

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000035012_03

Certified AMS: AR602Z/Hg for Hg

Manufacturer: OPSIS AB
Skytteskogsvägen 16
244 02 Furulund
Sweden

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and certified
according to the standards**

**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
(this certificate contains 7 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

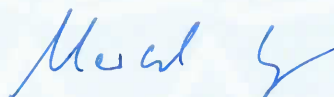
www.tuv.com
ID 0000035012

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

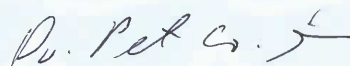
This certificate will expire on:
01 March 2022

German Federal Environment Agency
Dessau, 28 February 2017

TÜV Rheinland Energy GmbH
Cologne, 27 February 2017



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Test institute accredited to EN ISO/IEC 17025:2005 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

Certificate:
0000035012_03 / 28 February 2017

Test report: 936/21215492/C of 12 October 2012
Initial certification: 02 March 2012
Expiry date: 01 March 2022
Certificate renewal (previous certificate 0000035012_02 dated from 22 March 2013 with validity up to the 01 March 2017)
Publication: BAnz AT 05.03.2013 B10, chapter 1 No. 2.2

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV) and other plants requiring official approval. The measured ranges have been selected considering 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.

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

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 05.03.2013 B10, chapter I, No. 2.2,
Announcement by UBA from 12 February 2013:

AMS designation:

AR602Z/Hg for Hg

Manufacturer:

Opsis AB, Furulund/Sweden

Field of application:

For measurements at plants requiring official approval and
plants according to 27th BImSchV

Measuring ranges during the suitability test:

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

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 SO₂ 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

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV notification 35,
Announcement by UBA from 25 February 2015:

35 Notification as regards Federal Environment Agency (UBA) notice 12 February 2013 (Federal Gazette BAnz AT 05.03.2013 B10, chapter I number 2.2)

The step motor for the automatic grid finding type RDM 543/100A, of manufacturer BERGER LAHR, in the AR602Z/Hg measuring system for Hg, of the company Opsis AB, was discontinued and therefore replaced by the step motor for the automatic grid finding type RDM 545/100A of manufacturer BERGER LAHR.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 20 September 2014

Certified product

This certificate applies to automated measurement systems conforming 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 Hg₀. 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.

The software version is 7.21.

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 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 Energy 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 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

qal1.de

info@qal1.de

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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 of 10 October 2011
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 02.03.2012, 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 of 09 March 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 20.07.2012 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 of 12 October 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

Notifications according to EN 15267

Statement of TÜV Rheinland Energie und Umwelt GmbH of 20 September 2014
Publication: BAnz AT 02.04.2015 B5, chapter IV notification 35
Announcement by UBA from 25 February 2015
(new step motor)

Renewal of the certificate

Certificate No. 0000035012_03: 28 February 2017
Expiry date of the certificate: 01 March 2022

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
Date of report	TÜV Rheinland
	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_D 0.736 µg/m³	0.542 (µg/m³)²
Lack of fit	u_{lof} 0.404 µg/m³	0.163 (µg/m³)²
Zero drift from field test	$u_{d,z}$ 0.442 µg/m³	0.195 (µg/m³)²
Span drift from field test	$u_{d,s}$ 1.039 µg/m³	1.080 (µg/m³)²
Influence of ambient temperature at span	u_t 0.153 µg/m³	0.023 (µg/m³)²
Influence of supply voltage	u_v 0.208 µg/m³	0.043 (µg/m³)²
Cross sensitivity (interference)	u_i 0.694 µg/m³	0.481 (µg/m³)²
Influence of sample gas flow	u_b -0.049 µg/m³	0.002 (µg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm} 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_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.63 µg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.20 µg/m³

Relative total expanded uncertainty

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