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

ausverkauft / out of stock

CERTIFICATE OF ANALYSIS

ERM®-EB313

AlMg3

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Certified Values

	Certified value [1]		Uncertainty [2]
Element	Mass fraction in %		
Si	0.363	±	0.007
Fe	0.391	±	0.003
Cu	0.0931	±	0.0014
Mn	0.495	±	0.003
Mg	3.40	±	0.04
Cr	0.1224	±	0.0012
Ni	0.0278	±	0.0006
Zn	0.158	±	0.002
Ti	0.0947	±	0.0014
Element	Mass fraction in mg/kg		
As	7.2	±	0.7
Be	5.5	±	0.2
Bi	95	±	8
Ca	5.7	±	0.8
Cd	7.4	±	0.4
Ga	121	±	5
Hg	4.1	±	0.4
Li	6.04	±	0.12
Mo	5.3	±	1.9
Na	37.0	±	2.4
Pb	43.3	±	2.8
Sb	8.7	±	1.9
Sn	197	±	6
Tl	6.4	±	0.4
V	299	±	6
Zr	359	±	19

[1] Unweighted mean value of the means of accepted sets of data (at least 4 but usually 6), each set being obtained in a different laboratory and/or a different method of measurement. The values are traceable to the SI (Système International d'Unités) via calibration using sufficiently pure substances of known stoichiometry.

[2] Estimated expanded uncertainty *U* with a coverage factor of about *k*=2, corresponding to a level of confidence of 95 %, as defined in the Guide to the expression of uncertainty in measurement, ISO, 1993.

This certificate is valid until 02/2056; this validity may be extended as further evidence of stability becomes available.

The minimum sample size for wet chemical analysis is 0.5 g.

NOTE

European Reference Material ERM®-EB313 was originally certified as BAM-313. It 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 für Bergbau, Metallurgie, Rohstoff- und Umwelttechnik 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®, Berlin, 2006-02-24.

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DESCRIPTION OF THE SAMPLE

The Reference Material is available in the form of discs (58 mm diameter and 25 mm height). It is intended for establishing and checking the calibration especially of optical emission and X-ray spectrometers for the analysis of samples of similar materials.

MEANS OF ACCEPTED DATA SETS (FOR ONE METHOD AT ONE LABORATORY, RESPECTIVELY)

Mass fraction in %

No.	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti
1	0.3489	0.3796	0.0893	0.4851	3.277	0.1188	0.0261	0.1531	0.0902
2	0.3502	0.3826	0.0894	0.4853	3.316	0.1188	0.0262	0.1544	0.0920
3	0.3515	0.3843	0.0906	0.4894	3.362	0.1193	0.0262	0.1548	0.0924
4	0.3520	0.3870	0.0910	0.4914	3.368	0.1210	0.0267	0.1548	0.0930
5	0.3559	0.3872	0.0913	0.4921	3.383	0.1210	0.0268	0.1560	0.0930
6	0.3622	0.3872	0.0913	0.4939	3.401	0.1212	0.0273	0.1564	0.0933
7	0.3662	0.3908	0.0916	0.4947	3.404	0.1213	0.0274	0.1566	0.0939
8	0.3663	0.3916	0.0929	0.4953	3.406	0.1214	0.0278	0.1574	0.0941
9	0.3694	0.3926	0.0934	0.4971	3.408	0.1219	0.0279	0.1577	0.0942
10	0.3713	0.3931	0.0937	0.4977	3.414	0.1224	0.0280	0.1578	0.0942
11	0.3744	0.3941	0.0938	0.4980	3.416	0.1228	0.0281	0.1579	0.0943
12	0.3747	0.3943	0.0939	0.4982	3.431	0.1233	0.0283	0.1583	0.0953
13	0.3756	0.3958	0.0945	0.4986	3.487	0.1235	0.0283	0.1584	0.0958
14		0.3962	0.0952	0.4989	3.518	0.1238	0.0284	0.1592	0.0958
15		0.3975	0.0955	0.5009		0.1254	0.0285	0.1597	0.0983
16		0.3975	0.0978	0.5066		0.1260	0.0289	0.1625	0.0994
17		0.4001	0.0982			0.1267	0.0290	0.1631	0.1015
18						0.1254	0.0294	0.1644	
19							0.0295		
M	0.3630	0.3913	0.0931	0.4952	3.399	0.1224	0.0278	0.1579	0.0947
s_M	0.0101	0.0058	0.0026	0.0056	0.061	0.0024	0.0011	0.0031	0.0028
$\overline{s}_i$	0.0039	0.0034	0.0012	0.0055	0.021	0.0015	0.0004	0.0014	0.0011

M : mean of means of data sets

s_M : standard deviation of means of data sets

$\overline{s}_i$: mean of standard deviations of data sets under repeatability conditions

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MEANS OF ACCEPTED DATA SETS (FOR ONE METHOD AT ONE LABORATORY, RESPECTIVELY)

Mass fraction in mg/kg

Lfd. Nr.	As	*B*	Be	Bi	Ca	Cd	Ga	Hg	Li	Mo	Na	*P*	Pb	Sb	Sn	Tl	V	Zr
1	6.43	*3.48*	4.96	75.2	4.230	6.28	110.9	3.12	5.70	4.41	32.2	*11.2*	39.0	5.74	174.4	5.80	281.1	280.0
2	6.48	*4.53*	5.12	76.4	4.250	6.52	112.9	3.85	5.74	4.53	33.6	*11.8*	39.4	6.42	188.9	6.29	282.5	290.9
3	6.86	*5.24*	5.39	86.9	5.050	6.79	114.1	4.06	5.96	4.88	34.7	*12.3*	39.5	8.27	189.0	6.45	290.6	341.8
4	7.26	*6.91*	5.49	90.4	5.700	6.76	114.4	4.10	6.04	4.94	35.8	*13.0*	41.0	8.75	192.5	6.49	291.8	349.6
5	7.33		5.55	90.7	5.920	6.79	115.7	4.24	6.06	5.73	36.3	*16.4*	44.6	8.80	193.4	6.63	300.4	356.5
6	7.82		5.64	90.0	6.030	6.84	116.0	4.34	6.10	7.42	36.6		45.3	8.89	196.5	6.68	300.4	359.2
7	8.42		5.69	93.6	6.310	7.44	116.6	4.53	6.12		37.0		45.7	10.2	196.6		300.8	359.7
8			5.70	97.1	6.470	7.49	117.0	4.67	6.14		40.4		47.6	12.8	198.9		300.9	359.9
9			5.84	97.1	7.340	7.52	118.9		6.18		40.5		47.9		199.2		301.1	372.1
10			5.28	97.3		7.57	120.0		6.18		42.5				200.1		303.4	374.3
11				105.8		7.68	120.0		6.20						201.6		304.0	375.8
12				112.5		7.69	120.1								203.8		305.9	379.5
13				122.8		7.73	121.6								208.3		309.0	387.0
14						7.92	126.3								209.6		312.1	394.7
15						8.18	129.5											406.2
16						9.17	138.0											
17							139.0											
M	7.2	*5.0*	5.5	95	5.7	7.4	121	4.1	6.04	5.3	37.0	*12.9*	43.3	8.7	197	6.4	299	359
s_M	0.7	*1.4*	0.3	13	1.0	0.7	8	0.5	0.17	1.1	3.3	*2.0*	3.6	2.2	9	0.3	9	35
$\overline{s}_i$	0.3	*0.1*	0.1	2	0.34	0.3	3	0.2	0.09	0.2	1.0	*0.5*	1.3	0.5	4	0.3	4	8

M : mean of means of data sets

s_M : standard deviation of means of data sets

$\overline{s}_i$: mean of standard deviations of data sets under repeatability conditions

numbers in *italics* are indicative values

Additionally in one laboratory, the following elements (mass fraction in µg/g) have been measured using PAA: Nb: 2.43 ; Te: 2.92 ; U: 1.39 ; Y: 2.08

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ANALYTICAL METHOD USED FOR CERTIFICATION

Element	Lfd. Nr.	method
Silicium	3	Grav.
	1,2,4,7,8,9,12,13	ICP OES
	5,6,7,10,11	Phot.
Eisen	2,3,6,7,9,10,11,12,14,15,17	ICP OES
	5,8	F AAS
	13	IDMS
	4,12	Phot.
	1	NAA
	16	RFA
Kupfer	1,6,7,8,9,11,13,14,16,17	ICP OES
	3,4,10	F AAS
	12	IDMS
	9	Phot.
	15	NAA
	2	PAA
	5	RFA
Mangan	1,2,4,5,8,9,10,12,14,16	ICP OES
	6,11,15	F AAS
	12	Phot.
	3,7	NAA
	13	RFA
Magnesium	1,3,4,5,6,7,8,9,10	ICP OES
	2,11,12,14	F AAS
	13	RFA
Chrom	1,4,6,8,9,11,12,13,14	ICP OES
	2,3,5,15,18	F AAS
	7	IDMS
	6	Phot.
	10	NAA
	17	PAA
	16	RFA
Nickel	3,7,8,9,10,11,13,14,17,18,19	ICP OES
	2,5,6,15,17	F AAS
	12	IDMS
	1	PAA
	16	RFA
	4	ET AAS
Zink	1,2,5,6,8,9,10,11,15,16,18	ICP OES
	2,3,13,17	F AAS
	12	IDMS
	7	NAA
	4	PAA
	14	RFA

Element	Lfd. Nr.	Method
Titan	2,3,4,5,7,8,10,12,14,15,17	ICP OES
	1	F AAS
	9,11,13	Phot.
	16	PAA
	6	RFA
Arsen	3	IH
	1,5	HG AAS
	2,4	ICP-MS
	6	NAA
	7	PAA
Bor	1,3,4	ICP OES
	2	ICP-MS
Beryllium	1,2,3,4,6,8,9,10	ICP OES
	7	ICP-MS
	5	ET AAS
Bismut	1,2,3,4,6,7,11	ICP OES
	12	Hg AAS
	10,12	Phot.
	8	ICP-MS
	9	PAA
	5,13	ET AAS
Calcium	2,3,4,5,7,8,9	ICP OES
	1	F AAS
	6	ET AAS
Cadmium	1,2,3,4,5,8,14,15,16	ICP OES
	7	IDMS
	11,13	ICP-MS
	10	NAA
	6,9,12	ET AAS
Gallium	2,4,8,9,11,12,13,14,15,16	ICP OES
	7	IDMS
	5,6	ICP-MS
	10	NAA
	17	PAA
	1	RFA
	3	ET AAS
Quecksilber	5	ICP OES
	3,6	CV AAS
	2,8	HG AAS
	1,4	ICP-MS
	7	NAA
Lithium	1,2,3,4,6,8,9	ICP OES
	5,7,11	F AAS
	10	ET AAS

Element	Lfd. Nr.	Method
Molybdän	6	ICP OES
	1,3	ICP-MS
	5	NAA
	4	PAA
	2	ET AAS
Natrium	1,3,7,8,10	ICP OES
	2,4,5	F AAS
	9	NAA
	6	ET AAS
Phosphor	1,2,3,4,5	Phot.
Blei	9	ICP OES
	6	F AAS
	2	IDMS
	1,4,6	ICP-MS
	8	PAA
	3,5,7	ET AAS
Antimon	1	ICP OES
	2,5	HG AAS
	6	ICP-MS
	4	NAA
	7	PAA
	8	ET AAS
Tallium	1	ICP OES
	3	IDMS
	2,4	ICP-MS
	5	ET AAS
Vanadium	1,2,4,5,6,7,8,9,10,11,13	ICP OES
	3	RFA
	12,14	ET AAS
Zinn	2,3,4,5,7,9,10,14	ICP OES
	13	IDMS
	11,12	ICP-MS
	8	PAA
	1,6	ET AAS
Zirkonium	1,2,3,5,6,7,9,10,12,13	ICP OES
	8	Phot.
	11	ICP-MS
	14	NAA
	15	PAA
	4	RFA

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Abbreviations:

Grav:	Gravimetry	AAS:	Atomic absorbtion spectrometry
ET AAS:	Electrothermal AAS	IDMS:	Isotope dilution mass spectrometry
PAA:	Photon activation analsis	RFA:	X-ray fluorescence
ICP OES:	ICP - Optical emission spectrometry	F AAS:	Flame - AAS
CV AAS:	Cold vapour AAS	Phot:	Spectrophotometry
IM:	ICP - Mass spectrometry	HG AAS:	Hydride generation AAS
		NAA:	Neutron activation analsis

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INSTRUCTIONS FOR USE

Before use, the surface of the material must be cleaned by turning on a lathe.

STORAGE

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

TECHNICAL REPORT

A detailed technical report (in German) describing the analysis procedures and the treatment of the analytical data used to certify ERM®-EB313 is available on request.

SPECIMEN

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