

Reference Material Certificate

Certified Reference Material - CRM

122/10

Aluminium Base (Type of Standard)

Al pure (99.95% - 99.8%, Set 120)



ISO 17034 (SRMS 0006)

Certified Values

Element	Analytical methods used for certification	Mass fraction ¹⁾ in [%]	Uncertainty ²⁾ in mass fraction [%]
Silicon (Si)	a, g, h	0.0493	0.0026
Iron (Fe)	a, b, d, e, i	0.0511	0.0008
Copper (Cu)	a, b, c, d, e	0.0257	0.0005
Manganese (Mn)	a, b, c, d, e	0.0208	0.0005
Magnesium (Mg)	a, b, c, e	0.0191	0.0006
Chromium (Cr)	a, b, c, d, e	0.0198	0.0005
Nickel (Ni)	a, b, c, d, e	0.0205	0.0004
Zinc (Zn)	a, b, c, d, e	0.0194	0.0007
Titanium (Ti)	a, b, d, e	0.0178	0.0005
Silver (Ag)	b, d, g	0.0198	0.0003
Arsenic (As)	b, d, e	0.0054	0.0007
Boron (B)	b, d	(0.0003)	-
Barium (Ba)	a, b, c, d, e	0.0010	0.0001
Beryllium (Be)	a, b, c, d, e	0.00040	0.00002
Bismuth (Bi)	a, b, e	0.0101	0.0003
Calcium (Ca)	b	0.0006	0.0002
Cadmium (Cd)	a, b, c, d, e	0.0050	0.0001
Cerium (Ce)	a, b, c, e	0.0094	0.0006
Cobalt (Co)	a, b, c, d	0.0170	0.0004
Gallium (Ga)	a, b, e	0.0197	0.0003
Mercury (Hg)	c, d, e, k	0.0061	0.0004
Indium (In)	a, b, c, e	0.0085	0.0003
Lanthanum (La)	a, b, c, d, e	0.0181	0.0004
Lithium (Li)	A, b, d, e	0.0011	0.0002
Molybdenum (Mo)	a, b, d, e	0.0041	0.0002

Element	Analytical methods used for certification	Mass fraction ¹⁾ in [%]	Uncertainty ²⁾ in mass fraction [%]
Sodium (Na)	b, d	0.0017	0.0004
Phosphorus (P)	b, c, e	0.0038	0.0002
Lead (Pb)	b, c, e	0.0103	0.0003
Antimony (Sb)	b, c, d	0.0096	0.0007
Scandium (Sc)	b, c, g	0.0018	0.0001
Tin (Sn)	b, d, g	0.0121	0.0003
Strontium (Sr)	b, c, d, e	0.0012	0.0002
Tantalum (Ta)	e	< 0.0002	-
Thallium (Tl)	b, e	0.0088	0.0003
Vanadium (V)	a, b, c, d, e	0.0194	0.0007
Tungsten (W)	b, e	0.0091	0.0003
Zirconium (Zr)	b, c, d, e	0.0148	0.0004

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

- ¹⁾ 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.
- ²⁾ 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		Abbreviations	
a	ICP-OES, digestion with caustic soda	ICP-OES	Inductively coupled plasma - optical emission spectrometry
b	ICP-OES, digestion with acid		
c	ICP-OES, closed vessel digestion with acid	ICP-MS	Inductively coupled plasma - mass spectrometry
d	ICP-MS, digestion with acid		
e	ICP-MS, closed vessel digestion with acid	FAAS	Flame atomic absorption spectrometry
f	FAAS, digestion with acid		
g	Spark OES, solid sample analysis	CV-AAS	Cold vapor atomic absorption spectrometry
h	Spectrophotometry, digestion with caustic soda		
i	Spectrophotometry, digestion with acid	Spark OES	Spark optical emission spectrometry
k	CV-AAS, closed vessel digestion with acid		
l	ICP-MS, digestion with hydrofluoric acid		

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 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 < 1.0% for these elements (Si, Fe, Cu, Mn, Ni, Ag, Cd, Co and Ga), between 1.1% and 2.5% for these elements (Mg, Cr, Zr, Ti, Be, Bi, La, Pb, Sn, V, and Zr) and 1.3% - 9% for trace elements (all elements with mass fraction <0.01%). 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

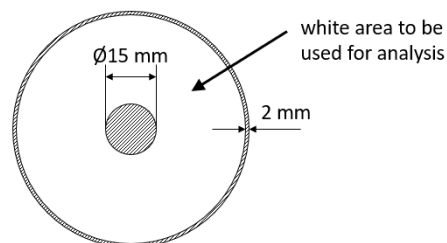
This reference material is available in the form of discs (approx. 60 mm diameter and 25 mm height).

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 (≤ 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 mm².



Traceability

Traceability of the certified mass fractions 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 a certified reference material according to ISO 17034 (SRMS 0006).



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Certificate version 001: 04-Dec-2024
This certificate is valid until: Dec / 2049

This certificate
can be downloaded
here: <https://refmat.ch/122-10>

