



Czech Metrology Institute

Dept. of Reference Materials Certification

Radiová 3
102 00 Praha 10

CERTIFICATE

No. 1014-CM-2015-07

CERTIFIED REFERENCE MATERIALS CZ 2015 A – 2024 A SET OF CAST IRON CRM WITH CERTIFIED CONTENT OF CARBON AND SULPHUR.

Designed for calibration and validation of combustion methods with a minimum test portion of 0,2g. The set covers the most frequent concentration ranges of the certified elements.

Manufacture and Technical Parameters

The graphite free candidate material was argon-sprayed, crushed, sieved and homogenised. More than 95% of the material consist of the fraction between 0,25 and 0,75mm grain size. The supply unit is 100g of CRM in a glass bottle with a plastic screw lid, sealed in a plastic container.

Homogeneity was tested by combustion infra-red absorption spectrometry. Both within-bottle and between-bottles inhomogeneity were tested and found statistically insignificant.

Stability and storage

The CRM materials and certified constituents are stable over the entire validity period.

The samples must be stored in a dry and non-corrosive enviroment with the lid replaced immediately after each weighing.

Producer

SPL, Šunychelská 1159, CZ-735 81 Bohumín, Czech Republic
tel./fax: +420 59 601 4627, e-mail: info@spl-bohumin.cz

Project Manager: Iva Bogumská

Procurements, production and characterisation were carried out in compliance with the quality requirements of the ISO-REMCO Guide 34 (2000).

CERTIFIED VALUES AND THEIR UNCERTAINTIES (expressed in % m/m)

CRM CZ		2015 A	2016 A	2017 A	2018 A	2019 A	2020 A	2021 A	2022 A	2023 A	2024 A
Carbon	value	1,996	2,053	2,463	3,173	3,270	3,532	3,806	3,826	4,029	4,512
	U	0,011	0,016	0,023	0,020	0,014	0,015	0,012	0,014	0,016	0,022
Sulphur	value	0,0157	0,0048	0,0755	0,0142	0,0116	0,0417	0,0357	0,0768	0,0886	0,0264
	U	0,0004	0,0004	0,0026	0,0005	0,0004	0,0013	0,0011	0,0030	0,0028	0,0004

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Ing. Vladimír Peršl
Director of Regional Branch Praha



CERTIFICATION

Characterisation was based on the interlaboratory experiment carried out by selected competent laboratories, in compliance with the ISO-REMCO Guide 35 (1989).

Traceability

The results (except of the calculable results - gravimetry, volumetry) were traced to the adequate matrix-compatible CRM.

Methods

The combustion in a stream of oxygen with infra-red molecular absorption spectrometry was applied for both carbon and sulphur, along with gravimetry and volumetry for carbon only.

Participating laboratories

Třinecké železářny a.s., Třinec	Czechia
ŽDAS a.s., Žďár nad Sázavou	Czechia
Chemopetrol a.s., Litvínov	Czechia
ŽDB a.s., Bohumín	Czechia
Moravské železářny a.s., Olomouc	Czechia
Tafonco a.s., Kopřivnice	Czechia
Qualitest lab., Dunayvaros	Hungary
ICRM, Ekaterinburg,	Russia
US Steel, Košice-Labortest s.r.o., Košice	Slovakia
Leco Corporation, St. Joseph, MI	USA
BAS, Middlesbrough	United Kingdom
IMŽ, Gliwice	Poland

Evaluation

First the distribution of the laboratory values and their means were assessed technically to justify the deletion of possible outliers, than the gross means were computed by a standard statistical software.

Certified values are the arithmetic means of seven to ten laboratory means, accepted by the technical and statistical assessment, rounded identically with their stated uncertainties.

Uncertainty was estimated with respect to the ISO Guide to Expression of Uncertainty in Measurement (1993) and Document EURACHEM, Quantifying Uncertainty in Analytical Measurement (1995) the standard deviation of the gross mean expanded by multiplying by the coverage factor $k = t$ (for $\alpha = 0,05$). It is expressed as a halfwidth of the two-sided interval U .

The uncertainty estimates were rounded to maximum of two valid figures.

Users instructions

The CRM must be used under the same conditions (crucible, accelerators, time-temperature setting), as used for the analysed samples, in accordance with the instrument manual.

CMI responsible person: Jan Tichý

