CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000081147_02

Certified AMS:	PFM 20 for dust
Manufacturer:	Dr. Födisch Umweltmesstechnik AG Zwenkauer Str. 159 04420 Markranstädt Germany
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify that the AMS has been tested and found to comply with the standards EN 15267-1 (2009), EN 15267-2 (2023), EN 15267-3 (2007) as well as EN 14181 (2014).

Certification is awarded in respect of the conditions stated in this certificate (this certificate contains 7 pages).
The present certificate replaces certificate 0000081147_01 dated 5 September 2023.

Suitability Tested
EN 15267
QAL1 Certified
Regular Surveillance

www.tuv.com
ID 0000081147

Publication in the German Federal Gazette (BAnz) of 10 May 2024

German Environment Agency

Dessau, 12 June 2024

This certificate will expire on:
9 May 2029

TÜV Rheinland Energy & Environment GmbH
Cologne, 11 June 2024

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Test institute accredited to EN ISO/IEC 17025 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.

Test report:	EuL/21258058/A dated 29 September 2023
Initial certification:	11 April 2022
Expiry date:	9 May 2029
Publication:	BAnz AT 10.05.2024 B7, chapter I No. 2.3

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2021), chapter IV (waste incineration plants / 17th BImSchV:2021), Directive 2015/2193/EC (44th BImSchV:2022), TA Luft:2021, 30th BImSchV:2019 and 27th BImSchV:2013. The measured ranges have been selected so as to ensure 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 fifteen month field test at an industrial drying plant for the production of ceramic floor coverings.

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 emission 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.

Note

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

Basis of the certification

This certification is based on:

- Test report EuL/21258058/A dated 29 September 2023 of TÜV Rheinland Energy 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 10.05.2024 B7, chapter I No. 2.3, Announcement by UBA dated 19 March 2024:

AMS designation:
PFM 20 for Dust

Manufacturer:
Dr. Födisch Umweltmesstechnik AG, Markranstädt

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

Measuring ranges during the performance test:

Component	Certification range	additional range			Unit
Dust	0 - 7.5	0 - 15	0 - 30	0 - 250	mg/m³

The measuring range of 0 to 30 mg/m³ corresponded to approx. 0 to 7.5 mg/m³ of dust in the field test.

Software version: v1.43

Restrictions:

1. In plants with fluctuating waste gas velocities, the measuring system requires the signal of a QAL1-certified and calibrated waste gas velocity measuring device to compensate for the influence of velocity.
2. The measuring system may not be operated downstream of electrostatic precipitators.
3. The measuring system may only be used in waste gases that are not saturated with water vapour.

Notes:

1. The maintenance interval is six months.
2. The dust concentration is measured in the wet waste gas under operating conditions
3. Supplementary test (extension of the maintenance interval) with regard to the announcement of the Federal Environment Agency of 5 July 2023 (BAnz AT 02.08.2023 B7, Chapter I Number 1.1).

Test institute:
TÜV Rheinland Energy GmbH, Cologne
Report No.: EuL/21258058/A dated 29 September 2023

Certified product

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

Measurement with the PFM 20 is carried out using the triboelectric measuring principle. The test gas in the waste gas flow is detected with the aid of the probe rod. Due to the dust particles flowing around and bouncing off, a charge exchange takes place between them and the probe rod. The derived current results in a signal that is dependent on the mechanical and electrical properties of the dust. The signal of the measuring system is also dependent on the exhaust gas velocity of the medium to be monitored. The dust-proportional signal, which is generated by the electronics integrated in the unit, is the measurement of the dust content.

The AMS can compensate for the influence of the waste gas velocity on the measured signal. To do this, it requires the signal from a QAL1-certified and calibrated waste gas velocity measuring system installed in the same measuring section.

The PFM 20 dust monitor consists of an in-situ probe with probe head and probe rod. The probe rod has a high-temperature coating for insulation. It is surrounded by a sleeve and an insulating body and is thus electrically isolated from the housing. The signal module with the evaluation electronics is located in the probe head.

The PFM 20 measuring system tested here consists of:

- The PFM 20 measuring system with the current software and
- A cable connecting the probe with the electronics.

The PFM20_HID software is required to operate the PFM 20 measuring system with a PC.

A standard notebook PC is required to parameterise the measuring system and to display the measured results of the AMS. The data is transferred via a specific USB cable.
The measuring probe is mounted on the flue to be measured using a flange with a Tri-Clamp quick-release fastener.

The LinTest PFM 20 test system is available for the annual AST of the PFM 20 measuring system. The signal generator can be used to perform linearity tests as well as zero and span point checks.

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 Energy & Environment 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 certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy & Environment 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**.

History of documents
Certification of PFM 20 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. 0000081147_00: 31 May 2022
Expiry date of the certificate: 10 April 2027
Test report: 936/21249601/A dated 10 November 2021
TÜV Rheinland Energy GmbH
Publication: BAnz AT 11.04.2022 B10, chapter I number 2.1
UBA announcement dated 9 March 2022

Supplementary testing according to EN 15267
Certificate No. 0000081147_01: 5 September 2023
Expiry date of the certificate: 1 August 2028
Test report: 936/21255410/A dated 9 February 2023
TÜV Rheinland Energy GmbH
Publication: BAnz AT 02.08.2023 B7, chapter I number 1.1
UBA announcement dated 5 July 2023

Supplementary testing according to EN 15267
Certificate No. 0000081147_02: 12 June 2024
Expiry date of the certificate: 9 May 2029
Test report: EuL/21258058/A dated 29 September 2023
TÜV Rheinland Energy GmbH
Publication: BAnz AT 10.05.2024 B7, chapter I number 2.3
UBA announcement dated 19 March 2024

Certificate:
0000081147_02 / 12 June 2024

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

Measuring system					
Manufacturer			Dr. Födisch Umweltmesstechnik AG		
AMS designation			PFM 20		
Serial number of units under test			20001 / 20002		
Measuring principle			Triboelectric		
Test report			EuL/21258058/A		
Test laboratory			TÜV Rheinland		
Date of report			2023-09-29		
Measured component			Dust		
Certification range			0 - 7.5	mg/m³	

Calculation of the combined standard uncertainty

Tested parameter				u²	
Standard deviation from paired measurements under field conditions *	u_D	0.064	mg/m³	0.004	(mg/m³)²
Lack of fit	u_{lof}	0.057	mg/m³	0.003	(mg/m³)²
Zero drift from field test	$u_{d,z}$	0.030	mg/m³	0.001	(mg/m³)²
Span drift from field test	$u_{d,s}$	0.081	mg/m³	0.007	(mg/m³)²
Influence of ambient temperature at span	u_t	0.153	mg/m³	0.023	(mg/m³)²
Influence of supply voltage	u_v	0.067	mg/m³	0.004	(mg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.061	mg/m³	0.004	(mg/m³)²

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

Combined standard uncertainty (u_C)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.22	mg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.42	mg/m³

Relative total expanded uncertainty	**U in % of the ELV 5 mg/m³**	**8.4**
Requirement of 2010/75/EU	**U in % of the ELV 5 mg/m³**	**30.0**
Requirement of EN 15267-3	U in % of the ELV 5 mg/m³	22.5