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Road vehicles - Portable Emission Measuring Systems (PEMS) - Performance assessment

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This standard includes the English version of the European Standard.

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Road vehicles - Portable Emission Measuring Systems (PEMS) - Performance assessment

Véhicules routiers - Systèmes portatifs de mesure des émissions (PEMS) - Vérification de la performance

Straßenfahrzeuge - Mobile Abgasmesssysteme (PEMS) - Leistungsbewertung

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European foreword

This document (EN 17507:2021) has been prepared by Technical Committee CEN/TC 301 “Road vehicles”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2022, and conflicting national standards shall be withdrawn at the latest March 2022.

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Introduction

The intention of this document is to determine the measurement uncertainty of mobile vehicle exhaust emission testing equipment (e.g. Portable Emissions Measurement Systems, PEMS) under consideration of applicable legal requirements (e.g. European Legislation on Light-Duty Real Driving Emission measurement, RDE).

The specific aims include the following:

— To be able to assess PEMS (for gaseous and particle number emissions) under various operating environments with the intention of predicting PEMS performance and uncertainty over the whole range of conditions used. For the time being, it focusses on light-duty-vehicle application and serves as a basis for assessing the uncertainty of heavy-duty emission measurement using PEMS.

— To be able to evaluate the deviation of gaseous PEMS under various light-duty on-road test conditions and heavy-duty PEMS test conditions against known analyser systems under standard laboratory conditions for the specified gas, which is traceable to national or international primary standards.

— To be able to evaluate the deviation of Particle Number (PN) - PEMS under various light-duty on-road test conditions and heavy-duty PEMS test conditions against a known analyser system under standard laboratory conditions for the same sample, which is traceable to national or international primary or secondary standards.

— To define the means for demonstrating that the PEMS equipment is stable and the measurement quality is sufficient between PEMS equipment service intervals.

— To provide input to the development of future specifications and quantified information about instrument and process accuracy to help improve the accuracy and robustness of PEMS systems and on-road measurements.

— To set a framework for determining the measurement uncertainty by analysing available data and providing a method for data evaluation.

In particular, the derivation of the uncertainty according to all parts of the document allows the following:

— The instrument measurement uncertainty can be evaluated.

— The instrument measurement uncertainty on-road can be reported as a part of the measurement result following ISO 10012:2003.

— The results of an investigation based on this document provides information about the suitability of the equipment for the intended use.

— Transparency with respect to the instrument measurement uncertainty of currently available equipment.

— Transparency with respect to the testing processes for the measurement uncertainty.

— Assessment of the statistical significance of the difference of measurement results.

1 Scope

This document defines the procedures for assessing the performance of test equipment that is used for the on-road measurement of tailpipe emissions of light-duty vehicles, on the basis of a common test procedure that simulates the range of conditions experienced during on-road tests.

This document prescribes:

— the tests to be conducted, and

— a procedure to determine, for any type of PEMS equipment, an appropriate uncertainty margin to reflect its performance over those conditions.

The key test variables are as follows (but not limited to the ones mentioned):

a) temperature, humidity and pressure (including step-wise or gradual changes),

b) acceleration and deceleration (longitudinal and lateral),

c) vibration, inclination and shock tests,

d) instrument positioning on a vehicle,

e) combinations of (a) to (d),

f) cross-interferences,

g) signal-processing, data treatment and time alignment, and

h) calculation methods (excluding the regulatory post-processing of data).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 29463 (all parts), *High-efficiency filters and filter media for removing particles in air (ISO 29463 (all parts))*

ISO 27891:2015, *Aerosol particle number concentration - Calibration of condensation particle counters*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*