

**CERTIFICATE FOR**  
**QC WW6**  
**SUSPENDED SOLIDS (SS)**

**BATCH:** VKI-31-3-0116

**INSTRUCTIONS FOR USE OF THE REFERENCE MATERIAL**

**Description**

This reference material consists of a bottle with concentrate for preparation of reference samples for quality control after dilution with water. The certificate includes documentation for the analytical parameter Suspended Solids (SS).

**Quantity and Preservation**

QC WW6 is a bottle containing 3.00 g concentrate from which 83 mL reference sample is prepared. The concentrate has been preserved by autoclaving.

**Use**

The reference material is intended for quality control, i.e. measurement and control of the accuracy and precision of analyses. It is typically intended for analyses of SS in wastewater samples. It may also be used in the quality control of other types of water samples and for the implementation and optimisation of analytical instruments and analytical methods.

It is important that the batch numbers of the reference material and on the certificate are identical.

**Preparation for Use**

Stabilise the bottle at room temperature (approx. 20°C). Open the bottle and add 80.0 mL water without a significant content of suspended solids (SS) to the bottle. Close the bottle and shake it well. Analyse the sample on the day when it is prepared. The certified concentration is given in the table on page 3 of this certificate.

Note: The reference material is to be prepared in the bottle. It is important to ensure sufficient purity of the water used for preparation.

If QC WW6 is used for other purposes than quality control of wastewater analyses, the dilution ratio between the concentrate and water can be altered.

**Analysis**

For quality control the reference material is analysed at the same time and in the same manner as other samples.

**Storage and Durability**

Store the bottle protected from sunlight, e.g. in the original box, and at room temperature or in a refrigerator. The certificate is valid until **1<sup>st</sup> of April 2021** provided the material is stored under the recommended conditions.

After preparation, the reference material has an expected storage time of up to 24 hours.

## PRODUCTION OF THE REFERENCE MATERIAL AND DOCUMENTATION

### Production

The production of this reference material is in accordance with the quality management procedures of Eurofins Miljø A/S, with the aim to obtain the intended quality of the material.

### Documentation of Content

All documentation for the reference material has been performed after dilution as described above.

#### *Internal control*

The analytical quality of Eurofins Miljø has been documented and found satisfactory by regular participation in international proficiency tests.

#### Homogeneity:

The homogeneity has been investigated by measurements of SS in randomly selected bottles of QC WW6. Tests for homogeneity have been performed by comparing the standard deviation between the reference material units with the within batch standard deviation obtained from duplicate measurements of the reference material in the same bottle (F-test, 95%). In addition, homogeneity testing was included in the external control. No indication of heterogeneity was found.

#### Stability:

The stability of the reference material is being followed at 5°C, 20°C and 37°C.

#### *External control*

The external laboratory documentation was performed by selected laboratories in an external documentation in April-May 2016. The participating laboratories are skilled and have documented good analytical quality by participation in interlaboratory comparisons and by analysis of a control sample in the certification. The laboratories were requested to analyse five bottles of QC WW6: three bottles in the same analytical series, one as a duplicate determination and the others as a single determination, and in addition two bottles in two different analytical series as single determinations. In addition, the laboratories were requested to analyse a control sample sent together with the reference material. The statistics are in accordance with the international standard: ISO Guide 35 /1/. On the basis of the analytical results submitted by the laboratories the following statistical parameters have been calculated:

$\bar{Y}$ : average, calculated in accordance with ISO Guide 35 (section 10.5.2)

$s_L$ : standard deviation between the laboratories, calculated in accordance with ISO Guide 35 (section 10.5.2):

$$\frac{1}{p-1} \sqrt{\sum (Y_i - \bar{Y})^2}$$

The 95% confidence interval of the true mean value of analytical results is:

$$\bar{Y} \pm t_{0,025}(v) \cdot \frac{s_L}{\sqrt{p}}$$

where

p: number of laboratories included in calculations

v: p-1, degrees of freedom

$t_{0,025}(v)$ : t value of 0,025 level at v degrees of freedom.

The criteria for selection of laboratories were as follows:

- the laboratory results in the above-mentioned proficiency tests diverged less than 2 standard deviations from the nominal value,
- the laboratory analyses more than 20 series of samples each year or holds an accreditation for SS,.
- the laboratory result for the control sample in the certification study deviated less than 15% from the nominal value, and
- the laboratory results in the certification study are not Cochran outliers, Grubbs outliers or deemed to be an outlier on the basis of a scientific evaluation.

The data included in the external control and names of the participating laboratories are listed in an annex to this certificate. On the basis of the selected results, the following has been calculated:

### Certified Value

DETERMINAND	UNIT	AVERAGE	BETWEEN LABORATORY STANDARD DEVIATION	95% CONFIDENCE LIMITS OF THE AVERAGE VALUE		NUMBER OF DATA SETS IN CALCULATIONS/ METHOD	EXCLUDED DATA SETS
				Lower	Upper		
		$\bar{v}$	$s_L$	$\bar{Y} \pm t_{0,025}(v) \cdot \frac{s_L}{\sqrt{p}}$		(p)	
SS	mg/L	241	3.5	240	243	5 / L 25 / M	4

### Methods

L DS 207, NS 4733.  
M EN 872

### Use of the Certified Values

For laboratories with an analytical quality that is comparable with that of the laboratories who have contributed to this certification, the following applies:

- 1) For single determinations, analytical results will with a probability of 95% be in the interval:

$$\bar{Y} \pm t_{0,025}(v) \cdot s_L$$

- 2) Analytical results, calculated as the average of two determinations will with a probability of 95% be in the interval:

$$\bar{Y} \pm t_{0,025}(v) \cdot \frac{s_L}{\sqrt{2}}$$

### REFERENCES

- /1/ ISO guide 35:2006. Certification of reference materials - General and statistical principles for certification.
- /2/ ISO guide 31:2000 Reference materials - Contents of certificates and labels.

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# ANNEX TO CERTIFICATE QC WW6

## Laboratory Measurements

SS					
$Y_i$ mg/L	$s_{ri}$ mg/L	$n_{ri}$	$s_{Li}$ mg/L	$n_{Li}$	Method
239.5	5.99	4	2.69	3	BM
241.7	3.75	4	1.30	3	AM
239.8	0.24	4	0.18	3	CM
241	4.16	4	2.08	3	AL
240.0	2.39	4	1.65	3	CM
242	4.35	4	3.53	3	CM
242	0.96	4	9.06	3	AM
232.7	1.96	4	5.22	3	AM
240.0	2.39	4	6.34	3	AM
241.95	3.29	4	1.87	3	DM
236.9	3.75	4	6.16	3	BM
243	2.06	4	0.14	3	AM
241.7	3.23	4	4.39	3	AM
236.9	3.75	4	4.88	3	DM
246.6	3.36	4	3.26	3	ZL
238	1.41	4	0.00	3	CM
234.6	1.66	4	4.11	3	AM
247.9	8.19	4	0.68	3	ZM
246	1.41	4	4.04	3	BM
246	8.37	4	2.08	3	AL
242	1.15	4	1.53	3	BL
245	5.94	4	1.53	3	CM
245	3.79	4	3.91	3	AL
237	2.63	4	7.80	3	AM
240.3	1.66	4	4.22	3	CM
244	4.35	4	3.53	3	AM
244.5	1.22	4	1.31	3	AM
241.93	3.01	4	2.47	3	CM
239.2	4.73	4	4.52	3	AM
241.0	2.99	4	2.66	3	BM

### External Control Values

$Y_i$  : average for laboratory i

$s_{ri}$  : standard deviation for laboratory i within an analytical series

$n_{ri}$  : number of results for determination of  $s_{ri}$

$s_{Li}$  : standard deviation for laboratory i between analytical series

$n_{Li}$  : number of results for determination of  $s_{Li}$

Methods: See explanation on page 3.

## ANNEX TO CERTIFICATE QC WW6

### Certifying Laboratories

#### *Denmark*

BIOFOS A/S, København K  
Eurofins Miljø A/S, Vejen  
Renseanlæg Bjergmarken, Roskilde  
Vandrens, Skælskør

#### *Finland*

Nab Labs Oy Ltd/Ambiotica, Jyväskylä

#### *Norway*

Alcontrol Skien, Skien  
Eurofins Environment Testing Norway AS, Moss  
Fishguard Avd. Måløy, Måløy  
Hardanger Miljøsender AS, Odda  
Ivar IKS, Randaberg  
Labora AS, Bodø  
Mjøslab IKS, Gjøvik  
Vestfoldlab A/S, Sem

#### *Sweden*

Iggesund Paperboard AB, Cell o. Miljölab, Iggesund  
INOVYN Sverige AB, Stenungsund  
Jönköpings Kommun VA-laboratoriet, Jönköping  
Karlskrona Kommuns Laboratorium, Lyckeby  
Motala Kommun, Tekn. Förvaltn. Vatten o. Avfall, Motala  
Norrköping Vatten o. Avfall AB, Laboratoriet Slottshagens Rv., Norrköping  
Nyköping Kommun / Vattenlaboratoriet, Nyköping  
Preemraff Lysekil, Lysekil  
Reningsverket Aggerud, Karlskoga  
St1 Refinery AB, Göteborg  
Stora Enso Paper AB, Hylte Mill, Hyltebruk  
Tekniska Verken i Linköping, Linköping  
Tekniska Förvaltningen, Verksamhetsstöd VA, Reningsverket Skebäck, Laboratoriet, Örebro  
VA SYD Ellingelaboratoriet, Malmö  
Vattenfall AB Heat Generation Uppsala, Kemilaboratoriet, Uppsala  
Vimmerby Energi o. Miljö, Vimmerby  
VIVAB, Varberg