



## CERTIFICATE OF ANALYSIS

### Tin LBA series

The assigned values<sup>1</sup> and uncertainties<sup>2</sup> in % w/w

Element No.	LBA1		LBA2		LBA3		LBA4		LBA5	
Cu	<b>0.282</b>	±0.022	<b>0.487</b>	±0.026	<b>0.885</b>	±0.029	<b>1.21</b>	±0.07	<b>0.763</b>	±0.031
Pb	<b>0.228</b>	±0.006	<b>0.319</b>	±0.009	<b>0.141</b>	±0.004	<b>0.0862</b>	±0.0042	<b>0.0579</b>	±0.0026
Sb	<b>0.0517</b>	±0.0058	<b>0.0979</b>	±0.0071	<b>0.142</b>	±0.012	<b>0.457</b>	±0.029	<b>0.286</b>	±0.013
Bi	<b>0.230</b>	±0.007	<b>0.175</b>	±0.014	<b>0.0989</b>	±0.0058	<b>0.0364</b>	±0.0040	<b>0.325</b>	±0.011
Au	<b>0.0115</b>	±0.0015	<b>0.0259</b>	±0.0018	<b>0.0468</b>	±0.0052	<b>0.0632</b>	±0.0056	<b>0.0691</b>	±0.0067
In	<b>0.208</b>	±0.012	<b>0.127</b>	±0.009	<b>0.0949</b>	±0.0050	<b>0.0503</b>	±0.0029	<b>0.0228</b>	±0.0023
Ag	<b>0.632</b>	±0.021	<b>0.697</b>	±0.010	<b>0.0971</b>	±0.0036	<b>0.0976</b>	±0.0020	<b>0.214</b>	±0.038
Al	–	–	<b>(0.0029)</b>	–	<b>0.0022</b>	±0.0004	<b>0.0061</b>	±0.0009	–	–
As	<b>0.0459</b>	±0.0057	<b>0.0314</b>	±0.0019	<b>0.0239</b>	±0.0046	<b>(0.0086)</b>	±0.0028	<b>(0.0090)</b>	±0.0015
Cd	<b>0.00085</b>	±0.00003	<b>0.0052</b>	±0.0008	<b>0.0039</b>	±0.0007	<b>0.0058</b>	±0.0008	<b>0.0053</b>	±0.0008
Fe	<b>0.0195</b>	±0.0014	<b>0.0182</b>	±0.0020	<b>0.0057</b>	±0.0005	<b>0.0114</b>	±0.0018	<b>0.0098</b>	±0.0009
Ni	<b>0.0055</b>	±0.0007	<b>0.0107</b>	±0.0011	<b>0.0224</b>	±0.0034	<b>0.0320</b>	±0.0026	<b>0.0346</b>	±0.0034
Zn	<b>0.0032</b>	±0.0003	<b>0.0047</b>	±0.0006	<b>0.0020</b>	±0.0005	<b>0.0006</b>	±0.0003	<b>(0.0009)</b>	–
Sn	base		base		base		base		base	

<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 %.

Prof. Zbigniew Śmieszek  
Director of the Institute

Certified on July 2013



Description of the material:

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

Traceability:

Most of the analytical work performed to assess this material has been carried out by laboratories with proven competence, often indicated by the national authority. LBA series is in accordance with LCA series produced by IMN and CRMs 71X SR3 and 74X AO produced by MBH Analytical Ltd.

Analytical methods applied:

- Cu, Pb, Sb, Bi, Au, In, Ag, Al, Fe, Ni – Inductively coupled plasma optical emission spectrometry (ICP OES),  
Spark optical emission spectrometry (spark OES)  
Flame atomic absorption spectrometry (FAAS),  
As, Cd, Zn – Inductively coupled plasma optical emission spectrometry (ICP OES)  
Flame atomic absorption spectrometry (FAAS),

Participants:

Institute of Non-Ferrous Metals, Analytical Chemistry Department, Gliwice, Poland

- Optical Emission Spectrometry Laboratory
- Atomic Absorption Spectrometry Laboratory

Huta Cynku “Miasteczko Śląskie”, Miasteczko Śląskie, Poland

Universal Scientific Laboratory Pty Ltd, Milperra, Australia

Exova Ltd, Middlesbrough, England

Intended use:

The CRM is intended for establishing or checking the calibration of optical emission and X-ray spectrometers for analysis of samples of similar matrix composition (for micro-analysis is not verified).

Instructions for use:

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

Brief description of the production and certification process:

The CRM<sub>s</sub> – LBA were made by melting of all components in the inductive, of crucible furnace and by casting into special moulds protecting elimination of segregation of the components during solidification. Homogeneity testing were made taking into account over 50 % of the material produced. Investigations were carried out using atomic emission spectrometry method with low voltage spark. Homogeneity was estimated statistically with application of the test F.

The set consists of 5 certified reference materials in form of discs 40 mm in diameter and ~25 mm height.

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