Umwelt Bundes Amt
For our Environment

TÜVRheinland®
Precisely Right.

# CERTIFICATE

## on Product Conformity (QAL1)

**Number of Certificate: 0000035017**

| | |
|---|---|
| **Certified AMS:** | D-R 820 F for dust |
| **Manufacturer:** | DURAG GmbH<br>Kollaustraße 105<br>22453 Hamburg<br>Germany |
| **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: 0000035017

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

Publication in the German Federal Gazette (BAnz.) of 20 July 2012

The certificate is valid until: 19 July 2017

Umweltbundesamt
Dessau, 20 August 2012

i. A. Marion Wichmann-Fiebig

TÜV Rheinland Energie und Umwelt GmbH
Köln, 17 August 2012

ppa. Dr. Peter Wilbring


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|---|---|
| www.umwelt-tuv.de / www.eco-tuv.com<br>teu@umwelt-tuv.de<br>Tel. +49 221 806-2756 | TÜV Rheinland Energie und Umwelt GmbH<br>Am Grauen Stein<br>51105 Köln |
| Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008. | |

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|---|---|
| **Test report:** | 936/21210225/A of 21 March 2012 |
| **First certification:** | 20 July 2012 |
| **Validity ends:** | 19 July 2017 |
| **Publication:** | BAnz AT 20 July 2012 B11, chapter I, No. 1.1 |

**Approved application**
The tested AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, 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 two three months field test at a municipal waste incinerator and a municipal heat and power plant (lignite-fired).

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 936/21210225/A of 21 March 2012 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette: BAnz AT 20 July 2012 B11, chapter I, No. 1.1

**AMS name:**
D-R 820 F for dust

**Manufacturer:**
DURAG GmbH, Hamburg

**Approval:**
For measurements at plants requiring official approval (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 measurement ranges | Unit |
|---|---|---|---|
| Total dust | 0 - 15 | 0 – 100 | mg/m³ |

**Software version:**
1.15h

**Restrictions:**
None

**Remarks:**
1. The maintenance interval is four weeks.
2. The requirement of the EN 15267-3 for the correlation coefficient $R^2$ of the calibration function was not met during the suitability test.

**Test report:**
TÜV Rheinland Energie und Umwelt GmbH, Köln
Report No.: 936/21210225/A of 21 March 2012

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

The D-R 820 F measuring system is an optical, extractive instrument intended for the continuous measurement of dust concentrations. A defined sample flow is extracted from the gas flow. This partial flow is continuously heated and diluted with purged, heated ambient air (35 to 70%). The partial flow is optically measured in the measurement chamber.

The D-R 820 F measuring system operates on the basis of the scattered light measuring principle (forward scattering). A focused and modulated light beam of a laser diode travels through the gas flow. Via optical fibres, the scattered light is led to the receiver diode, where it is processed. The tested measuring system consists of the following components:

- a special sampling probe;
- a laser-based dust measuring system (scattered light principle);
- Gas conditioning unit (dilution, heating);
- an injector for transporting gas
- two blower systems (for injected air and diluting air); and
- an electronic evaluation unit (software version 1.15h)

The sampling probe and the measuring chamber form an assembly. The probe i.e. the extracting tube is heated and twin-coated with an integrated dilution. Dilution is realized via a mixing nozzle. Processing of the extracted measuring gas and logging of the measured data takes place in the probe. The latter is integrated in a two-piece protecting enclosure made of glass-fibre amplified synthetic material. The protection enclosure is mounted directly to the flange.

The D-R 820 F measuring system continuously extracts a partial sample flow from the gas flow. Test gas is diluted as defined. Simultaneously, the gas mixture is heated. Subsequently, the extracted, diluted and heated test gas passes through the measuring cell and is finally led out of the measuring system.

For diagnosis and cleaning purposes, the D-R 820 F carries out cleaning activities automatically. Zero and span point checks as well as the cleaning of gas carrying parts are carried out. Moreover, the scattered light value of the optical sensor without dust is determined. In the event of excessive deviations, a warning signal is set.

Reference filters are available for QAL3 and AST activities.

**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 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 accessible on the internet Address: **qal1.de**.

Certification of D-R 820 F for dust 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. 0000035017: 20 August 2012

Validity of the certificate: 19 July 2017

Test report: 936/21210225/A of 21 March 2012
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz AT 20 July 2012 B11, chapter I, No. 1.1
Announcement by UBA from 06 July 2012

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

| | | | | |
|---|---|---|---|---|
| **Measuring system** | | | | |
| Manufacturer | DURAG GmbH | | | |
| Name of measuring system | D-R 820 F | | | |
| Serial number of the candidates | EP 1 7196 / EP 2 7197 | | | |
| Measuring principle | Scattered light (extractive sampling) | | | |
| **Test report** | 936/21210225/A | | | |
| Test laboratory | TÜV Rheinland | | | |
| Date of report | 2012-03-21 | | | |
| **Measured component** | Dust | | | |
| Certification range | 0 - 15 | mg/m³ | | |

**Calculation of the combined standard uncertainty**

| **Tested parameter** | | | | $u^2$ | |
|---|---|---|---|---|---|
| Repeatability standard deviation at set point * | $u_r$ | | mg/m³ | 0.250 | (mg/m³)² |
| Lack of fit | $u_{lof}$ | | mg/m³ | 0.065 | (mg/m³)² |
| Zero drift from field test | $u_{d,z}$ | | mg/m³ | 0.003 | (mg/m³)² |
| Span drift from field test | $u_{d,s}$ | -0.140 | mg/m³ | 0.020 | (mg/m³)² |
| Influence of ambient temperature at span | $u_t$ | 0.015 | mg/m³ | 0.000 | (mg/m³)² |
| Influence of supply voltage | $u_v$ | 0.015 | mg/m³ | 0.000 | (mg/m³)² |
| Influence of sample gas flow | $u_p$ | | mg/m³ | 0.043 | (mg/m³)² |
| Uncertainty of reference material at 70% of certification range | $u_{rm}$ | | 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"

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|---|---|---|---|
| Combined standard uncertainty ($u_C$) | $u_c = \sqrt{\sum (u_{max,j})^2}$ | 0.63 | mg/m³ |
| Total expanded uncertainty | $U = u_c * k = u_c * 1.96$ | 1.23 | mg/m³ |

| | | |
|---|---|---|
| **Relative total expanded uncertainty** | **U in % of the ELV 10 mg/m³** | **12.3** |
| **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 |