

**Reference Material Certificate**

**113/03**

Aluminium Base (Type of Standard)  
Al pure (99.99-99.95% Al), Set 110

**Certified Values**

<b>Element</b>	<b>Mass content [%]</b>	<b>Uncertainty [%]</b>
Silicon (Si)	0.0012	± 0.0002
Iron (Fe)	0.0054	± 0.0004
Copper (Cu)	0.00023	± 0.00004
Manganese (Mn)	0.00010	± 0.00003
Magnesium (Mg)	0.0008	± 0.0001
Chromium (Cr)	<0.0001	
Nickel (Ni)	0.00010	± 0.00005
Zinc (Zn)	0.00025	± 0.00005
Titanium (Ti)	0.00011	± 0.00004
Boron (B)	0.0090	± 0.0004
Beryllium (Be)	<0.00001	
Bismuth (Bi)	0.00053	± 0.00010
Calcium (Ca)	<0.0001	
Cadmium (Cd)	<0.00001	
Cobalt (Co)	0.00050	± 0.00005
Gallium (Ga)	0.00007	± 0.00003
Lithium (Li)	<0.00001	
Sodium (Na)	<0.00005	
Phosphorus (P)	0.0013	± 0.0003
Lead (Pb)	0.0007	± 0.0001
Antimony (Sb)	0.00065	± 0.00010
Tin (Sn)	0.0006	± 0.0001
Vanadium (V)	0.00039	± 0.00005
Zirconium (Zr)	0.0003	± 0.0001

The uncertainty reported is the result of standard deviation of all results multiplied with a factor of two and represents approximately the 95% confidence interval.

## Manufacturing

This standard is produced using six strand hot top vertical continuous casting out of single melt.

## Homogeneity

Homogeneity testing is performed by means of spark 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 content of the element, the relative standard deviation of multiple measurements between discs or within one disc is typically found between 0.3% - 1% for alloying and other elements and 0.5% - 5% for trace elements.

## Analysis

This reference material was analysed by the accredited laboratory of former Pechiney Research Center in Voreppe (COFRAC accreditation number 1-1656). At least two primary chemical or radiochemical methods of analysis are used to determine each of the certified elements listed on the certificated.

## Description of Sample

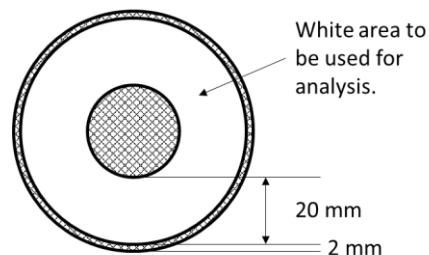
This reference material is available in the form of discs (approx. Ø 60 x 26 mm).

## 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. The minimum sample size for wet chemical analysis is 0.2g. The material will remain stable for the period given below (certification validity) if it is stored in a dry and clean environment at room temperature.

## Instructions for Use

Calibration measurements should be made within a ring between 2mm and 22mm from the edge of the CRM face. For wet chemical analysis chips have to be prepared by turning or milling of the sample surface.



## Traceability

Traceability of the certified mass contents to the SI (Système International d'Unités) is ensured by calibration using certified standard solutions or pure metals or substances of known stoichiometry.

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Certificate version 002: 31-Mar-2020  
This certificate is valid until: May-2073