



BSI Standards Publication

Stationary source emissions — Determination of total mercury — Automated measuring systems

National foreword

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The UK participation in its preparation was entrusted to Technical Committee EH/2/1, Stationary source emission.

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Emissionen aus stationären Quellen - Bestimmung der Gesamtquecksilber-Konzentration - Automatische Messeinrichtungen

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European foreword

This document (EN 14884:2022) has been prepared by Technical Committee CEN/TC 264 “Air quality”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14884:2005.

Annex B provides details of significant technical changes between this document and the previous edition.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

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Introduction

This document describes the quality assurance procedures related to automated measuring systems (AMS) for the determination of total mercury in waste gas, in order to meet the uncertainty requirements on measured values given by regulations, e.g. EU Directives [1], national or other legislation.

This document is derived from EN 14181, which specifies general procedures for establishing quality assurance levels (QAL) for AMS installed on industrial plants for the determination of the flue gas components and other flue gas parameters. It amends EN 14181 and provides guidance specific to total mercury measurements. It is only applicable in conjunction with EN 14181.

The calibration and validation of mercury AMS that measure the total vapour phase mercury content is based on parallel measurements with the manual method described in EN 13211. The species of mercury (elemental Hg^0 and oxidized Hg^{2+}) and the physical occurrence (gaseous, dust-bound or within droplets) can vary significantly depending on the type of process to be monitored and this is taken into account when implementing the SRM.

1 Scope

This document specifies requirements for the calibration and validation (QAL2), the ongoing quality assurance during operation (QAL3) and the annual surveillance test (AST) of AMS used for monitoring total mercury emissions from stationary sources to demonstrate compliance with an emission limit value (ELV). This document is derived from EN 14181 and is only applicable in conjunction with EN 14181.

This document is applicable by direct correlation with the standard reference method (SRM) described in EN 13211.

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 13211, *Air quality — Stationary source emissions — Manual method of determination of the concentration of total mercury*

EN 14181:2014, *Stationary source emissions — Quality assurance of automated measuring systems*

EN 17255-1, *Stationary source emissions — Data acquisition and handling systems — Part 1: Specification of requirements for the handling and reporting of data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13211 and EN 14181 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Symbols and abbreviations

4.1 Symbols

a	intercept of the calibration function
$\hat{a}$	best estimate of a
b	slope of the calibration function
$\hat{b}$	best estimate of b
D_i	difference between SRM value, y_i and calibrated AMS value $\hat{y}_i$
$\bar{D}$	average of D_i
E	emission limit value
h	water vapour content (by volume)
i	counter
N	number of paired samples in parallel measurements
k_v	test value for variability

o	oxygen content in dry gas (by volume)
o_s	oxygen reference value
p	gauge pressure
P	percentage
s_D	standard deviation of the differences D_i in parallel measurements
t	Celsius temperature
t_{90}	response time
t_{cycle}	total measurement cycle time of AMS with pre-concentration
t_{sample}	sample period of AMS with pre-concentration
U_{max}	maximum permissible expanded uncertainty
x_i	i^{th} AMS measured signal at AMS measuring conditions
$\bar{x}$	average of AMS measured signals
y_i	i^{th} SRM measured value
$\bar{y}$	average of SRM measured values
$y_{i,s}$	i^{th} SRM measured value at standard conditions
y_s	SRM measured value at standard conditions
$y_{s,\text{min}}$	lowest SRM measured value at standard conditions
$y_{s,\text{max}}$	highest SRM measured value at standard conditions
$\hat{y}_i$	best estimate for the “true value”, calculated from the AMS measured signal x_i by means of the calibration function
$\hat{y}_{i,s}$	best estimate for the “true value”, calculated from the AMS measured signal x_i by means of the calibration function at standard conditions
Δy_{max}	difference between the maximum and minimum SRM measured value at standard conditions
Z_i	check value Grubbs-Test
Z_{crit}	critical limit – Grubbs-Test
σ_0	standard deviation associated with the uncertainty derived from requirements of legislation

4.2 Abbreviations

AMS	automated measuring system
AST	annual surveillance test
DAHS	data acquisition and handling system
ELV	emission limit value
QAL	quality assurance level