-1A	0.12	0.07	0.07	0.082	0.055	0.03	0.028	0.005
CM-2A	0.03	0.33	0.23	0.10	0.34	0.43	0.11	0.08
CM-3A	0.05	0.33	0.015	0.007	0.006	0.012	0.005	0.007
CM-4A	0.07	0.35	0.14	0.15	0.11	0.12	0.008	0.022
CM-5A	0.12	0.12	0.028	0.019	0.015	0.012	0.015	0.013
CM-6A	0.02	0.04	0.04	0.05	0.03	0.03	0.025	0.017
CM-7A	0.13	0.015	0.01	0.012	0.14	0.007	0.005	0.008
CM-8A	0.02	0.001	0.01	0.008	0.001	0.004	0.002	0.003
CM-9A	0.053	0.001	0.01	0.009	0.003	0.004	0.002	0.005
CM-10A	0.086	1.234	0.96	0.908	0.0189	0.114	0.03	0.062
QCM	B	Nb	Pb	Sb	N	Zr	Ta	Zn
CM-1A	0.0013	0.016		0.01	0.008			
CM-2A	0.0005	0.48	0.06	0.008		0.03	0.027	
CM-3A	0.0002	0.006			0.007			
CM-4A	0.02	0.065	0.018	0.045	0.012	0.002	Ca 0.007	0.015
CM-5A	0.0009	0.008	0.006	0.01	0.008	0.002		
CM-6A	0.015	0.028	0.017	0.03	0.009	0.04		
CM-7A	0.0003	0.004	0.0014	0.0003	0.01	0.042		
CM-8A	0.004	0.034						
CM-9A	0.005	0.06						
CM-10A	0.05							