INTERNATIONAL STANDARD

ISO 14123-2

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Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery —

Part 2:
Methodology leading to verification procedures

Sécurité des machines — Réduction des risques pour la santé résultant de substances dangereuses émises par des machines —

Partie 2: Méthodologie menant à des procédures de vérification

Contents

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14123-2 was prepared by the European Committee for Standardization (CEN) (as EN 626-2:1994) and was adopted, under a special "fast-track procedure", by Technical Committee ISO/TC 199, *Safety of machinery*, with its approval by the ISO member bodies.

ISO 14123 consists of the following parts, under the general title *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery*:

— *Part 1: Principles and specifications for machinery manufacturers*

— *Part 2: Methodology leading to verification procedures.*

Annex A forms an integral part of this part of ISO 14123. Annexes B, C and D are for information only.

Introduction

ISO 14123-2 (EN 626-2) is one of a series of standards produced by CEN/CENELEC under mandates from CEC and EFTA. This series has been divided into several categories to avoid duplication and to develop a logical structure which will enable rapid production of standards and easy cross-reference between them.

The hierarchy of standards is as follows:

a) **Type A standards** (generic safety standards) giving basic concepts, principles for design, and general aspects that can be applied to all machinery.

b) **Type B standards** (group safety standards) dealing with one safety aspect or one type of safety-related device that can be used across a wide range of machinery:

— type B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise, etc.).

— type B2 standards are safety related devices (e.g. two-hand controls, interlocking devices, pressure-sensitive devices, etc.).

c) **Type C standards** (machine safety standards) giving detailed safety requirements for a particular machine or group of machines defined in the scope of the standard.

This is a type B1 standard and its primary purpose is to give guidance to the writers of type C standards when machines are identified as emitting hazardous substances as a significant risk. This part of ISO 14123 may also be used as guidance in controlling the risk where there is no type C standard for a particular machine.

This part of ISO 14123 also provides type C standard writers with guidance to enable the development of procedures relating to verification. Such procedures are required to take account of the health risks associated with the emission of hazardous substances at all stages in the life of a machine (see ISO/TR 12100-1, 3.11 and ISO 14123–1, clause 4).

This part of ISO 14123 may also be used to assist designers and manufacturers to identify sources of emission which may subsequently affect the exposure of operators and others.

Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery —

Part 2:
Methodology leading to verification procedures

1 Scope

This part of ISO 14123 defines a procedure which leads to the selection of critical factors relating to emissions of hazardous substances for the purpose of specifying suitable verification procedures.

This part of ISO 14123 is intended to be used in conjunction with ISO 14123-1 and relates specifically to clause 8 of that standard.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 14123. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 14123 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 14123-1: –[1]) *Safety of machinery – Reduction of risk to health from hazardous substances emitted by machinery – Part 1: Principles and specifications for machinery manufacturers*

ISO/TR 12100-1:1992 *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology*

3 Methodology

This clause defines the steps that shall be taken to lead to a verification procedure.

NOTE These steps are summarized in annex A.

3.1 Identification of hazardous substances

3.1.1 Identify substances which may be emitted during the intended use of the machine (see ISO/TR 12100-1 and ISO 14123-1, clause 4).

3.1.2 Determine which of these substances are hazardous to health and the nature of the hazard (see ISO 14123-1, 3.2).

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[1]) To be published.

3.1.3 Where a number of substances has been identified, the verification procedure should be carried out on key substances which represent worst-case properties. Key substances may be selected based on toxicity, corrosive properties, solvent properties, dustiness, etc.

3.2 Characterization of emissions

For all significant emissions of substances identified by 3.1.3, establish:

— the likely quantity or scale of emission under all foreseeable circumstances at all stages in the life of the machine;

NOTE 1 Amounts may be characterized by one of a number of assessment techniques (see annex B).

— the location and direction of the emission with respect to the machine and the likely position of persons;

— when the emission is likely to occur;

NOTE 2 This should relate to the likely presence of persons and the operating cycle of the machinery.

— the physical characteristics of the emission, e.g. phase, velocity, temperature, pressure;

— whether it is likely to create an airborne emission or surface contamination.

3.3 Identification of critical factors

3.3.1 Identify any relevant factor which causes an emission and on which the method of emission reduction is based.

NOTE Relevant factors may be related to materials, energy or machine design or performance; examples are given in annex C.

3.3.2 Identify critical factors. These are the relevant factors on which the emission is most dependent.

3.4 Specification of indicative parameters

3.4.1 Establish indicative parameters, which may be qualitative, related directly to the critical factors identified.

NOTE Examples are given in annex C.

3.4.2 Specify the value, range of values, condition or state of the indicative parameter required to reduce emission.

4 Verification

4.1 Verification is carried out by collection of data relating to the indicative parameters.

4.2 Verification may include results from field testing, laboratory testing, measurements, examination or calculations.

4.3 A number of general test methods, which may be used as part of verification, are described in ENV 1093–1 and the following parts which are under preparation. More detailed test conditions for a specific type or group of machines may be given in type C standards.

Annex A
(normative)

Flow diagram of steps leading to verification procedure

Table A.1 gives the sequence of steps to be taken in a verification procedure.

Table A.1

Clause	Sequence of steps	Examples
3.1	Identify hazardous substances ⇓	– identify stage in life of the machine; – identify the hazardous properties.
3.2	Characterize emissions ⇓	– likely quantity or scale of emission; – location of persons and direction of emissions; – when the emission is likely to occur; – physical characteristics; phase (e.g. gas), temperature; – airborne or surface contamination.
3.3.1	Identify relevant factors ⇓	– materials: dustiness; usage rates, production rates; – energy used: type; – machine design: ergonomics; distances; automation; – performance: efficacy.
3.3.2	Select critical factors ⇓	factors which most influence the emission of hazardous substances; prioritize these to assist selection of indicative parameters.
3.4.1	Specify indicative parameters ⇓	– quantitative: obtained by measurements or calculations; – qualitative: information obtained by e. g. visual inspection; visualization techniques, design details.
3.4.2	Set parameter values, ranges, conditions or states ⇓	requirements to give performance which reduces emissions.
4	Specify verification procedures	– specify information which relates to the specified indicative parameters; – evidence from field/laboratory tests, measurements, visual inspections or calculations, technical construction file.

Annex B
(informative)

Examples of types of emission and how to assess them

Table B.1 gives examples of types of emission and their assessment.

Table B.1

Type of emission	Examples of assessment techniques
Nil or insignificant	– visual inspection; – smoke tests; – Tyndall beam lamp; – pressure testing.
Localized	– component performance; – local concentration assessment.
Total (possibly multipoint emissions)	– calculation from mass balance; – test data.

Annex C
(informative)

Examples of relevant factors and their indicative parameters

Table C.1 gives examples of factors which may affect the reduction of risks to health from hazardous substances emitted by machinery.

Table C.1

Category	Relevant factors	Indicative parameters
Materials	Feed rates, discharge rates	mass rate ($kg \cdot h^{-1}$); linear rate ($mm \cdot min^{-1}$); resultant airborne concentrations ($mg \cdot m^{-3}$);
	Feed forms	dusty or solid, viscous, non-viscous or volatile liquids;
	Process timing	feed times (min).
Energy	Thermal	temperature control (range °C); rate of temperature rise or fall ($°C \cdot min^{-1}$); product discharge temperature (°C); liquid or gas coolant temperature (°C); coolant flow rate ($l \cdot h^{-1}$).
	Electrical	energy absorbed (kWh); drive motor current (A).
	Mechanical	stirring rate (r/min^{-1}); conveyor speed ($m \cdot min^{-1}$); mixing time (min).
	Air motion	cooling or capture velocity ($m \cdot s^{-1}$); exhaust gas velocity ($m \cdot s^{-1}$) or flowrate ($m^3 \cdot s^{-1}$).
Design	Settings, geometry, orientation	lid open or closed; time delay until lid opens (s); local exhaust ventilation, position; exhaust-duct diameter (mm); nearest operator position (m); height of material drop (m); direction of discharge.
Performance	Seal leaks	seal integrity.
	Air cleaner	separation efficiency (%); pressure loss across filter (Pa).
	Local exhaust ventilation	capture efficiency (%).
	Pollution control system	decontamination index.
	Total emission	emission rate ($g \cdot min^{-1}$), pollutant concentration parameter ($mg \cdot m^{-3}$).