

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000039317_01

AMS designation: APDA-371 with PM₁₀ pre-separator for suspended particulate matter PM₁₀

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 certified according to the standards VDI 4202-1 (2010), VDI 4203-3 (2010), EN 12341 (1998), Guide to the demonstration of equivalence of ambient air monitoring methods EN 15267-1 (2009) and DIN EN 15267-2 (2009).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 12 pages).



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

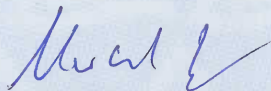
www.tuv.com
ID 0000039317

Publication in the German Federal Gazette (BAnz) of 23 July 2013

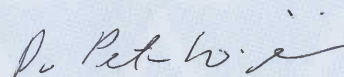
This certificate will expire on:
22 July 2023

German Federal Environment Agency
Dessau, 22 July 2018

TÜV Rheinland Energy GmbH
Cologne, 21 July 2018



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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:	936/21221789/A dated 19 March 2013
Initial certification:	23 July 2013
Expiry date:	22 July 2023
Certificate:	Renewal (of previous certificate 0000039317 dated 20 August 2013 valid until 22 July 2018)
Publication:	BAnz AT 23.07.2013 B4, chapter III no. 3.1

Approved application

The certified AMS is suitable for continuous ambient air monitoring of suspended particulate matter, PM₁₀ (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and field tests (initial testing) at three different locations and/or periods as well as equivalence assessments taking into account seven different locations/periods.

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

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for monitoring the limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification

This certification is based on:

- Test report 936/21221789/A dated 19 March 2013 issued by TÜV Rheinland Energie und Umwelt 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 23.07.2013 B4, chapter III no. 3.1,
UBA announcement dated 03 July 2013:

AMS designation:

APDA-371 with PM₁₀ pre-separator

Manufacturer:

HORIBA Europe GmbH, Oberursel

Field of application:

For continuous ambient air monitoring of suspended particulate matter, PM₁₀ (stationary operation)

Measuring ranges during performance testing:

Component	Certification range	Unit
PM ₁₀	0–1000	µg/m ³

Software version:

Version 3236-07 5.1.1

Restrictions:

None

Notes:

1. For monitoring PM₁₀, the instrument must be fitted with the following options at least: Sample heater (BX-830), sampling inlet (BX-802) and ambient temperature sensor (BX-592) or combined pressure and temperature sensor (BX-596).
2. The heater may only be used in the manner it was used during performance testing.
3. Flow control must be related to operational flow considering ambient conditions (operating mode: ACTUAL).
4. During the performance test, the cycle time was 1 h, i.e. the filter was automatically changed once an hour. Every filter spot was sampled only once.
5. The measuring system must be operated inside a lockable measurement container.
6. The measuring system must be calibrated on site at regular intervals by using the gravimetric PM₁₀ reference method according to EN 12341.
7. The measuring system may also be operated with the BX-125 pump (optional).
8. Since January 2012, the measuring system has been distributed with a re-engineered rear plate which accommodates additional interfaces such as the optional BX-965 reporting processor.
9. The measuring system complies with the requirements of standard EN 12341 and the guide to the "Demonstration of Equivalence of Ambient Air Monitoring Methods" in its January 2010 version. Furthermore, the manufacturing process and the quality management for the APDA-371 measuring system with PM₁₀-pre-separator meet the requirements of EN 15267.

10. The instrument was first publically announced by the Federal Environment Agency on 25 January 2010 (BAnz. p. 552, chapter IV, 11th notification). Most recently, the Federal Environment Agency made an announcement regarding the instrument on 6 July 2012 (BAnz AT 20.07.2012 B11, chapter IV 3rd notification).
11. Test report no. 936/21221789/A is available online at www.qal1.de.

Test Report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21221789/A dated 19 March 2013

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV ' notification 9, UBA announcement dated 25 February 2015:

9 Notification as regards Federal Environment Agency (UBA) notice of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter III number 3.1)

The 970603 pressure sensor (MICROSWITCH #185PC15AT) of the APDA-371 measuring system with PM₁₀ pre-separator manufactured by HORIBA Europe GmbH, is no longer produced and has been replaced by the 970595 pressure sensor (HONEYWELL SSCDANN015PAAA5).

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 20 September 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 42, UBA announcement dated 22 July 2015:

42 Notification as regards Federal Environment Agency notices of 3 July 2012 (BAnz AT 23.07.2013 B4, chapter III number 3.1) and of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV 9th notification)

The APDA-371 air quality monitor with PM₁₀ pre-separator manufactured by HORIBA Europe GmbH may also be operated with the BECKER VT 4.4 vacuum pump.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 23 March 2015

Publication in the German Federal Gazette: BAnz AT 31.07.2017 B12, chapter II notification 33, UBA announcement dated 13 July 2017:

33 Notification as regards Federal Environment Agency notices of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter III number 3.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4 chapter V 42nd notification)

The current software version of the APDA-371 air quality monitor with PM₁₀ pre-separator for suspended particulate matter, PM₁₀ fraction, manufactured by HORIBA Europe GmbH is:

3236-7 V 5.5.0.

Statement issued by TÜV Rheinland Energy GmbH dated 8 March 2017

Certified product

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

With the exception of a modified front design, the APDA-371 measuring system with PM₁₀ pre-separator exactly corresponds to the BAM-1020 developed and entirely manufactured by Met One Instruments, Inc.

The APDA-371 measuring system with PM₁₀-pre-separator consists of the PM₁₀-sampling inlet BX-802, the sampling tube, the sample heater BX-830, the ambient temperature sensor BX-592 (incl. radiation protection shield) or the combined pressure and temperature sensor BX-596, the vacuum pump BX-127 or optionally the BX-125, the measuring instrument APDA-371 (incl. glass-fibre filter tape), the respective connecting tubes and lines as well as adapters, the roof flange as well as the manual in German.

The measuring system uses beta-attenuation as a measurement principle.

The particle sample passes the PM₁₀-sampling inlet at a flow rate of 1 m³/h and reaches the APDA-371 analyser via the sampling tube.

During performance testing, the measuring system was operated with the BX-830 sample heater.

Particles arrive at the measuring instrument and will be separated by the glass fibre filter tape.

During the performance test, the cycle time was set to 60 min, radiometric measurement taking 4 min.

Thus, the cycle time consists of 2 x 4 min for the radiometric measurement (I₀ & I₃) as well as approximately 1–2 min for filter tape movements. Consequently, the effective sampling time is around 50 min.

Furthermore, the measuring system allows an extension of the measuring time to 6 or 8 min in order to increase the precision of the radiometric measurement. Effective sampling time in that case decreases to 46 or 42 min.

The radiometric determination of mass is calibrated in the factory and is checked hourly during operation as part of internal quality assurance at the zero point (clean filter spot) and at the span point (built-in reference foil). Measured values at zero and span points are easily derived from the data generated. These can then be compared to stability criteria (drift) or target values for span (factory settings).

The current software version is: 3236-7 V 5.5.0.

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.

Certification of the APDA-371 with PM₁₀ pre-separator 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. 0000039317: 20 August 2013
Expiry date of the certificate: 22 July 2018

Test report: 936/21221789/A dated 19 March 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 23.07.2013 B4, chapter III no. 3.1
UBA announcement dated 03 July 2013

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 20 September 2014
Publication: BAnz AT 02.04.2015 B5, chapter IV notification 9
UBA announcement dated 25 February 2015
(new pressure sensor)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 23 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 42
UBA announcement dated 22 July 2015
(alternative vacuum pump)

Statement issued by TÜV Rheinland Energy GmbH dated 08 March 2017
Publication: BAnz AT 31.07.2017 B12, chapter II notification 33
UBA announcement dated 13 July 2017
(new software version)

Renewal of the certificate

Certificate no. 0000039317_01: 22 July 2018
Expiry date of the certificate: 22 July 2023

Calculation of total uncertainty

PM ₁₀ APDA-371*	35.3% > 28 µg m ⁻³	Orthogonal Regression			Between Instrument Uncertainties		
	W _{CM} / %	n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	Reference	Candidate
All Paired Data	16.0	320	0.982	1.034 +/- 0.008	0.843 +/- 0.290	0.67	1.22
< 30 µg m ⁻³	24.7	215	0.826	1.119 +/- 0.032	-0.446 +/- 0.557	0.53	1.09
> 30 µg m ⁻³	17.7	105	0.971	1.042 +/- 0.017	0.141 +/- 1.031	0.91	1.49
4294	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.960	0.948 +/- 0.036	2.202 +/- 0.950	10.13	34.5
	Titz - Rödigen	37	0.962	1.058 +/- 0.035	0.376 +/- 0.782	14.75	18.9
	Cologne, Frankfurter Str.	28	0.963	1.025 +/- 0.039	-1.293 +/- 1.083	8.07	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.814	1.040 +/- 0.055	0.162 +/- 0.981	12.58	4.4
	> 30 µg m ⁻³	26	0.897	0.964 +/- 0.063	1.810 +/- 2.438	9.75	100.0
	All Data	94	0.953	0.987 +/- 0.022	1.048 +/- 0.563	9.16	35.3
4295	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.970	0.990 +/- 0.033	2.681 +/- 0.862	12.53	34.5
	Titz - Rödigen	37	0.961	1.056 +/- 0.035	1.260 +/- 0.785	17.52	18.9
	Cologne, Frankfurter Str.	28	0.969	1.021 +/- 0.035	-0.154 +/- 0.994	8.10	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.830	1.056 +/- 0.053	0.935 +/- 0.952	17.24	4.4
	> 30 µg m ⁻³	26	0.929	1.025 +/- 0.056	0.713 +/- 2.151	11.49	100.0
	All Data	94	0.960	1.004 +/- 0.021	1.735 +/- 0.528	11.41	30.9
Austria1	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.969	1.025 +/- 0.027	-0.202 +/- 1.848	20.89	82.2
	Steyregg	45	0.824	1.049 +/- 0.067	-1.750 +/- 1.392	9.31	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.644	1.339 +/- 0.109	-6.789 +/- 2.135	42.75	2.0
	> 30 µg m ⁻³	40	0.960	1.057 +/- 0.034	-2.826 +/- 2.431	19.58	100.0
	All Data	90	0.983	1.039 +/- 0.015	-1.294 +/- 0.729	15.95	45.6
Austria2	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.966	1.033 +/- 0.029	1.948 +/- 1.962	26.05	82.2
	Steyregg	45	0.793	1.035 +/- 0.072	-1.668 +/- 1.489	9.56	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.557	1.492 +/- 0.130	-9.462 +/- 2.545	62.86	2.0
	> 30 µg m ⁻³	40	0.956	1.084 +/- 0.037	-2.296 +/- 2.635	22.65	100.0
	All Data	90	0.980	1.079 +/- 0.016	-1.702 +/- 0.818	19.84	45.6
J7860	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	59	0.906	1.172 +/- 0.047	1.204 +/- 0.839	40.46	6.8
	> 30 µg m ⁻³	38	0.974	1.002 +/- 0.027	3.154 +/- 1.548	17.67	100.0
	All Data (Tusimice)	97	0.984	0.999 +/- 0.013	3.739 +/- 0.492	18.45	43.3
J7863	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	58	0.913	1.158 +/- 0.045	0.159 +/- 0.812	33.73	6.9
	> 30 µg m ⁻³	38	0.978	1.032 +/- 0.025	1.948 +/- 1.450	17.98	100.0
	All Data (Tusimice)	96	0.987	1.035 +/- 0.012	2.035 +/- 0.461	18.18	43.8
17011	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.960	1.039 +/- 0.034	0.632 +/- 0.458	11.13	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.949	1.162 +/- 0.042	-0.766 +/- 0.602	29.99	2.5
17022	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.958	1.051 +/- 0.035	0.603 +/- 0.477	13.45	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.963	1.110 +/- 0.034	-0.050 +/- 0.488	22.28	2.5

* The equivalence testing has been performed in the basis test with the identical measuring devices BAM-1020 of the company Met One Instruments, Inc.

PM ₁₀ APDA-371* Intercept Corrected	35.3% > 28 µg m ⁻³	Orthogonal Regression				Betw een Instrument Uncertainties	
		W _{CM} / %	n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	Reference
All Paired Data	14.2	320	0.982	1.034 +/- 0.008	0.000 +/- 0.290	0.67	1.22
< 30 µg m ⁻³	21.7	215	0.826	1.119 +/- 0.032	-1.288 +/- 0.557	0.53	1.09
> 30 µg m ⁻³	16.3	105	0.971	1.042 +/- 0.017	-0.701 +/- 1.031	0.91	1.49
4294	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.960	0.948 +/- 0.036	1.359 +/- 0.950	11.22	34.5
	Titz - Rödingen	37	0.962	1.058 +/- 0.035	-0.466 +/- 0.782	11.91	18.9
	Cologne, Frankfurter Str.	28	0.963	1.025 +/- 0.039	-2.136 +/- 1.083	8.92	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.814	1.040 +/- 0.055	-0.680 +/- 0.981	10.58	4.4
	> 30 µg m ⁻³	26	0.897	0.964 +/- 0.063	0.967 +/- 2.438	10.38	100.0
	All Data	94	0.953	0.987 +/- 0.022	0.206 +/- 0.563	9.30	35.3
4295	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.970	0.990 +/- 0.033	1.839 +/- 0.862	10.54	34.5
	Titz - Rödingen	37	0.961	1.056 +/- 0.035	0.417 +/- 0.785	14.52	18.9
	Cologne, Frankfurter Str.	28	0.969	1.021 +/- 0.035	-0.996 +/- 0.994	7.32	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.830	1.056 +/- 0.053	0.092 +/- 0.952	14.49	4.4
	> 30 µg m ⁻³	26	0.929	1.025 +/- 0.056	-0.129 +/- 2.151	9.57	100.0
	All Data	94	0.960	1.004 +/- 0.021	0.892 +/- 0.528	9.53	30.9
Austria1	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.969	1.025 +/- 0.027	-1.045 +/- 1.848	20.50	82.2
	Steyregg	45	0.824	1.049 +/- 0.067	-2.593 +/- 1.392	8.95	8.9
	< 30 µg m ⁻³	50	0.644	1.339 +/- 0.109	-7.631 +/- 2.135	39.58	2.0
Combined Datasets	> 30 µg m ⁻³	40	0.960	1.057 +/- 0.034	-3.668 +/- 2.431	19.88	100.0
	All Data	90	0.983	1.039 +/- 0.015	-2.137 +/- 0.729	15.78	45.6
Austria2	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.966	1.033 +/- 0.029	1.106 +/- 1.962	24.39	82.2
	Steyregg	45	0.793	1.035 +/- 0.072	-2.511 +/- 1.489	10.09	8.9
	< 30 µg m ⁻³	50	0.557	1.492 +/- 0.130	-10.304 +/- 2.545	59.63	2.0
Combined Datasets	> 30 µg m ⁻³	40	0.956	1.084 +/- 0.037	-3.138 +/- 2.635	21.77	100.0
	All Data	90	0.980	1.079 +/- 0.016	-2.544 +/- 0.818	18.61	45.6
J7860	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	59	0.906	1.172 +/- 0.047	0.361 +/- 0.839	37.23	6.8
	> 30 µg m ⁻³	38	0.974	1.002 +/- 0.027	2.311 +/- 1.548	15.38	100.0
	All Data (Tusimice)	97	0.984	0.999 +/- 0.013	2.896 +/- 0.492	15.92	43.3
J7863	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	58	0.913	1.158 +/- 0.045	-0.684 +/- 0.812	30.54	6.9
	> 30 µg m ⁻³	38	0.978	1.032 +/- 0.025	1.105 +/- 1.450	15.50	100.0
	All Data (Tusimice)	96	0.987	1.035 +/- 0.012	1.193 +/- 0.461	15.54	43.8
17011	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.960	1.039 +/- 0.034	-0.210 +/- 0.458	8.21	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.949	1.162 +/- 0.042	-1.608 +/- 0.602	26.73	2.5
17022	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.958	1.051 +/- 0.035	-0.240 +/- 0.477	10.40	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.963	1.110 +/- 0.034	-0.893 +/- 0.488	19.05	2.5

* The equivalence testing has been performed in the basis test with the identical measuring devices BAM-1020 of the company Met One Instruments, Inc.

PM ₁₀ APDA-371* Slope Corrected	35.3% > 28 µg m ⁻³	Orthogonal Regression				Betw een Instrument Uncertainties	
		W _{CM} / %	n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	Reference
All Paired Data	12.5	320	0.982	1.000 +/- 0.008	0.824 +/- 0.280	0.67	1.18
< 30 µg m ⁻³	17.9	215	0.826	1.079 +/- 0.031	-0.372 +/- 0.538	0.53	1.06
> 30 µg m ⁻³	14.9	105	0.971	1.007 +/- 0.017	0.164 +/- 0.997	0.91	1.44
4294	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.960	0.917 +/- 0.035	2.144 +/- 0.919	12.72	34.5
	Titz - Rödigen	37	0.962	1.023 +/- 0.034	0.378 +/- 0.756	9.03	18.9
	Cologne, Frankfurter Str.	28	0.963	0.990 +/- 0.037	-1.235 +/- 1.048	10.44	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.814	1.003 +/- 0.053	0.219 +/- 0.949	8.97	4.4
	> 30 µg m ⁻³	26	0.897	0.931 +/- 0.061	1.815 +/- 2.358	11.57	100.0
	All Data	94	0.953	0.954 +/- 0.022	1.032 +/- 0.545	10.23	35.3
4295	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Cologne, Parking Lot	29	0.970	0.957 +/- 0.032	2.605 +/- 0.834	9.04	34.5
	Titz - Rödigen	37	0.961	1.021 +/- 0.034	1.233 +/- 0.760	11.24	18.9
	Cologne, Frankfurter Str.	28	0.969	0.988 +/- 0.034	-0.135 +/- 0.962	7.70	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.830	1.018 +/- 0.052	0.961 +/- 0.921	11.33	4.4
	> 30 µg m ⁻³	26	0.929	0.990 +/- 0.054	0.737 +/- 2.080	8.24	100.0
	All Data	94	0.960	0.971 +/- 0.020	1.693 +/- 0.510	8.28	30.9
Austria1	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.969	0.991 +/- 0.027	-0.164 +/- 1.787	19.96	82.2
	Steyregg	45	0.824	1.012 +/- 0.065	-1.624 +/- 1.347	9.63	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.644	1.285 +/- 0.105	-6.378 +/- 2.065	34.09	2.0
	> 30 µg m ⁻³	40	0.960	1.022 +/- 0.033	-2.687 +/- 2.351	20.01	100.0
	All Data	90	0.983	1.005 +/- 0.014	-1.240 +/- 0.705	15.78	45.6
Austria2	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Individual Datasets	Graz	45	0.966	0.998 +/- 0.028	1.920 +/- 1.898	22.33	82.2
	Steyregg	45	0.793	0.997 +/- 0.069	-1.531 +/- 1.441	11.48	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.557	1.429 +/- 0.126	-8.879 +/- 2.462	52.84	2.0
	> 30 µg m ⁻³	40	0.956	1.048 +/- 0.036	-2.167 +/- 2.549	20.66	100.0
	All Data	90	0.980	1.043 +/- 0.016	-1.631 +/- 0.791	17.32	45.6
J7860	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	59	0.906	1.131 +/- 0.046	1.195 +/- 0.812	32.66	6.8
	> 30 µg m ⁻³	38	0.974	0.969 +/- 0.026	3.074 +/- 1.498	13.09	100.0
	All Data (Tusimice)	97	0.984	0.966 +/- 0.012	3.625 +/- 0.476	13.28	43.3
J7863	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	58	0.913	1.119 +/- 0.044	0.182 +/- 0.786	26.26	6.9
	> 30 µg m ⁻³	38	0.978	0.998 +/- 0.025	1.904 +/- 1.403	12.97	100.0
	All Data (Tusimice)	96	0.987	1.001 +/- 0.012	1.975 +/- 0.446	12.77	43.8
17011	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.960	1.004 +/- 0.033	0.620 +/- 0.443	5.53	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.949	1.123 +/- 0.041	-0.728 +/- 0.583	22.58	2.5
17022	Dataset	Orthogonal Regression				Limit Value of 50 µg m ⁻³	
		n _{c-s}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³
Combined Datasets	< 30 µg m ⁻³	39	0.958	1.016 +/- 0.034	0.592 +/- 0.461	7.27	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.963	1.073 +/- 0.033	-0.040 +/- 0.473	15.26	2.5

* The equivalence testing has been performed in the basis test with the identical measuring devices BAM-1020 of the company Met One Instruments, Inc.

PM ₁₀ APDA-371* Slope and Intercept Corrected	35.3% > 28 µg m ⁻³	Orthogonal Regression			Between Instrument Uncertainties		
		W _{CM} / %	n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	Reference	Candidate
All Paired Data	12.1	320	0.982	1.000 +/- 0.008	0.009 +/- 0.280	0.67	1.18
< 30 µg m ⁻³	15.5	215	0.826	1.079 +/- 0.031	-1.187 +/- 0.538	0.53	1.06
> 30 µg m ⁻³	14.9	105	0.971	1.007 +/- 0.017	-0.651 +/- 0.997	0.91	1.44
4294	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Individual Datasets	Cologne, Parking Lot	29	0.960	0.917 +/- 0.035	1.329 +/- 0.919	15.05	34.5
	Titz - Rödigen	37	0.962	1.023 +/- 0.034	-0.437 +/- 0.756	7.33	18.9
	Cologne, Frankfurter Str.	28	0.963	0.990 +/- 0.037	-2.050 +/- 1.048	12.87	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.814	1.003 +/- 0.053	-0.596 +/- 0.949	9.11	4.4
	> 30 µg m ⁻³	26	0.897	0.931 +/- 0.061	1.000 +/- 2.358	13.74	100.0
	All Data	94	0.953	0.954 +/- 0.022	0.217 +/- 0.545	12.26	35.3
4295	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Individual Datasets	Cologne, Parking Lot	29	0.970	0.957 +/- 0.032	1.790 +/- 0.834	9.04	34.5
	Titz - Rödigen	37	0.961	1.021 +/- 0.034	0.418 +/- 0.760	8.91	18.9
	Cologne, Frankfurter Str.	28	0.969	0.988 +/- 0.034	-0.950 +/- 0.962	9.54	42.9
Combined Datasets	< 30 µg m ⁻³	68	0.830	1.018 +/- 0.052	0.146 +/- 0.921	9.59	4.4
	> 30 µg m ⁻³	26	0.929	0.990 +/- 0.054	-0.078 +/- 2.080	8.55	100.0
	All Data	94	0.960	0.971 +/- 0.020	0.878 +/- 0.510	8.65	30.9
Austria1	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Individual Datasets	Graz	45	0.969	0.991 +/- 0.027	-0.979 +/- 1.787	20.64	82.2
	Steyregg	45	0.824	1.012 +/- 0.065	-2.439 +/- 1.347	11.48	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.644	1.285 +/- 0.105	-7.193 +/- 2.065	31.13	2.0
	> 30 µg m ⁻³	40	0.960	1.022 +/- 0.033	-3.502 +/- 2.351	21.30	100.0
	All Data	90	0.983	1.005 +/- 0.014	-2.055 +/- 0.705	16.94	45.6
Austria2	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Individual Datasets	Graz	45	0.966	0.998 +/- 0.028	1.105 +/- 1.898	21.51	82.2
	Steyregg	45	0.793	0.997 +/- 0.069	-2.346 +/- 1.441	13.69	8.9
Combined Datasets	< 30 µg m ⁻³	50	0.557	1.429 +/- 0.126	-9.694 +/- 2.462	49.76	2.0
	> 30 µg m ⁻³	40	0.956	1.048 +/- 0.036	-2.982 +/- 2.549	20.80	100.0
	All Data	90	0.980	1.043 +/- 0.016	-2.446 +/- 0.791	17.28	45.6
J7860	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Combined Datasets	< 30 µg m ⁻³	59	0.906	1.131 +/- 0.046	0.380 +/- 0.812	29.59	6.8
	> 30 µg m ⁻³	38	0.974	0.969 +/- 0.026	2.259 +/- 1.498	11.97	100.0
	All Data (Tusimice)	97	0.984	0.966 +/- 0.012	2.810 +/- 0.476	11.73	43.3
J7863	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Combined Datasets	< 30 µg m ⁻³	58	0.913	1.119 +/- 0.044	-0.633 +/- 0.786	23.28	6.9
	> 30 µg m ⁻³	38	0.978	0.998 +/- 0.025	1.089 +/- 1.403	11.54	100.0
	All Data (Tusimice)	96	0.987	1.001 +/- 0.012	1.160 +/- 0.446	11.08	43.8
17011	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Combined Datasets	< 30 µg m ⁻³	39	0.960	1.004 +/- 0.033	-0.195 +/- 0.443	4.58	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.949	1.123 +/- 0.041	-1.543 +/- 0.583	19.51	2.5
17022	Dataset	Orthogonal Regression			Limit Value of 50 µg m ⁻³		
		n _{c-s} r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 28 µg m ⁻³	
Combined Datasets	< 30 µg m ⁻³	39	0.958	1.016 +/- 0.034	-0.223 +/- 0.461	5.30	0.0
	> 30 µg m ⁻³	1		+/-	+/-		100.0
	All Data (Teddington)	40	0.963	1.073 +/- 0.033	-0.855 +/- 0.473	12.29	2.5

* The equivalence testing has been performed in the basis test with the identical measuring devices BAM-1020 of the company Met One Instruments, Inc.