Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000043107_02

AMS designation:	APDA-372 and APDA-372E for suspended particulate matter PM_{10} and $PM_{2,5}$
Manufacturer:	HORIBA Europe GmbH Hans-Mess-Str. 6 61440 Oberursel/Ts. Germany
Test Laboratory:	TÜV Rheinland Energy GmbH

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

VDI 4202-1 (2010), VDI 4203-3 (2010), EN 12341 (1998), EN 14907 (2005), EN 16450 (2017), EN 16450 (2017), Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods (2010), EN 15267-1 (2009) and EN 15267-2 (2009)

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 14 pages).
The present certificate replaces certificate 0000043107_01 of 25 April 2016

TÜVRheinland® CERTIFIED

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

www.tuv.com
ID 0000043107

Publication in the German Federal Gazette (BAnz) of 26 March 2019

This certificate will expire on:
25 March 2024

German Federal Environment Agency
Dessau, 12 June 2019

TÜV Rheinland Energy GmbH
Cologne, 11 June 2019

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

Test report:	936/21226418/C dated 7 December 2016 and Addendum 936/21243705/A dated 7 September 2018
Initial certification:	2 April 2015
Date of expiry:	25 March 2024
Publication:	BAnz AT 26.03.2019 B7, chapter IV notification 38

Approved application
The tested AMS is suitable for the continuous parallel monitoring of PM_{10} and $PM_{2.5}$ fractions in ambient air (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test at four different test sites respectively time periods.

The AMS is approved for a temperature range of +5 °C to +40 °C.

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

Basis of the certification
This certification is based on:

- 936/21226418/C dated 7 December 2016 and Addendum 936/21243705/A dated 7 September 2018 issued 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 02.04.2015 B5, chapter III number 3.1
UBA announcement dated 25 February 2015:

AMS designation:
APDA-372 for suspended particulate matter PM_{10} and $PM_{2.5}$

Manufacturer:
HORIBA Europe GmbH, Oberursel

Field of application:
For continuous and parallel ambient air monitoring of suspended particulate matter, PM_{10} and $PM_{2,5}$ fractions,
(stationary operation)

Measuring ranges during performance testing:

Component	Certification range	Unit
PM_{10}	0–10.000	µg/m³
$PM_{2,5}$	0–10.000	µg/m³

Software versions:
Measuring system: 100380.0014.0001.0001.0011
Implemented evaluation algorithm: PM_ENVIRO_0011
Evaluation software PDAnalyze: 1.010

Restrictions:
None

Notes:
1. The measuring system complies with the requirements of guideline “Demonstration of Equivalence of Ambient Air Monitoring Methods” for the component PM_{10} and $PM_{2.5}$.
2. One of the tested instruments did not meet the requirements for the variation coefficient R^2 as defined in EN 12341 during the campaign in Cologne, summer.
3. The measuring system is designed for indoor use at temperature controlled sites.
4. The sensitivity of the particle sensor has to be checked once a month using CalDust 1100.
5. The instrument must be calibrated on-site regularly using a gravimetric PM_{10} reference method in accordance with EN 12341.
6. The instrument must be calibrated on-site regularly using a gravimetric $PM_{2.5}$ reference method in accordance with EN 14907.
7. This report on the performance test is available online at www.qal1.de.

Test Report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21226418/A dated 29 September 2014

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7,
chapter V notification 5, UBA announcement dated 18 February 2016:

5 Notification as regards Federal Environment Agency (UBA) notice of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1)

The manual for the APDA-372 measuring system for PM10 and PM2,5 manufactured by HORIBA Europe GmbH was found to contain a mistake regarding the description of the IADS control function. The description must correctly read as follows:

The temperature of the IADS is controlled depending on the ambient temperature and humidity (measured by the weather station). The minimum temperature is 23°C. The moisture compensation is carried out by a dynamic adjustment of the IADS temperature up to a maximum heating output of 90 watt."

The manufacturer corrected this mistake in manual versions from HE0141015 and after. Test report no. 936/21226418/A dated 29 September 2014 prepared by TÜV Rheinland Energie und Umwelt GmbH was corrected accordingly and replaced by test report no. 936/21226418/B dated 15 October 2015.

In the future, the measuring system may alternatively be operated with the WS300-UMB weather station. An extended IADS is available for the measuring system. It is adaptable between 1.20 m and 2.10 m.

Moreover, instrument version APDA-372E is available with an external sensor.

The current software version is: 100396.0014.0001.0001.0011.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 6 November 2015

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11,
chapter V notification 34, UBA announcement dated 14 July 2016:

34 Notification as regards Federal Environment Agency (UBA) notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1 and of 18 February 2016 (BAnz AT 14.03.2016 B7, chapter V 4th notification)

The sensitivity test of the particle sensor for the APDA 372 PM_{10} and $PM_{2.5}$ particle monitor manufactured by Horiba Europe GmbH can be performed with Mono-Dust 1500 at an IADS temperature between 35 °C and 50 °C.

The measuring system may provide two additional contacts for the control of an external pump/flow regulator (not relevant to the performance-tested instrument version).

The current software version of the measuring system is:

100408.0014.0001.0001.0011

Statement issued by TÜV Rheinland Energie und Umwelt GmbH
dated 24 February 2016

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, chapter V notification 9, UBA announcement dated 22 February 2017:

9 Notification as regards Federal Environment Agency (UBA) notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1 and of 14 July 2016 (BAnz AT 01.08.2016 B11, chapter V 34th notification)

The APDA-372 measuring system for PM_{10} and $PM_{2,5}$ manufactured by Horiba Europe GmbH may alternatively be used with the new Siargo FS4008-10-O6-CV-A flow sensor instead of the Honeywell AWM5102VN version used so far.

The new factors for temperature compensation are as follows: 0.19 (APDA-372E) and 0.17 (APDA-372).

A mistake found in test report no. 936/21226418/B dated 15 October 2015 issued by TÜV Rheinland Energie und Umwelt GmbH was corrected. Unlike stated in two places in the report, the APDA-372 ambient air quality measuring system for PM_{10} and $PM_{2,5}$ operates with a moving 900 sec average (15 min) rather than a 30-minute mean. Test report 936/21226418/C dated 7 December 2016 issued by TÜV Rheinland Energy GmbH replaces the afore-mentioned report.

The current software version of the measuring system is:
100417.0014.0001.0001.0011

Statement issued by TÜV Rheinland Energy GmbH dated 13 December 2016

Publication in the German Federal Gazette: BAnz AT 31.07.2017 B12, chapter II notification 31, UBA announcement dated 13 July 2017:

31 Notification as regards Federal Environment Agency (UBA) notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1) and of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter V 9th notification)

The current software version for the APDA-372 and
APDA-372E for PM_{10} and $PM_{2,5}$ manufactured by HORIBA Europe GmbH is:

100427.0014.0001.0001.0011

Statement issued by TÜV Rheinland Energy GmbH dated 7 March 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8,
chapter V notification 7, UBA announcement dated 21 February 2018:

7 Notification as regards Federal Environment Agency (UBA) notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1) and of 13 July 2017 (BAnz AT 31.07.2017 B12, chapter II 31st notification)

The current software versions for the APDA-372 and APDA-372E measuring system for PM_{10} and $PM_{2,5}$ manufactured by HORIBA Europe GmbH are:

100430.0014.0001.0001.0011
100431.0014.0001.0001.0011
100434.0014.0001.0001.0011

Statement issued by TÜV Rheinland Energy GmbH dated 2 October 2017

Publication in the German Federal Gazette: BAnz AT 17.07.2018 B9,
chapter III notification 29, UBA announcement dated 3 July 2018:

29 Notification as regards Federal Environment Agency (UBA) notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1 and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V 7th notification)

In order to improve practicability of the leak test for the APDA-372 and APDA-372E particle monitors for PM_{10} and $PM_{2.5}$ manufactured by HORIBA Europe GmbH, the criterion for passing the leak test with the instrument inlet blocked was changed to 0 ± 0.5 l/min (entire system without the Sigma-2 sampling head) and 0 ± 0.08 l/min (APDA-372 control unit on its own).

In the future, the measuring system will be equipped with an LED protective shield. It is possible to retrofit systems.

Statement issued by TÜV Rheinland Energy GmbH dated 2 May 2018

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7,
chapter IV notification 38, UBA announcement dated 27 February 2019:

38 Notification as regards Federal Environment Agency notices of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter III number 3.1) and of 3 February 2018 (BAnz AT 17.07.2018 B9, chapter III 29th notification)

The APDA-372 and APDA-372E measuring system for PM_{10} and $PM_{2,5}$ manufactured by HORIBA Europe GmbH meet the requirements defined in standard EN 16450 (July 2017 version). An addendum to test report No. 936/21243705/A is available online at www.qal1.de.

The instrument's software version has been revised. The current software version is:

100449.0014.0001.0001.0011.

In addition to this version, the following intermediate version are also valid:

100435.0014.0001.0001.0011
100437.0014.0001.0001.0011
100439.0014.0001.0001.0011
100440.0014.0001.0001.0011
100441.0014.0001.0001.0011
100443.0014.0001.0001.0011
100444.0014.0001.0001.0011
100445.0014.0001.0001.0011
100447.0014.0001.0001.0011
100448.0014.0001.0001.0011

An o-ring at the sampling rod of the IADS was optimised. A resistance on the temperature measurement board was replaced by a new resistance with optimised temperature behaviour.

Statement issued by TÜV Rheinland Energy GmbH dated 8 October 2018

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

With the exception of a modified front design (“Horiba” replaces “Palas” and “APDA-372” replaces “Fidas® 200”) and an adapted software, the APDA-372 ambient dust monitor is absolutely identical to the Fidas® 200 measuring system designed and completely manufactured by PALAS GmbH.

The APDA-372 and APDA-372E are optical aerosol spectrometers that determine the particle count and size with the help of a scattered light analysis of individual particles in accordance with Lorenz-Mie. The particle count and size distributions are converted into the mass concentration with the help of a size-related and weighted algorithm.

The ambient air monitor is available in two different versions: the APDA-372 for installation at temperature-controlled measurement sites (e.g. air-conditioned measuring station) and the APDA-372E (which is identical with the APDA-372 but has an external sensor unit).

The tested measuring system consists of a Sigma-2 sampling head, the sampling tube c/w IADS humidity compensation module (standard or long version), the control unit with integrated aerosol sensor (APDA-372) or with external sensor unit (APDA-372E), the compact WS600-UMB or WS300-UMB weather station, the optional UMTS receiver, the required connecting tubes and cables, a bottle of CalDust 1100 or MonoDust 1500 as well as the manuals in German.

At a flow rate of 4.8 l/min (at 25°C and 1013hPa), the particle sample passes through the Sigma 2 sampling head and reaches the sampling tube which connects the sampling head to the control unit. In order to avoid water condensation effects especially at high ambient humidity, the IADS humidity compensation module is used. The IADS is controlled according to the ambient temperature and moisture levels (as determined by the compact weather station). The minimum temperature is 23°C. The moisture compensation is carried out by a dynamic adjustment of the IADS temperature up to a maximum heating output of 90 watt. The IADS module is controlled via the firmware. After passing through the IADS module, the particle sample eventually reaches the aerosol sensor which is were the actual measurement takes place. Downstream of the aerosol sensor, the sample passes through an absolute filter which may be used for further analyses of the collected aerosol. The APDA-372 and APDA-372E measuring systems also come with an integrated weather station (type Lufft WS300-UMB for recording parameters such as wind speed, wind direction, precipitation rates, type of precipitation, temperature, humidity and pressure; the alternative is the Lufft WS600-UMB for recording temperature, humidity and pressure). The measuring system’s control unit does not only provide the necessary electronics for operating the system, but also 2 sampling pumps, which are connected in parallel. If one pump fails, the other one takes over to ensure smooth operation.

The APDA-372 and APDA-372E measuring systems store data in the raw-format. To determine mass concentration values, the stored raw data will have to be converted with the help of evaluation algorithm. To this effect, a size-dependent and weighted algorithm converts particle size and counts into mass concentrations. Algorithm PM_ENVIRO_0011 was used for conversion in the context of performance testing.

The measuring system may be operated either directly via the touch screen at the front of the instrument or remotely via an internet connection using a wireless modem using appropriate software (e.g. Teamviewer). The user may retrieve measurement data and system information, change parameters and perform functionality tests of the measuring system.

The current software version is: 100449.0014.0001.0001.0011.

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 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 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 APDA-372 and APDA-372E measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Initial certification according to EN 15267:

Certificate no. 0000043107: 30 April 2015
Expiry date of the certificate: 1 April 2020
Test report: 936/21226418/A dated 29 September 2014
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 02.04.2015 B12, chapter III number 3.1
UBA announcement dated 25 February 2015

Notifications in accordance with EN 15267

Certificate no. 0000043107_01: 25 April 2016
Expiry date of the certificate: 1 April 2020
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 November 2015
and test report no. 936/21226418/B dated 15 October 2015
Publication: BAnz AT 14.03.2016 B7, chapter V notification 5
UBA announcement dated 18 February 2016
(correction of the manual, alternative weather station and new software version)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 24 February 2016
Publication: BAnz AT 01.08.2016 B11, chapter V notification 34
UBA announcement dated 14 July 2016
(temperature for sensitivity checks, new software version)

Statement issued by TÜV Rheinland Energy GmbH dated 13 December 2016
Publication: BAnz AT 15.03.2017 B6, chapter V notification 9
UBA announcement dated 22 February 2017
(alternative flow sensor, temperature compensation, new software version)

Statement issued by TÜV Rheinland Energy GmbH dated 7 March 2017
Publication: BAnz AT 31.07.2017 B12, chapter II notification 31
UBA announcement dated 13 July 2017
(new software version)

Statement issued by TÜV Rheinland Energy GmbH dated 2 October 2017
Publication: BAnz AT 26.03.2018 B8, chapter V notification 7
UBA announcement dated 21 February 2018
(new software version)

Statement issued by TÜV Rheinland Energy GmbH dated 2 May 2018
Publication: BAnz AT 17.07.2018 B9, chapter III notification 29
UBA announcement dated 3 July 2018
(modification of the criterion for the leak test)

Certificate no.0000043107_02 : 12 June 2019
Expiry date of the certificate: 25 March 2024
Statement issued by TÜV Rheinland Energy GmbH dated 8 October 2018
Test report: 936/21243705/A dated 7 September 2018
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 38
UBA announcement dated 27 February 2019
(migration to EN 16450, new software version)

Version PM 2.5

Comparison candidate with reference according to Standard EN 16450:2017				
Candidate	FIDAS 200 S	SN	SN 0111 & SN 0112	
		Limit value	30	µg/m³
Status of measured values	Slope and offset corrected	Allowed uncertainty	25	%
All comparisons				
Uncertainty between Reference	**0.58**	**µg/m³**		
Uncertainty between Candidates	**0.44**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**225**			
Slope b	**0.999**	**not significant**		
Uncertainty of b	**0.010**			
Ordinate intercept a	**0.012**	**not significant**		
Uncertainty of a	**0.178**			
Expanded meas. uncertainty W_{CM}	**10.53**	**%**		
All comparisons, ≥18 µg/m³				
Uncertainty between Reference	**0.63**	**µg/m³**		
Uncertainty between Candidates	**0.78**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**54**			
Slope b	**0.971**			
Uncertainty of b	**0.023**			
Ordinate intercept a	**0.771**			
Uncertainty of a	**0.715**			
Expanded meas. uncertainty W_{CM}	**13.21**	**%**		
All comparisons, <18 µg/m³				
Uncertainty between Reference	**0.57**	**µg/m³**		
Uncertainty between Candidates	**0.31**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**171**			
Slope b	**1.108**			
Uncertainty of b	**0.030**			
Ordinate intercept a	**-1.010**			
Uncertainty of a	**0.304**			
Expanded meas. uncertainty W_{CM}	**17.70**	**%**		

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	30	µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25	%
Cologne, Summer					
Uncertainty between Reference	**0.66**	**µg/m³**			
Uncertainty between Candidates	**0.11**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**81**		**82**		
Slope b	**1.036**		**1.034**		
Uncertainty of b	**0.031**		**0.033**		
Ordinate intercept a	**-0.518**		**-0.478**		
Uncertainty of a	**0.337**		**0.351**		
Expanded meas. uncertainty W_{CM}	**10.54**	**%**	**10.86**	**%**	
Cologne, Winter					
Uncertainty between Reference	**0.54**	**µg/m³**			
Uncertainty between Candidates	**0.51**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**51**		**50**		
Slope b	**0.976**		**0.942**		
Uncertainty of b	**0.013**		**0.013**		
Ordinate intercept a	**0.962**		**0.951**		
Uncertainty of a	**0.291**		**0.303**		
Expanded meas. uncertainty W_{CM}	**8.73**	**%**	**10.22**	**%**	
Bonn					
Uncertainty between Reference	**0.62**	**µg/m³**			
Uncertainty between Candidates	**0.65**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**50**		**50**		
Slope b	**1.034**		**0.993**		
Uncertainty of b	**0.023**		**0.025**		
Ordinate intercept a	**-0.394**		**-0.144**		
Uncertainty of a	**0.531**		**0.575**		
Expanded meas. uncertainty W_{CM}	**12.29**	**%**	**12.76**	**%**	
Bornheim					
Uncertainty between Reference	**0.42**	**µg/m³**			
Uncertainty between Candidates	**0.46**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**45**		**45**		
Slope b	**1.124**		**1.098**		
Uncertainty of b	**0.050**		**0.050**		
Ordinate intercept a	**-1.027**		**-1.137**		
Uncertainty of a	**0.598**		**0.598**		
Expanded meas. uncertainty W_{CM}	**21.43**	**%**	**16.74**	**%**	
All comparisons, ≥18 µg/m³					
Uncertainty between Reference	**0.63**	**µg/m³**			
Uncertainty between Candidates	**0.78**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**54**		**54**		
Slope b	**0.994**		**0.948**		
Uncertainty of b	**0.023**		**0.024**		
Ordinate intercept a	**0.515**		**1.011**		
Uncertainty of a	**0.701**		**0.74**		
Expanded meas. uncertainty W_{CM}	**13.11**	**%**	**14.17**	**%**	
All comparisons, <18 µg/m³					
Uncertainty between Reference	**0.57**	**µg/m³**			
Uncertainty between Candidates	**0.31**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**173**		**173**		
Slope b	**1.130**		**1.090**		
Uncertainty of b	**0.030**		**0.030**		
Ordinate intercept a	**-1.095**		**-0.929**		
Uncertainty of a	**0.304**		**0.308**		
Expanded meas. uncertainty W_{CM}	**21.05**	**%**	**15.38**	**%**	
All comparisons					
Uncertainty between Reference	**0.58**	**µg/m³**			
Uncertainty between Candidates	**0.44**	**µg/m³**			
	SN 0111		**SN 0112**		
Number of data pairs	**227**		**227**		
Slope b	**1.017**	**not significant**	**0.981**	**not significant**	
Uncertainty of b	**0.010**		**0.010**		
Ordinate intercept a	**-0.053**	**not significant**	**0.111**	**not significant**	
Uncertainty of a	**0.176**		**0.182**		
Expanded meas. uncertainty W_{CM}	**10.92**	**%**	**11.23**	**%**	

Version PM 10

Comparison candidate with reference according to Standard EN 16450:2017				
Candidate	FIDAS 200 S	SN	SN 0111 & SN 0112	
		Limit value	50	µg/m³
Status of measured values	Slope & offset corrected	Allowed uncertainty	25	%
All comparisons				
Uncertainty between Reference	**0.62**	**µg/m³**		
Uncertainty between Candidates	**0.64**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**227**			
Slope b	**0.999**	**not significant**		
Uncertainty of b	**0.011**			
Ordinate intercept a	**0.015**	**not significant**		
Uncertainty of a	**0.249**			
Expanded measured uncertainty WCM	**7.43**	**%**		
All comparisons, ≥30 µg/m³				
Uncertainty between Reference	**0.67**	**µg/m³**		
Uncertainty between Candidates	**1.10**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**35**			
Slope b	**0.949**			
Uncertainty of b	**0.036**			
Ordinate intercept a	**2.181**			
Uncertainty of a	**1.530**			
Expanded measured uncertainty WCM	**10.34**	**%**		
All comparisons, <30 µg/m³				
Uncertainty between Reference	**0.61**	**µg/m³**		
Uncertainty between Candidates	**0.55**	**µg/m³**		
SN 0111 & SN 0112				
Number of data pairs	**192**			
Slope b	**1.023**			
Uncertainty of b	**0.021**			
Ordinate intercept a	**-0.408**			
Uncertainty of a	**0.364**			
Expanded measured uncertainty WCM	**7.43**	**%**		

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	FIDAS 200 S		SN	SN 0111 & SN 0112	
			Limit value	50	µg/m³
Status of measured values	Slope & offset corrected		Allowed uncertainty	25	%
Cologne, Summer					
Uncertainty between Reference	**0.80**	**µg/m³**			
Uncertainty between Candidates	**0.26**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**81**			**82**	
Slope b	**0.986**			**0.970**	
Uncertainty of b	**0.026**			**0.026**	
Ordinate intercept a	**-0.098**			**0.009**	
Uncertainty of a	**0.463**			**0.462**	
Expanded measured uncertainty W_{CM}	**7.63**	**%**		**9.14**	**%**
Cologne, Winter					
Uncertainty between Reference	**0.53**	**µg/m³**			
Uncertainty between Candidates	**0.63**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**51**			**50**	
Slope b	**1.006**			**0.971**	
Uncertainty of b	**0.014**			**0.014**	
Ordinate intercept a	**0.238**			**0.216**	
Uncertainty of a	**0.378**			**0.377**	
Expanded measured uncertainty W_{CM}	**6.41**	**%**		**7.77**	**%**
Bonn					
Uncertainty between Reference	**0.38**	**µg/m³**			
Uncertainty between Candidates	**0.85**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**50**			**50**	
Slope b	**0.985**			**0.948**	
Uncertainty of b	**0.026**			**0.027**	
Ordinate intercept a	**1.372**			**1.510**	
Uncertainty of a	**0.776**			**0.817**	
Expanded measured uncertainty W_{CM}	**9.01**	**%**		**10.07**	**%**
Bornheim					
Uncertainty between Reference	**0.54**	**µg/m³**			
Uncertainty between Candidates	**0.82**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**47**			**47**	
Slope b	**1.064**			**1.022**	
Uncertainty of b	**0.037**			**0.037**	
Ordinate intercept a	**-0.425**			**-0.597**	
Uncertainty of a	**0.693**			**0.681**	
Expanded measured uncertainty W_{CM}	**13.42**	**%**		**7.60**	**%**
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	**0.67**	**µg/m³**			
Uncertainty between Candidates	**1.10**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**35**			**35**	
Slope b	**0.979**			**0.919**	
Uncertainty of b	**0.036**			**0.037**	
Ordinate intercept a	**1.526**			**2.795**	
Uncertainty of a	**1.539**			**1.56**	
Expanded measured uncertainty W_{CM}	**10.47**	**%**		**11.52**	**%**
All comparisons, <30 µg/m³					
Uncertainty between Reference	**0.61**	**µg/m³**			
Uncertainty between Candidates	**0.55**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**194**			**194**	
Slope b	**1.046**			**1.002**	
Uncertainty of b	**0.021**			**0.020**	
Ordinate intercept a	**-0.510**			**-0.305**	
Uncertainty of a	**0.372**			**0.358**	
Expanded measured uncertainty W_{CM}	**9.94**	**%**		**6.74**	**%**
All comparisons					
Uncertainty between Reference	**0.62**	**µg/m³**			
Uncertainty between Candidates	**0.64**	**µg/m³**			
	SN 0111			**SN 0112**	
Number of data pairs	**229**			**229**	
Slope b	**1.017**	**not significant**		**0.981**	**not significant**
Uncertainty of b	**0.011**			**0.011**	
Ordinate intercept a	**-0.037**	**not significant**		**0.081**	**not significant**
Uncertainty of a	**0.252**			**0.249**	
Expanded measured uncertainty W_{CM}	**8.24**	**%**		**8.19**	**%**