



National Standards Authority of Ireland

STANDARD

I.S. EN 1093-9:1999

ICS 13.040.40

**SAFETY OF MACHINERY - EVALUATION OF
THE EMISSION OF AIRBORNE HAZARDOUS
SUBSTANCES - PART 9: POLLUTANT
CONCENTRATION PARAMETER, ROOM
METHOD**

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*This Irish Standard was
published under the
authority of the National
Standards Authority of
Ireland
and comes into effect on:
March 5, 1999*

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Údarás um Chaighdeán Náisiúnta na hÉireann

EUROPEAN STANDARD

EN 1093-9

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 1998

ICS 13.040.40

Descriptors: safety of machinery, air pollution, emission, hazardous substances, measurements, concentration, testing conditions, premises

English version

Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 9: Pollutant concentration parameter, room method

Sécurité des machines - Evaluation de l'émission de substances dangereuses véhiculées par l'air - Partie 9: Paramètre de concentration en polluant, méthode en salle d'essai

Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen - Teil 9: Konzentrationsparameter des luftverunreinigenden Stoffes, Prüfraumverfahren

This European Standard was approved by CEN on 4 September 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This European Standard 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 March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999.

This European Standard 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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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

0 Introduction

This European Standard is a type B standard as stated in ENV 1070 : 1993.

This European Standard is a part of EN 1093. Part 1 of this European standard presents a selection of different methods for the evaluation of the emission of airborne hazardous substances from machines.

1 Scope

This European Standard specifies a room method for the measurement of the pollutant concentration parameter of a specified airborne hazardous substance from machines, located in a test room and operating the machines under defined conditions.

This method can only be used for machines with a local exhaust ventilation with an air flow rate $\geq 500 \text{ m}^3/\text{h}$ and machines without recirculated air.

Measurement of the pollutant concentration parameter of a machine can serve for the:

- a) evaluation of the performance of a machine;
- b) evaluation of the improvement of the machine;
- c) comparison of machines within groups of machines with the same intended use (groups are defined by the function and materials processed),
- d) ranking of machines from the same group according to their pollutant concentration parameters;
- e) determination of the state of the art of machines with respect to their pollutant concentration parameter.

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.

EN 292-1 : 1991	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN 292-2 : 1991	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
EN292-2/A1: 1995	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications; Amendment A1
ENV 1070 : 1993	Safety of machinery - Terminology
EN 1093-1	Safety of machinery - Evaluation of the emission of airborne hazardous substances - Part 1: Selection of test methods
ISO 2602:1980	Statistical interpretation of test results - Estimation of the mean - Confidence interval

3 Definitions

For the purposes of this European Standard the definitions of ENV 1070 :1993 and the following definition applies:

pollutant concentration parameter, room, P_{cr} : The measured concentration of a specified pollutant in defined position(s) near the machine. For the purpose of this European Standard the measurement points are at defined positions around the machine and the pollutant concentration parameter is the mean value of the measured concentrations.

4 Principle

The principle of the measurement method is to operate the machine with strong local exhaust ventilation ($\geq 500 \text{ m}^3/\text{h}$) under controlled conditions in a test room and to measure pollutant concentrations at defined positions (see 5.2).

The average concentration gives an indication of the emission of the machine and the standard deviation gives an indication of the dispersion of the pollutant emitted.

5 Measurement environment

5.1 Test room

The tests are performed in rooms meeting the following criteria:

- no other source of the specified pollutant in the test room;
- to ensure that the air flow from all measurement points is directed to the local exhaust ventilation, tests shall be carried out e.g. using a smoke cartridge;
- size of the room greater than 200 m³;
- the distances between the machine and the walls and ceiling shall be greater than 2 m;
- no return air from local exhaust ventilations;
- properly designed supply of air to avoid crossdraughts in the zone of measurement points.

5.2 Location of measurement points

A minimum of 4 measurement points around the machine is necessary. Empirical techniques shall be used to ensure that the locations chosen are in areas of major emissions. The number and precise positions shall be specified in type C standards.

6 Procedure

6.1 Operation of the machine

The machine shall be operated according to its intended use.

The stipulation of working procedures (e.g. feedrate), the tools used (e.g. type, tool speed) and the materials to be processed (e.g. nature, size) for each category of machine shall be specified in type C standards. Machines shall be operated according to the instructions of the manufacturer.

6.2 Measurement procedures

The measurement procedures used for the pollutant concentration shall comply with the appropriate International or European Standards.

The measurement time shall be sufficient to collect concentration data representative of the normal operational cycles of the machine.

Detailed procedures shall be specified in the appropriate type C standard for each type of machine.

The measurement shall take into account the normal operation cycles of the machine.

The machine should be started up and normal, working conditions should be achieved before the measuring instruments are switched on. However care should be taken not to overlook unusually high emissions that may occur during start up. The exact time or number of cycles shall be specified in the type C standards.

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

7 Expression of the test results

For each sequential test the mean value (\bar{x}_i) and standard deviation of the results for all measuring points shall be calculated. From the mean values the mean value (\bar{x}_p) and the one sided 95 % confidence interval are calculated. The pollutant concentration parameter, room (P_{cr}) is the sum of the mean value (\bar{x}_p) and the one sided 95 % confidence interval.

8 Test report

The test report shall include at least the following information:

- a) reference to this test standard and appropriate type C standards;
- b) description of the machine tested (e.g. manufacturer, model, type, version, size, year of manufacture, serial number) for the machine itself and for each additional piece of equipment;
- c) description of the test room, sketch with dimensions and position of the machine;
- d) operational data during tests including tools used with the machine and materials processed on the machine;

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