Umwelt Bundes Amt
For our Environment

TÜVRheinland®
Precisely Right.

CERTIFICATE

about Product Conformity (QAL1)

Number of Certificate: 0000028749

Certified AMS:	D-R 290 for dust
Manufacturer:	DURAG GmbH Kollaustraße 105 22453 Hamburg Germany
Test Institute:	TÜV Rheinland Energie und Umwelt GmbH

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

EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2008 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: 0000028749

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

Publication in the German Federal Gazette (BAnz.) of 26 January 2011

The certificate is valid until: 25 January 2016

Umweltbundesamt
Dessau, 9 February 2011

i. A. Dr. Hans-Joachim Hummel

TÜV Rheinland Energie und Umwelt GmbH
Köln, 7 February 2011

ppa. Dr. Peter Wilbring

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

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Umwelt Bundes Amt
For our Environment

Certificate:
0000028749 / 9 February 2011

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Test report:	936/21212470/B of 1 October 2010
First certification:	26 January 2011
Run of validity until:	25 January 2016
Publication	BAnz. 26 January 2011, No. 14, p. 294, Chapter I No. 1.2

Approved application
The certified AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incinerations plants according to EC directive 2000-76-EC and other plants requiring official permission. 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 three months field test on a municipal waste incineration plant.

The AMS is approved for the temperature range from -20 °C to +50 °C.

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

Basis of the certification
This certification is based on the test report 936/21212470/B of 1 October 2010 of TÜV Rheinland Energie und Umwelt GmbH, on the relevant body (German Umweltbundesamt) assessment and ongoing surveillance of the product and the manufacturing process and the publication in the German Federal Gazette (BAnz. 26 January 2011, No. 14, p. 294, Chapter I No. 1.2: UBA announcement from 10 January 2011):

AMS name:
D-R 290 for dust

Manufacturer:
DURAG GmbH, Hamburg

Approval:
For measurements at plants requiring official permission (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC, large combustion plants directive)

Measuring ranges during the suitability test:

Component	Certification range	Supplementary ranges			
dust (optical transmission)	0 – 15 mg/m³	0 – 0.2 Ext.	0 – 0.5 Ext.	0 – 1.6 Ext.	0 – 100 Opacity

0 – 0.1 Ext. equals 0 – 16 mg/m³ with an optical length of 5 m

Software versions:
3.21 (measuring head),
4.37 (evaluation unit)

Restrictions:
The measuring system can only be used if an undercut of the dewpoint can be excluded.

Remarks:
1. The dust concentration is measured in wet gas under operating conditions.
2. The maintenance interval is four weeks.
3. With the measuring path length of 5 m and the measuring range of 16 mg/m³ determined during the calibration a product of 80 mg m/m³ results for the field test plant.
4. Supplementary test on the announcement of the Federal Environmental Agency of 22 April 2003 (BAnz. p. 10742, chapter I No. 1.1) concerning the transfer into EN 15267.
5. The requirements of the determination coefficient of the calibration function R^2 according to EN 15267 have not been fulfilled.

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Köln
Report-No.: 936/21212470/B of 1 October 2010

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

The measuring system uses the two beam alternate light method, based on the autocollimation principle. The measuring light crosses the measuring path twice.

The attenuation of the measuring light beam due to the dust concentration is measured. An optical recorder receives the measuring and comparison light beams alternately. The changeover between measuring light and comparison light is performed using a step motor every 2 min for 2 s. There is a common amplifier for signal processing of measuring and comparison light, temperature influences and longterm drift effects of the amplifier are compensated. The measuring light beam is generated by a Super Wide Band Diode (SWBD) without any influence of d.c. light (daylight). With the Wide Band performance of the SWBD the measuring result is independent against temperature and other influences and provides a very stable measuring.

The measurement system D-R 290 has two analogue outputs. Each of these outputs has two freely selectable extinction and opacity measuring ranges, which are external changeable. The ranges are freely adjustable from 0.1 to 1.6 Extinction and from 20 to 100 % Opacity.

To check proper functioning of the D-R 290, a control cycle is performed in adjustable periodic intervals. In this cycle, the contamination of the optical interfaces, the span and the zero point are automatically measured and displayed. The results of the following measurements are corrected by the magnitude of the measured difference (contamination). If the contamination exceeds 6 % a status signal is given. By heating the optical discs, condensation and contamination are reduced as far as possible.

The standard system version D-R 290 consists of:

- measuring head
- reflector
- evaluation unit D-R 290 AW
- welding flanges and
- purge air unit

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 certified product is found no longer to comply with the applicable European Standard, TÜV Rheinland Energie und Umwelt GmbH should be notified at the address shown on page 1.

The certification mark with the product specific ID-Number that 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 the property of TÜV Rheinland Energie und Umwelt GmbH. With revocation of the publication the certificate looses its validity. After the expiration of the validity 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 seen at the Internet Address: **qal1.de**.

Certification of D-R 290 for dust is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

First suitability test:

Test report 936/801017/A of 31 January 2003
TÜV Immissionsschutz und Energiesysteme GmbH, Köln

Publication: BAnz. 15 May 2003, No. 90, p. 10742, Chapter I No 1.1:
Announcement by UBA from 22 April 2003.

Notification:

Publication: BAnz. 14 October 2006, No. 194, p. 6715, Chapter V notification 1:
Announcement by UBA from 12 September 2006. (Extension for crematorium)

Publication: BAnz. 12 February 2010, No. 24, p. 555, Chapter IV notification 12:
Announcement by UBA from 25 January 2010. (Software changing)

Publication: BAnz. 12 February 2010, No. 24, p. 556, Chapter IV notification 13:
Announcement by UBA from 25 January 2010. (Distribution also by Horiba)

Initial certification according to EN 15267:

Certificate No. 0000028749: 9 February 2011

Validity of the certificate until: 25 January 2016

Test report: 936/21212470/B of 1 October 2010,
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln,

Publication: BAnz. 26 January 2011, No. 14, p. 294: Announcement by UBA from 10 January 2011.

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

Measuring system					
Manufacturer			DURAG GmbH		
Name of measuring system			D-R 290		
Serial number of the candidates			406752 (142) / 406753 (158) / 1214444 / 1214434		
Measuring principle			optical Transmission		
Test report			936 / 21212470/B		
Test laboratory			TÜV Rheinland		
Date of report			2010-10-01		
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