

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000043525_01

Certified AMS: AR650/NHF for HF

Manufacturer: OPSIS AB
Skytteskogsvägen 16
SWE 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 6 pages).

The present certificate replaces certificate 0000043525 of 30 April 2015.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000043525

Publication in the German Federal Gazette
(BAnz.) of 14 March 2016

German Federal Environment Agency
Dessau, 25 April 2016


Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
01 April 2020

TÜV Rheinland Energy GmbH
Cologne, 24 April 2016


ppa. Dr. Peter Wilbring

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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

Test report:	936/21224575/B of 13 October 2015
Initial certification:	2 April 2015
Expiry date:	01 April 2020
Publication:	BAnz AT 14.03.2016 B7, chapter I number 2.1

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 three-month field test at a municipal waste incinerator.

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 936/21224575/B dated 13 October 2015 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 14.03.2016 B7, chapter I number 2.1,
Announcement by UBA from 18 February 2016:

AMS designation:

AR650/NHF for HF

Manufacturer:

OP SIS AB, Furulund, Sweden

Field of application:

For measurements at plants requiring official approval and plants of 27. BImSchV

Measuring ranges during the performance test:

Component	Certification range	Supplementary range	Unit
HF	0 – 3*	0 – 10*	mg/m ³ x m

*at a measurement path length of 1.0 meter

Software version:

7.21

Restrictions:

The requirement of EN 15267-3 with regard to the IP code of the enclosure is not fulfilled.

Notes:

1. The maintenance interval is six months.
2. During performance testing, the measurement path length for HF was 1 m in the laboratory test and 2 m in the field test.
3. At exceeding the tested measurement path length of 1 m is has to be checked during the installation of the measuring equipment on site, whether the minimum requirement on the cross sensitivities according to EN 15267-3 is still fulfilled.
4. In order to monitor the limit value for HF in accordance with directive 2010/75/EU, the active measurement path length must be at least 2 m.
5. Supplementary testing (maintenance interval extension) for the announcement of the Federal Environmental Agency (Umweltbundesamt) of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter I number 2.1).

Test report:TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21224575/B of 13 October 2015

Certified product

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

The AMS AR650/NHF for HF is an in-situ DOAS open path measuring system.

The system tested consists of a light source, a receiver, an opto-fibre cable, and an opto-analyser. The analyser consists of an interferometer, a detector, electronics for operating the scanner, and a computer for evaluation and signal processing.

The measurement section consists of the light path between light emitter and light receiver. The light source in the emitting unit is a high-pressure xenon lamp. The light beam generated by the emitter is directed towards the receiver. On its way through the medium, the intensity of the light beam is affected by scattering and absorption by molecules and particles.

The light collected by the receiver is led to the analyser via a fibre optic cable. This cable merely serves as a means to enable installing the analyser at a location where it is protected against dust, excessive moisture, variations in temperature etc.

The measuring system AR650/NHF consists of:

- Analyser (AR650/NHF)
- Emitter unit (EM062)
- Receiver unit (RE062)
- Fibre optic cable (OF 100B)
- Software version: 7.21
- Calibration unit

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.

Certification of AR650/NHF for HF 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. 0000043525 30 April 2015
Expiry date of the certificate: 01 April 2020

Test report: 936/21224575/A dated 22 September 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 02.04.2016 B5, chapter I number 2.1
Announcement by UBA from 25 February 2015

Ergänzungsprüfung gemäß DIN EN 15267

Certificate No. 0000043525_01: 25 April 2016
Expiry date of the certificate: 01 April 2020

Test report: 936/21224575/B of 13 October 2015
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 14.03.2016 B7, chapter I number 2.1
Announcement by UBA from 18 February 2016

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

Measuring system

Manufacturer	Opsis AB
AMS designation	AR650/NHF
Serial number of units under test	75 / 40
Measuring principle	IR-DOAS

Test report

Test laboratory	936/21224575/B TÜV Rheinland
Date of report	2014-09-22

Measured component

	HF
Certification range	0 - 3 mg/m ³

Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.04 mg/m ³
Sum of negative CS at zero point	-0.02 mg/m ³
Sum of positive CS at span point	0.08 mg/m ³
Sum of negative CS at span point	-0.05 mg/m ³
Maximum sum of cross-sensitivities	0.08 mg/m ³
Uncertainty of cross-sensitivity	0.049 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2	
Repeatability standard deviation at set point *	u_r 0.040 mg/m ³	0.002	(mg/m ³) ²
Lack of fit	u_{lof} -0.029 mg/m ³	0.001	(mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.033 mg/m ³	0.001	(mg/m ³) ²
Span drift from field test	$u_{d,s}$ 0.031 mg/m ³	0.001	(mg/m ³) ²
Influence of ambient temperature at span	u_t 0.015 mg/m ³	0.000	(mg/m ³) ²
Influence of supply voltage	u_v 0.017 mg/m ³	0.000	(mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.049 mg/m ³	0.002	(mg/m ³) ²
Influence of sample gas pressure	u_p 0.020 mg/m ³	0.000	(mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.024 mg/m ³	0.001	(mg/m ³) ²
Excursion of measurement beam	u_{mb} 0.023 mg/m ³	0.001	(mg/m ³) 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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.09 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.19 \text{ mg/m}^3$$

Relative total expanded uncertainty

Requirement of 2010/75/EU

Requirement of EN 15267-3

U in % of the ELV 1 mg/m³ 18.5

U in % of the ELV 1 mg/m³ 40.0

U in % of the ELV 1 mg/m³ 30.0