

# CERTIFICATE OF ANALYSIS

ERM<sup>®</sup> - EC681k

LOW DENSITY POLYETHYLENE				
		Mass Fraction		
		Certified value <sup>1)</sup>	Uncertainty <sup>2)</sup>	Unit
As		29.1	1.8	mg/kg
Br		0.77	0.04	g/kg
Cd		137	4	mg/kg
Cl		0.80	0.05	g/kg
Cr		100	5	mg/kg
Hg		23.7	0.8	mg/kg
Pb		98	6	mg/kg
S		0.63	0.04	g/kg
Sb		99	6	mg/kg

1) Unweighted mean value of the means of 5-14 accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The value is traceable to the International System of Units (SI).

2) The certified uncertainty is the expanded uncertainty estimated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM) with a coverage factor  $k = 2.78$  for Cr and  $k = 2$  for all other elements, corresponding to a level of confidence of about 95 %.

This certificate is valid for one year after purchase.

Sales date:

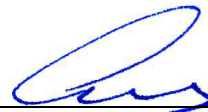
The minimum amount of sample to be used is 150 mg.

## NOTE

European Reference Material ERM<sup>®</sup>-EC681k was produced and certified under the responsibility of the IRMM according to the principles laid down in the technical guidelines of the European Reference Materials<sup>®</sup> co-operation agreement between BAM-IRMM-LGC. Information on these guidelines is available on the internet (<http://www.erm-crm.org>).

Accepted as an ERM<sup>®</sup>, Geel, May 2007

Signed: \_\_\_\_\_



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<b>Indicative Values</b>			
	Mass Fraction		
	Indicative value <sup>1)</sup>	Uncertainty <sup>2)</sup>	Unit
Sn	86	6	mg/kg
Zn	1.25	0.07	g/kg

1) Unweighted mean value of the means of 3-4 accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The value is traceable to the International System of Units (SI)..

2) The uncertainty is the expanded uncertainty estimated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM) with a coverage factor k = 2, corresponding to a level of confidence of about 95 %.

<b>Additional Material Information</b>	
	Mass Fraction <sup>1</sup>
	[mg/kg]
Acid digestible Cr	20-80

1) Range of results obtained by conventional acid digestion of the material in 9 laboratories. The value of the amount of acid digestible Cr depends on the sample intake as well as on digestion conditions (acid mix, temperature, pressure).

## DESCRIPTION OF THE SAMPLE

The sample consists of approximately 100 g granulate of low-density polyethylene (LDPE) spiked with various pigments to obtain the desired element contents.

**Note:** A significant fraction of Cr is in the form of Cr<sub>2</sub>O<sub>3</sub>. Not all digestion methods will therefore result in full digestion.

## ANALYTICAL METHOD USED FOR CERTIFICATION

The values are based on and/or confirmed by measurements using the following methods:

Atomic fluorescence spectrometry (AFS)  
 Direct mercury analyser (combustion-AAS)  
 Electrothermal atomic absorption spectrometry (ETAAS)  
 Cold vapour atomic absorption spectrometry (CVAAS)  
 Inductively coupled plasma - atomic emission spectrometry (ICP-AES)  
 Inductively coupled plasma – mass spectrometry (ICP-MS)  
 Neutron activation analysis using the k<sub>0</sub>-method for quantification (k<sub>0</sub>NAA)  
 Instrumental neutron activation analysis (INAA)  
 Instrumental photon activation analysis (IPAA)  
 Ion chromatography with conductivity detection (IC)  
 Thermal ionization mass spectrometry using isotope dilution (ID-TIMS)  
 Infrared spectrometry after combustion (Combustion-IR)  
 Titration after combustion  
 Wavelength-dispersive X-ray fluorescence spectrometry (WDXRF)

## PARTICIPANTS

Bundesanstalt für Materialforschung und –prüfung (BAM), Berlin (tests in the scope of ISO 17025 accreditation DAP-PL-2614.14)	(DE)
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EC-JRC, Institute for Reference Materials and Measurements (IRMM), Geel	(BE)
GSF, Neuherberg	(DE)
Institut Jozef Stefan, Ljubljana	(SI)
Solvias, Basle	(CH)
Studiecentrum voor Kernenergie (SCK), Mol	(BE)
Umweltbundesamt, Vienna (tests in the scope of ISO 17025 accreditation BMWA-92.714/0191-I/12/2005, PSID 200)	(AT)
Vlaamse Instelling voor Technologisch Onderzoek (VITO), Mol	(BE)

## SAFETY INFORMATION

The usual laboratory safety precautions apply.

## INSTRUCTIONS FOR USE

The main purpose of the materials is to assess method performance, i.e. for checking accuracy of analytical results. As any reference material, it can also be used for control charts or validation studies.

Comparing an analytical result with the certified value (see also ERM Application Note 1; [www.erm-crm.org](http://www.erm-crm.org))

A result is unbiased if the combined uncertainty of measurement and certified value covers the difference between the certified value and the measurement result.

### Use in quality control charts

The materials can be used for quality control charts. Different CRM-units will give the same result as heterogeneity was found negligible.

### Use as a calibrant

It is not recommended to use this matrix material as calibrant. If used nevertheless, the uncertainty of the certified value shall be taken into account in the final estimation of measurement uncertainty.

## STORAGE

The material should be stored at temperatures not higher than +18 °C in the dark.

However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

## LEGAL NOTICE

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## NOTE

A detailed technical report is available on [www.erm-crm.org](http://www.erm-crm.org). A paper copy can be obtained from IRMM on request.

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