



Łukasiewicz

Instytut Metali
Nieżelaznych

CERTIFICATE OF ANALYSIS

Zinc alloy ZM series

The assigned values¹ and uncertainties² in %

Element	ZM1	ZM2	ZM3	ZM4	ZM5	ZM55
Cd	0.0017 ± 0.0001	0.0065 ± 0.0002	0.0252 ± 0.0005	0.0430 ± 0.0008	0.0571 ± 0.0018	0.0652 ± 0.0016
Fe	0.0016 ± 0.0005	0.0084 ± 0.0010	0.0228 ± 0.0017	0.0541 ± 0.0036	0.0819 ± 0.0029	0.0855 ± 0.0043
Pb	0.0072 ± 0.0003	0.0497 ± 0.0018	0.438 ± 0.015	0.817 ± 0.016	1.137 ± 0.052	1.490 ± 0.041
Mg	0.123 ± 0.004	0.0826 ± 0.0019	0.0411 ± 0.0014	0.0103 ± 0.0010	0.00041 ± 0.00005	(0.00012)
Sn	0.123 ± 0.004	0.0836 ± 0.0017	0.0432 ± 0.0009	0.0150 ± 0.0015	0.0015 ± 0.0003	0.0027 ± 0.0006
Al	1.264 ± 0.042	0.856 ± 0.051	0.436 ± 0.028	0.0489 ± 0.0036	0.0035 ± 0.0003	-
Ni	1.260 ± 0.043	0.850 ± 0.031	0.455 ± 0.027	0.0534 ± 0.0020	0.0064 ± 0.0003	0.0062 ± 0.0005
Sb	0.00042 ± 0.0002	0.0064 ± 0.0003	0.0235 ± 0.0046	0.0405 ± 0.0038	0.0534 ± 0.0050	0.0880 ± 0.0047
Mn	0.0055 ± 0.0002	0.0500 ± 0.0016	0.460 ± 0.020	0.882 ± 0.018	1.247 ± 0.210	1.102 ± 0.049
Cu	0.0055 ± 0.0005	0.0520 ± 0.0053	0.474 ± 0.017	0.903 ± 0.025	1.682 ± 0.064	1.309 ± 0.052

¹ 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.

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

Production date: November 2020

Signature

SIEĆ BADAWCZA ŁUKASIEWICZ
INSTYTUT METALI NIEŻELAZNYCH
DYREKTOR

dr inż. Barbara Juszczyk



Description of the material:

The certified reference materials are available in the form of 40 mm diameter and 25 mm height discs.

Traceability:

The values are traceable to the SI via calibration using pure metals or certified monoelement standard solutions. All values were confirmed in an interlaboratory comparison using independent analytical methods. CRMs ZM series are in accordance with CRMs ZH series produced by Institute of Non-Ferrous Metals.

Analytical methods applied:

Cd, Fe, Pb, Mg, Sn, Al, Ni, Sb, Mn, Cu - Inductively coupled plasma optical emission spectrometry (ICP-OES)
- Flame atomic absorption spectrometry (FAAS)
- Inductively Coupled Plasma – Mass Spectrometry (ICP-MS)

Participants:

1. Łukasiewicz Research Network - Institute of Non-Ferrous Metals, Analytical Chemistry Department - Emission Spectrometry and Chromatography Laboratory, Gliwice, Poland
2. Łukasiewicz Research Network - Institute of Non-Ferrous Metals, Analytical Chemistry Department – Atomic Spectrometry Laboratory, Gliwice, Poland
3. Zakłady Górniczo-Hutnicze “Bolesław” S.A., Bukowno, Poland
4. Sheffield Assay Office, Sheffield, Great Britain

Intended use:

The CRM is intended for establishing or checking the calibration of spark-OES and XRF for analysis of samples of similar matrix composition.

Minimum sample size

Materials designed for spark-OES spectrometry, XRF spectrometry (>1 mm spot size). For other analytical techniques minimum 0.5 g of the CRM is required.

Storage, transportation and use:

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

Transport under normal conditions.

The surface of CRM must be prepared by milling or turning on a lathe before every use. Samples should be prepared in the same way as the CRM.

Brief description of the production and certification process:

For the certification process random specimens were selected.

Homogeneity tests were made by spark-OES analysis of 30% of the material produced. Results were estimated statistically with the ANOVA application.

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

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



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