

# Reference Material Certificate

**233/04**

Aluminium Base (Type of Standard)

AlCu, Set 230

## Certified Values

Element	Analytical methods used for certification	Mass fraction <sup>1)</sup> in [%]	Uncertainty <sup>2)</sup> in mass fraction [%]
Silicon (Si)	a, h	0.285	0.017
Iron (Fe)	a, b, c, f, i	0.393	0.008
Copper (Cu)	a, b, c, d, f	4.15	0.07
Manganese (Mn)	a, b, c, e, f	0.489	0.005
Magnesium (Mg)	a, b, c, d,	1.11	0.02
Chromium (Cr)	a, b, c, d, e, f	0.0494	0.0013
Nickel (Ni)	a, b, c, d, e	0.0136	0.0004
Zinc (Zn)	a, b, c, d, e	0.196	0.005
Titanium (Ti)	a, b, c, e, i	0.0315	0.0008
Boron (B)	d	(<0.0001)	-
Beryllium (Be)	a, b, c, e	0.0048	0.0002
Bismuth (Bi)	b, c, d, e	0.175	0.007
Calcium (Ca)	b, c	0.0025	0.0004
Cadmium (Cd)	a, b, c, d, e, f	0.0438	0.0015
Gallium (Ga)	a, b, c, d, e	0.0150	0.0006
Lithium (Li)	b, c, d, e, f	0.00036	0.00003
Lead (Pb)	a, b, d, f	0.740	0.018
Antimony (Sb)	d, e	(0.0003)	-
Tin (Sn)	b, e	0.0006	0.0002
Vanadium (V)	a, b, c, e	0.0153	0.0006
Zirconium (Zr)	b, c, e	0.0099	0.0003

Values in brackets ( ) are not certified but given for information only.

- <sup>1)</sup> Unweighted mean value of the means of accepted sets of data (consisting of at least 5 but usually 6 single results), each set being obtained by a different digestion and / or method of measurement.
- <sup>2)</sup> Uncertainty generated from the 95% confidence interval (calculated as  $C(95\%) = t \times S_M / \sqrt{n}$  where  $t$  is the appropriate two sided Student's t value at the 95% confidence level for  $n$  acceptable mean values and  $S_M$  is the single standard deviation of the accepted mean values) in combination with the standard deviation from sample homogeneity measurements using the square root of the summed squares.

**Analytical Methods used for Certification:**

- a ICP-OES, digestion with caustic soda
- b ICP-OES, digestion with acid
- c ICP-OES, closed vessel digestion with acid
- d ICP-MS, digestion with acid
- e ICP-MS, closed vessel digestion with acid
- f FAAS, digestion with acid
- g CV-AAS, closed vessel digestion with acid
- h Spectrophotometry, digestion with caustic soda
- i Spectrophotometry, digestion with acid

**Abbreviations:**

ICP-OES	Inductively coupled plasma - optical emission spectrometry
ICP-MS	Inductively coupled plasma - mass spectrometry
FAAS	Flame atomic absorption spectrometry
CV-AAS	Cold vapor atomic absorption spectrometry

**Manufacturing**

This certified reference material is produced using six strand vertical continuous casting out of a single melt.

**Analysis**

The analysis of this material was performed in our ISO/IEC 17025 accredited analytical laboratory (STS 0023) by different established wet chemical procedures. Every certified value is the result of multiple independent analyses.

**Homogeneity**

Homogeneity testing is performed by means of spark optical emission spectroscopy. Tests involve making multiple measurements on individual samples taken at regular intervals along the entire length of each cast rod. Depending on the mass fraction of the element, the relative standard deviation of multiple measurements between discs or within one disc is typically found between 0.3% - 1.5% for alloying elements (Si, Fe, Cu, Mn, Mg, Cr, Ni, Zn, Ti and Pb), 1% - 2.5% for other elements (Be, Bi, Cd, Ga, V and Zr) and 2.5% - 10% for trace elements (Ca, Li, Sn). The homogeneity within one sample and between discs (cast homogeneity) is taken into account in the calculation of the uncertainty of the certified value.

**Description of Sample**

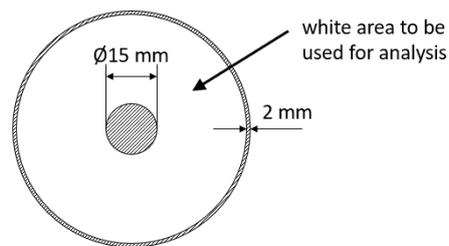
This reference material is available in the form of discs (approx. 65 mm diameter and 25 mm height).

**Intended use and Stability**

This certified reference material is primarily intended for use in spark optical emission spectroscopy. Other applications are X-ray fluorescence spectrometry (XRF) and classical wet chemical procedures. It may be used for instrument calibration, validation of analytical methods and drift correction over time. The material will remain stable for the period given below (certificate validity) if it is stored in a dry (non-condensing) and clean environment at room temperature ( $\leq 40$  °C).

### Instructions for Use

Measurements should be made within a ring (see white area in the picture). For wet chemical analysis chips have to be prepared by turning or milling of the sample surface. The minimum mass to be used is 0.2 g. For spark OES analysis, the surface of the material needs to be prepared by milling. The minimum area to be analyzed for spark OES and XRF analysis is 30 mm<sup>2</sup>.



### Traceability

Traceability of the certified mass fraction to the SI (Système International d'Unités) is ensured by calibration using certified standard solutions. This certified reference material is produced, analyzed and certified in accordance with ISO 17034 standard (SRMS 0006).

### Accreditation

Suisse Technology Partners Ltd. is accredited as a producer of reference materials and certified reference materials according to ISO 17034 (SRMS 0006). This material was produced according to the rules of ISO 17034 and analyzed in our own laboratories accredited according to ISO/IEC 17025 (STS 0023). This material is an accredited certified reference material according to ISO 17034 (SRMS 0006).

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ISO 17034 (SRMS 0006)

Date of certification: 25-Nov-2022  
Certificate version 001: 29-Mar-2023  
This certificate is valid until: Nov / 2047