Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000040206_03

Certified AMS:	Spirant BAM 1000 with PM_{10} pre-separator for suspended particulate matter PM_{10} fraction
Manufacturer:	Ecotech Pty Ltd. 1492 Ferntree Gully Road Knoxfield, VIC, 3180 Australia
Test Institute:	TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and found to comply with the standards: VDI 4202-1 (2002), VDI 4203-3 (2004), EN 12341 (1998), EN 16450 (2017), Guide to 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 9 pages).
The present certificate replaces certificate 0000040206_02 dated 01 July 2020.

TÜVRheinland® CERTIFIED

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

www.tuv.com
ID 0000040206

Publication in the German Federal Gazette (BAnz.) of 03 May 2021

German Federal Environment Agency
Dessau, 02 June 2021

Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
30 June 2025

TÜV Rheinland Energy GmbH
Cologne, 01 June 2021

ppa. Dr. Peter Wilbring

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Test institute accredited to EN ISO/IEC 17025 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:	936/21222754/B of 01 October 2013 and Addendum no. 936/21250428/B of 01 September 2020
Initial certification:	01 April 2014
Expiry date:	30 June 2025
Publication:	BAnz AT 03.05.2021 B9, chapter III notification 7

Approved application
The tested AMS is suitable for continuous ambient air monitoring of suspended particulate matter PM_{10} fraction (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 AMS readings 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 936/21222754/B of 01 October 2013 of TÜV Rheinland Energie und Umwelt GmbH and Addendum 936/21250428/B from 01 September 2020 of 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 01.04.2014 B12, chapter IV number 7.1, Announcement by UBA dated 24 Ferbuary 2014:

AMS designation:
Spirant BAM 1000 with PM_{10} pre-separator

Manufacturer:
Ecotech Pty Ltd., Knoxfield, Australia

Field of application:
For continuous ambient air monitoring of suspended particulate matter, PM_{10} (stationary operation)

Measuring range during performance testing:

Component	Certification range	Unit
PM_{10}	0 – 1,000	µg/m³

Software version:
Version 81236-02 V1.0.0

Restrictions: None

Notes:

1. For monitoring PM_{10}, the instrument must be fitted with the following options at least: Sample heater (BX-830), sampling head (BX-802) and ambient temperature sensor (BX-592).
2. The heater may only be used in the manner in which 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 hour, 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 PM_{10} reference method according to EN 12341.
7. The measuring system may also be operated with the BX-125 pump (optional).
8. 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.
9. The test report on performance testing is available on the internet at www.qal1.de.

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21222754/B of 01 October 2013

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV notification 2, UBA announcement dated 25 February 2015:

2 Notification as regards Federal Environment Agency (UBA) notice of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter IV number 7.1)

The 970603 pressure sensor (MICROSWITCH #185PC15AT) of the Spirant BAM 1000 measuring system with PM_{10} pre-separator manufactured by Eco-tech Pty Ltd., 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 03.05.2021 B9, chapter III notification 7, UBA announcement dated 31 March 2021:

7 Notification as regards Federal Environment Agency (UBA) notice of 27. February 2014 (BAnz AT 01.04.2014 B12, chapter IV No. 7.1) and of 25. February 2015 (BAnz AT 02.04.2015 B5, chapter IV, notification 2)

The current software version of the Spirant BAM 1000 measuring system with PM_{10} pre-separator manufactured by Ecotech Pty Ltd. is: 81237-05 V1.1.0.

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

81236-02 V1.0.1; 81236-02 V1.0.2; 81236-02 V1.0.3
81237-05 V1.0.0; 81237-05 V1.0.1; 81237-05 V1.0.2; 81237-05 V1.0.3

From software version 81237-05 V1.1.0, the measuring system fulfills the requirements of DIN EN 16450 (July 2017 edition). An addendum to the test report with report number 936/21250428/B is available on the Internet at www.qal1.de.

Statement issued by TÜV Rheinland Energy GmbH dated 1. September 2020

Certified product

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

With the exception of a modified front design and minor software adaptations, the Spirant BAM 1000 measuring system with PM_{10} pre-separator corresponds exactly to the BAM-1020 developed and entirely manufactured by Met One Instruments, Inc.

The Spirant BAM 1000 measuring system 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), the vacuum pump BX-127 or optionally the BX-125, the measuring instrument Spirant BAM 1000 (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 PM_{10} sampling inlet at a flow rate of 1 m^3/h and reaches the Spirant BAM 1000 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 (I_0 & I_3) 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).

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

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy 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. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must not be employed anymore.

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

History of documents
Certification of Spirant BAM 1000 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:

Initial certification according to EN 15267

Certificate no. 0000040206: 29 April 2014
Expiry date of the certificate: 31 March 2019
Test report no.: 936/21222754/B dated 1 October 2013
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 01.04.2014 B12, chapter IV number 7.1
UBA announcement dated 27 February 2014

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 2
UBA announcement dated 25 February 2015
(Design changes)

Renewal of the certificate

Certificate no. 0000040206_01: 01 April 2019
Expiry date of the certificate: 30 June 2020

Renewal of the certificate

Certificate no. 0000040206_02: 01 July 2020
Expiry date of the certificate: 30 June 2025

Certificate based on a notification according to EN 15267

Certificate No. 0000040206_03: 02 June 2021
Expiry date of the certificate: 30 June 2025
Statement by TÜV Rheinland Energy GmbH dated 01 September 2020
Addendum 936/21250425/A from 1 September 2020
TÜV Rheinland Energy GmbH, Cologne
Publication: BAnz AT 03.05.2021 B9, chapter III notification 7
Announcement by UBA dated 31 March 2021

Calculation of the total uncertainty

Comparison candidate with reference according to Standard EN 16450:2017				
Candidate	Spirant BAM 1000		SN	60 / SN 17022 & SN 4925 / Ö2 / J7863 / SN 17011
			Limit value	50 µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25 %
All comparisons				
Uncertainty between Reference	0.67	µg/m³		
Uncertainty between Candidates	1.18	µg/m³		
SN 4924 / Ö1 / J7860 / SN 17022 & SN 4925 / Ö2 / J7863 / SN 17011				
Number of data pairs	320			
Slope b	1.000	not significant		
Uncertainty of b	0.008			
Ordinate intercept a	0.009	not significant		
Uncertainty of a	0.280			
Expanded measured uncertainty WCM	12.27	%		
All comparisons, ≥30 µg/m³				
Uncertainty between Reference	0.91	µg/m³		
Uncertainty between Candidates	1.44	µg/m³		
SN 4924 / Ö1 / J7860 / SN 17022 & SN 4925 / Ö2 / J7863 / SN 17011				
Number of data pairs	105			
Slope b	1.007			
Uncertainty of b	0.017			
Ordinate intercept a	-0.652			
Uncertainty of a	0.997			
Expanded measured uncertainty WCM	15.09	%		
All comparisons, <30 µg/m³				
Uncertainty between Reference	0.53	µg/m³		
Uncertainty between Candidates	1.06	µg/m³		
SN 4924 / Ö1 / J7860 / SN 17022 & SN 4925 / Ö2 / J7863 / SN 17011				
Number of data pairs	215			
Slope b	1.079			
Uncertainty of b	0.031			
Ordinate intercept a	-1.187			
Uncertainty of a	0.538			
Expanded measured uncertainty WCM	15.57	%		

Calculation of the total uncertainty

Comparison candidate with reference according to Standard EN 16450:2017					
Candidate	Spirant BAM 1000		SN	60 / SN 17022 & SN 4925 / Ö2 / J7863 / SN 17011	
			Limit value	50	µg/m³
Status of measured values	Slope and offset corrected		Allowed uncertainty	25	%
Cologne, parking lot					
Uncertainty between Reference	0.55	µg/m³			
Uncertainty between Candidates	1.18	µg/m³			
	SN 4924			SN 4925	
Number of data pairs	29			29	
Slope b	0.917			0.957	
Uncertainty of b	0.035			0.032	
Ordinate intercept a	1.329			1.789	
Uncertainty of a	0.919			0.834	
Expanded measured uncertainty W_{CM}	15.13	%		9.18	%
Titz-Rödingen					
Uncertainty between Reference	0.65	µg/m³			
Uncertainty between Candidates	0.83	µg/m³			
	SN 4924			SN 4925	
Number of data pairs	37			37	
Slope b	1.023			1.021	
Uncertainty of b	0.034			0.034	
Ordinate intercept a	-0.438			0.417	
Uncertainty of a	0.756			0.760	
Expanded measured uncertainty W_{CM}	7.56	%		9.10	%
Cologne, Frankf. Str.					
Uncertainty between Reference	1.02	µg/m³			
Uncertainty between Candidates	0.96	µg/m³			
	SN 4924			SN 4925	
Number of data pairs	28			28	
Slope b	0.990			0.988	
Uncertainty of b	0.037			0.034	
Ordinate intercept a	-2.050			-0.951	
Uncertainty of a	1.048			0.962	
Expanded measured uncertainty W_{CM}	13.19	%		9.97	%
Steyregg					
Uncertainty between Reference	0.53	µg/m³			
Uncertainty between Candidates	0.73	µg/m³			
	Ö1			Ö2	
Number of data pairs	45			45	
Slope b	1.012			0.997	
Uncertainty of b	0.065			0.069	
Ordinate intercept a	-2.439			-2.347	
Uncertainty of a	1.347			1.441	
Expanded measured uncertainty W_{CM}	11.58	%		13.77	%
Graz					
Uncertainty between Reference	0.81	µg/m³			
Uncertainty between Candidates	1.90	µg/m³			
	Ö1			Ö2	
Number of data pairs	45			45	
Slope b	0.991			0.998	
Uncertainty of b	0.027			0.028	
Ordinate intercept a	-0.979			1.105	
Uncertainty of a	1.787			1.898	
Expanded measured uncertainty W_{CM}	20.77	%		21.63	%
Tusimice					
Uncertainty between Reference	0.95	µg/m³			
Uncertainty between Candidates	1.15	µg/m³			
	J7860			J7863	
Number of data pairs	97			96	
Slope b	0.966			1.001	
Uncertainty of b	0.012			0.012	
Ordinate intercept a	2.809			1.160	
Uncertainty of a	0.476			0.446	
Expanded measured uncertainty W_{CM}	11.73	%		11.08	%
Teddington					
Uncertainty between Reference	0.25	µg/m³			
Uncertainty between Candidates	0.97	µg/m³			
	SN 17022			SN 17011	
Number of data pairs	40			40	
Slope b	1.073			1.123	
Uncertainty of b	0.033			0.041	
Ordinate intercept a	-0.856			-1.544	
Uncertainty of a	0.473			0.583	
Expanded measured uncertainty W_{CM}	12.31	%		19.52	%
All comparisons, ≥30 µg/m³					
Uncertainty between Reference	0.91	µg/m³			
Uncertainty between Candidates	1.44	µg/m³			
	SN 4924 / Ö1 / J7860 / SN 17022			SN 4925 / Ö2 / J7863 / SN 17011	
Number of data pairs	67			67	
Slope b	1.001			1.032	
Uncertainty of b	0.021			0.022	
Ordinate intercept a	-1.821			-1.648	
Uncertainty of a	1.266			1.34	
Expanded measured uncertainty W_{CM}	17.71	%		17.26	%
All comparisons, <30 µg/m³					
Uncertainty between Reference	0.53	µg/m³			
Uncertainty between Candidates	1.06	µg/m³			
	SN 4924 / Ö1 / J7860 / SN 17022			SN 4925 / Ö2 / J7863 / SN 17011	
Number of data pairs	157			157	
Slope b	1.006			1.055	
Uncertainty of b	0.035			0.039	
Ordinate intercept a	-0.892			-1.223	
Uncertainty of a	0.605			0.675	
Expanded measured uncertainty W_{CM}	9.99	%		12.48	%
All comparisons					
Uncertainty between Reference	0.67	µg/m³			
Uncertainty between Candidates	1.18	µg/m³			
	SN 4924 / Ö1 / J7860 / SN 17022			SN 4925 / Ö2 / J7863 / SN 17011	
Number of data pairs	224			224	
Slope b	0.985	not significant		1.019	significant
Uncertainty of b	0.009			0.010	
Ordinate intercept a	-0.655	significant		-0.729	significant
Uncertainty of a	0.319			0.346	
Expanded measured uncertainty W_{CM}	13.17	%		12.96	%