

JOINT RESEARCH CENTRE  
Institute for Reference Materials and Measurements

# CERTIFICATE OF ANALYSIS

ERM<sup>®</sup>-CA713

WASTEWATER		
	Mass Concentration	
	Certified value <sup>1)</sup> [µg/L]	Uncertainty <sup>2)</sup> [µg/L]
As	10.8	0.3
Cd	5.09	0.20
Cr	20.9	1.3
Cu	101	7
Fe	445	27
Hg	1.84	0.11
Mn	95	4
Ni	50.3	1.4
Pb	49.7	1.7
Se	4.9	1.1

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. The certified value and its uncertainty are traceable to the International System of units (SI).

2) The certified uncertainty is the expanded uncertainty with a coverage factor  $k = 2$  corresponding to a level of confidence of about 95 % estimated in accordance with ISO/IEC Guide 98-3, Guide to the Expression of Uncertainty in Measurement (GUM:1995), ISO, 2008.

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of sample to be used is 0.02 mL for Cr and Mn; 0.04 mL for As, Cd, Cu and Pb; 0.05 mL for Ni; 0.5 mL for Hg and Se, and 1 mL for Fe.

Accepted as an ERM<sup>®</sup>, Geel, April 2013  
Latest revision: October 2013

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



Prof. Dr. Hendrik Emons  
European Commission  
Joint Research Centre  
Institute for Reference Materials and Measurements  
Retieseweg 111  
B-2440 Geel, Belgium

## NOTE

European Reference Material ERM<sup>®</sup>-CA713 was produced and certified under the responsibility of the Institute for Reference Materials and Measurements of the European Commission's Joint Research Centre 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>).

Additional Material Information	
	Mass Concentration
	Value <sup>2)</sup> [µg/L]
Zn <sup>1)</sup>	78
1) Zinc was determined by using ICP-OES, ICP-QMS and ICP-SFMS. 2) Unweighted mean value of the means of seven independent datasets.	

## DESCRIPTION OF THE MATERIAL

One unit consists of a flame-sealed borosilicate ampoule, containing approximately 100 mL wastewater effluent acidified with HNO<sub>3</sub> to about pH 2.

## ANALYTICAL METHODS USED FOR CERTIFICATION

- Cold vapour atomic absorption spectrometry
- Cold vapour atomic fluorescence spectrometry
- Direct mercury analysis
- Flame atomic absorption spectrometry
- Graphite furnace atomic absorption spectrometry
- Inductively coupled plasma optical emission spectrometry
- Inductively coupled plasma quadrupole mass spectrometry
- Inductively coupled plasma sector field mass spectrometry

## PARTICIPANTS

ALS Laboratory Group, ALS Czech Republic, Praha, CZ  
(measurements under the scope of ISO/IEC 17025 accreditation, CAI, 521)

ALS Laboratory Group, ALS Scandinavia AB, Luleå, SE  
(measurements under the scope of ISO/IEC 17025 accreditation, SWEDAC-1087)

Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, DE  
(measurements under the scope of ISO/IEC 17025 accreditation, DAP-PL-2614.14)

Consiglio Nazionale delle Ricerche (CNR), Istituto di Ricerca sulle Acque, UOS Brugherio, IT

DVGW -Technologiezentrum Wasser, Karlsruhe, DE  
(measurements under the scope of ISO/IEC 17025 accreditation, DACH DAC-PL-0142-01-10)

European Commission, Joint Research Centre, Institute for Reference Materials and Measurements (IRMM), Geel, BE  
(accredited to ISO Guide 34 for production of certified reference materials, BELAC No 268-RM)

Institute "Jozef Stefan" (JSI) Department for Environmental Sciences, Ljubljana, SI  
(measurements under the scope of ISO/IEC 17025 accreditation, SA, LP-90)

IWW Rheinisch-Westfälisches Institut für Wasser Beratungs und Entwicklungsgesellschaft, Mülheim an der Ruhr, DE  
(measurements under the scope of ISO/IEC 17025 accreditation, DGA DAC-PL-0170-02-10 )

Karl-Franzens Universität Graz, Institute of Chemistry, Graz, AT

The James Hutton Institute, Analytical Group, Aberdeen, GB  
(measurements under the scope of ISO/IEC 17025 accreditation, UKAS 1917)

Rijkswaterstaat, Ministerie van Verkeer en Waterstaat, Waterdienst, Lelystad, NL  
(measurements under the scope of ISO/IEC 17025 accreditation, RvA, No L194)

VA SYD, Malmö, SE  
(measurements under the scope of ISO/IEC 17025 accreditation, SWEDAC No 07-213-51.1056)

## **SAFETY INFORMATION**

The usual laboratory safety precautions apply.

## **INSTRUCTIONS FOR USE AND INTENDED USE**

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

The units shall be shaken by turning upside down for at least 2 min before opening to ensure the material re-homogenisation. To open the ampoule safely, score the neck of the ampoule with a diamond cutter to weaken the glass and break off the tip. As a precautionary measure, wrap some paper around the tip to protect your hands.

## **STORAGE**

The materials shall be stored at  $18\text{ °C} \pm 5\text{ °C}$  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**

Neither the European Commission, its contractors nor any person acting on their behalf:

(a) make any warranty or representation, express or implied, that the use of any information, material, apparatus, method or process disclosed in this document does not infringe any privately owned intellectual property rights; or

(b) assume any liability with respect to, or for damages resulting from, the use of any information, material, apparatus, method or process disclosed in this document save for loss or damage arising solely and directly from the negligence of the Institute for Reference Materials and Measurements of the European Commission's Joint Research Centre.

## **NOTE**

A detailed technical report is available on [www.irmm.jrc.be](http://www.irmm.jrc.be). A paper copy can be obtained from the Joint Research Centre, Institute for Reference Materials and Measurements on request.