

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000027277_02

Certified AMS: APDA-371 with PM_{2,5}-pre-separator for particulate matter PM_{2,5}

Manufacturer: HORIBA Europe GmbH
Hans-Mess-Str. 6
61440 Oberursel/Ts.
Germany

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: 2010; VDI 4203-3: 2010, EN 14907: 2005;
Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods: 2010
EN 15267-1: 2009 und EN 15267-2: 2009**

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

The present certificate replaces Certificate No. 0000027277_01 of 20 August 2012

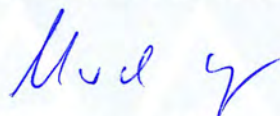


Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000027277

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

German Federal Environment Agency
Dessau, 20 August 2013



i. A. Dr. Marcel Langner

This certificate will expire on:
01 August 2015

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 19 August 2013



ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
teu@umwelt-tuv.de
Tel. +49 221 806-5200

TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Cologne

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

Certificate:
0000027277_02 / 20 August 2013

Test report: 936/21221789/B of 19 March 2013
Initial certification: 02 August 2010
Date of expiry: 01 August 2015
Publication: BAnz AT 23 July 2013 B4, chapter III, No. 2.1

Approved application

The certified AMS is suitable for permanent monitoring of suspended particulate matter PM_{2.5} 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 with four different test sites respectively 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 936/21221789/B of 19 March 2013 of 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 AT 23 July 2013 B4, chapter III, No. 2.1)

AMS designation:

APDA-371 with PM_{2,5}-pre-separator for particulate matter PM_{2,5}

Manufacturer:

HORIBA Europe GmbH, Oberursel

Field of application:

For continuous ambient air monitoring (stationary operation)

Measuring range during the performance test:

Component	Certification range	Unit
PM _{2,5}	0 - 1,000	µg/m ³

Software version:

Version 3236-07 5.1.1

Restrictions:

None

Notes:

1. The AMS fulfils the requirements of the 2010 version of the guide "Demonstration of Equivalence of Ambient Air Monitoring Methods" for component PM_{2,5}.
2. For recording PM_{2,5} values, the system has to be equipped with the following options: Sample heater (BX-830), PM₁₀ sampling inlet (BX-802), PM_{2,5} Sharp Cut Cyclone SCC (BX-807), combined pressure and temperature sensor (BX-596) or alternatively, the ambient temperature sensor (BX-592).
3. During the type approval test, the cycle time was set to 1 h, i.e. the AMS performed one automatic filter change per hour. Each filter spot was used only once.
4. The sampling time within the cycle time is 42 min.
5. The measuring system has to be operated in a lockable measuring cabinet.
6. The measuring system is to be calibrated on site at regular intervals by applying the gravimetric PM_{2,5} reference method specified in EN 14907.
7. As an option, the measuring system can be operated with the pump BX-125.
8. Since January 2012 the measuring system is distributed with a new designed back plate in order to make room for extended interfaces (e.g. the optional BX-965 reporting unit).
9. First notification issued by publication of the German Federal Environment Agency (UBA) on 12 July 2010 (BAnz. p. 2597, chapter II, No. 1.1, 7th Notice). Last notification for the AMS issued by publication of the German Federal Environment Agency (UBA) on 6 July 2012 (BAnz. AT 20 July 2012 B11, chapter IV, 2nd notification).
10. The type approval test report is available online under www.qal1.de.

Test institute: TÜV Rheinland Energie und Umwelt GmbH, Cologne

Report No.: 936/21221789/B dated 19 March 2013

Certified product

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

The measuring system APDA-371 with PM_{2.5}-pre-separator is identical to the measuring system BAM-1020 except for a different front design. It was developed by the company Met One Instruments, Inc. and is completely manufactured at Met One's production sites.

The measuring system APDA-371 with PM_{2.5} pre-separator consists of the PM₁₀-sampling inlet BX-802, the PM_{2.5} Sharp Cut Cyclone SCC BX-807, the sampling tube, the sample heater BX-830, the combined pressure and temperature sensor BX-596 or alternatively the ambient temperature sensor BX-592, the vacuum pump BX-127 and the optional BX-125, the measuring instrument APDA-371 (incl. glass fiber filter tape), the respective connecting tubes and lines as well as adapters, the roof flange and the manual in English / German.

The ambient air measuring system APDA-371 is based on the measuring principle of beta-attenuation.

The particle sample passes the PM₁₀-sampling inlet and the PM_{2.5} Sharp Cut Cyclone with a flow rate of 1 m³/h and arrives via the sampling tube at the measuring instrument APDA-371.

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

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

One measurement cycle (incl. automatic check of the radiometric measurement) consists of the following steps (setting: measuring time for radiometry 8 min):

1. The initial count of the clean filter tape I_0 is performed at the beginning of the cycle for a period of eight minutes.
2. The filter tape is moved forward the length of four windows and the sampling (vacuum pumping) begins on the spot in which I_0 was just measured. Air is drawn through this spot on the filter tape for approximately 42 minutes.
3. At the same time the second count I_1 occurs (at a point on the tape 4 windows back) for a period of eight minutes. The purpose of the measurement is to perform the verification for instrument drift caused by varying external parameters such as temperature and relative humidity. A third count I_2 occurs with the reference membrane extended over the same place on the tape. Eight minutes before the end of sampling time, another count I_{1x} occurs on the same point of the tape. With the help of I_1 and I_{1x} , the stability at the zero point can be monitored.
4. After sampling, the filter tape is moved back four windows to measure the beta ray absorption through the section that has collected dust (I_3). Finally the concentration calculation is performed to complete the cycle.
5. The next cycle begins with step 1.

The radiometric mass determination 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 can be easily derived to zero and reference points. They can be compared with any stability requirements (drift effects) or 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**.

Certification of APDA-371 with PM_{2,5}-pre-separator for particulate matter PM_{2,5} is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267

Certificate No 0000027277: 02 August 2010
Validity of the certificate: 01 August 2015
Test report: 936/21209919/A of 26 March 2010
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 28 July 2010, No. 111, p. 2597, chapter II, No. 1.1, 7th remark
Announcement by UBA from 12 July 2011

Update of certification according to EN 15267

Certificate No 0000027277_01: 20 August 2012
Validity of the certificate: 01 August 2015
1st notification on changes to the certificate according to EN 15267:
Statement of TÜV Rheinland Energie und Umwelt GmbH, Cologne from 22 March 2012
Publication: BAnz AT 20 July 2012 B11, chapter IV, notification 2
Announcement by UBA from 06 July 2012

Supplementary testing according to EN 15267:

Certificate No. 0000027277_02: 20 August 2013
Expiration date of the certificate: 01 August 2015
Test report: 936/21221789/B of 19 March 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 23 July 2013 B4, chapter III, No. 2.1
Announcement by UBA from 03 July 2013

Calculation of overall uncertainty

PM _{2,5} APDA-371*	33.1% > 17 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	Candidate
All Data	12.6	248	0.967	1.000 +/- 0.012	0.764 +/- 0.204	0.33	1.38
< 18 µg m ⁻³	9.8	174	0.889	0.971 +/- 0.025	1.066 +/- 0.267	0.34	1.05
> 18 µg m ⁻³	15.9	74	0.926	1.031 +/- 0.033	-0.068 +/- 0.919	0.30	1.57

SN 17010	Dataset	Orthogonal Regression				Limit Value of 30 µg m ⁻³	
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 17 µg m ⁻³
Individual Datasets	Teddington Summer	78	0.931	0.994 +/- 0.030	1.822 +/- 0.372	17.11	19.2
	Cologne Winter	75	0.957	0.980 +/- 0.024	0.960 +/- 0.512	12.79	56.0
	Bornheim Summer	53	0.941	1.052 +/- 0.036	-0.962 +/- 0.527	11.61	20.8
	Teddington Winter	45	0.991	0.970 +/- 0.014	-0.182 +/- 0.300	10.28	35.6
Combined Datasets	< 18 µg m ⁻³	175	0.849	0.955 +/- 0.028	1.137 +/- 0.306	11.46	4.6
	> 18 µg m ⁻³	76	0.907	0.984 +/- 0.035	0.584 +/- 0.975	16.02	100.0
	All Data	251	0.957	0.969 +/- 0.013	0.989 +/- 0.226	12.90	33.5

SN 17011	Dataset	Orthogonal Regression				Limit Value of 30 µg m ⁻³	
		n _{C-S}	r ²	Slope (b) +/- u _b	Intercept (a) +/- u _a	W _{CM} / %	% > 17 µg m ⁻³
Individual Datasets	Teddington Summer	78	0.955	1.016 +/- 0.025	1.018 +/- 0.308	14.66	19.2
	Cologne Winter	75	0.977	1.061 +/- 0.019	0.430 +/- 0.405	17.91	56.0
	Bornheim Summer	57	0.901	1.134 +/- 0.048	-1.498 +/- 0.727	23.91	21.1
	Teddington Winter	43	0.992	0.991 +/- 0.014	0.630 +/- 0.293	7.41	32.6
Combined Datasets	< 18 µg m ⁻³	178	0.881	1.021 +/- 0.026	0.634 +/- 0.286	13.44	4.5
	> 18 µg m ⁻³	75	0.929	1.092 +/- 0.034	-1.108 +/- 0.952	19.03	100.0
	All Data	253	0.966	1.041 +/- 0.012	0.377 +/- 0.214	16.28	32.8

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

** The investigations for the measuring system APDA-371 with PM_{2,5} pre-separator have been performed on basis of the version of July 2009 of the EC-Guide. In the meanwhile there have been again some modifications on the Guide and a new version has been published in January 2010. The made modifications are purely of cosmetic kind and do not lead to any changes in the equivalence test itself. Hence an equivalence test according to the Guide in version of January 2010 leads to exactly identical results as an equivalence test according to the Guide in version of July 2009.