

# CERTIFICATE

## on Product Conformity (QAL1)

Certificate No.: 0000035012\_02

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

**Manufacturer:** OPSIS AB  
Skytteskogsvägen 16  
244 02 Furulund  
Sweden

**Test Institute:** TÜV Rheinland Energie und Umwelt GmbH

**This is to certify that the AMS has been tested  
and found to comply with:**

**EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007  
and EN 14181: 2004**

Certification is awarded in respect of the conditions stated in this certificate  
(see also the following pages).

The present certificate replaces Certificate No. 0000035012\_01 of 20 August 2012



- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

Publication in the German Federal Gazette  
(BAnz.) of 05 March 2013

German Federal Environment Agency  
Dessau, 22 March 2013

i. A. Dr. Marcel Langner

This certificate will expire on:  
01 March 2017

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 21 March 2013

ppa. Dr. Peter Wilbring

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Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

<b>Test report:</b>	936/21215492/C of 12 October 2012
<b>Initial certification:</b>	02 March 2012
<b>Expiry date:</b>	01 March 2017
<b>Publication:</b>	BAnz AT 05 March 2013 B10, chapter I, No. 2.2

#### **Approved application**

The tested AMS is suitable for use at combustion plants according to EC Directive 2001/80/EC and at waste incineration plants according to EC Directive 2000/76/EC and other plants requiring official approval. The tested ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a sixmonth field test at a municipal waste incinerator, a one-month field test at a lignite-fired power plant (fluidized-bed firing) using secondary fuel and an one month field test at a cement kiln with use of secondary fuel.

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

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

#### **Basis of the certification**

This certification is based on:

- test report 936/21215492/C of 12 October 2012 of TÜV Rheinland Energie und Umwelt 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 05 March 2013 B10, chapter I, No. 2.2



**AMS designation:**

AR602Z/Hg for Hg

**Manufacturer:**

Opsis AB, Furulund/Sweden

**Field of application:**

Measurement at plants requiring official approval such as plants within the scope of 2000/76/EC (waste incineration directive) and 2001/80/EC (large combustion plants directive)

**Measuring ranges during the suitability test:**

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

**Software version:**

7.21

**Restriction:**

The requirement of Standard EN 15267-3 for response time was not met during the suitability test.

**Notes:**

1. The maintenance interval is two months.
2. Regular controls of the reference point during the maintenance interval require the test gas generator HovaCal.
3. The sample gas lines were 10 m and 15 m long in the laboratory and the field, respectively.
4. In order to compensate for cross-sensitivity, the SO<sub>2</sub> content has to be determined in the measuring cell.
5. The sampling probe shall be checked and, if required, exchanged after examination or malfunction of the exhaust gas purification system.
6. The AMS is suitability-tested both in its basic version (heated measuring cell as external module) and compact cabinet version (heated measuring cell in vertical mounting orientation within the air-conditioned measurement cabinet).
7. Supplementary testing (approval of further plant types, cabinet version) as regards Federal Environmental Agency notice of 6 July 2012 (Federal Gazette (BAnz.) AT 20.07.2012 B11, chapter I no. 2.2).

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report No.: 936/21215492/C of 12 October 2012

### **Certified product**

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

The AR602Z/Hg is an extractive AMS and consists of a rack with a measuring cell, an AR602 UV analyser, a heated sampling probe as well as a heated test gas line (10m length). The rack with measuring cell also houses all external devices.

The 2-metre-long measuring cell consists of stainless steel pipes of 89 centimetres in diameter, which is closed at both ends with fused quartz glass. Light emitters and receivers are fitted at either end of the measuring cell.

The emitter sends a light beam through the measuring cell. The emitter's high-pressure xenon lamp is powered by the supply unit PS150. The receiver registers the emitted light and concentrates it on a light conductor (fibre optic cable) which is connected to the analyser. This cable merely serves to enable the analyser being mounted at a location protected from dust, excessive moisture and temperature fluctuations.

The measuring gas is transported toward the measuring cell via a heated sampling probe (M&C SP2000) and a heated test gas line (10m length during the test). The sampling probe is equipped with a separate calibration gas connector. It is situated in front of the filter and is thus suited for the admission of external test gas as well as for adjustments and calibration.

On its way into the measuring cell, the test gas passes through a catalyser. This causes the chemical reaction to reverse and splits Hg-compounds to elementary Hg<sup>0</sup>. This can be measured with the help of the UV-DOAS technology.

Gas exits the cell at the opposite end. To ensure a stable flow rate, an ejector pump is installed at the exit side of the measuring cell. A flow monitor monitors the flow rate inside 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 Energie und Umwelt 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 can be applied to the product or used in publicity material for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energie und Umwelt 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).



Certification of AR602Z/Hg for Hg 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. 0000035012: 16 March 2012  
Expiry date of the certificate: 01 March 2017  
Test report: 936/21215492/A vom 10 October 2011  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 3.1  
Announcement by UBA from 23 February 2012

**Supplementary testing according to EN 15267:**

Certificate No. 0000035012\_01: 20 August 2012  
Expiry date of the certificate: 01 March 2017  
Test report: 936/21215492/B vom 09 March 2012  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz. AT 20 July 2012 B11, chapter I, No. 2.2  
Announcement by UBA from 06 July 2012

**Supplementary testing according to EN 15267:**

Certificate No. 0000035012\_02: 22 March 2013  
Expiry date of the certificate: 01 March 2017  
Test report: 936/21215492/C vom 12. Oktober 2012  
TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Publication: BAnz AT 05.03.2013 B10, chapter I, No. 2.2  
Announcement by UBA from 12 February 2013

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

**Measuring system**

Manufacturer	Opsis AB
Name of measuring system	AR602Z/Hg
Serial number of the candidates	1498 / 1499
Measuring principle	UV - DOAS

**Test report**

Test laboratory	936/21215492/C TÜV Rheinland
Date of report	2012-03-09

**Measured component**

Certification range	Hg 0 - 45 µg/m³
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**Evaluation of the cross sensitivity (CS)**

(system with largest CS)

Sum of positive CS at zero point	0.00 µg/m³
Sum of negative CS at zero point	-0.50 µg/m³
Sum of positive CS at reference point	1.00 µg/m³
Sum of negative CS at reference point	-1.10 µg/m³
Maximum sum of cross sensitivities	1.20 µg/m³
Uncertainty of cross sensitivity	0.694 µg/m³

**Calculation of the combined standard uncertainty**

**Tested parameter**

	u	u²
Standard deviation from paired measurements under field conditions *	u <sub>D</sub> 0.736 µg/m³	0.542 (µg/m³)²
Lack of fit	u <sub>lof</sub> 0.404 µg/m³	0.163 (µg/m³)²
Zero drift from field test	u <sub>d,z</sub> 0.442 µg/m³	0.195 (µg/m³)²
Span drift from field test	u <sub>d,s</sub> 1.039 µg/m³	1.080 (µg/m³)²
Influence of ambient temperature at span	u <sub>t</sub> 0.153 µg/m³	0.023 (µg/m³)²
Influence of supply voltage	u <sub>v</sub> 0.208 µg/m³	0.043 (µg/m³)²
Cross sensitivity (interference)	u <sub>i</sub> 0.694 µg/m³	0.481 (µg/m³)²
Influence of sample gas flow	u <sub>p</sub> -0.049 µg/m³	0.002 (µg/m³)²
Uncertainty of reference material at 70% of certification range	u <sub>rm</sub> 0.364 µg/m³	0.132 (µg/m³)²

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u <sub>c</sub> )	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.63 µg/m³
Total expanded uncertainty	U = u <sub>c</sub> * k = u <sub>c</sub> * 1.96	3.20 µg/m³

**Relative total expanded uncertainty**

<b>Requirement of 2000/76/EC and 2001/80/EC</b>	<b>U in % of the ELV 30 µg/m³</b>	<b>10.7</b>
<b>Requirement of EN 15267-3</b>	<b>U in % of the ELV 30 µg/m³</b>	<b>40.0</b>
	<b>U in % of the ELV 30 µg/m³</b>	<b>30.0</b>