TÜVRheinland®
Precisely Right.

CONFIRMATION

of Product Conformity (QAL1)

Certified AMS:	TEOM 1405-F Ambient Particulate Monitor with $PM_{2.5}$-pre-separator for $PM_{2,5}$
Manufacturer:	Thermo Fisher Scientific 27, Forge Parkway Franklin, MA 02038 USA
Test Institute:	TÜV Rheinland Energy & Environment GmbH

This is to certify that the AMS has been tested and found to comply with the standards VDI 4202-1 (2010), VDI 4203-3 (2010), EN 16450 (2017), EN 14907 (2005), Guide to the Demonstration of Equivalence of Ambient Air Monitoring Methods (2010) as well as EN 15267-1 (2009) and EN 15267-2 (2023).

The AMS underwent independent expert testing and was accepted.
This confirmation is valid up to the publication of the certificate,
but no longer than 9 months from the date of issue
(this document contains 4 pages).

This confirmation is valid until: 31 December 2026

TÜV Rheinland Energy & Environment GmbH
Cologne, 10 April 2026

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TÜV Rheinland Energy & Environment GmbH
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confirmation:
10 April 2026

Test report:	936/21209885/C dated 11 March 2012 and Addendum EuL/21271000/C of 01. August 2025
Expiry date:	31 December 2026

Approved application
The tested AMS is suitable for continuous ambient air monitoring of $PM_{2.5}$ (stationary operation).

The suitability of the product for this application was assessed on the basis of a laboratory test and a field test for four different test sites or time periods respectively.

The AMS is approved for an ambient temperature range of +8° to 25°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 measured values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended use.

Basis of the confirmation
This confirmation is based on:

- Test report 936/21209885/C dated 11 March 2012 of TÜV Rheinland Energie und Umwelt GmbH and Addendum EuL/21271000/C of 01. August 2025 issued by TÜV Rheinland Energy & Environment GmbH
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

confirmation:
10 April 2026

Notification on the announcements of the Federal Environment Agency of 06th July 2012 (BAnz AT 20.07.2012 B11, Chapter III number 1.1) and of 29th June 2021 (Banz AT 05.08.2021 B5, Chapter IV, 02nd notification).

The TEOM 1405-F Ambient Particulate Monitor with $PM_{2.5}$ pre-separator for $PM_{2.5}$ particulate matter from Thermo Fisher Scientific meets the requirements of DIN EN 16450 (July 2017 edition). An addendum to the test report with report number EuL/21271000/C is available online at www.qal1.de.

The measuring device also meets the requirements for equivalence testing, taking into account the future (to be achieved by January 1, 2030) daily limit values $PM_{2.5}$ of 25 µg/m³ according to Annex I of Directive (EU) 2024/2881. The results of the equivalence test are also listed in the addendum to the test report with report number EuL/21271000/C.

The current software version of the measuring device is: 1.75

Statement by TÜV Rheinland Energy & Environment GmbH dated 01 August 2025

confirmation:
10 April 2026

Tested product

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

The ambient air measuring system TEOM 1405-F Ambient Particulate Monitor is based on the measuring principle of oscillating micro weighing.
For the weighing principle, which is used in the TEOM mass transducer in the measuring system TEOM 1405-F Ambient Particulate Monitor, the change in mass determined with the sensor, results from the measurement of the change in frequency of the tapered element.
The particle sample passes the PM_{10}-pre-separator and the $PM_{2,5}$ sharp cut cyclone with a flow rate of 16.67 l/min (=1 m³/h). Subsequently, the flow is directed over a flow-splitter and divided into two sub-flows – the $PM_{2,5}$-flow of 3 l/min and the bypass-flow of 13.67 l/min. The $PM_{2,5}$-flow is directed to the actual measuring system TEOM 1405-F via the FDMS-unit. There it is secreted to the respective TEOM-filter (constantly heated at 30 °C) and the secreted mass of particles is quantified.
To take into account non-volatile as well as volatile particulate during the measuring, the FDMS technology is used. The FDMS-unit is placed between the flow-splitter and the measuring device TEOM 1405-F in the so called FDMS-tower. The FDMS-unit compensated automatically the part of the semi-volatile particulate using a switching valve and two operation modi – the base mode and the reference mode.
Every six minutes the switching valve changes the sampling flow rate from base to reference mode. In the base mode the sampling is done on a straight way via a dryer directly to the mass measuring. In the reference mode the air flow is directed through a cooled filter after the dryer, to remove and restrain the non-volatile and volatile part of the particulate from the sample. During normal operation the temperature of the cooler is maintained at constantly 4 °C.
Based on the mass concentration measuring during the base- and reference-modi the FDMS-system updates every six minutes the 1h-average of the following results:

Base-MC	=	Particle concentration of the particle-loaded sampling flow.
Ref-MC	=	Particle concentration of the particle-free sampling flow after passing through the cooled filter.
MC	=	Base-MC adjusted for Ref-MC Base-mass-concentration (normally positive) reference-mass-concentration (negative, in case mass of the filter evaporates).

After the mass determination the sampling flows are directed over a mass flow rate regulator. To guarantee a constant sampling volume flow at the inlet, bearing in mind the ambient temperature and pressure, the volume flow control shall be operated in the mode „active/ actual“.
The tested measuring system consists of PM_{10}-sampling inlet, flow splitter, the respective sampling tubes, a tripod to support the sample, the measuring device TEOM 1405-F incl. FDMS-tower, the vacuum pump with its respective power supply cord and cables as well as adapters, the hole in the roof incl. a flange and a manual in German/English.
The measuring device is operated via touch screen at the front of the device. The user can retrieve data and instrument information, change parameters as well as perform tests and controls of the functionality of the measuring device.