Umwelt Bundes Amt
For our Environment

TÜVRheinland®
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CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000037055

Certified AMS:	BAM-1020 with PM_{10}-pre-separator
Manufacturer:	Met One Instruments, Inc. 1600 Washington Blvd. Grants Pass Oregon 97526 USA
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH

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

VDI 4202-1: 2002, VDI 4203-3: 2004, EN 12341: 1998, Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods: 2010, EN 15267-1: 2009, EN 15267-2: 2009

Certification is awarded in respect of the conditions stated in this certificate (also see the following pages).

www.tuv.com TÜVRheinland® ID: 0000037055

- Certified equivalent EN method
- Complying with 2008/50/EC
- TUV approved
- Annual inspection

Publication in the German Federal Gazette (BAnz.) of 05 March 2013

German Federal Environment Agency
Dessau, 22 March 2013

i. A. Dr. Marcel Langner

The certificate will expire on:
04 March 2018

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013

ppa. Dr. Peter Wilbring

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Am Grauen Stein
51105 Cologne

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

Test report:	936/21205333/A of 06 December 2006 Addendum 936/21220762/A of 04 October 2012
Initial certification:	05 March 2013
Date of expiry:	04 March 2018
Publication:	BAnz AT 05 March 2013 B10, chapter V, notification 2

Approved application
The certified AMS is suitable for permanent monitoring of suspended particulate matter PM_{10} in ambient air (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test, a field test (type approval) performed at three different test sites on three different periods as well as an equivalence testing carried out at seven different test sites on seven different 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:

- test report 936/21205333/A of 06 December 2006 of TÜV Rheinland Immissionsschutz und Energiesysteme GmbH and addendum 936/21220762/A of 04 October 2012 by TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz. 20 April 2007, No. 75, p. 4139, chapter III, No. 1.2
- publication in the German Federal Gazette: BAnz. 25 August 2009, No. 125, p. 2929, chapter III, notification 6
- publication in the German Federal Gazette: BAnz. 12 February 2010, No. 24, p. 552, chapter IV, notification 10 und 11
- publication in the German Federal Gazette: BAnz. 28 July 2010, No. 111, p. 2597, chapter III, notification 2
- publication in the German Federal Gazette: BAnz. 29 July 2011, No. 113, p. 2725, chapter III, notification 12
- publication in the German Federal Gazette: BAnz AT 20 July 2012 B11, chapter IV, notification 6
- publication in the German Federal Gazette: BAnz AT 05 March 2013 B10, chapter V, notification 2

AMS designation:
BAM-1020 with PM_{10}-pre-separator

Manufacturer:
Met One Instruments, Inc., Grants Pass, USA

Field of application:
Continuous ambient air monitoring of the PM_{10}-fraction in suspended particulate matter (stationary operation)

Measuring range during performance test:
Particulate matter PM_{10}: 0 - 1,000 mg/m^3 = 0 - 1000 $\mu g/m^3$

Software version:
3236-02 3.2.1b

Restrictions:
None

Notes:

1. For recording PM_{10}, the system shall be equipped with the following options:
   Sample heater (BX-830), Sampling inlet (BX-802), Ambient temperature sensor (BX-592) and Ambient pressure sensor (BX-594).
2. The heater shall be used only in operating mode, as has been used during the type approval test.
3. The flow rate control shall be in actual volume related to ambient conditions (Operating mode: ACTUAL).
4. During the complete type approval test, the measuring system has been operated with the sample heater BX-830.
5. During the type approval test, the cycle time was 1 h, i.e. an automatic filter change was done each hour. Each filter spot has been sampled on only once.
6. The measuring system shall be operated in a lockable measuring cabinet.
7. The measuring system is to be calibrated on site at regular intervals by using the gravimetric PM_{10} reference method according to EN 12341.

Test Institute:
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne,
TÜV Rheinland Group
Report No.: 936/21205333/A dated 6 December 2006

6 Notification as regards Federal Environmental Agency notice of 12 April 2007 (BAnz. p. 4139)

The current firmware version of the ambient air measuring system BAM-1020 of the company Met One Instruments, Inc. is:

Version 3236-02 5.0.2

Remark No.1 has to be changed as follows:

1. For recording $PM_{10,}$ the system has to be equipped at minimum with the following options: Sample heater (BX-830), Sampling inlet (BX-802) and Ambient temperature sensor (BX-592).

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 30 March 2009

10 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139) and of 3 August 2009 (Federal Gazette [BAnz.] p. 2935)

The current firmware version of the ambient air measuring system BAM-1020 of the company Met One Instruments, Inc. is:

Version 3236-07 V5.0.5

Remark No. 1 is replaced by:

1. For recording $PM_{10,}$ the system has to be equipped at minimum with the following options: Sample heater (BX-830), Sampling inlet (BX-802) and Ambient temperature sensor (BX-592) respectively combined pressure and temperature sensor (BX-596).

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 9 October 2009

11 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139) and of 3 August 2009 (BAnz. p. 2935)

The identical measuring system BAM-1020 of the company Met One Instruments, Inc (TÜV report-No. 936/21205333A of 6 December 2006) is also distributed by the company Horiba Europe GmbH, 61440 Oberursel, Germany under the name APDA-371.

The current firmware version of the ambient air measuring system APDA-371 is:

Version 3236-07 V5.0.5.

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 9 October 2009

2 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139) and of 25 January 2010 (BAnz. p. 555)

The current firmware version of the ambient air measuring system BAM-1020 with PM_{10} pre-separator of the company Met One Instruments, Inc. is:

Version 3236-07 V5.0.10

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 16 March 2010

12 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139, chapter III, No. 1.2) and of 12 July 2010 (BAnz. p. 2597, chapter III, 2th notification)

As an option, the measuring system BAM-1020 with PM_{10}-pre-separator of the company Met One Instruments, Inc for the measured component PM_{10} can be operated with the pump BX-125.

As an option the measuring system can be equipped with a Touch Screen Display (Option BX-970). The current firmware version is:

3236-77 V5.1.0

The firmware version of the measuring system without the option BX-970 Touch Screen Display remains 3236-07 5.0.10.

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 24 March 2011

6 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139, chapter III, No. 1.2) and of 15 July 2011 (BAnz. p. 2725, chapter III, 12th notification)

The measuring system BAM-1020 with PM_{10}-pre-separator for the component suspended particulate matter PM_{10}-fraction manufactured by Met One Instruments, Inc. is equipped with a re-designed back plate in order to make room for extended interfaces (i.e. the optional BX-965 reporting unit).

The current firmware version of the AMS is:

3236-07 5.0.15

The current firmware version of the AMS with touch screen display (option BX-970) is:

3236-77 V5.1.2

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 21 March 2012

2 Notification as regards Federal Environmental Agency notices of 12 April 2007 (BAnz. p. 4139, chapter III, No. 1.2) and of 6 July 2012 (BAnz AT 20.07.2012 B11, chapter IV, 6th notification)

The measuring system BAM-1020 with PM_{10}-pre-separator of the company Met One Instruments, Inc for the measured component PM_{10} fulfills the requirements of EN 12341 (issue March 1998) as well as of the Guide „Demonstration of Equivalence of Ambient Air Monitoring Methods“ in its version of January 2010. Furthermore the manufacturing and the quality management of the measuring system BAM-1020 PM_{10} pre-separator fulfills the requirements of EN 15267.

The test report on the type approval test with the report number 936/21205333/A as well as an addendum to the test report with the report number 936/21220762/A are available on the internet: www.qal1.de.

Opinion stated by TÜV Rheinland Energie und Umwelt GmbH of 4 October 2012

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

The measuring system BAM-1020 with PM_{10} pre-separator consists of the PM_{10}-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 as an option BX-125, the measuring instrument BAM-1020 (incl. glass fiber filter tape), the respective connecting tubes and lines as well as adapters, the roof flange as well as the manual in English / German language.

The ambient air measuring system BAM-1020 is based on the measuring principle of beta-attenuation.

The particle sample passes the PM10-sampling inlet with a flow rate of 1 m³/h and arrives via the sampling tube at the measuring instrument BAM-1020.

Within the scope of the test work, the measuring system was operated with the sample heater BX-830.

The particles arrive at the measuring instrument and will be separated at the glass fiber filter tape for the radiometric measurement.

During the suitability test work, a cycle time of 60 min with a time need of 4 min for the radiometric measurement was set.

Therefore the cycle time consists of 2 x 4 min for the radiometric measurement (I_0 & I_3) as well as approximately 1-2 min for filter tape movements. Thus 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. The effective sampling time is then decreased to 46 respectively 42 min.

The radiometric determination of mass is calibrated in the factory and is checked within the scope of internal quality assurance hourly at the zero point (clean filter spot) and at the reference point (built-in reference foil) during operation. With the help of the generated data, measured values at zero and reference point can be easily affiliated. They can be compared with any stability requirements (drift effects) respectively with the nominal value for the reference foil (factory setting).

General notes
This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacture of the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energie und Umwelt GmbH must be notified at the address given on page 1.

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

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

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

Confirmation:
0000037055 / 22 March 2013

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Certification of BAM-1020 with PM_{10}-pre-separator is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test:

Test report: 936/21205333/A dated 06 December 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 20 April 2007, No. 75, p. 4139, chapter III, No. 1.2
Announcement by UBA from 12 April 2007

Notification:

Publication: BAnz. 25 August 2009, No. 125, p. 2929, chapter III, notification 6
Announcement by UBA from 03 August 2009

Publication: BAnz. 12 February 2010, No. 24, p. 552, chapter IV, notification 10 and 11
Announcement by UBA from 25 January 2010

Publication: BAnz. 28 July 2010, No. 111, p. 2597, chapter III, notification 2
Announcement by UBA from 12 July 2010

Publication: BAnz. 29 July 2011, No. 113, p. 2725, chapter III, notification 12
Announcement by UBA from 15 July 2011

Publication: BAnz AT 20 July 2012 B11, chapter IV, notification 6
Announcement by UBA from 06 July 2012

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 2
Announcement by UBA from 12 February 2013

Initial certification according to EN 15267:

Certificate No. 0000037055: 22 March 2013

Expiration date of the certificate: 04 March 2018

Test report: 936/21205333/A dated 06 December 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Addendum: 936/21220762/A dated 04 October 2012
TÜV Rheinland Energie und Umwelt GmbH, Köln

Statement of TÜV Rheinland Energie und Umwelt GmbH from 04 October 2012

Publication: BAnz AT 05 March 2013 B10, chapter V, notification 2
Announcement by UBA from 12 February 2013

Confirmation:
0000037055 / 22 March 2013

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PM_{10} Smart BAM 1020	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 - Rödingen	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 - Rödingen	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

Confirmation:
0000037055 / 22 March 2013

PM_{10} Smart BAM 1020 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	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
Combined Datasets	< 30 µg m^{-3}	50	0.644	1.339 +/- 0.109	-7.631 +/- 2.135	39.58	2.0
	> 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
Combined Datasets	< 30 µg m^{-3}	50	0.557	1.492 +/- 0.130	-10.304 +/- 2.545	59.63	2.0
	> 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

Confirmation:
0000037055 / 22 March 2013

PM_{10} Smart BAM 1020 Slope 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	12.5	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 - Rödingen	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 - Rödingen	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

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PM_{10} Smart BAM 1020 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 - Rödingen	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 - Rödingen	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