

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No: 0000043525\_03

**Certified AMS:** AR 650/NHF for HF

**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).  
The present certificate replaces certificate 0000043525\_02 dated 2 April 2020.



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000043525

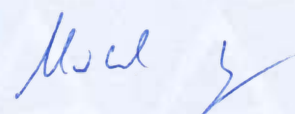
Publication in the German Federal Gazette  
(BAnz) of 14 March 2016

German Environment Agency

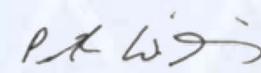
Dessau, 28 March 2025

This certificate will expire on:  
1 April 2030

TÜV Rheinland Energy &  
Environment GmbH  
Cologne, 26 March 2025



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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.

**Test report:** 936/21224575/B dated 13 October 2015  
**Initial certification:** 2 April 2015  
**Expiry date:** 1 April 2030  
**Certificate:** Renewal (of previous certificate 0000043525\_02 of 2 April 2020 valid until 1 April 2025)  
**Publication:** BAnz AT 14.03.2016 B7, chapter I No. 2.1

### Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2015), chapter IV (waste incineration plants / 17th BImSchV:2013), TA Luft:2002, 30th BImSchV:2009 and 27th BImSchV:2013. 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 twelve-month field test at a municipal waste incinerator 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 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 No. 2.1,  
Announcement by UBA dated 18 February 2016:

**AMS designation:**

AR650/NHF for HF

**Manufacturer:**

OPSIS AB, Furulund, Sweden

**Field of application:**

For measurements at plants requiring official approval and plants in accordance with the  
27th BImSchV

**Measuring ranges during the performance test:**

| Component | Certification range | Supplementary range | Unit                  |
|-----------|---------------------|---------------------|-----------------------|
| HF        | 0–3*                | 0–10*               | mg/m <sup>3</sup> x m |

\*at a measurement path length of 1.0 meter

**Software version:**

7.21

**Restriction:**

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. For measurement paths longer than the tested 1 m, it must be verified on-site whether the requirements defined in standard EN 15267-3 regarding cross-sensitivities are still met when the measuring system is installed.
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) as regards of the Federal Environment Agency (UBA) 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 dated 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 tested system 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)
- 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 & 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: [gal1.de](http://gal1.de).

### **History of documents**

Certification of AR 650/NHF 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\_00: 30 April 2015

Expiry date of the certificate: 1 April 2020

Test report: 936/21224575/A dated 22 September 2014

TÜV Rheinland Energie und Umwelt GmbH

Publication: BAnz AT 02.04.2015 B5, chapter I number 2.1

UBA announcement dated 25 February 2015

#### **Supplementary testing according to EN 15267**

Certificate No. 0000043525\_01: 25 April 2016

Expiry date of the certificate: 1 April 2020

Test report: 936/21224575/B dated 13 October 2015

TÜV Rheinland Energie und Umwelt GmbH

Publication: BAnz AT 14.03.2016 B7, chapter I number 2.1

UBA announcement dated 18 February 2016

#### **Renewal of certificates**

Certificate No. 0000043525\_02: 2 April 2020

Expiry date of the certificate: 1 April 2025

#### **Renewal of certificates**

Certificate No. 0000043525\_03: 28 March 2025

Expiry date of the certificate: 1 April 2030

## 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 |
| Date of report  | TÜV Rheinland  |
|                 | 2014-09-22     |

### Measured component

|                     |                         |
|---------------------|-------------------------|
| Certification range | HF                      |
|                     | 0 - 3 mg/m <sup>3</sup> |

### Evaluation of the cross-sensitivity (CS)

(system with largest CS)

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

### Calculation of the combined standard uncertainty

#### Tested parameter

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

\* 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

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

### Relative total expanded uncertainty

#### Requirement of 2010/75/EU

#### Requirement of EN 15267-3

|                                       |      |
|---------------------------------------|------|
| U in % of the ELV 1 mg/m <sup>3</sup> | 18.5 |
| U in % of the ELV 1 mg/m <sup>3</sup> | 40.0 |
| U in % of the ELV 1 mg/m <sup>3</sup> | 30.0 |