



CERTIFICATE OF ANALYSIS

Hard Lead PMA series

The assigned values¹ and uncertainties² in % w/w

Element	No.	PMA1		PMA2		PMA3		PMA4	
Sb		1.90	±0.13	1.08	±0.07	0.685	±0.065	0.182	±0.010
Cu		0.0523	±0.0054	0.0941	±0.015	0.0189	±0.0035	0.0052	±0.0006
Ag		0.0425	±0.0038	0.0763	±0.0043	0.0118	±0.0012	0.0041	±0.0010
Bi		0.0442	±0.0085	0.0602	±0.0013	0.0349	±0.0037	0.0284	±0.0017
Cd		0.00862	±0.00041	0.00116	±0.00029	0.00912	±0.00015	0.0175	±0.0018
Sn		0.102	±0.011	0.324	±0.048	0.536	±0.043	0.0526	±0.0064
Te		0.0780	±0.011	0.0097	±0.0009	0.0521	±0.0043	0.0374	±0.0034
In		0.0075	±0.0009	0.0541	±0.0065	0.0311	±0.0018	0.0046	±0.0009
As		0.380	±0.032	0.262	±0.032	0.159	±0.037	0.0610	±0.0074
Zn		0.0055	±0.0005	0.011	±0.0019	-	-	0.0026	±0.0016
Pb		remain		remain		remain		remain	

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 %.

Prof. Zbigniew Śmieszek
Director of the Institute

Certified on March 2011



Description of the material:

The certified reference materials are available in the form of discs (40 mm diameter and ~30 height).

Analytical methods applied:

Sb, Cu, Ag, Bi, Cd, Te, In, As, Zn – Inductively coupled plasma optical emission spectrometry (ICP OES),
Flame atomic absorption spectrometry (FAAS),
Sn – Inductively coupled plasma optical emission spectrometry (ICP OES),
Flame atomic absorption spectrometry (FAAS),
Colorimetric method

Participants:

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

- Optical Emission Spectrometry Laboratory
- Atomic Absorption Spectrometry Laboratory
- Classical Analytical Methods Laboratory

Huta Cynku “Miasteczko Śląskie”, Miasteczko Śląskie,

Universal Scientific Laboratory Pty Ltd, Milperra, Australia

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_s – PMA 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 45% 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 4 certified reference materials in form of discs 40 mm in diameter and ~30 mm height.

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