Umwelt Bundes Amt
For our Environment

TÜVRheinland®
Precisely Right.

CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000038496

Certified AMS:	PCME QAL 181 for total dust
Manufacturer:	PCME Ltd. 60 Edison Road St. Ives Cambs PE273 GH United Kingdom
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH

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

EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007 and EN 14181: 2004

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

www.tuv.com TÜVRheinland® ID: 0000038496

- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

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

This certificate will expire on: 04 March 2018

German Federal Environment Agency
Dessau, 22 March 2013

i. A. Dr. Marcel Langner

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013

ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
teu@umwelt-tuv.de
Tel. +49 221 806-2756

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.

Test report:	936/21220334/A of 28 September 2012
Initial certification:	05 March 2013
Expiry date:	04 March 2018
Publication:	BAnz AT 05 March 2013 B10, chapter I, No. 1.1

Approved application
The tested AMS is suitable for use at combustion plants according to EC Directive 2001/80/EC and at waste incineration plants according to EC Directive 2000/76/EC and other plants requiring official approval. The tested ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a threemonth field test at a cement plant.

The AMS is approved for an ambient temperature range of -20 °C to +50 °C.

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

Basis of the certification
This certification is based on:

- test report 936/21220334/A of 28 September 2012 of 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 05 March 2013 B10, chapter I, No. 1.1

AMS name:
PCME QAL 181 for total dust

Manufacturer:
PCME Ltd., St. Ives, United Kingdom

Approval:
Measurement at plants requiring official approval as well as plants within the scope of 2000/76/EC (waste incineration directive) and 2001/80/EC (large combustion plants directive)

Measuring ranges during performance test:

Component	Certification range	Supplementary range	Unit
Dust	0 - 15	0 - 100	mg/m³

Software versions:
Controller Software 7.90
Sensor Software 1.5D

Restrictions:
None

Notes:
1. Due to the temporary high dust concentrations on site, the manual calibration resulted in a measuring range of 0 - 85 mg/m³ dust at a nominal range of 0 - 100 mg/m³.
2. The maintenance interval is four weeks.
3. The requirement of Standard EN 15267-3 for determination coefficient R^2 of the calibration function was not met during the performance test.
4. The dust content is measured in wet exhaust gas under operating conditions.
5. Supplementary testing (implementation of EN 15267) as regards Federal Environmental Agency notices of 12 September 2006 (Federal Gazette (BAnz.), p. 6715, chapter I, No. 1.2) and of 23 February 2012 (Federal Gazette (BAnz.), p. 920, chapter V, notification 9).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21220334/A of 28 September 2012

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

The PCME QAL 181 is a pro-scatter forward light scattering instrument suitable for measuring dust concentration in industrial stacks.

The sensor probe is installed directly into the flue-gas. Particulates in the measuring volume at the end of the probe scatter the laser incident beam. The resulting forward scattered cone of light is transmitted to the detector electronics outside the stack via a heat tolerant quartz rod.

The instrument is connected to a supply of dry clean air to prevent dust entering the interior of the sensor.

The PCME QAL 181 system has automatic zero, span and contamination checks. The results of these tests are recorded within the separate control unit for QAL3 reporting purposes. In the span check, a scattering body is automatically rotated into the laser beam, to check the response to scattered light directly.

The instrument is supported by an optional Pro-scatter Audit unit which is an approved reference material for conducting linearity tests as part of AST or QAL 2 procedures.

The instrument is designed for measuring the full range of emissions found on highly abated Incinerator applications and EP controlled Power plant applications having two certification ranges of 0-15 mg/m³ and 0-100 mg/m³.

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.

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 its expiration is also accessible on the internet: **qal1.de**.

Certification of PCME QAL 181 for total dust is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test:

Test report: 936/21204255/A of 07 July 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne

Publication: BAnz. 14 October 2006, No. 194, p. 6715, chapter I, No. 1.2
Announcement by UBA from 12 September 2006

Notification:

Publication: BAnz. 11 March 2009, No. 38, p. 899, chapter IV, notification 11
Announcement by UBA from 19 February 2009 (change of name to QAL 181)

Publication: BAnz. 25 August 2009, No. 125, p. 2929, chapter III, notification 14
Announcement by UBA from 03 August 2009 (software)

Publication: BAnz. 12 February 2010, No. 24, p. 552, chapter IV, notification 17
Announcement by UBA from 25 January 2010 (description)

Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter V, notification 9
Announcement by UBA from 23 February 2012 (software and optics)

Initial certification according to EN 15267:

Certificate No. 0000038496: 22 March 2013

Expiry date of the certificate: 04 March 2018

Test report: 936/21220334/A of 28 September 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne

Publication: BAnz AT 05 March 2013 B10, chapter I, No. 1.1
Announcement by UBA from 12 February 2013

Umwelt Bundes Amt
For our Environment

Certificate:
0000038496 / 22 March 2013

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Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system					
Manufacturer			PCME Ltd.		
Name of measuring system			QAL 181		
Serial number of the candidates			25141 / 31192 / 25142 / 32012		
Measuring principle			Scattered light		
Test report			936/21220334/A		
Test laboratory			TÜV Rheinland		
Date of report			2012-09-28		
Measured component			Staub		
Certification range			0 - 15	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u²	
Standard deviation from paired measurements under field conditions *	u_D	0.249	mg/m³	0.062	(mg/m³)²
Lack of fit	u_{lof}	0.029	mg/m³	0.001	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.035	mg/m³	0.001	(mg/m³)²
Span drift from field test	$u_{d,s}$	-0.069	mg/m³	0.005	(mg/m³)²
Influence of ambient temperature at span	u_t	0.100	mg/m³	0.010	(mg/m³)²
Influence of supply voltage	u_v	0.015	mg/m³	0.000	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	(mg/m³)²

* The larger value is used :
"Repeatability standard deviation at span" or
"Standard deviation from paired measurements under field conditions"

$$u_c = \sqrt{\sum (u_{max,\ j})^2}$$

Combined standard uncertainty (u_c)			0.31	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$		0.60	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**6.0**
Requirement of 2000/76/EC and 2001/80/EC	**U in % of the ELV 10 mg/m³**	**30.0**
Requirement of EN 15267-3	U in % of the ELV 10 mg/m³	22.5