Umwelt Bundesamt

TÜVRheinland®
Precisely Right.

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000037054_01

AMS designation:	EM-D 5100 for dust
Manufacturer:	HORIBA GmbH Kaplanstraße 5 3430 Tulln Austria
Test Laboratory:	TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and certified according to the standards

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 (this certificate contains 6 pages).

TÜVRheinland®
CERTIFIED

Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000037054

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

This certificate will expire on:
04 March 2023

German Federal Environment Agency
Dessau, 05 March 2018

Dr. Marcel Langner
Head of Section II 4.1

TÜV Rheinland Energy GmbH
Cologne, 04 March 2018

ppa. Dr. Peter Wilbring

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51105 Köln

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.

10/221 2.08

Test Report:	936/21220824/A dated 10 October 2012
Initial certification:	05 March 2013
Expiry date:	04 March 2023
Certificate:	Renewal (of previous certificate 0000037054 dated 22 March 2013 valid until 04 March 2018)
Publication:	BAnz AT 05.03.2013 B10, chapter I no. 1.3

Approved application

The tested AMS is suitable for use at combustion plants according to EC Directive 2001/80/EC (13th BImSchV), at waste incineration plants according to EC Directive 2000/76/EC (17th BImSchV), the 27th BImSchV, the 30th BImSchV and TA Luft. The measured ranges have been selected so as to cater for as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three-months field test at a municipal waste incineration plant.

The AMS is approved for an ambient temperature range of -20 °C to +50 °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 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 installation at which it will be installed.

Basis of the certification

This certification is based on:

- Test report 936/21220824/A dated 10 October 2012 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 05.03.2013 B10, chapter I no. 1.3, UBA announcement dated 12 February 2013:

AMS designation:
EM-D 5100

Manufacturer:
HORIBA GmbH, Tulln, Austria

Field of application:
For plants requiring official approval and for plants according to the 27th BImSchV

Measuring ranges during performance testing:

Component	Certification range	Supplementary measuring ranges			
Dust (optical transmission)	0–15 mg/m³	0–0.2 Ext.	0–0.5 Ext.	0–1.6 Ext.	0–100% opac.

0–0.1 Ext. correspond to 0–16 mg/m³ at an optical length of 5 m

Software versions:
3.21 (measurement head)
4.37 (evaluation unit)

Restrictions:
None

Notes:
1. The dust concentration is determined in wet flue gas under operational conditions.
2. The maintenance interval is four weeks.
3. The length of the measurement path (5 m) and the measuring range of 16 mg/m³ determined during the calibration result in a product of 80 mg/m³ x m at the field test plant.
4. During performance testing in accordance with EN 15267-3, the requirement for the determination coefficient R^2 of the calibration function was not fulfilled.

Test Report:
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report no.: 936/21220824/A dated 10 October 2012

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

The EM-D 5100 measuring system performs 2-beam alternating light measurement on the basis of the auto collimation function. The measurement beam crosses the measuring section twice. What is measured is the decline in light intensity caused by dust concentrations present in the measuring section.

A photodiode alternately detects the measurement beam and the reference beam. A step motor switches between measurement and reference beam every 2 min for a period of 2 sec. A common amplifier is used for the signal caused by the measurement light and the reference light in order to compensate for contamination and long-term drift effects caused by the amplifiers. Light is emitted by a super wide band diode without interfering ambient light (daylight etc.). The wide-band method used by the SWBD prevents temperature and other influences on the measured results. Moreover, the wide-band diode ensures particularly stable measurements.

The EM-D 5100 measuring system is equipped with two analogue data outputs. Each of these data outputs has two freely selectable extinction or opacity measuring ranges which can be switched externally. Measuring ranges are freely selectable between 0.1 and 1.6 Ext. or 20 to 100 % opacity.

The EM-D 5100 measuring system performs control cycles at selectable intervals in order to monitor correct operation. To this effect, the zero point, the optical boundary surfaces and the span point are automatically measured and displayed. Where necessary, subsequent measurements are corrected automatically. Where the need for correction exceed 6 %, a status signal is produced. Condensation and contamination effects are largely reduced/avoided by heating the optical lenses.

In its standard version, the EM-D 5100 measuring system comprises the following:

- Measurement head
- Reflector
- EM-D 5100 AW evaluation unit
- Welding flanges
- Purge air blower

The current software version is:	3.21 (measurement head) 4.37 (evaluation unit)
The current manual version is:	GZD0000093249B

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 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 EM-D 5100 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. 0000037054: 22 March 2013
Expiry date of the certificate: 04 March 2018

Test report: 936/21220824/A dated 10 October 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05.03.2013 B10, chapter I no. 1.3
UBA announcement dated 12 February 2013

Renewal of the certificate

Certificate no. 0000037054_01: 05 March 2018
Expiry date of the certificate: 04 March 2023

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

Measuring system					
Manufacturer			HORIBA GmbH		
Name of measuring system			EM-D 5100		
Serial number of the candidates			406752 (142) / 406753 (158) / 1214444 / 1214434		
Measuring principle			Opacity		
Test report			936/21220824/A		
Test laboratory			TÜV Rheinland		
Date of report			2010-10-10		
Measured component			Dust		
Certification range			0 - 15	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter		u		u²	
Standard deviation from paired measurements under field conditions *	u_D	0.143	mg/m³	0.020	(mg/m³)²
Lack of fit	u_{lof}	0.058	mg/m³	0.003	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.012	mg/m³	0.000	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.017	mg/m³	0.000	(mg/m³)²
Influence of ambient temperature at span	u_t	0.052	mg/m³	0.003	(mg/m³)²
Influence of supply voltage	u_v	0.040	mg/m³	0.002	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.121	mg/m³	0.015	(mg/m³)²
Excursion of measurement beam	u_{mb}	0.167	mg/m³	0.028	(mg/m³)²

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

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.27	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.52	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 10 mg/m³**	**5.2**
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

Performance testing and uncertainty calculations were performed as part of the original tests carried out with the D-R 290 manufactured by Durag GmbH, which is identical in design.