

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000043528

Certified AMS: F-701-20 for particulate matter PM₁₀

Manufacturer: DURAG GmbH
Kollaustraße 105
22453 Hamburg
Germany

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

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

**VDI 4202 Blatt 1: 2002, VDI 4203 Blatt 3: 2004, EN 12341: 1998,
EN 15267-1: 2009 and EN 15267-2: 2009**

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

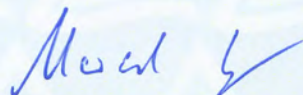


Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000043528

Publication in the German Federal Gazette
(BAnz.) of 14 October 2006

German Federal Environment Agency
Dessau, 30 September 2015



i. A. Dr. Marcel Langner

This certificate will expire on:
25 August 2020

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 29 September 2015



ppa. Dr. Peter Wilbring

www.umwelt-tuv.de / www.eco-tuv.com
teu@umwelt-tuv.de
Tel. +49 221 806-5200

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.

Certificate:
0000043528 / 30 September 2015

Test report: 720349 of 06 July 2006
First certification: 26 August 2015
Date of expiry: 25 August 2020
Publication: BAnz AT 26 August 2015 B4, chapter V 37th notification

Approved application

The tested AMS is suitable for the continuous monitoring of the PM₁₀ fraction in suspended particular in ambient air (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test at three different locations or rather time periods.

The AMS is approved for a temperature range of +5 °C to +40 °C.

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

Basis of the certification

This certification is based on:

- test report 720349 of 06 July 2006 of TÜV Süd Industrie Service GmbH and Statement of TÜV Rheinland Energie und Umwelt GmbH on quality management of 18 March 2015.
- suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- the on-going surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz 14 October 2006, p. 6715, chapter IV no 1.1: Announcement by UBA from 12 September 2006)
- publication in the German Federal Gazette (BAnz AT 23 July 2013 B4, chapter V 28th notification: Announcement by UBA from 3 July 2013)
- publication in the German Federal Gazette (BAnz AT 1 April 2014 B12, chapter IV 25th notification: Announcement by UBA from 27 February 2014)
- publication in the German Federal Gazette (BAnz AT 5 August 2014 B11, chapter V 16th notification: Announcement by UBA from 17 July 2014)
- publication in the German Federal Gazette (BAnz AT 26 August 2015 B4, chapter V 37th notification: Announcement by UBA from 22 July 2015)

AMS designation:

F-701-20

Manufacturer:

VEREWA Umwelt- und Prozeßmesstechnik GmbH, Hamburg

Field of application:

For the continuous monitoring of the PM₁₀ fraction in ambient air (stationary operation).

Measuring range during the performance test:

0 bis 200 µg/m³

Software version:

2.00b

Notes:

1. During performance testing, the cycle time was 3 h and the sample count rate was 1, meaning that an automatic change of filters was carried out every 3 h with every filter spot being sampled 1 time at maximum.
2. The measuring system shall be calibrated regularly on site with the PM₁₀ reference method as per EN 12341.

Test report:

TÜV Süd Industrie Service GmbH, München
Report No.: 720349 of 6 July 2006

28 Notification as regards Federal Environment Agency (UBA) notice of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1)

The company Verewa Umwelt- und Prozessmesstechnik GmbH merged with the DURAG GmbH on 1 January 2013. The new name of the manufacturer of the measuring system F-701-20 for dust is DURAG GmbH.

Statement of TÜV Nord Umweltschutz GmbH & Co. KG of 30 May 2013

25 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 3 July 2012 (BAnz AT 23 July 2013 B4, chapter V 28th notification)

The measuring system F-701-20 of DURAG GmbH for the component particulate matter PM₁₀ includes new computer electronics (F701 No11), new boards for the Geiger-Mueller-amplifier components (F701 No32 and No33), a new housing (manufacturer: Schroff) and new electronics for the optional filter tape printer.

The current software version is: 3.04

Statement of TÜV Rheinland Energie und Umwelt GmbH of 4 October 2013

16 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 27 February 2014 (BAnz AT 01 April 2014 B12, chapter VI 25th notification)

The current software version of the measuring system F-701-20 of DURAG GmbH for the component particulate matter PM₁₀ is: 3.10

Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 March 2014

37 Notification as regards Federal Environment Agency (UBA) notices of 12 September 2006 (BAnz. p. 6715, chapter IV number 1.1) and of 17 July 2014 (BAnz AT 5 August 2014 B11, chapter IV 16th notification)

The production and the quality management of the measuring system F-701-20 of DURAG GmbH for the component particulate matter PM₁₀ fulfill the requirements according to EN 15267.

The test report of the suitability test, report no. 720349 is available on the internet on www.qal1.de.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 18 March 2015

Certified product

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

The ambient air monitor consists of a PM₁₀ sampling head, a meteorological sensor, a sample inlet tube with active ventilation, the actual F-701-20 measuring system F-701-20 incl. glass fibre filter tape and the respective connecting tubes and cables as well as adapters, a roof duct incl. flange and a user manual in German.

The F-701-20 ambient air monitor is based on the principle of Beta attenuation.

The particulate sample passes the PM₁₀ sampling head at a flow rate of 1 m³/h (= 16.67 l/min) and reaches the F-701-20 measuring system via the sample inlet tube.

For the performance test the AMS was used with an activated auxiliary tube heating. The auxiliary tube heating keeps the temperature of the sample inlet tube +5°C above the ambient air temperature.

The AMS itself has a compact design. All components but the sampling probe (sample inlet tube, sampling head), the meteorological sensor used for measuring atmospheric pressure and ambient temperature as well as the installation for active ventilation of the sample inlet tube are placed in the enclosure.

The AMS is controlled by means of a micro controller board.

The filter tape is transported from supply roll to take-up roll by a stepper motor. On the basis of the decrease of intensity of the radiation emitted from the C-14 radiance source, the Geiger-Müller counter determines the mass increase on the filter tape. The air is sucked off by a pump and the volume flow is measured by the volume flow meter and kept constant at 1000 l/h by a bypass valve. Electronics control the measurement processes, allow for user-friendly handling via touchscreen and store measured values.

During a regular test sequence, in the beginning a clean filter spot is transported in between the C-14 source and the counter. The beta attenuation is measured for 300 s, meaning that the impulses generated by the counter are taken as a measure for the detected beta radiation.

Subsequently the filter holder is opened and the filter tape is transported until the evaluated filter area reaches the position where the particles are sampled. The filter holder is then closed again and the sampling process starts. After the sampling has finished the filter holder is opened and the filter paper

is brought back into its original position below the counter. The filter holder closes and the beta attenuation is measured again for 300 s.

The dust mass is determined from the measured counting rates before and after sampling and the dust concentration is calculated by relating the dust mass to the sampled volume.

The measured values are shown in the display and are made available as a 4-20 analogue-signal as well as through a serial RS232-interface (e.g. using Bayern-Hessen-Protokoll, Gesytec).

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 is presented on page 1 of this certificate.

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 the validity is also accessible on the internet: qal1.de.

Certification of F-701-20 for particulate matter PM₁₀ is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic test

Test report: 720349 of 6 July 2006
Süd Industrie Service GmbH, München

Publication: BAnz. 14 October 2006, no. 194, p. 6715, chapter IV no 1.1:
Announcement by UBA from 12 September 2006

Notifications

Statement of TÜV Nord Umweltschutz GmbH & Co. KG of 30 May 2013
Publication: BAnz AT 23 July 2013 B4, chapter V notification 28 (change of manufacturer name)
Announcement by UBA from 3 July 2013

Statement of TÜV Rheinland Energie und Umwelt GmbH of 4 October 2013
Publication: BAnz AT 1 April 2014 B12, chapter VI notification 25 (new electronics, new housing, new boards new software version)
Announcement by UBA from 27 February 2014

Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 March 2014
Publication: BAnz AT 5 August 2014 B11, chapter V notification 16 (new software version)
Announcement by UBA from 17 July 2014

Initial certification according to EN 15267

Certificate No. 0000043528: 30 September 2015

Expiry date of the certificate: 25 August 2020

Statement of TÜV Rheinland Energie und Umwelt GmbH of 18 March 2015

Publication: BAnz AT 26 August 2015 B4, chapter V 37th notification

Announcement by UBA from 22 July 2015

Expanded uncertainty U(c) of the single values system 1 (Serial number 10759), extract from test report 720349 of 06 July 2006 of TÜV Süd Industrie Service GmbH

50 µg/m³

Gerät 1 (Serienr. 10759)
Bezugswert (I₂):

Verfahrenskenngröße	Anforderung	Ergebnis	Unsicherheit in µg/m³	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	≥ 10	10	2,00	4,00
Vertrauensbereich nach DIN EN 12341 (CI95)	≤ 5 µg/m³	3,95	2,28	5,20
Temperaturabhängigkeit am Nullpunkt	≤ 2 µg/m³	-0,30	-0,17	0,03
Temperaturabhängigkeit des Messwertes	≤ 2 µg/m³	-0,36	-0,21	0,04
Drift am Nullpunkt	≤ 2 µg/m³	0,0003	0,0002	0,00000003
Drift des Messwertes	≤ 2 µg/m³	-1,12	-0,65	0,42
Netzspannung	≤ 2 µg/m³	-1,44	-0,83	0,69
Querempfindlichkeit	≤ 6 µg/m³	-1,40	-0,81	0,65
Unsicherheit durch Filterwechselzeit	-	0,14	0,08	0,01
Unsicherheit des Prüfstandards	≤ 1 µg/m³	2,00	1,15	1,33
			$\sum_k U^2(c_k)$	12,38
			$U(\bar{c}) = 2U(\bar{c})$	7,04 µg/m³
			$\frac{U(\bar{c})}{I_2}$	14,1%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		

Expanded uncertainty U(c) of the mean values system 1 (Serial number 10759), extract from test report 720349 of 06 July 2006 of TÜV Süd Industrie Service GmbH

40 µg/m³

Gerät 1 (Seriennr. 10759)
B₁ (I₁):

Verfahrenskenngröße	Unsicherheit (Einzelwert) in µg/m³	Zeitbasis	Anzahl n _k	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	2,00	24 h	365	0,01
Vertrauensbereich nach DIN EN 12341 (CI95)	2,28	1 a	1	5,20
Temperaturabhängigkeit am Nullpunkt	-0,17	1 a	1	0,03
Temperaturabhängigkeit des Messwertes	-0,21	1 a	1	0,04
Drift am Nullpunkt	0,0002	3 Wochen	21	0,000000001
Drift des Messwertes	-0,65	3 Wochen	21	0,02
Netzspannung	-0,83	1 a	1	0,69
Querempfindlichkeit	-0,81	1 a	1	0,65
Unsicherheit durch Filterwechselzeit	0,08	24 h	365	0,000018
Unsicherheit des Prüfstandards	1,15	1 a	1	1,33
			$\sum_k U^2(c_k)$	7,98
			$U(\bar{c}) = 2U(\bar{c})$	5,65 µg/m³
			$\frac{U(\bar{c})}{I_1}$	14,1%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		

Expanded uncertainty U(c) of the single values system 2 (Serial number 10760), extract from test report 720349 of 06 July 2006 of TÜV Süd Industrie Service GmbH

Gerät 2 (Seriennr. 10760)
Bezugswert (I₂): 50 µg/m³

Verfahrenskenngröße	Anforderung	Ergebnis	Unsicherheit in µg/m³	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	≥ 10	10	2,00	4,00
Vertrauensbereich nach DIN EN 12341 (CI95)	≤ 5 µg/m³	3,95	2,28	5,20
Temperaturabhängigkeit am Nullpunkt	≤ 2 µg/m³	0,80	0,46	0,21
Temperaturabhängigkeit des Messwertes	≤ 2 µg/m³	-1,68	-0,97	0,94
Drift am Nullpunkt	≤ 2 µg/m³	0,0010	0,0006	0,00000033
Drift des Messwertes	≤ 2 µg/m³	-1,04	-0,60	0,36
Netzspannung	≤ 2 µg/m³	-1,64	-0,95	0,90
Querempfindlichkeit	≤ 6 µg/m³	-0,50	-0,29	0,08
Unsicherheit durch Filterwechselzeit	-	0,14	0,08	0,01
Unsicherheit des Prüfstandards	≤ 1 µg/m³	2,00	1,15	1,33
$\sum_k u^2(c_k)$				13,04
$U(\bar{c}) = 2u(\bar{c})$				7,22 µg/m³
$\frac{U(\bar{c})}{I_2}$				14,4%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		

Expanded uncertainty U(c) of the mean values system 2 (Serial number 10760), extract from test report 720349 of 06 July 2006 of TÜV Süd Industrie Service GmbH

40 µg/m³

Gerät 2 (Seriennr. 10760)
B₁ (I₁):

Verfahrenskenngröße	Unsicherheit (Einzelwert) in µg/m³	Zeitbasis	Anzahl n _k	Quadrat der Unsicherheit in (µg/m³)²
Reproduzierbarkeit	2,00	24 h	365	0,01
Vertrauensbereich nach DIN EN 12341 (CI95)	2,28	1 a	1	5,20
Temperaturabhängigkeit am Nullpunkt	0,46	1 a	1	0,21
Temperaturabhängigkeit des Messwertes	-0,97	1 a	1	0,94
Drift am Nullpunkt	0,0006	3 Wochen	21	0,000000016
Drift des Messwertes	-0,60	3 Wochen	21	0,02
Netzspannung	-0,95	1 a	1	0,90
Querempfindlichkeit	-0,29	1 a	1	0,08
Unsicherheit durch Filterwechselzeit	0,08	24 h	365	0,000018
Unsicherheit des Prüfstandards	1,15	1 a	1	1,33
			$\sum_k u^2(c_k)$	8,70
			$U(\bar{c}) = 2u(\bar{c})$	5,90 µg/m³
			$\frac{U(\bar{c})}{I_1}$	14,7%

Verfahrenskenngröße	Performance characteristic	Temperaturabhängigkeit des Messwertes	Temperature dependence of measuring value
Anforderung	Criterion	Drift am Nullpunkt	Drift at zero point
Ergebnis	Result	Drift des Messwertes	Drift of measuring value
Unsicherheit	Uncertainty	Netzspannung	Electrical voltage
Quadrat der Unsicherheit	Square of uncertainty	Querempfindlichkeit	Interference
Reproduzierbarkeit	Reproducibility	Unsicherheit durch Filterwechselzeit	Uncertainty of filter change time
Vertrauensbereich nach DIN EN 12341 (CI95)	Confidence level according to EN 12341 (CI95)	Unsicherheit des Prüfstandards	Uncertainty of test standard
Temperaturabhängigkeit am Nullpunkt	Temperature dependence zero point		