SLOVENSKI STANDARD
SIST EN 1093-2:2007+A1:2008

01-oktober-2008

Varnost strojev - Vrednotenje emisije nevarnih snovi, ki jih prenaġa zrak - 2. del: Metoda s slednim plinom za merjenje stopnje emisije doloļ ene onesnaġevalne snovi

Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 2: Tracer gas method for the measurement of the emission rate of a given pollutant

Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen - Teil 2: Tracergasverfahren zur Messung der Emissionsrate eines bestimmten luftverunreinigenden Stoffes

Sécurité des machines - Evaluation de l'émission de substances dangereuses véhiculées par l'air - Partie 2: Méthode par traçage pour l'évaluation du débit d'émission d'un polluant donné

Ta slovenski standard je istoveten z: **EN 1093-2:2006+A1:2008**

ICS:

13.040.40	Emisije nepremiļ nih virov	Stationary source emissions
13.110	Varnost strojev	Safety of machinery

SIST EN 1093-2:2007+A1:2008 **en,fr,de**

EUROPEAN STANDARD

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EN 1093-2:2006+A1

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English Version

Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 2: Tracer gas method for the measurement of the emission rate of a given pollutant

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This European Standard was approved by CEN on 4 November 2006 and includes Amendment 1 approved by CEN on 18 May 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 1093-2:2006+A1:2008) has been prepared by Technical Committee CEN/TC 114 “Safety of machinery”, 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of an identical text or by endorsement, at the latest by December 2008, and conflicting national standards shall be withdrawn at the latest by December 2008.

This document includes Amendment 1, approved by CEN on 2008-05-18.

This document supersedes EN 1093-2:2006.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟩A1⟨ ⟩A1⟨.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

⟩A1⟨ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟩A1⟨

This part 2 of EN 1093 *Safety of machinery — Evaluation of the emission of airborne hazardous substances* belongs to a series of documents, the other parts of which are the following:

— Part 1: Selection of test methods;

— Part 3: Test bench method for the measurement of the emission rate of a given pollutant;

— Part 4: Capture efficiency of an exhaust system — Tracer method;

— Part 6: Separation efficiency by mass, unducted outlet;

— Part 7: Separation efficiency by mass, ducted outlet;

— Part 8: Pollutant concentration parameter, test bench method;

— Part 9: Pollutant concentration parameter, room method;

— Part 11: Decontamination index.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard is a type B standard as stated in EN ISO 12100-1.

The provisions of this European Standard can be supplemented or modified by a type C standard.

NOTE For machines which are covered by the scope of a type C standard and which have been designed and built according to the provisions of that standard, the provisions of that type C standard take precedence over the provisions of this type B standard.

1 Scope

This European Standard specifies a method to enable measurements of the emission rates of gaseous substances from a single machine, whose operation can be controlled, using tracer gas techniques.

This European Standard is not applicable to machinery which is manufactured before the date of its publication as an EN.

2 Normative references

The following referenced documents are indispensable for the application 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 1093-1, *Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 1: Selection of test methods.*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003).*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1093-1, EN ISO 12100-1:2003 and the following apply.

3.1
tracer gas technique
use of gaseous substances with an aerodynamic behaviour comparable with the gaseous hazardous substance under consideration and for which concentrations can be reliably measured

4 Principle

The principle is based on the use of a tracer gas generated at a known and constant emission rate to provide the best representation of the pollutant source. The mean tracer gas and pollutant concentrations are measured in the vicinity of the source. Assuming that the aerodynamic behaviour of the pollutant is equal to that of the tracer gas, the pollutant emission rate can be determined.

5 Location of the machine

5.1 General

The method is intended for use for a machine located either in a test room or in the field.

5.2 Test room method

The general airflow patterns in the test room should be characterised to enable more precise control of the general and local ventilation to be achieved. The machine should be placed in the centre of the room.

5.3 Field method

Many machines cannot be tested in a test room because they are too large, too difficult to handle or have special installation or process requirements. Tests may be performed on machines in the places where they are installed, i.e. the workplace. For this purpose, it shall be ensured that pollutants from other emission sources present in the room shall not affect the measurements of the concentrations of the specific pollutant emitted from the machine under test.

6 Apparatus and materials

6.1 Tracer gas emitter, capable of providing a release of the tracer gas in the same manner as the pollutant emission.

The shape of the emitter should resemble the shape of the real pollutant source. A distinction is generally drawn between:

— point sources (e.g. welding operations, localised leaks from gaskets, flanges, localised spraying, such as painting jet);

— plane sources (e.g. open vessel or tank containing liquid or melted solid liable to evaporate or sublimate, such as galvanising baths, electroplating baths);

— volumetric sources (e.g. closed machine with distributed leaks, rubber making machine, printing machine, degreaser, dry cleaning machine, diffuse spraying, such as plant-care products in agriculture).

Point sources should be simulated by opened tubes producing jets of variable aerodynamic characteristics or by sintered materials diffusing the tracer gas at a low initial velocity. Plane and volumetric sources should be simulated by a network of point sources or perforated tubes, which are suitably distributed.

6.2 Tracer gas flow rate measuring device, capable of measuring tracer gas flow rates in the appropriate range.

NOTE The tracer gas flow rate depends on the sensitivity of the tracer gas analyser. For most applications a device calibrated to measure flow rates in the range from 1 l min^{-1} to 10 l min^{-1} is suitable.

6.3 Tracer gas flow rate adjusting device, e.g. a valve.

6.4 Gas analyser(s), preferably direct reading.

An alternative method of measuring the pollutant concentration is to collect the gas on vapour absorption tubes for later analysis, in the laboratory, using gas analyser(s).

The gas analyser(s) should be selected to avoid any interference from any chemical substances present, other than the pollutant and tracer gas, in the test room or workplace where the machine under test is situated. Calibrations shall be carried out according to European or International Standards.

NOTE The choice of gas analyser depends upon the tracer gas and pollutant to be measured. Suitable analysers include infrared, electron capture, FID analysers, or mass spectrometer. Their performances should be checked before use. The analysers used should not be susceptible to change in environmental conditions such as temperature and relative humidity.

6.5 Connecting piping, for connection of the sampled tracer gas and pollutant gas to the analysers.

The piping length should be as short as possible and the material chosen to limit adsorption on the piping walls e.g. PTFE. If the machine is located in a dirty workplace atmosphere particle filters should be fitted. For adsorption tubes the piping length upstream should be shorter.

6.6 Tracer gas; it shall be selected in accordance with the following criteria:

a) nil or very low toxicity;

b) chemical stability at the intended process temperature;

c) easily measurable at low concentrations;

d) non-interference with pollutants present in the room;

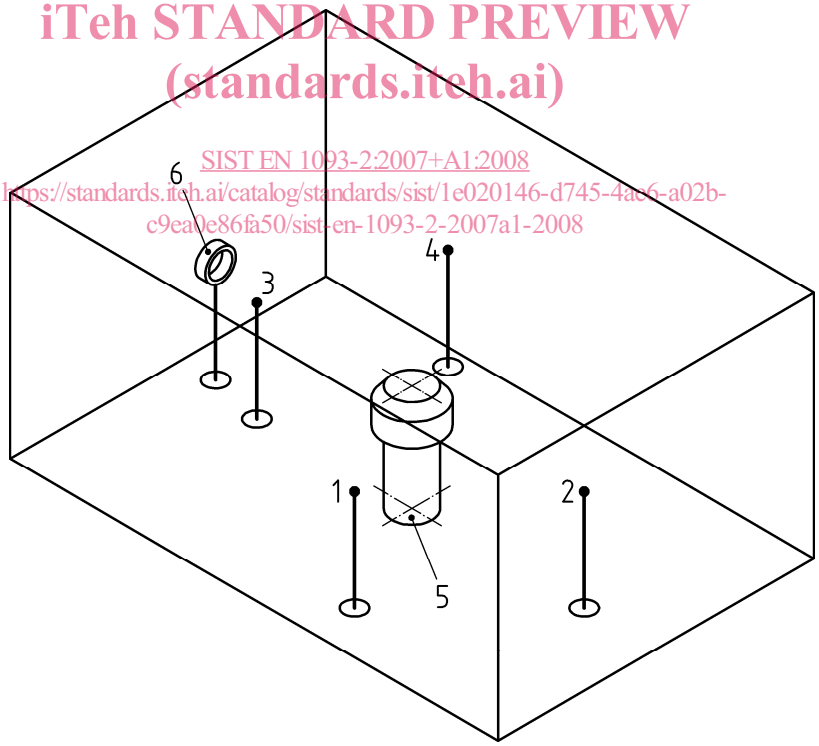
e) low background level.

The tracer gas chosen should have a relative density close to 1. The tracer gas can be mixed with an appropriate gas.

NOTE The choice of the tracer gas and associated analyser depends, in particular, on the desired accuracy, the measurement range and the cost. The gases normally used are helium, sulphur hexafluoride and nitrous oxide.

7 Measurement points

There should be at least three measurement points around the machine (see Figure 1). These should be positioned close to the machine, e.g. between 1 m and 3 m and at the height where the pollutant is generated. At each measurement point both tracer gas and pollutant concentrations are measured. The measurement points should be determined by pre-testing to ensure that they are in zones of measurable emission.



Key

1 to 4 measurement points
5 pollutant source
6 mixing fan

Figure 1 — Example of the location of four measurement points in a test room