

CERTIFICATE

of Product Conformity (QAL1)

Certificate No. : 0000050626

Certified AMS: CO 12e for CO

Manufacturer: Environnement S.A.
111, bd 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 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 9 pages).

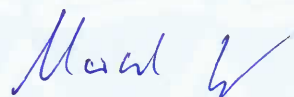


Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000050626

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

German Federal Environment Agency
Dessau, 25 April 2016



Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
13 March 2021

TÜV Rheinland Energy GmbH
Cologne, 24 April 2016



ppa. Dr. Peter Wilbring

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51105 Cologne

Test institute accredited to EN ISO/IEC 17025:2005 by DAKS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00

Certificate:
0000050626 / 25 April 2016

Test report: 936/21228317/A of 9 October 2015
Initial certification: 14 March 2016
Date of expiry: 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 (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 a 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 ambient air applications at which it will be installed.

Basis of the certification

This certification is based on:

- test report 936/21228317/A of 9 October 2015 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 14.03.2016 B7, chapter III number 1.1,
Announcement by UBA from 18 February 2016:

AMS designation:

CO 12e for CO

Manufacturer:

Environnement S.A., Poissy, France

Field of application:

For continuous ambient air monitoring of concentrations of carbon monoxide
(stationary operation).

Measuring ranges during the performance test:

Component	Certification range	Unit
carbon monoxide	0 - 100	mg/m ³

Software version:

Firmware: 1.0.d

Restrictions:

None

Notes:

1. Performance testing also covers version CO 12e* (without display) of the instrument. Measured values are displayed on a PC or laptop belonging to the AMS in this case.
2. The test report on performance test is online available at www.qal1.de.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21228317/A dated 9 October 2015

Certified product

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

CO 12e is a continuous carbon monoxide analyser. The measuring principle is based on non-dispersive infrared spectroscopy. The AMS is designed for continuous measurement of carbon monoxide in ambient air.

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.

Additional 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 over 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 card. 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 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 is presented on page 1 of this certificate.

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 certification 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 CO 12e for CO 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. 0000050626: 25 April 2016,
Expiration date of the certificate: 13 Month 2021,
Test report: 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,
Announcement by UBA from 18 February 2016

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

Measuring device:		Serial No.:		SN 11		
Measured component:		8h-limit value:		8.62		
CO 12e						
CO						
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 ₂ O with 21 mmol/mol	≤ 1.0 µmol/mol (Zero)	0.290	u_{H_2O} 0.25	0.0607	
8b	Interferent CO ₂ with 500 µmol/mol	≤ 1.0 µmol/mol (Span)	0.330			
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	-0.150	$u_{int,pos}$	0.08	
		≤ 0.5 µmol/mol (Span)	-0.140			
		≤ 0.5 µmol/mol (Zero)	-0.060			
		≤ 0.5 µmol/mol (Span)	0.040			
8d	Interferent N ₂ O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	-0.060	$u_{int,neg}$	0.0065	
		≤ 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 based on the results of the laboratory testing of device 2

Measuring device:		Serial-No.:		SN 12	
Measured component:		8h-limit value:		8.62	
CO 12e		CO		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 ₂ O with 21 mmol/mol	≤ 1.0 µmol/mol (Zero)	0.220	u_{H_2O} 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	$u_{H_2, pos}$	
		≤ 0.5 µmol/mol (Span)	-0.090		
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero)	-0.030	0.05	0.0027
		≤ 0.5 µmol/mol (Span)	0.000	or	
8d	Interferent N ₂ O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero)	-0.160	$u_{H_2, neg}$	
		≤ 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_{asc} 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
		Expanded uncertainty		U	0.6655
		Relative expanded uncertainty		W	7.72
		Maximum allowed expanded uncertainty		W_{req}	15

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

Measuring device:		CO 12e		Serial-No.:		SN 11	
Measured component:		CO		8h-limit value:		8.62	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty	μmol/mol	
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 u _r = 0 < u _{r,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 _{sp}	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 ₂ O with 21 mmol/mol	≤ 1.0 μmol/mol (Zero) ≤ 1.0 μmol/mol (Span)	0.290 0.330	u _{H2O}	0.25	0.0607	
8b	Interferent CO ₂ with 500 μmol/mol	≤ 0.5 μmol/mol (Zero) ≤ 0.5 μmol/mol (Span)	-0.150 -0.140	u _{int,pos}			
8c	Interferent NO with 1 μmol/mol	≤ 0.5 μmol/mol (Zero) ≤ 0.5 μmol/mol (Span)	-0.060 0.040	or	0.08	0.0065	
8d	Interferent N ₂ O with 50 nmol/mol	≤ 0.5 μmol/mol (Zero) ≤ 0.5 μmol/mol (Span)	-0.050 0.060	u _{int,neg}			
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 _{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		0.3984	μmol/mol
Expanded uncertainty				U		0.7968	μmol/mol
Relative expanded uncertainty				W		9.24	%
Maximum allowed expanded uncertainty				W _{req}		15	%

Measuring device:		Serial No.:		SN 12	
Measured component:		8h-limit value:		8.62	
CO 12e		CO		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 u _r = 0.01 < u _{r,f}	-
3	"lack of fit" at 8h-limit value	≤ 4.0% of measured value	2.060	u _f 0.10	0.0105
4	Sensitivity coefficient of sample gas pressure at 8h-limit value	≤ 0.7 µmol/mol/kPa	0.050	u _{sp} 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 ₂ O with 21 mmol/mol	≤ 1.0 µmol/mol (Zero) ≤ 1.0 µmol/mol (Span)	0.220 0.320	u _{H2O} 0.24	0.0571
8b	Interferent CO ₂ with 500 µmol/mol	≤ 0.5 µmol/mol (Zero) ≤ 0.5 µmol/mol (Span)	-0.210 -0.090	u _{CO2, pos}	
8c	Interferent NO with 1 µmol/mol	≤ 0.5 µmol/mol (Zero) ≤ 0.5 µmol/mol (Span)	-0.030 0.000	0.05	0.0027
8d	Interferent N ₂ O with 50 nmol/mol	≤ 0.5 µmol/mol (Zero) ≤ 0.5 µmol/mol (Span)	-0.160 0.010	u _{NO, neg}	
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,sh} 0.04	0.0020
18	Difference sample/calibration port	≤ 1.0%	0.220	u _{ssc} 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
Expanded uncertainty				U	0.7613
Relative expanded uncertainty				W	8.83
Maximum allowed expanded uncertainty				W _{req}	15