

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000081163\_00

**Certified AMS:** AR602Z/NNHg for Hg

**Manufacturer:** Opsis AB  
Skytteskogsvägen 16  
24402 Furulund  
Sweden

**Test Institute:** TÜV Rheinland Energy & Environment GmbH

**This is to certify that the AMS has been tested  
and found to comply with the standards  
EN 15267-1 (2009), EN 15267-2 (2023), EN 15267-3 (2007)  
as well as EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate  
(this certificate contains 6 pages).



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000081163

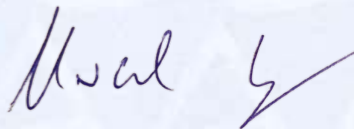
Publication in the German Federal Gazette  
(BAnz) of 10 May 2024

German Environment Agency

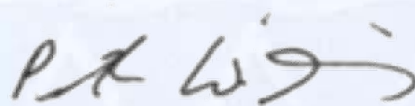
Dessau, 12 June 2024

This certificate will expire on:  
9 May 2029

TÜV Rheinland Energy &  
Environment GmbH  
Cologne, 11 June 2024



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Test institute accredited to EN ISO/IEC 17025 by DAkkS (German Accreditation Body).  
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00.

<b>Test report:</b>	EuL/21255229/B dated 2 June 2023
<b>Initial certification</b>	10 May 2024
<b>Expiry date:</b>	9 May 2029
<b>Publication:</b>	BAnz AT 10.05.2024 B7, chapter I No. 3.1

### Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC chapter IV (waste incineration plants / 17th BImSchV:2021). The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a six month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 °C to 40 °C.

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the emission limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the installation at which it will be installed.

### Note

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

### Basis of the certification

This certification is based on:

- Test report EuL/21255229/B dated 2 June 2023 of TÜV Rheinland Energy GmbH
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

Publication in the German Federal Gazette: BAnz AT 10.05.2024 B7, chapter I No. 3.1,  
Announcement by UBA dated 19 March 2024:

**AMS designation:**

AR602Z/NNHg for Hg

**Manufacturer:**

Opsis AB, Furulund, Sweden

**Field of application:**

For plants according to the 17th BImSchV

**Measuring ranges during the performance test:**

Component	Certification range	Supplementary measurement ranges		Unit
Hg	0 - 10	0 - 45	0 - 100	µg/m <sup>3</sup>

**Software version:** 7.21

**Restrictions:**

none

**Notes:**

1. A test gas generator such as HovaCal must be available for regular checks of the span point of the Hg component during maintenance intervals.
2. The length of the heated sample gas line was 10 m in the laboratory test and field test.
3. The SO<sub>2</sub> component is determined in the heated measuring cell for cross-sensitivity compensation of the Hg component.
4. The maintenance interval is three months.

**Test institute:**

TÜV Rheinland Energy GmbH, Cologne  
Report No.: EuL/21255229/B dated 2 June 2023



## Certified product

This certificate applies to automated measurement systems conforming to the following description:

The measuring device AR602Z/NNHg works according to the principle of UV absorption (DOAS).

The measuring device works extractive and consists of the following components:

- Rack with the heated extractive measuring cell, converter, ejector pump, signal outputs.
- AR602Z/N UV analyzer,
- heated sampling probe type M&C SP2000 (painted yellow)
- fiber optic cable (glass fiber cable)
- a heated sample gas line (length 10 m)

The extractive measuring bench consists of a total of three 2 m measuring cells. The gas to be measured is fed to the measuring cell via a heated sampling probe (M&C SP2000) and a heated sample gas line (length 10 m). The sampling probe has a separate calibration gas connection. This is located in front of filters and is therefore suitable for external test gas application as well as adjustment and calibration.

The gas outlet is located on the opposite side of the measuring cell. To ensure a constant gas flow through the cell, a suction jet pump is mounted at the outlet end of the measuring cell. The measuring cell, catalyst and suction jet pump are insulated with mineral wool. The measuring cell is heated, as are the sampling probe, the sample gas line and the catalyst. A light emitter unit is installed at the ends of the measuring bench, as well as the light receiver opposite.

The light emitter emits a light beam that is guided through the measuring cell. The light beam is guided through all 3 measuring cells one after the other by deflection mirrors. This results in an active measuring path length of 6 m in the heated measuring bench.

In the receiver, the emitted light is detected and focused onto an optical waveguide (fiber optic cable).

The analyzer is a grating spectrometer (Czerney-Turner principle with a 0.5 m light path). Approximately 100 sampling signals per second are recorded. The detector current is converted by a 12-bit A/D converter into a digital signal, which is then stored and summed in a multi-channel register.

One measurement cycle for Hg lasts 30 seconds. In addition, after each Hg cycle, the measurement device performs a 10 second SO<sub>2</sub> measurement cycle. The SO<sub>2</sub> value measured, if any, is used to correct for cross-sensitivity effects due to SO<sub>2</sub> present in the measuring cell.

## General notes

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy & Environment GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy & Environment GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: [qal1.de](http://qal1.de).

## History of documents

Certification of AR602Z/NNHg is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

### Initial certification according to EN 15267

Certificate No. 0000081163\_00: 12 June 2024

Expiry date of the certificate: 9 May 2029

Test report: EuL/21255229/B dated 2 June 2023

TÜV Rheinland Energy GmbH

Publication: BAnz AT 10.05.2024 B7, chapter I number 3.1

UBA announcement dated 19 March 2024



**Calculation of overall uncertainty according to EN 14181 and EN 15267-3**

**Measuring system**

Manufacturer	Opsis AB
AMS designation	AR602Z/NNHg
Serial number of units under test	2718/2719
Measuring principle	UV DOAS

**Test report**

Test laboratory	EuL/21255229/B TÜV Rheinland
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**Measured component**

Certification range	Hg 0 - 10 µg/m³
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**Evaluation of the cross-sensitivity (CS)**

(system with largest CS)

Sum of positive CS at zero point	0.35 µg/m³
Sum of negative CS at zero point	0.00 µg/m³
Sum of positive CS at span point	0.35 µg/m³
Sum of negative CS at span point	-0.34 µg/m³
Maximum sum of cross-sensitivities	0.35 µg/m³
Uncertainty of cross-sensitivity	$u_i$ 0.202 µg/m³

**Calculation of the combined standard uncertainty**

**Tested parameter**

			$u^2$
Lack of fit	$u_r$ 0.140 µg/m³		0.020 (µg/m³)²
Zero drift from field test	$u_{lof}$ 0.081 µg/m³		0.007 (µg/m³)²
Span drift from field test	$u_{d,z}$ 0.069 µg/m³		0.005 (µg/m³)²
Influence of ambient temperature at span	$u_{d,s}$ 0.144 µg/m³		0.021 (µg/m³)²
Influence of supply voltage	$u_t$ 0.083 µg/m³		0.007 (µg/m³)²
Cross-sensitivity (interference)	$u_v$ 0.062 µg/m³		0.004 (µg/m³)²
Influence of sample gas flow	$u_i$ 0.202 µg/m³		0.041 (µg/m³)²
Uncertainty of reference material at 70% of certification range	$u_b$ -0.029 µg/m³		0.001 (µg/m³)²
	$u_{rm}$ 0.081 µg/m³		0.007 (µg/m³)²

\* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )

$$u_c = \sqrt{\sum (u_{max, j})^2} \quad 0.33 \text{ µg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.65 \text{ µg/m}^3$$

**Relative total expanded uncertainty**

**U in % of the ELV 6,66 µg/m³** **9,8**

Requirement of 2010/75/EU

**U in % of the ELV 6,66 µg/m³** **40,0**

Requirement of EN 15267-3

**U in % of the ELV 6,66 µg/m³** **30,0**