Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000050626_01

AMS designation:	CO 12e for CO
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 (2010), VDI 4203-3 (2010), EN 14626 (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 0000050626 of 25 April 2016.

TÜVRheinland® CERTIFIED

Suitability Tested
Equivalent to
2008/50/EC
EN 15267
Regular Surveillance

www.tuv.com
ID 0000050626

Publication in the German Federal Gazette (BAnz) of 14 March 2016

This certificate will expire on:
13 March 2026

German Federal Environment Agency
Dessau, 13 March 2021

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 12 March 2021

ppa. Dr. Peter Wilbring

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TÜV Rheinland Energy GmbH
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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.

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Test Report:	936/21228317/A dated 9 October 2015
Initial certification:	14 March 2016
Expiry date:	13 March 2026
Certificate:	Renewal (of previous certificate 0000050626 dated 25 April 2016 valid until 13 March 2021)
Publication:	BAnz AT 14.03.2016 B7, chapter III number 1.1

Approved application
The certified AMS is suitable for continuous ambient air monitoring of carbon monoxide (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three-months 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 provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the limit values 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 no. 936/21228317/A dated 9 October 2015 issued by 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 14.03.2016 B7, chapter III number 1.1, UBA announcement dated 18 February 2016:

AMS designation:
CO 12e for CO

Manufacturer:
Environnement S.A., Poissy, France

Field of application:
For continuous ambient air monitoring of carbon monoxide (stationary operation)

Measuring ranges during performance testing:

Component	Certification range	Unit
Carbon monoxide	0 - 100	mg/m³

Software version:
Firmware: 1.0.d

Restrictions:
None

Notes:
1. Performance testing also covered the CO 12e* 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 Energie und Umwelt GmbH, Cologne
Report no.: 936/21228317/A dated 9 October 2015

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV notification 24, UBA announcement dated 27 February 2019:

24 Notification as regards Federal Environment Agency (UBA) notice of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter III number 1.1)

The latest software version of the CO12e/CO12e* measuring system for CO manufactured by Environnement S.A. is:

v1.0.m

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 notification 29, UBA announcement dated 24 February 2020:

29 Notification as regards Federal Environment Agency (UBA) notices of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter III number 1.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV 24th notification)

Environnement S.A., Poissy, France have changed their company name to ENVEA.

The latest software version of the CO12e/CO12e* measuring system for CO manufactured by ENVEA is: v1.1.c

Statement issued by TÜV Rheinland Energy GmbH dated 1 October 2019

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

The CO 12e is a continuous carbon monoxide analyser. Which uses the method of non-dispersive infrared photometry, designed for the continuous measurement of carbon monoxide in ambient air.

The CO 12e uses the method of infrared absorption according to the Beer-Lambert Law.

The AMS is available in two versions:

- The version **CO 12e** is fitted with a TFT LCD coloured display with backlight and a touch screen function. Signal output as well as operation can also be carried out via the web browser using an external PC connected via Ethernet.
- The version **CO 12e*** is not fitted with a display. Signal output as well as operation can only be operated via the web browser on an external PC connected via Ethernet.

Additionally, the AMS front side is fitted with the main switch.

Apart from that, both versions of the AMS are of identical design.

Fluid inputs and outputs as well as electrical connections are located on the rear side of the AMS.

The analyser's inside can be roughly divided in two components:

The **mechanical** component consists of an electro valve filter unit as well as the measuring cell. The sample to be analysed is led through a dust filter to the module which consists of two magnet valves. The pump draws the sample via the measurement cell in which the CO molecules selectively absorb infrared radiation centered to a wavelength of 4.67 µm. An optical sensor as well as a light source are located within the measurement cell. A selective CO filter allows for zero point correction.

The **electronic** component consists of a power supply providing a supply voltage of 24 V. It is connected to the outlet as well as the connection chip. The supply card provides additional internal supply voltage (24 V, 15 V, 5 V, 3.3 V). The control card controls general operation of the analyser (magnet valves, pressure and temperature control). The measurement card processes the measurement data and controls the motor and the infrared source. The HMI card controls the data output as well as the visualisation on the touch screen display.

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**.

Document history

Certification of the CO 12e 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. 0000050626: 25 April 2016
Expiry date of the certificate: 13 March 2021
Test report no. 936/21228317/A dated 9 October 2015
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 14.03.2016 B7, chapter III number 1.1
UBA announcement dated 18 February 2016

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 27 September 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 24
UBA announcement dated 27 February 2019
(New software version)

Statement issued by TÜV Rheinland Energy GmbH dated 1 October 2019
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 29
UBA announcement dated 24 February 2020
(new software version, new manufacturer name)

Renewal of the certificate

Certificate no. 0000050626_01: 13 March 2021
Expiry date of the certificate: 13 March 2026

Expanded uncertainty from the results obtained in the laboratory tests for analyser 1

Measuring device:	CO 12e			Serial-No.:	SN 11		
Measured component:	CO			8h-limit value:	8.62	µmol/mol	

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0.000	$u_{r,z}$	0.00	0.0000
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0.030	u_r	0.01	0.0001
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	1.940	u_l	0.10	0.0093
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0.050	u_{gp}	0.11	0.0128
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.000	u_{gt}	0.00	0.0000
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.019	u_{st}	0.04	0.0020
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0.000	u_V	0.00	0.0000
8a	Interferent H_2O with 21 mmol/mol	≤	1.0 µmol/mol (Zero)	0.290	u_{H2O}	0.25	0.0607
		≤	1.0 µmol/mol (Span)	0.330			
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.150	$u_{int,pos}$	0.08	0.0065
		≤	0.5 µmol/mol (Span)	-0.140			
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.060	or		
		≤	0.5 µmol/mol (Span)	0.040			
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	-0.050	$u_{int,neg}$		
		≤	0.5 µmol/mol (Span)	0.060			
9	Averaging effect	≤	7.0% of measured value	-2.560	u_{av}	-0.13	0.0162
18	Difference sample/calibration port	≤	1.0%	0.390	u_{Asc}	0.03	0.0011
21	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	0.09	0.0074

Combined standard uncertainty	u_c	0.3408	µmol/mol
Expanded uncertainty	U	0.6815	µmol/mol
Relative expanded uncertainty	W	7.91	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty from the results obtained in the laboratory tests for analyser 2

Measuring device: CO 12e | Serial-No.: SN 12

Measured component: CO | 8h-limit value: 8.62 µmol/mol

No.	Performance characteristic	Performance criterion	Result	Partial uncertainty		Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 0.3 µmol/mol	0.030	$u_{r,z}$	0.01	0.0001
2	Repeatability standard deviation at 8h-limit value	≤ 0.4 µmol/mol	0.050	u_r	0.01	0.0001
3	"lack of fit" at 8h-limit value	≤ 4.0% of measured value	2.060	u_l	0.10	0.0105
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.050	u_{gp}	0.11	0.0128
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.000	u_{gt}	0.00	0.0000
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤ 0.3 µmol/mol/K	0.019	u_{st}	0.05	0.0020
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤ 0.3 µmol/mol/V	0.010	u_V	0.03	0.0008
8a	Interferent H_2O with 21 mmol/mol	≤ 1.0 µmol/mol (Zero)	0.220	u_{H2O}	0.24	0.0571
		≤ 1.0 µmol/mol (Span)	0.320			
8b	Interferent CO_2 with 500 µmol/mol	≤ 0.5 µmol/mol (Zero)	-0.210	$u_{int,pos}$	0.05 or $u_{int,neg}$	0.0027
		≤ 0.5 µmol/mol (Span)	-0.090			
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	-0.030			
		≤ 0.5 µmol/mol (Span)	0.000			
8d	Interferent N_2O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	-0.160			
		≤ 0.5 µmol/mol (Span)	0.010			
9	Averaging effect	≤ 7.0% of measured value	-2.610	u_{av}	-0.13	0.0169
18	Difference sample/calibration port	≤ 1.0%	0.220	$u_{\Delta sc}$	0.02	0.0004
21	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	0.09	0.0074

Combined standard uncertainty	u_c	0.3327	µmol/mol
Expanded uncertainty	U	0.6655	µmol/mol
Relative expanded uncertainty	W	7.72	%
Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 1

Measuring device:	CO 12e			Serial-No.:	SN 11			
Measured component:	CO			8h-limit value:	8.62	µmol/mol		
No.	**Performance characteristic**		**Performance criterion**	**Result**	**Partial uncertainty**		**Square of partial uncertainty**	
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0.000	$u_{r,z}$	0.00	0.0000	
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0.030	u_r	not considered, as ur = 0 < ur,f	-	
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	1.940	u_l	0.10	0.0093	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0.050	u_{gp}	0.11	0.0128	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.000	u_{gt}	0.00	0.0000	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.019	u_{st}	0.04	0.0020	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0.000	u_v	0.00	0.0000	
8a	Interferent H_2O with 21 mmol/mol	≤	1.0 µmol/mol (Zero)	0.290	$u_{i,H2O}$	0.25	0.0607	
		≤	1.0 µmol/mol (Span)	0.330				
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.150	$u_{int,pos}$	or 0.08	0.0065	
		≤	0.5 µmol/mol (Span)	-0.140				
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.060				
		≤	0.5 µmol/mol (Span)	0.040				
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	-0.050	$u_{int,neg}$			
		≤	0.5 µmol/mol (Span)	0.060				
9	Averaging effect	≤	7.0% of measured value	-2.560	u_{av}	-0.13	0.0162	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1.790	$u_{r,f}$	0.15	0.0238	
11	Long term drift at zero level	≤	0.5 µmol/mol	0.230	$u_{d,l,z}$	0.13	0.0176	
12	Long term drift at span level	≤	5.0% of max. of certification range	0.700	$u_{d,l,sh}$	0.03	0.0012	
18	Difference sample/calibration port	≤	1.0%	0.390	$u_{i,ssc}$	0.03	0.0011	
21	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	0.09	0.0074	
					Combined standard uncertainty	u_c	0.3984	µmol/mol
					Expanded uncertainty	U	0.7968	µmol/mol
					Relative expanded uncertainty	W	9.24	%
					Maximum allowed expanded uncertainty	W_{req}	15	%

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 2

Measuring device:	CO 12e			Serial-No.:	SN 12		
Measured component:	CO			8h-limit value:	8.62	µmol/mol	

No.	Performance characteristic		Performance criterion	Result	Partial uncertainty		Square of partial uncertainty	
1	Repeatability standard deviation at zero	≤	0.3 µmol/mol	0.030	$u_{r,z}$	0.01	0.0001	
2	Repeatability standard deviation at 8h-limit value	≤	0.4 µmol/mol	0.050	u_r	not considered, as ur = 0.01 < ur,f	-	
3	"lack of fit" at 8h-limit value	≤	4.0% of measured value	2.060	u_l	0.10	0.0105	
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤	0.7 µmol/mol/kPa	0.050	u_{gp}	0.11	0.0128	
5	Sensitivity coefficient of sample gas temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.000	u_{gt}	0.00	0.0000	
6	Sensitivity coefficient of surrounding temperature at 8h-limit value	≤	0.3 µmol/mol/K	0.019	u_{st}	0.05	0.0020	
7	Sensitivity coefficient of electrical voltage at 8h-limit value	≤	0.3 µmol/mol/V	0.010	u_V	0.03	0.0008	
8a	Interferent H_2O with 21 mmol/mol	≤	1.0 µmol/mol (Zero)	0.220	u_{H2O}	0.24	0.0571	
		≤	1.0 µmol/mol (Span)	0.320				
8b	Interferent CO_2 with 500 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.210	$u_{int,pos}$	or 0.05	0.0027	
		≤	0.5 µmol/mol (Span)	-0.090				
8c	Interferent NO with 1 µmol/mol	≤	0.5 µmol/mol (Zero)	-0.030				
		≤	0.5 µmol/mol (Span)	0.000				
8d	Interferent N_2O with 50 nmol/mol	≤	0.5 µmol/mol (Zero)	-0.160	$u_{int,neg}$			
		≤	0.5 µmol/mol (Span)	0.010				
9	Averaging effect	≤	7.0% of measured value	-2.610	u_{av}	-0.13	0.0169	
10	Reproducibility standard deviation under field conditions	≤	5.0% of average over 3 months	1.790	$u_{r,f}$	0.15	0.0238	
11	Long term drift at zero level	≤	0.5 µmol/mol	0.160	$u_{d,l,z}$	0.09	0.0085	
12	Long term drift at span level	≤	5.0% of max. of certification range	0.890	$u_{d,l,8h}$	0.04	0.0020	
18	Difference sample/calibration port	≤	1.0%	0.220	$u_{\Delta sc}$	0.02	0.0004	
21	Uncertainty of test gas	≤	3.0%	2.000	u_{cg}	0.09	0.0074	

Combined standard uncertainty	u_c	0.3806	µmol/mol
Expanded uncertainty	U	0.7613	µmol/mol
Relative expanded uncertainty	W	8.83	%
Maximum allowed expanded uncertainty	W_{req}	15	%