Date: 2022-04-29

FINAL DRAFT INTERNATIONAL STANDARD

ISO/FDIS 15259:2022(E)

ISO/ TC 146/SC 1

Secretariat: BIS

Air quality — Measurement of stationary source emissions — Requirements for measurement sections and sites and for the measurement objective, plan and report

Date: 2022-12-14

Contents

Page

Document type: document
Document subtype:
Document stage: Formal Vote
Document language: E

STD Version 2.2

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by ~~the~~ European Committee for Standardization (CEN) (as EN 15259:2007) and ~~**drafted in accordance with its editorial rules. It was assigned to**~~ was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 1, *Stationary source emission* ~~**and adopted under the “fast-track procedure”.**~~, in parallel with its approval by the ISO member bodies.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Document type: document
Document subtype:
Document stage: Formal Vote
Document language: E

STD Version 2.2

Contents

Page

Introduction

This document defines requirements for

a) measurement sections and sites at waste gas ducts of industrial plants and

b) measurement objective, plan and report.

This document is intended to ensure reliable and comparable results when used in conjunction with reference methods such as those that have been developed by CEN/TC 264.

This document is important to plant designers, constructors, plant operators, testing laboratories, accreditation bodies and regulators.

This document requires the specification of a measurement objective. There can be various objectives for measuring emissions, e.g.

— for assessing whether industrial installations are operating in compliance with IPPC permits[1] (emission limit value compliance assessment),

— for emissions declaration and reporting for emission inventories (e.g. local, national and international e.g. for EPER[1]~~], [1,~~[2]),

— for acceptance tests (proof of guarantee),

— in case of complaints,

— for obtaining a permit (e.g. following changes to process operations or plant design),

— after expiration of a set time interval to establish the condition of the plant,

— in case of interruption or disturbance of operations,

— within the framework of safety precaution investigations,

— for the calibration of continuously operating emission measuring systems,

— for checking the function of continuously operating emission measuring systems,

— to establish the cause of particular emission behaviour (e.g. the determination of the cause of a failure of the waste gas treatment to maintain the guaranteed/required level of cleaning),

— to give a prognosis of likely emission levels in special operating conditions, e.g. after changes of procedure, in case of disturbance or interruption, or in case of expansion of capacity,

— for establishing emission trading schemes[3],

— for determining emission factors and

— for assessing available techniques for an industry sector (e.g. at company, sector and EU level~~) [~~[3].

Air quality — Measurement of stationary source emissions — Requirements for measurement sections and sites and for the measurement objective, plan and report

1 Scope

This document specifies the following requirements:

a) requirements for measurement sections and sites with respect to performing emission measurements;

b) requirements for the measurement objective, plan and report of emission measurements of air pollutants and reference quantities to be carried out in waste gas ducts at industrial plants.

This document applies to periodic measurements using manual or automated reference methods (RM).

This document specifies generic principles which can be applied to perform emission measurements at different plant types and to meet different measurement objectives.

NOTE The measurement objective is specified by the customer. The testing institute identifies the measurement objective and related regulatory requirements at the beginning of the measurement planning. Where measurements are being made for regulatory purposes, the customer should seek approval from the competent authority.

This document specifies procedures for taking representative samples in waste gas ducts.

This document specifies a procedure for finding the best available sampling point for automated measuring systems used for continuous monitoring of emissions.

The planning and reporting aspects of this document are applicable to emission measurements at diffusive and fugitive emission sources.

This document does not address aspects of structural safety of chimneys and ducts, construction of working platforms and safety of personnel using them.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

NOTE These terms and definitions are in accordance with VIM and CEN/TS 15674.

3.1
measurement
set of operations having the object of determining a value of a quantity

[SOURCE: VIM:1993, 2.1]

Note 1 to entry: The operations can be performed automatically.

3.2
individual measurement
measurement carried out over a defined period of time

Note 1 to entry: Information on the start and end time of the measurement can be of importance, e.g. in case of parallel measurements of the reference method with an automated measuring system to be calibrated or validated.

3.3
periodic measurement
determination of a measurand at specified time intervals

Note 1 to entry: The specified time intervals may be regular (e.g. once every month) or irregular. Measurands can include the amount or physical property of an emission. Measurements are usually made using portable equipment for typically less than 24 h.

3.4
grid measurement
determination of a measurand in a given grid of measurement points in the measurement plane

3.5
measurand
particular quantity subject to measurement

[SOURCE: VIM:1993, 2.6]

Note 1 to entry: The measurand is a quantifiable property of the waste gas under test, for example mass concentration of a measured component, temperature, velocity, mass flow, oxygen content and water vapour content.

3.6
measured component
constituent of the waste gas for which a defined measurand is to be determined by measurement

3.7
reference quantity
specified physical or chemical quantity which is needed for conversion of the measurand to standard conditions

Note 1 to entry: Reference quantities are e.g. temperature (T_{ref} = 273,15 K), pressure (p_{ref} = 101,325 kPa), water vapour volume fraction (h_{ref} = 0 %) and oxygen volume fraction o_{ref}.

3.8
reference method
RM

measurement method taken as a reference by convention, which gives the accepted reference value of the measurand

Note 1 to entry: A reference method is fully described.

Note 2 to entry: A reference method can be a manual or an automated method.

Note 3 to entry: Alternative methods can be used if equivalence to the reference method has been demonstrated.

3.9
standard reference method
SRM
reference method prescribed by European or national legislation

Note 1 to entry: Standard reference methods are used e.g. to calibrate and validate AMS and for periodic measurements to check compliance with limit values.

3.10
automated measuring system
AMS
measuring system permanently installed on site for continuous monitoring of emissions

Note 1 to entry: An AMS is a method which is traceable to a reference method.

[SOURCE: EN 14181:2004, 3.2]

3.11
measurement site
place on the waste gas duct in the area of the measurement plane(s) consisting of structures and technical equipment, for example working platforms, measurement ports, energy supply

Note 1 to entry: Measurement site is also known as sampling site.

3.12
measurement section
region of the waste gas duct which includes the measurement plane(s) and the inlet and outlet sections

3.13
measurement plane
plane normal to the centreline of the duct at the sampling position

Note 1 to entry: Measurement plane is also known as sampling plane.

3.14
hydraulic diameter
d_h
quotient of four times the area A and the perimeter P of the measurement plane

$$d_h = \frac{4 \times A}{P} \quad (1)$$

3.15

measurement line
line in the sampling plane along which the sampling points are located, bounded by the inner duct wall

Note 1 to entry: Measurement line is also known as sampling line.

3.16
measurement point
position in the measurement plane at which the sample stream is extracted or the measurement data are obtained directly

Note 1 to entry: Measurement point is also known as sampling point.

3.17
representative measurement point
measurement point at which the local mass flow density of the substance to be determined is equal to the mass flow density averaged over the measurement plane

3.18
measurement port
opening in the waste gas duct along the measurement line, through which access to the waste gas is gained

Note 1 to entry: Measurement port is also known as sampling port or access port.

3.19
clearance area
area of free space at the working platform outside the waste gas duct without obstacles in which the appropriate measuring probes are moved and handled

Note 1 to entry: See Table 1 in 5.2.3.2.

3.20
measurement objective
scope of the measurement programme

3.21
measurement plan
structured procedure to fulfil a defined measurement objective

3.22
measurement report
report established by the testing laboratory according to the customer request and containing at least the information required in the standards applied in the measurements programme, in particular this document

3.23
site review
visit conducted by the testing laboratory before undertaking emission measurements to ensure that the physical and logistical situation is fully understood before arriving on-site to conduct work

Note 1 to entry: The site review provides information essential for determining the appropriate measurement method and development of the measurement plan.

3.24

timing
time at which samples or measurements are taken

Note 1 to entry: Timing can be crucial to obtaining a result which is relevant to the measurement objective.

3.25
sampling duration
period of time over which the sample is taken

3.26
mass concentration
c
quotient of mass *m* of the measured component and gas volume *V*

$$c = \frac{m}{V} \quad (2)$$

3.27
mass flow rate
$\dot{m}$
quotient of the mass *m* flowing through the measurement plane and the time *t*

$$\dot{m} = \frac{m}{t} \quad (3)$$

3.28
mass flow density
$\dot{m}_d$
quotient of mass flow rate $\dot{m}$ and corresponding cross-sectional area *a*

$$\dot{m}_d = \frac{\dot{m}}{a} \quad (4)$$

3.29
sample volumetric flow
volumetric flow extracted from the main stream for determination of the measured component

3.30
volumetric flow rate
quotient of the volume flowing through a plane and the time

3.31
testing laboratory
laboratory that performs tests

Note 1 to entry: The term *testing laboratory* can be used in the sense of a legal entity, a technical entity or both.

Note 2 to entry: A testing laboratory undertakes work at the laboratory's permanent facilities, at sites away from their permanent facilities and in temporary or mobile laboratories.

Note 3 to entry: The sampling and analysis stages often occur at different locations as the analysis stage can be carried out at a permanent laboratory.

3.32
customer
organization or person that defines the measurement objective and receives the measurement report

Note 1 to entry: Adapted from ISO 9000:2005, Definition 3.3.5.

4 Symbols and abbreviated terms

4.1 Symbols

a	cross-sectional area
A	area of the measurement plane
c	mass concentration
d	diameter of the duct
d_h	hydraulic diameter
F	statistical value of the F-test
h_m	measured water vapour content as volume fraction
h_{ref}	standard water vapour content as volume fraction
m	mass
$\dot{m}$	mass flow rate
$\dot{m}_d$	mass flow density
N	number of measurements
o_m	measured oxygen content as volume fraction
o_{ref}	standard oxygen content as volume fraction
P	perimeter of the measurement plane
p_m	measured pressure
p_{ref}	standard pressure
r_i	ratio of actual value $y_{i,grid}$ of the measurand in the grid and the value $y_{i,ref}$ of the reference measurement
$\bar{r}$	average of the ratios r_i
s_{grid}	standard deviation of the grid measurements
s_{inh}	standard deviation due to the inhomogeneity of the waste gas
s_{pos}	standard deviation of combined grid and reference measurement
s_{ref}	standard deviation of the reference measurements
t	time

T_m	measured temperature (absolute)
T_{ref}	standard temperature (absolute)
U_{per}	permissible expanded uncertainty
U_{pos}	expanded uncertainty of the combined grid and reference measurement
U_{ref}	expanded uncertainty related to the reference measurements at the fixed point
v	velocity of the gas in the measurement plane
V	volume
$\dot{V}$	volume flow rate
$y_{i,grid}$	measured value at the ith sampling point
$y_{i,ref}$	ith measured value at the reference point
~~a~~	~~cross-sectional area~~
~~A~~	~~area of the measurement plane~~
~~c~~	~~mass concentration~~
~~d~~	~~diameter of the duct~~
~~d_h~~	~~hydraulic diameter~~
~~F~~	~~statistical value of the F test~~
~~h_m~~	~~measured water vapour content as volume fraction~~
~~h_{ref}~~	~~standard water vapour content as volume fraction~~
~~m~~	~~mass~~
	~~mass flow rate~~
	~~mass flow density~~
~~N~~	~~number of measurements~~
~~o_m~~	~~measured oxygen content as volume fraction~~
~~o_{ref}~~	~~standard oxygen content as volume fraction~~
~~P~~	~~perimeter of the measurement plane~~
~~p_m~~	~~measured pressure~~
~~p_{ref}~~	~~standard pressure~~
~~r_i~~	~~ratio of actual value $y_{i,grid}$ of the measurand in the grid and the value $y_{i,ref}$ of the reference measurement~~
	~~average of the ratios r_i~~