

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000035012_04

AMS designation: AR 602 Z/Hg for Hg

Manufacturer: Opsis AB
Skytteskogsvägen 16
24402 Furulund
Sweden

Test Laboratory: TÜV Rheinland Energy 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 (2009), EN 15267-3 (2007)
and EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 7 pages).

The present certificate replaces certificate 0000035012_03 of 28 February 2017.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000035012

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

German Federal Environment Agency
Dessau, 16 February 2022

This certificate will expire on:
01 March 2027

TÜV Rheinland Energy GmbH
Cologne, 15 February 2022



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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 certificate D-PL-11120-02-00.

Test report:	936/21215492/C of 12 October 2012
Initial certification:	16 March 2012
Expiry date:	01 March 2027
Certificate	Renewal (of previous certificate 0000035012_03 of 28 February 2017 valid until 01 March 2022)
Publication:	BAnz AT 05.03.2013 B10, chapter I number 2.2

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), chapter IV (17th BImSchV), 30th BImSchV, plants in compliance with TA Luft, plants according to the 27th BImSchV and other plants requiring official approval. 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 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° 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 limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification

This certification is based on:

- Test report 936/21215492/C of 12 October 2012 by 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 number 2.2, UBA announcement dated 12 February 2013:

AMS designation:

AR 602 Z/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 performance testing:

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

Software version:

7.21

Restriction:

The measuring system did not meet the requirement for the response time as defined in EN 15267-3.

Notes:

1. The maintenance interval is two months.
2. The HovaCal test gas generator must be available for regular checking of the span point during maintenance intervals.
3. The length of the heated sample gas line was between 10 and 15 m in the laboratory and field test.
4. For cross-sensitivity compensation, the SO₂ component shall be determined in the measuring cell.
5. After revisions or malfunctions in the waste gas cleaning system, the filters in the sampling probe must be checked and replaced if necessary.
6. The measuring system is performance-tested both in the basic version (heated measuring cell as external module) and in the compact cabinet version (heated measuring cell in a vertical installation position in an air-conditioned measuring cabinet).
7. Supplementary testing (approval of further plant types, cabinet version) as regards Federal Environmental Agency (UBA) notice of 06 July 2012 (BAnz AT 20.07.2012 B11, chapter I number 2.2).

Test Report:

TÜV Rheinland Energy 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
35th notification, UBA announcement dated 25 February 2015:

**35 Notification as regards Federal Environment Agency (UBA) notice
of 12 February 2013 (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 issued by TÜV Rheinland Energie und Umwelt GmbH
dated 20 September 2014

Certified product

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

The AR602Z/Hg measuring system operates extractive and consists of a rack with the measuring cell, an AR602 UV analyser, a heated sampling probe and a heated sample gas line (length 10 m). The rack with the measuring cell also houses all the external equipment. The 2 m long measuring cell consists of a stainless steel tube with a diameter of 89 mm, which is closed at both ends with a quartz glass. The light transmitter and receiver are each mounted on the ends of the measuring cell.

The transmitter emits a light beam that is passed through the measuring cell. The transmitter's high-pressure xenon lamp is powered by the PS150 power supply unit. In the receiver, the emitted light is detected and focused onto an optical fibre (glass fibre cable), which is connected to the analyser. This cable is only used to enable the analyser to be placed in a location protected from dust, excessive humidity and temperature fluctuations.

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. The sampling probe has a separate calibration gas connection. This is located upstream of the filter and is thus suitable for external test gas application as well as adjustment and calibration.

On the inlet side of the measuring cell, the sample gas is passed through a catalyst. This causes a reversal of the chemical reaction and separates the various Hg compounds to elemental Hg⁰, which can be measured using UV-DOAS technology.

The gas outlet is located on the opposite side of the measuring cell. To guarantee a constant gas flow through the cell, a suction jet pump is mounted at the outlet end of the measuring cell. The flow through the measuring cell is monitored by means of a flow monitor.

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 manufacturing process for 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at qal1.de.

Document history

Certification of the AR 602 Z/Hg measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Initial certification according to EN 15267

Certificate no. 0000035012_00: 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
Publication: BAnz. 02 March 2012, no. 36, p. 920, chapter I number 3.1
UBA announcement dated 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
Publication: BAnz AT 20.07.2012 B11, chapter I number 2.2
UBA announcement dated 06 July 2012

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
Publication: BAnz AT 05.03.2013 B10, chapter I number 2.2
UBA announcement dated 12 February 2013

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 20 September 2014
Publication: BAnz AT 02.04.2015 B5, chapter IV notification 35
UBA announcement dated 25 February 2015
(Design changes)

Renewal of the certificate

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

Certificate no. 0000035012_04: 16 February 2022
Expiry date of the certificate: 01 March 2027

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	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 _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 _p -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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 1.63 \text{ µg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 3.20 \text{ µg/m}^3$$

Relative total expanded uncertainty

U in % of the ELV 30 µg/m³ **10.7**

Requirement of 2000/76/EC and 2001/80/EC

U in % of the ELV 30 µg/m³ **40.0**

Requirement of EN 15267-3

U in % of the ELV 30 µg/m³ **30.0**