Umwelt Bundes Amt
For our Environment

TÜVRheinland®
Precisely Right.

CERTIFICATE

on Product Conformity (QAL1)

Number of Certificate: 0000001013_01

Certified AMS:	Gasmet CEMS for CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, CO_2, H_2O and O_2
Manufacturer:	Gasmet Technologies Oy 00880 Helsinki Pulttitie 8A1 Finland
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH

This is to certify that the AMS has been tested and found to comply with:

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 (see also the following pages).
The present certificate replaces Certificate No. 0000001013 of 19 August 2011

www.tuv.com TÜVRheinland® ID: 0000001013

- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

Publication in the German Federal Gazette (BAnz.) of 20 July 2012

Umweltbundesamt
Dessau, 20 August 2012

i. A. Marion Wichmann-Fiebig

The certificate is valid until:
28 July 2016

TÜV Rheinland Energie und Umwelt GmbH
Köln, 17 August 2012

ppa. Dr. Peter Wilbring

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TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Köln

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Test report:	936/21218384/A of 16 March 2012
First certification:	29 July 2011
Validity ends:	28 July 2016
Publication:	BAnz AT 20 July 2012 B11, chapter 1, No. 3.1

Approved application
The tested AMS is suitable for the use at combustion plants according to EC directive 2001-80-EC, at waste incinerations plants according to EC directive 2000-76-EC and other plants requiring official permission. The tested ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three months field test at a municipal waste incinerator.

The AMS is authorised for the ambient temperature range from +5 °C to +40 °C.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the installation at which it will be installed.

Basis of the certification
This certification is based on:

- test report 936/21210692/A of 30 March 2011 of TÜV Rheinland Energie und Umwelt GmbH and test report 936/21218384/A of 16 March 2012 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz AT 20 July 2012 B11, chapter 1, No. 3.1

AMS name:
Gasmet CEMS for CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, CO_2, H_2O and O_2

Manufacturer:
Gasmet Technologies Oy, Helsinki, Finland

Approval:
For measurements at plants requiring official approval (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC large combustion plants directive)

Measuring ranges during the suitability test:

Component	Certification range	supplementary measurement ranges		Unit
CO	0 - 75	0 - 300	0 - 1500	mg/m³
NO	0 - 200	0 - 600	0 - 2000	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 - 1500	mg/m³
HCl	0 - 15	0 - 90	-	mg/m³
HF	0 - 3	0 - 10	-	mg/m³
NH_3	0 - 15	0 - 50	-	mg/m³
CO_2	0 - 25	-	-	Vol.-%
H_2O	0 - 30	0 - 40	-	Vol.-%
O_2	0 - 25	-	-	Vol.-%

Software versions:
Calcmet: 11.101 with analysing unit 4.42.2,
OXITEC Ver. 1.50 np

Restrictions:
None

Remarks:
1. Wet test gases shall be used for testing HF, HCl and NH_3.
2. The maintenance interval is four weeks.
3. After disruptions of plant operation, the sampling probe needs to be cleaned.
4. For O_2 measurements, the OXITEC 500E SME 5 analyser manufactured by ENOTEC GmbH, Marienheide, Germany is integrated.
5. Complementary testing (conversion to DIN EN 15267) to Federal Environmental Agency notice of 15 July 2011 (Federal Journal (BAnz.) p. 2725, Chapter I, No. 4.1 and Chapter III, 10th notification).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Köln
Report No.: 936/21218384/A of 16 March 2012

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

The measuring equipment Gasmet CEMS consist of the following parts:

1) **Sampling system**
   Sampling probe: SP2000H of the company of M & C, 1 m length, to 180 °C heated, with PFTE filter element: 2 µm
   Heated line: 180 °C with 4 mm teflon tube, 25 m length, (standard 5 to 30 m)
   Pump: heated to 180 °C, with teflon membrane
2) **Analysers**
   FTIR 1: Gasmet CX-4000, cell temperature: 180 °C, cell with optical path length: 5 m
   FTIR HF: Gasmet CX-4001 for HF, cell temperature: 180 °C, optical path length: 10 m
   O_2: ZrO_2 test cell OXITEC 500E SME 5 in the 19"-box to the company ENOTEC with the software OXITEC Ver. 1,50 np
   TOC: Total-C measuring equipment Thermo-FID of the company M&A
   The measuring gas is pressed continuously through the three analysers in parallel (FTIR1, FTIR HF and O_2-measurement) by the sample pump. The amount of the gas is controlled. The injector pump of the TOC system takes a partial gas stream upstream the pump unit.
3) **Computer**
   PC standard with at least 512 MB RAM, 2 serial interfaces, analogue input card for O_2 and TOC-analyser, network access and Windows XP.
   For the evaluation of the spectrums of the analyser the spectrums are transferred via a RS232-interface into the computer and processed there. In this computer also the interface cards for the Analogous and Digital in- and output are integrated.
   The computer takes over also the control of sampling and the gas flows of the analysers.
4) **Software**
   The evaluation-software Calcmet 11.101 is based on Windows for the Gasmet CEMS.
5) **Measuring cabinet with**
   Air-conditioning on approx. 30 °C,
   Sampling pump, Control units, Analysers and Computer

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 Energie und Umwelt GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate. This can be applied to the product or used in publicity material for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate looses its validity. After the expiration of the validity of the certificate and on requests of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet Address: **qal1.de**.

Certification of Gasmet CEMS for CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, CO_2, H_2O and O_2 is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial test

Baseline report 936/21200448/A dated 07 July 2006
TÜV Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: Federal Gazette (BAnz.) of 14 October 2006, No. 194, p. 6715
Notification of the Federal Environmental Agency of 12 September 2006

Supplementary test report (Additional component: O_2) 936/21203240/B dated 03 September 2007
TÜV Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: Federal Gazette (BAnz.) of 07 March 2008, No. 38, p. 901
Notification of the Federal Environmental Agency of 14 February 2008

Notifications

Publication: Federal Gazette (BAnz.) 20 April 2007, No. 75, p. 4139ff
Notification of the Federal Environmental Agency of 12 April 2007 (enclosure variants)

Publication: Federal Gazette (BAnz.) 29 July 2011, No. 133, p. 2725-2733
Notification of the Federal Environmental Agency of 15 July 2011 (changes in software version)

Initial certification according to EN 15267

Certificate No 0000001013: 19 August 2011

Validity of the certificate: 28 July 2016

Test report: 936/21210692/A of 30 March 2011
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 29 July 2011, No. 113, p. 2725, chapter I, No. 4.1
Announcement by UBA from 15 July 2011

Supplementary testing according to EN 15267

Certificate No. 0000001013_01: 20 August 2012

Validity of the certificate: 28 July 2016

Test report: 936/21218384/A of 16 March 2012
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz AT 20 July 2012 B11, chapter 1, No. 3.1
Announcement by UBA from 06 July 2012

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

Measuring system			
Manufacturer		Gasmet Technologies Oy	
Name of measuring system		GASMET CEMS	
Serial number of the candidates		434 / 435	
Measuring principle		FTIR	
Test report		936/21218384/A	
Test laboratory		TÜV Rheinland	
Date of report		2012-03-16	
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		0.02	mg/m³
Sum of negative CS at zero point		0.00	mg/m³
Sum of postive CS at reference point		0.00	mg/m³
Sum of negative CS at reference point		-0.08	mg/m³
Maximum sum of cross sensitivities		-0.08	mg/m³
Uncertainty of cross sensitivity		-0.046	mg/m³

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
Standard deviation from paired measurements under field conditions *	u_D	0.030	mg/m³	0.001	(mg/m³)²
Lack of fit	$u_{D,f}$	0.029	mg/m³	0.001	(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	$u_{d,s}$	0.052	mg/m³	0.003	(mg/m³)²
Influence of ambient temperature at span	u_t	0.035	mg/m³	0.001	(mg/m³)²
Influence of supply voltage	u_v	0.015	mg/m³	0.000	(mg/m³)²
Cross sensitivity (interference)	u	-0.046	mg/m³	0.002	(mg/m³)²
Influence of sample gas flow	u_b	-0.013	mg/m³	0.000	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{ref}	0.024	mg/m³	0.001	(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)	$u_c = \sqrt{\sum (u_{i,...})^2}$	0.09	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.18	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 1 mg/m³**	**18.4**
Requirement of 2000/76/EC and 2001/80/EC	**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		
Name of measuring system	GASMET CEMS		
Serial number of the candidates	3305 / 3306		
Measuring principle	FTIR		
Test report	936/21218384/A		
Test laboratory	TÜV Rheinland		
Date of report	2012-03-16		
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 reference point	0.10	Vol.-%	
Sum of negative CS at reference point	-0.90	Vol.-%	
Maximum sum of cross sensitivities	-0.90	Vol.-%	
Uncertainty of cross sensitivity	-0.520	Vol.-%	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.058	Vol.-%	0.003	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.058	Vol.-%	0.003	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.64	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.25	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**5.0**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the range 25 Vol.-%**	**10.0**
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
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 reference point			1.90	mg/m³	
Sum of negative CS at reference point			-1.00	mg/m³	
Maximum sum of cross sensitivities			1.90	mg/m³	
Uncertainty of cross sensitivity			1.096	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.173	mg/m³	0.030	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.289	mg/m³	0.084	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	1.54	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	3.01	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**6.0**
Requirement of 2000/76/EC and 2001/80/EC	**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		
Name of measuring system	GASMET CEMS		
Serial number of the candidates	3305 / 3306		
Measuring principle	FTIR		
Test report	936/21218384/A		
Test laboratory	TÜV Rheinland		
Date of report	2012-03-16		
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 reference point	1.10	Vol.-%
Sum of negative CS at reference point	-0.10	Vol.-%
Maximum sum of cross sensitivities	1.10	Vol.-%
Uncertainty of cross sensitivity	0.632	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.058	Vol.-%	0.003	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.404	Vol.-%	0.163	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.95	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.86	Vol.-%

Relative total expanded uncertainty	**U in % of the range 30 Vol.-%**	**6.2**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the range 30 Vol.-%**	**10.0**
Requirement of EN 15267-3	U in % of the range 30 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
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 reference point			0.60	mg/m³	
Sum of negative CS at reference point			-0.10	mg/m³	
Maximum sum of cross sensitivities			0.60	mg/m³	
Uncertainty of cross sensitivity			0.346	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.058	mg/m³	0.003	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.289	mg/m³	0.084	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.61	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.20	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**12.0**
Requirement of 2000/76/EC and 2001/80/EC	**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		
Name of measuring system	GASMET CEMS		
Serial number of the candidates	3305 / 3306		
Measuring principle	FTIR		
Test report	926/21218384/A		
Test laboratory	TÜV Rheinland		
Date of report	2012-03-16		
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 reference point	3.20	mg/m³
Sum of negative CS at reference point	-0.80	mg/m³
Maximum sum of cross sensitivities	3.20	mg/m³
Uncertainty of cross sensitivity	1.848	mg/m³

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
Standard deviation from paired measurements under field conditions *	u_D	0.630	mg/m³	0.397	(mg/m³)²
Lack of fit	u_{lof}	-0.231	mg/m³	0.053	(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	$u_{d,s}$	0.577	mg/m³	0.333	(mg/m³)²
Influence of ambient temperature at span	u_t	0.252	mg/m³	0.064	(mg/m³)²
Influence of supply voltage	u_v	0.314	mg/m³	0.099	(mg/m³)²
Cross sensitivity (interference)	u_i	1.848	mg/m³	3.413	(mg/m³)²
Influence of sample gas flow	u_p	-0.120	mg/m³	0.014	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.808	mg/m³	0.653	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.24	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	4.40	mg/m³

Relative total expanded uncertainty	**U in % of the range 100 mg/m³**	**4.4**
Requirement of 2000/76/EC and 2001/80/EC	**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

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
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 reference point			0.30	mg/m³	
Sum of negative CS at reference point			-0.60	mg/m³	
Maximum sum of cross sensitivities			-0.60	mg/m³	
Uncertainty of cross sensitivity			-0.346	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.058	mg/m³	0.003	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.231	mg/m³	0.053	(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_p	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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.49	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.96	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**9.6**
Requirement of 2000/76/EC and 2001/80/EC	**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

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
Measured component			NO_2		
Certification range			0 - 200	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 reference point			7.90	mg/m³	
Sum of negative CS at reference point			-1.60	mg/m³	
Maximum sum of cross sensitivities			7.90	mg/m³	
Uncertainty of cross sensitivity			4.561	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.404	mg/m³	0.163	(mg/m³)²
Span drift from field test	$u_{d,s}$	2.887	mg/m³	8.335	(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}	1.617	mg/m³	2.613	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	5.86	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	11.48	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 200 mg/m³**	**5.7**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 200 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 200 mg/m³	15.0

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
Measured component			NO		
Certification range			0 - 200	mg/m³	
Evaluation of the cross sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			1.14	mg/m³	
Sum of negative CS at zero point			0.00	mg/m³	
Sum of postive CS at reference point			2.40	mg/m³	
Sum of negative CS at reference point			-5.70	mg/m³	
Maximum sum of cross sensitivities			-5.70	mg/m³	
Uncertainty of cross sensitivity			-3.291	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
Repeatability standard deviation at set point *	u_r	0.859	mg/m³	0.738	(mg/m³)²
Lack of fit	u_{lof}	-0.635	mg/m³	0.403	(mg/m³)²
Zero drift from field test	$u_{d,z}$	1.097	mg/m³	1.203	(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	0.874	mg/m³	0.764	(mg/m³)²
Influence of supply voltage	u_v	0.920	mg/m³	0.846	(mg/m³)²
Cross sensitivity (interference)	u_i	-3.291	mg/m³	10.830	(mg/m³)²
Influence of sample gas flow	u_p	0.553	mg/m³	0.306	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	1.617	mg/m³	2.613	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	4.36	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	8.55	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 131 mg/m³**	**6.5**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 131 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 131 mg/m³	15.0

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

Measuring system			
Manufacturer	Gasmet Technologies Oy		
Name of measuring system	GASMET CEMS		
Serial number of the candidates	3305 / 3306		
Measuring principle	Zirconia		
Test report	936/21218384/A		
Test laboratory	TÜV Rheinland		
Date of report	2012-03-16		
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 reference point	0.00	Vol.-%
Sum of negative CS at reference point	0.00	Vol.-%
Maximum sum of cross sensitivities	0.00	Vol.-%
Uncertainty of cross sensitivity	0.000	Vol.-%

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
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	$u_{d,z}$	0.029	Vol.-%	0.001	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.069	Vol.-%	0.005	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.30	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.58	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.3**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the range 25 Vol.-%**	**10.0**
Requirement of EN 15267-3	U in % of the range 25 Vol.-%	7.5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.

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

Measuring system					
Manufacturer			Gasmet Technologies Oy		
Name of measuring system			GASMET CEMS		
Serial number of the candidates			3305 / 3306		
Measuring principle			FTIR		
Test report			936/21218384/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-03-16		
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 reference point			2.30	mg/m³	
Sum of negative CS at reference point			-2.90	mg/m³	
Maximum sum of cross sensitivities			-2.90	mg/m³	
Uncertainty of cross sensitivity			-1.676	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
Repeatability standard deviation at set point *	u_r	0.357	mg/m³	0.127	(mg/m³)²
Lack of fit	u_{lof}	-0.316	mg/m³	0.100	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.346	mg/m³	0.120	(mg/m³)²
Span drift from field test	$u_{d,s}$	-1.039	mg/m³	1.080	(mg/m³)²
Influence of ambient temperature at span	u_t	0.557	mg/m³	0.310	(mg/m³)²
Influence of supply voltage	u_v	0.898	mg/m³	0.806	(mg/m³)²
Cross sensitivity (interference)	u_i	-1.676	mg/m³	2.808	(mg/m³)²
Influence of sample gas flow	u_p	0.226	mg/m³	0.051	(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 span" or
"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.40	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	4.71	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 50 mg/m³**	**9.4**
Requirement of 2000/76/EC and 2001/80/EC	**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