

## CERTIFICATE OF REFERENCE MATERIAL

CCE1

Copper of attested magnesium content

The assigned certified values<sup>1</sup> and uncertainties<sup>2</sup>

	<b>Mg</b>
	<b>%</b>
CCE1	0.541
	±0.021

<sup>1</sup> Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination.

<sup>2</sup> The certified uncertainty is the expanded uncertainty with a coverage factor  $k=2$ , corresponding to a level of confidence of about 95 %.

Certified on December 2025

Signature

SIEĆ BADAWCZA ŁUKASIEWICZ-  
INSTYTUT METALI NIEŻELAZNYCH  
DYREKTOR

dr inż. Barbara Juszczyk, MBA

Version 1 from 4<sup>th</sup> of December 2025

Description of the material:

The certified reference material is in form of chips.

Traceability:

The certified values are traceable to the SI via calibration using pure metals, certified monoelement standard solutions and certified reference materials i.e. CCB Łukasiewicz – IMN.

Analytical methods applied for characterization:

Inductively coupled plasma optical emission spectrometry (ICP-OES)

Flame atomic absorption spectrometry (FAAS)

Participating laboratories:

	Mg
ICP-OES	1, 2, 3
FAAS	2, 4

1. Łukasiewicz Research Network – Institute of Non-Ferrous Metals, Centre of Analytical Chemistry, Laboratory of Emission Spectrometry and Chromatography, Gliwice, Poland
2. Łukasiewicz Research Network – Institute of Non-Ferrous Metals, Centre of Analytical Chemistry, Laboratory of Atomic spectrometry, Gliwice, Poland
3. Łukasiewicz Research Network – Upper Silesian Institute of Technology, Gliwice, Poland
4. Łukasiewicz Research Network – Cracow Institute of Technology, Cracow, Poland

Intended use:

The CRM is intended for establishing or checking the calibration of chemical analysis methods, for validation and to demonstrate results traceability of samples with similar matrix composition.

Minimum sample size:

Not lower than 0.5 g

Instructions for storage and use:

Storage the material in a dry and clean environment at room temperature.

Transport at normal condition.

Overheating of the material during preparation should be avoided. Samples should be prepared in the same way as the CRM. Such preparation does not result in change of certified value.

Brief description of the production and certification process:

The certified reference material CCE1 was made by melting off all components in a crucible induction furnace and by casting into special moulds. Cast was done by Łukasiewicz Research Network – Institute of Non-Ferrous Metals. Homogeneity testing was carried out taking into account the whole material that was produced. Investigations were carried out using inductively coupled plasma optical emission spectrometry (ICP-OES). Homogeneity was statistically estimated with application of the ANOVA.

The certification of CCE1 is valid 50 years, within the measurement uncertainties specified, provided the CRM is handled in accordance with the instructions given in this certificate.

Expired date:

50 years

Certificate Revision History: 4<sup>th</sup> of December 2025 (original certificate date);

Since 2018 our production of the certified reference materials has been carried out in accordance with requirements of the ISO 17034 standard.

The Łukasiewicz Research Network —Institute of Non-Ferrous Metals holds an accreditation of the Polish Centre for Accreditation as a reference material producer according to ISO/IEC 17034 with certificate number RM 006.

**Contact:**

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