



**University of Stuttgart**  
Germany

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AQS Baden-Württemberg

To the participants of AQS Baden-Württemberg

**Institute for Sanitary Engineering,  
Water Quality and Solid Waste  
Management**

**AQS Baden-Württemberg**

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**Proficiency test 2/23 - Elements in waste water**

2022-12-02

Dear Madam or Sir,

in March 2023 the execution of the above mentioned proficiency test (PT) round „Elements in waste water“ is planned.

Details about the PT round are enclosed. Please read them with care. If you are interested in participation, please register online via our website <http://www.aqsbw.de/en>.

You will receive a confirmation of receipt by e-mail. With a second e-mail we will bindingly confirm your application to the PT. You are not registered if you do not receive any e-mail.

**Application deadline: 16 December 2022**

Please consider our general terms and conditions of business for the execution of the PT, which can be downloaded from [http://www.aqsbw.de/pdf/agb\\_en.pdf](http://www.aqsbw.de/pdf/agb_en.pdf).

If we receive your application after the deadline we cannot guarantee that participation will be possible. The production of PT samples in this dimension is accompanied with high effort. Early registration is highly appreciated.

If you have any questions, please do not hesitate to contact us:  
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**Bank**

Baden-Württembergische  
Bank Stuttgart – BW-Bank

**IBAN**

DE51 6005 0101 7871 5216 87

**SWIFT/BIC**

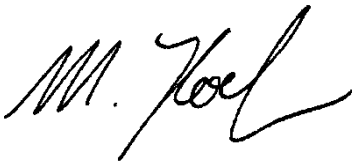
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**VAT-No.**

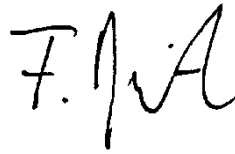
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Best regards



Dr.-Ing. Michael Koch  
Scientific director AQS



Dr.-Ing. Frank Baumeister  
PT coordinator

Annex:  
Details of the proficiency test exercise



## Details of the proficiency test round 2/23 - Elements in waste water – 03/2023

### Parameters

- aluminium
- arsenic
- lead
- cadmium
- chromium
- iron
- copper
- nickel
- mercury
- zinc

### Matrix

waste water

### Dates and deadlines

Registration deadline: 16 December 2022

**Please register for this PT only via our website [www.aqsbw.de/en](http://www.aqsbw.de/en).**

You will receive a confirmation of receipt by e-mail. With a second e-mail we will bindingly confirm your application to the PT. You are not registered if you do not receive any e-mail.

Dispatch of the samples: 13 March 2023

**Deadline for submission of results: 31 March 2023; 24:00h online via internet.  
Results submitted after the deadline will not be accepted.**

### Sample dispatch

Samples will be sent by courier service.

### Sample details

- 3 samples in 500-ml-plastic bottles for the determination of aluminium, arsenic, lead, cadmium, chromium, iron, copper, nickel, zinc. Preservation with HNO<sub>3</sub> (pH 2,1).
- 3 samples in 250-ml-glas bottles for the determination of mercury. Preservation according to ISO 12846: 2012 only with hydrochloric acid. Further preservation steps must be done directly after receipt of the samples.

**Permitted analytical methods**

The following restrictions do not apply for laboratories outside Germany. Laboratories participating in this PT not under the rules of the 67. LÜRV are free to choose a suitable method:

parameter	analytical method according to module water from 18.10.2018	digestion
Al	DIN EN ISO 11885: 2009-09 (E 22) DIN EN ISO 12020: 2000-05 (E 25) DIN EN ISO 17294-2: 2017-01 (E 29)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
As	DIN EN ISO 11969: 1996-11 (D 18) DIN EN ISO 11885: 2009-09 (E 22) DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4) DIN 38405-D 35: 2004-9	Digestion according to section 8.3.1 D18 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Pb	DIN EN ISO 11885: 2009-09 (E 22) DIN 38406-E 6: 1998-07 DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Cd	DIN EN ISO 11885: 2009-09 (E 22) DIN EN ISO 5961: 1995-05 (E 19) DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Cr	DIN EN ISO 11885: 2009-09 (E 22) DIN EN 1233: 1996-08 (E 10) DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Fe	DIN EN ISO 11885: 2009-09 (E 22) DIN 38406-E 32: 2000-05 DIN EN ISO 15586: 2004-02 (E 4) DIN EN ISO 17294-2: 2017-01 (E 29)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Cu	DIN EN ISO 11885: 2009-09 (E 22) DIN 38406-E 7: 1991-09 DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Ni	DIN EN ISO 11885: 2009-09 (E 22) DIN 38406-E 11: 1991-09 DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07
Hg	DIN EN ISO 12846: 2012-08 (E 12)  DIN EN ISO 17852: 2008-04 (E 35)	potassium bromide- potassium bromate -reagent potassium bromide- potassium bromate -reagent
Zn	DIN EN ISO 11885: 2009-09 (E 22) DIN 38406-E 8: 2004-10 DIN EN ISO 17294-2: 2017-01 (E 29) DIN EN ISO 15586: 2004-02 (E 4)	DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07 DIN EN ISO 15587-2 (A32): 2002-07

**Limit of quantification**

The analytical methods must be able to achieve the following limits of quantification:

parameter	limit of quantification in µg/l
aluminium	100
arsenic	10
lead	10
cadmium	0,5
chromium	20
iron	50
copper	20
nickel	20
mercury	0,1
zinc	20

**Execution of the analysis**

The samples must be analysed in the own laboratory with own personnel and own equipment. Subcontracting of the analysis is not allowed.

**Evaluation and assessment of the single values**

The statistical evaluation will be executed according to DIN 38402 – A45 or ISO/TS 20612 “Interlaboratory comparison for proficiency testing of analytical chemistry laboratories” with the combined estimator Hampel/Q-method, a method of robust statistics. The assigned value  $x_{PT}$  is calculated by the Hampel estimator. If possible, the standard deviation for proficiency assessment  $\sigma_{pt}$  will be taken from the variance function for the calculation of the  $z_U$ -scores according to DIN 38402 - A45 (chapter 10.4) or ISO/TS 20612 respectively.  $\sigma_{pt}$  will be limited for both parameters as follows:

Parameter	limits for $\sigma_{pt}$ in %		
	lower limit	upper limit	upper limit with addition of suspended solids
aluminium	5	15	20
arsenic	5	15	20
lead	5	15	20
cadmium	5	15	20
chrom	5	15	15
iron	5	15	20
copper	5	15	15
nickel	5	15	15
mercury	15 ( $\leq 0,6 \mu\text{g/l}$ , low level) 10 ( $> 0,6 \mu\text{g/l}$ , high level)	35 ( $\leq 0,6 \mu\text{g/l}$ , low level) 25 ( $> 0,6 \mu\text{g/l}$ , high level)	
zinc	5	15	20

A z-score is calculated for each measurement result derived from the assigned value  $x_{PT}$  and the standard deviation for proficiency assessment:

$$z = \frac{x - x_{pt}}{\sigma_{pt}}$$

The z-score will be modified to a  $z_U$ -score with a correction factor for proficiency assessment (as described in the above mentioned standards).

The tolerance limits are defined as  $|z_U| = 2$ .

The single results will be assessed as follows:

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$ z_U  \leq 2.0$	satisfactory
$2.0 <  z_U  < 3.0$	questionable
$ z_U  \geq 3.0$	unsatisfactory

### **Overall assessment**

There is no overall assessment of the proficiency test round, but the single parameters are assessed. A parameter is assessed as successful, if more than half of the values are assessed as "satisfactory".

In addition those values are assessed as "unsatisfactory":

- 1) that are not determined (if the other samples of this parameters are analysed),
- 2) that are indicated with "lower than limit of quantification",
- 3) that have been subcontracted,
- 4) that have been submitted after the deadline of submission of results.

### **Participation fee**

The participation fee will be 425 € plus transport costs.