in cooperation with the WG 'Lead'
of the Committee of Chemists of GDMB

CERTIFICATE OF ANALYSIS

ERM®-EB108

Pure Lead		
	Certified value [1]	Uncertainty [2]
Element	Mass fraction in mg/kg	
Cd	26.0	± 1.3
Hg	8.3	± 0.9

[1] Unweighted mean value of the means of accepted sets of data, each set being obtained by at least 10 laboratories and/or with different methods of measurement. The values are traceable to the SI (Système International d'Unités) by the use of pure substances of known stoichiometry for calibration.

[2] Estimated expanded uncertainty *U* with a coverage factor of $k = 2$, corresponding to a level of confidence of about 95 %, as defined in the ISO/IEC Guide 98-3:2008 [Uncertainty of measurement -- Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)].

This certificate is valid until 06/2065; this validity may be extended as further evidence of stability becomes available.

DESCRIPTION OF THE SAMPLE

This Reference Material is in the form of discs (40 mm diameter and 40 mm height). The minimum sample intake for wet chemical analysis is 0.5 g.

NOTE

European Reference Material ERM®-EB108 was produced and certified under the responsibility of Bundesanstalt für Materialforschung und -prüfung (BAM) in cooperation with the Committee of Chemists of the GDMB, Gesellschaft der Metallurgen und Bergleute e. V., according to the principles laid down in the technical guidelines of the European Reference Materials® co-operation agreement between BAM-LGC-IRMM. Information on these guidelines is available on the Internet (http://www.erm-crm.org).

Accepted as an ERM®,

BAM Department 1
Analytical Chemistry;
Reference Materials

Prof. Dr. U. Panne
(Head of Department)

BAM Division 1.6
Inorganic Reference Materials

Dr. S. Recknagel
(Head of Division)

MEANS OF ACCEPTED DATA SETS

Mass fraction in mg/kg

Line no.	Cd	Hg
1	24.52	6.08
2	24.55	7.30
3	24.91	7.38
4	25.54	7.85
5	25.82	7.88
6	26.23	8.01
7	26.33	8.11
8	26.85	8.72
9	27.66	9.45
10	27.78	9.71
11		10.22
M	26.02	8.25
s_M	1.18	1.20
$\bar{s}_i$	0.441	0.448

The laboratory mean values have been examined statistically to check for outlying values.
Each laboratory mean is derived from at least 3 but usually 6 single values.

M : mean of means of data sets

s_M : standard deviation of means of data sets

$\bar{s}_i$: square root of mean of variances of data sets under repeatability conditions

INTENDED USE

The CRM is intended for establishing and checking the calibration of spark emission spectrometers for the analysis of samples of similar materials. It is also suitable for wet chemical analysis.

INSTRUCTIONS FOR USE

Before use, the surface of the material must be prepared by milling or turning on a lathe. The preparation of the surface has to be done slowly to avoid heating of the disc. For wet chemical analysis chips have to be prepared by turning or milling of the sample surface.

STORAGE

The material should be stored in a dry and clean environment at ambient temperature.

ANALYTICAL METHOD USED FOR CERTIFICATION

Element	Line no.	Method
Cd	1, 2, 3, 6, 10	ICP-OES, dissolution with HNO_3,
	4	ICP-OES, dissolution with HNO_3/H_2O_2
	5	ICP-OES, dissolution with tartaric acid/HNO_3, separation of lead as lead sulphate
	7, 8	ICP-OES, dissolution with tartaric acid/HNO_3
	9	GFAAS, dissolution with HNO_3
Hg	1, 4, 5, 6, 8	CVAAS, dissolution with HNO_3
	2	ICP-OES after cold vapour generation, dissolution with tartaric acid/HNO_3
	3	AAS-FIMS, dissolution with HNO_3
	7	DMA (AAS), solid sampling technique
	9	ICP-OES, dissolution with HNO_3
	10	ICP-OES, dissolution with tartaric acid/HNO_3
	11	ICP-OES, dissolution with HNO_3/H_2O_2

Abbreviations:

AAS-FIMS:	Atomic absorption spectrometry flow injection mercury system
ICP-OES:	Inductively coupled plasma optical emission spectrometry
CVAAS:	Cold vapour atomic absorption spectrometry
GFAAS:	Graphite furnace atomic absorption spectrometry
DMA (AAS):	Direct mercury analyser (AAS)

PARTICIPANTS

- Aurubis AG, Hamburg, Germany
- Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany
- BERZELIUS Stolberg GmbH, Stolberg, Germany
- Exide Technologies GmbH, Büdingen, Germany
- Harz-Metall GmbH, Goslar, Germany
- Hoppecke Batterien GmbH & Co. KG, Brilon-Hoppecke, Germany
- Johnson Controls Recycling GmbH, Buchholz, Germany,
- Johnson Controls Sachsen-Batterien GmbH & Co. KG, Zwickau, Germany
- Johnson Controls, VB Autobatterie GmbH & Co. KGaA, Hannover, Germany
- Muldenhütten Recycling und Umwelttechnik GmbH, Freiberg, Germany
- Treibacher Industrie AG, Treibach-Althofen, Austria
- WESER METALL GmbH, Nordenham, Germany

TECHNICAL REPORT

A detailed technical report describing the analysis procedures and the treatment of the analytical data used to certify ERM®-EB108 is available on request or can be downloaded from BAM website (www.bam.de/en/fachthemen/referenzmaterialien/index.htm).

Supply of Reference Materials by

Bundesanstalt für Materialforschung und -prüfung (BAM)

Richard-Willstätter-Str. 11, D-12489 Berlin, Germany

Phone: +49 30 8104 2061 E-mail: sales.crm@bam.de

Fax: +49 30 8104 1117 Internet: www.bam.de