



SLOVENSKI STANDARD
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**Varnost strojev - Vrednotenje emisije nevarnih snovi, ki jih prenaša zrak - 11. del:
Indeks dekontaminacije**

Safety of machinery - Evaluation of the emission of airborne hazardous substances -
Part 11: Decontamination index

Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen -
Teil 11: Reinigungsindex

Sécurité des machines - Évaluation de l'émission de substances dangereuses
véhiculées par l'air - Partie 11 : Indice d'assainissement

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Ta slovenski standard je istoveten z: EN 1093-11:2001+A1:2008

ICS:

13.040.40	Stationary source emissions
13.110	Safety of machinery

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1093-11:2001+A1

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ICS 13.040.40

Supersedes EN 1093-11:2001

English Version

Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 11: Decontamination index

Sécurité des machines - Évaluation de l'émission de substances dangereuses par l'air - Partie 11 : Indice d'assainissement

Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen - Teil 11: Reinigungsindex

This European Standard was approved by CEN on 19 April 2001 and includes Amendment 1 approved by CEN on 6 June 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword.....	3
1 Scope	4
2 Normative references.....	4
3 Terms and definitions	5
4 Principle.....	5
5 Determination of concentration measurement points.....	5
6 Test method	5
7 Application to specific group of machines.....	8
8 Influencing factors	8
9 Expression of results	8
10 Test report.....	9
Annex ZA (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC	11
Annex ZB (informative)  Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	12

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Foreword

This document (EN 1093-11:2001+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 January 2009, and conflicting national standards shall be withdrawn at the latest by January 2009.

This document includes Amendment 1, approved by CEN on 2008-06-06.

This document supersedes EN 1093-11:2001.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$.

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 EC Directive(s).

$\boxed{A_1}$ For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. $\boxed{A_1}$

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.

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EN 1093-11:2001+A1:2008

Introduction

This is a type B standard as specified in EN 1070. This standard is a part of EN 1093. Part 1 “ Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 1: Selection of test methods” of this standard presents a selection of different methods for the evaluation of the emission of airborne hazardous substances from machines.

1 Scope

This standard describes a method for the measurement of the decontamination index of pollution control systems e. g. capture devices including local exhaust ventilation, water spray systems and, when appropriate, separation equipment installed on a machine. This method uses the real pollutant (see 4.2 of EN 1093-1 : 1998 “ *Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 1: Selection of test methods*”) and can be operated in room or field environments.

It should be observed that during the test, especially during the shutdown or the removal of the pollution control system, the concentration of hazardous substances , if present, can reach levels which are liable to incur a risk to the health of the operators or other occupants present in the room.

Warning: This standard does not deal with the protective measures required to control these risks.

Measurement of the decontamination index of pollution control system can serve for the:

- evaluation of the performance of a pollution control system of a machine;
- evaluation of the improvement of a pollution control system;
- comparison of pollution control systems for machines of similar design;
- ranking of pollution control systems according to their decontamination efficiency;
- determination of the air flow rate in the case of an exhaust system to achieve a given level;
- determination of the state of the art of pollution control systems for machines with respect to the decontamination efficiency.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1070, *Safety of machinery - Terminology*

ISO 3966:1977, *Measurement of fluid flow in closed conduits - Velocity area method using Pitot static tubes*

ISO 4006:1991, *Measurement of fluid flow in closed conduits - Vocabulary and symbols*

ISO 4053-1:1977, *Measurement of gas flow in conduits - Tracer methods - Part 1 : General*

ISO 5167-1:1991, *Measurement of fluid flow by means of pressure differential devices - Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full*

ISO/TR 5168:1998, *Measurement of fluid flow - Evaluation of uncertainties*

ISO 7145:1982, *Determination of flowrate of fluids in closed conduits of circular cross-section - Method of velocity measurement at one point of the cross-section*

3 Terms and definitions

For the purposes of this European Standard the definitions of EN 1070 and the following definition applies:

3.1

decontamination index I_A

the average of the ratios, obtained at a number of specified locations in the surroundings, of the ambient air quality improvement¹⁾ to the real pollutant mean concentration with the pollution control system not in operation. Corrections can be necessary to take into account of air pollution caused by other operations ("the background level")

When particle size distribution is determined at the same time as pollutant concentration, a decontamination index for each size fraction can be determined (see for example EN 481 "Workplace atmospheres - Size fraction definitions for measurement of airborne particles").

4 Principle

The principle of this measurement method consists in determining the decontamination index as defined in clause 3, the concentrations being measured at predetermined points around the machinery under inspection and in interpreting the value of this index, taking into account its range of variation and the influencing factors.

5 Determination of concentration measurement points

The measurement points will have been determined by pre-testing to ensure that they are in zones of measurable emission. The number and precise positions shall be specified in type C standards.

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6 Test method

The measurement will be more accurate and the interpretation more reliable if the background level concentration is low. Whenever possible, the concentration measurements should be taken with the surrounding machinery and other processes shut down.

Once the measurement points have been selected, the measurement procedure takes place in three phases. These three phases are repeated further two times. An example with two measurement points is given in figure 1.

The measurement procedures used for the determination of the pollutant concentration shall comply with the appropriate International or European Standards. For the measurement of the air flow rate see ISO 3966:1977, ISO 4006:1991, ISO 4053-1:1977, ISO 5167-1:1991, ISO/TR 5168:1998 and ISO 7145:1982.

Phase 1 Measurement of $[C_{fi}]$

For the determination of the concentration level $[C_{fi}]$ resulting from the pollutant emission of the surrounding machinery and other processes (background level), the machine under test is shut down as well as its pollution control system if already installed. The operating conditions of the surrounding machinery and other processes are recorded.

When stable conditions are reached, the concentrations are measured at the selected points. The sampling duration at each point shall correspond to a representative fraction of the duration of the pollutant emission of the surrounding machinery and other processes.

At each measurement point at least three measurements shall be made.

¹⁾ Expressed as the difference between the real pollutant concentrations measured in these surroundings with and without the pollution control system in operation.

EN 1093-11:2001+A1:2008**Phase 2 Measurement of [C_{mi}]**

For this phase, the machine under test is in operation. Its pollution control system is installed and in operation. The operating conditions of the machine and its associated pollution control systems shall be defined.

The measurements of concentration are carried out following the same specifications as in phase 1: stable conditions, location of the measurement points, sampling duration, operating conditions of the surrounding machinery and other processes.

Checks shall be carried out to confirm that, as closely as possible, the same conditions prevail as in phase 1.

The sampling duration at each point shall correspond to a representative fraction of the duration of the pollutant emission from the machine under test.

At each measurement point at least three measurements shall be made.

Phase 3 Measurement of [C_{ai}]

The machine under test remains in operation in the same conditions as in phase 2, but with its pollution control system shut down or removed. The test cannot be performed where blockage of the extraction is likely to occur.

Warning Switching off or altering the pollution control system can, in some instances, lead to exposures of operators or occupants in the room to hazardous pollutant levels. In these instances take appropriate preventive measures to minimize the risk to which the people are exposed.

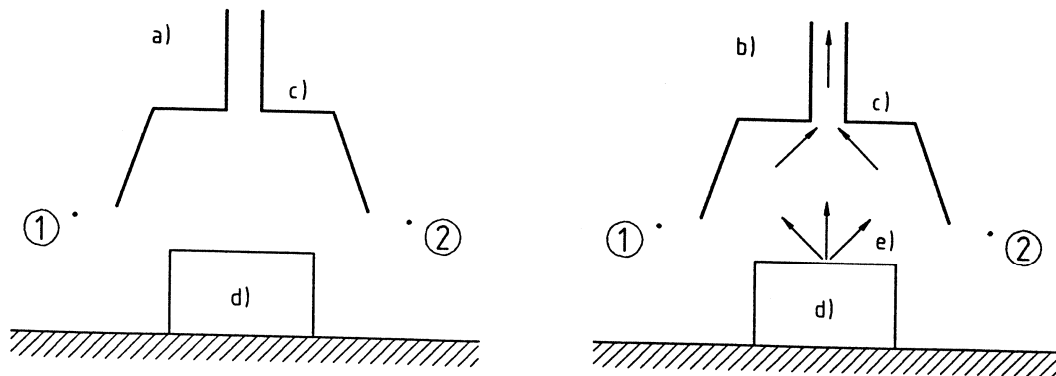
The measurements of concentration are carried out in a similar way to the two other phases. However, it should be observed that it can require a long stabilization time before stable conditions are established in the room.

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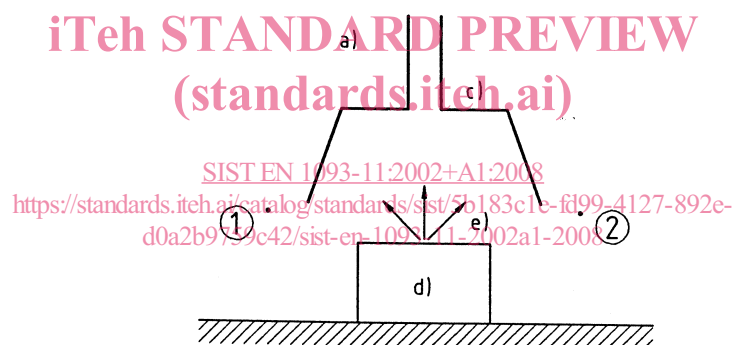
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At each measurement point at least three measurements shall be made.



Phase 1: Measurement of $[C_{ff}]$

Phase 2: Measurement of $[C_{mi}]$



Phase 3: Measurement of $[C_{ai}]$

Key

- a) Airflow = 0 m³/h
- b) Airflow = Q m³/h
- c) Capture device
- d) Machine
- e) Pollutant emission
- 1,2 measurement points

Figure 1 — Example of measurement procedure