DAkkS Deutsche Akkreditierungsstelle D-ZE-11120-02-00

TÜVRheinland® Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000089099_00

Certified AMS:	ACF5000 LCS for CO, NO, NO_2, NO_x, SO_2, HCl, HF, NH_3, CH_2O, N_2O, CH_4, H_2O, TOC, CO_2 and O_2
Manufacturer:	ABB AG Stierstädter Straße 5 60488 Frankfurt/Main Germany
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify
that the AMS has been tested and found to comply with the standards
EN 15267-3 (2007), EN 15267-3 (2023) as well as EN 15267-1 (2023)
and EN 15267-2 (2023).

This certification applies to the conditions set out in this certificate and the accompanying change history document for the device certificate (0000089099)
(this certificate contains 20 pages).

TÜVRheinland® CERTIFIED

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

www.tuv.com
ID 0000089099

This certificate will expire on:
2nd June 2031

TÜV Rheinland Energy & Environment GmbH
Cologne, 3rd June 2026

Dr. Tobias Schäfer
Local Field Manager

M. Sc. Sebastian Decker
deputy Head of QAL1 Certification Body

QAL1-Certification Body **www.qal1.de** Tel. +49 221 806-5200	TÜV Rheinland Energy & Environment GmbH Am Grauen Stein 51105 Cologne

Certification body accredited to EN ISO/IEC 17065 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-ZE-11120-02-00.

Test report:	EuL/21269395/C dated 28 May 2026 as well as 936/21219814/E dated 10 March 2017
Initial certification:	3rd June 2026
Expiry date:	2nd June 2031
Publication:	3rd June 2026, official database www.qal1.de

Approved application:

The tested AMS is suitable for use at plants according to Directive 2010/75/EU, chapter III (combustion plants / 13th BImSchV:2021), chapter IV (waste incineration plants / 17th BImSchV:2024), Directive 2015/2193/EC (44th BImSchV:2022), 30th BImSchV:2019, plants in compliance with TA Luft and plants according to the 27th BImSchV:2013. 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 a laboratory test and a twelve-month field test at a waste incineration plant.

The AMS is approved for an ambient temperature range of +5 °C to +45 °C.

The notification of the measuring equipment, the suitability test and the performance of the uncertainty calculations were carried out on the basis of the regulations valid at the time of the test. Due to possible changes in the legal framework, each user should ensure, prior to using the measuring equipment, that it is suitable for monitoring the limit values and oxygen concentrations relevant to them.

Every potential user should consult with the manufacturer to ensure that this AMS is suitable for the intended application.

Basis of the certification

This certification is based on:

- Test report EuL/21269395/C dated 28 May 2026 issued by TÜV Rheinland Energy & Environment GmbH, and test report 936/21219814/E dated 10 March 2017 for TOC issued by TÜV Rheinland Energy GmbH
- Audit report EuL/21271143/A dated 14 April 2025 from TÜV Rheinland Energy & Environment GmbH
- Certification decision by the QAL1 certification body TÜV Rheinland Energy & Environment GmbH, accredited in accordance with DIN EN ISO/IEC 17065
- Surveillance of the product and the manufacturing process

AMS designation:

ACF5000 LCS for CO, NO, NO_2, NO_x, SO_2, HCl, HF, NH_3, CH_2O, N_2O, CH_4, H_2O, TOC, CO_2 and O_2

Manufacturer:

ABB AG
Stierstädter Straße 5
60488 Frankfurt/Main
Germany

Field of application:

For plants requiring official approval according to Directive 2010/75/EU, chapter III (combustion plants / 13th BImSchV:2021), chapter IV (waste incineration plants / 17th BImSchV:2024), Directive 2015/293/EC (44th BImSchV:2022), 30th BImSchV:2019, plants in compliance with TA Luft and plants according to the 27th BImSchV:2013

Measuring ranges during performance testing:

Component	Certification range	Supplementary ranges	Unit
CO	0 – 15	0 – 15000	mg/m³
NO	0 – 50	0 – 5000	mg/m³
NO_2	0 – 60	0 – 5000	mg/m³
NO_x	0 – 60	0 – 5000	mg/m³
SO_2	0 – 7.5	0 – 10000	mg/m³
HCl	0 – 3	0 – 1700	mg/m³
HF	0 – 1.35	0 – 300	mg/m³
NH_3	0 – 3	0 – 300	mg/m³
CH_2O	0 – 12.5	0 – 200	mg/m³
N_2O	0 – 50	0 – 5000	mg/m³
CH_4	0 – 5	0 – 2600	mg/m³
H_2O	0 – 40	-	Vol.-%
TOC*	0 – 15	0 – 30/300/500	mg/m³
CO_2	0 – 30	-	Vol.-%
O_2	0 – 25	-	Vol.-%

*Based on certificate 0000053802 issued by the Federal Environment Agency (UBA) on 25 April 2017

Software versions:

Syscon3	V5.5.0
AMC	V3.9.8
FTIR	V3.0.0.146
FTIR-Model Standard	V1.9.9.39

Restrictions:

None

Notes:

1. When testing HF, HCl, NH3 and CH_2O, humid test gases must be used.
2. For the reference point check (QAL3) of the components measured by the FTIR, the internal automatic validation unit may be used as an alternative to test gases.
3. The measuring system may be operated within a temperature range of 5 to 45 °C.
4. The maintenance interval is 6 months for all FTIR components (CO, NO, NO_2, NOx, SO_2, HCl, HF, NH_3, CH_2O, N_2O, CH_4, H_2O and CO_2) and TOC and 3 months for oxygen.
5. The measuring system has a digital interface for data transmission in accordance with VDI Guideline 4201, Part 1 (General Requirements), Part 2 (Profibus) and Part 3 (Modbus EIA485 and TCP/IP).
6. The CEM-DAS data acquisition and evaluation unit can be optionally integrated into the system cabinet.
7. Maintenance work must be spread over several days in order to comply with the criteria for downtime at installations under the 13th BImSchV and the 17th BImSchV.
8. During the supplementary inspection relating to test report EuL/21269395/C dated 28 May 2026, a FID was installed for TOC. The certification of TOC is based on the Federal Environment Agency certificate 0000053802 dated 25 April 2017 and the associated test report.

Test institute:

TÜV Rheinland Energy & Environment GmbH, Cologne

Report No.: EuL/21269395/C dated 28 May 2026 issued by TÜV Rheinland Energy & Environment GmbH and test report 936/21219814/E dated 10 March 2017 for TOC issued by TÜV Rheinland Energy GmbH

Certified product

The certificate applies to the AMS that complies with the following description:

The ACF5000 LCS measuring system is a multi-component measuring system comprising a Fourier-transform infrared spectrometer (FTIR spectrometer) for the determination of the com-ponents CO, NO, NO_2, N_2O, SO_2, HCl, HF, NH_3, H_2O, CO_2, CH_2O and CH_4 a zirconium dioxide probe for deter-mining the component O_2 as well as optional a flame ionisation detector (FID) for determining the component TOC. The NOx component is calculated from the measurement data for NO and NO_2 (NOx sum channel).

The gas to be measured is sampled from the flue gas duct using a gas sampling probe and fed to the analysis cabinet via a heated sample gas line. The probe contains a particle filter which removes dust from the gas. The control system for the analysis system offers, as stand-ard, the option of automatic zero gas and calibration gas injection at the probe upstream of the filter element. Automatic cleaning of the probe filter is available as an option. The FTIR ana-lyser, the FID and the zirconium dioxide sensor are all fed simultaneously; the sample gas is split and fed to all three analysers.
The gas path from the sampling point to the analyser is continuously heated (180°C) and reg-ulated and monitored by the system electronics to prevent the flue gas falling below the dew point or condensing.

For process measurements, a heated measurement point switchover can be configured as an option.
The sample is fed to the analyser according to the injector principle by means of an air jet injector, which is integrated into the heated conditioning block (ASP block). This, in turn, is directly connected to the heated gas cell.
Test gases can be introduced both automatically and manually; both at the gas sampling probe and directly at the analyser.
All current concentrations of the individual measurement components and status signals are displayed on the system display.
The system controller is tailored to the requirements of both emissions and process measure-ment and offers interfaces such as an internal CAN bus and fieldbus systems like Modbus and Profibus. An Ethernet interface is available for remote monitoring of the entire analysis system and for data transmission via internal or external TCP/IP networks. Remote control of the anal-ysis system via a UMTS router is possible. Analogue outputs for the measurement components and relay contacts for fault/status signals are standard.

The certified measurement system consists of:

- Heated sampling probe (180 °C) with an ABB GAC125 filter and an ABB Type 40 or ABB Type 42 probe tube, heated to 180 °C
- Heated sample gas line (180 °C) ABB TBL01-S, internal diameter 6 mm, Teflon material, max. 60 m length
- Analytical cabinet with:
  - Interferometer (including internal test facility for validating the spectrometer adjust-ments (validation unit))
  - FID (optional)
  - O_2 sensor
  - Air conditioner
  - Cooling unit
  - CEM DAS emissions analysis computer (optional)

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 & Environment 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 certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment 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 certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet **qal1.de**.

History of documents

The history of the certified ACF5000 LCS measuring system from ABB AG is based on the change history documents associated with the certificate number, as well as on the regular ongoing monitoring of the manufacturer's quality management system.

Initial certification according to EN 15267

Certificate no.	0000089099_00
Expiry of the certificate:	2nd June 2031

Test report: EuL/21269395/C dated 28 May 2026 by TÜV Rheinland Energy & Environment GmbH as well as 936/21219814/E dated 10 March 2017 for TOC by TÜV Rheinland Energy GmbH

Issue of the certificate:	3rd June 2026
Official certificate database:	www.qal1.de

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

Measuring system					
Manufacturer			ABB AG		
AMS designation			ACF5000 LCS		
Serial number of units under test			3.424917.1 /3.467483.3		
Measuring principle			FTIR		
Test report			EuL/21269395/C		
Test laboratory			TÜV Rheinland		
Measured component			CO		
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			-0.07 mg/m³		
Sum of postive CS at span point			0.20 mg/m³		
Sum of negative CS at span point			-0.20 mg/m³		
Maximum sum of cross-sensitivities			0.20 mg/m³		
Uncertainty of cross-sensitivity		u_i	0.116 mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				u^2	
		u_D	0.022 mg/m³	0.000	(mg/m³)²
Lack of fit		u_{lof}	0.011 mg/m³	0.000	(mg/m³)²
Zero drift from field test		$u_{d,z}$	0.095 mg/m³	0.009	(mg/m³)²
Span drift from field test		$u_{d,s}$	-0.087 mg/m³	0.008	(mg/m³)²
Influence of ambient temperature at span		u_t	0.015 mg/m³	0.000	(mg/m³)²
Influence of supply voltage		u_v	0.015 mg/m³	0.000	(mg/m³)²
Cross-sensitivity (interference)		u_i	0.116 mg/m³	0.013	(mg/m³)²
Influence of sample gas flow		u_p	0.058 mg/m³	0.003	(mg/m³)²
Uncertainty of reference material at 70% of certification range		u_{rm}	0.121 mg/m³	0.015	(mg/m³)²
Combined standard uncertainty (u_C)		$u_c = \sqrt{\sum (u_{max,j})^2}$		0.22	mg/m³
Total expanded uncertainty		$U = u_c * k = u_c * 1.96$		0.43	mg/m³

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

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**4.3**
Requirement of 2010/75/EU	**U in % of the ELV 10 mg/m³**	**10.0**
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	7.5

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		NO			
Certification range		0 - 50	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		1.21	mg/m³		
Sum of negative CS at span point		0.00	mg/m³		
Maximum sum of cross-sensitivities		1.21	mg/m³		
Uncertainty of cross-sensitivity	u_i	0.699	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				u^2	
	u_D	0.182	mg/m³	0.033	(mg/m³)²
Lack of fit	u_{lof}	0.058	mg/m³	0.003	(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	$u_{d,s}$	-0.346	mg/m³	0.120	(mg/m³)²
Influence of ambient temperature at span	u_t	0.095	mg/m³	0.009	(mg/m³)²
Influence of supply voltage	u_v	0.059	mg/m³	0.003	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.699	mg/m³	0.489	(mg/m³)²
Influence of sample gas flow	u_p	0.277	mg/m³	0.077	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404	mg/m³	0.163	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.95	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.86	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 33.33 mg/m³**	**5.6**
Requirement of 2010/75/EU	**U in % of the ELV 33.33 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 33.33 mg/m³	15.0

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		NO_2			
Certification range		0 - 60	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		0.50	mg/m³		
Sum of negative CS at span point		-1.80	mg/m³		
Maximum sum of cross-sensitivities		-1.80	mg/m³		
Uncertainty of cross-sensitivity	u_i	-1.039	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				u^2	
	u_D	0.107	mg/m³	0.011	(mg/m³)²
Lack of fit	u_{lof}	0.173	mg/m³	0.030	(mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.069	mg/m³	0.005	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.346	mg/m³	0.120	(mg/m³)²
Influence of ambient temperature at span	u_t	0.070	mg/m³	0.005	(mg/m³)²
Influence of supply voltage	u_v	0.151	mg/m³	0.023	(mg/m³)²
Cross-sensitivity (interference)	u_i	-1.039	mg/m³	1.080	(mg/m³)²
Influence of sample gas flow	u_p	-0.231	mg/m³	0.053	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.485	mg/m³	0.235	(mg/m³)²
Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$			1.25	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$			2.45	mg/m³

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

Relative total expanded uncertainty	**U in % of the ELV 40 mg/m³**	**6.1**
Requirement of 2010/75/EU	**U in % of the ELV 40 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 40 mg/m³	15.0

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		NOx			
Certification range		0 - 60	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.29	mg/m³		
Sum of negative CS at zero point		0.00	mg/m³		
Sum of postive CS at span point		0.80	mg/m³		
Sum of negative CS at span point		-0.80	mg/m³		
Maximum sum of cross-sensitivities		0.80	mg/m³		
Uncertainty of cross-sensitivity	u_i	0.461	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				u^2	
	u_D	0.218	mg/m³	0.048	(mg/m³)²
Lack of fit	u_{lof}	0.173	mg/m³	0.030	(mg/m³)²
Zero drift from field test	$u_{d,z}$	-0.104	mg/m³	0.011	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.554	mg/m³	0.307	(mg/m³)²
Influence of ambient temperature at span	u_t	0.085	mg/m³	0.007	(mg/m³)²
Influence of supply voltage	u_v	0.181	mg/m³	0.033	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.461	mg/m³	0.213	(mg/m³)²
Influence of sample gas flow	u_p	-0.300	mg/m³	0.090	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.485	mg/m³	0.235	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.99	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.93	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 40 mg/m³**	**4.8**
Requirement of 2010/75/EU	**U in % of the ELV 40 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 40 mg/m³	15.0

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

Measuring system			
Manufacturer	ABB AG		
AMS designation	ACF5000 LCS		
Serial number of units under test	3.424917.1 /3.467483.3		
Measuring principle	FTIR		
Test report	EuL/21269395/C		
Test laboratory	TÜV Rheinland		
Measured component	SO_2		
Certification range	0 - 7.5	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	0.29	mg/m³	
Sum of negative CS at span point	0.00	mg/m³	
Maximum sum of cross-sensitivities	0.29	mg/m³	
Uncertainty of cross-sensitivity	u_i 0.168	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u²	
	u_D	0.064	mg/m³	0.004	(mg/m³)²
Lack of fit	u_{lof}	-0.010	mg/m³	0.000	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.126	mg/m³	0.016	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.126	mg/m³	0.016	(mg/m³)²
Influence of ambient temperature at span	u_t	0.015	mg/m³	0.000	(mg/m³)²
Influence of supply voltage	u_v	0.029	mg/m³	0.001	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.168	mg/m³	0.028	(mg/m³)²
Influence of sample gas flow	u_p	-0.043	mg/m³	0.002	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.061	mg/m³	0.004	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.27	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.52	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 5 mg/m³**	**10.4**
Requirement of 2010/75/EU	**U in % of the ELV 5 mg/m³**	**20.0**
Requirement of EN 15267-3	U in % of the ELV 5 mg/m³	15.0

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

Measuring system					
Manufacturer			ABB AG		
AMS designation			ACF5000 LCS		
Serial number of units under test			3.424917.1 /3.467483.3		
Measuring principle			FTIR		
Test report			EuL/21269395/C		
Test laboratory			TÜV Rheinland		
Measured component			HCl		
Certification range			0 - 3	mg/m³	
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point			0.05	mg/m³	
Sum of negative CS at zero point			-0.09	mg/m³	
Sum of postive CS at span point			0.02	mg/m³	
Sum of negative CS at span point			-0.11	mg/m³	
Maximum sum of cross-sensitivities			-0.11	mg/m³	
Uncertainty of cross-sensitivity		u_i	-0.064	mg/m³	
Calculation of the combined standard uncertainty					
Tested parameter					u^2
		u_D	0.018	mg/m³	0.000 (mg/m³)²
Lack of fit		u_{lof}	-0.028	mg/m³	0.001 (mg/m³)²
Zero drift from field test		$u_{d,z}$	-0.042	mg/m³	0.002 (mg/m³)²
Span drift from field test		$u_{d,s}$	-0.047	mg/m³	0.002 (mg/m³)²
Influence of ambient temperature at span		u_t	0.011	mg/m³	0.000 (mg/m³)²
Influence of supply voltage		u_v	0.009	mg/m³	0.000 (mg/m³)²
Cross-sensitivity (interference)		u_i	-0.064	mg/m³	0.004 (mg/m³)²
Influence of sample gas flow		u_p	-0.014	mg/m³	0.000 (mg/m³)²
Uncertainty of reference material at 70% of certification range		u_{rm}	0.024	mg/m³	0.001 (mg/m³)²
Combined standard uncertainty (u_C)		$u_c = \sqrt{\sum (u_{max,j})^2}$			0.10 mg/m³
Total expanded uncertainty		$U = u_c * k = u_c * 1.96$			0.20 mg/m³

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

Relative total expanded uncertainty	**U in % of the ELV 2 mg/m³**	**9.9**
Requirement of 2010/75/EU	**U in % of the ELV 2 mg/m³**	**40.0**
Requirement of EN 15267-3	U in % of the ELV 2 mg/m³	30.0

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

Measuring system					
Manufacturer			ABB AG		
AMS designation			ACF5000 LCS		
Serial number of units under test			3.424917.1 /3.467483.3		
Measuring principle			FTIR		
Test report			EuL/21269395/C		
Test laboratory			TÜV Rheinland		
Measured component			HF		
Certification range			0 - 1.35	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			-0.01	mg/m³	
Sum of postive CS at span point			0.04	mg/m³	
Sum of negative CS at span point			-0.04	mg/m³	
Maximum sum of cross-sensitivities			0.04	mg/m³	
Uncertainty of cross-sensitivity		u_i	0.025	mg/m³	
Calculation of the combined standard uncertainty					
Tested parameter					u^2
		u_D	0.010	mg/m³	0.000 (mg/m³)²
Lack of fit		u_{lof}	-0.009	mg/m³	0.000 (mg/m³)²
Zero drift from field test		$u_{d,z}$	0.010	mg/m³	0.000 (mg/m³)²
Span drift from field test		$u_{d,s}$	0.019	mg/m³	0.000 (mg/m³)²
Influence of ambient temperature at span		u_t	0.008	mg/m³	0.000 (mg/m³)²
Influence of supply voltage		u_v	0.008	mg/m³	0.000 (mg/m³)²
Cross-sensitivity (interference)		u_i	0.025	mg/m³	0.001 (mg/m³)²
Influence of sample gas flow		u_p	-0.005	mg/m³	0.000 (mg/m³)²
Uncertainty of reference material at 70% of certification range		u_{rm}	0.011	mg/m³	0.000 (mg/m³)²
Combined standard uncertainty (u_C)		$u_c = \sqrt{\sum (u_{max,j})^2}$			0.04 mg/m³
Total expanded uncertainty		$U = u_c * k = u_c * 1.96$			0.08 mg/m³

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

Relative total expanded uncertainty	**U in % of the ELV 0.9 mg/m³**	**8.5**
Requirement of 2010/75/EU	**U in % of the ELV 0.9 mg/m³**	**40.0**
Requirement of EN 15267-3	U in % of the ELV 0.9 mg/m³	30.0

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		NH_3			
Certification range		0 - 3	mg/m³		
Evaluation of the cross-sensitivity (CS)					
(system with largest CS)					
Sum of positive CS at zero point		0.05	mg/m³		
Sum of negative CS at zero point		-0.01	mg/m³		
Sum of postive CS at span point		0.10	mg/m³		
Sum of negative CS at span point		-0.02	mg/m³		
Maximum sum of cross-sensitivities		0.10	mg/m³		
Uncertainty of cross-sensitivity	u_i	0.055	mg/m³		

Calculation of the combined standard uncertainty

Tested parameter				u^2	
	u_D	0.020	mg/m³	0.000	(mg/m³)²
Lack of fit	u_{lof}	0.013	mg/m³	0.000	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.035	mg/m³	0.001	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.047	mg/m³	0.002	(mg/m³)²
Influence of ambient temperature at span	u_t	0.012	mg/m³	0.000	(mg/m³)²
Influence of supply voltage	u_v	0.012	mg/m³	0.000	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.055	mg/m³	0.003	(mg/m³)²
Influence of sample gas flow	u_p	-0.014	mg/m³	0.000	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.024	mg/m³	0.001	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.09	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 2 mg/m³**	**8.8**
Requirement of 2010/75/EU	**U in % of the ELV 2 mg/m³**	**40.0 ****
Requirement of EN 15267-3	U in % of the ELV 2 mg/m³	30.0

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 40.0 % was used instead.

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

Measuring system			
Manufacturer	ABB AG		
AMS designation	ACF5000 LCS		
Serial number of units under test	3.424917.1 /3.467483.3		
Measuring principle	FTIR		
Test report	EuL/21269395/C		
Test laboratory	TÜV Rheinland		
Measured component	CH_2O		
Certification range	0 - 12.5	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	0.11	mg/m³	
Sum of negative CS at span point	-0.22	mg/m³	
Maximum sum of cross-sensitivities	-0.22	mg/m³	
Uncertainty of cross-sensitivity	u_i -0.127	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u²	
	u_D	0.023	mg/m³	0.001	(mg/m³)²
Lack of fit	u_{lof}	0.029	mg/m³	0.001	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.029	mg/m³	0.001	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.159	mg/m³	0.025	(mg/m³)²
Influence of ambient temperature at span	u_t	0.030	mg/m³	0.001	(mg/m³)²
Influence of supply voltage	u_v	0.006	mg/m³	0.000	(mg/m³)²
Cross-sensitivity (interference)	u_i	-0.127	mg/m³	0.016	(mg/m³)²
Influence of sample gas flow	u_p	0.029	mg/m³	0.001	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.101	mg/m³	0.010	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.24	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.46	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 8.33 mg/m³**	**5.5**
Requirement of 2010/75/EU	**U in % of the ELV 8.33 mg/m³**	**30.0 ****
Requirement of EN 15267-3	U in % of the ELV 8.33 mg/m³	22.5

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 30.0 % was used instead.

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		N_2O			
Certification range		0 - 50	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		0.70	mg/m³		
Sum of negative CS at span point		-0.40	mg/m³		
Maximum sum of cross-sensitivities		0.70	mg/m³		
Uncertainty of cross-sensitivity	u_i	0.404	mg/m³		
Calculation of the combined standard uncertainty					
Tested parameter				u^2	
	u_D	0.039	mg/m³	0.002	(mg/m³)²
Lack of fit	u_{lof}	0.058	mg/m³	0.003	(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	$u_{d,s}$	0.260	mg/m³	0.068	(mg/m³)²
Influence of ambient temperature at span	u_t	0.108	mg/m³	0.012	(mg/m³)²
Influence of supply voltage	u_v	0.091	mg/m³	0.008	(mg/m³)²
Cross-sensitivity (interference)	u_i	0.404	mg/m³	0.163	(mg/m³)²
Influence of sample gas flow	u_p	-0.173	mg/m³	0.030	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.404	mg/m³	0.163	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.68	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.33	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 33.33 mg/m³**	**4.0**
Requirement of 2010/75/EU	**U in % of the ELV 33.33 mg/m³**	**20.0 ****
Requirement of EN 15267-3	U in % of the ELV 33.33 mg/m³	15.0

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 20.0 % was used instead.

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		CH_4			
Certification range		0 - 5	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		-0.11	mg/m³		
Sum of postive CS at span point		0.15	mg/m³		
Sum of negative CS at span point		-0.08	mg/m³		
Maximum sum of cross-sensitivities		0.15	mg/m³		
Uncertainty of cross-sensitivity	u_i	0.087	mg/m³		

Calculation of the combined standard uncertainty

Tested parameter				u^2	
	u_D	0.012	mg/m³	0.000	$(mg/m^3)^2$
Lack of fit	u_{lof}	-0.008	mg/m³	0.000	$(mg/m^3)^2$
Zero drift from field test	$u_{d.z}$	-0.069	mg/m³	0.005	$(mg/m^3)^2$
Span drift from field test	$u_{d.s}$	0.046	mg/m³	0.002	$(mg/m^3)^2$
Influence of ambient temperature at span	u_t	0.003	mg/m³	0.000	$(mg/m^3)^2$
Influence of supply voltage	u_v	0.023	mg/m³	0.001	$(mg/m^3)^2$
Cross-sensitivity (interference)	u_i	0.087	mg/m³	0.008	$(mg/m^3)^2$
Influence of sample gas flow	u_p	-0.020	mg/m³	0.000	$(mg/m^3)^2$
Uncertainty of reference material at 70% of certification range	u_{rm}	0.040	mg/m³	0.002	$(mg/m^3)^2$

* 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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.13	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.26	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 3.33 mg/m³**	**7.7**
Requirement of 2010/75/EU	**U in % of the ELV 3.33 mg/m³**	**30.0 ****
Requirement of EN 15267-3	U in % of the ELV 3.33 mg/m³	22.5

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 30.0 % was used instead.

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

Measuring system					
Manufacturer		ABB AG			
AMS designation		ACF5000 LCS			
Serial number of units under test		3.424917.1 /3.467483.3			
Measuring principle		FTIR			
Test report		EuL/21269395/C			
Test laboratory		TÜV Rheinland			
Measured component		H_2O			
Certification range		0 - 40	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	
	u_D	0.086	Vol.-%	0.007	(Vol.-%)²
Lack of fit	u_{lof}	0.115	Vol.-%	0.013	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.069	Vol.-%	0.005	(Vol.-%)²
Span drift from field test	$u_{d,s}$	0.462	Vol.-%	0.213	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.071	Vol.-%	0.005	(Vol.-%)²
Influence of supply voltage	u_v	0.023	Vol.-%	0.001	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000	(Vol.-%)²
Influence of sample gas flow	u_p	-0.214	Vol.-%	0.046	(Vol.-%)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.323	Vol.-%	0.105	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.63	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.23	Vol.-%

Relative total expanded uncertainty	**U in % of the range 40 Vol.-%**	**3.1**
Requirement of 2010/75/EU	**U in % of the range 40 Vol.-%**	**10.0 ****
Requirement of EN 15267-3	U in % of the range 40 Vol.-%	7.5

** The EU-directive 2010/75/EC on industrial emissions does not define requirements for this component.
A value of 10.0 % was used instead.

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

Measuring system					
Manufacturer	ABB AG				
AMS designation	ACF5000 LCS				
Serial number of units under test	3.424917.1 /3.467483.3				
Measuring principle	FTIR				
Test report	EuL/21269395/C				
Test laboratory	TÜV Rheinland				
Measured component	CO_2				
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		0.20	Vol.-%		
Sum of negative CS at span point		0.00	Vol.-%		
Maximum sum of cross-sensitivities		0.20	Vol.-%		
Uncertainty of cross-sensitivity	u_i	0.116	Vol.-%		

Calculation of the combined standard uncertainty

Tested parameter				u^2	
	u_D	0.029	Vol.-%	0.001	(Vol.-%)²
Lack of fit	u_{lof}	0.057	Vol.-%	0.003	(Vol.-%)²
Zero drift from field test	$u_{d,z}$	0.017	Vol.-%	0.000	(Vol.-%)²
Span drift from field test	$u_{d,s}$	-0.087	Vol.-%	0.008	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.050	Vol.-%	0.003	(Vol.-%)²
Influence of supply voltage	u_v	0.038	Vol.-%	0.001	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.116	Vol.-%	0.013	(Vol.-%)²
Influence of sample gas flow	u_p	-0.173	Vol.-%	0.030	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.34	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.67	Vol.-%

Relative total expanded uncertainty	**U in % of the range 30 Vol.-%**	**2.2**
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/EC on industrial emissions does not define requirements for this component.
A value of 10.0 % was used instead.

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

Measuring system					
Manufacturer	ABB AG				
AMS designation	ACF5000 LCS				
Serial number of units under test	3.424917.1 /3.467483.3				
Measuring principle	Zirkoniumdioxid				
Test report	EuL/21269395/C				
Test laboratory	TÜV Rheinland				
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	
	u_D	0.046	Vol.-%	0.002	(Vol.-%)²
Lack of fit	u_{lof}	0.058	Vol.-%	0.003	(Vol.-%)²
Zero drift from field test	$u_{d.z}$	0.075	Vol.-%	0.006	(Vol.-%)²
Span drift from field test	$u_{d.s}$	0.115	Vol.-%	0.013	(Vol.-%)²
Influence of ambient temperature at span	u_t	0.047	Vol.-%	0.002	(Vol.-%)²
Influence of supply voltage	u_v	0.047	Vol.-%	0.002	(Vol.-%)²
Cross-sensitivity (interference)	u_i	0.000	Vol.-%	0.000	(Vol.-%)²
Influence of sample gas flow	u_p	-0.052	Vol.-%	0.003	(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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.27	Vol.-%
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.53	Vol.-%

Relative total expanded uncertainty	**U in % of the range 25 Vol.-%**	**2.1**
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/EC on industrial emissions does not define requirements for this component.
A value of 10.0 % was used instead.