

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000043529

**Certified AMS:** LaserGas II for NH<sub>3</sub> and H<sub>2</sub>O

**Manufacturer:** NEO Monitors AS  
Solheimveien 62A  
1473 Lørenskog  
Norway

**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).

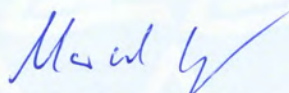


Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000043529

Publication in the German Federal Gazette  
(BAnz.) of 26 August 2015

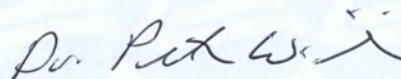
German Federal Environment Agency  
Dessau, 30 September 2015



i. A. Dr. Marcel Langner

This certificate will expire on:  
25 August 2020

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 29 September 2015



ppa. Dr. Peter Wilbring

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Am Grauen Stein  
51105 Cologne

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

|                               |   |
|-------------------------------|---|
| <b>Test report:</b>           | 936/21228113/A of 12 March 2015   |
| <b>Initial Certification:</b> | 26 August 2015  |
| <b>Expiry date:</b>           | 25 August 2020  |
| <b>Publication:</b>           | BAnz AT 26 August 2015 B4, chapter I number 2.1 and chapter V 17 <sup>th</sup> notification |

### Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III, at waste incineration plants according to Directive 2010/75/EU, chapter IV 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 twelve-month field test at a municipal waste incinerator.

The AMS is approved for an ambient temperature range of -20 °C to 50 °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 936/21228113/A of 12 March 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 26 August 2015 B4, chapter I number 2.1 and chapter V 17<sup>th</sup> notification: Announcement by UBA from 22 July 2015)



**Measuring system:**

LaserGas II for NH<sub>3</sub> and H<sub>2</sub>O

**Manufacturer:**

NEO Monitors AS, Skedsmokorset, Norway

**Field of application:**

For measurements at plants requiring official approval (e.g. Directive 2010/75/EU on industrial emissions, chapters III and IV)

**Measuring ranges during performance testing:**

| Component        | Certification range | Supplementary ranges |         | Unit              |
|------------------|---------------------|----------------------|---------|-------------------|
|                  |                     |                      |         |                   |
| NH <sub>3</sub>  | 0 – 10*             | 0 – 15*              |         | mg/m <sup>3</sup> |
| H <sub>2</sub> O | 0 – 40*             | 0 – 30*              | 0 – 50* | Vol.-%            |

\*with reference to a measurement path of 1 m

**Software version:**

GM 6.1f1-6

**Restriction:**

None

**Notes:**

1. The maintenance interval is six months.
2. The active measurement path for the performance test had a length of 0.513 m during the laboratory test and 1.0 m during the field test.
3. Dry test gases can be used with an unheated measuring cell for monitoring NH<sub>3</sub>.
4. The measuring system contains an internal cell for the automatic span point check of NH<sub>3</sub>.
5. Supplementary testing (transfer into EN 15267 requirements) to Federal Environment Agency notices of 19 February 2009 (BAnz. p. 899, chapter I number 2.3) and 17 July 2014 (BAnz AT 5 August 2014 B11, chapter V 9<sup>th</sup> notification).

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report no.: 936/21228113/A of 12 March 2015

**17 Notification as regards Federal Environment Agency (UBA) notices of 19 February 2009 (Federal Gazette (BAnz.) p. 899, chapter I number 2.3) and of 17 July 2014 (Federal Gazette (BAnz.) AT 5 August 2014 B11, chapter IV 9<sup>th</sup> notification)**

The LaserGas II measuring system for H<sub>2</sub>O and NH<sub>3</sub>, manufactured by NEO Monitors AS, can also be used with a detector of the type IG17X3000G1i, manufactured by Laser Components.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 18 March 2015

**Certified product**

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

The LaserGas II is an optical instrument based on transmitting infrared laser light from a transmitter unit of one side of the stack to a receiver unit on the diametrically opposite side of the stack. The measuring technique is based on measuring the absorption of light by the gas molecules present in the stack.

The measuring principle is called infrared single-line absorption spectroscopy and is based on the fact that most gases absorb light at certain wavelengths. The absorption is a direct function of the gas concentration in the stack.

The tested system comprises the following parts:

- Transmitter with purge gas device and evaluation system
- Receiver unit with purge gas device
- Data cable of 5 m length for connecting the sender and receiver unit
- Voltage supply
- Heated measuring path

**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 LaserGas II for NH<sub>3</sub> and H<sub>2</sub>O is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

#### **Basic test**

Test report: 936/21205655/A of 9 November 2007  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 07 March 2008, no 38, p. 901, chapter I no 2.2:  
UBA Announcement from 14 February 2008

#### **Supplementary tests**

Test report: 936/21205655/B of 29 February 2008  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 03 September 2008, no 133, p. 3243, chapter I no 2.2:  
UBA Announcement from 12 August 2008

Test report: 936/21205655/C of 1 October 2008  
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 11 March 2009, no 38, p. 899, chapter I no 2.3:  
UBA Announcement from 19 February 2009

#### **Notifications**

Statement of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH of 30 April 2009  
Publication: BAnz.12 February 2010, no 24, p. 552, chapter IV notification 14:  
UBA Announcement from 25 January 2010 (publication as single-component system)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 20 March 2012  
Publication: BAnz AT 20 July 2012 B11, chapter IV notification 8:  
UBA Announcement from 6 July 2012 (new software)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 March 2013  
Publication: BAnz AT 23 July 2013 B4, chapter V notification 8:  
UBA Announcement from 3 July 2013 (Ex housing)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 2 April 2014  
Publication: BAnz AT 5 August 2014 B11, chapter V notification 9:  
UBA Announcement from 17 July 2014 (new software)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 18 March 2015  
Publication: BAnz AT 26 August 2015 B4, chapter V notification 17 (new detector)  
Announcement by UBA from 22 July 2015

**Initial certification according to EN 15267**

Certificate No. 0000043529: 30 September 2015

Expiry date of the certificate: 25 August 2020

Test report: 936/21228113/A of 12 March 2015  
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 26 August 2015 B4, chapter I number 2.1 and chapter V 17<sup>th</sup> notification  
Announcement by UBA from 22 July 2015

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

#### Measuring system

|                                   |                             |
|-----------------------------------|-----------------------------|
| Manufacturer                      | NEO Monitors AS             |
| AMS designation                   | LaserGas II                 |
| Serial number of units under test | 3187 / 32510 / 3188 / 32574 |
| Measuring principle               | Laser Spektroskopie         |

#### Test report

|                 |               |
|-----------------|---------------|
| Test laboratory | TÜV Rheinland |
| Date of report  | 2015-03-12    |

#### Measured component

|                     |   |
|---------------------|---|
| Certification range | NH <sub>3</sub><br>0 - 10 mg/m <sup>3</sup> |
|---------------------|---|

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

(system with largest CS)

|                                    |                               |
|------------------------------------|-------------------------------|
| Sum of positive CS at zero point   | 0.18 mg/m <sup>3</sup>        |
| Sum of negative CS at zero point   | -0.08 mg/m <sup>3</sup>       |
| Sum of positive CS at span point   | 0.00 mg/m <sup>3</sup>        |
| Sum of negative CS at span point   | -0.16 mg/m <sup>3</sup>       |
| Maximum sum of cross-sensitivities | 0.18 mg/m <sup>3</sup>        |
| Uncertainty of cross-sensitivity   | $u_i$ 0.104 mg/m <sup>3</sup> |

#### Calculation of the combined standard uncertainty

##### Tested parameter

|  |                                    |  | $u^2$                                   |
|--|------------------------------------|--|---|
| Standard deviation from paired measurements under field conditions * | $u_D$ 0.142 mg/m <sup>3</sup>      |  | 0.020 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Lack of fit  | $u_{lof}$ -0.098 mg/m <sup>3</sup> |  | 0.010 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Zero drift from field test   | $u_{d,z}$ 0.028 mg/m <sup>3</sup>  |  | 0.001 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Span drift from field test   | $u_{d,s}$ -0.075 mg/m <sup>3</sup> |  | 0.006 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Influence of ambient temperature at span                             | $u_t$ 0.115 mg/m <sup>3</sup>      |  | 0.013 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Influence of supply voltage  | $u_v$ 0.015 mg/m <sup>3</sup>      |  | 0.000 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Cross-sensitivity (interference)                                     | $u_i$ 0.104 mg/m <sup>3</sup>      |  | 0.011 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Influence of sample gas pressure                                     | $u_b$ 0.057 mg/m <sup>3</sup>      |  | 0.003 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Uncertainty of reference material at 70% of certification range      | $u_{rm}$ 0.081 mg/m <sup>3</sup>   |  | 0.007 (mg/m <sup>3</sup> ) <sup>2</sup> |
| Excursion of measurement beam  | $u_{mb}$ 0.069 mg/m <sup>3</sup>   |  | 0.005 (mg/m <sup>3</sup> ) <sup>2</sup> |

\* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.27 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.54 \text{ mg/m}^3$$

#### Relative total expanded uncertainty

##### Requirement of 2010/75/EU

Requirement of EN 15267-3

**U in % of the ELV 10 mg/m<sup>3</sup> 5.4**

**U in % of the ELV 10 mg/m<sup>3</sup> 40.0**

U in % of the ELV 10 mg/m<sup>3</sup> 30.0



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

#### Measuring system

|                                   |                             |
|-----------------------------------|-----------------------------|
| Manufacturer                      | NEO Monitors AS             |
| AMS designation                   | LaserGas II                 |
| Serial number of units under test | 3187 / 32510 / 3188 / 32574 |
| Measuring principle               | Laser Spektroskopie         |

#### Test report

|                 |                |
|-----------------|----------------|
| Test laboratory | 936/21228113/A |
| Date of report  | TÜV Rheinland  |
|                 | 2015-03-12     |

#### Measured component

|                     |                  |               |
|---------------------|------------------|---------------|
| Certification range | H <sub>2</sub> O | 0 - 40 Vol.-% |
|---------------------|------------------|---------------|

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

(system with largest CS)

|                                    |       |               |
|------------------------------------|-------|---------------|
| Sum of positive CS at zero point   | 0.00  | Vol.-%        |
| Sum of negative CS at zero point   | 0.00  | Vol.-%        |
| Sum of positive CS at span point   | 0.57  | Vol.-%        |
| Sum of negative CS at span point   | -0.75 | Vol.-%        |
| Maximum sum of cross-sensitivities | -0.75 | Vol.-%        |
| Uncertainty of cross-sensitivity   | $u_i$ | -0.434 Vol.-% |

#### Calculation of the combined standard uncertainty

##### Tested parameter

|  |           |               | $u^2$                       |
|--|-----------|---------------|-----------------------------|
| Standard deviation from paired measurements under field conditions * | $u_D$     | 0.390 Vol.-%  | 0.152 (Vol.-%) <sup>2</sup> |
| Lack of fit  | $u_{lof}$ | -0.323 Vol.-% | 0.104 (Vol.-%) <sup>2</sup> |
| Zero drift from field test   | $u_{d,z}$ | 0.023 Vol.-%  | 0.001 (Vol.-%) <sup>2</sup> |
| Span drift from field test   | $u_{d,s}$ | -0.092 Vol.-% | 0.008 (Vol.-%) <sup>2</sup> |
| Influence of ambient temperature at span                             | $u_t$     | 0.173 Vol.-%  | 0.030 (Vol.-%) <sup>2</sup> |
| Influence of supply voltage  | $u_v$     | 0.029 Vol.-%  | 0.001 (Vol.-%) <sup>2</sup> |
| Cross-sensitivity (interference)                                     | $u_i$     | -0.434 Vol.-% | 0.188 (Vol.-%) <sup>2</sup> |
| Influence of sample gas pressure                                     | $u_p$     | 0.255 Vol.-%  | 0.065 (Vol.-%) <sup>2</sup> |
| Uncertainty of reference material at 70% of certification range      | $u_{rm}$  | 0.323 Vol.-%  | 0.105 (Vol.-%) <sup>2</sup> |
| Excursion of measurement beam  | $u_{mb}$  | 0.150 Vol.-%  | 0.023 (Vol.-%) <sup>2</sup> |

\* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

|   |                                   |      |        |
|---|-----------------------------------|------|--------|
| Combined standard uncertainty ( $u_c$ ) | $u_c = \sqrt{\sum (u_{max,j})^2}$ | 0.82 | Vol.-% |
| Total expanded uncertainty              | $U = u_c * k = u_c * 1.96$        | 1.61 | Vol.-% |

#### Relative total expanded uncertainty

|                           |                               |         |
|---------------------------|-------------------------------|---------|
| Requirement of 2010/75/EU | U in % of the range 40 Vol.-% | 4.0     |
| Requirement of EN 15267-3 | U in % of the range 40 Vol.-% | 10.0 ** |
|                           | U in % of the range 40 Vol.-% | 7.5     |

\*\* The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component..  
A value of 10 % was chosen.