

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000053805

Certified AMS: AC 32e for NO, NO₂, NO_x

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

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and certified
according to the standards**

**VDI 4202-1 (2010), VDI 4203-3 (2010), EN 14211 (2012),
EN 15267-1 (2009) and EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 9 pages).



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

www.tuv.com
ID 0000053805

Publication in the German Federal Gazette
(BAnz.) of 15 March 2017

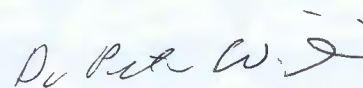
German Federal Environment Agency
Dessau, 25 April 2017



Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
14 March 2022

TÜV Rheinland Energy GmbH
Cologne, 24 April 2017



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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.
qal1.de info@qal1.de page 1 of 9

Test report: 936/21233023/A dated 13 October 2016
Initial certification: 15 March 2017
Expiry date: 14 March 2022
Publication: BAnz AT 15.03.2017 B6, chapter III no. 1.1

Approved application

The tested AMS is suitable for continuous ambient air monitoring of nitrogen oxide (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 an ambient temperature range of 0 °C to +30 °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 ambient air application at which it will be installed.

Basis of the certification

This certification is based on:

- Test report 936/21233023/A dated 13 October 2016 of TÜV Rheinland Energy 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 15.03.2017 B6, chapter III no. 1.1,
Announcement by UBA from 22 February 2017

AMS designation:

AC 32e for NO, NO₂ and NO_x

Manufacturer:

Environnement S. A., Poissy, France

Field of application:

For continuous ambient air monitoring (stationary operation) of nitrogen oxide

Measuring ranges during the performance test:

Component	Certification range	Unit
Nitrogen monoxide	0 - 1200	µg/m ³
Nitrogen dioxide	0 - 500	µg/m ³

Software version:

Firmware: 1.0.a

Restrictions:

none

Notes:

1. Performance testing also covered the AC 32e* version (without display) of the measuring system. This version displays measured values via a PC or laptop accompanying the measuring system.
2. The test report on performance testing is available on the internet at www.qal1.de.

Test report:

TÜV Rheinland Energy GmbH, Cologne
Report No.: 936/21233023/A dated 13 October 2016

Certified product

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

The AC 32e air quality monitoring system is a continuous nitrogen oxide analyser. The measuring principle relies on the chemiluminescence method.

The main switch of the measuring system and a TFT-LCD colour display with background lighting and touch screen is located at the front of the instrument. This touch screen ensures operation of the AC 32e NO_x analyser. The AC 32e* version is identical to the AC 32e measuring system (apart from its front design), but it does not have a display. The AC 32e* measuring system is only operated via an external PC connected via Ethernet.

Fluid in- and outlets and electrical connections are located on the back of the analyser.

The instrument is operated with an external vacuum pump.

In the analyser, sample gas flows to a solenoid valve unit via an inlet filter. At this point, the relevant inlet can be selected (sample, zero gas, span gas). The dryer between the dust filter and the solenoid valves allows the removal of all interferences from moisture.

The sample is sucked into the reaction chamber directly; for the NO cycle and indirectly via the NO₂→NO converter oven.

The ozoniser generates the necessary ozone for measurements from ambient air. Dust is removed from the air sucked in before the latter is transported through a drier. At the outlet of the ozone generator, the ozone passes through cleaning before it reaches the reaction chamber inside the measuring module. The ozoniser chip ensures the energy supply of the ozone generator.

Furthermore, the dryer provides purge air for the conversion of the photomultiplier tube after flow through of the purge dryer filter.

The vacuum distributor connected to the external pump connects all internal elements which require subatmospheric pressure.

The current software version is Firmware: 1.0.a.

The current version of the operation manual is dated July 2016.

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 AC 32e 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. 0000053805: 25 April 2017
Expiry date of the certificate: 14 March 2022

Test report: 936/21233023/A dated 13 October 2016
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 15.03.2017 B6, chapter III no. 1.1
Announcement by UBA dated 22 February 2017

Expanded uncertainty, System 1

Measuring device:		AC 32e		Serial-No.:		SN 5	
Measured component:		NO		1h-limit value:		104.6	
						nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty		
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.050	$U_{r,z}$	0.01	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.940	$U_{r,1h}$	0.02	0.0005	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.790	$U_{l,1h}$	0.48	0.2276	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.740	U_{gp}	1.86	3.4672	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.190	U_{gt}	0.48	0.2286	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.947	U_{st}	2.38	5.6783	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	U_v	0.06	0.0034	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.220	U_{H_2O}	0.47	0.2178	
		≤ 10 nmol/mol (Span)	3.870				
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.290	$U_{int,pos}$			
		≤ 5.0 nmol/mol (Span)	-0.470	or	0.38	0.1456	
8c	Interferent NH ₃ mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.120	$U_{int,neg}$			
		≤ 5.0 nmol/mol (Span)	2.070				
9	Averaging effect	≤ 7.0% of measured value	-2.330	U_{av}	-1.41	1.9799	
18	Difference sampler/calibration port	≤ 1.0%	0.240	U_{asc}	0.25	0.0630	
21	Converter efficiency	≥ 98	99.40	U_{ec}	0.63	0.3939	
23	Uncertainty of test gas	≤ 3.0%	2.000	U_{cg}	1.05	1.0941	
				Combined standard uncertainty	u_c	3.6743	
				Expanded uncertainty	U	7.3486	
				Relative expanded uncertainty	W	7.03	
				Maximum allowed expanded uncertainty	W_{req}	15	

Expanded uncertainty, System 2

Measuring device:		AC 32e	Serial-No.:	SN 6	nmol/mol
Measured component:		NO	1h-limit value:	104.6	
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-limit value	≤ 3.0 nmol/mol	0.910	$U_{r,1h}$	0.0005
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.000	$U_{l,1h}$	0.3647
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.970	U_{gp}	5.9575
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	U_{gt}	0.1070
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	1.667	U_{st}	17.5951
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	U_v	0.0078
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero) ≤ 10 nmol/mol (Span)	0.040 2.600	U_{H_2O}	0.1804
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.180 0.030	$U_{int,pos}$ or	0.2797
8c	Interferent NH ₃ mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.290 2.570	$U_{int,neg}$	
9	Averaging effect	≤ 7.0% of measured value	3.930	U_{av}	5.6328
18	Difference sample/calibration port	≤ 1.0%	-0.280	U_{Asc}	0.0858
21	Converter efficiency	≥ 98	99.20	U_{EC}	0.7002
23	Uncertainty of test gas	≤ 3.0%	2.000	U_{cg}	1.0941
Combined standard uncertainty				U_c	5.6574
Expanded uncertainty				U	11.3148
Relative expanded uncertainty				W	10.82
Maximum allowed expanded uncertainty				W_{req}	15

Combined standard uncertainty, System 1

Measuring device: AC 32e		Serial No.: SN 5		1h-limit value: 104,6		nmol/mol	
Measured component: NO		1h-limit value:		1h-limit value:		1h-limit value:	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty		
1	Repeatability standard deviation at zero	s	0,050	U _{r,z}	0,0000		
2	Repeatability standard deviation at 1h-limit value	s	0,940	U _{r,1h}	-		
3	"lack of fit" at 1h-limit value	s	0,790	U _{l,1h}	0,2276		
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	s	0,740	U _{sp}	3,4672		
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	s	0,190	U _{gt}	0,2286		
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	s	0,947	U _{st}	5,6783		
7	Sensitivity coefficient of electrical voltage at 1h-limit value	s	0,020	U _v	0,0034		
8a	Interferent H ₂ O with 21 nmol/mol	s	-0,220	U _{H2O}	0,2178		
		s	3,870				
8b	Interferent CO ₂ with 500 µmol/mol	s	0,290	U _{int,pos}			
		s	-0,470	or	0,1456		
8c	Interferent NH ₃ mit 200 nmol/mol	s	0,120				
		s	2,070	U _{int,neg}			
9	Averaging effect	s	-2,330	U _{av}	1,9799		
10	Reproducibility standard deviation under field conditions	s	1,570	U _{r,f}	2,6969		
11	Long term drift at zero level	s	1,580	U _{d,l,z}	0,8321		
12	Long term drift at span level	s	2,430	U _{d,l,1h}	2,1535		
18	Difference sample/calibration port	s	0,240	U _{use}	0,0630		
21	Converter efficiency	z	99,400	U _{EC}	0,3939		
23	Uncertainty of test gas	s	2,000	U _{CG}	1,0941		
Combined standard uncertainty				U _c	4,3797	nmol/mol	
Expanded uncertainty				U	8,7595	nmol/mol	
Relative expanded uncertainty				W	8,37	%	
Maximum allowed expanded uncertainty				W _{req}	15	%	

Combined standard uncertainty, System 2

Measuring device:		AC 32e		Serial No.:		SN 6	
Measured component:		NO		1h-limit value:		104.6	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty	nmol/mol	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.040	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.910	$u_{r,h}$	not considered, as $\sqrt{2} \cdot u_{r,h} = 0.03 < u_{r,f}$	-	
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	1.000	$u_{l,h}$	0.60	0.3647	
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.970	u_{sp}	2.44	5.9575	
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.130	u_{gt}	0.33	0.1070	
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	1.667	u_{st}	4.19	17.5951	
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.030	u_v	0.09	0.0078	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero) ≤ 10 nmol/mol (Span)	0.040 2.600	u_{H_2O}	0.42	0.1804	
8b	Interferent CO ₂ with 500 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.180 0.030	$u_{H_2, pos}$ or	0.53	0.2797	
8c	Interferent NH ₃ mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.290 2.570	$u_{int, neg}$			
9	Averaging effect	≤ 7.0% of measured value	3.930	u_{av}	2.37	5.6328	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	1.570	$u_{r,f}$	1.64	2.6969	
11	Long term drift at zero level	≤ 5.0 nmol/mol	2.140	$u_{t,z}$	1.24	1.5265	
12	Long term drift at span level	≤ 5.0% of max. of certification range	0.870	$u_{t,h}$	0.53	0.2760	
18	Difference sample/calibration port	≤ 1.0%	-0.280	u_{asc}	-0.29	0.0858	
21	Converter efficiency	≥ 98	99.200	u_{ec}	0.84	0.7002	
23	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.05	1.0941	
Combined standard uncertainty				u_c		6.0419	nmol/mol
Expanded uncertainty				U		12.0838	nmol/mol
Relative expanded uncertainty				W		11.55	%
Maximum allowed expanded uncertainty				W_{req}		15	%