Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000001013_06

AMS designation:	CEMS II *e* for CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, CO_2, H_2O, CH_4, CH_2O and O_2
Manufacturer:	Gasmet Technologies Oy Pulttitie 8 A 1 00880 Helsinki Finland
Test Laboratory:	TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with the standards EN 15267-1 (2009), EN 15267-2 (2009), EN 15267-3 (2007) and EN 14181 (2004).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 23 pages).
The present certificate replaces certificate 0000001013_05 of 25 April 2017.

TÜVRheinland® ZERTIFIZIERT

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000001013

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

This certificate will expire on:
28 July 2022

German Federal Environment Agency
Dessau, 28 July 2021

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 27 July 2021

ppa. Dr. Peter Wilbring

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TÜV Rheinland Energy GmbH
Am Grauen Stein
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.

Test Report:	936/21225866/C of 13 October 2016
Initial certification:	29 July 2011
Expiry date:	28 July 2022
Certificate:	Renewal (of previous certificate 0000001013_05 of 25 April 2017 valid until 28 July 2021)
Publication:	BAnz AT 15.03.2017 B6, chapter I number 3.3

Approved application
The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13th BImSchV), chapter IV (17th BImSchV), 30th BImSchV and plants in compliance with TA Luft. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of several laboratory tests and three field tests, each over three months. For the maintenance interval extension a further field test was carried out over twelve months. The field tests occurred at two different waste incineration plants.

The AMS is approved for an ambient temperature range of +5 °C to +40 °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 and oxygen concentrations 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 936/21225866/C 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 I number 3.3, UBA announcement dated 22 February 2017:

AMS designation:

CEMS II *e* for CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, CO_2, H_2O, O_2, CH_4 and CH_2O

Manufacturer:

Gasmet Technologies Oy, Helsinki, Finland

Field of application:

For plants requiring official approval

Measuring ranges during performance testing:

Component	Certification range	Supplementary measuring ranges		Unit
CO	0 – 75	0 – 300	0 – 1,500	mg/m³
NO	0 – 150	0 – 600	0 – 2,000	mg/m³
NO_2	0 – 200	0 – 500	-	mg/m³
N_2O	0 – 100	0 – 500	-	mg/m³
SO_2	0 – 75	0 – 300	0 – 1,500	mg/m³
HCl	0 – 15	0 – 90	-	mg/m³
HF	0 – 3	0 – 10	-	mg/m³
NH_3	0 – 15	0 – 50	-	mg/m³
O_2	0 – 25	-	-	vol.-%
CO_2	0 – 25	-	-	vol.-%
H_2O	0 – 30	0 – 40	-	vol.-%
CH_4	0 – 15	0 – 50	0 – 150	mg/m³
CH_2O	0 – 20	0 – 30	0 – 90	mg/m³

Software versions:

Calcmet: 12.18 with evaluation module 4.42.2 and OXITEC Ver. 1.50 np

Restrictions:

None

Notes:

1. The maintenance interval is six months.
2. During the test with HF, HCl, NH_3 and CH_2O wet test gases are to be used.
3. The sampling probe should be cleansed after plant failures.
4. The measuring system is available as variant A (air conditioner unit on top of the measurement cabinet) and variant B (air conditioner unit on the back of the measurement cabinet).
5. For the measurement of the component O_2 (optional) the OXITEC 500E SME 5 analyser manufactured by ENOTEC GmbH, Marienheide, Germany is integrated.

6. Supplementary testing (maintenance interval extension) for notification of the German Federal Environment Agency (UBA) dated 14 July 2016 (BAnz AT 01.08.2016 B11, chapter I number 3.1).

Test Report:

TÜV Rheinland Energy GmbH, Cologne

Report no.: 936/21225866/C of 13 October 2016

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chapter V 50th notification, UBA announcement dated 21 February 2018:

50 Notification as regards Federal Environmental Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.3)

The current software versions of the measuring system CEMS II *e* for the components O_2, CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, H_2CO and CH_4 from Gasmet Technology Oy are:

Calcmet: 12.20 with evaluation module 4.42.2 OXITEC Ver. 1.50 np

Calcmet version 12.19 can also be used.

Statement issued by TÜV Rheinland Energy GmbH dated 7 December 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV 36th notification, UBA announcement dated 27 February 2019:

36 Notification as regards Federal Environmental Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.3) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V 50th notification)

The current software versions of the measuring system CEMS II *e* for the components O_2, CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, H_2CO and CH_4 from Gasmet Technology Oy are:

Calcmet: 12.202 with evaluation module 4.42.2
OXITEC 4.10

Calcmet version 12.201 can also be used.

The optionally installed oxygen analyser OXITEC 500E can be installed with a new front panel with modified display and operation. With the new front panel, the reference to the manufacturer Enotec is no longer included.
The background colour of the rotameters in the purge gas supply module has been changed from black to white. The Fujitsu B19-7 LED monitor can also be used as a monitor for device display.

Statement issued by TÜV Rheinland Energy GmbH dated 8 October 2018

Publication in the German Federal Gazette: BAnz AT 22.07.2019 B8, chapter V 6th notification, UBA announcement dated 28 June 2019:

6 Notification as regards Federal Environmental Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.3) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV 36th notification)

The new address of Gasmet Technology Oy, manufacturer of the CEMS II *e* measuring system for O_2, CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, H_2CO und CH_4, is as follows:
Gasmet Technologies Oy, Mestarintie 6, 01730 Vantaa, Finland

Statement issued by TÜV Rheinland Energy GmbH dated 7 March 2019

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV 47th notification, UBA announcement dated 24 February 2020:

47 Notification as regards Federal Environmental Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.3) and of 28 June 2019 (BAnz AT 22.07.2019 B8, chapter V 6th notification)

The label at the door of the CEMS II *e* measuring system for O_2, CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, H_2CO and CH_4 manufactured by Gasmet Technology Oy was adapted to the latest corporate design.
The measuring system may also be equipped with a SIMATIC IPC847E PC running the Windows 10 operating system.
The cylinder of the FTIR measuring cell may also be used when gold-coated from two sides.

Statement issued by TÜV Rheinland Energy GmbH dated 16 December 2019

Publication in the German Federal Gazette: BAnz AT 03.05.2021 B9, chapter III 30th notification, UBA announcement dated 31 March 2021:

30 Notification as regards Federal Environmental Agency (UBA) notices of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter I number 3.3) and of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV 47th notification)

The latest software versions of the CEMS II e measuring system for the components O_2, CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, H_2CO and CH_4 manufactured by Gasmet Technology Oy are:
Calcmet: 12.210 with evaluation module 4.42.2
Calcmet version 12.206 may also be used.
The software version of the Oxitex 500E remains unchanged at 4.10.
In addition to the previously used power supply unit, the PSF-125-12 power supply unit from Powerbox Oy can also be used in the future.

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 measuring system CEMS II *e* consists of the parts:

1) Sampling system:

Sampling probe:	SP2000H from the company M & C, heated to 180 °C, with PTFE filter: 2 µm
Heated line:	180 °C with 4 mm Teflon hose, 25 m length, (standard 5 to 30 m)
Pump:	heated to 180 °C, with Teflon membrane

2) Analysers:

FTIR:	Gasmet CX-4000, cuvette temperature: 180 °C, optical path length: 5 m,
	IR source: SiC,
O_2: OPTIONAL:	ZrO_2 measuring cell OXITEC 500E SME 5 in the 19"-module manufactured by ENOTEC GmbH with software OXITEC Ver. 4.10 np

3) DAHS:

Standard industrial PC with Windows 7 Ultimate 32bit.
To analyse the Gasmet CEMS spectra, the calculated spectra are transmitted to a PC via RS232 interface for further processing. The PC also controls and monitors sampling and gaseous analyte flow of the analysers.

4) Software:

Evaluation software Calcmet version 12.202 with analysis module 4.42.2

5) Measuring cabinet

Air-conditioning adjusted to approx. 30 °C,

Sampling pump, control units, analysers, interface boards for analogue and digital input and output and computer.

The measurement cabinet is available as version:
A (dimensions: 212x61x70 cm, air conditioner unit on top of the measurement cabinet) and
B (dimensions: 210x61x113 cm, air conditioner unit on the back of the measurement cabinet).
Both versions can be equipped with the OXITEC 500E SME 5 O2 analyser manufactured by ENOTEC GmbH with software version OXITEC Ver. 1.50 np in addition to the FTIR. All other components are identical.

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 CEMS II *e* measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

First suitability test:

Initial report 936/21200448/A of 07 July 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz 14 October 2006, no. 194, p. 6715
UBA announcement dated 12 September 2006

Supplementary testing

Supplementary test report 936/21203240/B of 03 September 2007
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz 07 March 2008, no. 38, p. 901
UBA announcement dated 14 February 2008
(Additional component O_2)

Notifications

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
dated 14 December 2006
Publication: BAnz 20 April 2007, no. 75, p. 4139
UBA announcement dated 12 April 2007
(Enclosure variants)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 March 2011
Publication: BAnz 29 July 2011, no. 133, p. 2725,
UBA announcement dated 15 July 2011
(New software version)

Initial certification according to EN 15267

Certificate no. 0000001013: 19 August 2011
Expiry date of the certificate: 28 July 2016
Test Report: 936/21210692/A of 30 March 2011
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz 29 October 2011, no. 113, p. 2725, chapter I number 4.1
UBA announcement dated 15 July 2011

Supplementary testing according to EN 15267

Certificate no. 0000001013_01: 20 August 2012
Expiry date of the certificate: 28 July 2016
Test Report: 936/21218384/A of 16 March 2012
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 20 July 2012 B11, chapter I number 3.1
UBA announcement dated 06 July 2012

Certificate no. 0000001013_02: 20 August 2013
Expiry date of the certificate: 28 July 2016
Test Report: 936/21220683/A of 27 March 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 23 July 2013 B4, chapter I number 3.1
UBA announcement dated 03 July 2013

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 30 September 2013
Publication: BAnz AT 01.04.2014 B12, Chapter VI notification 12
UBA announcement dated 27 February 2014
(New software version)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 01 October 2014
Publication: BAnz AT 02.04.2015 B5, chapter IV notification 33
UBA announcement dated 03 July 2013
(Hardware changes)

Renewal of the certificate

Certificate no. 0000001013_03: 22 July 2016
Expiry date of the certificate: 28 July 2021

Supplementary testing according to EN 15267

Certificate no. 0000001013_04: 19 August 2016
Expiry date of the certificate: 28 July 2021
Test Report: 936/21225866/B of 23 February 2016
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 01.08.2016 B11, chapter I number 3.1
UBA announcement dated 14 July 2016

Certificate no. 0000001013_05: 25 April 2017
Expiry date of the certificate: 28 July 2021
Test Report: 936/21225866/C of 13 October 2016
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 15.03.2017 B6, chapter I number 3.3
UBA announcement dated 22 February 2017

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energy GmbH dated 7 December 2017
Publication: BAnz AT 26.03.2018 B8, chapter V notification 50
UBA announcement dated 21 February 2018
(Software updates)

Statement issued by TÜV Rheinland Energy GmbH dated 8 October 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification36
UBA announcement dated 27 February 2019
(Software changes, hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 7 March 2019
Publication: BAnz AT 22.07.2019 B8, chapter V notification 6
UBA announcement dated 28 June 2019
(Change of address)

Statement issued by TÜV Rheinland Energy GmbH dated 16 December 2019
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 47
UBA announcement dated 24 February 2020
(Software changes, hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 9 September 2020
Publication: BAnz AT 03.05.2021 B9, chapter III notification 30
UBA announcement dated 31 March 2021
(Software changes, hardware changes)

Renewal of the certificate

Certificate no. 0000001013_06: 28 July 2021
Expiry date of the certificate: 28 July 2022

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMS II e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		HF	
Certification range		0 - 3	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		0.04	mg/m³
Sum of postive CS at span point		0.12	mg/m³
Sum of negative CS at span point		-0.09	mg/m³
Maximum sum of cross-sensitivities		0.12	mg/m³
Uncertainty of cross-sensitivity	u_i	0.068	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.010	mg/m³	0.000	$(mg/m^3)^2$
Lack of fit	u_{lof}	0.032	mg/m³	0.001	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	0.002	mg/m³	0.000	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	-0.040	mg/m³	0.002	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.040	mg/m³	0.002	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.016	mg/m³	0.000	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	0.068	mg/m³	0.005	$(mg/m^3)^2$
Influence of sample gas flow	u_p	-0.006	mg/m³	0.000	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	0.024	mg/m³	0.001	$(mg/m^3)^2$

* The larger value is used :
"Repeatability standard deviation at span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.10	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.19	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 1 mg/m³**	**19.4**
Requirement of 2010/75/EU	**U in % of the ELV 1 mg/m³**	**40.0**
Requirement of EN 15267-3	U in % of the ELV 1 mg/m³	30.0

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMS II e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		CH_2O	
Certification range		0 - 20	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.16	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		0.36	mg/m³
Sum of negative CS at span point		-0.19	mg/m³
Maximum sum of cross-sensitivities		0.36	mg/m³
Uncertainty of cross-sensitivity	u_i	0.208	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.038	mg/m³	0.001	(mg/m³)²
Lack of fit	u_{lof}	-0.104	mg/m³	0.011	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.000	mg/m³	0.000	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.242	mg/m³	0.059	(mg/m³)²
Influence of ambient temperature at span	u_t	0.153	mg/m³	0.023	(mg/m³)²
Influence of supply voltage	u_v	0.047	mg/m³	0.002	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.208	mg/m³	0.043	(mg/m³)²
Influence of sample gas flow	u_p	-0.051	mg/m³	0.003	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.162	mg/m³	0.026	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.41	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.80	mg/m³

Relative total expanded uncertainty	**U in % of the range 20 mg/m³**	**4.0**
Requirement of 2010/75/EU	**U in % of the range 20 mg/m³**	**30.0 ****
Requirement of EN 15267-3	U in % of the range 20 mg/m³	22.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 30.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			Gasmet Technolgies Oy		
AMS designation			CEMS II e		
Serial number of units under test			14433 / 14434		
Measuring principle			FTIR		
Test report			936/21225866/C		
Test laboratory			TÜV Rheinland		
Date of report			2016-10-13		
Measured component			CH_4		
Certification range			0 - 15	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.00	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			0.08	mg/m³	
Sum of negative CS at span point			-0.38	mg/m³	
Maximum sum of cross-sensitivities			-0.38	mg/m³	
Uncertainty of cross-sensitivity	u_i		-0.217	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.034	mg/m³	0.001	$(mg/m^3)^2$
Lack of fit	u_{lof}	0.035	mg/m³	0.001	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	0.000	mg/m³	0.000	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	0.156	mg/m³	0.024	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.057	mg/m³	0.003	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.026	mg/m³	0.001	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	-0.217	mg/m³	0.047	$(mg/m^3)^2$
Influence of sample gas flow	u_p	-0.069	mg/m³	0.005	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	$(mg/m^3)^2$

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.31	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.61	mg/m³

Relative total expanded uncertainty	**U in % of the range 15 mg/m³**	**4.1**
Requirement of 2010/75/EU	**U in % of the range 15 mg/m³**	**30.0 ****
Requirement of EN 15267-3	U in % of the range 15 mg/m³	22.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 30.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMS II e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		NO	
Certification range		0 - 150	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		0.00	mg/m³
Sum of negative CS at span point		-2.60	mg/m³
Maximum sum of cross-sensitivities		-2.60	mg/m³
Uncertainty of cross-sensitivity	u_i	-1.498	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.360	mg/m³	0.130	(mg/m³)²
Lack of fit	u_{lof}	0.580	mg/m³	0.336	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.087	mg/m³	0.008	(mg/m³)²
Span drift from field test	$u_{d,s}$	1.645	mg/m³	2.706	(mg/m³)²
Influence of ambient temperature at span	u_t	0.709	mg/m³	0.503	(mg/m³)²
Influence of supply voltage	u_v	0.379	mg/m³	0.144	(mg/m³)²
Cross-sensitivity (interference)	u_i	-1.498	mg/m³	2.244	(mg/m³)²
Influence of sample gas flow	u_p	-0.577	mg/m³	0.333	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.212	mg/m³	1.470	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.81	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	5.50	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 98 mg/m³**	**5.6**
Requirement of 2010/75/EU	**U in % of the ELV 98 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 98 mg/m³	15.0

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMSII e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		HCl	
Certification range		0 - 15	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.00	mg/m³
Sum of negative CS at zero point		-0.06	mg/m³
Sum of postive CS at span point		0.60	mg/m³
Sum of negative CS at span point		-0.10	mg/m³
Maximum sum of cross-sensitivities		0.60	mg/m³
Uncertainty of cross-sensitivity	u_i	0.346	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.209	mg/m³	0.044	(mg/m³)²
Lack of fit	u_{lof}	0.173	mg/m³	0.030	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.000	mg/m³	0.000	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.208	mg/m³	0.043	(mg/m³)²
Influence of ambient temperature at span	u_t	0.265	mg/m³	0.070	(mg/m³)²
Influence of supply voltage	u_v	0.091	mg/m³	0.008	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.346	mg/m³	0.120	(mg/m³)²
Influence of sample gas flow	u_p	-0.045	mg/m³	0.002	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.58	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.13	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**11.3**
Requirement of 2010/75/EU	**U in % of the ELV 10 mg/m³**	**40.0**
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	30.0

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			Gasmet Technologies Oy		
AMS designation			CEMS II e		
Serial number of units under test			14433 / 14434		
Measuring principle			FTIR		
Test report			936/21225866/C		
Test laboratory			TÜV Rheinland		
Date of report			2016-10-13		
Measured component			H_2O		
Certification range			0 - 30	Vol.-%	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.00	Vol.-%	
Sum of negative CS at zero point			0.00	Vol.-%	
Sum of postive CS at span point			1.10	Vol.-%	
Sum of negative CS at span point			-0.10	Vol.-%	
Maximum sum of cross-sensitivities			1.10	Vol.-%	
Uncertainty of cross-sensitivity	u_i		0.632	Vol.-%	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.292	Vol.-%	0.085	(Vol.-%)²
Lack of fit	u_{lof}	0.230	Vol.-%	0.053	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.000	Vol.-%	0.000	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.329	Vol.-%	0.108	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.231	Vol.-%	0.053	(Vol.-%)²
Influence of supply voltage	u_v	0.262	Vol.-%	0.069	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.632	Vol.-%	0.400	(Vol.-%)²
Influence of sample gas flow	u_p	0.112	Vol.-%	0.013	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.242	Vol.-%	0.059	(Vol.-%)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.92	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.80	Vol.-%

Relative total expanded uncertainty	**U in % of the range 30 Vol.-%**	**6.0**
Requirement of 2010/75/EU	**U in % of the range 30 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 30 Vol.-%	7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 10.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMS II e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		SO_2	
Certification range		0 - 75	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.24	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		2.30	mg/m³
Sum of negative CS at span point		-2.90	mg/m³
Maximum sum of cross-sensitivities		-2.90	mg/m³
Uncertainty of cross-sensitivity	u_i	-1.676	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Repeatability standard deviation at set point *	u_r	0.357	mg/m³	0.127	$(mg/m^3)^2$
Lack of fit	u_{lof}	-0.316	mg/m³	0.100	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	0.043	mg/m³	0.002	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	0.996	mg/m³	0.992	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.557	mg/m³	0.310	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.898	mg/m³	0.806	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	-1.676	mg/m³	2.808	$(mg/m^3)^2$
Influence of sample gas flow	u_p	0.226	mg/m³	0.051	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606	mg/m³	0.368	$(mg/m^3)^2$

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.36	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	4.62	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**9.2**
Requirement of 2010/75/EU	**U in % of the ELV 50 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	15.0

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer	Gasmet Technologies Oy		
AMS designation	CEMS II e		
Serial number of units under test	14433 / 14434		
Measuring principle	FTIR		
Test report	936/21225866/C		
Test laboratory	TÜV Rheinland		
Date of report	2016-10-13		
Measured component	CO		
Certification range	0 - 75	mg/m³	
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point	0.32	mg/m³	
Sum of negative CS at zero point	0.00	mg/m³	
Sum of postive CS at span point	1.90	mg/m³	
Sum of negative CS at span point	-1.00	mg/m³	
Maximum sum of cross-sensitivities	1.90	mg/m³	
Uncertainty of cross-sensitivity	u_i 1.096	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.478	mg/m³	0.228	(mg/m³)²
Lack of fit	u_{lof}	0.554	mg/m³	0.307	(mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.043	mg/m³	0.002	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.693	mg/m³	0.480	(mg/m³)²
Influence of ambient temperature at span	u_t	0.208	mg/m³	0.043	(mg/m³)²
Influence of supply voltage	u_v	0.298	mg/m³	0.089	(mg/m³)²
Cross-sensitivity (interference)	u_i	1.096	mg/m³	1.200	(mg/m³)²
Influence of sample gas flow	u_p	0.117	mg/m³	0.014	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.606	mg/m³	0.368	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.65	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.24	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**6.5**
Requirement of 2010/75/EU	**U in % of the ELV 50 mg/m³**	**10.0**
Requirement of EN 15267-3	U in % of the ELV 50 mg/m³	7.5

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer	Gasmet Technologies Oy		
AMS designation	CEMS II e		
Serial number of units under test	14433 / 14434		
Measuring principle	FTIR		
Test report	936/21225866/C		
Test laboratory	TÜV Rheinland		
Date of report	2016-10-13		
Measured component	NO_2		
Certification range	0 - 150	mg/m³	
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point	1.66	mg/m³	
Sum of negative CS at zero point	0.00	mg/m³	
Sum of postive CS at span point	7.90	mg/m³	
Sum of negative CS at span point	-1.60	mg/m³	
Maximum sum of cross-sensitivities	7.90	mg/m³	
Uncertainty of cross-sensitivity	u_i 4.561	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	1.200	mg/m³	1.440	(mg/m³)²
Lack of fit	u_{lof}	-0.520	mg/m³	0.270	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.115	mg/m³	0.013	(mg/m³)²
Span drift from field test	$u_{d,s}$	-1.155	mg/m³	1.334	(mg/m³)²
Influence of ambient temperature at span	u_t	0.529	mg/m³	0.280	(mg/m³)²
Influence of supply voltage	u_v	0.571	mg/m³	0.326	(mg/m³)²
Cross-sensitivity (interference)	u_i	4.561	mg/m³	20.803	(mg/m³)²
Influence of sample gas flow	u_p	-0.313	mg/m³	0.098	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.212	mg/m³	1.470	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	5.10	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	10.00	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 150 mg/m³**	**6.7**
Requirement of 2010/75/EU	**U in % of the ELV 150 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 150 mg/m³	15.0

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			Gasmet Technologies Oy		
AMS designation			CEMS II e		
Serial number of units under test			14433 / 14434		
Measuring principle			FTIR		
Test report			936/21225866/C		
Test laboratory			TÜV Rheinland		
Date of report			2016-10-13		
Measured component			N_2O		
Certification range			0 - 100	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.00	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at span point			3.20	mg/m³	
Sum of negative CS at span point			-0.80	mg/m³	
Maximum sum of cross-sensitivities			3.20	mg/m³	
Uncertainty of cross-sensitivity		u_i	1.848	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.630	mg/m³	0.397	$(mg/m^3)^2$
Lack of fit	u_{lof}	-0.231	mg/m³	0.053	$(mg/m^3)^2$
Zero drift from field test	$u_{d,z}$	0.000	mg/m³	0.000	$(mg/m^3)^2$
Span drift from field test	$u_{d,s}$	0.346	mg/m³	0.120	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.252	mg/m³	0.064	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.314	mg/m³	0.099	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	1.848	mg/m³	3.413	$(mg/m^3)^2$
Influence of sample gas flow	u_p	-0.120	mg/m³	0.014	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	0.808	mg/m³	0.653	$(mg/m^3)^2$

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.19	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	4.30	mg/m³

Relative total expanded uncertainty	**U in % of the range 100 mg/m³**	**4.3**
Requirement of 2010/75/EU	**U in % of the range 100 mg/m³**	**20.0 ****
Requirement of EN 15267-3	U in % of the range 100 mg/m³	15.0

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 20.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system			
Manufacturer		Gasmet Technologies Oy	
AMS designation		CEMS II e	
Serial number of units under test		14433 / 14434	
Measuring principle		FTIR	
Test report		936/21225866/C	
Test laboratory		TÜV Rheinland	
Date of report		2016-10-13	
Measured component		NH_3	
Certification range		0 - 15	mg/m³
Evaluation of the cross-sensitivity (CS)			
(system with largest CS)			
Sum of positive CS at zero point		0.06	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at span point		0.30	mg/m³
Sum of negative CS at span point		-0.60	mg/m³
Maximum sum of cross-sensitivities		-0.60	mg/m³
Uncertainty of cross-sensitivity	u_i	-0.346	mg/m³

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.074	mg/m³	0.005	(mg/m³)²
Lack of fit	u_{lof}	-0.139	mg/m³	0.019	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.000	mg/m³	0.000	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.199	mg/m³	0.040	(mg/m³)²
Influence of ambient temperature at span	u_t	0.115	mg/m³	0.013	(mg/m³)²
Influence of supply voltage	u_v	0.091	mg/m³	0.008	(mg/m³)²
Cross-sensitivity (interference)	u_i	-0.346	mg/m³	0.120	(mg/m³)²
Influence of sample gas flow	u_b	0.061	mg/m³	0.004	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.47	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.93	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**9.3**
Requirement of 2010/75/EU	**U in % of the ELV 10 mg/m³**	**40.0 ****
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	30.0

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 40.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			Gasmet Technologies Oy		
AMS designation			CEMS II e		
Serial number of units under test			14433 / 14434		
Measuring principle			Zirconium dioxide		
Test report			936/21225866/C		
Test laboratory			TÜV Rheinland		
Date of report			2016-10-13		
Measured component			O_2		
Certification range			0 - 25	Vol.-%	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.00	Vol.-%	
Sum of negative CS at zero point			0.00	Vol.-%	
Sum of postive CS at span point			0.00	Vol.-%	
Sum of negative CS at span point			0.00	Vol.-%	
Maximum sum of cross-sensitivities			0.00	Vol.-%	
Uncertainty of cross-sensitivity	u_i		0.000	Vol.-%	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.047	Vol.-%	0.002	(Vol.-%)²
Lack of fit	u_{lof}	-0.104	Vol.-%	0.011	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.069	Vol.-%	0.005	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.098	Vol.-%	0.010	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.165	Vol.-%	0.027	(Vol.-%)²
Influence of supply voltage	u_v	0.015	Vol.-%	0.000	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000	(Vol.-%)²
Influence of sample gas flow	u_p	-0.012	Vol.-%	0.000	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.31	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.61	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.4**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 10.0 % was used for this.

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			Gasmet Technologies Oy		
AMS designation			CEMS II e		
Serial number of units under test			14433 / 14434		
Measuring principle			FTIR		
Test report			936/21225866/C		
Test laboratory			TÜV Rheinland		
Date of report			2016-10-13		
Measured component			CO_2		
Certification range			0 - 25	Vol.-%	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.00	Vol.-%	
Sum of negative CS at zero point			0.00	Vol.-%	
Sum of postive CS at span point			0.10	Vol.-%	
Sum of negative CS at span point			-0.90	Vol.-%	
Maximum sum of cross-sensitivities			-0.90	Vol.-%	
Uncertainty of cross-sensitivity	u_i		-0.520	Vol.-%	

Calculation of the combined standard uncertainty

Tested parameter				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.100	Vol.-%	0.010	(Vol.-%)²
Lack of fit	u_{lof}	0.115	Vol.-%	0.013	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.014	Vol.-%	0.000	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.188	Vol.-%	0.035	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.231	Vol.-%	0.053	(Vol.-%)²
Influence of supply voltage	u_v	0.099	Vol.-%	0.010	(Vol.-%)²
Cross-sensitivity (interference)	u_i	-0.520	Vol.-%	0.270	(Vol.-%)²
Influence of sample gas flow	u_p	-0.060	Vol.-%	0.004	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%)²

* The larger value is used :
"Repeatability standard deviation at set point" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.66	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.29	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**5.2**
Requirement of 2010/75/EU	**U in % of the range 25 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.
A value of 10.0 % was used for this.