

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081159_00

Certified AMS: LasIR HF-HCl-H₂O for HF, HCl and H₂O

Manufacturer: Unisearch Associates Inc.
96 Bradwick Drive
Concord, Ontario / L4K 1K8
Canada

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 (2023),
as well as EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 8 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

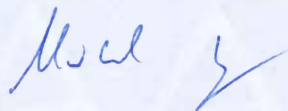
www.tuv.com
ID 0000081159

Publication in the German Federal Gazette
(BAnz) of 31 October 2024

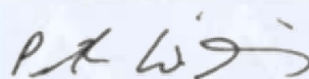
This certificate will expire on:
30 October 2029

German Environment Agency
Dessau, 15 November 2024

TÜV Rheinland Energy & Environment
GmbH Cologne, 8 November 2024



Dr. Marcel Langner
Head of Section II 4



ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Tel. + 49 221 806-5200

TÜV Rheinland Energy & Environment GmbH
Am Grauen Stein
51105 Köln

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:	EuL/21257618/B dated 20 February 2024
Initial certification	31 October 2024
Expiry date:	30 October 2029
Publication:	BAnz AT 31.10.2024 B9, chapter I No. 2.2

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2021), Directive 2010/75/EC, chapter IV (waste incineration plants / 17th BImSchV:2021), Directive 2015/2193/EC (44th BImSchV:2022), TA Luft:2021, 30th BImSchV:2019 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 waste incineration plant.

The AMS is approved for an ambient temperature for the analyser range of +5 °C to +40 °C and for the measuring heads 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 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 EuL/21257618/B dated 20 February 2024 of TÜV Rheinland Energy & Environment 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 31.10.2024 B9, chapter I No. 2.2,
Announcement by UBA dated 21 August 2024:

AMS designation:

LasIR HF-HCl-H₂O for HF, HCl and H₂O

Manufacturer:

Unisearch Associates, Concord, Canada

Field of application:

For plants according to directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV), chapter IV (waste incineration plants / 17th BImSchV), Directive 2015/2193/EC (44th BImSchV), 30th BImSchV, TA Luft and 27th BImSchV.

Measuring ranges during the performance test:

Component	Certification range	Supplementary measuring ranges		Unit
HF	0 – 5*	0 – 10*	0 – 50*	mg/m ³ *m
HCl	0 – 15*	0 – 90*	-	mg/m ³ *m
H ₂ O	0 – 30*	0 – 40*	0 – 50*	Vol.-%*m

* based on a measuring path length of 1.0 m

Software version: 4.96

Restrictions:

none

Notes:

1. The testing of HF and HCl can be carried out with dry test gases from gas cylinders and an unheated test gas cell.
2. The maintenance interval is six months.
3. The measuring system is operated with dual-pass optical units.
4. If the tested measuring path length of 1 m is exceeded, it must be checked on site when installing the measuring system whether the minimum requirement for crosssensitivity according to DIN EN 15267-3 is still met.
5. The measuring system can also be operated with the FFTR option.

Test institute:

TÜV Rheinland Energy & Environment GmbH, Cologne
Report No.: EuL/21257618/B dated 20 February 2024

Certified product

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

The LasIR measuring system is based on the principle of light absorption of a tunable diode laser in the near infrared range. It is designed for the insitu measurement of HF (laser module 1) and HCl/H₂O (laser module 2) in waste gas emissions. The core of the LasIR measuring system are the two laser diodes, which serve as a light source in the near infrared range. These diodes emit a light beam in a narrow but adjustable wavelength spectrum. The high spectral resolution and the adjustability of the laser diodes make it possible to measure the optical absorption of a single rotation/vibration line in the spectrum of the molecules to be measured. As a result, the gas under test is clearly identified and there is a high degree of differentiation from interfering gases.

The measuring system consists of the following components:

- LasIR control/analysis unit with 2 laser modules (HF & HCl/H₂O)
- Transmitter and receiver unit with purging device
- Reflector unit with flushing device
- Optical cables (between control/analysis unit and transmitter/receiver unit)
- Unheated test gas cell / sample gas cell (length 12.5 cm)
- Heated sample gas cell (length 1 m)

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: qal1.de.

History of documents

Certification of LasIR HF-HCl-H₂O 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. 0000081159_00: 12 November 2024

Expiry date of the certificate: 30 October 2029

Test report: EuL/21257618/B dated 20 February 2024

TÜV Rheinland Energy & Environment GmbH

Publication: BAnz AT 31.10.2024 B9, chapter I number 2.2

UBA announcement dated 21 August 2024

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

Measuring system

Manufacturer	Unisearch Associates
Name of measuring system	LasIR HF-HCl-H2O
Serial number of the candidates	LAS1002 / LAS1003
Measuring principle	Laser spectroscopy

Test report

Test laboratory	TÜV Rheinland
Date of report	2024-02-20

Measured component

Certification range	HF	0 - 5 mg/m³
---------------------	----	-------------

Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0,00 mg/m³
Sum of negative CS at zero point	0,00 mg/m³
Sum of positive CS at reference point	0,00 mg/m³
Sum of negative CS at reference point	0,00 mg/m³
Maximum sum of cross sensitivities	0,00 mg/m³
Uncertainty of cross sensitivity	0,000 mg/m³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0,024 mg/m³	0,001 (mg/m³)²
Lack of fit	u_{lof}	-0,035 mg/m³	0,001 (mg/m³)²
Zero drift from field test	$u_{d,z}$	0,023 mg/m³	0,001 (mg/m³)²
Span drift from field test	$u_{d,s}$	0,046 mg/m³	0,002 (mg/m³)²
Influence of ambient temperature at span	u_t	0,017 mg/m³	0,000 (mg/m³)²
Influence of supply voltage	u_v	0,006 mg/m³	0,000 (mg/m³)²
Cross sensitivity (interference)	u_i	0,000 mg/m³	0,000 (mg/m³)²
Influence of sample pressure	u_p	0,012 mg/m³	0,000 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0,040 mg/m³	0,002 (mg/m³)²
Excursion of measurement beam	u_{mb}	0,022 mg/m³	0,000 (mg/m³)²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

$$u_c = \sqrt{\sum (u_{max,j})^2}$$

Combined standard uncertainty (u_c)		0,08 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0,16 mg/m³

Relative total expanded uncertainty

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

Requirement of EN 15267-3

U in % of the ELV 1 mg/m³ 16.4

U in % of the ELV 1 mg/m³ 40.0

U in % of the ELV 1 mg/m³ 30.0

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

Measuring system

Manufacturer	Unisearch Associates
AMS designation	LasIR HF-HCl-H2O
Serial number of units under test	16 / 17
Measuring principle	Laser spectroscopy

Test report

Test laboratory	TÜV Rheinland
Date of report	2024-02-20

Measured component

Certification range	HCl	0 - 15 mg/m³
---------------------	-----	--------------

Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0,06 mg/m³
Sum of negative CS at zero point	0,00 mg/m³
Sum of positive CS at span point	0,00 mg/m³
Sum of negative CS at span point	-0,08 mg/m³
Maximum sum of cross-sensitivities	-0,08 mg/m³
Uncertainty of cross-sensitivity	u_i -0,046 mg/m³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D 0,224 mg/m³		0,050 (mg/m³)²
Lack of fit	u_{lof} -0,087 mg/m³		0,008 (mg/m³)²
Zero drift from field test	u_{dz} 0,095 mg/m³		0,009 (mg/m³)²
Span drift from field test	u_{ds} 0,121 mg/m³		0,015 (mg/m³)²
Influence of ambient temperature at span	u_t 0,100 mg/m³		0,010 (mg/m³)²
Influence of supply voltage	u_v 0,031 mg/m³		0,001 (mg/m³)²
Cross-sensitivity (interference)	u_i -0,046 mg/m³		0,002 (mg/m³)²
Influence of sample gas pressure	u_p 0,020 mg/m³		0,000 (mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm} 0,121 mg/m³		0,015 (mg/m³)²
Excursion of measurement beam	u_{mb} 0,540 mg/m³		0,292 (mg/m³)²

* 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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0,63 mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1,24 mg/m³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 10 mg/m³	12.4
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	40.0
	U in % of the ELV 10 mg/m³	30.0

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

Measuring system

Manufacturer	Unisearch Associates
AMS designation	LasIR HF-HCl-H2O
Serial number of units under test	16 / 17
Measuring principle	Laser spectroscopy

Test report

Test laboratory	TÜV Rheinland
Date of report	2024-02-20

Measured component

Certification range	H ₂ O	0 - 30 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	0,20	Vol.-%
Sum of negative CS at span point	0,00	Vol.-%
Maximum sum of cross-sensitivities	0,20	Vol.-%
Uncertainty of cross-sensitivity	u_i	0,116 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

			u^2	
Standard deviation from paired measurements under field conditions *	u_D	0,122 Vol.-%	0,015	(Vol.-%) ²
Lack of fit	u_{lof}	0,116 Vol.-%	0,013	(Vol.-%) ²
Zero drift from field test	u_{dz}	0,121 Vol.-%	0,015	(Vol.-%) ²
Span drift from field test	u_{ds}	-0,225 Vol.-%	0,051	(Vol.-%) ²
Influence of ambient temperature at span	u_t	0,115 Vol.-%	0,013	(Vol.-%) ²
Influence of supply voltage	u_v	0,139 Vol.-%	0,019	(Vol.-%) ²
Cross-sensitivity (interference)	u_i	0,116 Vol.-%	0,013	(Vol.-%) ²
Influence of sample gas pressure	u_p	0,021 Vol.-%	0,000	(Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0,242 Vol.-%	0,059	(Vol.-%) ²
Excursion of measurement beam	u_{mb}	0,690 Vol.-%	0,476	(Vol.-%) ²

* 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)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0,82 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 1,61 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 30 Vol.-% **5.4**

Requirement of 2010/75/EU

U in % of the range 30 Vol.-% **10.0**

Requirement of EN 15267-3

U in % of the range 30 Vol.-% **7.5**