

CERTIFICATE

of Product Conformity (QAL1)

Certificate No. : 0000043106

Certified AMS: O3 42e* for ozone

Manufacturer: Environnement S.A.
111 bd, Robespierre
78304 Poissy Cedex
France

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

**This is to certify that the AMS has been tested
and found to comply with:**

**VDI 4202-1: 2010, VDI 4203-3: 2010, EN 14625: 2012,
EN 15267-1:2009 and EN 15267-2:2009**

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000043106

Publication in the German Federal Gazette
(BAnz.) of 2 April 2015

This certificate will expire on:
1 April 2020

German Federal Environment Agency
Dessau, 30 April 2015

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 29 April 2015



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51105 Cologne

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

Certificate:
0000043106 / 30 April 2015

Test report: 936/21225396/A of 1 October 2014
Initial certification: 2 April 2015
Date of expiry: 1 April 2020
Publication: BAnz AT 2 April 2015 B5, chapter III Number 1.1

Approved application

The certified AMS is suitable for continuous ambient air monitoring (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three-month field test.

The AMS is approved for the temperature range of 0 °C to +30 °C.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for ambient air applications at which it will be installed.

Basis of the certification

This certification is based on:

- test report 936/21225396/A of 1 October 2014 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz AT 2 April 2015 B5, chapter III Number 1.1
Announcement by UBA from 25 February 2015

AMS designation:

O3 42e* for ozone

Manufacturer:

Environnement S. A., Poissy, France

Field of application:

For the continuous determination of ozone concentrations in ambient air (stationary operation)

Measuring ranges during the performance test:

Component	Certification range	Unit
ozone	0 - 500	µg/m ³

Software version:

Version 1.0.4

Restrictions:

None

Notes:

1. Measured values are displayed by means of a PC or Laptop which is part of the measuring system.
2. The performance test also comprised the O3 42e version with integrated display.
3. The report on the performance test is available online at www.qal1.de.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne

Report no.: 936/21225396/A of 1 October 2014

Certified product

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

The ambient air monitor O3 42e* is a continuous ozone monitor. The measurement principle is based on ultraviolet absorption. The instrument was developed for the continuous measurement of ozone concentrations in ambient air.

The measurement principle of the O3 42e* is based on UV photometry according to the Beer-Lambert law. The absorption spectrum of ozone has its maximum in the wavelength range of 250 to 270 nanometres. The monochromatic UV-LED light source of the O3 42e* is adjusted to a wavelength of 255 nm and therefore within the maximum absorption range of ozone.

The O3 42e* analyser uses non-dispersive ultraviolet (UV) absorption technology to measure ozone concentrations. The sample to be analysed is led to the measurement module via a dust filter. The measurement module consists of the following parts:

- LED for monochromatic UV-light with a wavelength of 255 nm, placed under a protective cover, which is fastened with 4 screws. The LED card is directly connected to the card of the reference photodetector.
- two photodetector cards: the reference photodetector card for measuring the energy of the incoming LED light (UV_0) and the photodetector card for measuring UV absorption, which enables detection of signals i and i_0 . Both cards are mounted beneath a protective cover to protect them against interfering light.
- the optical chamber consists of a beam splitter and a convex, flat lense for concentrating the light on the reference photodetector. In the optical chamber, the LED light can be distributed to reference photodetector and measuring chamber.
- a measurement chamber consisting of a glass tube and two mechanical parts at the inlet and outlet where the LED light is absorbed. The optical path length for the sample gas is 400 mm.
- cycle solenoid valve by means of which the sample gas can either cyclically or alternately be changed over to cycle channel i or cycle channel i_0 .
- a flow restrictor which regulates the sample gas flow to 55 litres/hour. The excess flow valve is mounted at the fluid outlet of the measurement chamber.
- ozone filter which can filter out any trace of ozone from the sample gas
- connection for the pressure sensor
- Type PT1000 temperature sensor
- gas inlet

The AMS is available in 2 versions. The O3 42e version is equipped with an LCD display which displays the measured values. The O3 42e* version does not have a display. Apart from that, both versions are identical in construction. For both versions, measured values can be displayed and instruments controlled by means of an external PC connected via Ethernet in a web browser.

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 is presented on page 1 of this certificate.

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 the validity is also accessible on the internet: **qal1.de**.

Certification of O3 42e* for ozone 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. 0000043106: 30 April 2015

Expiration date of the certificate: 1 April 2020

Test report: 936/21225396/A of 1 October 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 2 April 2015 B5, chapter III Number 1.1
Announcement by UBA from 25 February 2015

Expanded uncertainty based on the results of the laboratory testing of system 1

Measuring device:		Serial-No.:		SN 12	
Measured component:		1h-alert threshold:		120 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.030	$u_{r,z}$	0.0000
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.130	$u_{r,h}$	0.0004
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	2.450	$u_{l,h}$	2.8812
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.410	u_{gp}	20.5464
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.010	u_{gt}	0.0122
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.392	u_{st}	8.5280
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.010	u_v	0.0166
8a	Interferent H ₂ O with 21 mmol/mol	≤ 10 nmol/mol (Zero) ≤ 10 nmol/mol (Span)	1.340 -4.700	u_{H_2O}	12.2994
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	3.250 2.170	$u_{int, pos}$ or	11.6821
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	4.460 3.750	$u_{int, neg}$	
9	Averaging effect	≤ 7.0% of measured value	-4.280	u_{av}	8.7928
18	Difference sample/calibration port	≤ 1.0%	-0.350	$u_{\Delta sec}$	0.1764
21	Uncertainty of test gas	≤ 3.0%	2.000	u_{tg}	1.4400
Combined standard uncertainty				u_c	8.1471
Expanded uncertainty				U	16.2942
Relative expanded uncertainty				W	13.58
Maximum allowed expanded uncertainty				W_{req}	15

Expanded uncertainty based on the results of the laboratory testing of system 2

Measuring device:		Serial-No.:		1h-alert threshold:		nmol/mol		
Environment O3 42e*		SN 14		120				
Measured component:		Performance criterion		Result		Square of partial uncertainty		
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty			
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.040	$u_{r,z}$	0.01	0.0000		
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.110	$u_{r,lv}$	0.02	0.0003		
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	2.100	$u_{l,lv}$	1.45	2.1168		
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.420	u_{gp}	4.69	22.0271		
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.020	u_{gt}	0.22	0.0489		
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.231	u_{st}	1.72	2.9614		
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.020	u_v	0.26	0.0665		
8a	Interferent H ₂ O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	0.630	u_{H_2O}	-2.71	7.3367		
8b	Interferent Toluene with 0.5 µmol/mol	≤ 10 nmol/mol (Span)	-3.630	$u_{int,pos}$ or	4.12	16.9456		
		≤ 5.0 nmol/mol (Zero)	3.250					
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Span)	3.110	$u_{int,neg}$	-3.30	10.9214		
		≤ 5.0 nmol/mol (Zero)	4.040					
9	Averaging effect	≤ 7.0% of measured value	4.020	u_{av}	-0.43	0.1866		
18	Difference sample/calibration port	≤ 1.0%	-0.360	u_{ssc}	1.20	1.4400		
21	Uncertainty of test gas	≤ 3.0%	2.000	ucg	1.20	1.4400		
				Combined standard uncertainty		u_c	8.0032	nmol/mol
				Expanded uncertainty		U	16.0064	nmol/mol
				Relative expanded uncertainty		W	13.34	%
				Maximum allowed expanded uncertainty		W_{req}	15	%

Expanded uncertainty based on the results of the laboratory and field testing of system 1

Measuring device:		Environment O3 42e*		Serial No.:		SN 12	
Measured component:		O ₃		1h-alert threshold:		120 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty		
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.030	u _{r,z}	0.000		
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.130	u _{r,h}	not considered, as u _{r,h} = 0.01 < u _{r,f}		
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	2.450	u _{r,h}	1.70	2.8812	
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.410	u _{sp}	4.53	20.5464	
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.010	u _{gt}	0.11	0.0122	
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.392	u _{st}	2.92	8.5280	
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.010	u _v	0.13	0.0166	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	1.340	u _{H2O}	-3.51	12.2994	
		≤ 10 nmol/mol (Span)	-4.700				
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	3.250	u _{int,pos}			
		≤ 5.0 nmol/mol (Span)	2.170	OR	3.42	11.6821	
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	4.460	u _{int,neg}			
		≤ 5.0 nmol/mol (Span)	3.750				
9	Averaging effect	≤ 7.0% of measured value	-4.280	u _{av}	-2.97	8.7928	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	2.590	u _{r,f}	3.11	9.6597	
11	Long term drift at zero level	≤ 5.0 nmol/mol	0.590	u _{d,t,z}	0.34	0.1160	
12	Long term drift at span level	≤ 5.0% of max. of certification range	1.190	u _{d,t,h}	0.82	0.6797	
18	Difference sample/calibration port	≤ 1.0%	-0.350	u _{asc}	-0.42	0.1764	
21	Uncertainty of test gas	≤ 3.0%	2.000	u _{cg}	1.20	1.4400	
Combined standard uncertainty				u _c		8.7653 nmol/mol	
Expanded uncertainty				U		17.5306 nmol/mol	
Relative expanded uncertainty				W		14.61 %	
Maximum allowed expanded uncertainty				W _{req}		15 %	

Expanded uncertainty based on the results of the laboratory and field testing of system 2

Measuring device:		Serial-No.:		SN 14	
Measured component:		1h-alert threshold:		120	
O ₃		1h-alert threshold:		120	
Environment O3 42e*		1h-alert threshold:		120	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.040	u _{r,z}	0.0000
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.110	u _{r,th}	-
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	2.100	u _{l,th}	2.1168
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.420	u _{gp}	22.0271
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.020	u _{gt}	0.0489
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.231	u _{gt}	2.9614
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.020	u _y	0.0665
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	0.630	u _{H2O}	7.3367
		≤ 10 nmol/mol (Span)	-3.630		
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	3.250	u _{tol,pos}	
		≤ 5.0 nmol/mol (Span)	3.110	or	
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	4.040	u _{tol,neg}	16.9456
		≤ 5.0 nmol/mol (Span)	4.020		
9	Averaging effect	≤ 7.0% of measured value	-4.770	u _{av}	10.9214
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	2.590	u _{r,f}	9.6597
11	Long term drift at zero level	≤ 5.0 nmol/mol	0.810	u _{gl,z}	0.2187
12	Long term drift at span level	≤ 5.0% of max. of certification range	1.450	u _{gl,th}	1.0092
18	Difference sample/calibration port	≤ 1.0%	-0.360	u _{Δsc}	0.1866
21	Uncertainty of test gas	≤ 3.0%	2.000	u _{cg}	1.4400
Combined standard uncertainty			u _c		8.6567
Expanded uncertainty			U		17.3134
Relative expanded uncertainty			W		14.43
Maximum allowed expanded uncertainty			W _{req}		15