

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000053805\_01

**AMS designation:** AC32e for NO, NO<sub>2</sub> and NO<sub>x</sub>

**Manufacturer:** ENVEA  
111, Boulevard Robespierre  
78304 Poissy Cedex  
France

**Test Laboratory:** TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested  
and found to comply with the standards  
VDI 4202-1 (2018), 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 10 pages).  
The present certificate replaces certificate 0000053805\_00 of 25 April 2017.



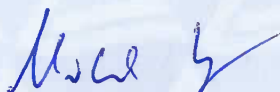
Suitability Tested  
Complying with  
2008/50/EC  
EN 15267  
Regular Surveillance  
  
www.tuv.com  
ID 0000053805

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

German Federal Environment Agency  
Dessau, 02 March 2022

This certificate will expire on:  
14 March 2027

TÜV Rheinland Energy GmbH  
Cologne, 01 March 2022



Dr. Marcel Langner  
Head of Section II 4.1



ppa. Dr. Peter Wilbring

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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 certificate D-PL-11120-02-00.

<b>Test report:</b>	936/21233023/A of 13 October 2016
<b>Initial certification:</b>	25 April 2017
<b>Expiry date:</b>	14 March 2027
<b>Certificate</b>	Renewal (of previous certificate 0000053805_00 of 25 April 2017 valid until 14 March 2022)
<b>Publication:</b>	BAnz AT 15.03.2017 B6, chapter III number 1.1

### **Approved application**

The certified AMS is suitable for continuous ambient air monitoring of nitrogen oxides (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 applicable at the time of 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 intended purpose.

### **Basis of the certification**

This certification is based on:

- Test report 936/21233023/A of 13 October 2016 by 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 number 1.1,  
UBA announcement dated 22 February 2017:

**AMS designation:**

AC32e for NO, NO<sub>2</sub> and NO<sub>x</sub>

**Manufacturer:**

ENVEA, Poissy, France

**Field of application:**

For the continuous measurement of nitrogen oxide concentrations from stationary  
sources in ambient air

**Measuring ranges during performance testing:**

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

**Software version:**

Firmware: 1.0.a

**Restriction:**

None

**Notes:**

1. Performance testing also covered the AC32e\* 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](http://www.qal1.de).

**Test Report:**

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

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV  
20<sup>th</sup> notification, UBA announcement dated 27 February 2019:

**20 Notification as regards Federal Environment Agency (UBA) notice  
of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter III number 1.1)**

The current software version of the AC32e/AC32e\* measuring system  
for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by Environnement S.A. is: v1.0.e

Statement issued by TÜV Rheinland Energy GmbH dated 27 September 2018

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV  
24<sup>th</sup> notification, UBA announcement dated 24 February 2020:

**24 Notification as regards Federal Environment Agency (UBA) notices  
of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter III number 1.1) and  
of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV 20<sup>th</sup> notification) and**

The company Environnement S.A., Poissy, France, has changed its name and  
now operates under the name ENVEA.

The current software version of the AC32e/AC32e\* measuring system  
for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by ENVEA is: v1.0.f

Statement issued by TÜV Rheinland Energy GmbH dated 1 October 2019

Publication in the German Federal Gazette: BAnz AT 03.05.2021 B9, chapter III  
19<sup>th</sup> notification, UBA announcement dated 31 March 2021:

**19 Notification as regards Federal Environment Agency (UBA) notices  
of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter III number 1.1) and  
of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV 24<sup>th</sup> notification)**

The current software version of the AC32e/AC32e\* measuring system  
for NO, NO<sub>2</sub> and NO<sub>x</sub> manufactured by ENVEA is: v1.1.b

The AMS can also be optionally equipped with a separate zero gas inlet on the  
back of the device.

Statement issued by TÜV Rheinland Energy GmbH dated 9 September 2020

**Certified product**

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

The AC32e air quality monitoring system is a continuous nitrogen 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<sub>x</sub> 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 inputs and outputs as well as electrical connections are located on the rear side of the AMS.

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, test gas). The dryer between the dust filter and the solenoid valves allows the removal of all interferences from moisture.

The sample is sucked directly into the reaction chamber for the NO cycle and via the NO<sub>2</sub> → NO converter oven for the NO<sub>x</sub> cycle.

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 sub-atmospheric pressure.

**General remarks**

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 manufacturing process for 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at [qal1.de](http://qal1.de).

### **Document history**

Certification of the AC32e measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

#### **Initial certification according to EN 15267**

Certificate no. 0000053805\_00: 25 April 2017  
Expiry date of the certificate: 14 March 2022  
Test report: 936/21233023/A of 13 October 2016  
TÜV Rheinland Energy GmbH  
Publication: BAnz AT 15.03.2017 B6, chapter III number 1.1  
UBA announcement dated 22 February 2017

#### **Notifications according to EN 15267**

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 27 September 2019  
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 20  
UBA announcement dated 27 February 2019  
(Software updates)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 01 October 2019  
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 24  
UBA announcement dated 24 February 2020  
(Change of software and manufacturer name, formerly Environnement S.A.)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 09 September 2020  
Publication: BAnz AT 03.05.2021 B9, chapter III notification 19  
UBA announcement dated 31 March 2021  
(Design and software changes)

#### **Renewal of the certificate**

Certificate no. 0000053805\_01: 02 March 2022  
Expiry date of the certificate: 14 March 2027

Expanded uncertainty laboratory, system 1

Measuring device:		Serial-No.:		nmol/mol	
AC.32e		SN 5		104.6	
Measured component:		1h-limit value:			
NO					
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.050	$U_{r,z}$	0.0000
2	Repeatability standard deviation at 1h-limit value	≤ 3.0 nmol/mol	0.940	$U_{r,h}$	0.0005
3	"lack of fit" at 1h-limit value	≤ 4.0% of measured value	0.790	$U_{l,h}$	0.2276
4	Sensitivity coefficient of sample gas pressure at 1h-limit value	≤ 8.0 nmol/mol/kPa	0.740	$U_{gp}$	3.4672
5	Sensitivity coefficient of sample gas temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.190	$U_{gt}$	0.2286
6	Sensitivity coefficient of surrounding temperature at 1h-limit value	≤ 3.0 nmol/mol/K	0.947	$U_{st}$	5.6783
7	Sensitivity coefficient of electrical voltage at 1h-limit value	≤ 0.30 nmol/mol/V	0.020	$U_v$	0.0034
8a	Interferent H <sub>2</sub> O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.220	$U_{H_2O}$	0.2178
8b	Interferent CO <sub>2</sub> with 500 µmol/mol	≤ 10 nmol/mol (Span)	3.870	$U_{int,pos}$	0.38
		≤ 5.0 nmol/mol (Zero)	0.290		
8c	Interferent NH <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Span)	-0.470	or	0.1456
		≤ 5.0 nmol/mol (Zero)	0.120		
9	Averaging effect	≤ 5.0 nmol/mol (Span)	2.070	$U_{int,neg}$	1.9799
		≤ 7.0% of measured value	-2.330		
18	Difference sample/calibration port	≤ 1.0%	0.240	$U_{sc}$	0.0630
21	Converter efficiency	≥ 98	99.40	$U_{EC}$	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	$U_{sg}$	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 laboratory, system 2

Measuring device:		Serial-No.:		SN 6		
Measured component:		1h-limit value:		104.6		
AC 32e		NO		nmol/mol		
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.040	$u_{r,z}$	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 <sub>2</sub> 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 <sub>2</sub> 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 <sub>3</sub> 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	$u_{isc}$	0.0858	
21	Converter efficiency	≥ 98	99.20	$u_{ec}$	0.7002	
23	Uncertainty of test gas	≤ 3.0%	2.000	$u_{og}$	1.0941	
Combined standard uncertainty				$u_c$	5.6574	nmol/mol
Expanded uncertainty				U	11.3148	nmol/mol
Relative expanded uncertainty				W	10.82	%
Maximum allowed expanded uncertainty				$W_{req}$	15	%



Combined uncertainty, laboratory and field, 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	$u_{r,1h}$	not considered, as $\sqrt{2} \cdot u_{r,1h} = 0,03 < u_{r,f}$	-
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 <sub>2</sub> O with 21 mmol/mol	≤ 10 nmol/mol (Zero)	-0.220	$u_{H_2O}$	0.47	0.2178
		≤ 10 nmol/mol (Span)	3.870			
8b	Interferent CO <sub>2</sub> 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 <sub>3</sub> mit 200 nmol/mol	≤ 5.0 nmol/mol (Zero)	0.120			
		≤ 5.0 nmol/mol (Span)	2.070	$u_{int,neg}$		
9	Averaging effect	≤ 7.0% of measured value	-2.330	$u_{sv}$	-1.41	1.9799
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	1.580	$u_{d,l,z}$	0.91	0.8321
12	Long term drift at span level	≤ 5.0% of max. of certification range	2.430	$u_{d,l,1h}$	1.47	2.1535
18	Difference sample/calibration port	≤ 1.0%	0.240	$u_{ssc}$	0.25	0.0630
21	Converter efficiency	≥ 98	99.400	$u_{EC}$	0.63	0.3939
23	Uncertainty of test gas	≤ 3.0%	2.000	$u_{sg}$	1.05	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 uncertainty, laboratory and field, system 2

Measuring device: AC 32e		Senal-No.:		SN 6	
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	$u_{r,1h}$	-
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 <sub>2</sub> 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 <sub>2</sub> 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 <sub>3</sub> 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
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	1.570	$u_{r,f}$	2.6969
11	Long term drift at zero level	≤ 5.0 nmol/mol	2.140	$u_{d,l,z}$	1.5265
12	Long term drift at span level	≤ 5.0% of max. of certification range	0.870	$u_{d,l,1h}$	0.2760
18	Difference sample/calibration port	≤ 1.0%	-0.280	$u_{\Delta sc}$	0.0858
21	Converter efficiency	≥ 98	99.200	$u_{EC}$	0.7002
23	Uncertainty of test gas	≤ 3.0%	2.000	$u_{cg}$	1.0941
Combined standard uncertainty				$u_c$	6.0419
Expanded uncertainty				U	12.0838
Relative expanded uncertainty				W	11.55
Maximum allowed expanded uncertainty				$W_{req}$	15